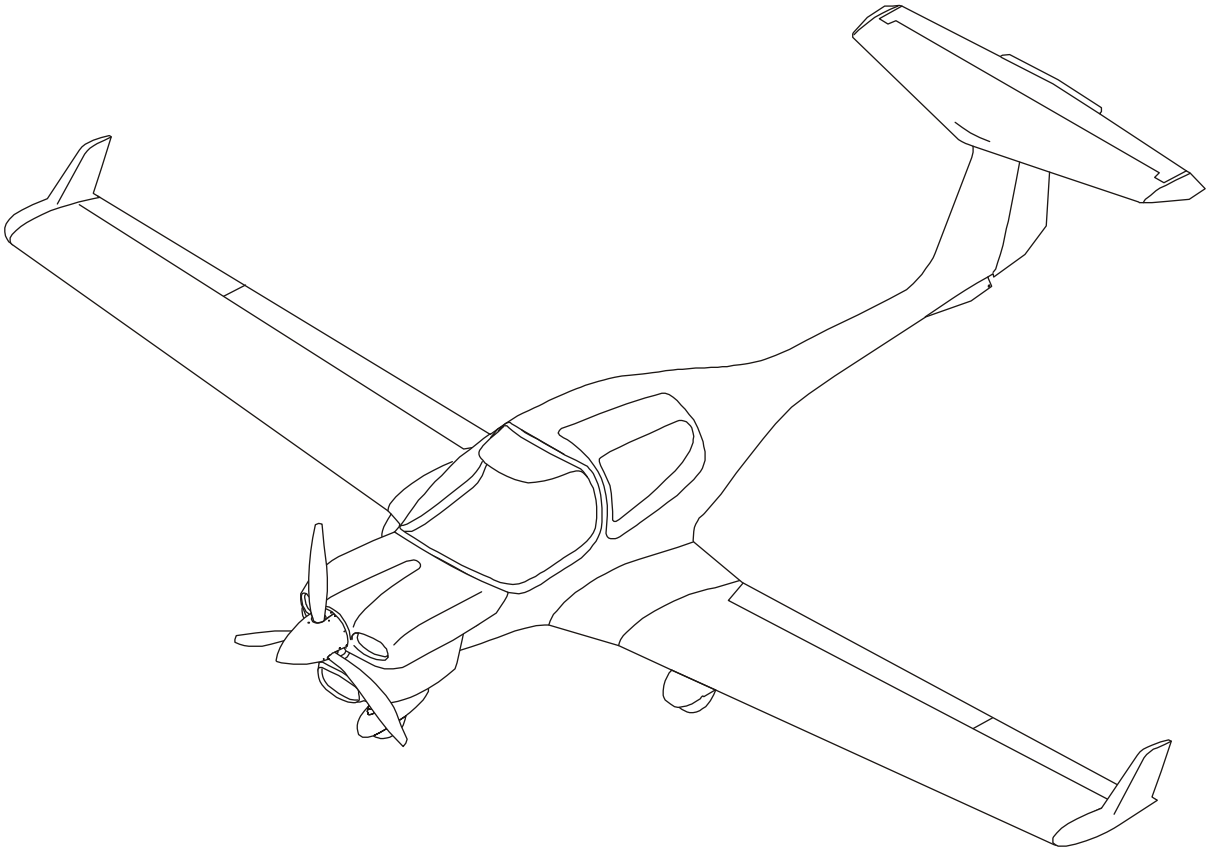
DA 40 NG
AIRPLANE MAINTENANCE MANUAL



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If the airplane maintainer is in doubt of the airplane's as-built configuration from the factory, contact DAIC customer support for guidance.

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MASTER TABLE OF CONTENTS

RECORD OF REVISION

1. Record of Revision

Use this check list to record and control all of the revisions which you put in this Airplane Maintenance Manual (AMM). This manual is available on the Diamond Aircraft Website.

http://support.diamond-air.at/techpubs+M52087573ab0.html

NOTE: Hard copy revisions and incremental revisions are no longer available for the AMM and hard copies wll not be distributed.

NOTE: The date of 15 July 2024 will show on all changed pages for Revision 5.
Revision bars in the LOEP will show the changed pages, for technical content.
Revision bars on the changed pages will show the content changes made.
The Highlights pages will indicate why the changes were made.

DAIC - Diamond Aircraft Industries Canada.

Revision Number	Date Issued	Date Inserted	Inserted By
Initial Issue	01 Apr 2010	01 Apr 2010	DAI
1	15 Jun 2011	15 Jun 2011	DAI
2	15 Apr 2013	15 Apr 2013	DAI
3	01 Sep 2017	01 Sep 2017	DAI
4 Re-Issue	08 Jan 2020	08 Jan 2020	DAIC
5	15 July 2024	15 July 2024	DAIC

Revision Number	Date Issued	Date Inserted	Inserted By

2. Record of Incorporated Temporary Revisions

The following Temporary Revisions have been incorporated into the DA 40 NG AMM at Revision 1:

Temporary Revision Number	Description of Temporary Revision
AMM-TR-MÄM 40-434	Cowling Redesign
AMM-TR-MÄM 40-434/a	Cowling Redesign
AMM-TR-MÄM 40-434/b & AMM-TR-MÄM 40-549	Cowling Redesign
AMM-TR-MÄM 40-436	Shock Mount Installation Torques
AMM-TR-MÄM 40-440	Safety Harnesses
AMM-TR-MÄM 40-442	New Governor Speed Settings
AMM-TR-MÄM 40-468	Fuel Pulsation Damper
AMM-TR-MÄM 40-481	Safety Walk Adhesive Strips
AMM-TR-MÄM 40-524	Maintenance Program Phase 1
AMM-TR-MÄM 40-525	Maintenance Interval GFC 700
AMM-TR-MÄM 40-526	Landing Gear Special Torque Values and Corrections
AMM-TR-MÄM 40-535	Gearbox Oil Inspection
AMM-TR-OÄM 40-310	Exhaust Muffler
AMM-TR-OÄM 40-314/c	Additional Alternator
AMM-TR-OÄM 40-316	Recirculating Air - Cabin Cooling (RACC)
AMM-TR-OÄM 40-317	Coated Safety Walk
AMM-TR-OÄM 40-321	Conventional Cockpit DA 40 NG Club
AMM-TR-OÄM 40-326/a	Emergency Axe
AMM-TR-OÄM 40-327	Sun Visor for Tall Canopy
AMM-TR-OÄM 40-329	DA 40 NG Retrofit, G1000 with Autopilot KAP 140
AMM-TR-OÄM 40-330	DA 40 NG Retrofit, G1000 without Autopilot GFC 700
AMM-TR-OÄM 40-331	Short Baggage Extension
AMM-TR-OÄM 40-333	DA 40 NG without Autopilot GFC 700

The following Temporary Revisions have been incorporated into the DA 40 NG AMM at Revision 2:

Temporary Revision Number	Description of Temporary Revision
AMM-TR-MÄM 40-502/a & AMM-TR-MÄM 40-506/a	Replacement of Charged Air Hoses with Tube
AMM-TR-MÄM 40-505	Firewall Reinforcements on Engine Mount Holes
AMM-TR-MÄM 40-519 & AMM-TR-MÄM 40-520	Breather Line with Additional Outlet
AMM-TR-MÄM 40-534	Propeller Shipping Plug Removal
AMM-TR-MÄM 40-537	Fuel Drain Valve Mounting Torque
AMM-TR-MÄM 40-551	Alternator Regulator E4A-91-200-000
AMM-TR-MÄM 40-568/a	Alternative Engine Shock Mount
AMM-TR-MÄM 40-574/a & AMM-TR-OÄM 40-334/b & AMM-TR-MÄM 40-631	1280 kg Maximum Landing Mass and/or Landing Gear with Large or Small Tires
AMM-TR-MÄM 40-607/a	Adaption of Engine Time Limits
AMM-TR-MÄM 40-629	Rudder Control Cable Installation
AMM-TR-MÄM 40-630	Turbo Connector and Worm Drive Clamps
AMM-TR-MÄM 40-632	New AE 300 Gearbox
AMM-TR-MÄM 40-634	Snow and Ice Removal
AMM-TR-MÄM 40-636	Additional Greases
AMM-TR-MÄM 40-639	Charged Air Hoses SG5-0
AMM-TR-OÄM 40-314/e	Additional Alternator
AMM-TR-OÄM 40-316/a	Recirculating Air-Cabin Cooling
AMM-TR-OÄM 40-339	Foot Step Rear Option
AMM-TR-OÄM 40-340	Avidyne/Ryan TAS 600 Series
AMM-TR-OÄM 40-341	Whelen LED Position Lights

The following Temporary Revisions have been incorporated into the DA 40 NG AMM at Revision 3

Temporary Revision Number	Description of Temporary Revision
AMM-TR-MÄM 40-561	New GFC 700 Autopilot Hardware
AMM-TR-MÄM 40-619	Passenger Door Improvement
AMM-TR-MÄM 40-635	Adjust Taxi Light Procedure
AMM-TR-MÄM 40-638	Cold Weather Operation
AMM-TR-MÄM 40-647	Engine Oil Quick Drain
AMM-TR-MÄM 40-650	Fuel Filter Element Check Valve
AMM-TR-MÄM 40-654	Trouble Shooting Fuel System
AMM-TR-MÄM 40-655/a	Governor Nut Torque
AMM-TR-MÄM 40-658/a	Coolant Tank Pressure Relief Valve Test
AMM-TR-MÄM 40-661	Coolant System Pressure Test
AMM-TR-MÄM 40-678	Removal of Checklist Items
AMM-TR-MÄM 40-709	Stall Warning System
AMM-TR-MÄM 40-728	Lubrication Schedule
AMM-TR-MÄM 40-743	Protective Pads for Charged Air Hoses
AMM-TR-MÄM 40-763	Coolant Water Tank with Threaded Cap and Larger Filler Neck
AMM-TR-MÄM 40-785	Replacement of Passenger Door Hinges
AMM-TR-MÄM 40-792	Additional Elevator Mass
AMM-TR-MÄM 40-806/a	Silicate Cartridge
AMM-TR-MÄM 40-808	Inspection of NLG Elastomer Pack Center Tube
AMM-TR-MÄM 40-820	Flexible Charge Air Hose
AMM-TR-MÄM 40-822	Inspection of MLG Strut
AMM-TR-MÄM 40-824	New Type 6 Lubricants
AMM-TR-MÄM 40-840	Main Landing Gear Adaptions
AMM-TR-MÄM 40-841	Fuel Tank Maintenance
AMM-TR-MÄM 40-846	Door Handle Improvement
AMM-TR-MÄM 40-847	Fuel Filter Assembly
AMM-TR-MÄM 40-853/c & -873	Turbo Charger V-Clamp
AMM-TR-MÄM 40-860	Vent Line Routing

Temporary Revision Number	Description of Temporary Revision
AMM-TR-MÄM 40-865	Conservation of Exterior Parts
AMM-TR-MÄM 40-868	Garmin Hard- und Software Upgrade I
AMM-TR-MÄM 40-874	Engine Oils
AMM-TR-MÄM 40-899	Improved Air Charge Hose
AMM-TR-OÄM 40-251	Electrical Pedal Adjustment
AMM-TR-OÄM 40-258	HID-Lights
AMM-TR-OÄM 40-312	Towing Device
AMM-TR-OÄM 40-314/g	Additional Alternator
AMM-TR-OÄM 40-316/b	Recirculating Air - Cabin Cooling (RACC)
AMM-TR-OÄM 40-348	Fuel Quantity of Filler Placard
AMM-TR-OÄM 40-349	Provisions for Tablet Mount
AMM-TR-OÄM 40-354	Seat Belt Holder
AMM-TR-OÄM 40-358	Headset Hanger
AMM-TR-OÄM 40-363	Battery Heating System
AMM-TR-OÄM 40-369	Whelen LED Position / Anti Collision Lights
AMM-TR-OÄM 40-370	Diesel Operation
AMM-TR-OÄM 40-375	Front Seats with Adjustable Backrest - Hydrolok
AMM-TR-OÄM 40-379	Bilstein NLG - Damper
AMM-TR-OÄM 40-398	Higher Main Landing Gear
AMM-TR-OÄM 40-399	"Foot Step Aft, LH Option"
AMM-TR-OÄM 40-400	"Foot Step Aft, RH Option"
AMM-TR-OÄM 40-401	Emergency Egress Hammer

The following Temporary Revisions have been incorporated into the DA 40 NG AMM at Revision 4

Temporary Revision Number	Description of Temporary Revision
AMM-TR-MÄM-40-899a (Ch. 05, 20 & 81)	Improved Air Charge Hose
AMM-TR-MÄM-40-901 (Ch. 20)	Worm Drive Clamp Installation
AMM-TR-MÄM 40-1007 (Ch. 22, 31, 34 & 92)	Garmin G1000 Nxi PHASE II
AMM-TR-MÄM-40-1012 (Ch. 51 & 71)	Fire Resistant Cowlings
AMM-TR-MÄM 40-1013 (Ch. 28)	Removal and Installation of the Fuel Transfer Check Valve
AMM-TR-MÄM 40-1016 (Ch. 05)	Fuel Filter Element Check Valve
AMM-TR-MÄM 40-1038 (Ch. 05 & 32)	NLG Inspection and Maintenance Procedure
AMM-TR-MÄM-40-1048 (Ch. 28)	Fuel Filler Assembly Sealant
AMM-TR-MÄM-40-1060 (Ch.92)	New Schematic D44-9224-60-01 for USB Charging Ports
AMM-TR-OÄM-40-402 (Ch. 03, 05 & 92)	Kannad 406-AF ELT
AMM-TR-OÄM 40-1003 (Ch. 05 & 31)	Garmin GTX 335R/345R with ADS-B
AMM-TR-OÄM 40-1029 (Ch. 03, 05, 34 & 92)	Standby Attitude Module MD302

The following Temporary Revisions have been incorporated into the DA 40 NG AMM at Revision 5

Temporary Revision Number	Description of Temporary Revision
AMM-TR-OÄM-40-316a (Ch. 21)	Revised procedures for the R&I of the RACC Central Unit
AMM-TR-OÄM-40-316b (Ch. 21)	Revised procedures for the R&I of the RACC Central Unit

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HIGHLIGHTS

1. General

The table below highlights the changes that have been incorporated into Revision 5 of the AMM.
Revision bars and the date of 15 July 204 will show on the changed pages in the LOEP.
Revision bars on the changed pages will show where the content changes were made.

CH-SE-SU	Page(s)	Highlights
Front Matter	ALL	The Cover Page, Master Table of Contents (TOC), Record of Revisions (ROR) and Temporary Revisions (TR), Highlights, and List of Effective Pages (LOEP) were revised.
Master TOC	ALL	The header and footer have been revised to show that it is a “Master Table of Contents (TOC)” for the manual.
01-TOC	1	New items added and page numbering has changed.
01-00-00	1	Paras 2 and 3 revised extensively.
	2	Para 4 “Equivalent Tools, Fixtures, and Test Equipment” and para 5 “Equivalent Procedures” added to the chapter. Para 6 re-numbered.
	4	“Group A - Introduction” and “Group B - Airplane General” given an expanded explanation.
	5 & 6	Para 7 “Page Numbering System” given an expanded explanation.
	7	All paras have been re-numbered and minor changes made for each para.
	8	All paras have been re-numbered and minor changes made for each para.
	9 & 10	Pagination.
02-00-00	1	Changes made to the general para and to the revisions para to give a more clear explanation for each.
05-00-00	3	Document added to the table for the Artex 1000 ELT.
05-10-00	4	Pitot-static system added to the component time limits for chapter 34.
		Added a maintenance requirement for the short pushrods connected to the ailerons and flaps for chapter 27.
		Added the interval time for the bonding system and static discharging system.
	5	Added a component replacement time for the ELT battery to the list
		Added a component replacement time for the Amerex 337TS fire extinguisher.

CH-SE-SU	Page(s)	Highlights
05-28-00	3	Para 3 revised to be more clear. Step 8 revised to explain the EECU data read out. Step 9 added to follow step 8 in sequence.
	4	Changed the reference for the mixture ratio of the coolant.
	5	Added step 12 for inspection of the additional alternator.
	6 - 8	All steps from 13 to 25 have been re-numbered.
05-28-50	6	Revised the interval for the wheel track and camber test.
20-10-00	6	Torque values added for the horizontal stabilizer.
20-70-00	1	Type of engine changed to AE E4-A vs AE E4-B.
	2	Metric thread added to table 1.
21-TOC	1 & 2	Revised the maintenance practices sections for page numbering
21-50-00	201	Added a caution. Revised the titles.
	202	Added a key item to step 8.
	206	Added a key item to step 4.
	203 - 205, 207 - 216	Pagination changes as the pages were re-numbered.
21-51-00	201	Added a caution. Revised the titles. Added a key item to step 6.
	206	Added a key item to step 6.
	202 - 205, 207 - 216	Pagination changes as the pages were re-numbered.
22-10-00	1	Added GSM 86 servo clutch to description items.
	3	Added item E. for the GSM servo clutch.
	4	Revised the graphic to add in the servo clutch.
	201	Included a reference to a figure in the D&O pageblock.
	202	Included a reference to a figure in the D&O pageblock.
	205	Revised the graphic to add in the servo clutch.
	206	Included a reference to figure 201.
	208 & 209	Revised the text and graphic to add in the servo clutch and mounting brace.
	212	Revised the adjustment procedure for GSM 86 not installed

CH-SE-SU	Page(s)	Highlights
22-10-00	213 -& 214	Revised the adjustment procedure for GSM 86 installed..
	215 - 216	Pagination.
23-TOC	2 - 4	Added GDL 69A SXM on page 2, pages 3 & 4 pagination.
23-00-00	1	GIA 63 revised to show GIA 6X.
23-10-00	3	GIA 63 revised to show GIA 6X.
	101	GIA 63 revised to show GIA 6X.
	201	GIA 63 revised to show GIA 6X.
23-52-00	1 - 4	Added in the D&O for the GDL 69A SXM Datalink System
	201 - 202	Added in the R&I of the GDL 69A SXM Datalink receiver
	2013- 204	Added in the R&I of the GDL 69A SXM Datalink antenna
24-TOC	2	Revised the maintenance practices section. Added R&I of ECU batteries.
24-31-00	201 - 206	Revised the R&I of the main battery added R&I of the ECU Batteries.
24-60-00	210 - 212	New R&I of the ECU VOTER and the FUEL PUMPS Toggle Switch.
25-60-00	1	Revised “Artex ME 406” to “Artex ME 406/Artex 1000” where required.
	2	Revised figure to “Artex ME 406/Artex 1000”
	202	Revised figure to “Artex ME 406/Artex 1000”
	205	Revised the document number to reference.
26-00-00	1 - 4	Revised the pageblock to bring in the Amerex 337TS fire extinguisher.
27-TOC	1 & 2	Procedures added to maintenance practices 27-00-00 & 27-20-00.
27-00-00	201	Revised the general para to include the R&I of the control stick handle.
	203 - 208	New procedures added for R&I of the control stick handle.
27-10-00	202	Added the flap/aileron deflection gauge to the equipment table.
	204	Added the flap/aileron deflection gauge to the equipment table.
27-20-00	201	An explanation of the procedures contained in the pageblock.
	202	Added the rudder deflection gauge to the equipment table.
	203	Added the rudder deflection gauge to the equipment table.
	205	Rigging pin added to the list of equipment.

CH-SE-SU	Page(s)	Highlights
	206 - 209	Revised the procedures to remove and install the rudder control cables from the bulkhead to the yoke.
	210 - 214	Revised the procedures to remove and install the rudder control cables from the yoke to the rudder..
	215	Re-numbered the procedure to 5. Included a reference to figure 203.
	216	Re-numbered and re-named figure 203.
	217	Re-numbered the procedure to B. Included a reference to figure 203.
	218 - 221	New procedures added for the R&I of the rudder/brake pedal assy.
	222 -225	New procedures added for the removal and installation of only the pedal assembly.
	226	Procedure re-numbered to 8, due to other additions.
27-30-00	202	Added the elevator deflection gauge to the equipment table.
	204	Added the elevator deflection gauge to the equipment table.
27-38-00	202	Added the elevator trim-tab deflection gauge to the equipment table.
	203	Added the elevator trim-tab deflection gauge to the equipment table.
	206	The friction force for step (5) has been revised.
27-50-00	204 - 206	Added the flap/aileron deflection gauge to the equipment table and procedure.
	207	Pagination.
28-TOC	2	Pages re-numbered throughout 28-20-00. Procedures added to maintenance practices 28-20-00.
28-20-00	3	New figure added to show the fuel system components.
	4	First para of the description revised due to figure changes.
	5, 6 & 8	Pagination.
	7	Figure 3 re-numbered and revised to show the fuel connector bracket
	201	Figure reference given at the start of the procedure.
	202	Step (8) added to the procedure.
	203 & 204	Procedure to install the fuel valve and gascolator revised, figure added.
	205 & 206	Figure reference given at the start of the procedures.

CH-SE-SU	Page(s)	Highlights
	207 - 209	Figure reference given at the start of the procedures. The install, procedure revised to be complete. New figure 202.
	210 & 211	New procedures to remove and install the fuel filter assembly.
	212 - 214	Revised the procedures to remove/replace/install the pulsation damper
28-20-00	215 - 217	Revised the procedures to remove/install the fuel pump, added a new figure.
	218 - 221	Revised the procedures to remove/install the fuel transfer pump, added two new figures.
	222 & 223	Re-numbered the procedure to 9. Added a figure reference at the start of the procedures.
	224 - 226	Revised the procedures to remove/install the fuel cooler, added figure 207.
	227	Revised the procedure to add steps to remove and install the cowling.
	228	Revised the procedure to add steps to remove and install the cowling.
	229 - 231	Revised the procedures to remove/install the transfer valve, added a new figure.
	232 - 234	Introduced a new procedure to bleed the fuel distribution system.
31-TOC	1 & 2	Pages re-numbered throughout 31-10-00 & 31-11-00. Procedures revised to maintenance practices 31-40-00. Pages re-numbered
31-10-00	3	Added a figure to show the circuit breaker panel.
	4 & 5	Added a table to show the circuit breakers information.
	6	Made reference to the figure and table added on pages 3 to 5.
	7 & 8	Re-numbered the figure on pg. 7 and corrected the reference on pg. 8.
31-11-00	4	Added a figure to show the circuit breaker panels.
	5 & 6	Added a table to show the circuit breakers information.
	7 & 8	Made reference to the figure and table added on pages 4 to 6. Page 8 pagination.
31-40-00	2	Revised figure 1 to show the changes required.
	13 - 17	Revised the description for the transponders, the GEA 71/71B and the GMU 44 and 44B. Added new figures to show the components.
	18	Blank page due to pages being added.

CH-SE-SU	Page(s)	Highlights
	210 - 212	New procedure and figure for GTX33/335R/345R Transponder R&I.
	220 - 223	New procedure and figure for GMU 44/44B Magnetometer R&I.
	224 - 225	New procedure for the ADS-B Out Test.
	226	Blank page due to pages being added.
31-51-00	201 & 202	Added a figure and revised the procedures to reference the figure.
32-TOC	2	Page number changes for the maintenance practices sections.
32-00-00	1 & 2	Added a new figure on page 2 and reference to it on page 1.
32-20-00	201	Revised the general para to include components of the system.
	201 - 203	Revised the procedures to remove/install the strut, added figure 201.
32-20-00	204 - 207	Revised the procedures to remove/install the elastomer pack or hydraulic damper, revised the figures to 202 and 203.
32-20-00	208 - 209	Caution revised. Revised the procedure to replace the elastomer elements. Reference to figure given where required.
	210	Caution revised. Reference to the figure revised in the procedure.
	211	Reference to the figure revised in the procedure.
	212	Figure number revised.
	213	Reference to the figure revised in the procedure.
	214	Figure number revised.
32-40-00	1 & 4	Reference to the figures revised.
	201	Revised the general para to explain what will be included in the pageblock.
	202 - 224	Revised the procedures to remove/install a main wheel, added a new figure. New procedures added for the disassembly/assembly of the main wheel. Revised the procedures to remove/install a nose wheel, revised the numbering for the two figures. New procedures added for the disassembly/assembly of the nose wheel. Revised the procedures to remove/install a brake master cylinder, added a new figure. Revised the procedures to remove/install a parking brake valve, added a new figure. Changes to the para numbering was required due to the additional items.
34-20-00	202	Revised the caution. Added to the note regarding wind tolerance.

CH-SE-SU	Page(s)	Highlights
34-22-00	202	Revised the caution. Added to the note regarding wind tolerance.
34-25-00	203	Revised the caution. Added to the note regarding wind tolerance.
51-80-00	201	The word “must” changed to “should” be approximately 2 amps.
52-TOC	1	Added item 15 to 52-10-00 maintenance practices.
52-10-00	222 - 226	New procedure introduced (replace the canopy bowden cable) with two new figures. Page 226 pagination.
52-40-00	2	Revised the figure to make it clear that it is a view from below.
53-TOC	1	Added R&I of the foot steps for 53-00-00.
53-00-00	1 201-204	Added para 4 to indicate the foot steps installation Added removal and installation procedures for the foot steps.
55-30-00	201	Revised the sealant data.
55-40-00	202	Revised step (2) to make it more clear. Removed old step (5).
56-10-00	201 - 205	Revised the procedures to change the white sealant and filler P/N’s.
61-TOC	1	Page numbering changes for 61-10-00 maintenance practices section. New item added in 61-20-00 maintenance practices
61-10-00	201	Revised the general para to list what is included in the pageblock. Figure reference given at the start of the procedure.
	202	Item numbering changes.
	204	Revision to the figure nomenclature to agree with the procedure.
	205	Figure reference given at the start of the procedure. Item (6) revised to agree with the callouts in the two figures.
	206	Step (13) added to agree with the removal procedure. Re-numbering.
	207	Step (8) added.
	208	Figure reference given at the start of the procedure.
	210	Figure and para references given to assist the technician in the procedure.
	212	Figure and para references given to assist the technician in the procedure. Steps (12) and (13) added. Re-numbering as a result.
	216	Figure reference given at the start of the procedure. Change to step (5).
	217	Figure reference given at the start of the procedure.

CH-SE-SU	Page(s)	Highlights
	203, 209, 211, 213, 214, 215, 218	Pagination.
61-20-00	203 & 204	Added a new procedure for the governor maximum RPM stop adjustment.
71-TOC	1	Page numbering change in 71-00-00 R&I of the engine.
71-00-00	211	The torque value for the rear bolts has been revised.
71-10-00	203	Added in step (6) to connect the main battery.
72-TOC	1	Added two new items to 72-00-00 maintenance practices.
72-00-00	203	Revised step (10). To shut down the engine first.
	205	Revised step (8). To shut down the engine first.
	206 - 208	New procedure. Complete an EECU software update.
	209 - 210	New procedure. Read out EECU data. Pg. 210 pagination.
75-TOC	1	Page numbering changes for 75-00-00 maintenance practices section.
75-00-00	1	Explained the figures in para 2 of the general. Figure 1 has now 2 sheets. Long cooling circuit changed to large cooling circuit.
	3	Figure 1 changed to show it is the first sheet.
	4	New figure added for sheet 2 of figure 1.
	5 - 8	Pagination.
	202	Revised the steps of the procedures to agree with the figure nomenclature.
	203	Figure reference given at the start of the procedures.
	204	Figure reference given at the start of the procedures.
	211	Added to step (5) to open the a drain plug for ease of flow.
	212	Added step (6). Procedure re-numbered to step (7).
	218	Figure reference given at the start of the procedures.
79-Title	1	Changed the title to read “Engine Oil System”.
79-TOC	1	Added new item to 79-00-00 maintenance practices.
79-00-00	201	Figure reference given for step (7).
	202	Figure reference given for step (1).

CH-SE-SU	Page(s)	Highlights
	203	New figure to show the quick drain assembly.
	204	Figure reference given at the start of the procedures. References to the paras have been revised.
92-TOC	1	Added electrical/electronic symbols to the TOC. Schematics 1 thru 87.
92-00-00	1 - 3	An update on the list of schematics and drawing numbers.
	4 - 6	New data to show electrical/electronic symbols used in the drawings.
Ch. 92 Schematics	1 - 93	Schematics with the advisory change included in the bookmarks.
	10, 13, 16, 17, 19, 20, 47 - 52, 59 - 64, 67, 68 & 86.	New schematic or revised schematic introduced.

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LIST OF EFFECTIVE PAGES

1. General

The List of Effective Pages (LOEP) uses the following abbreviations:

- TOC = Table of Contents
- ROR = Record of Revisions
- TR = Temporary Revisions.
- LOEP = List of Effective Pages

All Chapters have a Title page and a Table of Contents.

Each revision to the Airplane Maintenance Manual (AMM) will have a new List of Effective Pages.

Front Matter	Page	Revision Date
Master TOC	i	15 July 2024
Master TOC	ii	15 July 2024
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Master TOC	v	15 July 2024
ROR	vi	15 July 2024
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ROR	viii	08 Jan 2020
ROR	ix	08 Jan 2020
ROR	x	08 Jan 2020
ROR	xi	15 July 2024
ROR	xii	08 Jan 2020
Highlights	1	15 July 2024
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Highlights	3	15 July 2024
Highlights	4	15 July 2024
Highlights	5	15 July 2024

Front Matter	Page	Revision Date
Highlights	6	15 July 2024
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Schematic	23	08 Jan 2020
Schematic	24	08 Jan 2020
Schematic	25	08 Jan 2020
Schematic	26	08 Jan 2020

CH-SE-SU	Page	Revision Date
Schematic	27	08 Jan 2020
Schematic	28	08 Jan 2020
Schematic	29	08 Jan 2020
Schematic	30	08 Jan 2020
Schematic	31	08 Jan 2020
Schematic	32	08 Jan 2020
Schematic	33	08 Jan 2020
Schematic	34	08 Jan 2020
Schematic	35	08 Jan 2020
Schematic	36	08 Jan 2020
Schematic	37	08 Jan 2020
Schematic	38	08 Jan 2020
Schematic	39	08 Jan 2020
Schematic	40	08 Jan 2020
Schematic	41	08 Jan 2020
Schematic	42	08 Jan 2020
Schematic	43	08 Jan 2020
Schematic	44	08 Jan 2020
Schematic	45	08 Jan 2020
Schematic	46	08 Jan 2020
Schematic	47	15 July 2024
Schematic	48	15 July 2024
Schematic	49	15 July 2024
Schematic	50	15 July 2024
Schematic	51	15 July 2024
Schematic	52	15 July 2024
Schematic	53	08 Jan 2020

CH-SE-SU	Page	Revision Date
Schematic	54	08 Jan 2020
Schematic	55	08 Jan 2020
Schematic	56	08 Jan 2020
Schematic	57	08 Jan 2020
Schematic	58	08 Jan 2020
Schematic	59	15 July 2024
Schematic	60	15 July 2024
Schematic	61	15 July 2024
Schematic	62	15 July 2024
Schematic	63	15 July 2024
Schematic	64	15 July 2024
Schematic	65	08 Jan 2020
Schematic	66	08 Jan 2020
Schematic	67	15 July 2024
Schematic	68	15 July 2024
Schematic	69	08 Jan 2020
Schematic	70	08 Jan 2020
Schematic	71	08 Jan 2020
Schematic	72	08 Jan 2020
Schematic	73	08 Jan 2020
Schematic	74	08 Jan 2020
Schematic	75	08 Jan 2020
Schematic	76	08 Jan 2020
Schematic	77	08 Jan 2020
Schematic	78	08 Jan 2020
Schematic	79	08 Jan 2020
Schematic	80	08 Jan 2020

CH-SE-SU	Page	Revision Date
Schematic	81	08 Jan 2020
Schematic	82	08 Jan 2020
Schematic	83	08 Jan 2020
Schematic	84	08 Jan 2020
Schematic	85	08 Jan 2020
Schematic	86	15 July 2024
Schematic	87	08 Jan 2020
Schematic	88	08 Jan 2020
Schematic	89	08 Jan 2020
Schematic	90	08 Jan 2020
Schematic	91	08 Jan 2020
Schematic	92	08 Jan 2020
Schematic	93	08 Jan 2020

CHAPTER 01
INTRODUCTION

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TABLE OF CONTENTS

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INTRODUCTION

1. General

This Airplane Maintenance Manual (AMM) contains the data necessary to do the maintenance of the DA 40 NG airplane. It contains a full description of the systems, trouble shooting procedures, removal and installation procedures and maintenance instructions. It does not contain maintenance data for components removed from the airplane (maintenance shop data).

The AMM contains wiring diagrams for the various electrical systems.

Use the DA 40 NG Airplane Flight Manual, latest revision, with the AMM and the related Service Bulletins. Additional maintenance data is referenced in Chapter 05-00.

2. Revision Service

The manufacturer provides a revision service to the AMM. The revision shows design changes to the airplane or changes in procedures. Each page of the manual shows the date of first issue. If the page has changed, it shows the revision and date of the revision with revision bars showing the actual changes made. The List of Effective Pages (LOEP) is part of each revision. It also shows which pages have changed.

Diamond Aircraft will supply temporary revision service to this manual as necessary. The Temporary Revisions (TR) supply temporary instructions before the next scheduled revision. The TRs will be included in the manual at the next scheduled revision. The TRs are applicable to only one page block. The TRs are not revised. If changes are necessary to the TR, a new TR is supplied.

3. Warnings, Cautions and Notes

Obey all the usual safety precautions and maintenance instructions when doing maintenance.

This Airplane Maintenance Manual contains warnings and cautions that will show before applicable instructions:

WARNING: **A WARNING TELLS THE PERSON DOING THE MAINTENANCE THAT INJURY OR DEATH IS POSSIBLE IF THEY DO NOT STRICTLY FOLLOW THE INSTRUCTIONS.**
***WARNINGS WILL BE IN UPPERCASE AND BOLDED*.**

CAUTION: A CAUTION TELLS THE PERSON DOING THE MAINTENANCE THAT DAMAGE TO EQUIPMENT IS POSSIBLE IF THEY DO NOT FOLLOW THE INSTRUCTIONS.
CAUTIONS WILL BE IN UPPERCASE.

This Airplane Maintenance Manual also contains notes that can show before or after applicable instructions:

NOTE: A Note gives information to the person doing the maintenance that will assist in the performance of the task.
Notes will be in sentence case.

4. **Equivalent Tools, Fixtures, and Test Equipment**

The tools, fixtures, and test equipment which are necessary to a given maintenance task are supplied in a table (in the applicable maintenance procedure) with the heading Tools and Equipment. These items are the ones recommended by Diamond Aircraft to do the given maintenance procedure. The airplane operator can use equivalent tools, fixtures, or test equipment as alternatives to those given in the table (unless specified differently) if those items agree with the conditions that follow:

- They are functionally interchangeable with those given in the table.
- They are applicable to the given maintenance procedure.
- They are equally safe for the equipment and for the person or persons who do the maintenance.

5. **Equivalent Procedures**

The steps written within the procedures for the various tasks in the AMM are in logical order as interpreted by the Technical Writer. They are correct if followed step by step for the completion of the task. However, if the intent of the maintenance procedure is not altered and the objective is met, the order of the steps required to complete the task may be revised at the discretion of the technician (Example: step 4.f. before step 4.e.). Unless otherwise specified, the elapsed time between the start and the end of a procedure is not important. Diamond Aircraft assumes no responsibility for the precision of the revised maintenance procedure.

6. **Manual Configuration**

This manual is written using the regulations of the Air Transport Association of America Specification 100 (ATA 100). Each system is given a chapter number from the ATA 100. Where applicable, a chapter contains sections for each sub-system.

The Specification AECMA Simplified English has been used to write this AMM. This is a mandatory requirement of the Air Transport Association of America Specification 100 (ATA 100).

There are only 3 sources of words available to use in Simplified English (SE).

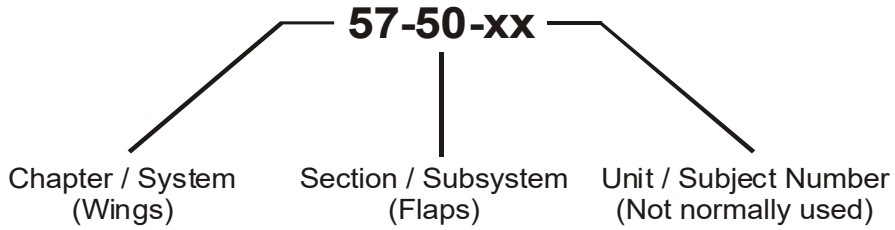
- Approved words from the SE Guide. These have defined meanings and selected parts of speech.
- Technical names as defined in the SE Guide. Used only as Adjectives or Nouns.
- Manufacturing processes as defined in the SE Guide. Always used as Verbs.

To obtain a copy of the SE Guide contact ASD-STAN, Avenue de Tervuren, B-1150 Brussels, Belgium. Tel: +32-2775-81-26, Fax:+32-2763-35-65, Email: contact@asd-stan.org

This manual does not use the ATA 100 Airplane Maintenance Task Oriented Support System (ATMOSS) or the ATA iSpec2200 Production Management Data Base (PMDB).

A. The ATA Numbering System

The ATA *i*Spec2200 numbering system uses 3 pairs of numbers, for example:



The first pair of numbers shows the system. System 57 is the wings. Chapter 57 contains the data for the wings.

The second pair of numbers shows the sub-system. Sub-system 50 is the Trailing Edge Flaps. Chapter 57, section 50 contains the data for the trailing edge flaps installation.

The third pair of numbers shows a unit. A unit could be the flap itself. Only complex systems use unit numbers.

For simple systems, the main chapter has all of the data and there are no section/sub-system break-downs.

B. Groups of Chapters

The chapters are put together in the following groups:

Group A	Introduction	Chapters 01-02
Group B	Airplane General	Chapters 03-12
Group C	Airframe Systems	Chapters 20-37
Group D	Structure	Chapters 51-57
Group E	Propeller	Chapter 61
Group F	Power Plant	Chapters 71-81

A separation sheet divides each chapter. The separation sheet shows the number of the chapter and the title.

C. The main contents of each group of chapters are given below:

(1) Group A - Introduction

Chapter 01 describes about the Airplane Maintenance Manual.

Chapter 02 describes the organization and handling of the Manual.

(2) Group B - Airplane General

Chapter 03 describes the general description of the airplane and its systems.

Chapter 04 describes the data about the Airworthiness Limitations and certification of the airplane.

Chapter 05 contains the scheduled maintenance checklist. Some tasks require a maintenance procedure. The scheduled maintenance checklist identifies the chapter in the manual that gives the maintenance procedure for the task. It also tells you where to find general information.

Chapters 06 to 10 tell you about the dimensions of the airplane and general procedures such as towing, parking and weighing.

Chapter 11 tells you about the placards and markings which are important for the safe operation of the airplane.

Chapter 12 contains servicing tasks such as refueling and lubrication. It also contains data about cleaning the airplane.

(3) Group C - Airframe Systems

Chapter 20 contains the standard practices for airframe maintenance.

Chapters 21 to 34 describe about the airframe systems. They include the avionics systems (such as communications (23)) and the mechanical systems (such as flight controls (27)).

Chapter 31 shows the location of the instruments. The chapter which is applicable to the system gives the details. For example, Chapter 27 gives the details for the flap position indicator.

(4) Group D - Structure

Chapter 51 contains data about the design of the airframe. It also gives instructions for assessing damage to the airframe and how to do minor repairs.

Chapters 52 to 57 describe about each part of the structure.

(5) Group E - Propeller

Chapter 61 contains the maintenance procedures for the propeller. Refer to the propeller manufacturer’s manual for other data.

(6) Group F - Power Plant

This group of chapters describes the engine and its systems. It contains the maintenance procedures for maintenance of the engine on the airplane. Refer to the engine manufacturer's manual for other data.

7. **Page Numbering System**

This manual uses the ATA *i*Spec 2200 page block numbering system. The page number is at the bottom of the page at the outer edge. It is adjacent to the chapter/section/subject number.

The first page of each chapter shows the number of the chapter and the title. The table of contents for that chapter follows the chapter title pages.

Each subject in a Chapter has page numbering for the following page blocks:

Description and Operation: Pages 1 to 99.

Trouble-Shooting: Pages 101 to 199.

Maintenance Practices: Pages 201 to 299.

A. Description and Operation page blocks (Pages 1 to 99).

The Description and Operation portion of the AMM gives the function, operation, configuration and control of the systems and components in the airplane. The information is given in sufficient detail to let the technician know the function and construction of the system.

B. Trouble-Shooting page blocks (Pages 101 to 199).

Trouble-Shooting is included with the AMM in the 101 to 199 range of pages. The function of the trouble-shooting page-blocks is to give airplane maintenance personnel sufficient data to isolate system/component malfunctions that occur in the airplane systems as quickly and as accurately as possible. Generally, the trouble-shooting is limited to the replacement of line replaceable units (LRU) and/or wiring repairs necessary to correct these malfunctions.
Regular or scheduled maintenance is not included as part of the trouble-shooting.

C. Maintenance Practices page blocks (Pages 201 to 299).
Where applicable the Maintenance Practices give data on the following procedures:

(1) Servicing.

Chapter 12 contains scheduled and unscheduled servicing applicable to the whole airplane. Included in this chapter are the replenishment of items such as: fuel, oil, hydraulic fluid, water, tire pressure, etc. Servicing which is necessary to complete other maintenance tasks is found in related chapters. Tasks such as filling and draining of a component are included.

(2) Removal and Installation.

Removal/installation procedures have two independent tasks: one for the removal and one for the installation. However, the job "set-up" and job "close-out" procedures are not given in both tasks.

The job “close-out” procedures are not given in the removal task because the installation usually follows it. If the installation task does not immediately follow the removal task, it is assumed that the operator will use the applicable close-out procedures, related to what was required in the removal task.

For the installation task it is assumed that the airplane is in the same configuration as it was for the removal task. These steps can include:

- Circuit breaker adjustment.
- Access panels removed.
- Safety practices.
- Installation of safety stands, etc.

(3) Adjustment/Tests. There are three types of tests: operational, functional and system.

Operational Test - That procedure required to ascertain only that a system or unit is operable. These tests should require no special equipment or facilities other than that installed on the airplane and should be comparable to the tests performed by the flight crews. It is not intended that the operational test of the unit meet the specifications and tolerances ordinarily established for overhaul, or major maintenance periods.

Functional Test - That procedure required to ascertain that a system or unit is functioning in all aspects in accordance with minimum acceptable system or unit design specifications. These tests may require supplemental ground support equipment and should be more specific and detailed than an operational test. It should contain all necessary information to perform proficiency tests to maintain system or unit reliability at an acceptable level, without reference to additional documents.

System Test - That procedure containing all adjustment specifications and tolerances required to maintain system and/or unit performance at maximum efficiency and design specifications. It shall be self-contained and may duplicate other tests. It is normally used at major maintenance periods.

(4) Checking/Testing.

These Maintenance Practices contain information and instructions to inspect or perform a check of a system, a component, an area (zone) or connected parts.

(5) Cleaning/Painting.

These Maintenance Practices give the necessary procedures to clean and/or paint a part or area of the airplane.

(6) Repairs.

These Maintenance Practices give all approved repair procedures for the airplane. It does not include those repairs that would normally be contained in a Component Maintenance Manual or a Structural Repair Manual.

8. **Figures Numbering**

Figures are given numbers in sequence, as follows:

- The first figure in the Description and Operation page block is Figure 1.
- The first figure in the Troubleshooting page block is Figure 101.
- The first figure in the Maintenance Practices page block is Figure 201.

References to the figures are given throughout the various page blocks to assist with the written text.

9. **Record of Revisions**

This Airplane Maintenance Manual has a Record of Revisions (ROR). The ROR shows when revision changes were included in the Airplane Maintenance Manual

10. **Revision Highlights**

The Revision Highlights pages indicate the reasons changes were made to the manual at the revision. Used with the List of Effective Pages (LOEP), the change can be identified in the manual.

11. **List of Service Bulletins**

Service Bulletins will be issued as required to provide information or instructions for modification and/or inspection of the airplane in service. A list is kept to show the Service Bulletins that have been issued against the airplane.

12. **List of Temporary Revisions**

This Airplane Maintenance Manual has a record of Temporary Revisions (TR). Use the TR Record List to record when temporary changes are included in the Airplane Maintenance Manual. The List is updated with each TR included in the Airplane Maintenance Manual .
All TR's should be incorporated at the next revision of the manual.

13. **List of Effective Pages**

This Airplane Maintenance Manual has a List of Effective Pages (LOEP). The LOEP shows you the number and effective date of each page contained in the Airplane Maintenance Manual.

- There will be a new LOEP given with each revision of the Airplane Maintenance Manual.
- Change Bars in the LOEP will show when a change has been made to a page.
- Change Bars on the page of the Airplane Maintenance Manual will show the change.
- The Revision Highlights will show the reason for the change.

14. **Safety**

This manual describes processes that may require the use of chemicals, solvents, paints or other commercially available materials.

Material Safety Data Sheets (MSDS) containing information about Trade name, Safety hazards, Health Hazards, Reactivity, Spill or Leak Procedures, Special Protection Information, Special Precautions and Transportation and Labelling are available from the manufacturer. Make sure that you read the applicable MSDS prior to using the consumable materials. Anyone using chemicals, solvents, paints or other materials in the performance maintenance on the airplane is responsible for knowing and complying with requirements of all governing agencies with jurisdiction at that location.

15. **Acronyms**

An acronym is defined the first time it is used within a unit of work with the abbreviation following in parenthesis (e.g. Air Transport Association (ATA)). Subsequent use, within that unit of work, will make use of the abbreviation.

16. **Request for Manual Change**

If operators have suggestions for improvement to the content of the manual or if errors or omissions are found, please submit the request via the Manual Change Request (MCR) form shown in Figure 1.
The MCR form is also available in a fillable PDF format that can be e-mailed directly to Tech Pubs.

Technical Publications - Manual Change Request

To: Diamond Aircraft Corporation
Technical Publications
1560 Crumlin Sideroad, London, Ontario, Canada N5V 1S2
techpubs@diamondair.com

Diamond Reference #:

Date:

All Fields marked with an asterisk * are required

Contact Information

*Name: and Name of Company	*Telephone:	*Department:
Mobile/Cell Phone:	Fax Number:	*E−Mail:

I would like to receive notification of actions on this request. *Media Type:

NOTE: Responses will only be sent by electronic mail.

Publication Information

*Publication Name:	Revision:	*What is the location of the data in the Publication: Chapter/Section/Subject/Task/IPC Figure/Page Number, etc.
*Publication Document/Part Number:		

*Description of Change Requested: (Attach sheets if more space is required)

Reason for change:

Reference Data Provided:

Description:

Figure 1 : Manual Change Request Form

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CHAPTER 02
ORGANIZATION AND HANDLING OF THE MANUAL

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TABLE OF CONTENTS

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ORGANIZATION AND HANDLING OF THE MANUAL

1. General

For data about a system, look in the list of chapters and find the chapter number. The table of contents for the chapter follows the title pages.

2. Applicability

Data applicable to a series of airplane is marked with an applicability note. For example:

Valid for S/N 40.N001 thru 40.N099.

This shows that you can use this data for airplane with serial numbers 40.N001 through 40.N099 inclusive.

3. Revisions

The manufacturer makes changes to the Airplane Maintenance Manual (AMM) to show design changes, maintenance procedure changes or other changes. Each group of changes is called a 'Revision'.

NOTE: Hard copy revisions and incremental revisions are no longer available for the AMM and hard copies will not be distributed. The AMM is available on the Diamond Aircraft Website.

http://support.diamond-air.at/techpubs+M52087573ab0.html

A manual revision contains these items:

- The changed pages, contained within the complete manual.
- A vertical bar in the left margin of the changed page shows where the changes were made on the page.
- The reason for the revision/changed pages, contained in the highlights section of the manual.
- A new List of Effective Pages (LOEP).

A vertical bar in the left margin of the LOEP page shows the page changes, with the date of the change. Where a figure is changed, a vertical bar in the left margin shows where the change was made.

4. Temporary Revisions

Temporary revisions correct errors, or they give temporary instructions. The manufacturer sends them to the airplane owners quickly. The manufacturer uses yellow paper for temporary revisions. The manufacturer usually puts the contents of a temporary revision in the next approved revision.

5. Service Bulletins

Service Bulletins get issued when necessary. They give the operator more information on inspections, maintenance, repairs or modifications.

Service Bulletins have 4 categories:

A. Alert Service Bulletins

Alert Service Bulletins are issued if there is an immediate danger (risk of damage or total loss). They are sent immediately by the fastest means to all known addresses of operators and service stations which are affected.

B. Mandatory Service Bulletins

Mandatory Service Bulletins include the description of a problem and the solution. If you do not follow a mandatory Service Bulletin, failures or malfunctions can result during further operation.

You must do the work given in a Mandatory Service Bulletin.

C. Recommended Service Bulletins

Recommended Service Bulletins give data about:

- A minor problem and its correction.
- A better technical design.

If you do not follow a Recommended Service Bulletin, it will not cause a failure. But it may cause increased maintenance work.

If you do follow a Recommended Service Bulletin:

- The maintenance work may be reduced (for example, reduced wear, increased life).
- The operational behavior will be improved (for example, easier engine starting).

D. Optional Service Bulletins

Optional Service Bulletins give data about optional equipment that you can install in an airplane (for example, sailplane towing device).

The airplane owner makes the decision to follow an Optional Service Bulletin.

6. Service Information

A Service Information tells the operator about permitted installations or provided information to installed or additional equipment. It also gives the applicable technical data.

7. Concession-Reports and Non-Conformance-Reports

Concession- and Non-Conformance-Reports are tools to approve and document deviations from the standard manufacturing processes during construction and assembly of an individual airplane (for example, handling of a mis-drilled hole in the fuselage). In case the operator or the maintenance organization needs to be informed as a consequence of the deviations for that particular airplane (for example, the use of a special spare part is necessary or a different limit in a control surface balancing report applies), these Concession and Non-Conformance-Reports are contained in the airplane log. Before you do maintenance, check the airplane log for such Concession- and Non-Conformance Reports.

8. Abbreviations

Where possible, the abbreviations used correspond with the related regulations.

A	Ampere
ACL	Anti-Collision Light
ADF	Automatic Direction Finder
A.M.E.	Aircraft Maintenance Engineer
Ah	Ampere-Hour
A&P	Aircraft and Power Plant Mechanic
ASI	Airspeed Indicator
CAN	Controller Area Network
CFRP	Carbon Fiber Reinforced Plastic
DME	Distance Measuring Equipment
EECU	Electronic Engine Control Unit
ELT	Emergency Locator Transmitter
FRP	Fiber Reinforced Plastic
GFRP	Glass Fiber Reinforced Plastic
GPS	Global Positioning System
G/S	Glide Slope
IAU	Integrated Avionics Unit

ICS	Integrated Cockpit Unit
IFR	Instrument Flight Rules
HSI	Horizontal Situation Indicator
LOC	Localizer
MED	Main Engine Display
MFD	Multi-Function Display
MSI	Major Structural Inspection
OAT	Outside Air Temperature
PFD	Primary Flight Display
P/N	Part Number
SB	Service Bulletin
SED	Secondary Engine Display
S/N	Serial Number
TBO	Time Between Overhaul
TSMOH	Time Since Major Overhaul
UHF	Ultra High Frequency
TTSN	Total Time Since New
TTSO	Total Time Since Overhaul
V	Volt
VFR	Visual Flight Rules
VHF	Very High Frequency
VOR	VHF Omni-directional Ranging
VSI	Vertical Speed Indicator

9. Conversion Factors and Abbreviations

Dimension Units/Abbreviations	Conversion Factor SI to US/Imperial	Conversion Factor US/Imperial to SI
Length		
Meter [m]	[m] x 0.3048 = [ft]	
Millimeter [mm]	[mm] / 25.4 = [in]	
Kilometer [km]	[km] / 1.852 = [nm]	
Inch [in]		[in] x 25.4 = [mm]
Foot [ft]		[ft] x 0.3048 = [m]
Nautical mile [NM]	[km] / 1.609 =[sm]	[nm] x 1.852 = [km]
Statute mile [SM]		[sm] x 1.609 = [km]
Velocity		
Kilometers per hour [km/h]	[km/h] / 1.852 = [kts]	
Miles per hour [mph]	[km/h] / 1.609 = [mph]	[mph] x 1.609 = [km/h]
Meters per second [m/s]	[m/s] x (60/0.3048) = [fpm]	
Knots [kts]		[kts] x 1.852 = [km/h]
Feet per minute [fpm]		[fpm] / 196.85 = [m/s]
Rotational Speed		
Revolutions per minute [RPM]		[RPM] = [min^{-1}]
Pressure		
Bar [bar]	[bar] x 14.5038 = [psi]	
Hectopascal [hPa]	[hPa] / 33.865 = [InHg]	
	[mbar] / 33.864 = [inHg]	
Pounds per square inch [psi]		[psi] / 14.5038 = [bar]
Inches of mercury column [inHg]		[inHg] x 33.864 = [hPa]
		[inHg] x 33.864 = [mbar]
Force or Weight		
Newton [N]	[N] / (g x 0.45359) = [lbs]	
	where g = 9.80665 m/s^2	
Decanewton [daN]	[daN] / 0.4448 = [lb]	
Pound [lb]		[lb] x 4.448 = [N]
		[lb] x 0.4448 = [daN]

Dimension Units/Abbreviations	Conversion Factor SI to US/Imperial	Conversion Factor US/Imperial to SI
Mass		
Kilogram [kg]	[kg] / 0.45359 = [lbs]	
Pound [lb]		[lb] x 0.45359 = [kg]
Volume		
Liter [l]	[l] / 3.7853 = [US gal] [l] / 0.9464 = [US qts] [l] / 4.5459 = [Imp gal] [l] / 61.024 = [in^3]	
US gallon [US gal]		[US gal] x 3.7854 = [l]
US quart [US Qt]		[US qt] x 0.9464 = [l]
Imperial gallon [Imp gal]		[Imp gal] x 4.5459 = [l]
Cubic inch [in^3]		[in^3] x 61.024 = [l]
Torque		
Newton meter [Nm]	[Nm] / 1.3558 = [lbf-ft] [Nm] x 8.851 = [lbf-in]	
Foot pound [ft.lb]		[lbf-ft] x 1.3558 = [Nm]
Inch pound [in.lb]		[lbf-in] / 8.851 = [Nm]
Temperature		
Degree celsius [°C]	[°C] x 1.8 + 32 = [°F]	
Degree fahrenheit [°F]		([°F] - 32) / 1.8 = [°C]

NOTE: In this Airplane Maintenance Manual masses are referred to as weights. The authors accept that this is technically incorrect but have used the expression for simplicity and convenience.

10. Torque Conversion Graphs

Use Figure 1 for conversion of torque values Nm - lbf.ft. Use Figure 2 for conversion of Nm - lbf.in.

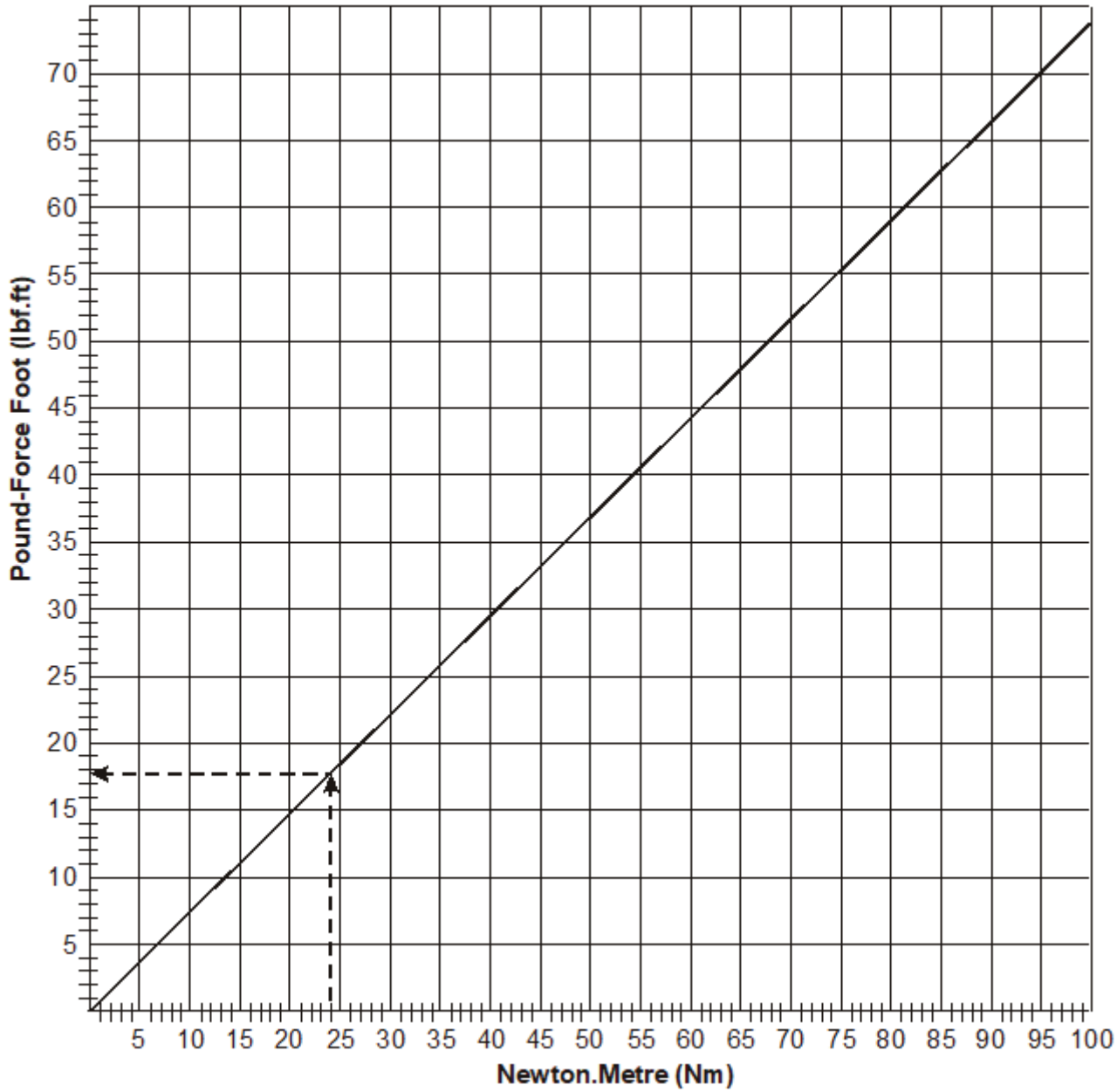

Figure 1 : Nm - lbf.ft.

Find the Nm value on the horizontal axis. Move vertically to the solid black diagonal line. Then move horizontally to the vertical axis. Read the value in lbf.ft.

Example: To convert 24 Nm to lbf.ft., find 24 Nm on the horizontal axis (see the dashed line). Follow the dashed line vertically to the solid black diagonal line. Then follow the dashed line horizontally to the vertical axis. Read the value of 17.7 lbf.ft.

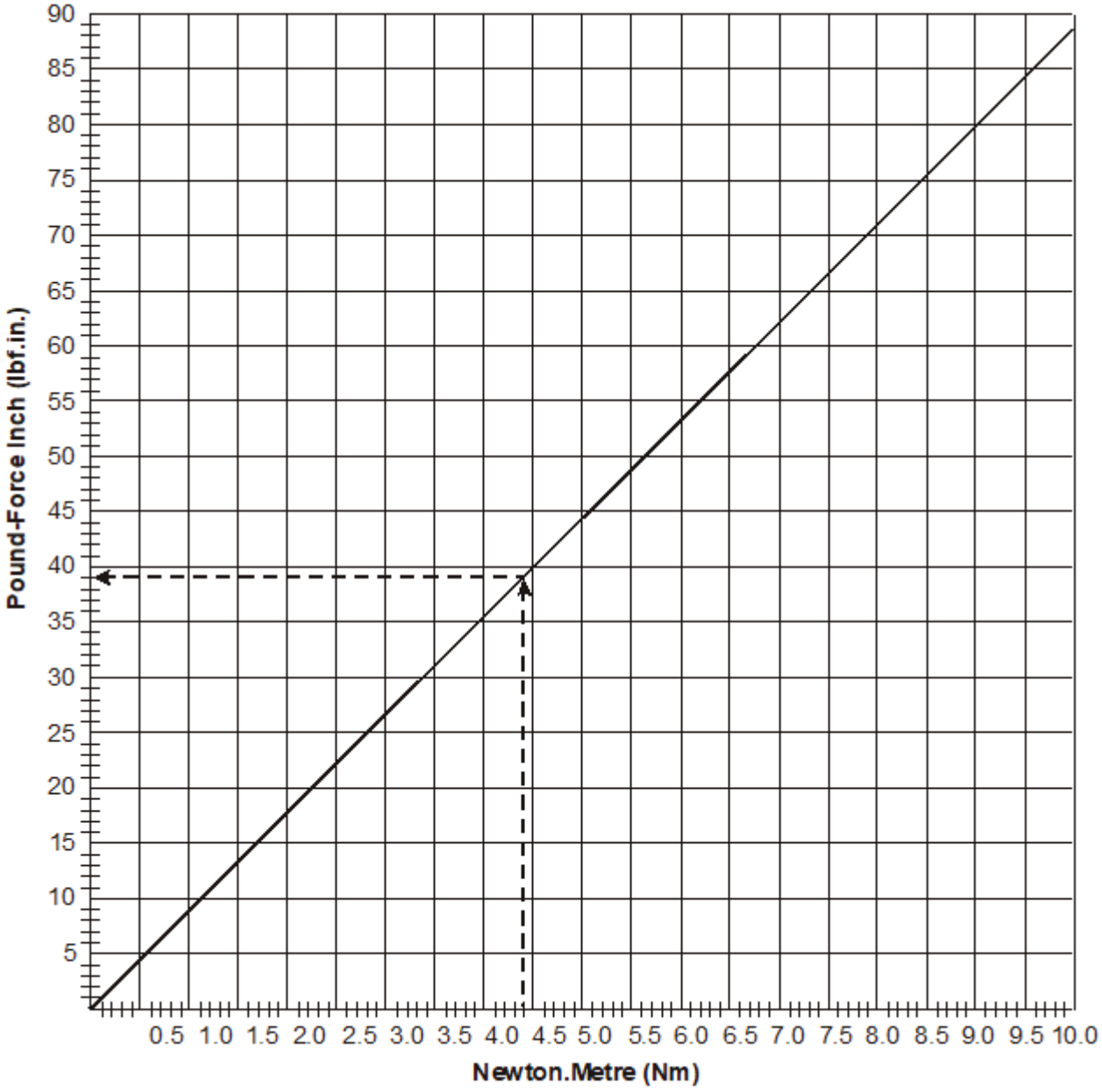

Figure 2 : Nm - lbf.in.

Find the Nm value on the horizontal axis. Move vertically to the solid black diagonal line. Then move horizontally to the vertical axis. Read the value in lbf.in.

Example: To convert 4.4 Nm to lbf.in., find 4.4 Nm on the horizontal axis (see the dashed line). Follow the dashed line vertically to the solid black diagonal line. Then follow the dashed line horizontally to the vertical axis. Read the value of 39 lbf.in.

11. Supplemental Airplane Manuals

Supplemental Airplane Maintenance Manuals are used to provide maintenance procedures and installation instructions for additional equipment.

A. List of Supplemental AMMs.

Doc. No.	Title	Rev. No.	Date	Applicable	
				YES	NO
7.02.15-003	003 - Retrofit Installation of Austro Engine E4-B	0	01-Jun-2009		

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CHAPTER 03
GENERAL DESCRIPTION OF THE AIRPLANE

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GENERAL DESCRIPTION OF THE AIRPLANE

1. General

Diamond Aircraft Industries Inc. 1560 Crumlin Sideroad, London, Ontario Canada N5V 1S2, is the manufacturer of the DA 40 NG airplane.

2. Description

The DA 40 NG is a single-engine, four seat, low-wing monoplane. It has a cantilever wing and a 'T' tail. The airplane structure is fiber-reinforced plastic composite. This gives a very strong but light structure.

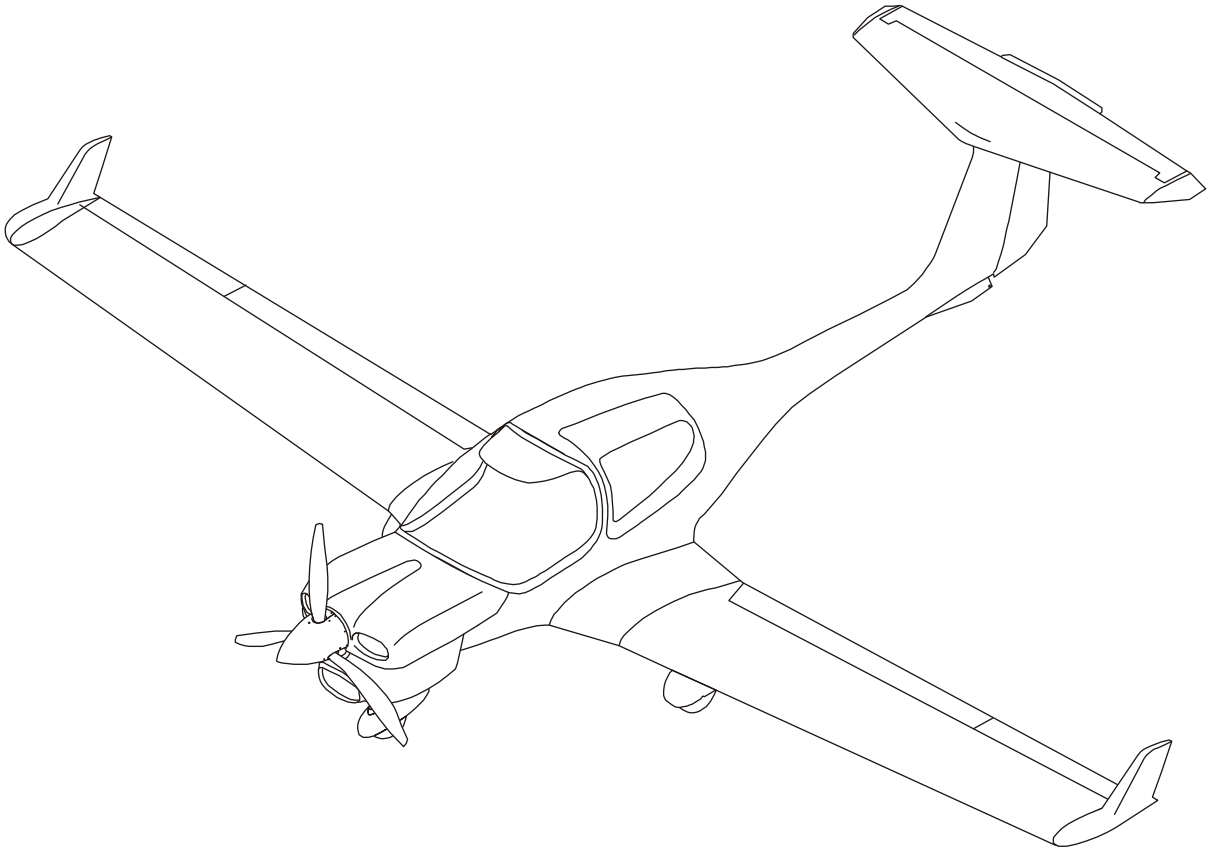

Figure 1 : DA 40 NG Airplane

The semi-monocoque fuselage is a glass-fiber reinforced-plastic (GFRP) shell with GFRP bulkheads and stiffeners. Uni-directional carbon fiber bands give extra strength and stiffness in many areas. Left and right half-shells bond together with a center section to make the fuselage. The center section makes the bottom of the cockpit. It has the main bulkheads which connect to the spars in each wing. The vertical stabilizer has two GFRP half-shells that are part of the fuselage shells.

The cantilever wing is a semi-monocoque structure. Each wing has two I-shaped spars with webs made form GFRP/rigid foam s andwich and caps made from CFRP bands. Each wing has top and bottom shells made of CFRP/GFRP/rigid foam sandwich which bond to the spars. GFRP ribs and webs bond to the spars and shells to complete the structure.

The wings attach to the fuselage center section. Each wing has two stump-spars. Four large bolts attach each wing to the fuselage main bulkheads. Standard ailerons and electrically operated flaps attach to the trailing edge of the wing.

The horizontal stabilizer is a semi-monocoque structure. It has top and bottom shells made of GFRP. The shells bond to GFRP spars and ribs. The trailing edge has a conventional elevator and a trim tab.

The one-piece canopy has a large quantity of wrap-around glazing. This gives a good all-round view from the cockpit. A glazed rear passenger door gives access to the rear seats from the left side of the airplane.

A polyurethane paint finish protects the outside skin from ultraviolet rays and humidity.

The fixed tricycle landing gear has fairings attached to each leg. The main legs attach to the fuselage centersection.The nose leg attaches to the forward fuselage. Each main wheel has a disc brake on the inside. Hydraulic pressure operates each disc brake.

The flight control system uses conventional ailerons, elevator and rudder. The DA 40 NG has two control sticks and two rudder pedal assemblies to operate the primary flight-controls. Push-pull rods operate the ailerons and elevator. Cables operate the rudder. An electric motor operates the wing flaps. A hand wheel and Bowden cable operate the elevator trim.

The DA 40 NG is powered by an Austro Engine E4-A liquid-cooled, in-line four-stroke four cylinder engine with double overhead camshaft (DOHC) with four valves per cylinder. The valves are actuated by the cam follower. The direct fuel injection is realized by means of a common rail technique and the engine is charged by a turbo-charger in combination with an intercooler. The propeller is activated by an integrated gearbox with an integral torsional vibration damper. All engine components are controlled by an EECU system.

The airplane has an aluminum fuel tank in each wing. Each tank consists of one (standard tank) or two (long range tank) chambers. The fuel tanks are inboard between the spars. The tank as s emblies have fuel fillers at or near the outboard end. Flexible hoses connect the tanks to a fuel selector and shut-off valve under the cockpit floor. An electrically driven pump supplies fuel to the engine. The tanks have fuel quantity probes which operate the cockpit indicating systems.

The airplane has two sources of electrical power. A 24 Volt battery supplies power when the engine is not running. An alternator provides power when the engine is running. Switches and circuit breakers control all electrical devices. A starter key controls the engine starter motor. It also serves as ELECTRIC MASTER key switch.

The DA 40 NG has a full range of flight instruments. These include Pitot/static instruments to show airspeed and altitude, as well as electrically driven instruments to show direction. If the G1000 system is installed most indications are shown on the G1000 and only the backup instruments are installed on the instrument panel.

The airplane has all the usual engine ins truments, except a load indication instead of a manifold pressure indication.

The airplane also has radio and navigation aids installed.

3. Equipment Data

The table below gives you the name and address of the manufacturers who supply systems and/or equipment for the DA 40 NG. This will help you get more data on a system and/or equipment.

ATA Chapter	Equipment/System	Address
12	Anti-Corrosion Cleaning Agent: Ardox AV 980 Anti-Corrosion Coating: Ardox AV 30	Chemetall GmbH Trakehnerstrasse 3 D-60487 Frankfurt a.M. Germany Tel: +49 69 7165-0 Fax: +49 69 7165-3018 Website: ww.chemetall.com
12	Anti-Corrosion Cleaning Agent: Diestone DLS Anti-Corrosion Coating: Socopac 65H	Socomor ZI du Prat - RP 3707 F56037 Vannes Cedex France Tel: +33 (0)297437690 Fax: +33 (0)297437686 Website: www.socomor.com
22, 23, 31, 34	Garmin G1000 System and GFC 700 A/P:	Garmin International Inc. 1200 E. 151st Street Olathe, KS 66062 USA Tel: (913) 397-8200 Fax: (913) 397-8282 Homepage: www.garmin.com
22, 23, 31, 34	Cooling Fans for Integrated Cockpit System:	SANDIA aerospace 3700 Osuna Road NE, Suite 711 Albuquerque, NM 87109 USA Tel: (505) 341-2930 Fax: (505) 341-2927 Website: www.sandiaaerospace.com

ATA Chapter	Equipment/System	Address
22	Autopilot System (if KAP 140 A/P is installed):	Bendix/King 400 North Rogers Road Olathe, Kansas 66062-1212 USA Tel: (913) 782-0400 (USA and Canada) (913) 782-0700 (other countries) Website: www.bendixking.com
22	Kannad 406-AF ELT	Kannad Z.I. des Cinq Chemins BP23 56520 GUIDEL FRANCE Tel: (33) 2 97 02 49 49 Fax: (33) 2 97 65 00 20
24	Battery:	Concorde Battery Corp. 2009 San Bernardino Road West Covina, California 91790 USA Tel: (626) 813-1234 Website: www.concordebattery.com
25	Emergency Locator Transmitter (ELT):	Artex Aircraft Supplies 14405 Keil Road NE Aurora, Oregon 97002 USA Tel: (503) 678-7929 Fax: (503) 678-7930 Website: www.artex.net
NOTE: The airspeed indicator must have the markings specified in Chapter 2 of the Airplane Flight Manual, Doc. No. 6.01.15-E, latest revision.		
31	Backup Airspeed Indicator, Backup Altimeter:	United Instruments Inc. 3625 Comotara Avenue Wichita, Kansas 67226 USA Tel: (316) 636-9203 Fax: (316) 636-9243 Website: www.unitedinst.com
31	Backup Attitude Gyro:	Mid-Continent Instrument Co., Inc. 7706 E, Osie, Wichita, Kansas 67207 USA Tel: (316) 683-5619 Fax: (316) 683-1861 Website: www.mcico.com

ATA Chapter	Equipment/System	Address
31	Attitude Gyro, Standby Attitude Module:	Mid-Continent Instrument and Avionics 9400 E. 34th Street North, Wichita, Kansas 67226 USA Tel: (316) 630-0101 Fax: (316) 630-0723 Website: www.mcico.com
32	Wheels and Brakes:	Parker Hannifin Corporation Aircraft Wheel and Brake Division 1160 Center Road Avon, Ohio 44011 USA Tel: (440) 9376211
33	Position / Strobe Lights:	Whelen Engineering Company, Inc. Route 145, Winthrop Rd. Chester, CT 06412-0684 USA Tel: (860) 526-9504 Fax: (860) 526-2009 Website: www.whelen.com
61	Propeller:	MT-Propeller Entwicklung GmbH Flugplatzstr. 1 D-94348 Atting Germany Tel.: +49 (9429) 94090 Fax: +49 (9429)8432 Homepage: www.mt-propeller.de MT-Propeller USA, Inc. 1180 Airport Terminal Drive DeLand, FL 32724 Tel.: (386) 736- 7762 Fax: (386) 736-7696 E-mail: mtprop@bellsouth.net
72	Austro Engines E4-A Engine:	Austro Engine GmbH Rudolf Diesel-Str. 11 A-2700 Wiener Neustadt Austria Tel: +43 (2622) 23 000 Fax: +43 (2622) 23 000 - 2711 Homepage: www.austroengine.at

4. Handling of Identification Data

No person shall remove, change, or place identification information on any airplane, engine, propeller, propeller blade, or propeller hub, without the approval of the competent national Airworthiness Authority.

If a deviation from the procedure above is necessary, any person performing maintenance work may in consultation with the competent national Airworthiness Authority:

- Remove, change, or place the identification plate on any airplane, engine, propeller, propeller blade, or propeller hub.
- Remove an identification plate, when necessary during maintenance operations.
- No person shall install an identification plate, removed in accordance with the procedures above, on any airplane, engine, propeller, propeller blade, or propeller hub other than the one from which it was removed.

CHAPTER 04
AIRWORTHINESS LIMITATIONS

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CHAPTER 04

AIRWORTHINESS LIMITATIONS

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CHAPTER 04

AIRWORTHINESS LIMITATIONS

THIS AIRWORTHINESS LIMITATIONS SECTION IS APPROVED BY THE MINISTER IN ACCORDANCE WITH THE APPLICABLE CERTIFICATION PROCEDURES AND THE TYPE CERTIFICATION BASIS. IT SPECIFIES THE AIRWORTHINESS LIMITATIONS REQUIRED BY AWM 523.

THE AIRWORTHINESS LIMITATIONS SECTION IS FAA APPROVED AND SPECIFIES MAINTENANCE REQUIRED UNDER SECS. 43.16 AND 91.403 OF THE FEDERAL AVAITION REGULATIONS UNLESS AN ALTERNATIVE PROGRAM HAS BEEN FAA APPROVED.

SERVICE BULLETINS OR OTHER DOCUMENTS REVISING THIS SECTION WHICH CONTAIN A STATEMENT THAT THE DOCUMENT IS TRANSPORT CANADA CIVIL AVIATION (TCCA) APPROVED ARE CONSIDERED FAA APPROVED.

DocuSigned by:
Michael Lopez
C9358B25C4794F6...

September 21, 2023

Chief, Engineering

National Aircraft Certification

Transport Canada

Date

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1. Airworthiness Limitations

This Chapter is approved and shows the mandatory limitations which were established as a result of the certification process.

The time limits given in Chapter 04 must be applied to ensure Continued Airworthiness of the DA 40 NG.

NOTE: Regular inspections of the airplane including replacement and overhaul of certain components are required to ensure Continued Airworthiness of the DA 40 NG.

For possible airworthiness limitations of engine, propeller, components and vendor equipment refer to the applicable Maintenance data as listed in Section 05-00.

A. Certification Maintenance Requirements

(1) Component and System Checks

The component and system checks under this paragraph are also included in Section 05-10.

The following table lists airplane components and systems which require monitoring through scheduled maintenance.

Where an interval is given in both flight time and calendar years, the limit which is reached first must be applied.

VFR in the "Kind of Operation" column means that this limit applies to day VFR, night VFR and IFR operation. NVFR in the "Kind of Operation" column means that this limit applies to night VFR and IFR operation. IFR in the "Kind of Operation" column means that this limit applies to IFR operation.

ATA CH	COMPONENT	MAINTENANCE REQUIREMENT	INTERVAL		KIND OF OPER.
			Hours	Yrs	
24	Essential Bus	Verify proper function. (Refer to Section 24-60).	1000 ± 50		NVFR
51	Bonding system and static discharging system.	Resistance measurements. (Refer to Section 51-80).	1000 ± 50	4 yrs ± 60 days	NVFR

(2) Life Time Limit / Structure Checks

There is no structural life limit.

A Major Structural Inspection (MSI) is required:

- at 6000 hours ± 50 or 12 years ± 6 months since new (that which comes first) and:
- at 4000 hours ± 50 or 12 years ± 6 months since new (that which comes first) after the initial MSI.

NOTE: The DA 40 NG has been designed and tested under a 'damage tolerant structure' philosophy. Therefore the structural inspections given in Chapter 05 cover all required structure checks.

B. Replacement Requirements

The following table lists life limited airplane components which must be replaced at a specific time.

Where an interval is given in both flight time and calendar years, the limit which is reached first must be applied.

NOTE: The replacement requirements under this paragraph are also included in Section 05-10.

VFR in the "Kind of Operation" column means that this limit applies to day VFR, night VFR and IFR operation. NVFR in the "Kind of Operation" column means that this limit applies to night VFR and IFR operation. IFR in the "Kind of Operation" column means that this limit applies to IFR operation.

ATA CH	COMPONENT	REPLACEMENT TIME		KIND OF OPER.
		Hours	Yrs	
24	Emergency battery.	2 years, or upon reaching the date marked on each cell or package, or after use, which ever comes first.		IFR
24	ECU backup battery	-	1 ± 30 days	VFR

C. Colour of the Airframe

It is mandatory to paint the DA 40 NG white as described in Chapter 51 of this manual. This will prevent the temperature of the structure from becoming too high. Examples of approves shades are:

- RAL 9016
- Mercedes DB 147
- BMW 218
- Volvo XG28
- Volvo BC76
- Saab 5AC6
- Alfa Romeo 230

Before painting the DA 40 NG in a different shade the type certificate holder must be contacted.

Only certain areas which are defined in Chapter 51 of this manual (for example, registration markings, placards and warning markings) may have a different colour.

D. Repairs

Repairs which are not described in Chapter 51 of this manual may only be carried out in accordance with a repair scheme which has been approved by the manufacturer or the competent National Airworthiness Authority.

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CHAPTER 05
TIME LIMITS AND MAINTENANCE CHECKS

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05-00 - TIME LIMITS AND MAINTENANCE CHECKS

1. General

This Chapter will help to do the maintenance of the DA 40 NG correctly. Refer to Sections 04-00 and 05-00 for maintenance and inspections.

The times given in this Chapter are times recommended by the airplane manufacturer. Do the scheduled maintenance at the given times, because they are the minimum required to keep the airplane in a good technical condition.

Time limits and maintenance checks were established for operation in a moderate climate and on paved runways. For operation under rough conditions (extreme temperatures, saline air, wind-borne sand, operation on grass runways, etc.) it may be necessary to make changes to the maintenance requirements given in this Chapter. You can decrease the time between scheduled maintenance checks if the airplane's operation makes it necessary. You must not extend the time between scheduled maintenance checks without the Airworthiness Authority's approval.

These checks do not over-ride the requirements of the Airworthiness Authority of the country where the airplane is registered. You must ensure that all Airworthiness Directives, Service Bulletins and any other requirements of the Airworthiness Authority are completed as required.

The airplane manufacturer can change the time between checks. If this happens, the airplane manufacturer will publish the change as a revision to the Airplane Maintenance Manual.

2. Chapter Configuration

A. Section 05-10

Section 05-10 contains the recommended time limits for maintenance checks. It also contains the recommended time between overhaul for components. Use the data in Section 05-10 to find when to do the maintenance.

B. Section 05-20

Section 05-20 contains information about the Maintenance Checklist structure.

C. Section 05-21

Section 05-21 contains information about the Flight-Line Checks.

D. Section 05-25

Section 05-25 contains the Drain Holes Inspection Checklist.

E. Section 05-28

Section 05-28 contains the Maintenance Checklist for the DA 40 NG airplane. The Section is subdivided into engine and airframe sections and provides checklists for the engines and the airframe and the corresponding reports.

(1) Section 05-28-00

Maintenance Checklist for the engine:

- Maintenance checks schedule for 100, 200, 1000, and 2000 hour checks on the engine.
- Data for the annual check (if necessary) for national regulations on the engine.

(2) Section 05-28-50

Maintenance Checklist for the airframe:

- Maintenance checks schedule for 100, 200, 1000, and 2000 hour checks and the Major Structural Inspection (MSI) on the airframe.
- Data for the annual check (if necessary) for national regulations on the airframe.

(3) Section 05-28-90

Maintenance Report.

(4) Section 05-28-91

Engine Ground Test Report.

(5) Section 05-28-92

Check Flight Report.

(6) Section 05-28-93

Major Structural Inspection (MSI) Findings Report.

F. Section 05-50

Section 05-50 contains the unscheduled maintenance checks. Do these checks after hard landings, propeller damage, engine fire and lightning strike.

G. Referenced Maintenance Data

Use latest revision of referenced maintenance data.

SUPPLIER	DOCUMENT NAME	DOCUMENT NO.
Artex	Installation and Maintenance Manual for the ME406 ELT	570-1600
Artex	Installation and Maintenance Manual for the 1000 ELT	Y1-03-0259
Austro Engine	Austro Engine Operation Manual AE300	E4.01.01
Austro Engine	Austro Engine Maintenance Manual AE300	E4.08.04
Cleveland/Parker	Cleveland/Parker Maintenance Manual	AWBCMM0001
Cleveland/Parker	Cleveland/Parker Product Catalog	AWBPC0001
Cleveland/Parker	Cleveland/Parker Technician's Service Guide	AWBTSG0001
Concorde	RG® Series Main Aircraft Batteries Component Maintenance Manual	5-0171
Honeywell	Honeywell Flightline Maintenance Manual Bendix/King KAP 140 Flight Control System	006-15574-0002
Kannad	Installation / Operation Manual, ELT Kannad 406 AF - Compact	08038 (x) Ref 014 55 99 (x)
L-3	Stormscope WX-500 Installation Manual	009-11500-001
Mid Continent	Installation Manual and Operating Instructions Model MD 302 Series SAM	9017782
mt-Propeller	mt-Propeller Operation and Installation Manual	E-124, ATA 61-01-24
mt-Propeller	mt-Propeller Operation and Installation Manual for the Hydraulic Constant Speed Governor	E-1048, ATA 61-20-48
Goodyear	Aircraft Tire Care & Maintenance	
Tost	Betriebshandbuch Kupplungstyp E 85	

3. Definitions

In this Airplane Maintenance Manual, the words that follow have special meanings:

Adjust: To put to a specified position or condition. For example, adjust the clearance to 1 mm.

Check: A technical name for a group of maintenance tasks. For example, the 100 hour check.

Examine: To look carefully at an item. It includes steps such as these:

- Make sure that the item:

  Is complete.

  Is correctly attached.

  Has no loose parts.

  Shows no signs of leaks.

  Is not cracked or damaged.

  Is not worn.

- Make sure that:

  The surface protection is not damaged.

  All locking devices are installed correctly.

- Make sure that items such as pipes and cables:

  Look serviceable.

  Do not rub against other items.

- For log books and other technical records:

  To find outstanding faults.

  To make sure they are up-to-date and correctly maintained.

Inspection: The procedure which compares an object with its standard or specification.

Measure: To find out the dimensions, capacity or quantity of something.

Monitor: To look at something during a time. For example, monitor the engine speed indicator.

Record: (1) Technical name for something that shows what was done. For example, write the result of the test in the engine record.

(2) The act of making a record. For example, record the result of the test in the Airplane Maintenance Log.

Replace: To remove an unserviceable item and install a serviceable item in the same location.

Set: To put equipment into a given adjustment, condition or mode. For example, set the altimeter scale to 1013 mbar (= 1013 hPa).

Task: An assigned work or a procedure. For example, each step of the task has an identification letter.

Test: That which you do when you operate or examine an item to make sure that it agrees with the applicable specifications. For example, disconnect the systems which are not necessary for the test. Or do an engine test.

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05-10 - TIME LIMITS

1. General

This Section lists time limits for scheduled Maintenance on airframe and components, and replacement or overhaul of components directly or by reference.

Obey the time limits in this Section to keep the airplane in a technical good condition.

NOTE: National Regulatory Authorities can have different requirements. You must make sure that you meet the requirements of the Regulatory Authority of the country where the airplane is registered.

2. Scheduled Maintenance Time Limits

(Refer to Sections 05-20 through 05-28).

The following recommended hourly and calendar time limits apply to the scheduled maintenance checks which are necessary to maintain the airplane in a good technical condition. Do the scheduled maintenance at the intervals and within the tolerances shown below:

SCHEDULED MAINTENANCE Check (Hourly)	DO AT THESE TIMES	MAXIMUM TOLERANCE
100 Hour Check	At 100 hours since new and every 100 hour intervals.	± 10%
200 Hour Check	At 200 hours since new and every 200 hour intervals.	± 5%
1000 Hour Check	At 1000 hours since new and every 1000 hour intervals.	± 5%
2000 Hour Check	At 2000 hours since new and every 2000 hour intervals or 12 years, whichever comes first.	±± 5%
First Major Structural Inspection (MSI)	At 6000 hours or 12 years since new, whichever comes first.	± 50 hours ± 6 months
Subsequent Major Structural Inspections	At 4000 hours or 12 years intervals, whichever comes first.	± 50 hours ± 6 months

SCHEDULED MAINTENANCE Check (Hourly)	DO AT THESE TIMES	MAXIMUM TOLERANCE
The GTX 335R/345R transponders must have the ADS-B function tested and shown to comply with local authority operational requirements. If there are no requirements, use Title 14 CFR Part 91.411, 91.413.	24 Calendar months or when the GPS source is removed. Refer to Chapter 31-40-00 for test details.	

NOTE: The use of the tolerances specified in the scheduled maintenance time-limits-table may require approval from the civil aviation authority in which the airplane is registered.

The intervals between the inspections must be adhered to within the tolerances shown. These tolerances must not be added up. For example: if the 100 hour inspection was done at 110 hours, the next inspection must be done at 200 ±10 hours, not 210 ±10 hours.

If an inspection is carried out earlier than allowed by the specified tolerance, all subsequent inspection intervals are counted from that inspection. For example: If the 100 hour inspection was done at 83 hours, the next inspection must be done at 183 hours.

If the airplane was flown less than 200 hours for the last 12 months:

SCHEDULED MAINTENANCE CHECK (Calendar)	DO AT THESE TIMES	MAXIMUM TOLERANCE
Annual Inspection (for airplane registered in the USA).	At 12 months since new and at every 12 month interval do a 100 Hour Check.	
Annual Inspection (for airplane registered in other countries).	At 12 months since new and at every 12 month interval do a 200 Hour Check, if no 200 Hour Check was performed during the last 12 months due to flight time.	30 Days.

NOTE: For maintenance of airplane registered in the USA, do the items marked X and the items marked X* in the Maintenance Checklist.

For maintenance of airplane registered in other countries, do only the items marked X in the Maintenance Checklist.

3. Component Time Limits

A. Maintenance Requirements

The following table lists airplane components and systems which require overhaul or specific checks.

Where an interval is given in both flight time and calendar years, the limit which is reached first must be used.

For possible maintenance requirements of engine, propeller, components and vendor equipment refer to the applicable Maintenance data as listed in Section 05-00.

VFR in the "Kind of Operation" column means that this limit applies to day VFR, night VFR and IFR operation.
NVFR in the "Kind of Operation" column means that this limit applies to night VFR and IFR operation.
IFR in the "Kind of Operation" column means that this limit applies to IFR operation.

NOTE: Components marked with an asterisk (*) are Airworthiness Limitation items. The Airworthiness Limitation items are listed in Chapter 4 and Chapter 5 of the AMM.

ATA CH	COMPONENT	MAINTENANCE REQUIREMENT	INTERVAL		KIND OF OPER.
			Hours	Yrs	
21	RACC System	Leakage Test. (Refer to Section 21-51).	-	1 yr ± 30 days	VFR
NOTE: The mechanical check of the GFC 700 autopilot system (if installed) is mandatory.					
22	Autopilot System (GFC 700)	Mechanical Check. (Refer to Section 22-10).	-	1 yr ± 30 days	VFR
22	Autopilot System (GFC 700, if MÄM 40-561 (GSM 86 servo mounts) is installed).	Clutch Torque Check.	-	5 yrs ± 60 days	VFR
NOTE: The mechanical check of the KAP 140 autopilot system (if installed) is not mandatory. It is however recommended to do this check at the times shown below.					
22	Autopilot System (KAP 140)	Mechanical Check. (Refer to Section 22-11).	1000 ± 50	-	VFR
24	Essential Bus *	Verify proper function. (Refer to Section 24-60).	1000 ± 50	-	NVFR
26	Fire extinquisher	Overhaul.	-	10 yrs ± 60 days	VFR

ATA CH	COMPONENT	MAINTENANCE REQUIREMENT	INTERVAL		KIND OF OPER.
			Hours	Yrs	
27	Short pushrods connected to the aileron.	Boroscopic examination of the inner pushrod surface.	-	5 yrs ± 60 days	VFR
27	Short pushrods connected to the flap.	Boroscopic examination of the inner pushrod surface.	-	5 yrs ± 60 days	VFR
28	Check valve in front of fuel transfer pump.	Replace the check valve.	1000 ± 50	-	VFR
34	Pitot-static system.	Clean system, perform leakage test. (Refer to Section 34-10).	1000 ± 50	2 yrs ± 30 days	NVFR
34	Airspeed indicators including airspeed indicator on G1000.	Check for correct indication.	-	4 yrs ± 60 days	IFR
34	Vertical speed indicator.	Check for correct indication.	-	4 yrs ± 60 days	IFR
34	Altimeter(s) including altimeter on G1000.	Check for correct indication.	-	2 yrs ± 30 days	VFR
34	Magnetic compass.	Compensate.	-	1 yr ± 30 days	IFR
34	Transponder (on G1000) and blind altitude encoder (altitude digitizer).	System check	1000 ± 50	2 yrs ± 30 days	IFR
51	Bonding system and static discharging system.*	Resistance measurements. (Refer to Section 51-80).	1000 ± 50	4 yrs ± 60 days	NVFR

B. Airplane Life-Limited Components

The following table lists life limited airplane components which must be replaced at a specific time.

Where an interval is given in both flight time and calendar years, the limit which is reached first must be used.

For possible life-limits of engine, propeller, components and vendor equipment refer to the applicable Maintenance data as listed in Section 05-00.

VFR in the "Kind of Operation" column means that this limit applies to day VFR, night VFR and IFR operation.
NVFR in the "Kind of Operation" column means that this limit applies to night VFR and IFR operation.
IFR in the "Kind of Operation" column means that this limit applies to IFR operation.

Components marked with an asterisk (*) are Airworthiness Limitation items. The Airworthiness Limitation items are listed in Chapter 4 and Chapter 5 of the AMM.

ATA CH	COMPONENT	REPLACEMENT TIME		KIND OF OPER.
		Hours	Yrs	
24	Emergency battery.*	Two years, or upon reaching the date marked on the package, or after use. Whichever comes first.		IFR
24	ECU backup battery.*	-	1 yr ± 30 days	VFR
24	V-belt of additional alternator, if installed (OÄM 40-314).	2000 ± 50	-	VFR
25	Safety harnesses, front and rear.	-	12 yrs ± 90 days	VFR
25	First aid kit. Replace aseptic items.	Upon reaching the date marked on the kit.		VFR
25	ELT battery. Replace all cells at the same time. All cells must have the same expiration date.	1 hour of cumulative operation, after use in an emergency, after an inadvertent activation of unknown duration, or upon reaching the date marked on the ELT.		VFR
26	Amerex 337TS fire extinguisher	-	12 yrs ± 90 days	VFR
27	Rudder cables, non-stainless steel, 3.2 mm (1/8 in) diameter.	3000 ± 50	5 yrs ± 60 days	VFR

ATA CH	COMPONENT	REPLACEMENT TIME		KIND OF OPER.
		Hours	Yrs	
27	Rudder cables, stainless steel, 3.2 mm (1/8 in) diameter.	On Condition.		VFR
	NOTE: If material of rudder cables is unknown, assume non-stainless steel.			
28	Electrical fuel pumps (2 pcs). including check valves (1 pc. per pump), if installed (MÄM 40-480).	2400 hours, or after failure of one fuel pump.		VFR
28	Fuel bypass valve.	Co-incident with engine TBO.	-	VFR
28	Fuel tank vent hoses.	-	8 yrs ± 60 days	IFR
28	Fuel filter element.	100 ± 10	1 yr ± 30 days	VFR
28	Fuel hoses interconnecting the individual fuel tank chambers, and fuel hoses connecting fuel tank chambers to filler assemblies.	-	8 yrs ± 60 days	VFR
28	Fuel pressure pulsation damper, if installed (MÄM 40-468).	Co-incident with engine TBO.	-	VFR
32	Brake fluid.	-	3 yrs ± 60 days	VFR
52	Canopy door handle compression gas spring, if installed (MÄM 40-139).	3000 ± 50	6 yrs ± 60 days	VFR
71	Engine shock mounts (including bolts, washers and lock nuts).	Co-incident with engine TBO.	-	VFR
71	Air filter.	200 ± 10	-	VFR
75	Coolant silicate pouch.	Co-incident with engine TBO.	6 yrs ± 60 days	VFR

ATA CH	COMPONENT	REPLACEMENT TIME		KIND OF OPER.
		Hours	Yrs	
75	Coolant hoses	-	8 yrs ± 60 days	VFR
81	If MÄM 40-899 is NOT installed, or If MÄM 40-899 and MÄM 40-902 are installed All charge air hoses from turbo charger to engine air intake manifold.	Co-incident with engine TBO.	-	VFR
81	If MÄM 40-899/b is installed: Charge air hose between turbo adapter and turbo connector assy.	1000 ± 50	-	VFR

4. Component Time Tracking

To make sure that components overhaul/replacement is done at the correct time you must record the data that follows in the Airplane Maintenance Log for each component requiring overhaul/replacement:

- Serial Number.
- Flight hours and date at installation.
- Flight hours and date at removal.

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05-20 - SCHEDULED MAINTENANCE CHECKS

1. General

Do the scheduled maintenance checks in this Section at the intervals (flight hours and calendar time) stated in Section 05-10, Paragraph 3.

NOTE: Only persons or maintenance organizations authorized by national Regulatory Authorities of the country where the airplane is registered may do these checks. The inspection level for each item is a general visual inspection unless differently specified.

NOTE: Only AE authorized maintenance organizations may carry out maintenance and inspection work on the AE engine. Any engine malfunction must be reported to AE.

2. Maintenance Checklist Organization

Do the scheduled maintenance checks with reference to the Maintenance Checklist in this Section. Before starting a check, complete the requirements of Paragraphs 2 and 3 of the checklist. In parallel do the scheduled drain hole checks with reference to the Drain Holes Inspection Checklist and Report.

Do all the applicable tasks on the checklists.

NOTE: For maintenance of airplane registered in the USA, do the items marked X and the items marked X* in the Maintenance Checklist.
For maintenance of airplane registered in other countries, do only the items marked X in the Maintenance Checklist.

NOTE: The interval columns "100", "200", “1000", and "2000" are used for maintenance items which must be done at intervals of 100, 200, 1000, or 2000 flight hours. The interval column "time" is used for maintenance items which mus t be done at certain calendar time intervals, or during a Major Structural Inspection (MSI).

NOTE: Where an interval is given in both flight time and calendar years, the limit which is reached first must be applied.

NOTE: Some inspection items must be done at other intervals than the standard intervals (100, 200, 1000, or 2000 hrs.). In thes e cases, the maintenance interval is shown in the column for the next shorter interval instead of an X. For example, an item which must be done every 400 hours is identified by the words "400 hrs." in the 200 hrs. column.

All of the applicable items mus t be s igned by authorized maintenance personnel. Record the completion of the check in the airplane log book. Complete a copy of the Maintenance Report (refer to Section 05-28-90).

The Maintenance Checklist is divided into the following Sections:

A. Section 05-28-00 - Engine Compartment

All items forward of the firewall. It includes the cowlings and the propeller.

B. Section 05-28-50 - Airframe:

(1) Front Fuselage

All items on the outside of the front fuselage from the firewall to the trailing edge of the wing. It includes the nose landing gear, the main landing gear, the canopy and rear door.

(2) Cockpit

All items inside the fuselage s hell from the aft face of the firewall to the aft face of the rear main bulkhead. It also includes the internal parts of the brake system.

(3) Center Fuselage, Internal

All items inside the fuselage shell below the rear seats from the aft face of the rear main bulkhead to the baggage compartment. It includes the control systems on the aft main bulkhead and the baggage compartment.

(4) Rear Fuselage

All items on the outside of the fuselage from the trailing edge of the wing to the front of the vertical stabilizer.

(5) Tail

All items of the fuselage aft of the rear fuselage, vertical stabilizer and horizontal stabilizer.

(6) Wings

All items on the left and right wings. It includes the ailerons, flaps and Pitot head.

(7) General

Those items which include more than one zone at the same time. It includes items such as control checks which need one person in the cockpit and another person at the control surface.

3. Major Structural Inspection

The Major Structural Inspection (MSI) is an important part of the infinite lifetime concept of the DA 40 NG. It is required to prove the structural integrity of the airframe. It mus t be carried out at the intervals shown in Section 05-20.

Since the MSI is intended to coincide with a 2000 hour inspection, the inspection items are included in the maintenance checklist, and are identified by the term ‘MSI' in the ‘time’ column.

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05-21 - FLIGHT LINE CHECKS

1. General

These checks include the pre-flight and post-flight checks. Do these checks each day the airplane is used.

2. Flight-Line Checks

The Daily Check must be done before the first flight of the day. It shows the pilot the general condition of the airplane and the engine. It is important for flight safety. Look in the airplane log-book for problems before doing the daily check.

WARNING: DO ALL THE STEPS OF THE DAILY CHECK CAREFULLY. ACCIDENTS CAN OCCUR IF THE DAILY CHECK IS NOT DONE CORRECTLY.

The schedule for the pilot's daily check is in the Airplane Flight Manual for the DA 40 NG.

3. Post-Flight Check

Do the post-flight check after the last flight of the day. The post-flight check includes all the steps of the daily check.

You must also:

- Refuel the airplane (Section 12-10).
- Record in the log book each problem found in flight and during the post-flight check.
- Park the airplane (Sections 10-00 and 10-10).
- If necessary, moor the airplane (Section 10-20).

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05-25 - DRAIN HOLES INSPECTION CHECKLIST AND REPORT

1. General

Do a check of the drain holes. The drain holes must not be blocked by dirt or other residues. Make sure to remove all foreign objects and clean the drain holes to their full diameter. Otherwise the drain capacity may not be sufficient under certain conditions like heavy rain etc.

All drain holes should be drilled with a diameter of 5 mm (+2 mm / -0 mm) or 0.2 in (+0.08 in / -0.00 in). The holes should be circular, deburred, not frayed and cleaned.

At drain holes marked with an asterisk (*) the adhesive bonding is recessed.

Refer to the corresponding indication on the figures to identify the locations of the drain holes listed below.

2. Drain Holes Inspection Checklist

DRAIN HOLES INSPECTION CHECKLIST			
REF.	**DRAIN HOLE LOCATION**	**HOURS**	**INITIALS**
1	**FUSELAGE**		
1.01	Range top hat section, LH and RH	100	
1.02	Lower fuselage shell in the wing nose area, outboard of top hat section, LH & RH	100	
1.03	Lower fuselage shell, in front of front spar flange, center position	100	
1.04	Lower fuselage shell, next to front spar, LH & RH	100	
1.05	Lower fuselage shell, aft of front spar flange, center position	100	
1.06	Lower fuselage shell, next to rear spar, LH & RH	100	
1.07	Lower fuselage shell, aft of rear spar flange, center position	100	
1.08	Lower fuselage shell, in front of flaps torsion rod, center position	100	
1.09	Lower fuselage shell, fuselage rib reinforcement section, LH & RH	100	
1.10	Lower fuselage shell, inner corner of fuel duct flange, LH & RH	100	
1.11	Footwell cockpit to the clearance, LH & RH	100	
1.12	Lower fuselage shell, aft of baggage compartment frame base	100	
1.13	Lower fuselage shell, in front of baggage compartment frame base, LH & RH	100	
1.14	On lowest point of the fin	100	
1.15	On lowest point of the EPC connector	100	
1.16	In rudder bolt mounting shell (on top of the rudder)	100	
1.17	In rib of vertical stabilizer, in front of rear web	200	
1.18	In rib of vertical stabilizer, in front of front web	200	

DRAIN HOLES INSPECTION CHECKLIST			
REF.	**DRAIN HOLE LOCATION**	**HOURS**	**INITIALS**
1.19	On bottom of the vertical stabilizer front web	200	
1.20	Lower fuselage shell, aft of vertical stabilizer rear web	200	
1.21	On nose wheel strut, LH & RH	200	
1.22	Through roll over bar duct and baggage compartment frame	200	
1.23	Through lower end of ring frame 1	200	
1.24	Through baggage compartment frame, center position above lower fuselage shell	200	
1.25	Through lower end of ring frame 2	200	
1.26	Through lower end of ring frame 3	200	
2	**CANOPY AND DOOR**		
2.01	Lower canopy frame, in front of Bowden cable guide, LH & RH	100	
2.02	Lower canopy frame, aft of the canopy locking mechanism, LH & RH	100	
2.03	Inner door shell, below the front locking bolt	100	
3	**HORIZONTAL STABILIZER**		
3.01	Lower shell, next to the mid inspection hole, LH & RH	200	
3.02	Lower shell, next to the front inspection hole, LH & RH	200	
3.03	On the lowest point of the horizontal stabilizer tips, LH & RH	100	
3.04	Elevator end rib, next to the rear spar, next to lower shell, LH & RH	200	
3.05	LH & RH rib, in front of the rear spar, above the lower shell	200	
3.06	LH & RH rib, behind the front spar, above the lower shell	200	
3.07	LH & RH rib, in front of the front spar, above the lower shell	200	
3.08	Mid, LH & RH rib, behind the rear spar, above the lower shell	2000	
3.09	Mid, LH & RH rib, behind the front spar, above the lower shell	2000	
4	**ELEVATOR**		
4.01	Lower shell, leading edge section, LH & RH	100	
4.02	Lower shell, in front of trailing edge, LH & RH	100	
5	**ELEVATOR TRIM TAB**		
5.01	Lower shell, leading edge section, LH & RH	100	
5.02	Lower shell, in front of trailing edge bonding, LH & RH	100	
6	**RUDDER**		
6.01	Lower edge, at the left and right shell of the rudder	100	

DRAIN HOLES INSPECTION CHECKLIST			
REF.	**DRAIN HOLE LOCATION**	**HOURS**	**INITIALS**
7	**WINGS**		
7.01	In outer wing end rib at aileron mass balance cut out	100	
7.02	Wing tip in front of rear bonding (LH & RH wing)	100	
7.03	First fuel tank rib, next to front and rear spar and lower shell (LH & RH wing)*	100	
7.04	In flap rib rear spar next to lower shell (LH & RH wing)	200	
7.05	In rear root rib next to rear spar and lower shell (LH & RH wing)*	200	
7.06	In aileron rib next to rear spar and lower shell (LH & RH wing)	200	
7.07	Second fuel tank rib, next to front and rear spar and lower shell (LH & RH wing)*	200	
7.08	Third fuel tank rib, next to front and rear spar and lower shell (LH & RH wing)*	200	
7.09	Fourth fuel tank rib, next to front and rear spar and lower shell (LH & RH wing)*	200	
7.10	Fifth fuel tank rib, next to frond and rear spar and lower shell (LH & RH wing)*	200	
7.11	In front root rib, next to front spar and lower shell (LH & RH wing)	2000	
7.12	Vent hole on face side of wing spar (LH & RH wing)	2000	
8	**FLAPS**		
8.01	Root rib, next to trailing edge bonding, LH & RH	100	
9	**AILERONS**		
9.01	Inner root rib, next to the trailing edge bonding, LH & RH	100	
9.02	Lower shell, aft of mass balance weight, LH & RH	100	
9.03	Lower shell, in front of mass balance hingeline, LH & RH	100	

At drain holes marked with an asterisk (*) the bonding is recessed.

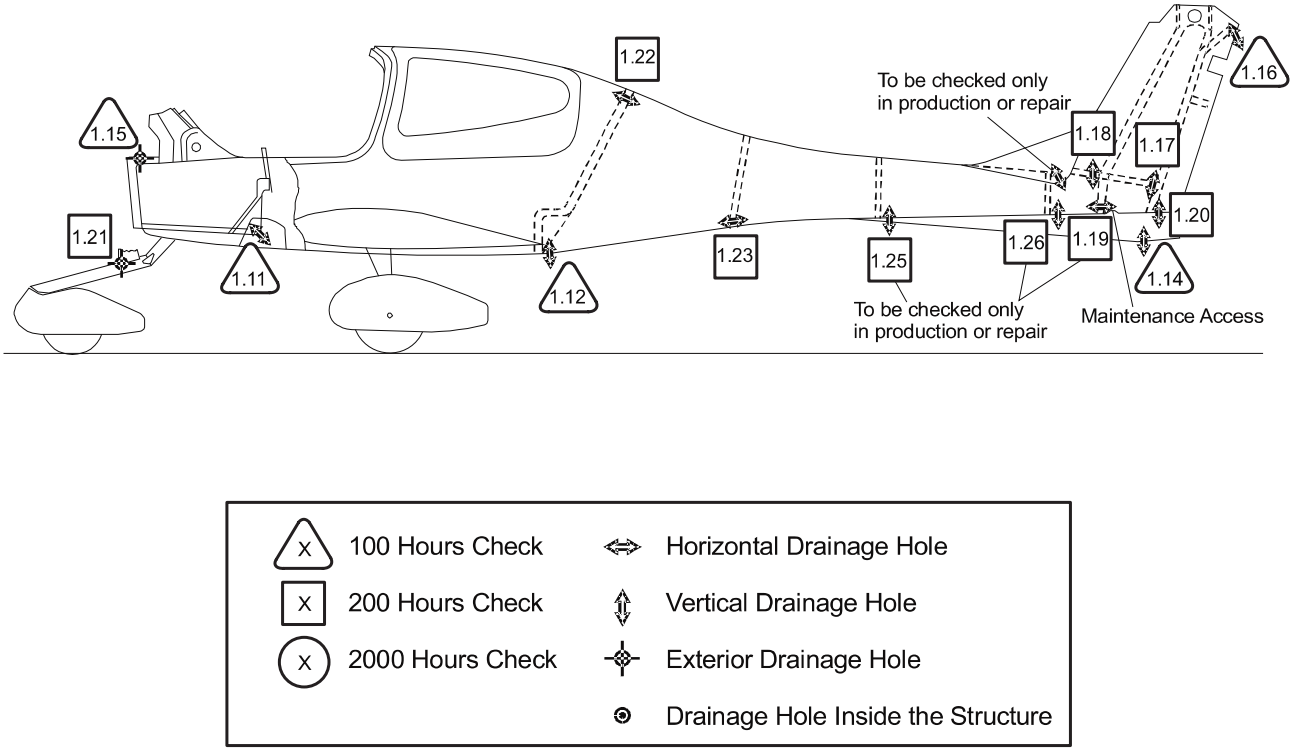
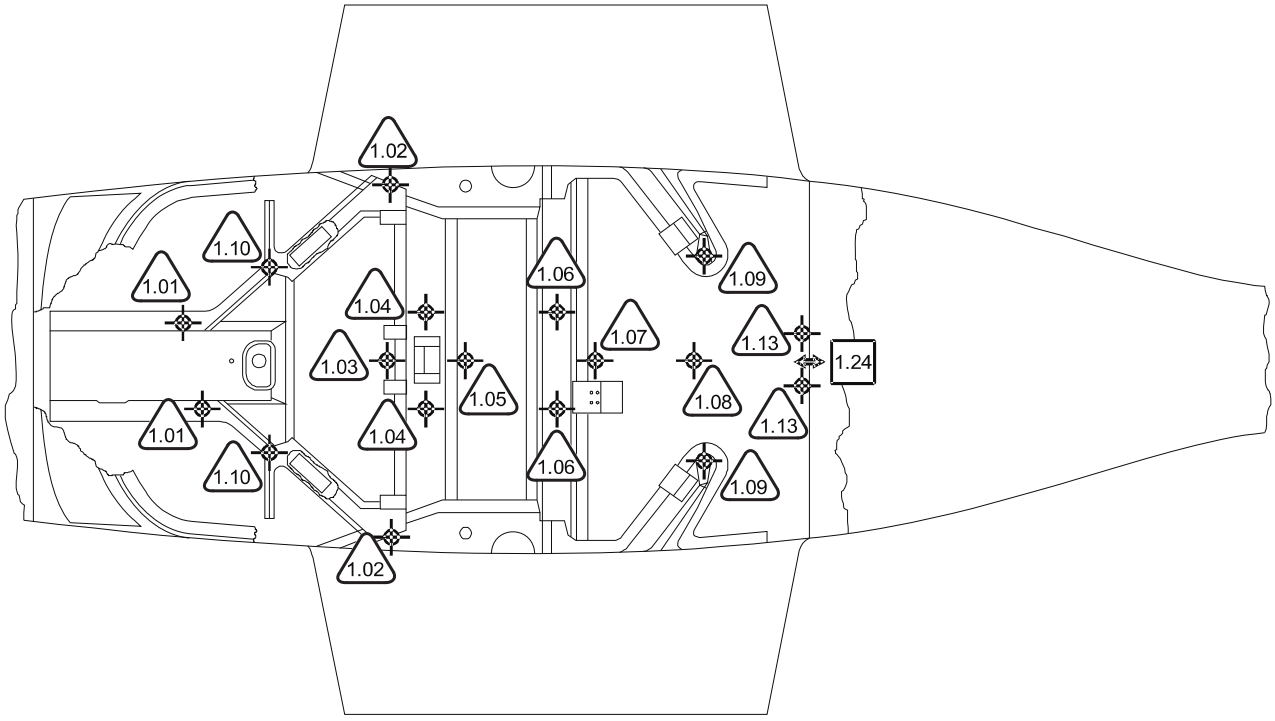


Figure 1 : Drain Holes - Fuselage (Part 1)



X 100 Hours Check	⇔ Horizontal Drainage Hole
X 200 Hours Check	⇕ Vertical Drainage Hole
X 2000 Hours Check	⊕ Exterior Drainage Hole
	⊙ Drainage Hole Inside the Structure

Figure 2 : Drain Holes - Fuselage (Part 2)

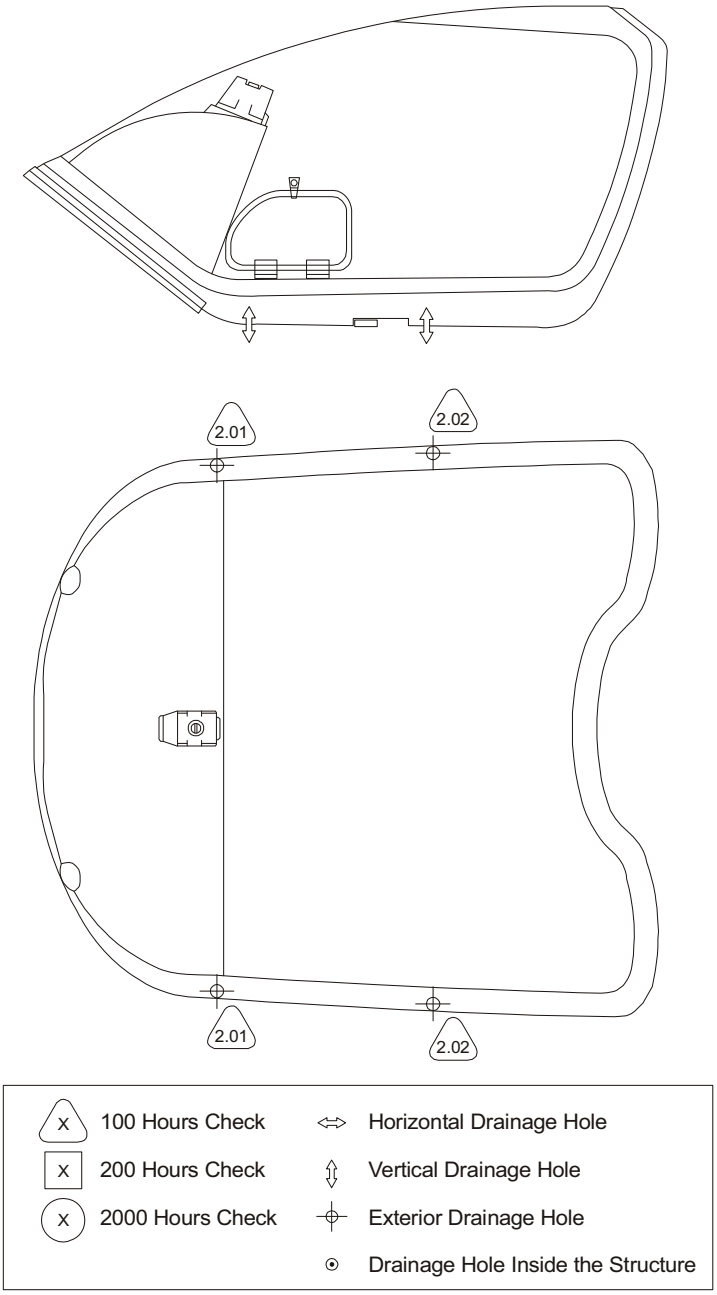


Figure 3 : Drain Holes - Canopy

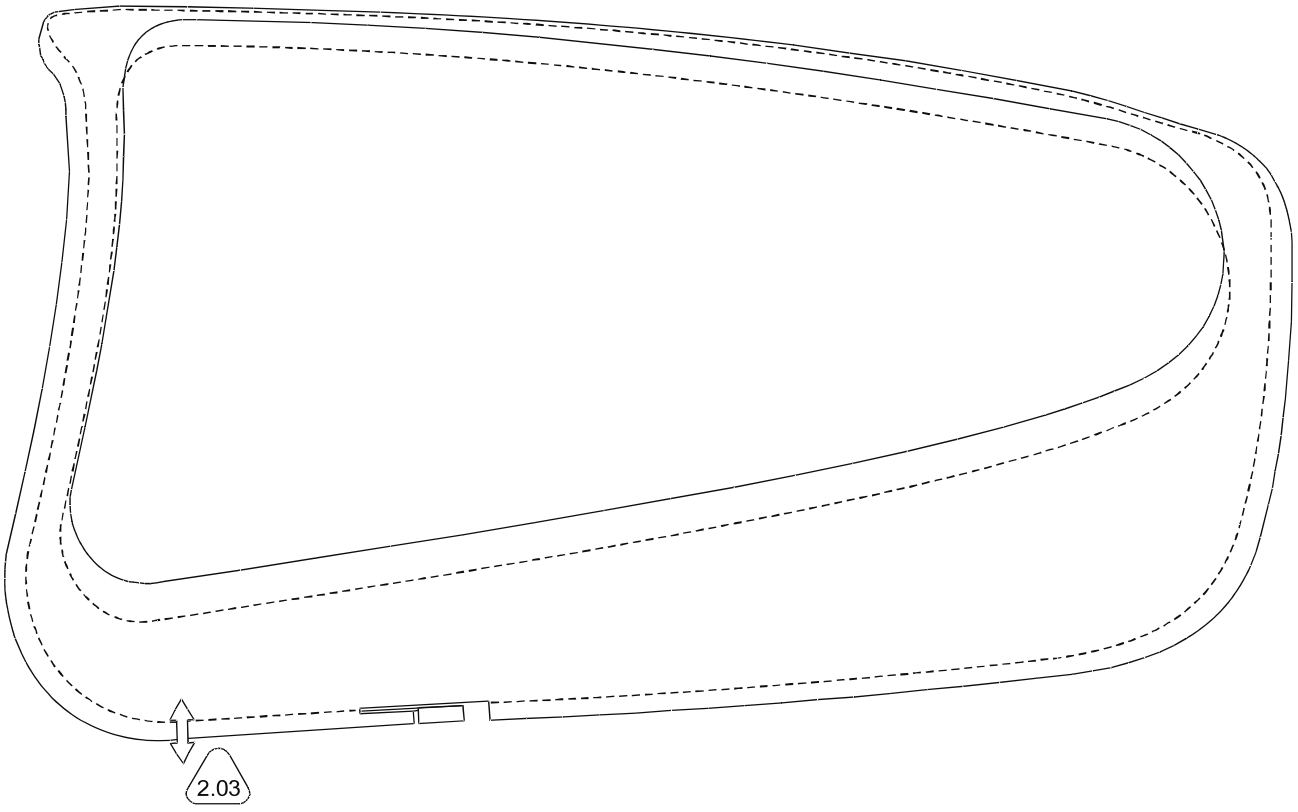


Figure 4 : Drain Holes - Passenger Door

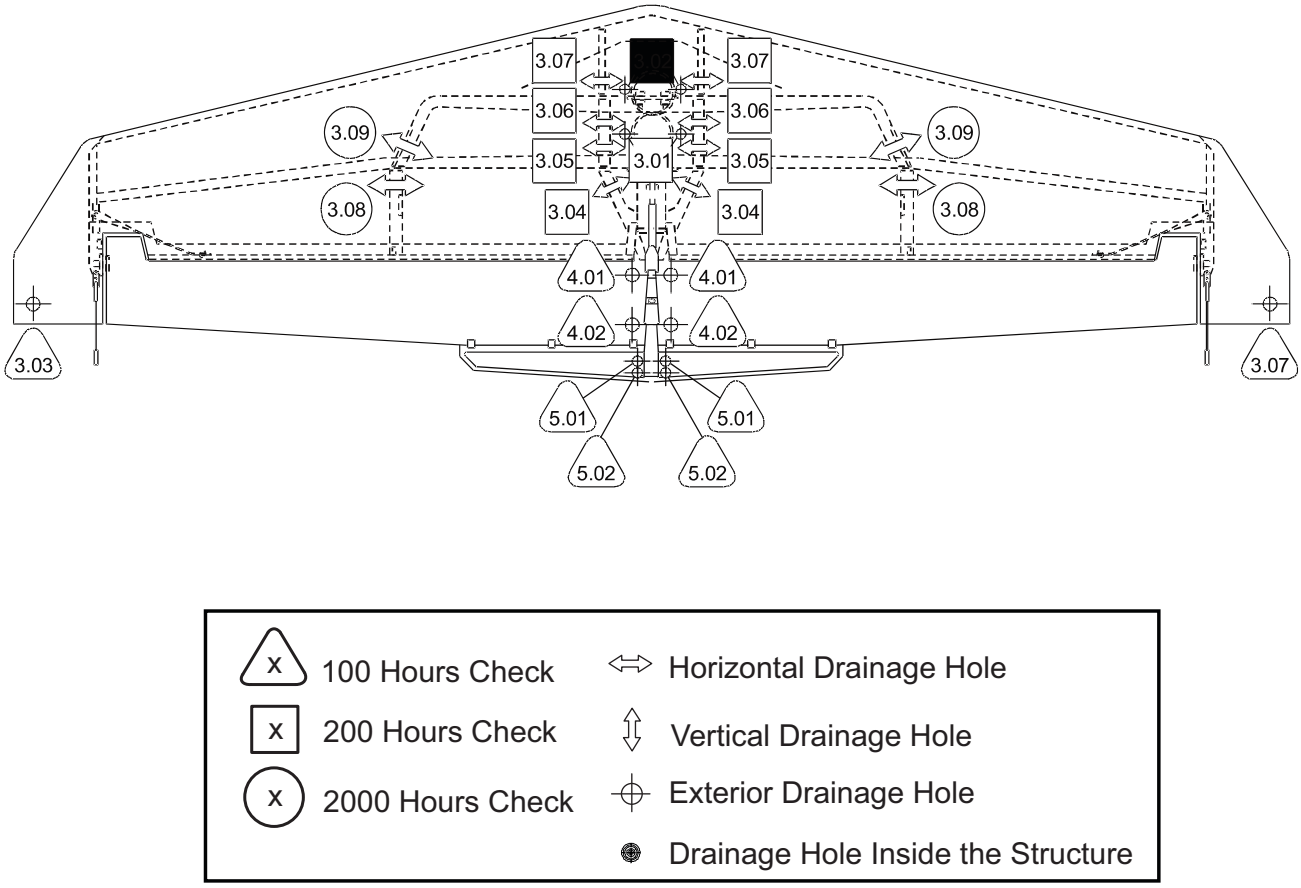


Figure 5 : Drain Holes - Horizontal Stabilizer, Elevator and Elevator Trim Tab

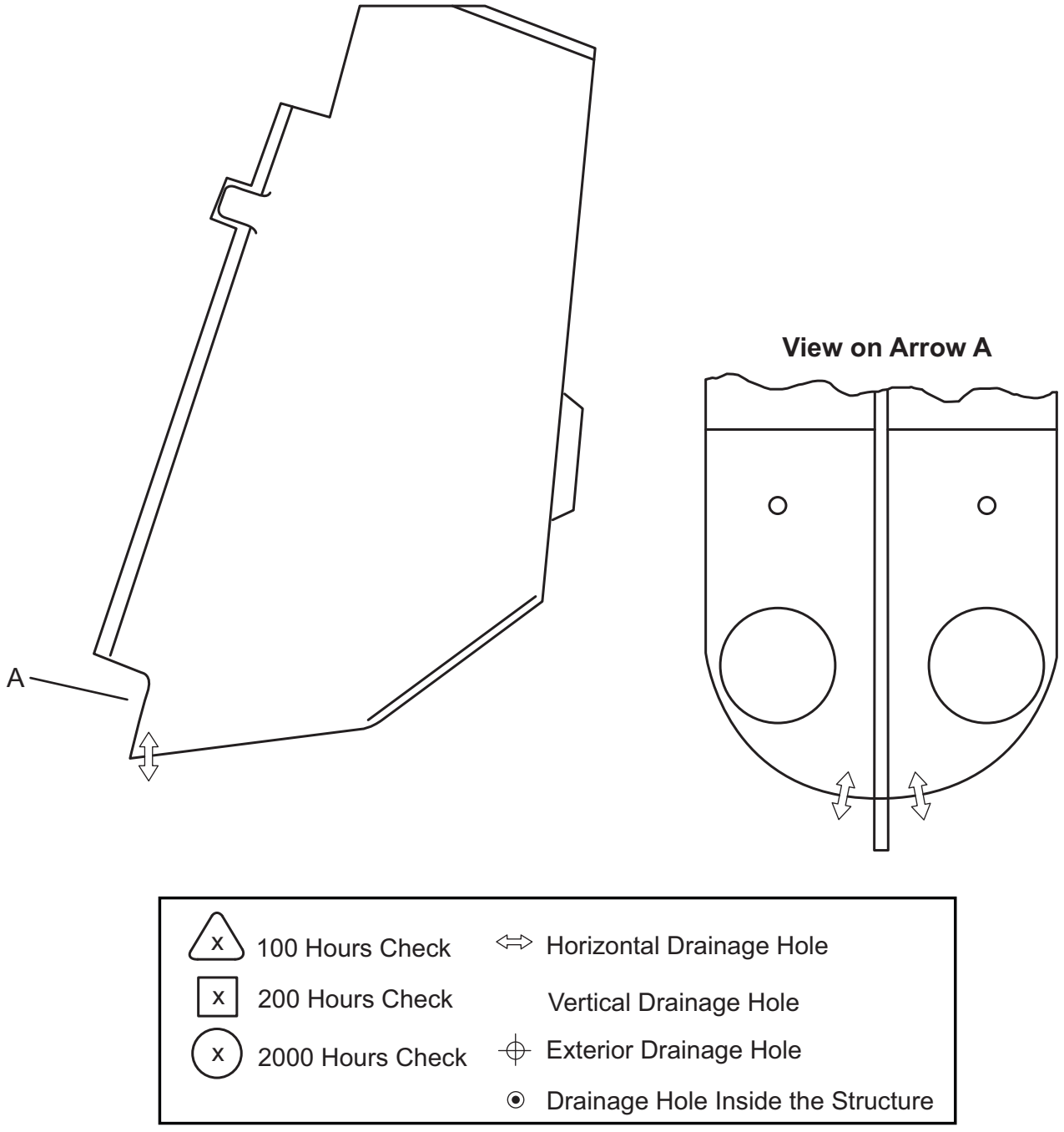


Figure 6 : Drain Holes - Rudder

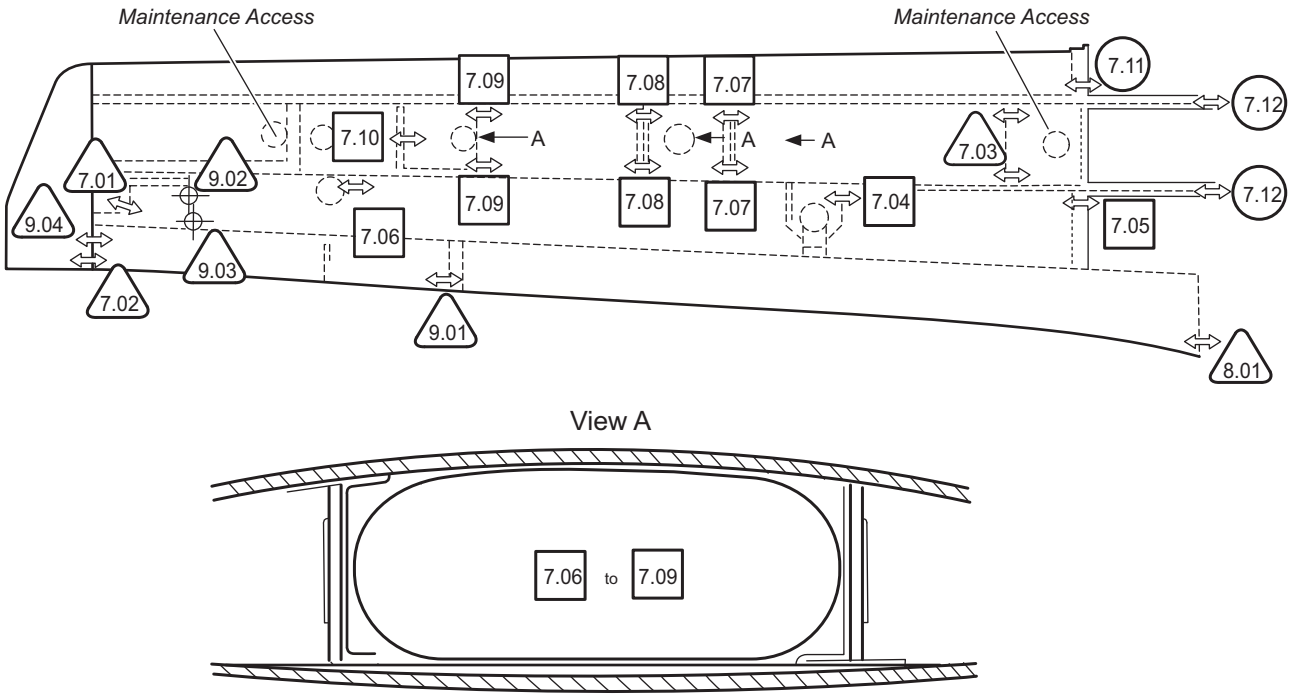


Figure 7 : Drain Holes - Wings, Flaps and Ailerons

05-28-00 - MAINTENANCE CHECKLIST ENGINE

1. General

Enter the applicable data in the blocks below:

<table>
<tr><td>REGISTRATION: _____</td><td>DATE: _____</td></tr>
<tr><td>AIRPLANE S/N: _____</td><td>ENGINE S/N: _____</td></tr>
<tr><td>AIRPLANE
OPERATING HOURS: _____</td><td>ENGINE HOURS
TTSN/TSMCH: _____</td></tr>
<tr><td rowspan="2">CHECK: _____

(100, 200, 1000, 2000 HR ANNUAL INSPECTION)</td><td>PROPELLER S/N: _____</td></tr>
<tr><td>PROPELLER HOURS
TTSN/TSMCH: _____</td></tr>
</table>

2. Preparation

CAUTION: OBSERVE THE COMPONENT TIME LIMITS STATED IN SECTIONS 04-00 AND 05-10 OF THIS AIRPLANE MAINTENANCE MANUAL.

Do the following items before you start the applicable check: :

	INSPECTION ITEMS	INTERVAL (Flight Hours)				
		100	200	1000	2000	INITIALS
1.	Before you do the inspection: - Read the applicable Airworthiness Directives. - Read the applicable Service Bulletins.	X	X	X	X	
2.	Examine the Log Books. Look specially for: - Life limited parts. - Reported problems.	X	X	X	X	
3.	Clean the airplane fully. (Refer to Section 12-30).	X	X	X	X	

3. Engine Ground Test

Do an engine ground test as follows:

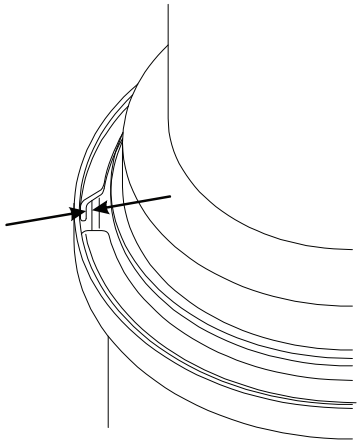
Complete a copy of the Engine Ground Test Record as part of the engine ground test.
(Refer to Section 05-28-91).

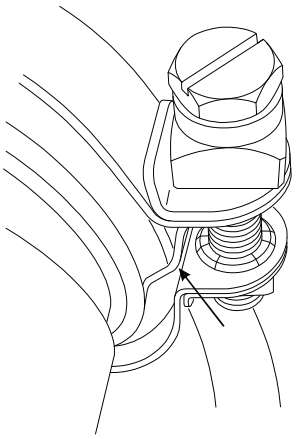
	INSPECTION ITEMS	INTERVAL					
		100	200	1000	2000	Time	Initials
	WARNING: DO NOT LET PERSONS GO INTO THE DANGER AREA OF THE PROPELLER. PROPELLERS CAN CAUSE INJURY OR DEATH. **WARNING: SET THE PARKING BRAKE TO ON. IF YOU DO NOT DO THIS, THE AIRPLANE CAN MOVE. THIS CAN CAUSE INJURY OR DEATH.**						
1.	Do an operational test of the parking brake.		X	X	X		
2.	Set the parking brake to ON.	X	X	X	X		
3.	Put the chocks against the airplane main wheels.	X	X	X	X		
4.	Do an engine ground run. (Refer to Section 71-00 and the AE Maintenance Manual, latest revision).	X	X	X	X		
5.	Check engine instruments.	X	X	X	X		
6.	Shut engine down.	X	X	X	X		
7.	Examine the engine for oil/fuel/coolant leaks.	X	X	X	X		
8.	Read out EECU data using the AE300-Wizard. (Refer to Section 72-00-00, Maintenance Practices and the AE Maintenance Manual E4.08.04, latest revision) Send the following data to Austro Engine GmbH via e-mail. - Serial Number of the Engine - Serial Number of the Aircraft - Aircraft Registration Marks - Company - Engine event log - Event recorder - Engine data log.	X	X	X	X		
9.	Examine the fault code memory of the EECU for failure. (Refer to Section 72-00-00, Maintenance Practices)	X	X	X	X		

4. Engine Maintenance Checklist

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS, ENGINE	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
	WARNING: MAKE SURE THE EXHAUST SYSTEM IS COOL BEFORE YOU DO MAINTENANCE ON THE ENGINE. THE EXHAUST SYSTEM CAN BE HOT. THIS CAN CAUSE INJURY TO PERSONS. **WARNING: DO NOT GET OIL ON YOU. OIL CAN CAUSE SKIN DISEASE.** **WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PEOPLE AND DAMAGE TO EQUIPMENT.**						
1.	Remove the top and bottom cowling. (Refer to Section 71- 10). Examine the cowlings. Make sure that the fasteners are serviceable. Look for cracks and areas that have been exposed to high temperatures. Check rubber seals.	X	X	X	X		
2.	Examine the engine and airplane fuel system. - Look for signs of leakage, material deterioration, chafing or damage of the flexible fuel hoses. Refer also to the AE Maintenance Manual, latest revision.	X	X	X	X		
3.	Clean the engine and engine compartment. Refer to Section 12-30 and the AE Maintenance Manual, latest revision.	X	X	X	X		
4.	Do engine maintenance in accordance with the AE Maintenance Manual, latest revision.	X	X	X	X		
5.	Cut open the used oil filter: - Look for contamination and metal abrasion. - If the filter contains particles of metal, refer to the engine manufacturer.	X	X	X	X		
6.	Verify the correct mixture ratio of the coolant. Refer to the AE Operation Manual, Doc. No.: E4.01.01, latest revision.	X*	X	X	X		
7.	Check gascolator filter. - If filter is contaminated, wash in clean fuel. - Do a check for fuel leakage.	X	X	X	X		
8.	Examine the exhaust end pipe incl. muffler (if installed). Look specially for cracks and heat damage or incorrect attachment.	X	X	X	X		

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS, ENGINE	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
9.	Examine the alternator mounting bracket and electrical connections.	X	X	X	X		
10.	Examine the mounting bracket, pulley assembly and electrical connections of the additional alternator (if OÄM 40-314 is installed): - Visual inspection of mounting bracket and pulley assembly for corrosion and cracks. - Examine the electrical connections. Look especially for rub marks, damage and corrosion. Pull lightly to make sure they are not loose.	X	X	X	X		
11.	Examine the v-belt of the additional alternator (if OÄM 40-314 is installed): - Visual inspection for damage and material deterioration. - Check the v-belt tension. Refer to Chapter 61.	X	X	X	X		
12.	Inspect the additional alternator in accordance with the Hartzell Aircraft Alternator Owner's Manual P/N ES1031, latest version (if OÄM 40-314 is installed).	X	X	X	X		
13.	Examine the cable ties and all electrical connectors in the engine area: - Look specially for rub marks and damage. - Pull lightly to make sure they are not loose.	X	X	X	X		
14.	Examine the bonding cables and their connectors in the engine area: - Look specially for rub marks and damage. - Pull lightly to make sure they are not loose.	X	X	X	X		
15.	Examine the oil breather line. Refer to the AE Maintenance Manual, latest revision.	X	X	X	X		
16.	Examine the propeller control system: - Look specially for leakage and damage.	X	X	X	X		

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS, ENGINE	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
17.	Examine the air intake and turbo-charging system: Look specially for signs of chafing or damage on these items: - Air filter. - Hose from air filter to turbo charger. - Turbo-charger. On the pressure side of the turbo-charger: - Hoses and hose clamps. - Aluminum pipes. - Look specially for signs of damage. - Make sure that the air hoses and ducts are correctly attached and the torque seal on the hose clamps is intact. - Intercooler. Do NOT re-tighten the worm drive clamps once they have been installed unless they are loose. Re- tightening of worm drive clamps will lead to damage of silicone hoses and possible loss of engine power. Inspect the V-clamp on the pressure side of the turbo charger: - Inspect for positive clearance between the flanges of the turbo charger/aluminum charged air tube and the base of the V-clamp on the complete circumference. If there is NO positive clearance: Replace the V-clamp. 	X	X	X	X		

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS, ENGINE	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
	- Inspect for signs of cracks in the edges of the ends of the V-bands of the V-clamp with flashlight and mirror. 						
18.	Perform a coolant tank pressure relief valve test. Refer to Section 75-00.	X	X	X	X		
19.	Check cooling system for leaks. Look specially at these items: - Hoses and worm drive clamps. - Aluminum pipes.	X	X	X	X		
20.	Examine the coolant radiator: - Look specially for leakage, damage, and loose attachments. - Make sure the cooling air flow through the radiator is not blocked due to bent fins.	X	X	X	X		
21.	Examine the coolant tank: - Look specially for leakage and damage. - Check the attachment brackets for cracks.	X	X	X	X		
22.	Examine the alternate air valve assembly: - Check correct movement when the alternate air lever in the cockpit is operated. - Examine the FOD screen for contamination. (Refer to Section 71-60).		X	X	X		

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS, ENGINE	**100**	**200**	**1000**	**2000**	**Time**	**Initials**

23.	Examine the engine mounts. Look specially for:
	- Cracks or corrosion. No cracks or corrosion allowed.
	- Damaged surface protection. Repair damaged surface protection.
	- Mounting bolts:
	  - Incorrect attachment.
	  - Damage. No damage allowed.
	  - Incorrect torque value. (Refer to Section 20-10).
	  - Loose or missing lock devices.
	- Damaged shock mounts. Replace damaged shock mounts.
		X	X	X	X		

24.	Check bolts engine mount to firewall. Torque to the value given in Section 20-10. - At the first 100 hrs. check.	(X)			X		
25.	Do an engine ground test. (Refer to Para 3)	X	X	X	X		

5. Propeller

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
	WARNING: DO NOT LET PERSONS GO INTO THE DANGER AREA OF THE PROPELLER. PROPELLERS CAN CAUSE INJURY OR DEATH. **WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU TURN THE PROPELLER..**						
1.	Inspection in accordance with mt-Propeller Maintenance Manual, latest revision.	X*	X	X	X		

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05-28-50 - MAINTENANCE CHECKLIST AIRFRAME

NOTE: The items of the Major Structural Inspection (MSI) are included in the maintenance checklist of the airframe and identified by the term 'MSI' in the 'Time' column.

NOTE: If the airplane is operated on rough terrain it is recommended to perform additional inspections of items marked "**[|||]**" at intervals half the intervals marked.

1. Front Fuselage

	100 hr items marked X* apply to US registered airplane only	**INTERVAL**					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
1.	Examine the complete surface of the front fuselage. Look specially for damage (dents, cracks, holes and delamination). Examine the paint coat.	X*	X	X	X		
2.	Do a coin-tap test for delamination of the fuselage shell.					MSI	
3.	Examine these NACA air inlets for blockage: - One in the left stub wing. - Two in the forward fuselage, LH and RH.	X	X	X	X		
4.	Examine the canopy: - Make sure the canopy lock mechanism operates correctly. (Refer to Section 52-10). - Examine the acrylic glass window for damage. Look specially for cracks. - Examine the bonding between the window and the canopy frame. (Refer to Section 56-10). - Examine the emergency windows and their hinges for damage. - Examine the 'pop out' windows and their hinges for damage, if installed. Check hinges for improper friction, correct if necessary.	X*	X	X	X		
5.	Do a function test of the door unlocked warning light system. (Refer to Section 52-10).	X*	X	X	X		

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
6.	Examine the rear passenger door: - Make sure the door lock mechanism operate correctly. (Refer to Section 52-10). - If MÄM 40-139 is installed: Do a test of the passenger door handle compression gas spring. (Refer to Section 52-10). - Examine the acrylic glass window for damage. Look specially for cracks. - Examine the bonding between the window and the door frame. (Refer to Section 56-10).	X*	X	X	X		
7.	Examine the safety hook mechanism. (Refer to Section 52-10).	X	X	X	X		
8.	Examine the carbon hinges for cracks. (Refer to Section 52-10).	X	X	X	X		
9.	Examine the rear window on the RH side: - Examine the acrylic glass window for damage. Look specially for cracks. - Examine the bonding between the window and the frame. (Refer to Section 56-10).	X*	X	X	X		
10.	Examine all antennas. Look specially for damage and incorrect attachment.	X*	X	X	X		
11.	Remove the wheel fairings. Look for cracks on the fairing mounts. (Refer to Section 32-40).	X	X	X	X		
12.	Lift the airplane on jacks. (Refer to Section 07-10).	X	X	X	X		
13.	Examine the tires. Look specially for cuts and wear. Measure the tire pressure. (Refer to Section 12-10).	X	X	X	X		
14.	Examine the rims of the main and the nose wheels. Look specially for cracks and deformation of the flanges.	X*	X	X	X		
15.	Examine the wheel bearings. Look specially for play, corrosion and irregular operation.		X	X	X		

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**

16.	Remove the main and nose wheels.
	- Clean and lubricate the bearings (Refer to Section 12-20).
	- If OÄM 40-334 is installed:
	  - Remove axle, torque-plate and mounting plate on the MLG. If installed, mark position of shim for adjustment of wheel track and camber (Refer to Section 32-10).
	  - Clean axle attachment area on MLG strut and examine that area for cracks.
	  - Install axle, torque plate and mounting plate. Make sure that the shim for wheel track and camber adjustment is installed as it was prior to disassembly (Refer to Section 32-10).
		X*	X	X	X		

17.	Examine the brake lining. Look specially for wear. Minimum thickness according to Cleveland/Parker Maintenance Manual, latest revision.	X	X	X	X		
18.	Examine the brake disks. Look specially for wear. Minimum thickness according to Cleveland/Parker Maintenance Manual, latest revision.		X	X	X		
19.	Remove the access panels for the main landing gear legs. (Refer to Section 52-40)	**[||]**	X	X	X		
20.	Examine the mounting for the landing gear. Look specially for: - Incorrect attachment. - Loose / missing insert at outboard strut mounting. (Refer to Section 32-10). Re-glue to retaining bar if necessary. - Incorrect torque value of outboard mounting bolts. (Refer to Section 20-10). - Loose or missing lock devices.	**[||]**	X	X	X		
21.	Examine the main landing gear. Look specially for cracks and deformation.	**[||]**	X	X	X		
22.	Examine the wing main bolts. Look specially for incorrect locking.	X*	X	X	X		

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
23.	Examine these components on LH and RH sides for disbonding, delamination and damage: - The center section top and bottom shells. - The outer faces of the front and rear main bulkheads. Look specially in the area of the bushes for the main pins. - The front, middle and rear outer ribs. - The main landing gear ribs. - The front and rear closing ribs. - The rear web.			**[II]**	X		
24.	Examine the inner faces of the front and rear main bulkheads with the wings removed. Look specially in the area of the bushes for the main bolts. (See also Paragraph 6).				X		
25.	Install the access panels for the main landing gear legs. (Refer to Section 52-40).	**[II]**	X	X	X		
26.	Remove the access panel for the nose landing gear leg. (Refer to Section 52-40). Inspect the nose landing gear leg for cracks, corrosion, paint condition and deformation.	**[II]**	X	X	X		
27.	Examine the nose-wheel assembly. Look specially for incorrect attachment, cracks and deformation.	**[II]**	X	X	X		
28.	Examine the nose-gear journal-bearings in the bottom of the fuselage. Look specially for play.	**[II]**	X	X	X		
29.	Examine the journals in the elastomeric spring. Look specially for play (if OÄM 40-379 is NOT installed).	X	X	X	X		
30.	Examine the spherical bearing at the top of the elastomeric spring. Look specially for play (if OÄM 40-379 is NOT installed).	X	X	X	X		
31.	Examine the elastomeric spring (if OÄM 40-379 is NOT installed). Look specially for: - Looseness. Tighten if necessary. (Refer to Section 32-20). - Damage. Replace elastomer donuts if necessary. (Refer to Section 32-20).	X	X	X	X		

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**

32.	Examine the elastomer pack center tube (if OÄM 40-379 is NOT installed):
	- Remove elastomer pack. (Refer to Section 32-20).
	- Remove elastomer elements. (Refer to Section 32-20).
	- Examine elastomer pack center tube:
	  - If the center tube shows signs of deformation: Replace center tube (Refer to Section 32-20).
	  - If the center tube shows signs of wear: Replace center tube if a radial wear limit (depth measured) of 0.8 mm is exceeded.
	- Replace the elastomer elements in the event that they are worn or cracks are found. (Refer to Section 32-20).
	- Adjustment and installation of elastomer pack (Refer to Section 32-20).
				X	X		

33.	If OÄM 40-379 is installed: Examine the journals of the nose landing gear lower damper attachment. Look specially for play.	X	X	X	X		
34.	If OÄM 40-379 is installed: Examine the spherical bearing at the top of the damper. Look specially for play.	X	X	X	X		
35.	If OÄM 40-379 is installed: Examine the damper. Look specially for: - Damage of the damper assembly. - Looseness of spring (unloaded damper). - Leakage of damper assembly. - Damage or porosity of rubber stop.	X	X	X	X		
36.	If OÄM 40-379 is installed: Remove and examine the damper assembly and lower attachment brackets: - Check for damage. - Check for corrosion. - Check lower damper bearing. Refer to Section 32-20 for more information.			X	X		

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
37.	Remove the NLG fork (Refer to Chapter 32-20). Inspect the fork for cracks, corrosion and deformation. Look specially on the legs and filleted areas.	X	X	X	X		
38.	Visually examine the NLG fork collar bushings.	X	X	X	X		
39.	Inspect the NLG leg for cracks, corrosion and damage. Use a flashlight and a 10X magnifier. Pay special attention to the pivot axle (especially the radius at the top), filleted areas, and the threads at the bottom of the for pivot axle. If cracks are suspected, perform a fluorescent dye penetrant inspection in accordance with ASTM 1417 or equivalent method.	X	X	X	X		
40.	Inspect the stop plate for cracks and damage.	X	X	X	X		
41.	Install the NLG fork (Refer to Chapter 32-20-00)	X	X	X	X		
42.	Examine the nose-wheel fork. Do a test for play and caster friction. (Refer to Section 32-20): - The friction force should be 30 - 50 N (6.75 - 11.25 lbf) at the axle.	X	X	X	X		
43.	Install the main and nose wheels.	X*	X	X	X		
44.	Do a test for wheel track and camber. (Refer to Section 32-10).			X	X		
45.	Install the wheel fairings.	X	X	X	X		
46.	Examine all fuel system components: - Look specifically for signs of leakage and damage, chafings, or material deterioration. - Make sure they are correctly attached.	X	X	X	X		
47.	Examine the fuel pump electrical cables. Look specially for rub marks.	X*	X	X	X		
48.	Examine the top hat profile and the closing rib. Look specially for dis-bonding, delamination and damage.			[II]	X		
49.	Install the access panel for the nose landing gear leg. (Refer to Section 52-40).	[II]	X	X	X		

2. Cockpit:

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
	WARNING: DO NOT LOOSEN THE LEVER FOR THE ADJUSTABLE BACKREST OF THE FRONT SEATS UNINTENTIONALLY. THE SPRING LOADED BACKREST MAY SNAP FORWARD AND CAN CAUSE INJURY.						
1.	If the adjustable front seats (OÄM 40-252 or OÄM 40-375) are installed: - Do a test of the backrest adjustment mechanism on both front seats (refer to Section 25-10). - Do a test of the lumbar support mechanism on both front seats (refer to Section 25-10).	X*	X	X	X		
2.	Remove the front seats and the access panels in rear seat (if installed). (Refer to Section 25-10).	X*	X	X	X		
3.	Remove the rear seat shells. (Refer to Section 25-10).			X	X		
4.	Examine the seats for damage.	X*	X	X	X		
5.	Examine the safety belts. Make sure the lock mechanism operates correctly: - Insert the tongue into the buckle. - Pull on the strap. Make sure the ratchet holds the tongue in the buckle. - Operate the release button. The tongue must pull freely from buckle.	X*	X	X	X		
6.	Examine the cable ties and electrical connectors. Pull lightly to make sure they are not loose.	X*	X	X	X		
7.	Examine the control sticks. Make sure that the control stick attachments are not loose and do not catch.	X*	X	X	X		
8.	Examine the control stick stops.	X*	X	X	X		
9.	Examine the aileron and elevator control system. Look specially for incorrect attachment and loose or missing lock devices. (Refer to Sections 27-10 and 27-30).	X*	X	X	X		
10.	Examine the Pitot-static system water traps.	X*	X	X	X		
11.	Examine the stall-warning hose. Look specially for contamination by water. (Refer to Section 27-39).	X*	X	X	X		

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
12.	Examine the rudder pedals. Look specially for: - Incorrect attachment and function. - Corrosion and damaged surface protection. - Damaged adjustment mechanism. - Improper function of adjustment mechanism. (Refer to Section 27-20).	X*	X	X	X		
13.	Examine the rudder pedals S-tube. Look specially for: - Wear on cable inlets and outlets. - Wear in inner radius of tube (no deformation visible or tactile). (Refer to Section 27-20).	X*	X	X	X		
14.	Examine the rudder cables and pulleys. Look specially for: - Incorrect attachment and function. (Refer to Section 27-20). - Rub marks. - Defective safety plates. - Worn out pulleys.	X*	X	X	X		
15.	Examine the brake pipes/hoses and components. Look specially for leakage.	X	X	X	X		
16.	Examine the brake fluid reservoirs on the co-pilot's side. Make sure the fluid level is correct: - The fluid level must be 12 mm to 25 mm (½ in to 1 in) below the top face of the reservoir filler hole.	X*	X	X	X		
17.	Examine the instruments. Make sure that: - The markings are clear. - The function is correct. - Switches are correctly attached. - The instrument lights operate correctly.	X*	X	X	X		
18.	Examine the placards. Make sure that: - They are not damaged. - None are missing. (Refer to Chapter 11).	X*	X	X	X		
19.	Remove the instrument panel cover.	X*	X	X	X		

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
20.	Examine the instrument panel. Make sure that: - The wiring is correctly attached. - The instruments are correctly attached. - The hoses are correctly attached. - The circuit breakers are correctly attached. - The cooling fans are operative and correctly attached.	X*	X	X	X		
21.	Examine the emergency battery system (if installed): - Measure the voltage of the emergency battery on the EMERGENCY switch. Replace emergency battery if the voltage is below 30 V.	X*	X	X	X		
22.	Make sure that the seal on the EMERGENCY switch is intact.	X	X	X	X		
23.	Examine the alternate static valve. Make sure that: - The valve is correctly attached. - The valve is not blocked. - The hoses are correctly attached.	X*	X	X	X		
24.	Examine the compass. Make sure that: - The compass is correctly attached. - The fluid level is correct.	X*	X	X	X		
25.	Examine the controls in the center console. Make sure that for each control lever: - There is full and free movement. - There is no unusual play. - The friction is correct.	X*	X	X	X		
26.	Inspect universal joints in fuel selector shaft (upper and lower) very carefully for: - Excessive wear. - Uneven movement. - Pins not completely pressed in. - Loose pins.			X	X		

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
27.	Examine the control cables in the center console: - Remove the retaining screws for the center console cover plate. - Lift the center console cover plate and visually examine the cables. Look specially for wear and kinks in the cables. - Lower the center console cover plate into the correct position, install the retaining screws.	X*	X	X	X		
28.	Examine the trim control in the center console. Make sure that: - There is full and free movement. - There is no unusual play.	X*	X	X	X		
29.	If the autopilot system is installed, then examine the trim servo assembly. Look specially for: - Wear and corrosion. - Insecure attachment of servo. - Damaged, deformed, or worn out cardan shaft and chain gears. (Refer to Section 22-10 for GFC 700 autopilot or Section 22-11 for KAP 140 autopilot).	X*	X	X	X		
30.	Examine the front cockpit structure. Look for dis-bonding, delamination and damage, specially to these components: - The fuselage shells. - The firewall. - The floor. - The control bulkhead. - The fuel pipe channels. - The front main bulkhead. - The rear main bulkhead. - The inner faces of the front and rear closing ribs.				X		
31.	Check for damage, cracks, delamination and disbonding from the fuselage skin. Inspect the following components: - Front and rear seat crash elements.			X	X		

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
32.	If the emergency axe (OÄM 40-326) is installed: - Check attachments for looseness. - Check release mechanism for interference or improper function.		X	X	X		
33.	If the sun visors (OÄM 40-327) are installed: - Check for obvious damage. - Check press-studs for lack of retention force.		X	X	X		
34.	Examine the towing device system (if installed): - Check attachments for looseness. - Check release lever for proper function.		X*	X	X		
35.	Examine the Emergency Egress Hammer installation (if OÄM 40-401 is installed): - Check attachments for looseness. - Check release mechanism for interference or improper function.		X	X	X		

3. Center Fuselage, Internal

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
1.	Examine the fire extinguisher. Make sure that: - The fire extinguisher will release from the mounting bracket. - The fire extinguisher is full.	X*	X	X	X		
2.	Examine the cabin baggage compartment. Look specially for damage and insecure attachment. Inspect the following components: - Baggage compartment structure. - Baggage restraint net. - D-rings for the attachment of the baggage restraint net. - Door to the baggage extension. - Lid for the tray on the floor.	X*	X	X	X		
3.	If the autopilot system is installed, then examine the pitch servo assembly. Look specially for: - Wear and corrosion. - Insecure attachment of servo. - Defective bridle cable assembly. - Loose bridle cables or clamps on the elevator push-rod. (Refer to Section 22-10 for GFC 700 autopilot or Section 22-11 for KAP 140 autopilot).	X*	X	X	X		
4.	Examine the cable ties and electrical connectors. Pull lightly to make sure they are not loose.	X*	X	X	X		
5.	Examine the push rod guides for the elevator push-rod. Look specially for incorrect attachment and interference.	X*	X	X	X		
6.	Examine the flap control mechanism on the aft main bulkhead. Look specially for: - Damage and corrosion. - Incorrect attachment and loose or missing lock devices.	X*	X	X	X		
7.	Examine the flap-actuator indicator and position switches. Look specially for incorrect attachment and operation.	X*	X	X	X		

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
8.	Examine the aileron control system on the aft main bulkhead. Look specially for: - Damage and corrosion. - Incorrect attachment and loose or missing lock devices.	X*	X	X	X		
9.	If the autopilot system is installed, then examine the roll servo assembly. Look specially for: - Wear and corrosion. - Insecure attachment of servo. - Defective bridle cable assembly. - Loose bridle cables or clamps on the aileron push-rod. (Refer to Section 22-10 for GFC 700 autopilot or Section 22-11 for KAP 140 autopilot).	X*	X	X	X		
10.	Do a cable tension test of the rudder control cable. (Refer to Section 27-20).	X*	X	X	X		
11.	Examine the center fuselage structure. Look for dis-bonding, delamination and damage, specially to the fuselage shells.				X		
12.	Examine the baggage compartment frame. Look for dis-bonding, delamination and damage.			X	X		
13.	Do a coin-tap test for delamination of the center section of the top and bottom shells.					MSI	
14.	Examine the Garmin G1000 unit behind the baggage compartment frame, if installed. Look specially for: - Insecure cable ties and connections. - Insecure attachment.	X*	X	X	X		
15.	Check the following components for wear and/or corrosion, if installed: - Servo. - Servo mount (capstan). - Bridge cable assemblies.	X*	X	X	X		

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
16.	If the RACC system (OÄM 40-316) is installed: Examine the RACC central unit. Look specially for: - Insecure attachment of hoses, shrouds and cables. - Leakage of hoses. - Cleanness of drain tubes.	X	X	X	X		
17.	If the RACC system (OÄM 40-316) is installed: Examine the RACC central unit. Look specially for: - Defective bonding of side brackets. - Incorrect attachment of mounting panel. - Lack of mechanical stability of mounting panel. - Insecure attachment of RACC components to the mounting panel. - Insecure attachment of hoses, shrouds and cables.		X	X	X		
18.	If the RACC system (OÄM 40-316) is installed: Perform a leakage test.					1 Yr. ± 30 days	
19.	If the RACC system (OÄM 40-316) is installed: Check the condenser and evaporator for contamination and remove any accumulation of dust and dirt.	X*	X	X	X		

4. Rear Fuselage

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
1.	Examine the complete surface of the rear fuselage. Look specially for damage (dents, cracks, holes and delamination). Examine the paint coat.	X*	X	X	X		
2.	Do a coin-tap test for delamination of the fuselage shell.					MSI	
3.	If the RACC system (OÄM 40-316) is installed: Check the structure in the area of the RACC inlets and outlets for cracks, delamination and disbonding.				X		
4.	Examine the push rod guides for the elevator push-rod. Look specially for: - Incorrect attachment. - Interference.	X*	X	X	X		
5.	Examine the rudder-control cables and turnbuckles. Look specially for: - Corrosion and wear. - Incorrect lock devices.	X*	X	X	X		
6.	Examine the rear fuselage structure. Look for dis-bonding, delamination and damage specially to these components: - The fuselage shells. - Ring frames 1, 2 and 3.				X		

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
7.	Check static source holes for blockage.	X	X	X	X		
8.	Examine the ECU backup battery: - Check for leakage, damage, insecure mounting, and loose connectors. - Measure voltage (minimum: 24.5 Volts).	X*	X	X	X		
9.	If the RACC system (OÄM 40-316) is installed: Examine the RACC air inlets and outlets: - Check the air inlet filter for contamination. - Check the air inlets and outlets on the LH and RH side of the upper fuselage and at the bottom. - Check the RACC compartment ventilation filter on LH side fuselage for contamination (if installed). - Check evaporator drain on the bottom for blockage (if installed). Check the compartment fan for incorrect operation (if installed).	X*	X	X	X		

5. Tail

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
1.	Examine the complete surface of the aft part of the fuselage, vertical stabilizer, and horizontal stabilizer. Look specially for damage (dents, cracks, holes and delamination). Examine the paint coat.	X*	X	X	X		
2.	Examine the lower fin. Look specially for: - Damage to the bottom of the fin. - Incorrect attachment.	X	X	X	X		
3.	Remove the rudder. (Refer to Section 55-40).	X*	X	X	X		
4.	Examine the inside of the vertical stabilizer.				X		
5.	Inspect the inner skin of the vertical stabilizer through all access holes with mirror and flashlight. Check for damage, cracks and delamination. (Refer to Section 53-10).					MSI	
6.	Inspect the interior structure of the vertical stabilizer through all access holes with mirror and flashlight. Check for damage, cracks, delamination and disbonding from the vertical stabilizer skin. Look specially at these components: - Front web. - Rear web. - Lower rib (front and rear). - Structure next to holes for mounting brackets. (Refer to Section 53-10).					MSI	
7.	Examine the rudder mounting and control cable connections.	X*	X	X	X		
8.	Examine the rudder support bracket.	X*	X	X	X		
9.	Examine the bottom edge of the rudder. Look specially for cracks and deformation.	X*	X	X	X		
10.	Examine the rudder-stop reinforcement bars. Look specially for cracks and corrosion.	X*	X	X	X		
11.	Examine the trim mechanism. Look specially for: - Incorrect attachment. - Wear.	X*	X	X	X		

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
12.	Examine the trim tab for damage. Look specially for incorrect attachment and loose or missing lock devices. (Refer to Section 55-20).	X*	X	X	X		
13.	Adjust the friction of the trim mechanism.	X*	X	X	X		
14.	Examine the horizontal stabilizer: - Remove the fairing for the horizontal stabilizer. - Examine the mounting brackets. Look specially at the attachment bolts for corrosion. (Refer to Section 55-10).	X*	X	X	X		
15.	Remove the tips from the horizontal stabilizer: - Examine the interior of the horizontal stabilizer. Look specially for dis-bonding, delamination and damage to the shells, spars and ribs. - Install the horizontal stabilizer tips. (Refer to Section 55-10).				X		
16.	Remove the horizontal stabilizer. (Refer to Section 55-10).				MSI		
17.	Inspect the inner skin of the horizontal stabilizer through all access holes with mirror and flashlight. Check for damage, cracks, delamination. (Refer to Section 55-10).				MSI		
18.	Inspect the interior structure of the horizontal stabilizer through all access holes with mirror and flashlight. Check for damage, cracks, delamination and disbonding from the horizontal stabilizer skin. Look specially at these components: - Front spar. - Rear spar. - Trailing edge web. - Root rib (front, middle and rear). - All interior ribs and stiffeners. - Structure next to holes for mounting brackets. (Refer to Section 55-10).				MSI		
19.	Examine the elevator for damage. Look specially for incorrect attachment and loose or missing lock devices. (Refer to Section 55-20).	X	X	X	X		

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
20.	Examine the elevator hinges and control horn. Look specially for too much play. Play allowed: - Axial ± 1.00 mm (± 0.04 in). - Radial ± 0.25 mm (± 0.01 in).	X*	X	X	X		
21.	Examine the elevator push-rod: - Remove the elevator push-rod which goes through the rear fuselage. - Look specially for rub marks. - Install the push-rod. (Refer to Section 27-30).				X		
22.	Examine the structure of the vertical stabilizer. Look specially for dis-bonding, delamination and damage to the shells, spars and ribs.				X		
23.	Inspect the inner skin of the rear fuselage through all access holes with mirror and flashlight. Check for damage, cracks, delamination and disbonding from the sandwich foam. (Refer to Section 53-10).				MSI		
24.	Inspect the interior structure of the rear fuselage through all access holes with mirror and flashlight. Check for damage, cracks, delamination and disbonding from the fuselage skin. Look specially at these components: - Ring frames 1, 2 and 3.				MSI		
25.	Install the horizontal stabilizer. (Refer to Section 55-10).				MSI		
26.	Install the fairing for the horizontal stabilizer. (Refer to Section 55-10).	X*	X	X	X		
27.	Install the rudder. (Refer to Section 55-40).	X*	X	X	X		
28.	Examine the towing device system (if installed): - Clean and lubricate the system. - Check attachments for looseness. - Check release lever for proper function. Refer also to release device manufacturer's manual.		X*	X	X		

6. Wings

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
1.	Examine the complete surface of the wings. Look specially for damage (dents, cracks, holes and delamination). Examine the paint coat.	X*	X	X	X		
2.	Examine the ailerons. Look specially for damage (dents, cracks, holes and delamination).	X*	X	X	X		
3.	Examine the aileron hinges and horn. Look specially for too much play. Play allowed: - Axial ± 1.00 mm (± 0.04 in). - Radial ± 0.25 mm (± 0.01 in).	X*	X	X	X		
4.	Examine the aileron mass balance.	X*	X	X	X		
5.	Examine the flaps. Look specially for damage (dents, cracks, holes and delamination).	X*	X	X	X		
6.	Examine the flap hinges and horn. Look specially for too much play. Play allowed: - Axial ± 1.00 mm (± 0.04 in). - Radial ± 0.25 mm (± 0.01 in).	X*	X	X	X		
7.	Examine the flap mass balance.	X*	X	X	X		
8.	Remove the flap and aileron bellcrank access panels in the wing (Refer to Section 52-40). - Examine the aileron and flap control system. Look specially for incorrect attachment and loose or missing lock devices (Refer to Sections 27-10 and 27-50). - Visually check fuel tank bonding system through access panels for improper connections and damaged strips. - Install the access panels.	X*	X	X	X		
9.	Examine the Pitot head. Look specially for: - Incorrect attachment. - Damage. - Foreign objects.	X*	X	X	X		
10.	Remove the winglets. (Refer to Section 57-10).				X		

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
11.	Defuel the airplane (Refer to Section 12-10).			X	X		
12.	Remove the wings. (Refer to Section 57-10): - Examine the main bolts. - Grease the main bolts. - Examine the A-bolts. - Grease the A-bolts. - Examine the B-bolts. - Grease the B-bolts. (Refer to Section 12-20).				X		
13.	Inspect the inner wing skin through all access holes with mirror and flashlight. Check for damage, cracks, delamination and disbonding from the sandwich foam. (Refer to Section 57-10).				MSI		
14.	Inspect the interior structure of the wing through all access holes with mirror and flashlight. Check for damage, cracks, delamination and disbonding from the wing skin. Look specially at these components: - Front spar. - Rear spar. - Rear web. - Root rib (front, middle and rear). - End rib. - All interior ribs and stiffeners. (Refer to Section 57-10).				MSI		
15.	Inspect the wing shells: - Look carefully for signs of damage. - Look for dis-bonding between the shells and each spar, rib and web. - Do a coin-tap test for delamination of the shells. (Refer to Section 51-10 and 57-10).				X		
16.	Examine the aileron push-rods: - Remove the aileron push-rods from the wings. - Look specially for rub marks. - Install the aileron push-rods. (Refer to Section 27-10).				X		

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
17.	Examine the flap push-rods: - Remove the flap push-rods from the wings. - Look specially for rub marks. - Install the flap push-rods. (Refer to Section 27-50).				X		
	WARNING: **DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PEOPLE AND DAMAGE TO EQUIPMENT.**						
18.	Examine the fuel tank outlets: - Clean the finger filters. - Look for foreign matter. - Look for defective lock wire.				X		
19.	Remove the access covers.		X	X	X		
20.	Check condition of tank interconnecting hoses.		X	X	X		
21.	Check for leaks.	X	X	X	X		
22.	Collect a drain sample: - If sample is contaminated flush tank with removed drain valve.	X	X	X	X		
23.	Flush the tank: - Remove the drain valve. - Flush the fuel tank. - Check for debris and foreign objects. - Install the drain valve.			X	X		
24.	Install the access covers.		X	X	X		
25.	Examine the fuel tank vents for blockage. - Open fuel filler caps and carefully blow through the forward vent lines located on the lower wing shell vent cap from outside into the tank with compressed air.	X*	X	X	X		

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
26.	Examine the fuel tanks: - Remove the fuel tanks. - Look specially for corrosion, leaks and other damage. - Look for foreign objects in the tanks. - Look for material deterioration or damage of the flexible fuel hoses connecting the fuel tank chambers. - Install the fuel tanks. (Refer to Section 28-10).				X		
27.	Install the wings. (Refer to Section 57-10).				X		
28.	Do a function test of the fuel low-level switch: - Set the ELECTRIC MASTER key switch to ON. - The FUEL LOW on the G1000 (if installed) or LOW FUEL on the White Wire annunciator panel (if installed) caution message must appear. - Set the ELECTRIC MASTER key switch to OFF.			X	X		
29.	Examine the strobe and position lights for excessive scratches, discoloration or cracking on the lens.	X*	X	X	X		
30.	Install the winglets. (Refer to Section 57-10).				X		

7. General

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
1.	If necessary, inspect optional equipment. Refer to Chapter 9 of the Airplane Flight Manual (Supplements).	X	X	X	X		
2.	If necessary, inspect additional equipment (equipment which is installed but is not listed in Section 6.5 of the Airplane Flight Manual).	X	X	X	X		
3.	Lubricate the airplane. (Refer to Section 12-20).	X	X	X	X		
4.	Measure the play in the aileron and elevator controls with the control surfaces locked. (Refer to Section 27-30). Look specially for too much play. Do the test at the top of the control stick. - Maximum play allowed ± 2.5 mm (± 0.1 in). (Refer to Section 27-10).	X*	X	X	X		
5.	Check flight controls and engine controls for improper operation and installation.	X*	X	X	X		
6.	Do a function test of the aileron control system. (Refer to Section 27-10).				X		
7.	Do a function test of the rudder control system. (Refer to Section 27-20).				X		
8.	Do a function test of the elevator control system. (Refer to Section 27-30).				X		
9.	Do a function test of the trim-system. Look specially for incorrect operation and indication. (Refer to Section 27-38).				X		
10.	Do a function test of the flap system. (Refer to Section 27-50). Look specially at the pre-load. With the flaps set to UP: - Correct pre-load 3 - 5 daN (6.7 - 11.2 lbf).				X		
11.	Lower the airplane off jacks. (Refer to Section 07-10).	X*	X	X	X		
12.	Do an operational test of the external lights.	X*	X	X	X		
13.	Do an operational test of the Pitot heat.	X*	X	X	X		

	100 hr items marked X* apply to US registered airplane only	INTERVAL					
	INSPECTION ITEMS	**100**	**200**	**1000**	**2000**	**Time**	**Initials**
14.	Examine the airplane. Look specially for loose items and tools. Close all access panels. Install these items: - Engine cowling. - The instrument panel cover. - The seat shells. - The control-stick boots.	X	X	X	X		
	WARNING: DO NOT LET PERSONS INTO THE DANGER AREA OF THE PROPELLER. PROPELLERS CAN CAUSE INJURY OR DEATH. **WARNING: SET THE PARKING BRAKE TO ON. IF YOU DO NOT DO THIS THE AIRPLANE CAN MOVE. THIS CAN CAUSE INJURY OR DEATH.**						
15.	Put the chocks against the main airplane wheels.	X	X	X	X		
16.	Do the post maintenance engine test: - For the engine run procedures refer to the Airplane Flight Manual. - Record the data. Refer to AE Maintenance Manual, latest revision.	X	X	X	X		
17.	Examine the engine for leakage.	X	X	X	X		
18.	Make sure the engine oil filter is tight. Refer to Section 79-00 or AE Maintenance Manual, latest revision.	X	X	X	X		
19.	Do a check flight. Put the engine ground test and the flight test reports in the Airplane Maintenance Log.	X*	X	X	X		

NOTE: If a Maintenance Check was done, complete the Maintenance Report. Refer to Section 05-28-90.

NOTE: If a Major Structural Inspection (MSI) was done, complete the Findings Report for the Major Structural Inspection (MSI). Refer to Section 05-28-93.

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05-28-90 - MAINTENANCE REPORT

1. Maintenance Report

Complete a copy of the Maintenance Report after all of the applicable maintenance tasks in the Maintenance Checklist have been initialed.

DA 40 NG	
Airplane Serial Number:	Registration Number:
Check: _____ (100 hr., 200 hr., 1000 hr., 2000 hr., Annual)	
REMARKS:	
The airplane is airworthy with respect to its maintenance condition. _____ _____ _____ Place Date Authorized	

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05-28-91 - ENGINE GROUND TEST REPORT

1. Engine Ground Test Report

Do the engine test in accordance with Section 71-00 and record the results and comments.

WARNING: **DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS.**

WARNING: **MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU TURN THE PROPELLER. DISCONNECT THE SPARK PLUG LEADS. MAKE SURE THAT:**

- **THE ELECTRIC MASTER KEY SWITCH IS SET TO "OFF".**
- **THE ENGINE MASTER SWITCH IS SET TO "OFF".**
- **THE POWER LEVER IS SET TO "IDLE".**

WARNING: **DO NOT GET OIL ON YOU. OIL CAN CAUSE SKIN DISEASE.**

WARNING: **DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PEOPLE AND DAMAGE TO EQUIPMENT.**

WARNING: **WHEN YOU COMPLETE AN INSPECTION, MAKE SURE THAT YOU REMOVE ALL LOOSE ITEMS/TOOLS FROM THAT AREA. LOOSE ITEMS/TOOLS CAN PREVENT FULL MOVEMENT OF THE AIRPLANE CONTROLS. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.**

CAUTION: YOU MUST ATTACH BLANKS/CAPS TO HOLES/PIPES WHEN YOU REMOVE COMPONENTS. IF YOU DO NOT DO THIS, UNWANTED DEBRIS CAN ENTER THE HOLES/PIPES. THIS CAN CAUSE BLOCKAGE TO THE AIRPLANE SYSTEMS

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05-28-92 - CHECK FLIGHT REPORT

1. Check Flight Report

NOTE: The maintenance check flight must be done in accordance with the applicable national regulations.

	MAINTENANCE CHECK FLIGHT	DA 40 NG
Diamond AIRCRAFT	(See Maintenance Checklist for Applicability)	**Page 1 of 4**

Registration:	Pilot:	Airdrome:
Date:	Take-Off:	Landing:

Functional Check, Flight Behavior	**Findings**		
	N/A	**NO**	**YES**
Fuel quantity indicator			
Strobe Lights (ACL), Navigation lights			
Warning, Caution and Status lights			
Altimeter(s) (including G1000, if installed), QNH adjustment; autopilot: QNH adjustment (if KAP 140 is installed)			
Airspeed indicators (including G1000, if installed)			
Vertical speed indicator (including G1000, if installed)			
Attitude, Bank indicator (including G1000, if installed)			
Compass (G1000, if installed: slaved directional gyro; magnetic compass)			
Radio, radio check			
Audio panel, intercom			
Navigational instruments			
G1000 reversionary mode (if installed)			
Fuel transfer pump			
Fuel pumps			
Starter behavior			
Engine starting behavior, cold			
Oil pressure indicator			

Diamond AIRCRAFT	**MAINTENANCE CHECK FLIGHT** (See Maintenance Checklist for Applicability)	**DA 40 NG** **Page 2 of 4**

Registration:	Pilot:	Airdrome:
Date:	Take-Off:	Landing:

Functional Check, Flight Behavior	**Findings**		
	N/A	**NO**	**YES**
Fuel temperature indicator			
Fuel flow indication			
RPM indicator			
Engine oil temperature indicator			
Coolant temperature indicator			
Gearbox temperature indicator			
Instrument lighting			
Flood light			
Map light, overhead			
G1000 manual dim (if installed			
Parking brake			
Wing flaps			
Power lever			
Taxiing behavior, take-off behavior			
Behavior during climb			
Alternate static valve			
Alternate air valve			
OAT indicator			
Chronometer (clock)			
Transponder, modes A and C			
VOR, CDI			
ADF (if installed)			

	MAINTENANCE CHECK FLIGHT (See Maintenance Checklist for Applicability)	DA 40 NG Page 3 of 4

Registration:	Pilot:	Airdrome:
Date:	Take-Off:	Landing:

Functional Check, Flight Behavior	Findings		
	N/A	NO	YES
DME (if installed)			
GPS, GPS annunciation control unit (if installed)			
Autopilot (if GFC 700 is installed): - HDG mode. - FD. - FLC mode. - GA (go around) mode. - NAV mode (if required). - ALT / VS preselect and hold. - CWS (control wheel steering) button. - Disconnect (red button).			
Autopilot (if KAP 140 is installed): - HDG mode. - Wings level mode. - NAV mode (if required). - ALT / VS preselect and hold. - CWS (control wheel steering) button. - Disconnect (red button).			
Cabin heat / cabin air			
Behavior during high-speed flight			
Longitudinal trim / trim range			
Directional trim			
Lateral trim			
Behavior during slow-speed flight			
Pitot heat			

Diamond AIRCRAFT	**MAINTENANCE CHECK FLIGHT** (See Maintenance Checklist for Applicability)	**DA 40 NG** **Page 4 of 4**

Registration:	Pilot:	Airdrome:
Date:	Take-Off:	Landing:

Functional Check, Flight Behavior	**Findings**		
	N/A	**NO**	**YES**
Stall warning			
Localizer, glideslope			
Marker beacon receiver (if installed)			
Landing behavior			
Engine starting behavior, warm			
Engine shut-down behavior			

Remarks:

(Pilot)

05-28-93 - MAJOR STRUCTURAL INSPECTION - CHECK FINDINGS REPORT

1. General

Complete the Findings Report and report the following:

- Defects found during the Major Structural Inspection (MSI).
- Structural defects found during the associated 2000 hour inspection.
- All structural defects that were detected and repaired since new or since the last Major Structural Inspection (MSI).

Send a copy of the completed Findings Report to the manufacturer:

DIAMOND AIRCRAFT INDUSTRIES INC.

Office of Airworthiness

1560 CRUMLIN SIDEROAD, LONDON, ONTARIO, CANADA N5V 1S2

by Fax (1-519-457-4031)

By e-mail (customer support - techs@diamondair.com)

NOTE: The manufacturer will use the completed Findings Reports for the continuous improvement of the checklist for the Major Structural Inspection (MSI).

Enter the applicable data in the blocks below:

FINDINGS REPORT DA 40 NG AT MAJOR STRUCTURAL INSPECTION (MSI)	
REGISTRATION: _____	DATE: _____
AIRPLANE S/N: _____	AIRPLANE OPERATING HOURS: _____
MAINTENANCE ORGANIZATION:	AMM REV. USED FOR CHECK: _____
	SIGNATURE: _____

NO.	DEFECT/FINDING	REPAIR METHOD, REMARKS	AT TSN

NO.	DEFECT/FINDING	REPAIR METHOD, REMARKS	AT TSN

All defects have been repaired. The airplane is airworthy with respect to its maintenance condition.

PLACE: _____

DATE: _____

AUTHORIZED: _____

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05-50 - UNSCHEDULED MAINTENANCE CHECKS

1. General

Unscheduled maintenance checks are necessary after any incident that could cause damage to the airplane.

2. Hard Landing Check

Figure 1 shows the hard landing check areas. You must do a hard landing check when the pilot makes a report of a hard landing or when ground handling applies unusual loads.

A. Equipment

Item	Quantity	Part Number
Slide Sheets	4	Commercial

B. Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Remove the access panels for the main and nose landing gear.	Refer to Section 52-40.
(2)	Examine the landing gear fittings. Look specially for cracks.	Use a mirror and a flashlight.
(3)	Examine the fuselage structure where the landing gear attaches. Look specially for: - Delamination of the GFRP structure. - Damage to the mounting brackets.	Refer to Section 32-10.
(4)	Examine the landing gear struts. Look specially for: - Bending. - Cracks.	Refer to Section 32-10.
(5)	Do a test of the wheel tracking.	Refer to Section 32-10.
(6)	Examine the tires. Look specially for cuts in the side walls.	Refer to Section 32-40.
(7)	Examine the wheel rims. Look specially for cracks and deformation of the flanges.	
(8)	Examine the brake discs. Look specially for damage. Turn the wheel and make sure the disc is not bent.	

	Detail Steps/Work Items	Key Items/References
(9)	Examine the nose-gear assembly. Look specially for: - Deformation of the upper cross bar of the engine mount. - Nose wheel strut axle area. - Remove the fork assembly. (Refer to Section 32-20.) Use a flashlight and a 10X magnifier. Pay special attention to the pivot axle (especially the radius at the top, filleted areas, and the threads at the bottom of the fork pivot axle). If cracks are suspected, perform a fluorescent dye penetrant inspection in accordance with ASTM 1417 or equivalent method. - Install the fork assembly. Refer to Section 32-20.	
(10)	If OÄM 40-379 is NOT installed: Examine the elastomer pack center tube: - Remove the elastomer pack. - Remove elastomer elements. - Examine elastomer pack center tube: - If the center tube shows signs of deformation: Replace the center tube (Refer to Section 32-20). - If the center tube shows signs of wear: Replace the center tube if a radial wear limit (depth measured) of 0.8 mm (0.03 in) is exceeded. - Replace the elastomer elements in the event that they are worn or cracks are found. - Adjustment and installation of elastomer pack.	Refer to Section 32-20.
(11)	If OÄM 40-379 is installed: Remove and examine the damper assembly: - Check for damage. - Check for looseness of spring. - Check damper for leakage. - Check rubber stop for damage.	

	Detail Steps/Work Items	Key Items/References
	CAUTION: IF YOU THINK THE AIRPLANE HAS DAMAGE TO AN AREA THAT TRANSMITS A LOAD, YOU MUST ASK THE AIRPLANE MANUFACTURER FOR ADVICE.	
(12)	Examine the top hat profile and its closing rib in the bottom of the fuselage for delamination and disbonding. Look specially in the area of the bearings for the nose-gear assembly.	
(13)	Remove the load from the nose-gear and examine it. Look specially for more than the usual play.	
(14)	Examine the control surfaces. Look specially for: - Correct attachment of the hinges. - Correct attachment of the mass balance to the structure.	
(15)	Examine the leading edge of the wing for damage.	
(16)	Examine the area of the spar attachments to the wing shells. Look specially for cracks.	
(17)	Examine the leading edge of the horizontal and vertical stabilizers for damage.	
(18)	Examine the engine mount.	
(19)	Examine the engine mount points on the firewall.	
(20)	Examine the propeller. Look specially to see if the propeller has touched the ground..	
If the adjustable front seats (OÄM 40-252 or OÄM 40-375) are installed: **WARNING: DO NOT ENGAGE THE LEVER OR BUTTON FOR THE ADJUSTABLE BACKREST OF THE FRONT SEATS UNINTENTIONALLY. THE SPRING LOADED BACKREST MAY SNAP FORWARD AND CAN CAUSE INJURY.**		
(21)	If the adjustable front seats (OÄM 40-252 or OÄM 40-375) are installed: Do a test of the backrest adjustment mechanism on both front seats.	(Refer to Section 25-10).

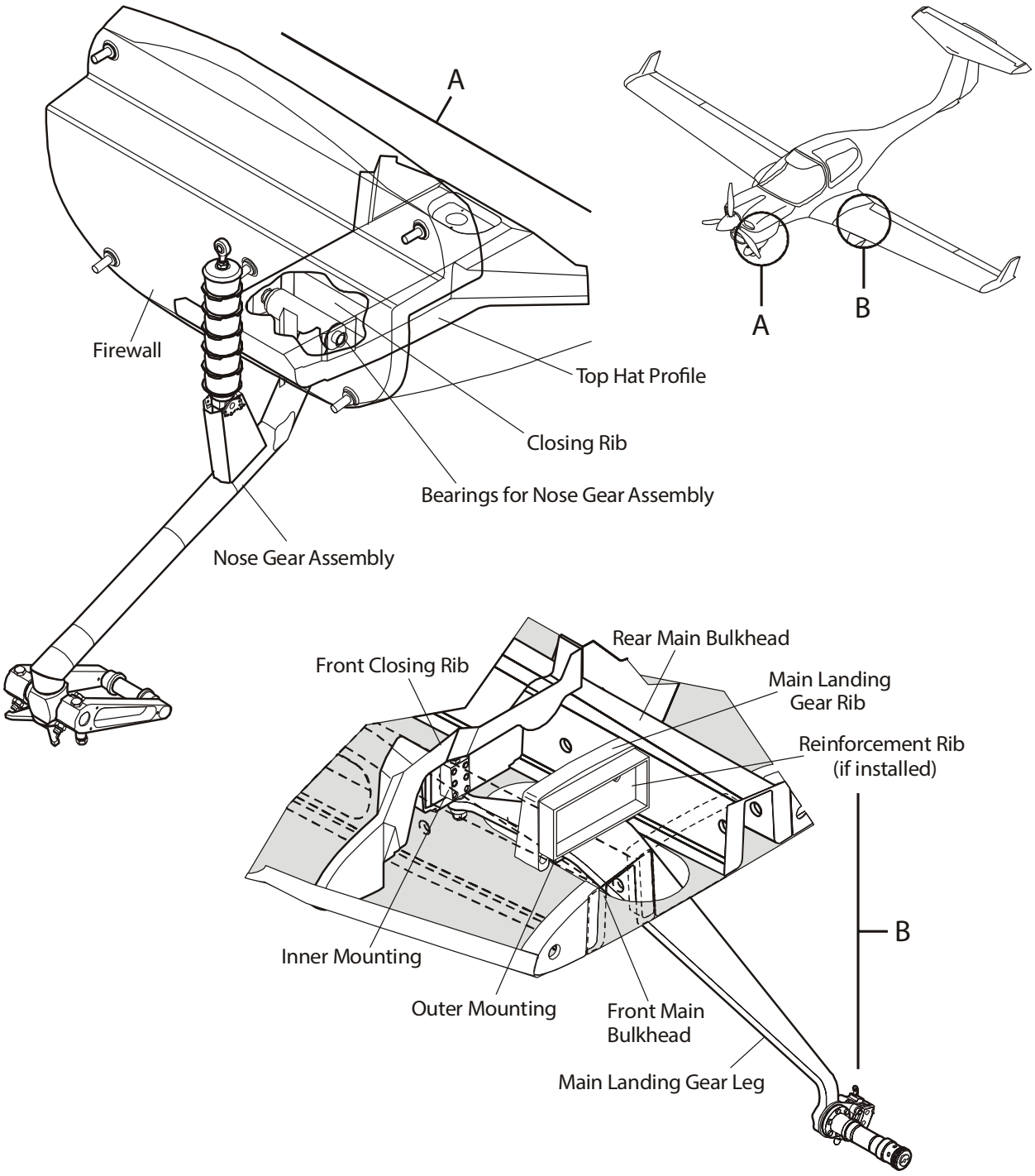

Figure 1 : Hard Landing Check Areas

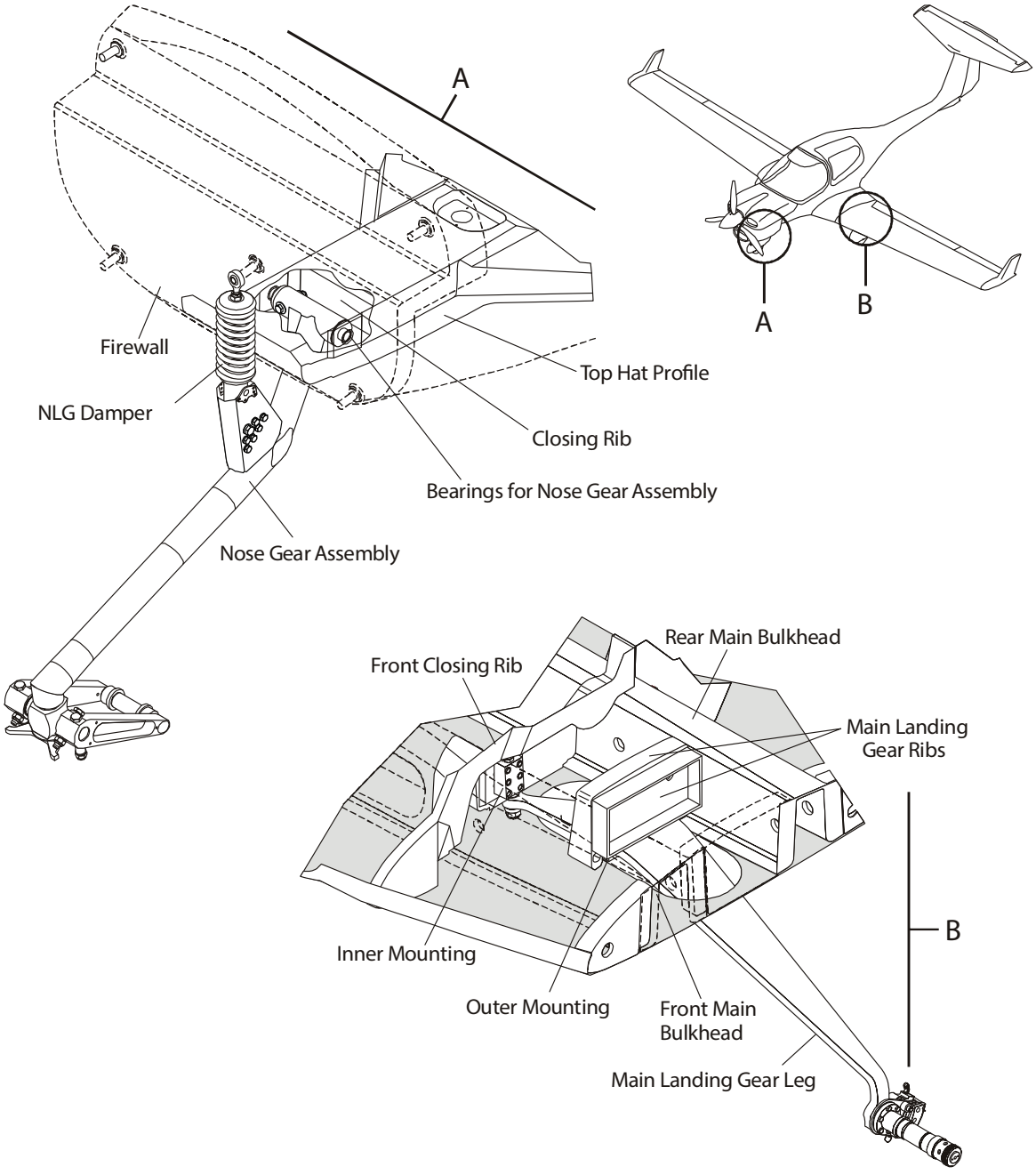

Figure 2 : Hard Landing Check Areas (if OÄM 40-379 is installed)

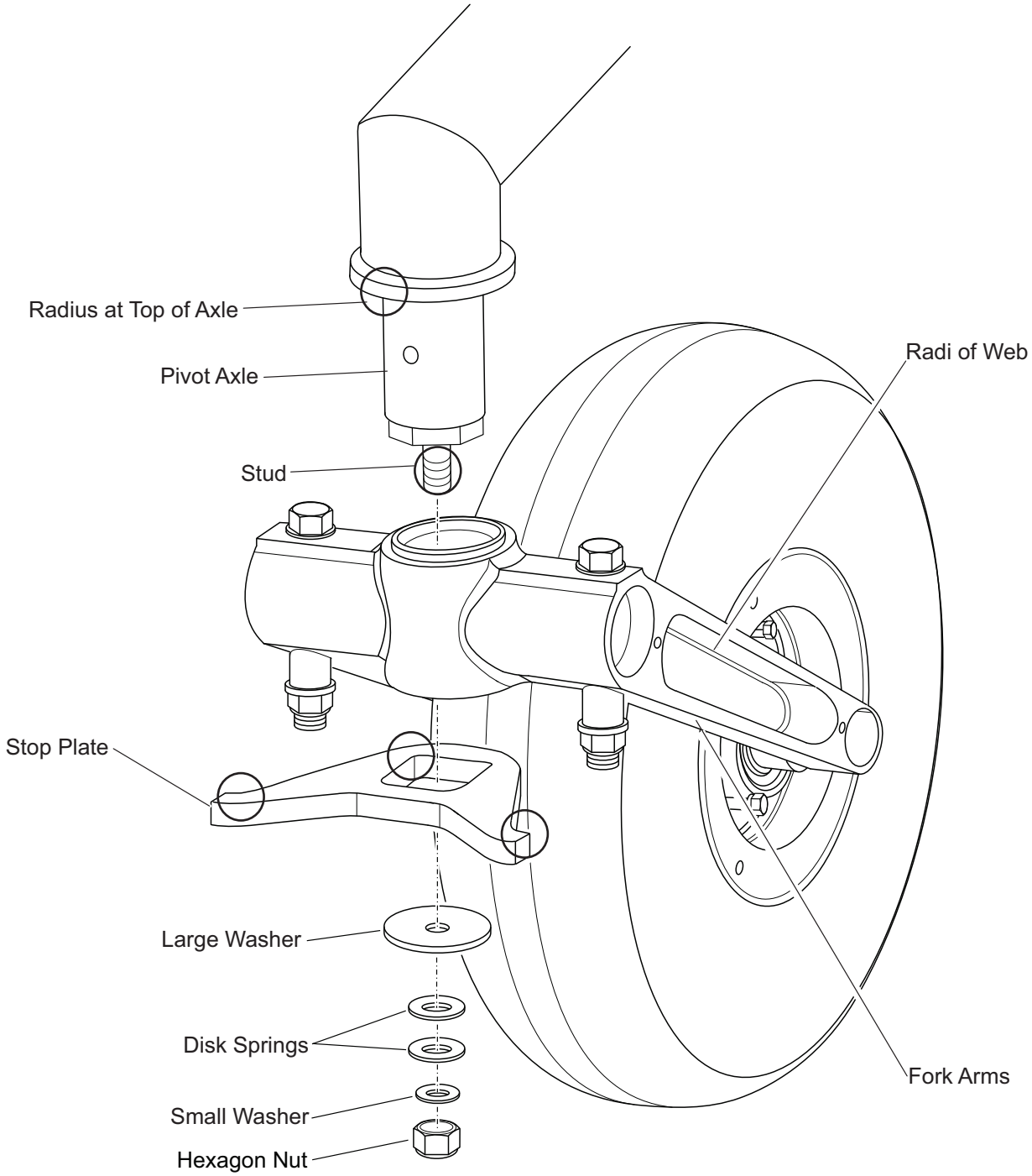

Figure 3 : Hard Landing Check Areas - NLG Fork Assembly

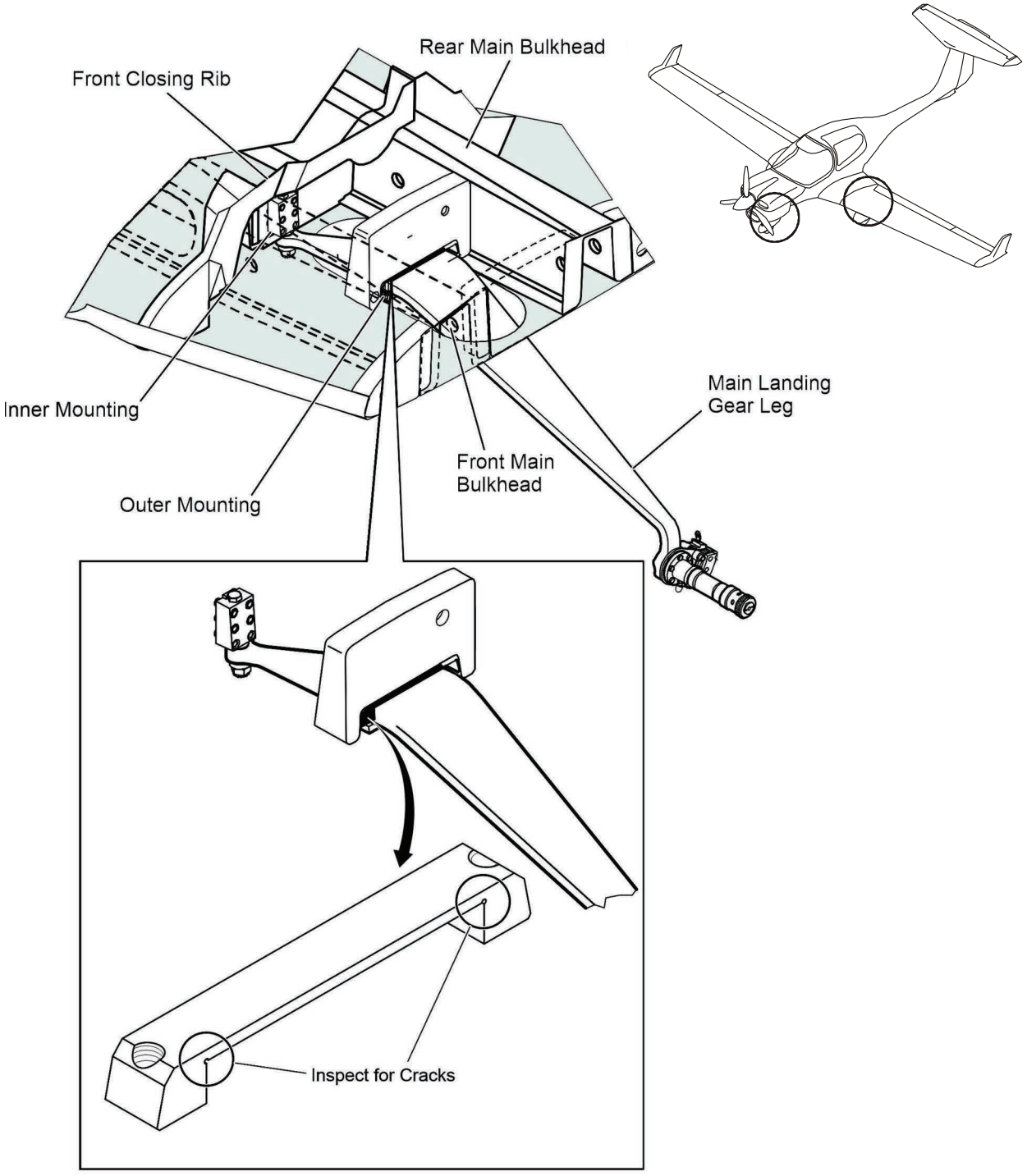

Figure 4 : Hard Landing Check Areas - MLG Support

3. Propeller Strike

A propeller strike can be a moving propeller (engine running) which has hit a solid object. Or it can be a moving object that hits a propeller that is not moving.

A. Propeller Strike with the Engine Running

If the propeller has hit a solid object while the engine was running:

	Detail Steps/Work Items	Key Items/References
(1)	Remove the propeller.	Refer to Chapter 61.
(2)	Proceed according to Austro Engine Maintenance Manual, latest revision.	
(3)	Do an inspection of the engine mount.	Refer to Section 71-20.
(4)	Do an inspection of the propeller.	Refer to the mt-Propeller Owner's Manual, latest revision.

B. Propeller is Hit by a Moving Object

If the propeller which is not moving is hit by a moving object:

	Detail Steps/Work Items	Key Items/References
(1)	Do an inspection of the propeller. If the propeller must be removed to do a repair other than minor dressing of the blades, you must do the inspection procedure specified for a moving propeller strike.	Refer to the mt-Propeller Owner's Manual, latest revision.
(2)	Inspect the airplane for damage.	

4. Engine Fire

WARNING: **BEFORE YOU DO WORK ON THE AIRPLANE MAKE SURE THE FIRE HAS BEEN EXTINGUISHED. LET THE ENGINE COOL AND DISCONNECT THE BATTERY.**

WARNING: **FIRE CAN SERIOUSLY WEAKEN CFRP. IF YOU FIND ANY DAMAGE TO CFRP, DO NOT OPERATE THE AIRPLANE. ASK THE MANUFACTURER FOR ADVICE.**

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-10.
(2)	Disconnect the airplane batteries (main battery and ECU backup battery).	Refer to Section 24-31.
(3)	Examine the engine cowlings. Look specially for signs of fire damage.	
(4)	Examine the electrical cables. Look specially for signs of fire damage.	Replace damaged cables.
(5)	Examine the fuel lines. Look specially for signs of fire damage to the fire-protection sleeves.	Replace damaged fuel lines.
(6)	Examine the engine oil lines. Look specially for signs of fire damage to the fire-protection sleeves.	Replace damaged oil lines.
(7)	Examine the engine. Look specially for: - Damage to the engine air filter. - Damage to gaskets and seals. - Damage to the engine shock mounts. - Damage to the engine mount. - Damage to pipes/hoses.	Make a record of the damage you find and ask the engine manufacturer for advice before you repair or operate the engine.
(8)	Examine elastomer pack or damper assembly for damage.	Replace damaged elastomer pack or damper assembly.
(9)	Examine the fuselage compartment. Look specially for: - Blisters on the paint or burn marks. - Disbonding of the nacelle skin from the firewall. If you find any damage, ask the airplane manufacturer for advice.	

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT GET FIRE EXTINGUISHER PARTICLES ON YOU. THE CHEMICALS USED TO EXTINGUISH A FIRE CAN BE CAUSTIC/ POISONOUS. WHEN YOU CLEAN THE ENGINE REFER TO THE FIRE EXTINGUISHER MANUFACTURER'S SAFETY INSTRUCTIONS. USE SAFETY MASKS AND GLOVES AS RECOMMENDED.	
(10)	Clean the engine. Make sure you clean all the fire extinguisher particles from the engine.	Refer to the manufacturer of the fire extinguisher.
(11)	Connect the airplane batteries (main battery and ECU backup battery).	Refer to Section 24-31.
(12)	Trouble-shoot the engine. Find the cause of the engine fire. Repair the defect if possible.	Ask the engine manufacturer for advice before you repair or operate the engine.
(13)	Install the engine cowlings.	Refer to Section 71-10.
(14)	Do an engine test.	Refer to the AE Maintenance Manual, latest revision.

5. Lightning Strike

A lightning strike usually enters the airplane at one point and leaves the airplane at another point. These points are called "attachment points". You usually find these points at the extremities of the airplane. You will often find the most damage to the airplane occurs at the attachment points. There can be more than two attachment points.

When a lightning strike is reported you must do the inspection procedure at Sub-paragraph D before the next flight.

A. Group 1 Damage

Group 1 damage is the direct damage caused by the lightning strike. To find this damage you must carefully examine all the external s urface of the airplane. Look specially for burn marks, holes, discoloration or other physical damage. If you find this damage you must remove panels or equipment to look for damage on the inside of the airplane. Look specially around the area of the external damage.

You must also examine the airplane lightning protection system. Look specially for signs of heat damage or distortion to the conduction tubes and bonding strips. Also look for heat damage in the structures around the conduction tubes and bonding s trips . Refer to Section 51-80 for data about the lightning protection system.

B. Group 2 Damage

Group 2 damage is the indirect damage caused by the lightning strike. It is mostly caused by the electromagnetic fields associated with lightning strikes. The electromagnetic fields can induce temporary voltages into the wiring system. These temporary voltages can cause damage to the electrical and electronic components of the airplane. Refer to the Wiring Diagrams for data about the electrical wiring.

NOTE: If you find any lightning damage you must make a record of the damage and ask Diamond Aircraft for advice before you repair or operate the airplane.

C. Equipment

Item	Quantity	Part Number
Bonding Tester	1	Commercial

D. Lightning Strike Inspection

	Detail Steps/Work Items	Key Items/References
(1)	Examine the surface of the complete fuselage assembly. Look specially in these areas: - Propeller and spinner. - Exhaust pipes. - Engine breather. - Canopy handles. - Antennas. - Static discharge wicks. - Vertical fin tip. - Rudder. - Lower fin.	If you find any damage you must examine the airplane internally, specially in the area of the external damage. Make a record of the damage you find and ask Diamond Aircraft for advice before you repair or operate the airplane. If you find any sign of a lightning strike on the propeller, spinner, exhaust pipe or engine breather remove the engine from the airplane and send it back to Austro Engine GmbH. Refer to Section 71-00 for engine removal.
(2)	Examine the surface of the left wing for lightning damage. Look specially in these areas: - Pitot head. - Static discharge wicks. - Wing tip. - Strobe lights. - Wing tip light assembly. - Wing trailing edge. - Aileron trailing edge. - Flap trailing edge. - Aileron horn. - Flap horn.	If you find any damage you must examine the airplane internally, specially in the area of the external damage. Make a record of the damage you find and ask Diamond Aircraft for advice before you repair or operate the airplane.

	Detail Steps/Work Items	Key Items/References
(3)	Examine the surface of the right wing for lightning damage. Look specially in these areas: - Wing tip. - Static discharge wicks. - Strobe lights. - Wing tip light assembly. - Wing trailing edge. - Aileron trailing edge. - Flap trailing edge. - Aileron horn. - Flap horn.	If you find any damage you must examine the airplane internally, specially in the area of the external damage. Make a record of the damage you find and ask Diamond Aircraft for advice before you repair or operate the airplane.
(4)	Examine the surface of the horizontal stabilizer for lightning damage. Look specially in these areas: - Horizontal stabilizer tip. - Static discharge wicks. - Trailing edge. - Elevator trailing edge. - Trim tab.	If you find any damage you must examine the airplane internally, specially in the area of the external damage. Make a record of the damage you find and ask Diamond Aircraft for advice before you repair or operate the airplane.
(5)	Examine the main landing gear. Look specially in these areas: - Wheel fairings. - Main gear leg attachment points.	Refer to Section 32-10.
(6)	Examine the nose landing gear. Look specially in these areas: - Wheel fairing. - Nose gear attachment points.	Refer to Section 32-20.
(7)	Operate the flight controls through their complete range of movement. Look specially for: - Stiff or unusual feel during movement. - Restriction of movement. - Noisy operation.	Refer Section 27-00.

	Detail Steps/Work Items	Key Items/References
(8)	Examine the metal conduction tubes and bonding strips in the fuselage and in the wings. Look specially for: - Heat damage or discoloration. - Fusion of bonding joints. - Burn or scorch marks to the structure around the conduction tubes. Use the bonding tester when you are not able to see the whole length of a tube or bonding strip.	Make a record of any damage you find and ask Diamond Aircraft for advice before you repair or operate the airplane. Refer to Section 51-80. Follow the instructions of the tester manufacturer. The resistance must be in accordance with Section 51-80.

(9)	Do a test of these lighting systems:
	- External lights:
	  - Navigation lights.
	  - Strobe lights.
	  - Landing light.
	  - Taxi light.
	- Internal lights:
	  - Instrument panel lights.
	  - Instrument flood lights.
	  - Dome lights.
		Refer to Section 33-40.
		Refer to Section 33-10.

(10)	Do a test of the Pitot heat system.	Refer to Section 34-10.
(11)	Do a test of the Garmin G1000 system (if installed): - Check all functions on the G1000 system.	Refer to the Garmin G1000 Line Maintenance Manual, latest revision.
(12)	Do a test of these communication systems: - COM VHF. - Intercom.	
(13)	Do a test of these attitude and direction systems: - Magnetic compass. - Directional gyro. - Artificial horizon. - Turn & bank indicator.	
(14)	Operate the engine power controls through their range of movement. Look specially for: - Stiff or unusual feel during movement. - Restriction of movement. - Noisy operation.	Refer to Section 76-10.

	Detail Steps/Work Items	Key Items/References
(15)	Do a visual check of engine bondings and wirings.	
(16)	Operate the cockpit heating controls through their range of movement. Look specially for: - Stiff or unusual feel during movement. - Restriction of movement. - Noisy operation.	Refer to Section 21-40.
(17)	Operate the parking brake control through its range of movement. Look specially for: - Stiff or unusual feel during movement. - Restriction of movement. - Noisy operation.	Refer to Section 32-40.
(18)	Do an engine run-up. Look specially for abnormal operation of the following systems: - Engine indicating systems. - DC generation.	Refer to Section 71-00. Refer to Section 31-00. Refer to Section 24-30.
(19)	Do an ECU test.	Refer to Section 71-00.
(20)	Do an ECU VOTER test.	Refer to Section 71-00.
(21)	Contact the engine manufacturer.	
(22)	Do a compass check swing.	

6. Over Temperature

	Detail Steps/Work Items	Key Items/References
(1)	Check the fluid level and leakage.	
(2)	Check data and oil sample and send it to Austro Engine GmbH.	

7. High Oil Consumption

	Detail Steps/Work Items	Key Items/References
(1)	Check engine for oil leakage.	
(2)	Check the compression.	

8. Oil Pressure Loss

	Detail Steps/Work Items	Key Items/References
(1)	Check the oil quantity.	
(2)	Check the indication.	
(3)	Check the wiring.	
(4)	Check if negative g-load flights have been conducted. (Visual inspection of the breather outlet for oil contamination).	

9. Hang Start

	Detail Steps/Work Items	Key Items/References
(1)	Check the voltage.	
(2)	Check the battery condition.	
(3)	Read out data and send to Austro Engine GmbH.	

CHAPTER 06
DIMENSIONS AND AREAS

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DIMENSIONS AND AREAS

1. General

The DA 40 NG uses the System Internationale (SI) for dimensions and areas. Imperial dimensions are also given in brackets. For example: Wing span 11.63 m (38.16 ft).

Conversions between SI units and imperial units are given in Chapter 02.

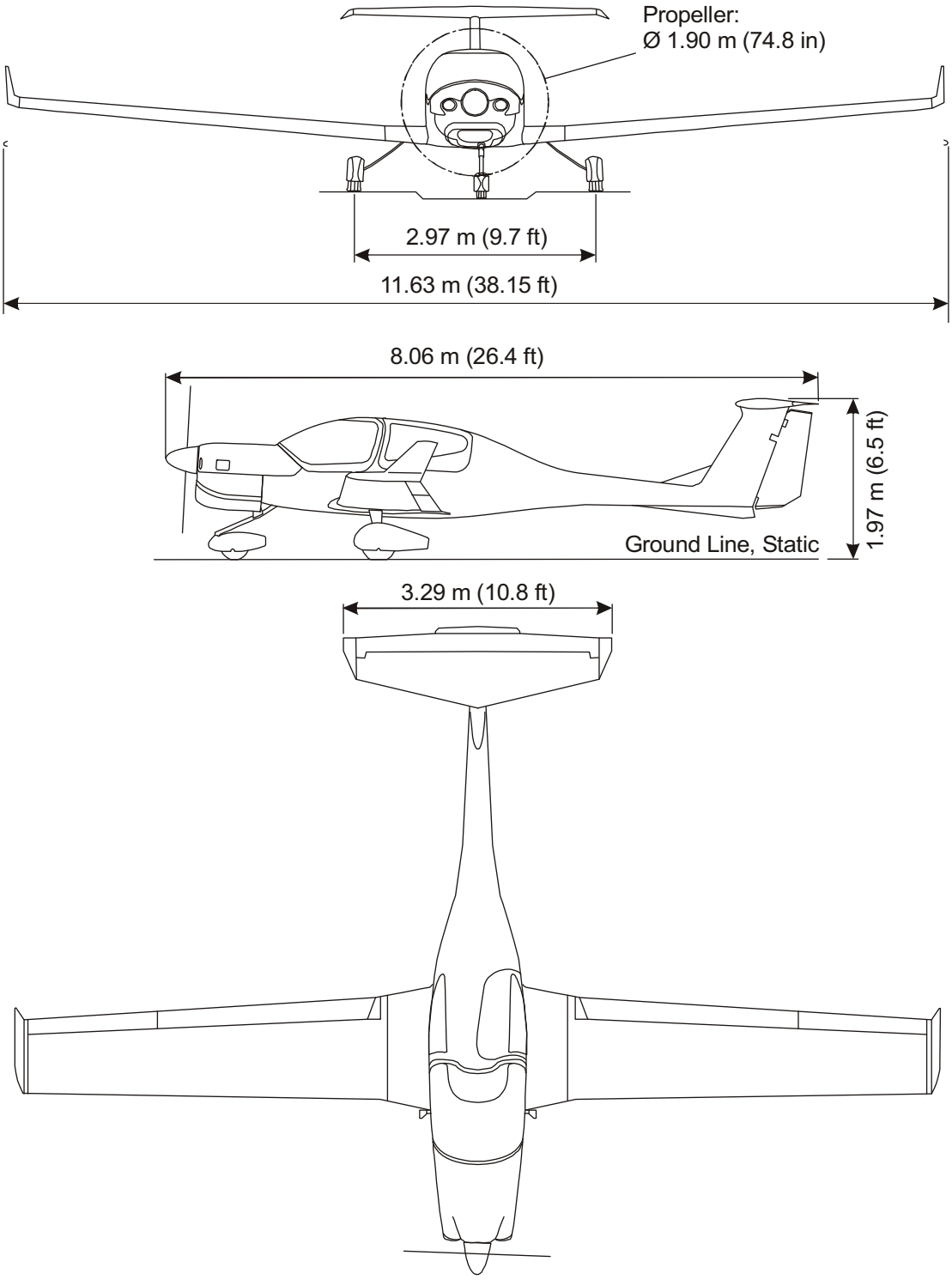


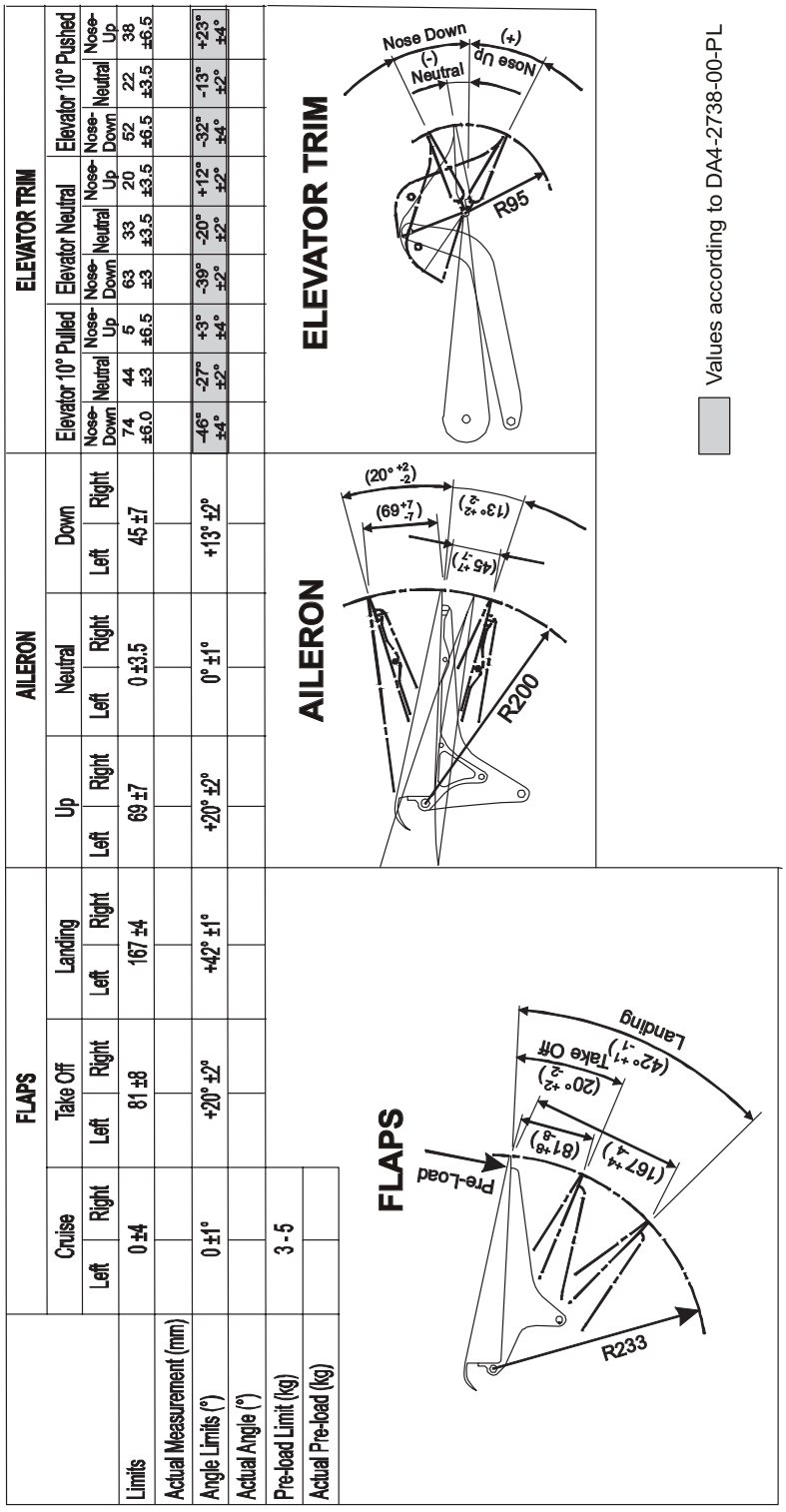
Figure 1 : DA 40 NG - Overall Dimensions (Approximate Values)

DA 40 NG	
Overall Dimensions	
Wing span	11.63 m (38.16 ft)
Length	8.06 m (26.44 ft)
Height (nominal)	1.97 m (6.46 ft)
Wing	
Airfoil	Wortmann FX 63-137/20-W4
Wing area	13.244 m^2 (142.6 ft^2)
Dihedral (nominal)	5°
Angle of incidence (nominal)	0°
Horizontal Tail Surfaces	
Span	3.29 m (10.79 ft)
Angle of incidence	-3.0° relative to longitudinal axis of airplane
Landing Gear (Typical Static, Normal Load)	
Wheel track	2.97 m (9.74 ft)
Wheel base	1.72 m (5.64 ft)
Wheel base (if MÄM 40-631 is installed)	1.88 m (6.17 ft)
Wheel base (if OÄM 40-334 or MÄM 40-574 are installed)	1.79 m (5.87 ft)
Nose wheel tire	5.00-5; 6 PR, TT, 120 mph
Nose wheel tire (if OÄM 40-334 is installed)	Goodyear 6.00-6; 6 PR, TT
Main wheel tire	15x 6.0-6; 6 PR, TT, 160 mph
Main wheel tire (if OÄM 40-334 is installed)	Goodyear 8.50-6; 6 PR, TT

2. Adjustment Values

The measurements of the DA 40 NG are recorded on an Adjustment Report at the factory when the airplane is built. See Figure 2 and 3. These Reports become part of the airplane records.

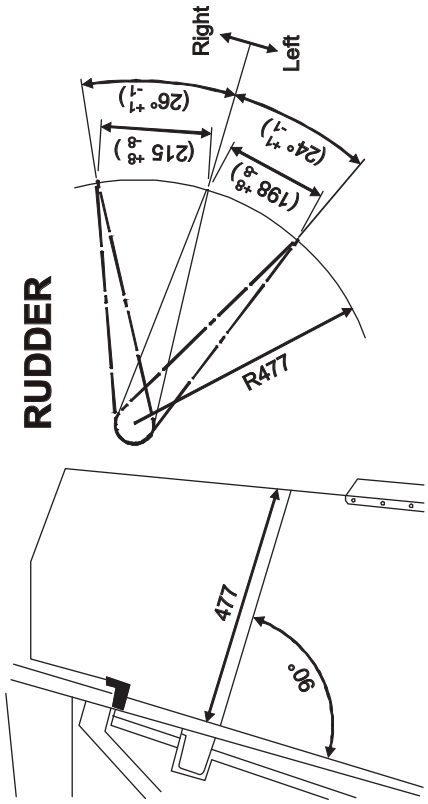
When you measure the dimensions, use the Adjustment Report as a reference for deviations.



	FLAPS						AILERON						ELEVATOR TRIM									
	Cruise		Take Off		Landing		Up		Neutral		Down		Elevator 10° Pulled			Elevator Neutral			Elevator 10° Pushed			
	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Nose-Up	Neutral	Nose-Down	Nose-Up	Neutral	Nose-Down	Nose-Up	Neutral	Nose-Down	
Limits	0 ±4		81 ±8		167 ±4		69 ±7		0 ±3.5		45 ±7		5 ±6.5	44 ±3	74 ±6.0	20 ±3.5	33 ±3.5	63 ±3	38 ±6.5	22 ±3.5	52 ±6.5	
Actual Measurement (mm)																						
Angle Limits (°)	0 ±1°		+20° ±2°		+42° ±1°		+20° ±2°		0° ±1°		+13° ±2°		-46° ±4°	-27° ±2°	+3° ±4°	+12° ±2°	-20° ±2°	-39° ±2°	+23° ±4°	-13° ±2°	-32° ±4°	
Actual Angle (°)																						
Pre-load Limit (kg)	3 - 5																					
Actual Pre-load (kg)																						

Figure 2 : Control Surface Adjustment Report (Sheet 1 of 2)

RUDDER	Right	215 ±8	+26° ±1°
	Left	198 ±8	+24° ±1°



ELEVATOR	Lower	71 +4/-0	+17° +1°/-0°
	Upper	88 +0/-4	+21° +0°/-1°

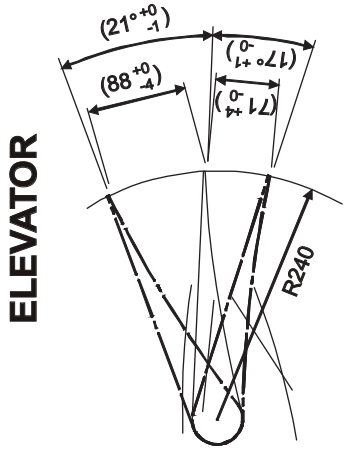


Figure 3 : Control Surface Adjustment Report (Sheet 2 of 2)

Diamond AIRCRAFT	**Adjustment Report DA 40 NG**	Registration
Date	Prepared by Signature	Serial Number

	Wings				Horizontal Stabilizer	Main Landing Gear (at Empty Weight, on Glide Sheets)					Rudder Controls
	Leading Edge Sweep Back		Dihedral (Wing Supported)		Angle of Incidence	Camber		Toe			Cable Tension
	Left	Right	Left	Right		Left	Right	Left	Right	Differ-ence	
Nominal	1.0° ± 0.2°	1.0° ± 0.2°	5.0 ° ± 0.25°	5.0° ± 0.25°	3.0° + 0.0° / - 0.2°	1° to 4°	1° to 4°	0° to ±1°	0° to ±1°	max. 1°	15 daN (33.7 lb) ± 2 daN (± 4.5 lb)
Actual											

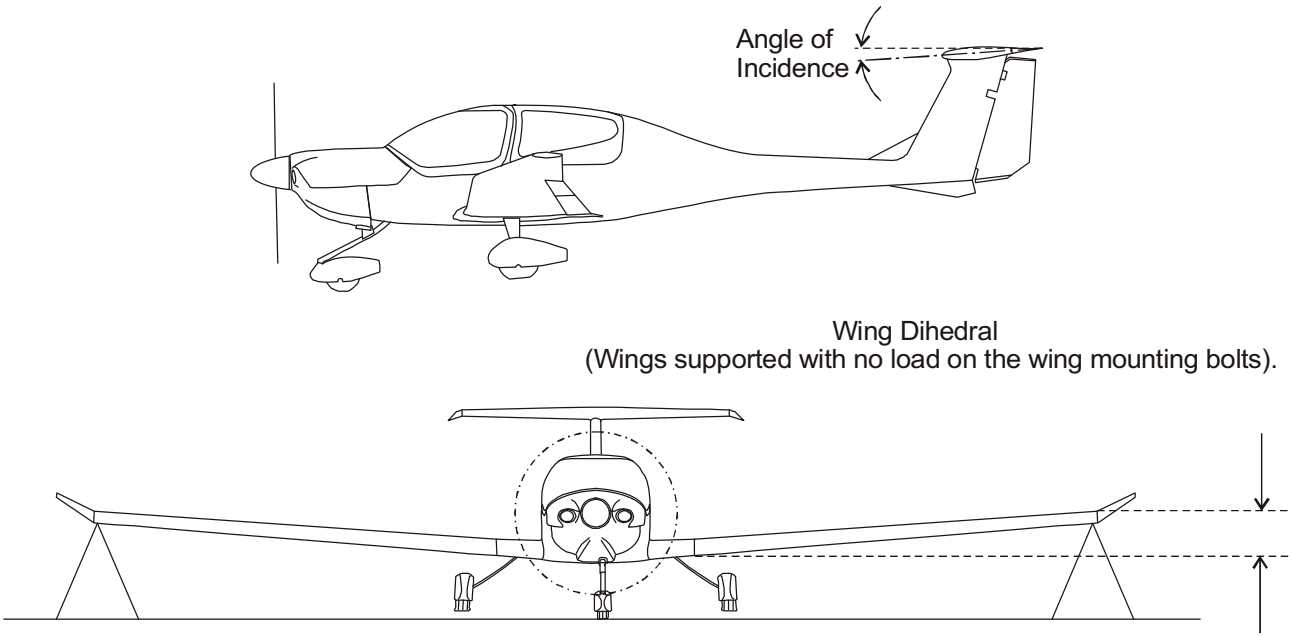
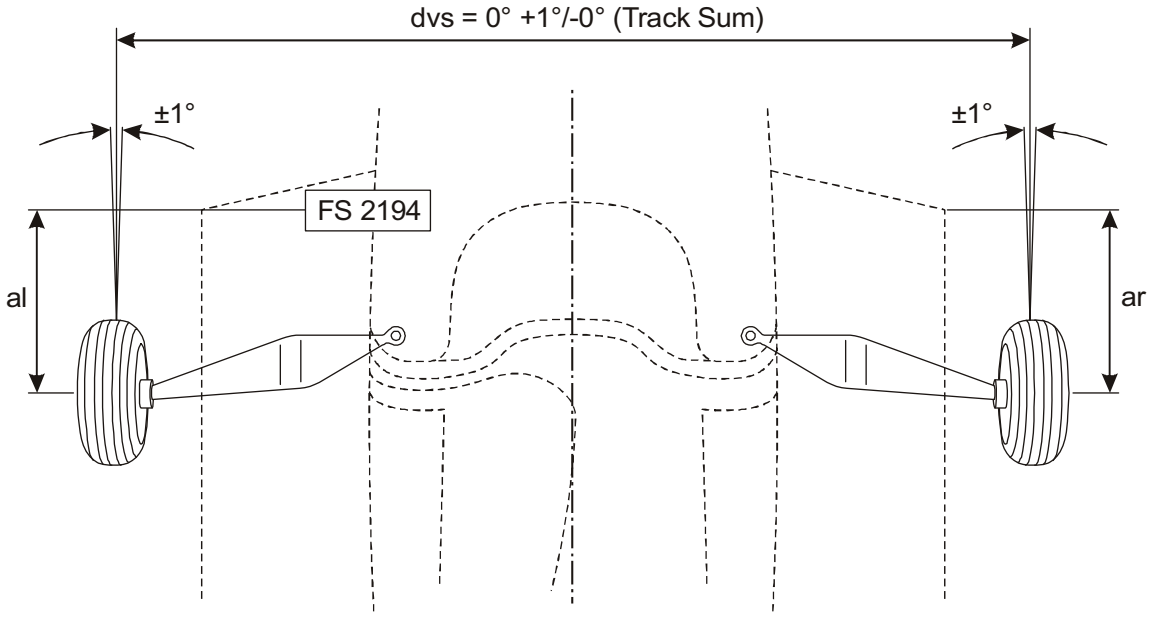


Figure 4 : Adjustment Report - General Items

Main Landing Gear Wheel Track and Camber Report (for test/adjustment procedure refer to Section 32-10 Paragraph 3)		
	CHECK PROCEDURE	**MEASURED DATA**
(1)	Perform check at empty weight (fuel tank empty)	
(2)	Set airplane MLG wheels on relocatable plates (2 steel plates 250 x 300 x 2 mm; use grease between steel plates to reduce friction)	
(3)	Use either a track/camber fixture or perform the check manually	
	Measure the Wheel Track	
(4)	Track LH wheel	dvsl = _____ °
(5)	Track RH wheel	dvsr = _____ °
(6)	Angle between LH and RH wheel (dvsl + dvsr)	dvs = _____ °
	Measure Wheel Camber	
(7)	Camber LH wheel	gl = _____ °
(8)	Camber RH wheel	gr = _____ °
	Measure the Track Width	
(9)	Overall track width	S = _____ mm
(10)	Axis distance LH wheel	al = _____ mm
(11)	Axis distance RH wheel	ar = _____ mm



Main Landing Gear Loaded with Empty Weight

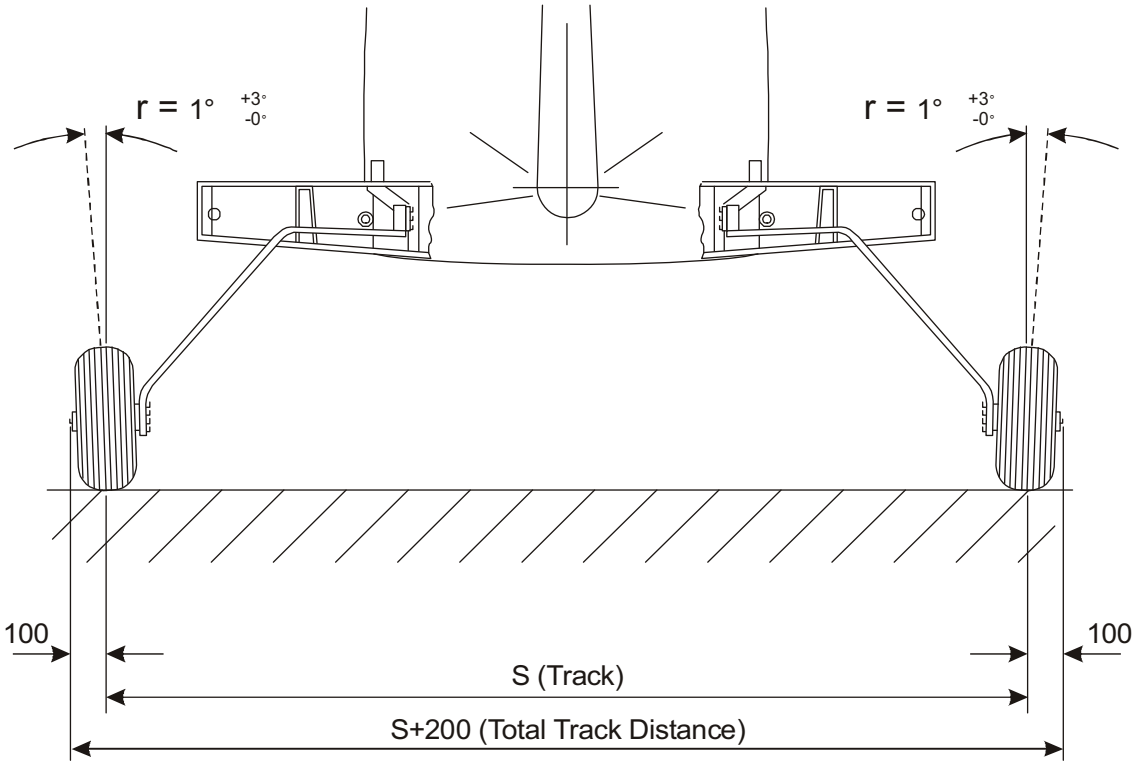


Figure 5 : Main Landing Gear - Track and Camber

3. Weight and Static Moments of Control Surface

WARNING: **IF YOU REPAINT (OR DO REPAIRS TO) THE CONTROL SURFACES, YOU MUST MAKE SURE THAT THE WEIGHTS AND STATIC MOMENTS OF THE CONTROL SURFACES ARE IN THE LIMITS IN THE CONTROL SURFACE BALANCING REPORT. THIS WILL PREVENT CONTROL SURFACE FLUTTER.**

To measure the static moments you must remove the control surface from the airplane. Refer to Section 51-60 for the measuring procedures.

If the values are not within the limits in the Control Surface Balancing Report, you must ask the manufacturer for advice before you adjust the balancing weight.

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CHAPTER 07
LIFTING AND SHORING

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LIFTING AND SHORING

1. General

The DA 40 NG has no hoisting points. Use straps to lift the airplane.

You can use your hands to lift the wings and the horizontal stabilizer.

Section 07-10 tells you how to lift the airplane with jacks..

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JACKING

1. General

The DA 40 NG has three jacking points. There are main jacking points under each stub-wing. The tie-down hole in the lower fin makes the tail jacking point. For maintenance lift the fuselage with the three hydraulic jacks. Use a trestle with a special former to hold the front of the fuselage. Use standard trestles under the wings at the position where the tips connect to the wing. Refer to Figure 1.

WARNING: IF THE WIND SPEED IS MORE THAN 10 KM/H (6 KNOTS), DO NOT LIFT THE AIRPLANE ON JACKS OUTDOORS. IF YOU DO THIS, IT COULD CAUSE DAMAGE TO THE AIRPLANE AND/OR INJURY TO PERSONNEL.

2. Lifting the Airplane on Jacks

A. Equipment

Item	Quantity	Part Number
Airplane jacks (800 kg / 1764 lb minimum lifting capacity).	3	Commercial
Nose trestle.	1	Commercial
Wing trestles.	2	Commercial

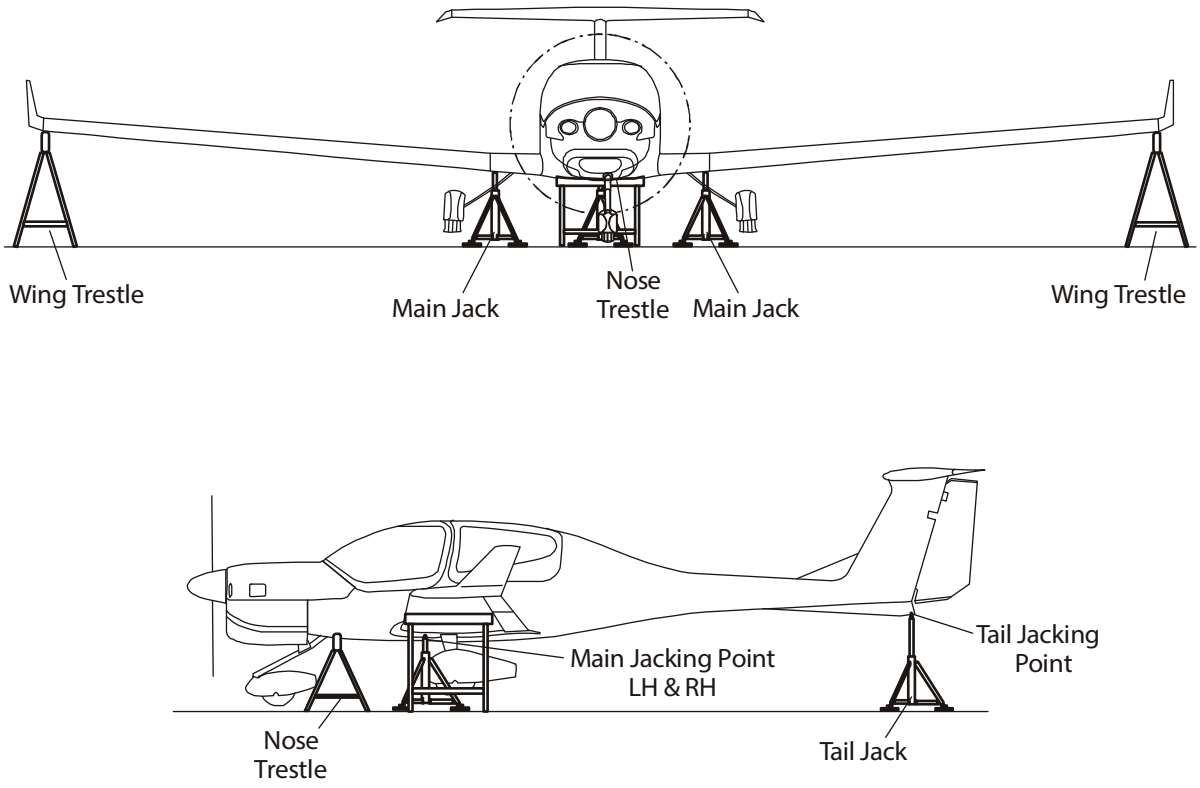

Figure 1 : Lifting the Airplane on Jacks

B. Lifting the Airplane on Jacks

	Detail Steps/Work Items	Key Items/References
CAUTION:	IF THE AIRPLANE IS IN THE OPEN, THEN ALIGN IT INTO THE WIND. THE MAXIMUM WIND SPEED PERMITTED TO LIFT THE AIRPLANE OUTSIDE IS 10KMH (6 KTS).	
(1)	Apply the parking brake. Put chocks under the main wheels.	
(2)	Put two jacks in position under the main jacking points. Extend the jacks to engage with the jacking plates.	Refer to Figure 1. The jacking plates are bonded to the bottom surface of the stub wing, forward of the front main spar.
(3)	Put a jack in position under the tail jacking point. Extend the jack to engage with the lower fin skid plate.	
(4)	Extend the jacks until the wheels are clear of the ground.	Operate the jacks together to keep the airplane level.
(5)	If necessary, level the airplane.	Refer to Section 08-20.
CAUTION:	DO NOT PUT TRESTLES UNDER THE MIDDLE OF THE WING. YOU MUST ONLY PUT TRESTLES UNDER THE OUTBOARD RIB OF THE WINGS.	
(6)	Put the wing trestles in position under each wing at the tip	Refer to Figure 1.
(7)	Put the nose trestle in position under the front fuselage.	Just aft of the access panel for the nose gear leg.

C. Lowering the Airplane on Jacks

	Detail Steps/Work Items	Key Items/References
CAUTION: MAKE SURE THAT THE AREA UNDER THE AIRPLANE IS CLEAR BEFORE THE AIRPLANE IS LOWERED.		
(1)	Remove the nose trestle from under the fuselage.	
(2)	Remove the wing trestles from under the wings.	
(3)	Retract the jacks until the wheels are on the ground.	Retract the three jacks equally to keep the airplane level.
(4)	Apply the parking brake. Put chocks under the wheels.	
(5)	Retract the three jacks fully. Move the jacks clear of the airplane	

CHAPTER 08
WEIGHING AND LEVELLING

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WEIGHING AND LEVELLING

1. General

This Chapter tells you how to weigh the airplane. It also tells you how to level the airplane. Use the procedures in Section 08-10 to weigh the airplane and to calculate the airplane moment. Use the procedures in Section 08-20 to level the airplane.

NOTE: In this Airplane Maintenance Manual masses are referred to as weights. The authors accept that this is technically incorrect but have used the expression for simplicity and convenience.

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WEIGHING

1. General

Only operate the airplane within the permitted range of weight and center of gravity limits. This will give good flight performance and good handling qualities. It is also necessary for safety.

If you make any changes to the airplane that will alter the weight (or the center of gravity), then you must calculate the new weight of the airplane. You must also calculate its center of gravity.

Only an approved person can weigh the airplane. The national Airworthiness Authority of the country where the airplane is registered gives approval for persons to weigh the airplane. It also gives the time limits.

Use the Weighing Report when you do the weight and balance calculations
(Refer to Figure 4 or Figure 6).

The reference plane for the DA 40 NG is a transverse, vertical plane in front of the airplane. It is at right angles to the horizontal reference line. The reference plane lies 2,194 mm (86.38 in) in front of the stub-wing leading edge at the wing joint on each side.

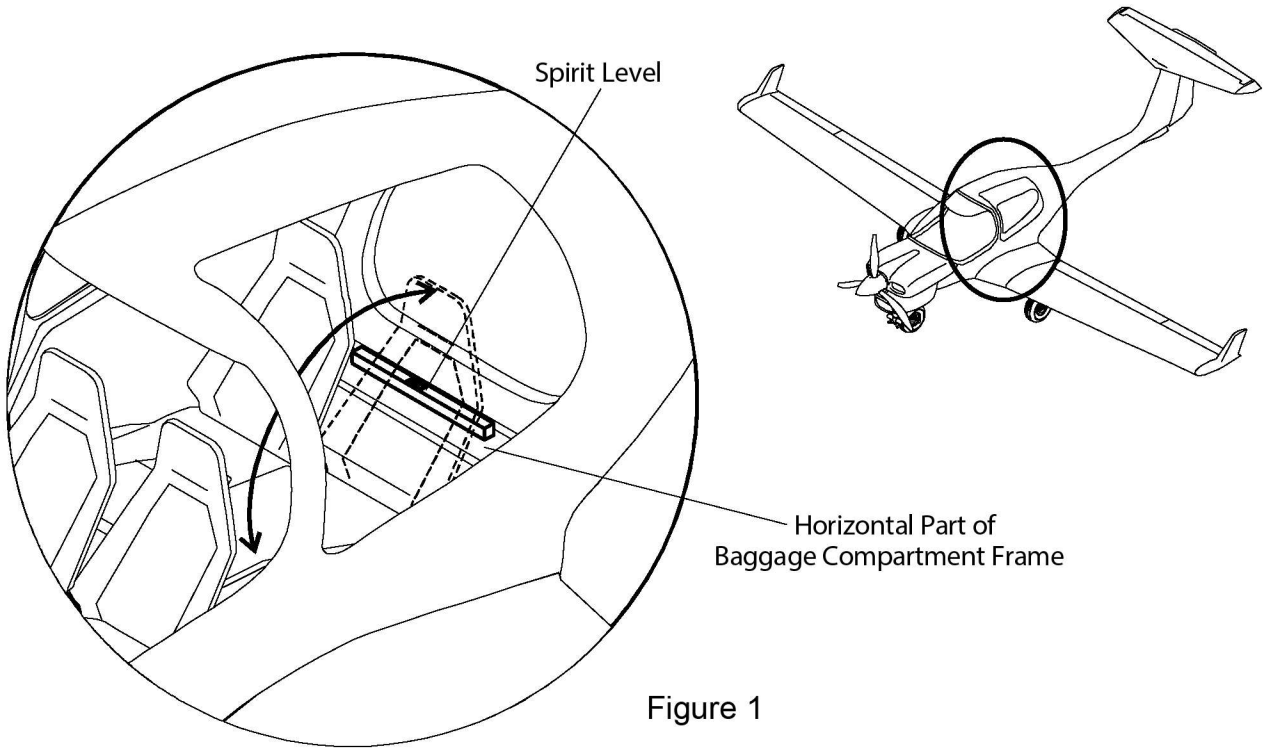


Figure 1

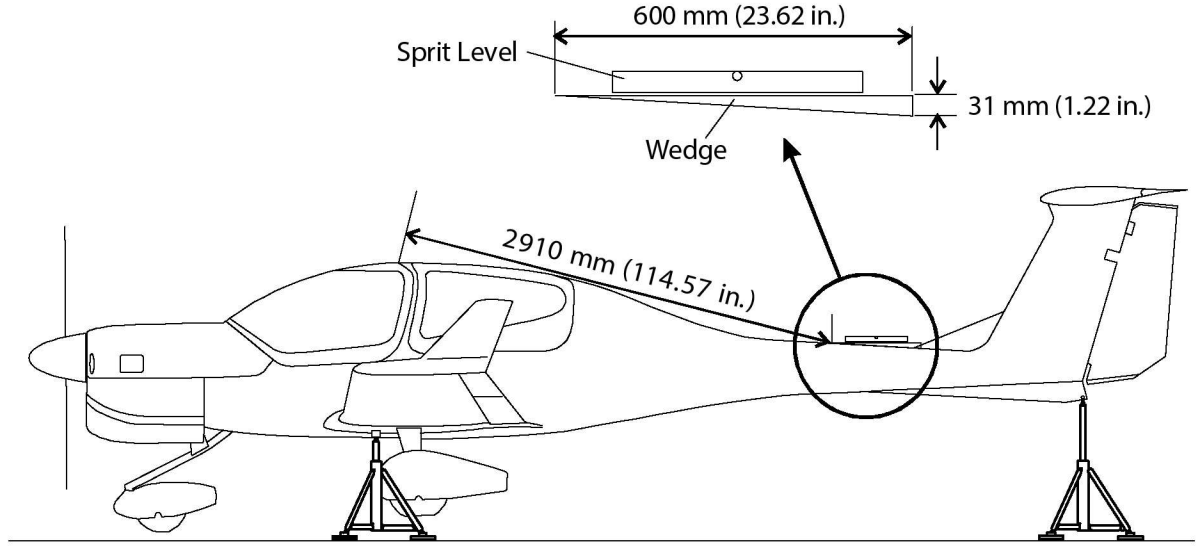


Figure 2

Figure 1 : Level the Airplane Laterally for Weighing
Figure 2 : Level the Airplane Longitudinally for Weighing

2. Weighing with Electronic Weighing Units at the Jacking Points

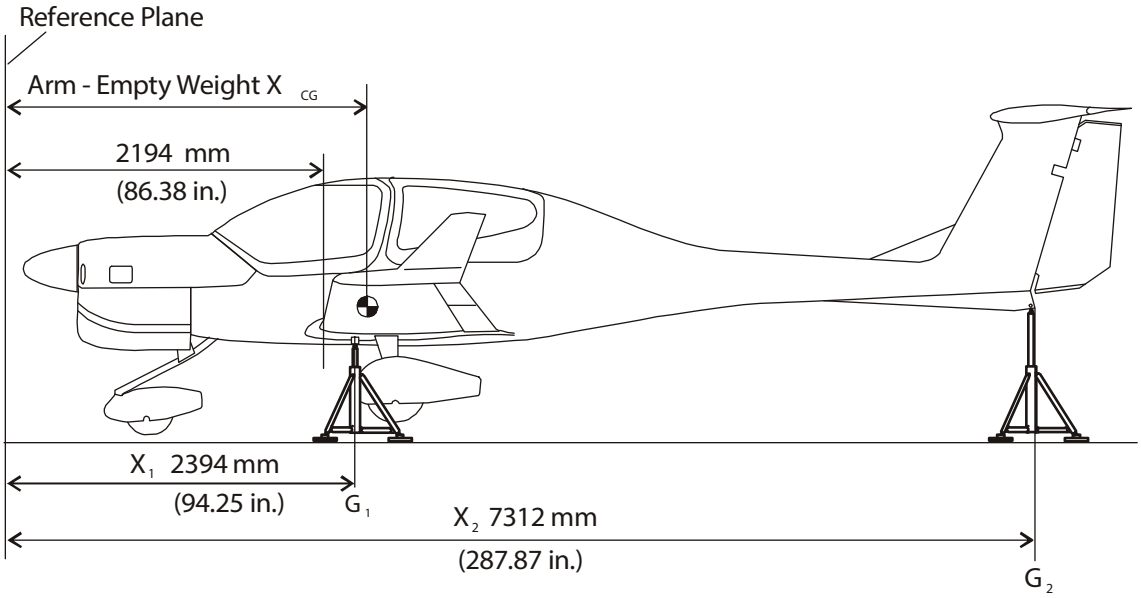
If you can use electronic weighing units to weigh the airplane, you can use the jacks to make the airplane level. You must obey the manufacturers' instructions on the weighing units.

A. Equipment

Item	Quantity	Part Number
Airplane jacks (800 kg / 1764 lb minimum lifting capacity).	3	Commercial
Electronic weighing units.	3	Commercial
Spirit level.	1	Commercial
Wedge, slope 600:31.	1	Local Manufacture

Before you weigh the airplane do these items:

- Make sure the airplane has all its equipment. The equipment must be in the location shown in the Equipment Inventory. The Equipment Inventory is included in Section 6.5 of the Airplane Flight Manual.
- Defuel the airplane to the unusable fuel level. The unusable fuel level is 1 US gal (approx. 3.8 liter) per wing tank. Refer to Section 12-10.
- Add engine oil and operating fluids up to the maximum level. Refer to Section 12-10.
- Clean the airplane and dry it.
- Remove all objects which are not part of the Equipment Inventory (for example tools, baggage, etc.). The Equipment Inventory is included in Section 6.5 of the Airplane Flight Manual.



Legend:

X_1 = Arm, Reference Plane to Center Line of Main Jacking Points.

X_2 = Arm, Reference Plane to Center Line of Tail Jacking Point.

G_1 = $G_{1LH} + G_{1RH}$ = Net Weight, main jacks LH and RH.

G_2 = Net Weight, Tail Jack.

G = $G_{1LH} + G_{1RH} + G_2$ = Empty Weight.

X_{CG} = Arm - Empty Weight Center-of-Gravity (calculated).

Figure 3 : Weighing Dimensions for Electronic Weighing Units at the Jacking Points

B. Weighing Procedure with Electronic Weighing Units at the Jacking Points

	Detail Steps/Work Items	Key Items/References
NOTE:	Weigh the airplane in a closed room. This will avoid any wind causing weighing errors.	
(1)	Make a copy of the Weighing Report form.	Refer to Figure 4.
(2)	Put the electrical weighing units in position on the jacks.	Refer to the weighing unit manufacturer‘s instructions.
(3)	Zero the electrical weighing units.	Refer to the weighing unit manufacturer‘s instructions.
(4)	Lift the airplane on jacks.	Refer to Section 07-10.
(5)	Make the airplane level laterally: - Put a spirit level on the horizontal surface of the baggage compartment frame. - Adjust the main jacks to bring the spirit level horizontal.	Refer to Figure 1. Behind the back seats. Make sure that you do not touch the airplane when you read the spirit level.
(6)	Make the airplane level longitudinally: - Place a wedge on the rear fuselage with the thin end forward. - Place a spirit level on the wedge. - Adjust the tail jack to bring the spirit level horizontal.	Refer to Figure 2.
(7)	Remove the leveling equipment from the airplane.	
(8)	Put the rear passenger seats in the upright position.	
(9)	Close the canopy and the passenger door.	
(10)	Read the value from the left main jack weighing unit. Enter the value on the Weighing Report under MAIN G_{1LH} Gross.	
(11)	Read the value from the right main jack weighing unit. Enter the value on the Weighing Report under MAIN G_{1RH} Gross.	
(12)	Read the value from the tail jack weighing unit. Enter the value on the Weighing Report under TAIL G_2 Gross.	
(13)	Refer to the calibration records for the electrical weighing units. If necessary, correct the Gross values of MAIN G_{1LH}, MAIN G_{1RH}, and TAIL G_2.	

	Detail Steps/Work Items	Key Items/References
(14)	Lower the airplane with the jacks.	Refer to Section 07-10.
(15)	If you have used adapters between the weighing units and the jacking points, and these adapters were not placed on the weighing units during zeroing (step 3), then record the weight of them under Tare in the related column.	
(16)	Subtract each Tare value from the related Gross value. Record the result under Net in the Weighing Report.	
(17)	Calculate the Empty Weight, G.	$G = \text{Net } G_{1LH} + \text{Net } G_{1RH} + \text{Net } G_2$
(18)	Calculate the Empty Weight Moment, M.	$M = ((G_{1LH} + G_{1RH}) * X_1) + (G_2 * X_2)$
(19)	Calculate the position of the Empty Weight Center-of- Gravity, X_{CG}.	$X_{CG} = M/G$
(20)	Record the Empty Weight (G) and the Empty Weight Moment (M) in the Airplane Flight Manual.	

WEIGHING REPORT

Model: DA 40 NG Serial Number:_____ Registration:_____

Data with reference to the Type Certificate Data Sheet and the Airplane Flight Manual.

Reference Plane: Vertical plane 2194 mm (86.38 in) in front of the leading edge of wing at the root rib.

Horizontal reference line: Wedge 600:31 (2.96°), 2910 mm (114.57 in) aft of the step in the cockpit rim.

Equipment Inventory - dated:_____ Cause for Weighing:_____

Weight and Balance Calculations (Weighing at the jacking points)

Weight Condition: Including brake fluid, engine oil (MAX level), coolant, and unusable fuel (2 x 1 US gal / 2 x 3.8 liters).

Support	Gross	Tare	Net
MAIN G_{1LH}			
MAIN G_{1RH}			
TAIL G_2			
		Empty Weight	

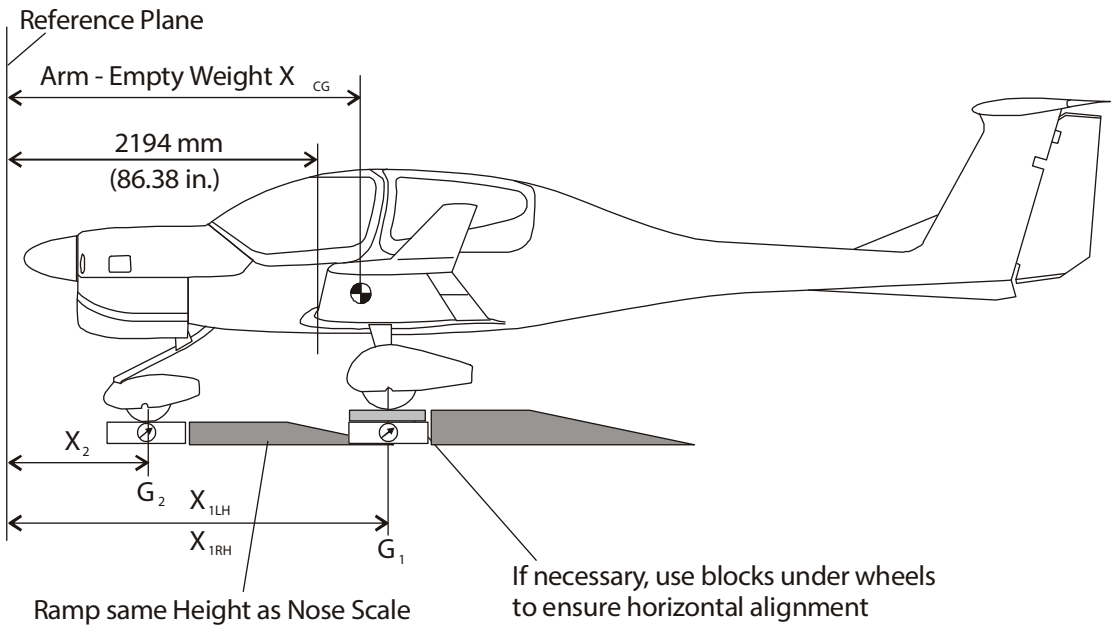
Lever Arm
X_1 = 2394 mm (94.25 in)
X_2 = 7312 mm (287.87 in)

Calculate the Empty Weight, G = MAIN G_{1LH} + MAIN G_{1RH} + TAIL G_2.	G =
Calculate the Empty Weight Moment, M = ((G_{1LH} + G_{1RH}) * X_1) + (G_2 * X_2).	M =
Calculate the Empty Weight Center-of-Gravity position, X_{CG} = M/G.	X_{CG} =
Maximum permitted all-up-weight: Max AUW (see AFM)	
Maximum useful load = Max AUW - G.	

Record the Empty Weight (G) and the Empty-Weight Moment (M) in the Airplane Flight Manual.

Place/Date	Authorizing Stamp	Authorizing Signature

Figure 4 : Weighing Report for Electronic Weighing Units at the Jacking Points



Legend:

X_1 = Arm, Reference Plane to center line of main wheels.

X_2 = Arm, Reference Plane to center line of nose wheel.

G_1 = $G_{1LH} + G_{1RH}$ = Net weight, main wheel scales LH and RH.

G_2 = Net weight, Nose wheel scale.

$G = G_{1LH} + G_{1RH} + G_2$ = Empty Weight.

X_{CG} = Arm - Empty Weight center-of-gravity (calculated).

Figure 5 : Weighing Dimensions for Mechanical Scales under the Wheels

3. Weighing with Mechanical Scales under the Wheels

If you use mechanical scales to weigh the airplane, you must also use wooden blocks under the wheels to level the airplane. You must obey the manufacturers' instructions on the scales.

A. Equipment

Item	Quantity	Part Number
Mechanical scales (the scales used for the main wheels must be the same).	3	Commercial
Spirit level.	1	Commercial
Plumb line.	1	Commercial
Wedge, slope 600:31 (2.96”).	1	Local Manufacture
Wooden blocks (various thickness)	A/R	Local Manufacture
Ramps	3	Local Manufacture
Optional: Airplane jacks (800 kg / 1764 lb minimum lifting capacity).	3	Commercial

NOTE: If you use airplane jacks to lift the airplane onto the ramps, you must move the airplane a small distance back and forward to allow the landing gear to spread. This will prevent side loads on the scales causing errors.

This procedure uses jacks because the main wheel scales need approximately 52 mm (2 in) of blocks to bring the airplane level. If OÄM 40-334 is installed, the blocks must be approximately 100 mm (4 in) high to bring the airplane level.

Before you weigh the airplane do these items:

- Make sure the airplane has all its equipment. The equipment must be in the location shown in the Equipment Inventory. The Equipment Inventory is included in Section 6.5 of the Airplane Flight Manual.

Defuel the airplane to the unusable fuel level. The unusable fuel level is 1 US gal (approx. 3.8 liter) per wing tank. Refer to Section 12-10.

- Add engine oil and operating fluids up to the maximum level. Refer to Section 12-10.
- Clean the airplane and dry it.
- Remove all objects which are not part of the Equipment Inventory (for example tools, baggage, etc.). The Equipment Inventory is included in Section 6.5 of the Airplane Flight Manual.

B. Weighing Procedure with Mechanical Scales under the Wheels

	Detail Steps/Work Items	Key Items/References
NOTE:	Weigh the airplane in a closed room. This will avoid any wind causing weighing errors.	
(1)	Make a copy of the Weighing Report form.	Refer to Figure 6.
(2)	Put the weighing scales in position on the floor in front of each wheel.	
(3)	Zero the scales.	Refer to the scale manufacturer‘s instructions.
(4)	Close the canopy.	
(5)	Lift the airplane on jacks.	Refer to Section 07-10.
(6)	Put the flat part of the ramps under each wheel.	
(7)	Lower the airplane onto the ramps with the jacks. Remove the jacks.	Refer to Section 07-10.
(8)	Move the airplane a small distance backwards and forwards on the flat top of the ramps.	To allow the landing gear legs to spread.
(9)	If necessary, put a wooden on the scale in front of each main wheel.	To ensure horizontal alignment of the airplane.
CAUTION:	DO NOT ALLOW THE AIRPLANE TO RUN OFF THE SCALES. THIS WILL CAUSE DAMAGE TO THE WHEEL FAIRINGS.	
(10)	Push the airplane forward onto the scales.	Make sure that the wheels are above the center of the scales.
(11)	Engage parking brake or use wheel chocks.	
(12)	Make the airplane level laterally: - Put a spirit level on the horizontal surface of the baggage compartment frame. - If necessary, use additional thin blocks between the scale and the main wheel on the low side to bring the spirit level horizontal.	Refer to Figure 1. Behind the back seats. Push the airplane on and off the scales as necessary. Make sure that you do not touch the airplane when you read the spirit level.

	Detail Steps/Work Items	Key Items/References
(13)	Make the airplane level longitudinally: - Place a wedge on the rear fuselage with the thin end forward. - Place a spirit level on the wedge. - Put thin blocks between the nose wheel and the scale to bring the spirit level horizontal. OR - If necessary, reduce the air pressure in the nose wheel tire to bring the spirit level horizontal.	Refer to Figure 2.
(14)	Remove the leveling equipment from the airplane.	
(15)	Put the rear passenger seats in the upright position.	
(16)	Close the passenger door.	
(17)	Read the value from the left main wheel scale. Enter the value on the Weighing Form under MAIN G_{1LH} Gross.	
(18)	Read the value from the right main wheel scale. Enter the value on the Weighing Form under MAIN G_{1RH} Gross.	
(19)	Read the value from the nose wheel scale. Enter the value on the Weighing Form under NOSE G_2 Gross.	
(20)	Use the plumb line to mark the position of the reference plane on the floor: Hold the plumb line against the leading edge of the wing where the wing joins the stub-wing.Mark this position on the floor. Draw a straight line between the 2 points you Marked on the floor.Draw a second line 2194 mm (86.38 in) forward of the first line.	Do this on each side.
(21)	Use the plumb line to mark the position of the nose wheel center line on the floor.	
(22)	Use the plumb line to mark the position of each main wheel center line on the floor.	
(23)	Lift the airplane off the scales with the jacks.	Refer to Section 07-10.

	Detail Steps/Work Items	Key Items/References
(24)	Read the weight of the wooden blocks on each of the scales. Record the values in the column headed TARE in the Weighing Report.	
(25)	Remove the scales and the ramps.	
(26)	Measure the distance X_{1LH}. Record the value in the Weighing Report.	
(27)	Measure the distance X_{1RH}. Record the value in the Weighing Report.	
(28)	Measure the distance X_2. Record the value in the Weighing Report.	
(29)	Refer to the calibration records for the weighing scales. If necessary, correct the Gross and Tare values of MAIN G_{1LH}, MAIN G_{1RH}, and NOSE G_2.	
(30)	Subtract each Tare value from the related Gross value. Record the result under Net in the Weighing Report.	
(31)	Lower the airplane with the jacks.	
(32)	Calculate the Empty Weight, G, from the Net values.	G = Net G_{1LH} + Net G_{1RH} + Net G_2
(33)	Calculate the Empty Weight Moment, M.	M = $(G_{1LH} * X_{1LH})+(G_{1RH} * X_{1RH}) + (G_2 * X_2)$
(34)	Calculate the position of the Empty Weight Centerof- Gravity, XCG.	$X_{CG} = M/G$
(35)	Record the Empty Weight (G) and the Empty Weight Moment (M) in the Airplane Flight Manual.	

WEIGHING REPORT

Model: DA 40 NG Serial Number:_____ Registration:_____

Data with reference to the Type Certificate Data Sheet and the Airplane Flight Manual.

Reference Plane: Vertical plane 2194 mm (86.38 in) in front of the leading edge of wing at the root rib.

Horizontal reference line: Wedge 600:31 (2.96°), 2910 mm (114.57 in) aft of the step in the cockpit rim.

Equipment Inventory - dated:_____ Cause for Weighing:_____

Weight and Balance Calculations (Weighing at the wheels)

Weight Condition: Including brake fluid, engine oil (MAX level), coolant and unusable fuel (2 x 1 US gal / 2 x 3.8 liters).

Support	Gross	Tare	Net
MAIN G_{1LH}			
MAIN G_{1RH}			
NOSE G_2			
		Empty Weight	

Lever Arm
X_{1LH} =
X_{1RH} =
X_2 =

Calculate the Empty Weight, G = MAIN G_{1LH} + MAIN G_{1RH} + NOSE G_2.	G =
Calculate the Empty Weight Moment, M = (G_{1LH} * X_{1LH})+(G_{1RH} * X_{1RH}) + (G_2 * X_2).	M =
Calculate the Empty Weight Center-of-Gravity position, X_{CG} = M/G.	X_{CG} =
Maximum permitted all-up-weight: Max AUW (see AFM).	
Maximum useful load = Max AUW - G.	

Record the Empty Weight (G) and the Empty-Weight Moment (M) in the Airplane Flight Manual.

Place/Date	Authorizing Stamp	Authorizing Signature

Figure 6 : Weighing Report for Mechanical Scales under the Wheels

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LEVELLING

1. General

These procedures tell you how to make the airplane level. See Section 07-10 for lifting the airplane with jacks.

Make the airplane level with jacks unless you are weighing the airplane. If you weigh the airplane, change the airplane tire pressures or use blocks to make the airplane level (see Section 08-10).

2. Make the Airplane Level with Jacks

A. Equipment

Item	Quantity	Part Number
Airplane jacks (600 kg / 1320 lb minimum lifting capacity).	3	Commercial
Nose trestle.	1	Commercial
Wing trestles.	2	Commercial
Spirit level.	1	Commercial
Wedge, slope 600:31 (2.96”).	1	Local manufacture

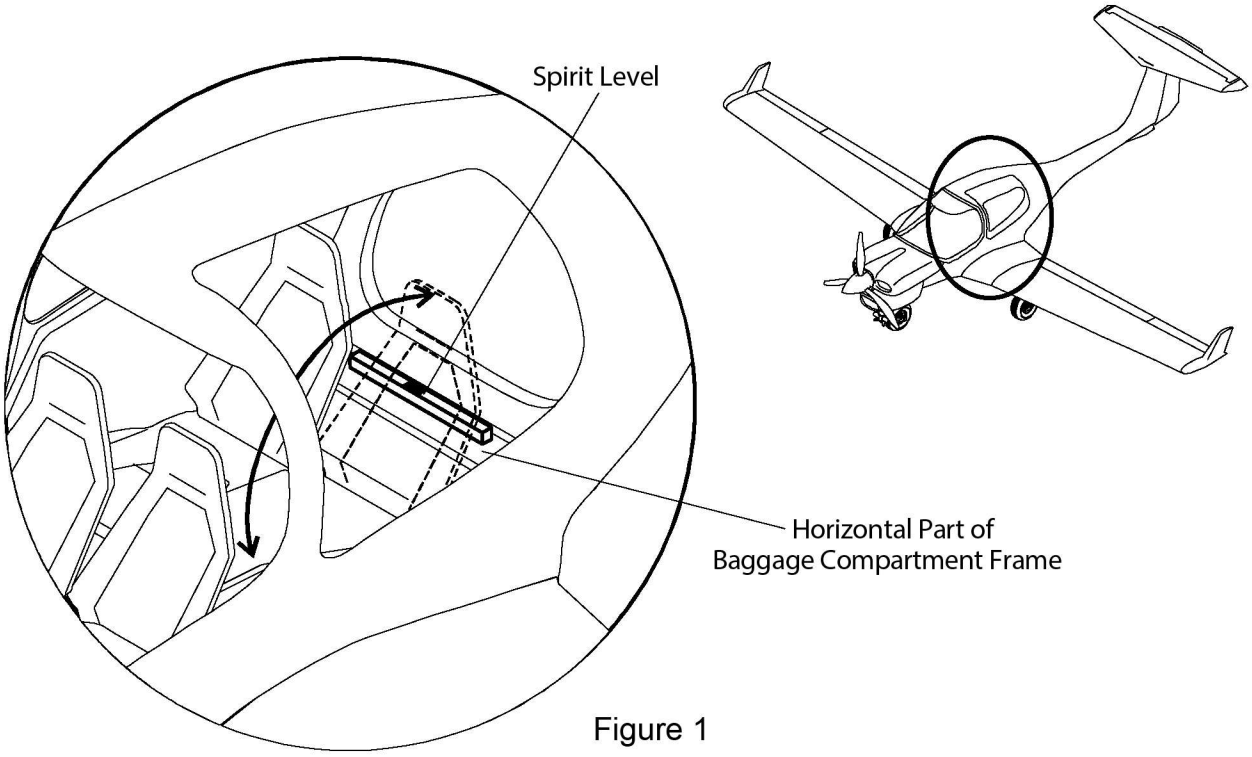

Figure 1

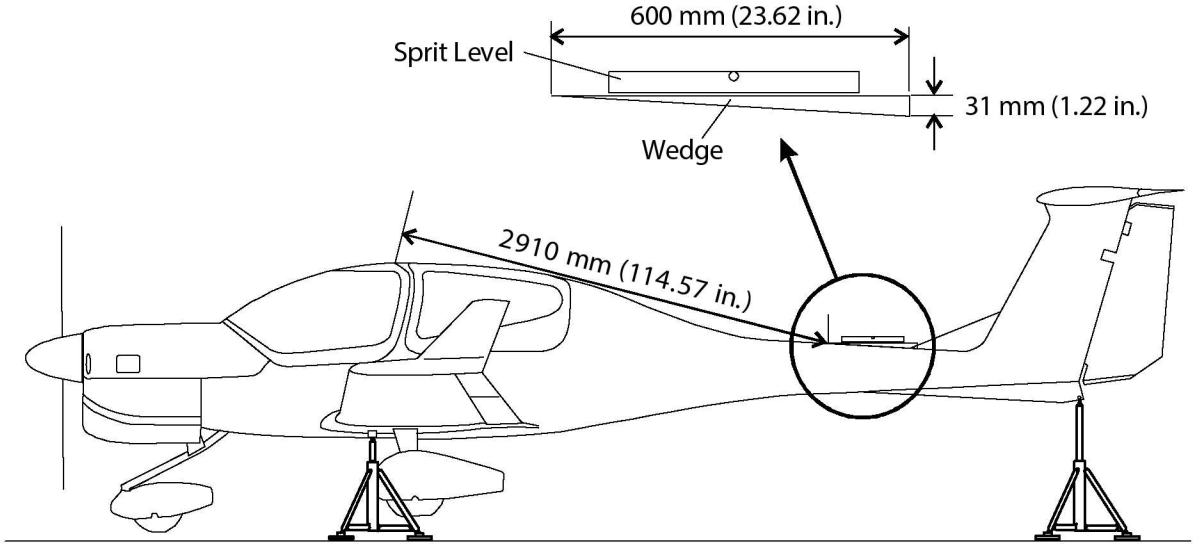

Figure 2

Figure 1 : Level the Airplane Laterally
Figure 2 : Level the Airplane Longitudinally

B. Level the Airplane with Jacks

	Detail Steps/Work Items	Key Items/References
NOTE:	Level the airplane in a closed room. This will avoid any wind causing levelling errors.	
(1)	Lift the airplane on jacks.	Refer to Section 07-10.
(2)	Make the airplane level laterally: - Put a spirit level on the horizontal surface of the baggage compartment frame. - Adjust the main jacks to bring the spirit level horizontal.	Refer to Figure 1. Behind the back seats. Make sure that you do not touch the airplane when you read the spirit level.
(3)	Make the airplane level longitudinally: - Place a wedge on the rear fuselage with the thin end forward. - Place a spirit level on the wedge. - Adjust the tail jack to bring the spirit level horizontal.	Refer to Figure 2.
(4)	Put trestles under each wing tip and under the front fuselage.	Refer to Section 07-10.
(5)	Remove the levelling equipment from the airplane.	

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CHAPTER 09
TOWING AND TAXIING

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TOWING AND TAXIING

1. General

You can move the airplane on the ground by hand or by taxiing it. Use the procedures in Section 09-10 and Section 09-20 to move the airplane safely. Section 09-10 tells you how to tow the airplane. Section 09-20 tells you how to taxi the airplane.

WARNING: **YOU MUST NOT TAXI THE AIRPLANE UNLESS YOU HAVE BEEN TRAINED TO TAXI AND HAVE BEEN AUTHORIZED BY YOUR AIRWORTHINESS AUTHORITY.**

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TOWING

1. General

You can move the airplane without using a tow bar. You can push or pull the DA 40 NG at the wing tip, at the wing nose, and at the propeller blades near the spinner

2. Towing Procedure

WARNING: DO NOT PUSH ON THE SPINNER. IF YOU PUSH ON THE SPINNER YOU CAN DAMAGE THE SPINNER WHICH CAN CAUSE VIBRATION. VIBRATION COULD CAUSE AN ACCIDENT AND DAMAGE TO THE AIRPLANE AND INJURY TO PERSONNEL.

CAUTION: NEVER USE FORCE ON THE PROPELLER TIPS OR ON THE CONTROL SURFACES. YOU CAN DAMAGE THE PROPELLER AND THE CONTROL SURFACES.

CAUTION: NEVER APPLY WEIGHTS TO THE TAILPLANE TO LIFT THE NOSE WHEEL. YOU CAN DAMAGE THE TAILPLANE.

CAUTION: NEVER TOW THE AIRPLANE IF THE WHEELS ARE BLOCKED BY SNOW OR MUD. YOU CAN DAMAGE THE LANDING GEAR.

CAUTION: THE NOSE WHEEL STEERING ANGLE IS 30º TO THE LEFT AND RIGHT. IF YOU TURN THE WHEEL MORE THAN 30º YOU WILL CAUSE DAMAGE TO THE NOSE GEAR.

A. Forward Movement

Pull the airplane forward on the propeller blades near the spinner. The nose wheel will follow the movement of the airplane. You can change direction by pulling on the appropriate propeller blade near the spinner.

B. Rearward Movement

Push down the fuselage in front of the vertical stabilizer until the nose wheel is clear of the ground while pushing the airplane in rearward direction.

C. Turn the Airplane on the Ground

If you have a limited area to maneuver the airplane, two persons can turn the airplane around the main wheels. One person must push down in front of the vertical stabilizer until the nose wheel is clear of the ground. The other person must push on the wing tip.

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TAXIING

1. General

When you taxi the DA 40 NG you use the toe operated brakes to steer the airplane. To make the airplane turn operate the left or the right toe brake.

WARNING: YOU MUST NOT TAXI THE AIRPLANE UNLESS YOU HAVE BEEN TRAINED TO TAXI AND HAVE BEEN AUTHORIZED BY YOUR AIRWORTHINESS AUTHORITY.

CAUTION: THIS SECTION GIVES GENERAL DATA ON TAXIING ONLY. YOU MUST USE THE DA 40 NG AIRPLANE FLIGHT MANUAL WHEN YOU TAXI THE AIRPLANE.

2. Taxiing Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the area around the airplane is clear of objects.	For example: ground equipment and tools.
(2)	Operate the parking brake.	
(3)	If necessary remove: - Wheel chocks. - Tow bar. - Mooring ropes.	
	WARNING: MAKE SURE THAT THERE ARE NO PERSONS OR OBJECTS NEAR THE AIRPLANE. THE AIRPLANE CAN INJURE PERSONS. OBJECTS CAN DAMAGE THE AIRPLANE.	
(4)	Start the engine.	Refer to the Airplane Flight Manual.
(5)	Release the parking brake.	
	WARNING: MAKE SURE THE BRAKES OPERATE CORRECTLY WHEN YOU TAXI THE AIRPLANE. IF THE BRAKES SHOULD FAIL, YOU MUST BE ABLE TO STOP THE AIRPLANE BEFORE YOU HIT PERSONS OR EQUIPMENT. CAUTION: OBEY THE SAFETY RANGE FOR TAXIING SHOWN IN FIGURE 1. CAUTION: TAKE CARE IF YOU TAXI ON UNEVEN GROUND. THE PROPELLER MUST NOT TOUCH THE GROUND. LOOSE STONES AND GRAVEL CAN DAMAGE THE PROPELLER.	
(6)	Taxi the airplane to its new position.	
(7)	Shut down the engine.	Refer to the Airplane Flight Manual.
(8)	Park the airplane. If necessary, moor the airplane.	Refer to Chapter 10.

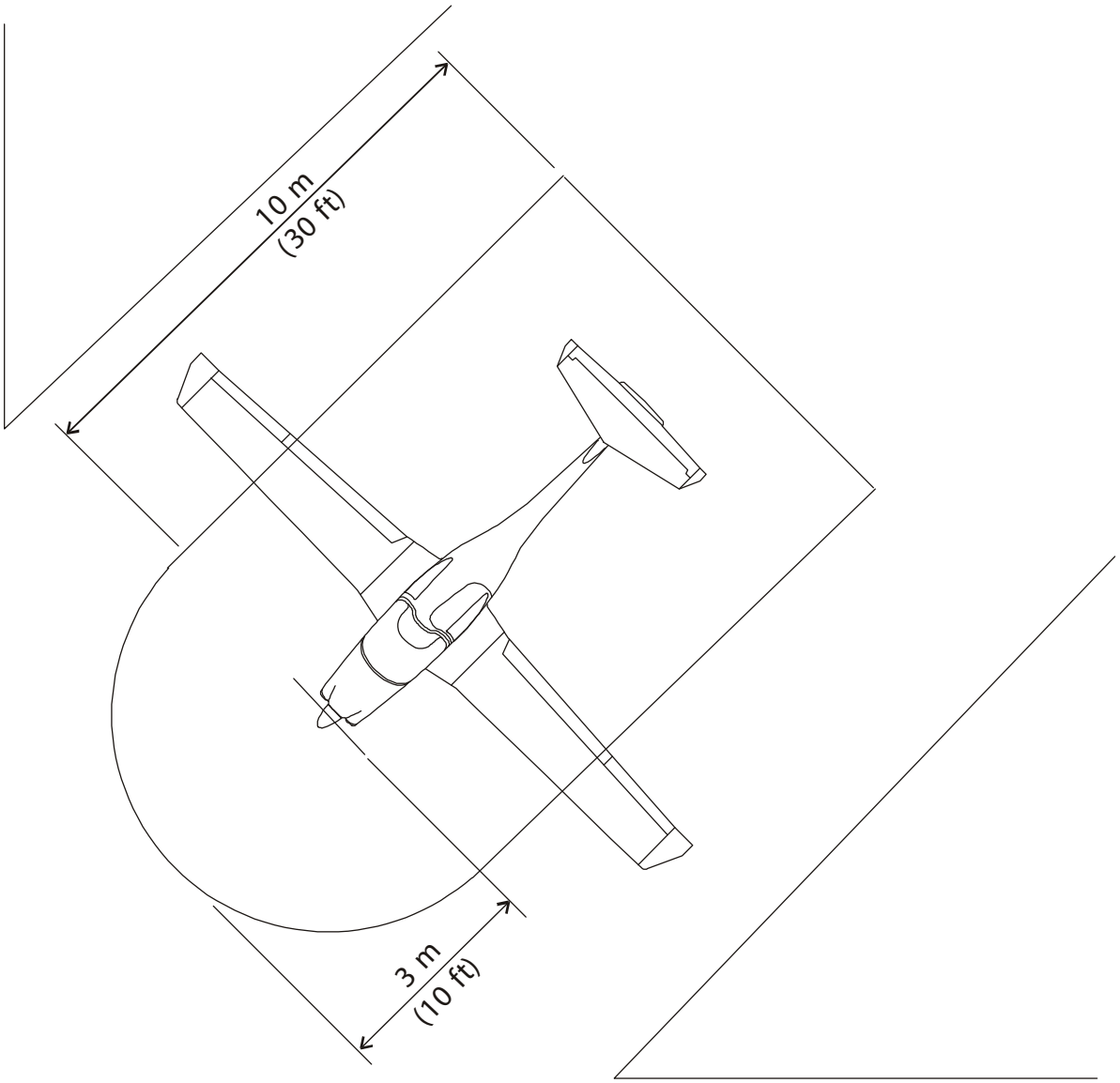

Figure 1 : The Safety Range for Taxiing the DA 40 NG Airplane

CHAPTER 10
PARKING, MOORING, STORAGE AND RETURN TO SERVICE

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PARKING, MOORING, STORAGE AND RETURN TO SERVICE

1. General

Always park or moor the DA 40 NG when it is not in use. Use the procedures in Section 10-10 for parking the airplane. Use the procedure in Section 10-20 to moor the airplane. If the airplane is parked over-night, we recommend that you moor the airplane. If strong winds are forecast, you must always moor the airplane.

Refer to the AE Operation Manual, latest revision for detailed information about engine standstill and storage procedures..

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PARKING AND STORAGE

1. General

Use these procedures to protect the airplane when it is parked. Use the short-term parking procedure when the airplane will be parked for less than five days. Use the long term parking procedure when the airplane will be parked for 5 to 30 days. Use the storage procedure if the airplane will be parked for more than 30 days.

All pilots and all maintenance staff for the DA 40 NG must know the procedures in this Section.

CAUTION: MAKE SURE THAT THE AIRPLANE IS CORRECTLY MOORED AND PROTECTED IF STRONG WINDS ARE FORECAST. STRONG WINDS CAN CAUSE DAMAGE TO AN UNPROTECTED AIRPLANE.

A. Equipment

Item	Quantity	Part Number
Wheel chocks.	4	Commercial
Gust lock.	1	Commercial

B. Short-Term Parking

	Detail Steps/Work Items	Key Items/References
(1)	Taxi or tow the airplane to the parking position.	Refer to Chapter 09.
(2)	Align the airplane into wind.	
CAUTION: MAKE SURE THAT THE NOSE WHEEL IS ALIGNED STRAIGHT AHEAD WHEN THE AIRPLANE STOPS. THIS WILL PREVENT SIDE LOADS WHICH CAN DAMAGE THE NOSE LANDING GEAR.		
(3)	If the wind is gusty (or the weather is stormy) moor the airplane.	Refer to Section 10-20.
(4)	If there is packed snow or ice on the parking area, spread about 5 mm (0.2 in) of sand under the wheels.	
CAUTION: DO NOT SET THE PARKING BRAKE WHEN THE BRAKES ARE OVER-HEATED. THE BRAKES CAN SEIZE ON.		
(5)	Set the parking brake ON. Pull the lever fully aft, and push both brake pedals at least two times.	
(6)	Put chocks in front of and behind the main wheels.	
(7)	RELEASE the parking brake.	Lever fully forward.

	Detail Steps/Work Items	Key Items/References
(8)	Install the gust lock: - Move the rudder pedals fully rearward. - Engage the control surfaces gust lock with the pedals. - Engage the sticks; wrap straps around stick once. - Attach the locks and tighten the straps.	
(9)	Set the flaps to UP.	Fully up.
(10)	If OÄM 40-363 (battery heating system) is installed, it is recommended to heat the batteries, if the temperature is below 0° C (32° F).	Connect to external power, 230V / 50 Hz.
(11)	If the fire extinguisher type Air Total (Halon 1211) is installed, remove it at temperatures below -40°C (-40°F).	
(12)	Make sure that the passenger door and canopy is closed and locked.	

C. Long-Term Parking

CAUTION: MAKE SURE TO PERFORM THE LONG TERM PARKING PROCEDURE WHEN THE AIRPLANE IS PARKED FOR A LONG TIME. IF THE PROCEDURE IS NOT FOLLOWED CORRECTLY, DAMAGE TO THE AIRPLANE CAN OCCUR.

	Detail Steps/Work Items	Key Items/References
(1)	Do the procedure for short-term parking.	Refer to Paragraph 1.B.
(2)	If the airplane can be moved, remove the chocks. Move the airplane to turn the wheels 3 or 4 revolutions. Put the chocks back. If the airplane is on jacks, turn each wheel 3 or 4 revolutions by hand.	You can push or tow the airplane. Make sure that a different part of the tire touches the ground when you stop.
(3)	For engine standstill period refer to the AE Operation Manual, latest revision.	
NOTE: Do step 2 every day in cold weather and every 7 days in warm weather.		
(4)	Do the procedure for corrosion prevention on the engine installed in an inactive airplane.	Refer to AE Operation Manual, latest revision.
(5)	Install Pitot cover.	Located on the lower side of the LH wing.
(6)	Do a test for water contamination of the fuel.	Refer to Section 12-10.

2. Storage

If the airplane is parked (or not operated) for more than 30 days, you have to do this storage procedure.

A. Equipment and Material

Item	Quantity	Part Number
Wheel chocks.	4	Commercial
Tire protector spray.	A/R	Commercial

B. Preparation

	Detail Steps/Work Items	Key Items/References
(1)	If possible, ventilate the airplane in a dry atmosphere.	
(2)	Do the procedure for the long-term parking.	Refer to Paragraph 1.C.
(3)	For engine standstill period and storage refer to AE Operation Manual, latest revision.	
(4)	Disconnect the airplane main battery and the ECU backup batteries.	
NOTE:	It is highly recommended to remove the airplane main battery and the ECU backup batteries at outside air temperatures below -30 °C (-22° F).	
(5)	If OÄM 40-363 (battery heating system) is installed, it is recommended to heat the batteries, if the temperature is below 0° C (32° F).	Connect to external power, 230V / 50 Hz.
(6)	Completely fill the fuel tanks with fuel.	Refer to Section 12-10.
(7)	Wipe the tires with a dry cloth. Apply tire protector spray.	Obey the tire protector manufacturers instructions.
(8)	Lubricate the airplane.	Refer to Section 12-10.
(9)	Remove loose equipment from the airplane.	

MOORING

1. General

CAUTION: IF THE AIRPLANE MUST BE STORED OUTSIDE FOR A LONG TIME, THEN YOU MUST MOOR IT. STRONG WINDS OR GUSTS CAN CAUSE DAMAGE TO AN AIRPLANE WHICH IS NOT MOORED.

2. Mooring

Figure 1 shows the location of the mooring points on the airplane.
There are three mooring points: One below each wing and one on the skid plate at the tail.

A. Equipment

Item	Quantity	Part Number
Wheel chocks.	4	Commercial
Rope (nylon preferred, or hemp).	A/R	Commercial

B. Mooring Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Park the airplane.	Refer to Section 10-10.
(2)	Make sure that the flaps are set to UP.	Fully up.
	CAUTION: MOOR THE AIRPLANE AT THE MOORING POINTS ONLY. CAUTION: WHEN USING HEMP ROPES, DO NOT MAKE THEM TIGHT. IF THE ROPES GET WET THEY WILL TIGHTEN AND DAMAGE THE AIRPLANE. THIS IS MOST IMPORTANT WHEN YOU USE SECURE GROUND ANCHOR-POINTS.	
(3)	Attach a rope to each mooring point and to the ground anchor point. Do not make the ropes tight.	
(4)	Remove all items from the area that may damage the airplane.	
(5)	If snow is forecast you must put a trestle under the lower fin.	

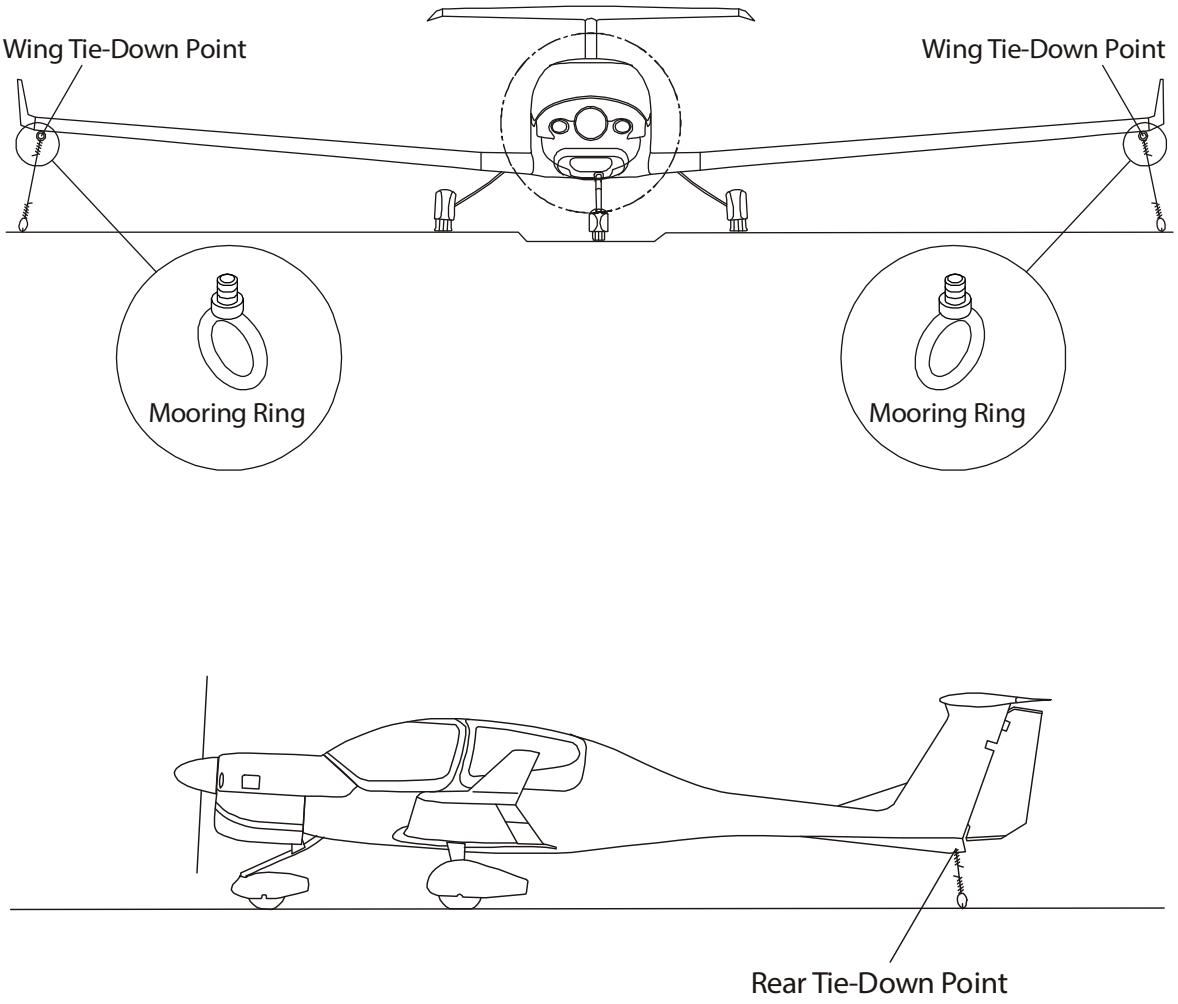

Figure 1 : Location of Mooring Points on the Airplane

RETURN TO SERVICE

1. General

Do this procedure when the airplane has been parked (or stored) for more than five days.

2. Return to Service Procedure

A. Storage Time is Less Than One Year

	Detail Steps/Work Items	Key Items/References
(1)	If necessary, install the loose equipment which was removed for storage.	
(2)	If the battery has been removed: - Install the airplane main battery.	Refer to Section 24-31.
(3)	Do the test for water contamination of the fuel.	Refer to Section 12-10.
(4)	Do the test for correct air pressure in each tire. If necessary, inflate the tires.	Refer to Section 12-10.
(5)	Check the Pitot system and canopy for contamination/dirt.	
(6)	Check to make sure that all air inlets and outlets are clear.	
(7)	Check the oil and coolant level.	Refer to Section 12-10.
(8)	Perform an engine ground run according to the AE Operation Manual, latest revision.	
(9)	Remove the gust lock: - Loosen the straps and detach the locks. - Disengage the stick from the straps. - Disengage the pedals from the gust lock. - Move the rudder pedals into position.	

B. Storage Time is One Year or More than One Year

	Detail Steps/Work Items	Key Items/References
(1)	Contact the engine manufacturer Austro Engine GmbH	
(2)	If necessary, install the loose equipment which was removed for storage.	
(3)	If the battery has been removed: - Install the airplane main battery.	Refer to Section 24-31.
(4)	Remove the gust lock: - Loosen the straps and detach the locks. - Disengage the stick from the straps. - Disengage the pedals from the gust lock. - Move the rudder pedals into position.	
(5)	Do a 200 Hour Scheduled Maintenance Check.	Refer to Section 05-10.

CHAPTER 11
PLACARDS AND MARKINGS

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PLACARDS AND MARKINGS

1. General

Placards are used for identification and indication. They show the function, operation and operating limitations of systems and equipment.

NOTE: Placards must not be removed, exchanged or altered unless approved by the national Airworthiness Authority.

This Chapter shows you the location of these placards and markings:

- Exterior placards.
- Exterior markings.
- Interior placards.

Self-adhesive plastic foil is used for all placards except for the manufacturer's placard. The manufacturer's placard is made of metal and is located on the vertical stabilizer, lower left side.

Replace damaged placards.

2. Replace Plastic Foil Placards

A. Material

Item	Quantity	Part Number
Solvent.	A/R	Commercial

B. Replace a Placard

Use this procedure for both internal and external foil placards.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the old placard: - Heat the placard with a hot air blower. - Lift one corner of the placard. - Pull the placard off.	
WARNING:	**DO NOT GET SOLVENT ON YOUR SKIN. DO NOT BREATH SOLVENT VAPOR. SOLVENT CAN CAUSE DISEASE OR ILLNESS.**	
(2)	Clean the surface where the new placard will fit on the aircarft.	Use a commercial solvent. There must be no dirt or grease on the surface. Obey the solvent manufacturer's instructions.
(3)	Remove the protective backing from the new placard.	
(4)	Put the new placard in the correct position. Make the placard smooth with a clean cloth.	

EXTERIOR PLACARDS AND MARKINGS

1. General

Figures 1 and 2 show the exterior markings and placards for the DA 40 NG.

For the safety walk adhesive strips are installed. Refer to the Maintenance Practices for more details about the positioning of the safety walk adhesive strips.

If OÄM 40-317 is installed the safety walk is a coated safety walk instead of safety walk with adhesive strips. Refer to Section 51-20 for coated safety walk repair procedures.

If OÄM 40-339 is installed the foot steps are mounted aft of the wing's trailing edge.

If OÄM 40-399 is installed, an additional foot step is mounted on the LH side, aft of the wing's trailing edge.

If OÄM 40-400 is installed, an additional foot step is mounted on the RH side, aft of the wing's trailing edge.

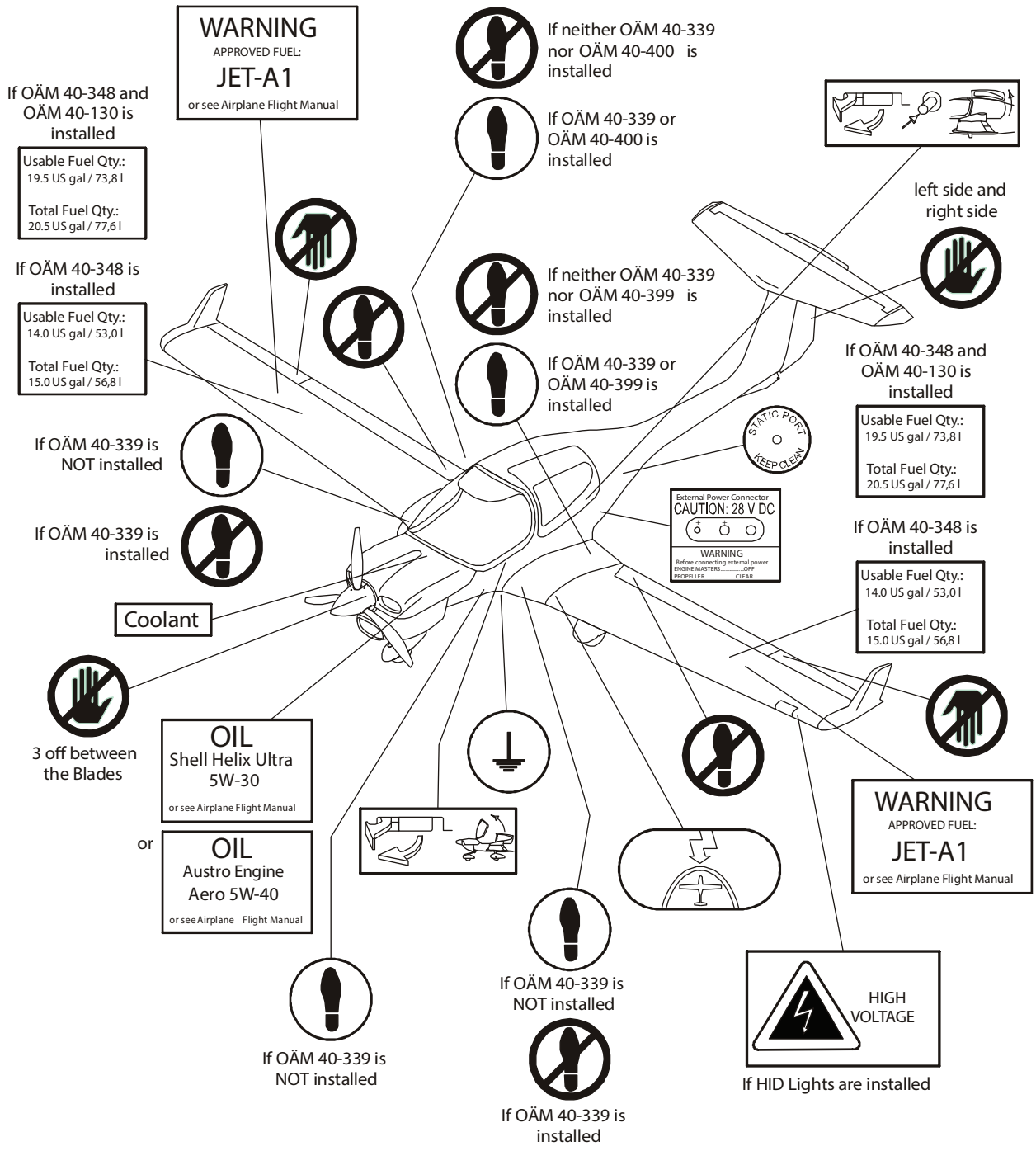

Figure 1 : Exterior Placards 1

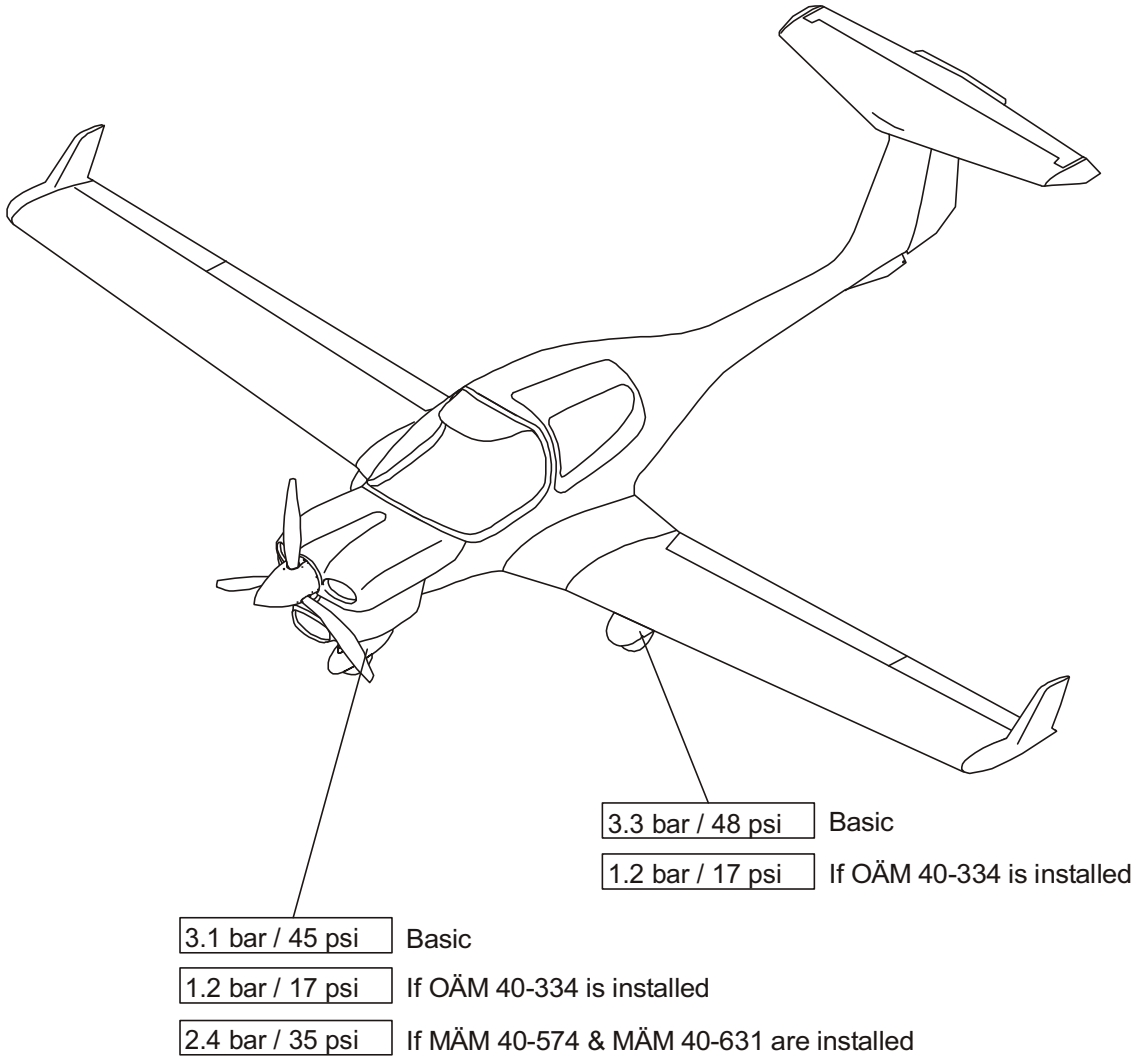

Figure 2 : Exterior Placards 2

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MAINTENANCE PRACTICES

1. General

This Section tells you how to replace safety-walk adhesive strips.

2. Replace the Safety-Walk Adhesive Strips

A. Equipment

Item	Quantity	Part Number
Safety walk template.	1	D44-1127-10-52
Roller.	1	Commercial
Heat gun.	1	Commercial

B. Material

Item	Quantity	Part Number
Socomore Dienstone DLS Satwipes.	A/R	29003-C86-C10
Acetone.	A/R	N000 148

C. Replacement Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Remove the safety walk adhesive strips: - Use a heat gun to warm up the safety walk adhesive strips. - Start removing the safety walk adhesive strips by lifting one corner. - Carefully pull the safety walk adhesive strips off.	Do not exceed 60° C (140°F).
	WARNING: WHEN HANDLING CHEMICALS ALWAYS OBSERVE THE HEALTH AND SAFTEY REGULATIONS GIVEN BY THE MANUFACTURER OF THE CHEMICALS.	
(2)	Remove the adhesives layer of the safety walk adhesive strips from surface: - Use fresh acetone or Socomore® cleaning cloth (P/N: 29003-C86-C10) to remove the adhesive layer. - Do not use cleaning or polishing agents which contain silicon.	
(3)	Use water to remove dirt from the surface. If necessary, add a mild cleaning agent.	Refer to Section 12-30.
(4)	Use a commercial solvent to remove grease from the surface. The surface must be totally clean from grease or dirt.	
(5)	Place the safety walk template on the LH side of center wing.	Refer to Figure 201.
(6)	Make sure that the template orientation is parallel to flight direction.	
(7)	Remove the protective layer from the safety walk adhesive strips.	Note LH side - long strips.
(8)	Place the safety walk adhesive strips into the slots of the safety walk template.	
(9)	Use a roller to flatten and paste on the safety walk adhesive strips.	
(10)	Place the front and rear placards according to the safety walk template.	Refer to Figure 1 in 11-20-00 D&O.
(11)	Use a clean cloth to flatten the ‘No Step’ placard and the ‘Foot Step’ placard.	
(12)	Remove the safety walk template.	
(13)	Place the safety walk template on the RH side of center wing.	Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(14)	Make sure that the template orientation is parallel to flight direction.	
(15)	Remove the protective layer from the safety walk adhesive strips.	Note RH side - short strips.
(16)	Place the safety walk adhesive strips into the slots of the safety walk template.	Start from the most forward end of template. Refer to Figure 201.
(17)	Use a roller to flatten and paste on the safety walk adhesive strips.	
(18)	Place the front and rear placards according to the safety walk template.	Refer to Figure 1 in 11-20-00 D&O.
(19)	Use a clean cloth to flatten the 'No Step' placard and the 'Foot Step' placard.	
(20)	Remove the safety walk template.	

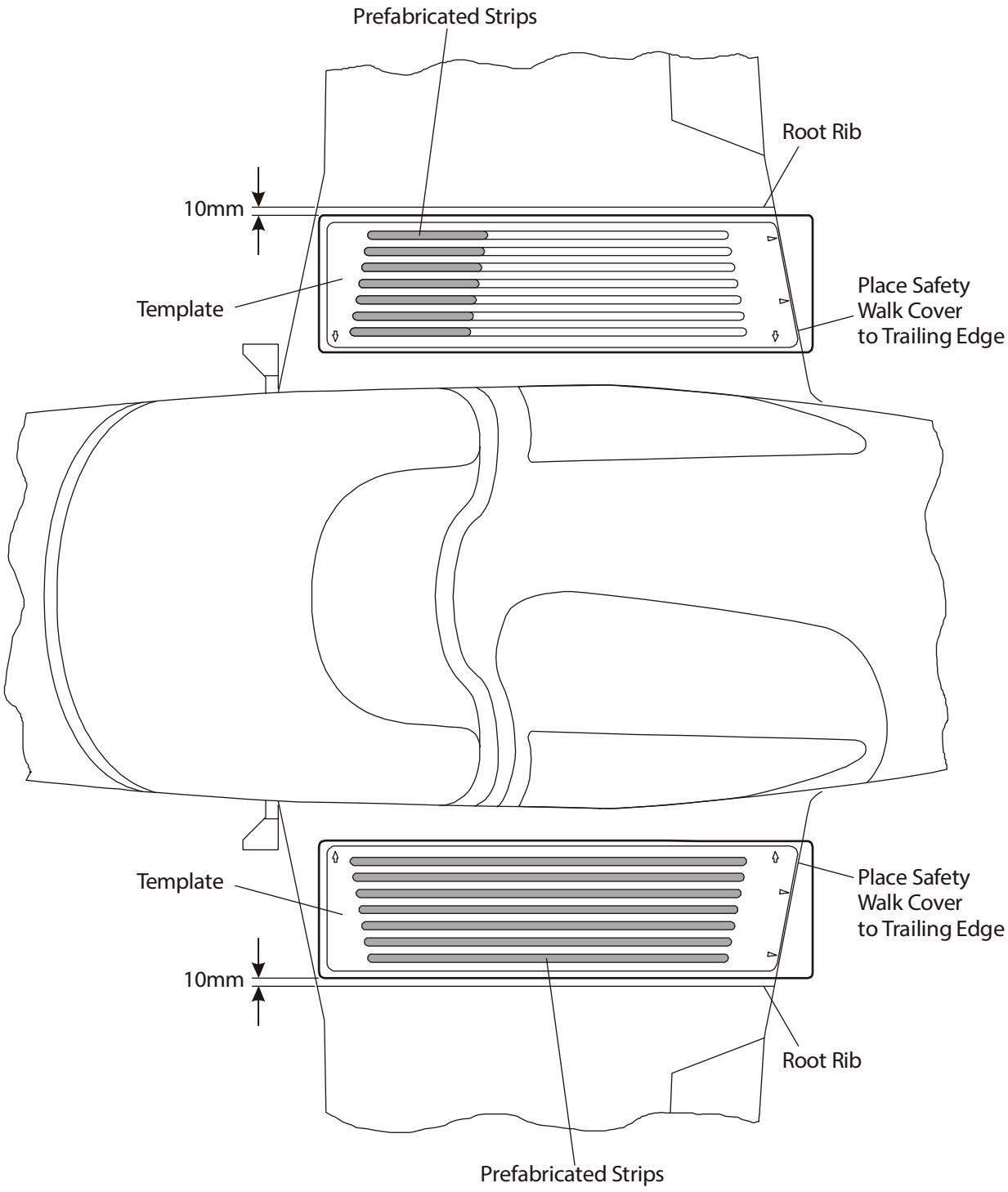

Figure 201 : Safety Walk Template Positioning

INTERIOR PLACARDS AND MARKINGS

1. General

Figure 1 shows the interior placards and markings.

Figures 2 thru 4 show the instrument panel placards, if the G1000 system is installed.

Figures 5 shows the instrument panel placards, if the conventional cockpit is installed.

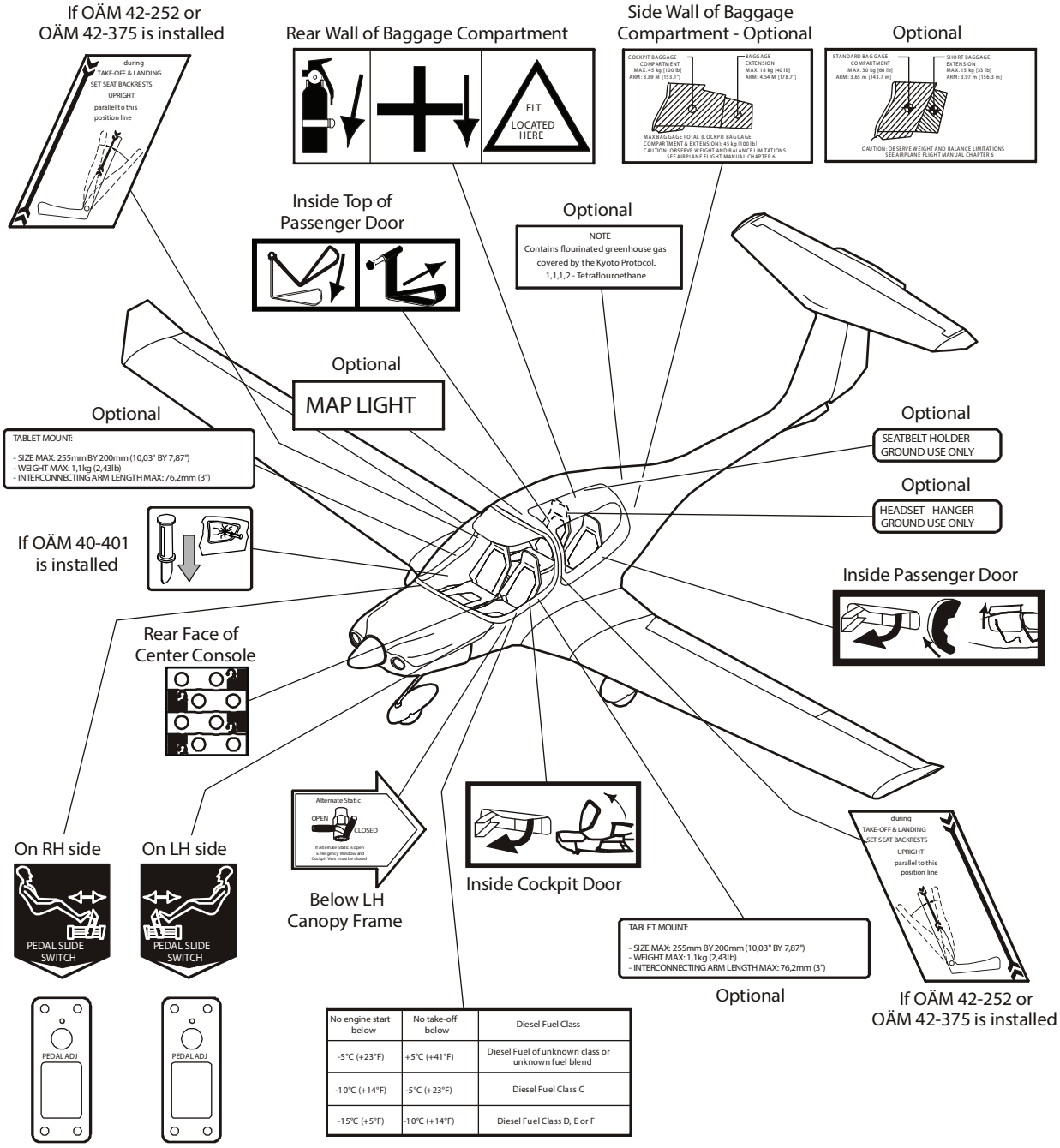

Figure 1 : Interior Placards and Markings

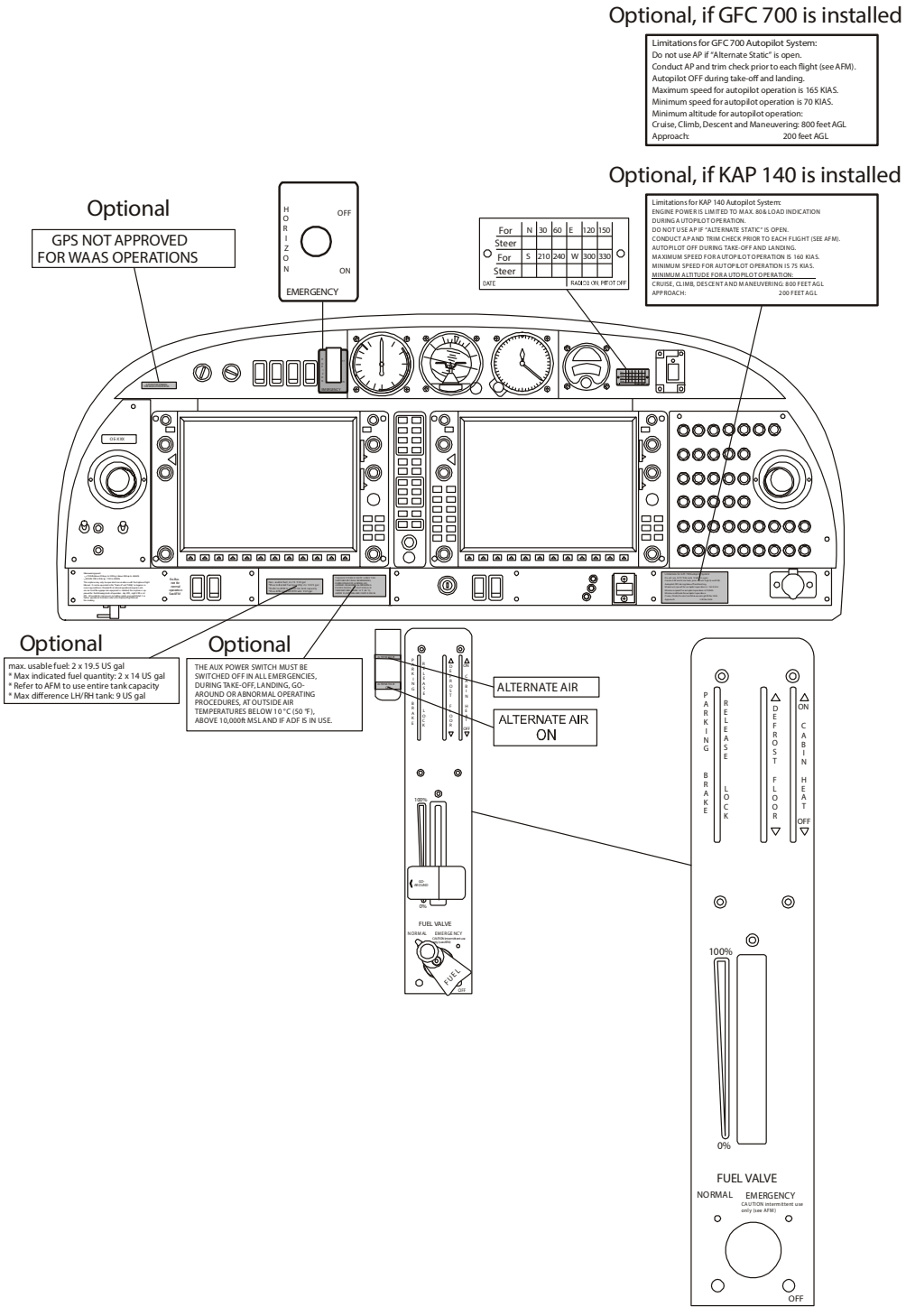

Figure 2 : Instrument Panel Placards and Markings

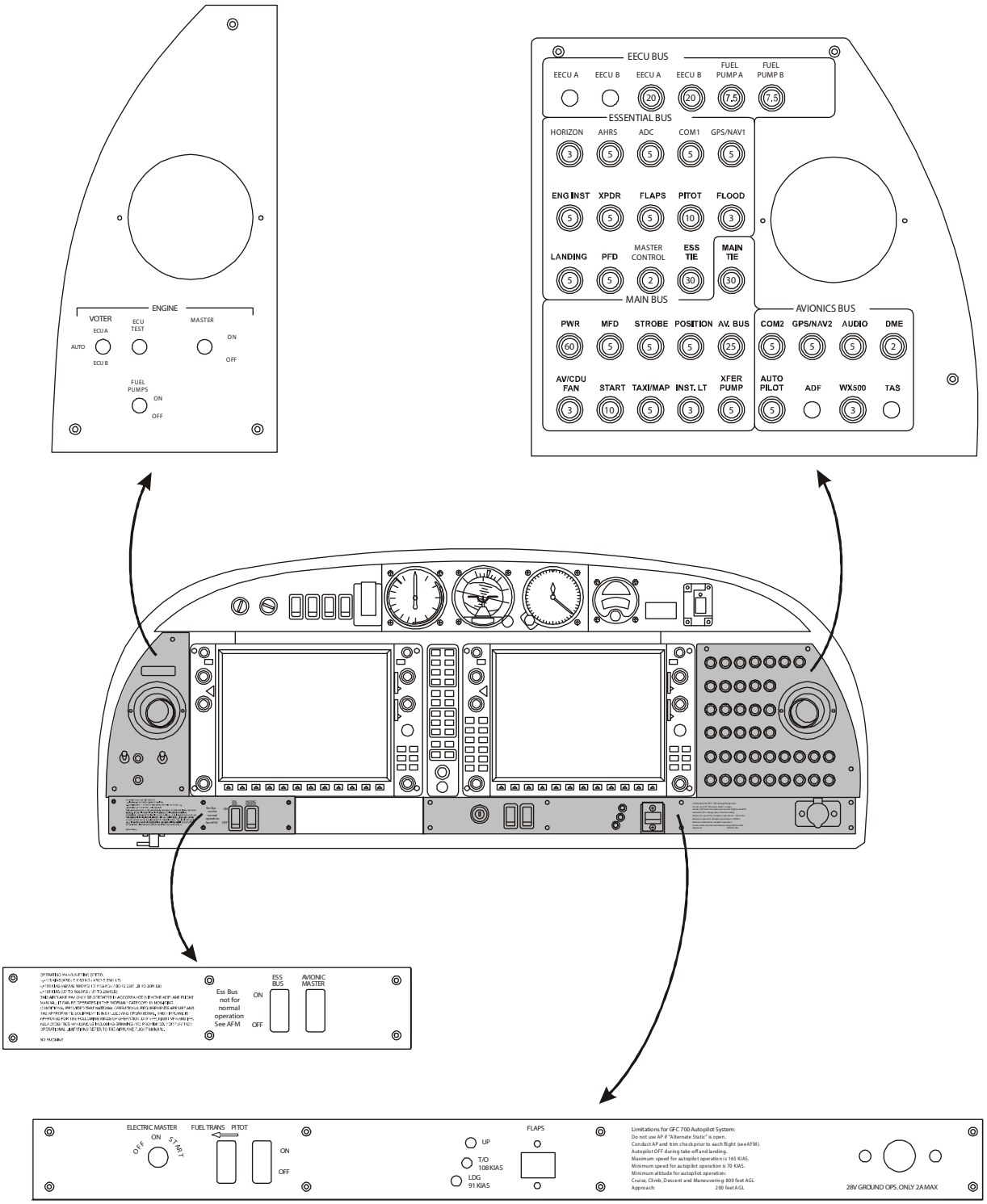

Figure 3 : Placard Panels - Sheet 1 of 2

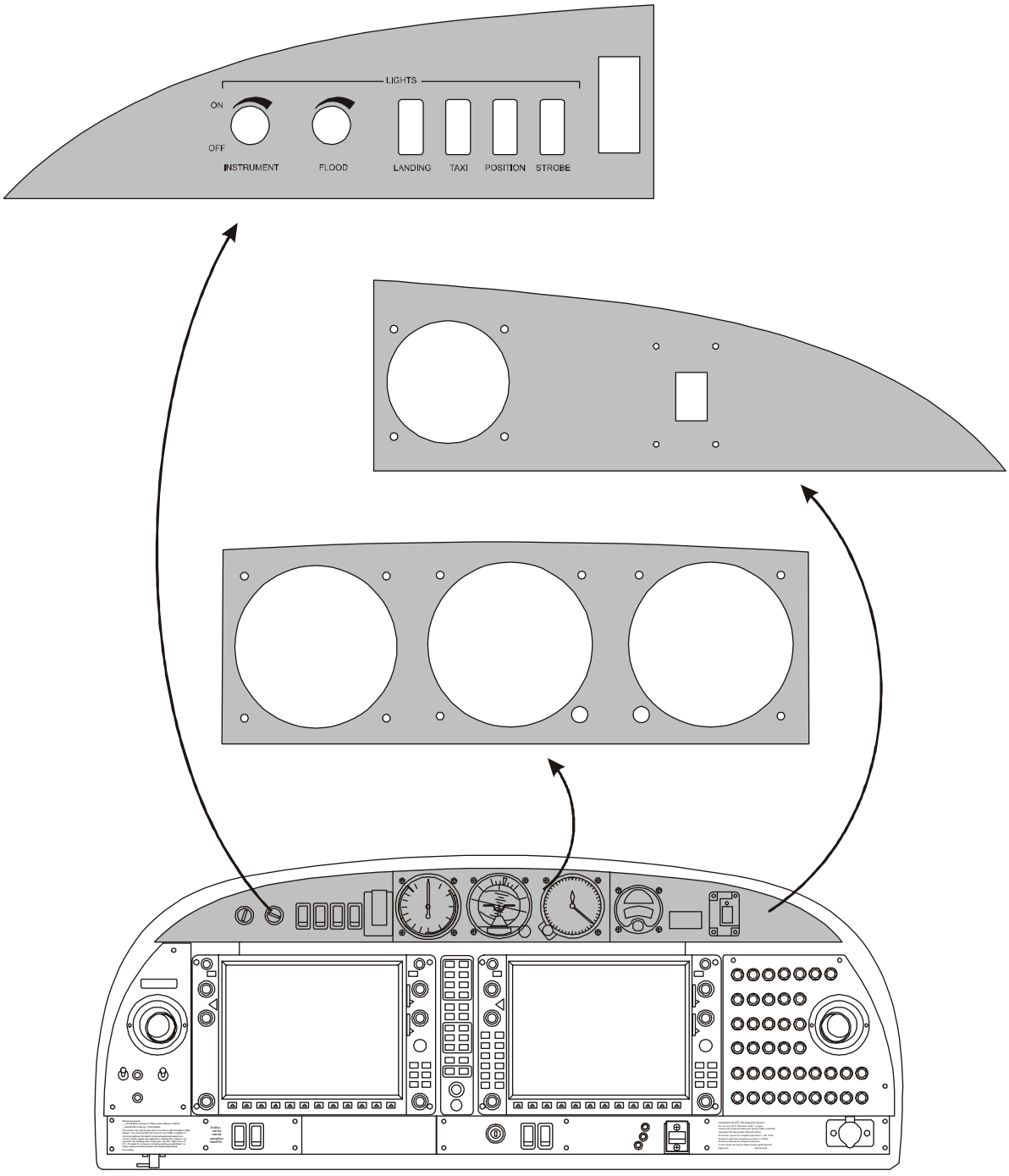

Figure 4 : Placard Panels - Sheet 2 of 2

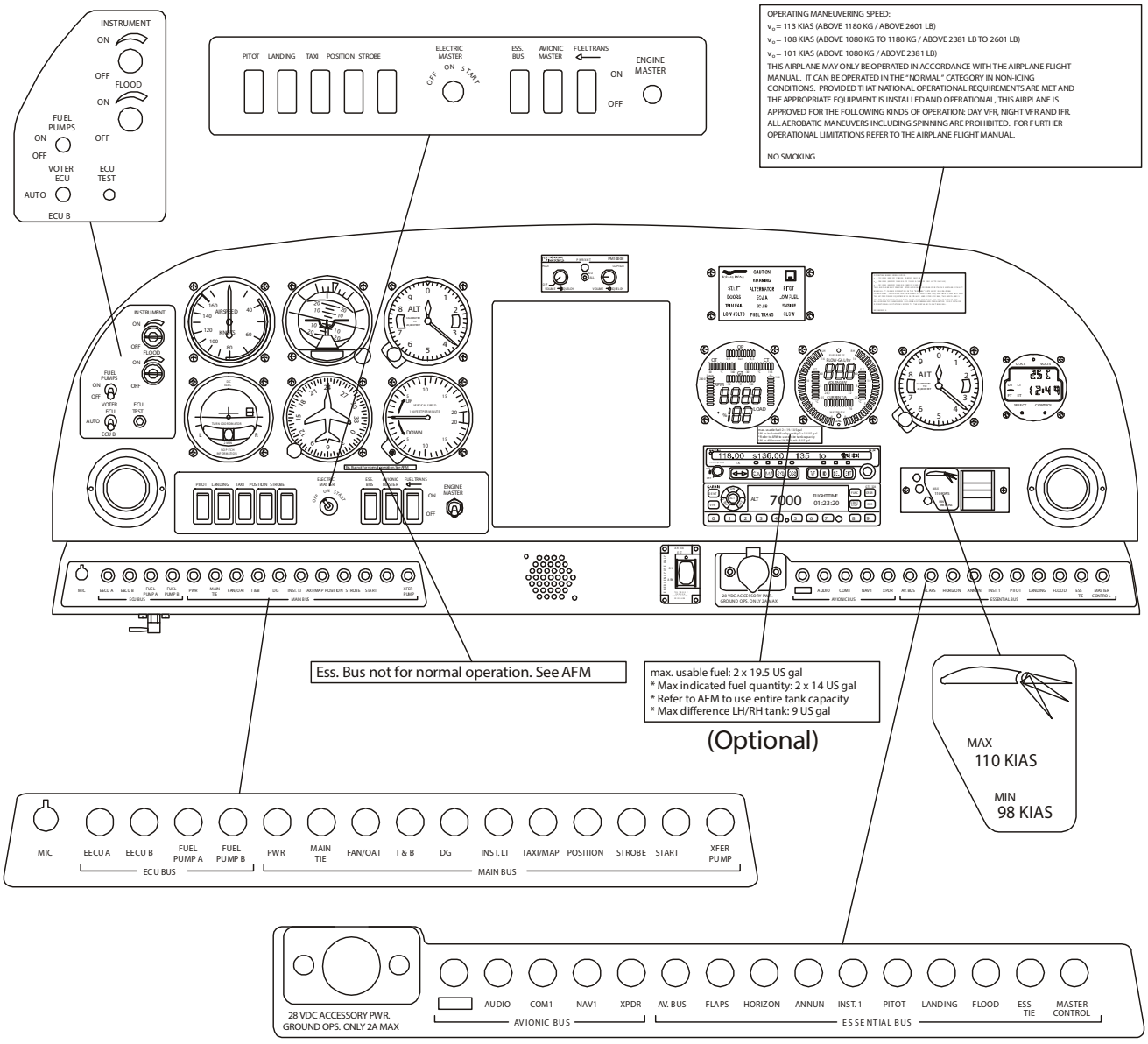

Figure 5 : Instrument Panel Placards and Markings - Conventional Cockpit (OÄM 40-321)

CHAPTER 12
SERVICING

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TABLE OF CONTENTS

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SERVICING

1. General

This Chapter gives these servicing tasks which apply to the whole airplane:

- Section 12-10. Replenishing procedures for fluid systems.
- Section 12-20. Lubrication data.
- Section 12-30. Cleaning and snow and ice removal.

The procedures for preventive and corrective maintenance of systems are given in the related Chapter of this manual. Refer to Chapter 05 for time limits and schedules.

NOTE: The designation of "left" and "right" as well as "forward" and "aft" is based on the airplanes direction of flight.

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REPLENISHING

1. General

Use the procedures in this Section to replenish the fluid systems on the airplane. Figures 1 thru 3 show the location of the servicing points.

2. Fuel System

The fuel tanks are located in each wing between the two main spars. They consist of one (Standard Tank configuration) or two (Long Range Tank configuration) interconnected chambers. Number of chambers and usable fuel capacity are shown in the following table:

Fuel Tank Version	Chambers	Usable Capacity Per Tank	
	Per Tank	[US gal]	[liter]
Standard Tank Configuration	1	14	53
Long Range Tank Configuration (OÄM 40-130)	2	19.5	74

Each wing has a fuel filler cap located at the top wing side about midway between the wing root and the tip. The filler cap connects to the outboard end of the fuel tanks. A fuel tank drain is located below each wing just outboard of the wing root. A third drain is located below the front fuselage and is connected to the gascolator.

WARNING: DO NOT ALLOW FIRE, SPARKS OR HEAT NEAR FUEL. FUEL BURNS VIOLENTLY AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO THE AIRPLANE.

WARNING: DO NOT GET FUEL ON YOUR SKIN. FUEL CAN CAUSE SKIN DISEASE.

WARNING: CONNECT THE AIRPLANE AND THE FUEL SUPPLY VEHICLE TO ELECTRICAL GROUND BEFORE REFUELING. IF YOU DO NOT GROUND THE AIRPLANE, STATIC ELECTRICITY CAN CAUSE FIRE DURING REFUELING.

WARNING: **MAKE SURE THAT A FIRE EXTINGUISHER IS AVAILABLE.**

WARNING: **TURN OFF ALL GROUND EQUIPMENT IN THE REFUELING AREA.**

WARNING: **DO NOT OPERATE ELECTRICAL SWITCHES IN THE AIRPLANE.**

CAUTION: USE ONLY FUEL TYPES GIVEN IN CHAPTER 2 OF THE AIRPLANE FLIGHT MANUAL.

CAUTION: MAKE SURE THAT THE CORRECT AMOUNT OF FUEL ADDITIVES ARE APPLIED. REFER TO SECTION 2.14 OF THE AIRPLANE FLIGHT MANUAL FOR FUEL AND FUEL ADDITIVE LIMITATIONS.

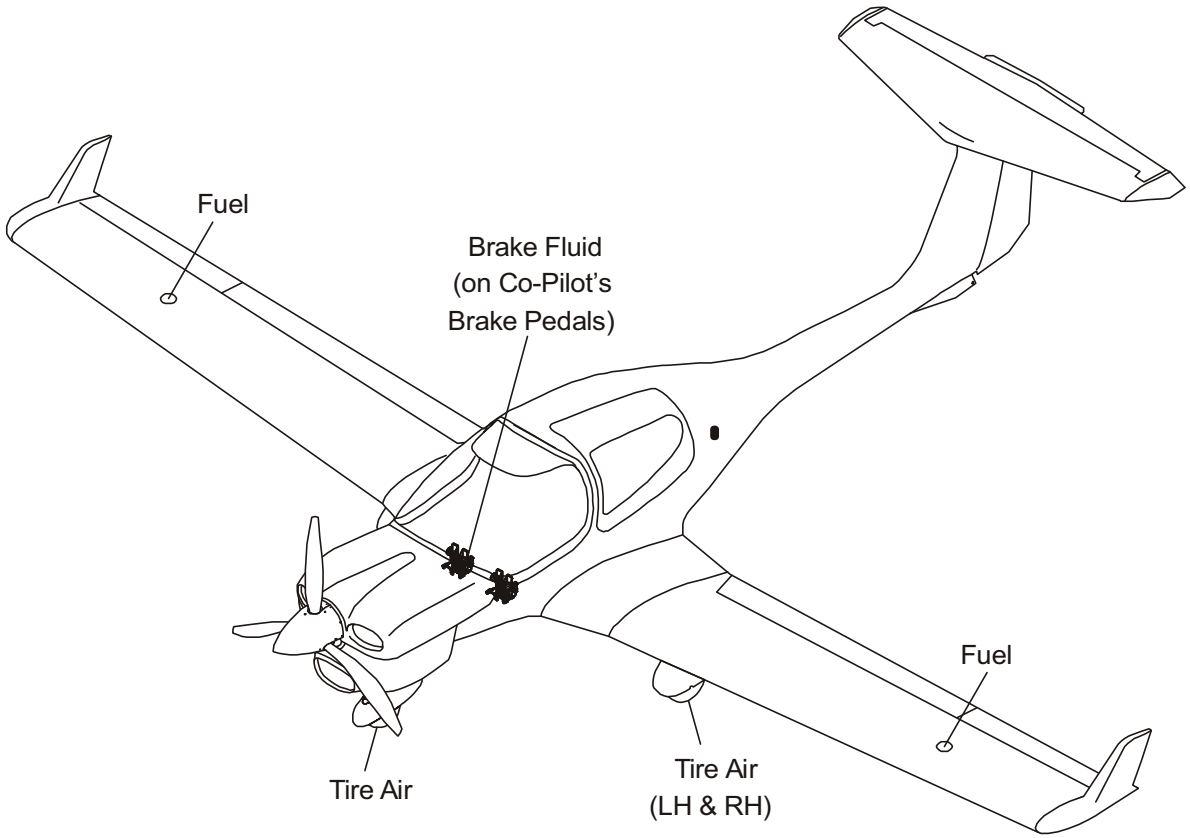

Figure 1 : Replenishment Points

3. Refueling/Defueling

A. Refueling.

	Detail Steps/Work Items	Key Items/References
CAUTION: USE ONLY FUEL TYPES GIVEN IN CHAPTER 2 OF THE AIRPLANE FLIGHT MANUAL.		
(1)	Shut down the engine.	
(2)	Set ENGINE MASTER OFF.	
(3)	All occupants leave the airplane.	
(4)	Ground the airplane electrically.	At the refueling connection.
(5)	Ground the refueling vehicle electrically.	
(6)	Remove the fuel filler cap.	
CAUTION: MAKE SURE THAT THE CORRECT AMOUNT OF FUEL ADDITIVES ARE APPLIED. REFER TO SECTION 2.14 OF THE AIRPLANE FLIGHT MANUAL FOR FUEL AND FUEL ADDITIVE LIMITATIONS		
(7)	Refuel the airplane.	
(8)	Install the fuel filler cap.	Make sure that the filler cap is locked.
(9)	Do steps 6 thru 8 for the other wing.	
(10)	Remove the ground cable from the airplane.	
(11)	Remove the ground cable from the refueling vehicle.	

B. Defueling.

	Detail Steps/Work Items	Key Items/References
(1)	Ground the airplane electrically.	At the refueling connection.
(2)	Put a suitable container below the drain valve for the wing that you will defuel.	Make sure that you have enough containers to hold all the fuel. Each wing can hold approximately 20 US gal (75 liter) fuel.
(3)	Open the drain valve.	
(4)	When the fuel stops draining, close the drain valve.	Make sure that the drain valve is seated correctly.
(5)	If necessary, do steps 2 thru 4 for the other wing.	
(6)	Remove the ground cable from the airplane.	At the refueling ground connection.

4. Fuel Contamination Test

A. Equipment.

Item	Quantity	Part Number
Glass container.	1	Commercial

B. Fuel Contamination Test Procedure.

	Detail Steps/Work Items	Key Items/References
(1)	Put the glass container under the fuel tank drain valve that you will take the fuel from.	
(2)	Open the drain valve.	
(3)	When the fuel container is half full, close the drain valve.	Make sure that the drain valve is seated correctly.
(4)	Let the fuel in the glass container stand for one minute.	
(5)	Examine the fuel sample: - It must be clear (JET A1). - Look specifically for small water droplets at the bottom of the glass container. - Look for small contamination particles.	If you find any contamination you must do the test again. If you still find contamination after three tests, you must drain the related fuel tank. Flush the tank (use fuel) and fill it with clean fuel.
(6)	Perform steps 1 thru 5 for the other wing.	
(7)	Perform steps 1 thru 5 for the drain valve at the gascolator.	Gascolator drain is located below the front fuselage.

5. Engine Oil System

WARNING: ENGINE OPERATION WITH NO ENGINE OIL (OR VERY LOW OIL LEVEL) WILL CAUSE ENGINE MALFUNCTION OR FAILURE

The engine installed on the DA 40 NG has a wet-sump oil system. The oil capacities are given in the following table:

Oil Sump Capacity		Minimum Safe Quantity	
[liters]	[US qts]	[liters]	[US qts]
7.0	7.4	5.0	5.3

Use only oil specified by the engine manufacturer.

The oil filler is located on the left side of the engine (Figure 2). There is an access hole implemented in the top engine cowling LH side. The oil filler has a dip-stick attached.

A marginal oil consumption of 0.1 liter/h is normal. Measure the oil quantity before each flight (or engine ground run-up). If necessary, replenish the oil system.

A. Replenish the Engine Oil System.

	Detail Steps/Work Items	Key Items/References
(1)	Open the access panel on the LH side of the top cowling.	
CAUTION: USE ONLY APPROVED ENGINE OIL. REFER TO CHAPTER 2 OF THE AIRPLANE FLIGHT MANUAL FOR APPROVED ENGINE OIL SPECIFICATIONS. IF YOU DO NOT USE APPROVED ENGINE OIL, THE ENGINE CAN BE DAMAGED.		
(2)	Replenish the oil system to the correct level.	Refer to the AE Maintenance Manual, latest revision.
(3)	Close the access panel of the top cowling.	

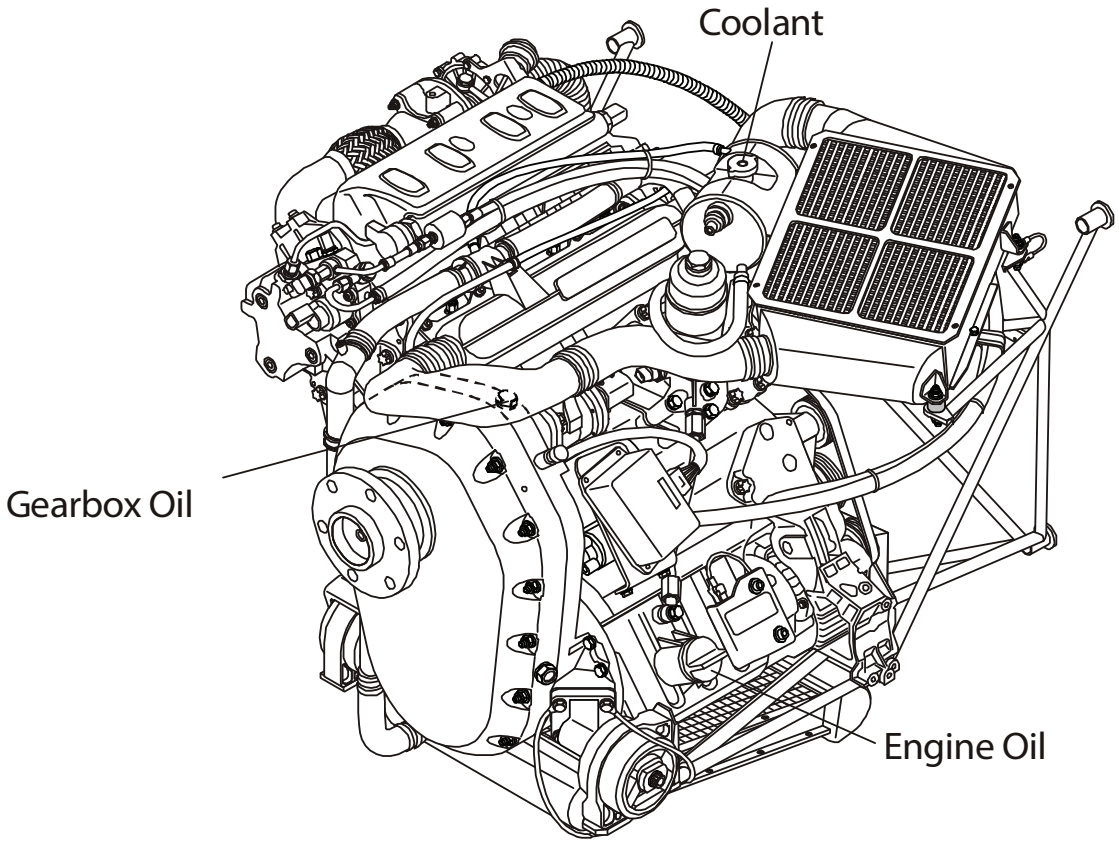

Figure 2 : Replenishment Points

6. Gearbox Oil

WARNING: ENGINE OPERATION WITH NO GEARBOX OIL (OR VERY LOW OIL LEVEL) WILL CAUSE ENGINE MALFUNCTION OR FAILURE.

The gearbox oil level can be checked through an oil level window at the front side of the engine.

A. Replenish the Gearbox Oil System.

CAUTION: IF THE GEARBOX OIL LEVEL IS LOW THE REASON MUST BE DETERMINED AND THE PROBLEM MUST BE CORRECTED BY AUTHORIZED PERSONNEL.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine top cowling.	Refer to Section 71-10.
	CAUTION: USE ONLY APPROVED GEARBOX OIL. REFER TO CHAPTER 2 OF THE AIRPLANE FLIGHT MANUAL FOR APPROVED GEARBOX OIL SPECIFICATIONS. IF YOU DO NOT USE APPROVED GEARBOX OIL, THE ENGINE CAN BE DAMAGED.	
(2)	Replenish gearbox oil.	Refer to the AE Maintenance Manual, latest revision.
(3)	Install the engine top cowling.	Refer to Section 71-10.

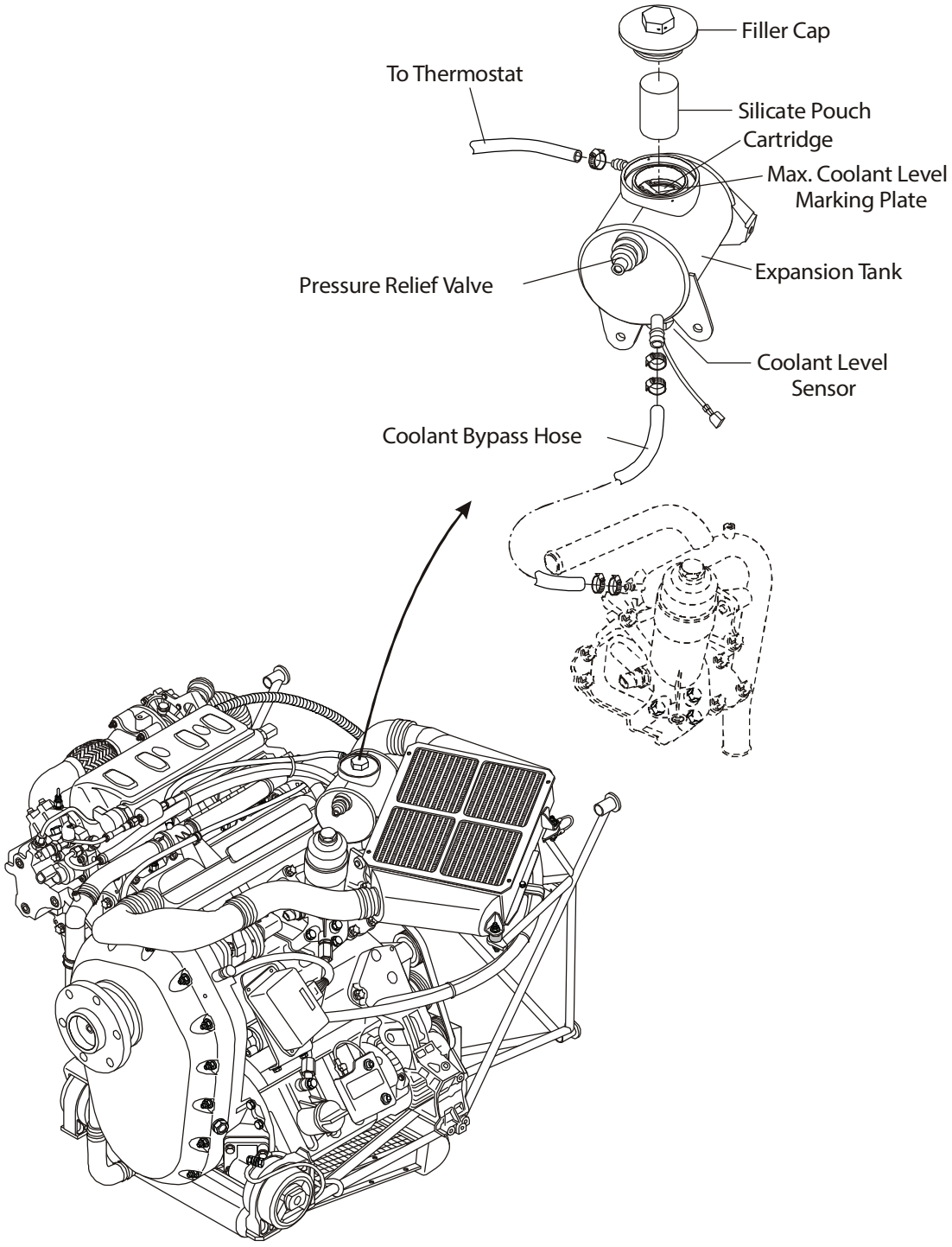

Figure 3 : Engine Coolant Expansion Tank / Filler Cap (if MÄM 40-763 is installed)

7. Engine Coolant

WARNING: DO NOT REMOVE THE EXPANSION TANK FILLER CAP WHEN THE ENGINE IS HOT. THE TANK IS PRESSURIZED WITH HOT COOLANT. HOT COOLANT CAN CAUSE INJURY TO PERSONS.

WARNING: DURING NORMAL OPERATION THE AE E4 ENGINE SHOULD NOT CONSUME COOLANT. ANY COOLANT LOSS MUST BE INVESTIGATED BEFORE FURTHER OPERATION OF THE ENGINE. OPERATING THE ENGINE WITH A FAULTY COOLING SYSTEM CAN DAMAGE THE ENGINE.

The DA 40 NG engine uses liquid coolant to cool the engine and supply heating to the cabin. The coolant is circulated around the engine in an integral water jacket. When the coolant is at normal engine operating temperature a thermostatic valve directs the coolant to flow through a heat exchanger. The thermostatic valve controls the flow of coolant through the coolant radiator in order to control the temperature of the coolant.

A coolant expansion tank is located on the left side of the engine (Figure 3). The expansion tank has a filler cap, a pressure relief valve, a silicate pouch and a coolant level sensor. Use the procedures in this Paragraph to replenish the coolant system when the system has been drained for maintenance or system repair.

A. Replenish the Coolant System.

CAUTION: IF THE COOLANT LEVEL IS LOW THE REASON MUST BE DETERMINED AND THE PROBLEM MUST BE CORRECTED BY AUTHORIZED PERSONNEL.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine top cowling.	Refer to Section 71-10.
	WARNING: DO NOT REMOVE THE PRESSURE CAP FROM THE COOLANT TANK IF THE ENGINE IS HOT. THE PRESSURE IN THE SYSTEM CAN FORCE HOT COOLANT TO COME OUT AND CAUSE INJURY TO PERSONS.	
(2)	Remove the pressure cap from the coolant tank: - Turn the cap counter-clockwise a small distance to release the pressure. - When the pressure has fully released, turn the cap fully counter-clockwise.	
	CAUTION: USE ONLY APPROVED COOLANT. REFER TO CHAPTER 2 OF THE AIRPLANE FLIGHT MANUAL FOR APPROVED COOLANT SPECIFICATIONS. IF YOU DO NOT USE APPROVED COOLANT, THE ENGINE CAN BE DAMAGED.	

	Detail Steps/Work Items	Key Items/References
(3)	If MÄM 40-763 is NOT installed: Add coolant until the fluid level is at the bottom of the tank filler tab. If MÄM 40-763 is installed: Add coolant until the fluid level is at the “max. coolant level marking” in the filler neck.	
(4)	Install the filler cap. If MÄM 40-763 is installed: - Install the filler cap. - Install safety lock wire to secure filler cap.	 Torque refer to Section 20-70. Check O-ring for deformation, apply EZ TURN. Wire diameter 0.8 mm (0.032 in).
(5)	Do an engine ground run-up until the engine reaches normal operating temperature. Then shut down the engine.	Refer to Section 71-00 Inspect for leaks.
(6)	Let the engine cool down.	
	WARNING: DO NOT REMOVE THE PRESSURE CAP FROM THE COOLANT TANK IF THE ENGINE IS HOT. THE PRESSURE IN THE SYSTEM CAN FORCE HOT COOLANT TO COME OUT AND CAUSE INJURY TO PERSONS.	
	NOTE: When the coolant system has been drained for maintenance / repair air may get trapped in the system. The following steps are to remove any air trapped in the system and give a correct fluid level in the expansion tank.	
(7)	Repeat steps 2 thru 6 until the coolant level remains constant and is at the correct level.	
(8)	Install the engine top cowling.	

8. Brake System

The brake fluid reservoirs are located on the brake master cylinders on the co-pilot's side. You get access in the cockpit below the instrument panel.

WARNING: DO NOT GET BRAKE FLUID ON YOUR SKIN OR IN YOUR MOUTH. BRAKE FLUID IS TOXIC AND CAN CAUSE INTERNAL INJURY.

CAUTION: REMOVE SPILLED BRAKE FLUID IMMEDIATELY. BRAKE FLUID CAN CAUSE DAMAGE TO PAINT AND OTHER MATERIALS.

A. Fill the Brake System Reservoirs.

	Detail Steps/Work Items	**Key Items/References**
(1)	Clean the top of the brake fluid reservoir and filler cap.	
(2)	Remove the filler cap.	
(3)	Fill the reservoir to the correct level.	Use only MIL-PRF-5606 H hydraulic fluid. Fill 12 to 25 mm (0.5 to 1 in) below the top of the filler hole.
(4)	Install the filler cap.	

9. Tires

The DA 40 NG has these tires:

Main tires: 15 x 6.0 - 6, 6PR, TT, 160 mph, TSO C62; pressure (loaded): 3.3 bar (48 PSI).

Nose tire: 5.00 - 5, 6PR, TT, 120 mph; TSO C62; pressure (loaded): 3.1 bar (45 PSI).

If MÄM 40-631 is installed:

Main tires: 15 x 6.0 - 6, 6PR, TT, 160 mph, TSO C62; pressure (loaded): 3.3 bar (48 PSI).

Nose tire: 5.00 - 5, 6PR, TT, 120 mph; TSO C62; pressure (loaded): 2.4 bar (35 PSI).

If OÄM 40-334 is installed:

Main tires: 8.50 - 6, 6PR, TT, 120 mph, TSO C62; pressure (loaded): 1.2 bar (17 PSI).

Goodyear, P/N 856C61-3

Nose tire: 6.00 - 6, 6PR, TT, TSO C62; pressure (loaded): 1.2 bar (17 PSI)

Goodyear, P/N 606C66-8

Goodyear, P/N 606C61-6

Goodyear, P/N 606C61B1

A. Examine the Tires and Measure the Pressure.

	Detail Steps/Work Items	Key Items/References
(1)	Examine the tires. Look specially for: - Cuts and friction damage. - Correct alignment of the slippage markers.	Move the airplane as necessary so that each part of each tire can be seen. If the slippage markers do not align, remove the wheel for shop maintenance.
(2)	Measure the tire pressure (loaded). If necessary, inflate the tires to the correct pressure: If MÄM 40-631 is installed: If OÄM 40-334 is installed: Intentionally left blank	Main tire: 3.3 bar (48 PSI). Nose tire: 3.1 bar (45 PSI). Nose tire: 2.4 bar (35 PSI). Main tire: 1.2 bar (17 PSI) -1.5 bar (22PSI). Nose tire: 1.2 bar (17 PSI) -1.5 bar (22PSI). For operation on paved surface or hard unpaved surfaces it is recommended to operate the airplane at the upper limit of the inflation pressure.

SCHEDULED SERVICING

1. General

This Section gives lubrication data. It tells you where components are located. It gives a list of approved lubricants. It also gives the components which MUST NOT be lubricated.

Most systems and components have maintenance-free bearings. These can be sealed ball/roller bearings or Teflon bushes. These bearings MUST NOT be lubricated.

Table 1 shows the bearings which MUST NOT be lubricated.

Table 1 : Items which MUST NOT be Lubricated	
Rudder pedal sled.	DO NOT LUBRICATE.
Flap rod-end bearings.	DO NOT LUBRICATE.
Aileron rod-end bearings.	DO NOT LUBRICATE.
Elevator rod-end bearings.	DO NOT LUBRICATE.
Elastomeric spring. (See Note 7).	DO NOT LUBRICATE.

2. Lubrication Schedule

Table 2 shows the lubrication schedule. Clean each lubrication point before lubrication.

See Figures 1 thru 3 for the location of lubrication points listed on the left side of the table. The center columns show the type of lubricant. The right column shows the lubrication interval.

Table 2 : Lubrication Schedule

Location		Type of Lubricant						Interval
No.	See Figures 1 thru 3	1	2	3	4	5	6	(Hours) see Notes (1), (2)
(1)	Brake pedal pivot.		X					200
(2)	Rudder cable S-tubes.			X				200
(3)	Flap actuator extension rod.			X				200
(4)	Passenger door safety hook (red).				X			100
(5)	Upper rudder pivot bearing.	X						200
(6)	Nose wheel bearing (see notes 3, 5 and 6).	X						200
(7)	Wing main bolts.	X						2000
(8)	NLG elastomer pack / hydraulic damper eye end.		X					200
(9)	Battery terminals.				X			1000
(10)	B-bolts.	X						2000
(11)	B-bolt spherical bearings.	X						2000
(12)	A-bolts.	X						2000
(13)	A-bolt spherical bearings.	X						2000
(14)	Brake pedal pivot shaft interior.					X		1000
(15)	Flap actuator universal pivot block.	X						1000
(16)	Brake caliper locating pins.						X	1000
(17)	Stick support pivot pins.	X						1000
(18)	Main wheel bearings (see notes 3, 5 and 6).	X						200
(19)	Cable eyes on rudder.	X						200

Notes to Table 2 - Lubrication Schedule:

(1) Lubricate at the time shown or at every disassembly/assembly.

(2) Lubricate more frequently in severe climates or operating conditions.

(3) Lubricate at the time shown and at Annual Inspection.

(4) Do not get grease on the threads. It will reduce the friction of the lock-nut.

CAUTION: DO NOT MIX AVIATION WHEEL BEARING GREASES WITH EACH OTHER. IF USING OTHER APPROVED GREASES, COMPLETE REMOVAL OF CONTAINED GREASE AND BEARING CLEANING IS REQUIRED. REPLACEMENT OF PREVIOUSLY LUBRICATED FELT GREASE SEALS IS ALSO REQUIRED.

(5) The wheel manufacturer lubricates the main wheel bearings with Mobil Aviation Grease SHC 100.

(6) On airplanes registered in the USA, lubricate the wheel bearings at every annual/100 hour inspection (see FAR 43, Appendix D).

(7) The elastomeric spring is maintenance free.

Table 3 : Lubricant Specifications		
Specification	**Product**	**Manufacturer**
TYPE 1		
MIL-G-3545 (obsolete)	AeroShell Grease 5 (Warm climates only)	Shell Oil Company
GOST 6267-74	Grease CIATIM 201	RUSMA LLC Company
GOST 9433-80	Grease CIATIM 221	RUSMA LLC Company
	Mobil Aviation Grease SHC 100	Exxon Mobil Company
MIL-PRF-81322F Grade 2	AeroShell Grease 22	Shell Oil Company
TYPE 2		
MIL-L-7870	Royco 363	Royal Lubricants Co. Inc.
	Brayco 363	Bray Oil Co.
	LPS 2 (Warm climates only)	LPS
TYPE 3		
Greaseless Lubricant	LPS 1	
TYPE 4		
VV-P-236 (Petrolatum)	Royco 1	Royal Lubricants Co. Inc.
	DC 4	Dow Corning
TYPE 5		
MIL-C-16173 (Grade 2)	LPS 3	LPS
TYPE 6		
--	Multi-Purpose Lubricant	DRI SLIDE
--	LPS Force 842	LPS
--	Lubriplate X	Lubriplate
--	Loctite 8191	Loctite
--	Anti-Friction Spray MoS2	WEICON GmbH

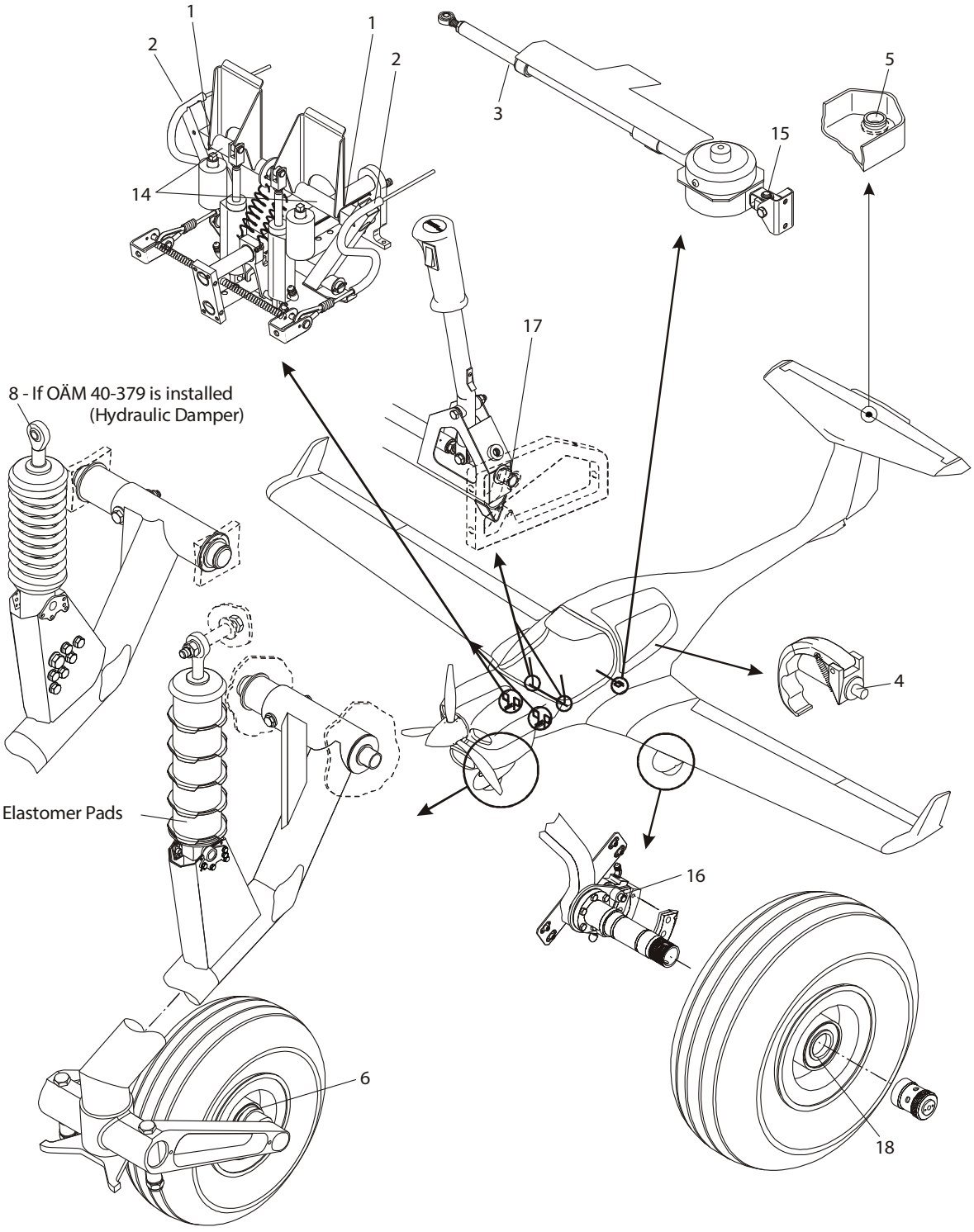

Figure 1 : Lubrication Points - Sheet 1

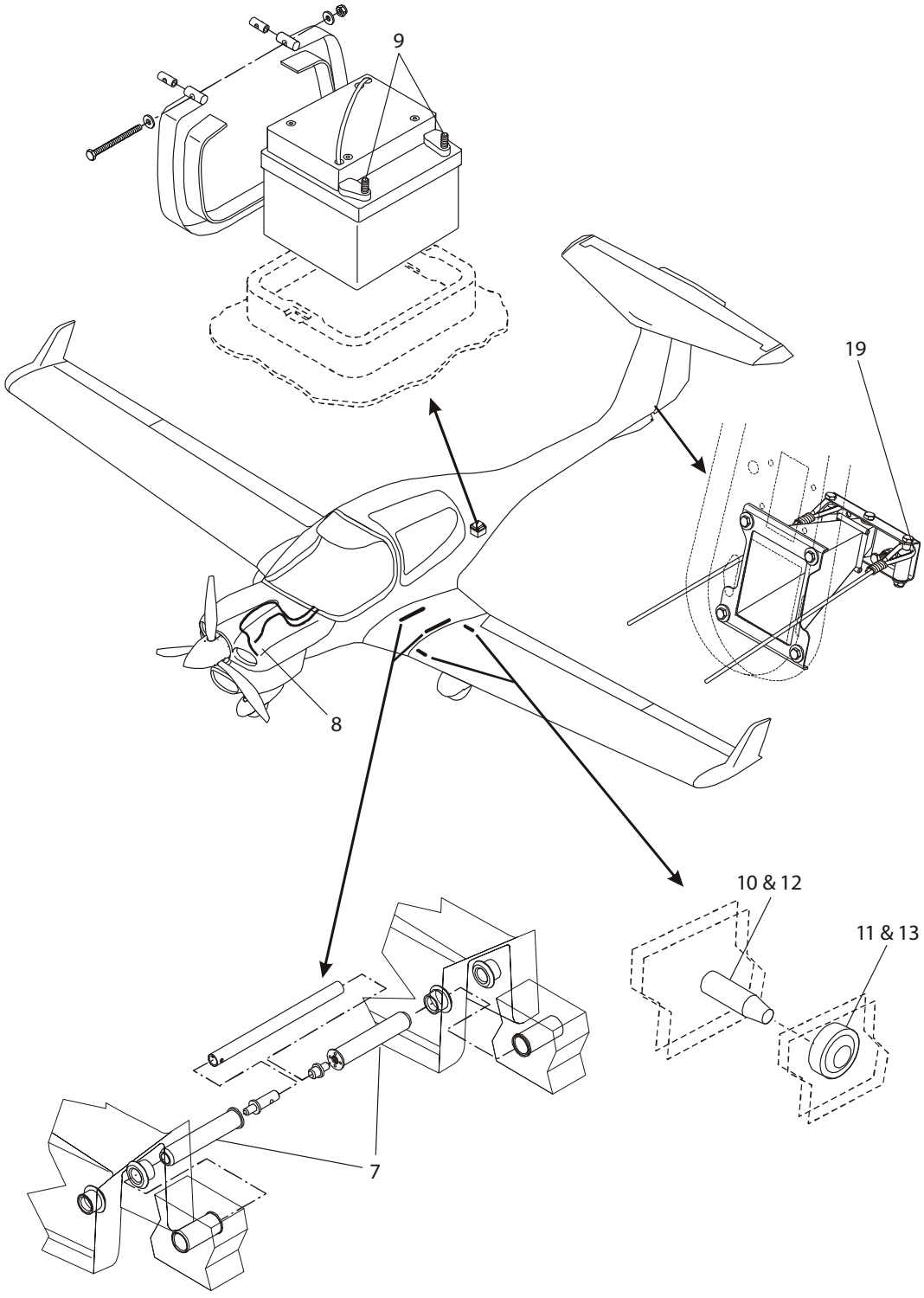

Figure 2 : Lubrication Points - Sheet 2

UNSCHEDULED SERVICING

1. General

This Section tells you how to clean the airplane. It also tells you how to remove snow and ice from the airplane.

2. Exterior Cleaning

The outer surfaces of the DA 40 NG must be kept clean to keep the good performance characteristics of the airplane. The leading edges of the wings are specially important.

Protect all control surface bearings and other lubricated components before cleaning the airplane.

Use large quantities of water to clean the airplane. If necessary, add a mild cleaning agent to the water. Remove excess dirt or dead insects immediately after flight. Dried-on dirt or dead insects are very difficult to remove.

CAUTION: DO NOT USE CLEANING OR POLISHING AGENTS WHICH CONTAIN SILICONE. IF THE AIRPLANE NEEDS REPAIR, SILICONE CAN PREVENT REPAIR MATERIALS FROM BONDING CORRECTLY.

Approximately once a year, apply a silicone-free automotive polish to the outer surface.

3. Canopy Cleaning

CAUTION: DO NOT RUB THE CANOPY WHILE IT IS DRY. DO NOT USE DIRTY CLOTHS OR SPONGES. THE ACRYLIC CANOPY SCRATCHES VERY EASILY WITH EVEN THE SMALLEST PARTICLES OF DUST.

Clean the canopy with large quantities of water. Use clean sponges and a good chamois leather which is not used for any other purpose.

Polish dull or scratched areas using a special acrylic cleaner. Remove scratches with special polishing emery cloth (e.g. Micro-mesh).

4. Interior Cleaning

Clean the interior with a flame-proof vacuum cleaner.

All plastic surfaces should be wiped clean using a damp cloth without any cleaning agents.

CAUTION: IF INSTALLED, THE PFD AND MFD DISPLAYS OF THE GARMIN G1000 USE A LENS COATED WITH A SPECIAL ANTI-REFLECTIVE COATING THAT IS VERY SENSITIVE TO SKIN OILS, WAXES, AND ABRASIVE CLEANERS. CLEANERS CONTAINING AMMONIA WILL HARM THE ANTI-REFLECTIVE COATING. IT IS VERY IMPORTANT TO CLEAN THE LENS USING A CLEAN, LINT-FREE CLOTH AND AN EYEGLASS LENS CLEANER THAT IS SPECIFIED AS SAFE FOR ANTI-REFLECTIVE COATINGS.

5. Engine Cleaning

Use a cold cleaning agent to clean the engine (e.g. Berner Cold Cleaner No.13618.0 or refer to the AE Maintenance Manual, latest revision).

CAUTION: DO NOT CLEAN THE ENGINE WHILE THE ENGINE IS HOT.

CAUTION: DO NOT USE HIGHLY FLAMMABLE OR CORROSIVE CLEANING AGENTS TO CLEAN THE ENGINE.

CAUTION: DO NOT LET THE CLEANING AGENT GET INTO ELECTRICAL COMPONENTS AND ENGINE INTAKES.

CAUTION: DO NOT START THE ENGINE UNTIL ALL OF THE CLEANING AGENT HAS EVAPORATED.

Protect all electrical components and engine intakes with polythene bags or other means. Obey the cleaning agent manufacturer's instructions. Refer to the engine manufacturer's Maintenance Instruction Manual for more data.

6. Snow and Ice Removal

Remove snow and ice as soon as possible to prevent melted water from freezing later and causing damage.

CAUTION: DO NOT USE SHARP OBJECTS TO REMOVE SNOW OR ICE. YOU CAN DAMAGE THE AIRPLANE STRUCTURE.

Use soft brushes to remove snow from the surfaces.

Put the airplane in a heated hangar to remove ice or spray de-icing fluid onto ice-covered surfaces using a suitable spray bottle. For approved de-icing fluids refer to the AFM, Section 8.6.

Use a soft piece of cloth to wipe the airplane dry.

7. Conservation of Exterior Parts

This section tells you which exterior parts are protected with an anti-corrosion coating, when and how a new anti-corrosion coating must be applied.

A. Anti-Corrosion Coating Check.

Check the protected exterior parts (refer to the Anti-Corrosion Checklist and Figures 1 through 11) for a film of the anti-corrosion coating. If the film is scratched or the part shows signs of corrosion, you must replace the anti-corrosion coating (refer to paragraphs B and C of this section).

B. Remove the Anti-Corrosion Coating.

CAUTION: YOU MUST USE THE APPROVED ANTI-CORROSION COATING CLEANING AGENTS IN ORDER TO PREVENT DAMAGE TO OTHER PARTS OF THE AIRPLANE.

Approved anti-corrosion coating cleaning agents are:

- Ardrox® AV 980.
- Diestone DLS.

Remove the anti-corrosion coating:

- Read the product datasheet carefully.
- Cover the airplane parts and surfaces in your working area, which are not subject to the cleaning.
- Apply the anti-corrosion cleaning agent to the parts.
- Use a cloth to remove the remains.
- Repeat until the surface is clean and dry.

C. Apply the Anti-Corrosion Coating

CAUTION: YOU MUST USE THE APPROVED ANTI-CORROSION COATINGS IN ORDER TO PREVENT DAMAGE TO OTHER PARTS OF THE AIRPLANE.

Approved anti-corrosion coatings are:

- Ardrox® AV 30 (color: red; recommended for not visible parts)
- Socopac 65H (color: red; recommended for not visible parts)
- Cor-Ban 35 (color: transparent; recommended for visible parts)

Apply the anti-corrosion coating:

- Read the product datasheet carefully.
- Cover the airplane parts and surfaces in your working area, which are not subject to the anti-corrosion coating.
- Apply the anti-corrosion agent to the parts. Make sure the surface is covered with a thin film of the anti-corrosion coating.
- The anti-corrosion coating needs 3 hours to dry.
- Remove the covers from the airplane.

D. Anti-Corrosion Coating Checklist

Refer to the figure numbers in the following table to identify the parts, where anti-corrosion coatings must be applied.

Anti-Corrosion Coating Checklist		
Figure	**Part / Location**	**Initials**
	FLAPS LH/RH	
1	Control rod eye end fitting (2)	
1	Ball joint bolt and nut (2)	
	AILERONS LH/RH	
2	Control rod eye end fitting (2)	
2	Ball joint bolt and nut (2)	
	MAIN LANDING GEAR LH/RH	
3, 4	Outboard attachment bolts (2), nuts (2) and washers (2)	
3, 4	Inboard attachment bolts , nuts and washers	
3	Axle mounting nuts (6)	
3	Brake caliper, bolt heads and nuts (4)	
	ELEVATOR, ELEVATOR CONTROLS AND ELEVATOR TRIM SYSTEM	
5, 6, 7	Elevator push rod, upper eye end fitting	
5, 6, 7	Elevator upper eye end fitting, bolt head and nut	
5, 6, 7	Elevator trim bolt heads (8) and nuts (8)	
5, 6, 7	Elevator trim actuating lever attaching bolt head and nut	
8	Elevator push eye end fitting, bolt head and nut	
8	Elevator bellcrank, bolt heads (3) and nuts (3)	
	RUDDER	
9	Rudder Pedestal, nuts (4)	
9	Rudder plate, bolt heads (3) and nuts (3)	
10	Rudder upper bearing	

Anti-Corrosion Coating Checklist		
Figure	**Part / Location**	**Initials**
	NOSE LANDING GEAR	
11	Centering unit bolt heads (2) and nuts (2)	
11	Damper eye end fitting, screw and nut	
11	Mounting bolt head and nut	
	FUSELAGE	
12	Foot step screws LH (3), RH (3)	

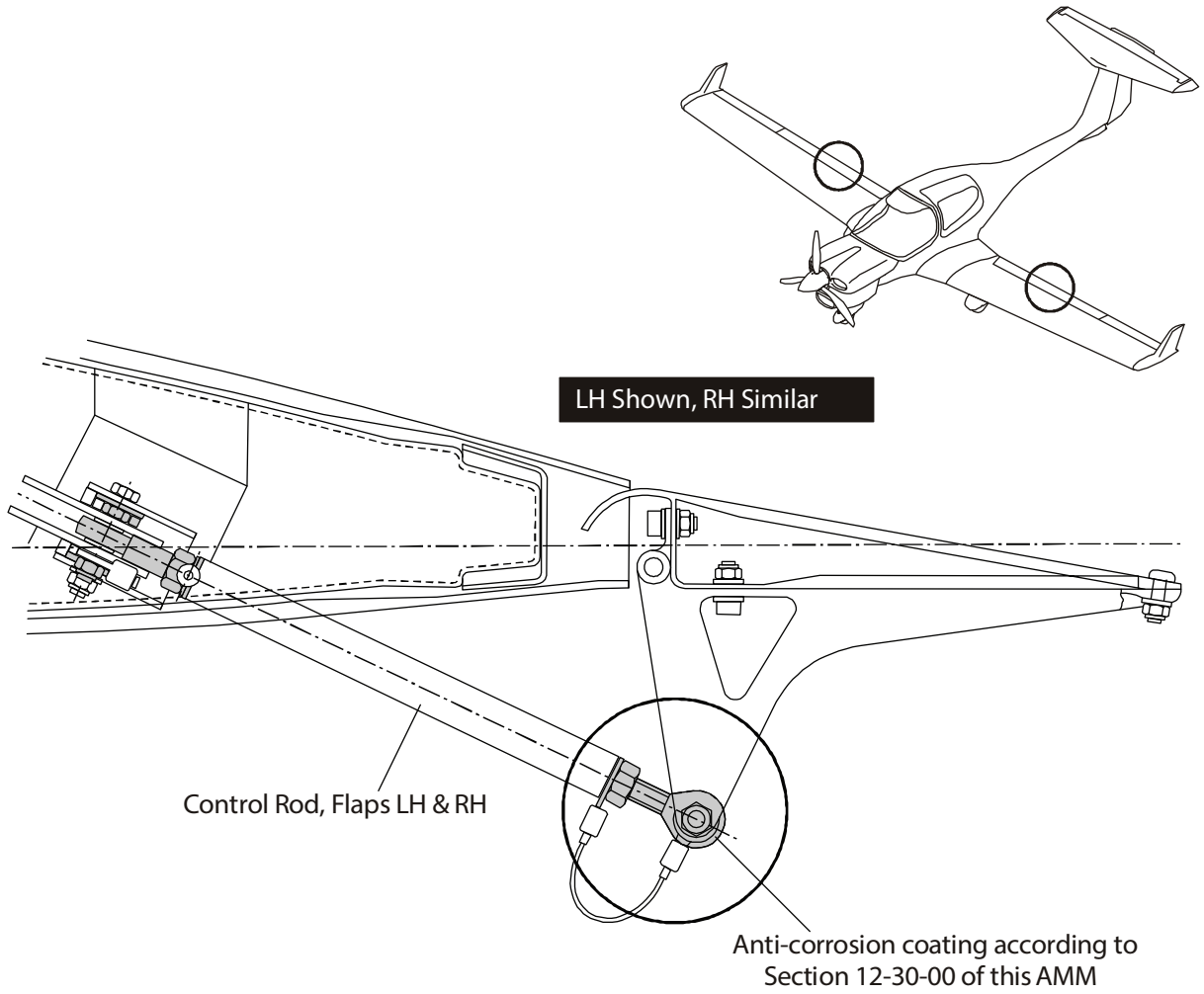

Figure 1 : Anti-Corrosion Coating - Control Rods Flaps LH/RH

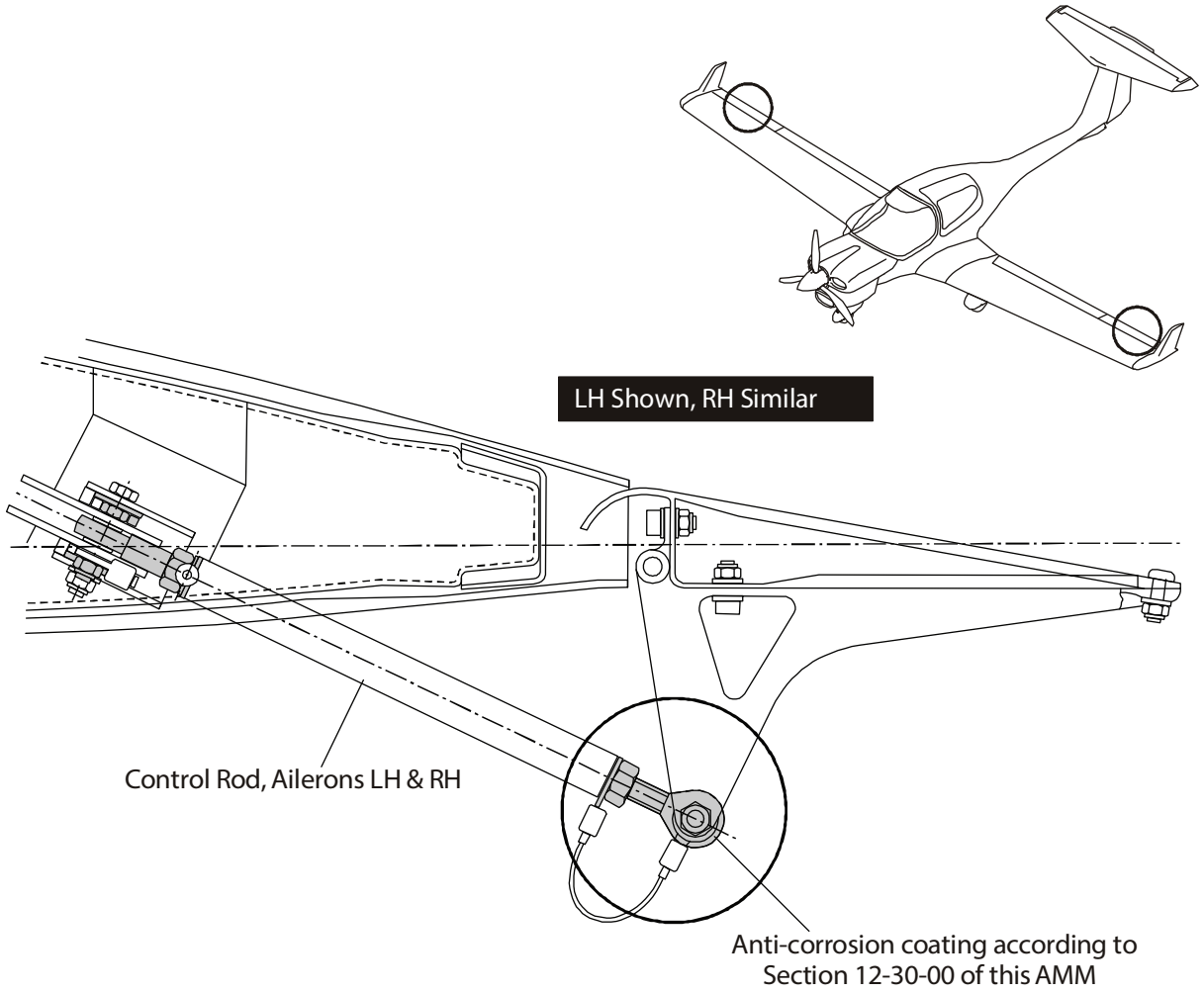

Figure 2 : Anti-Corrosion Coating - Control Rods Ailerons LH/RH

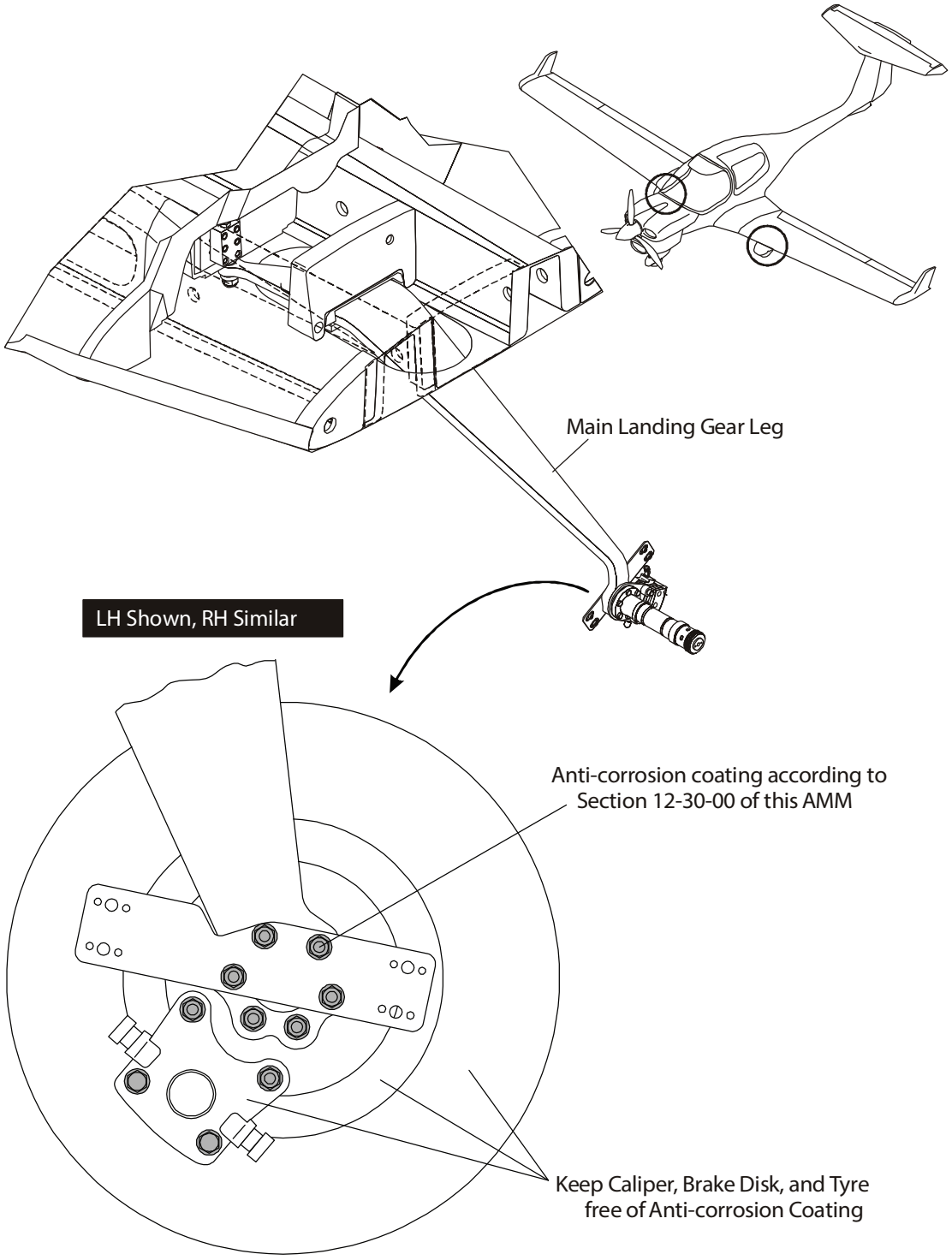

Figure 3 : Anti-Corrosion Coating - Main Landing Gear LH/RH (1)

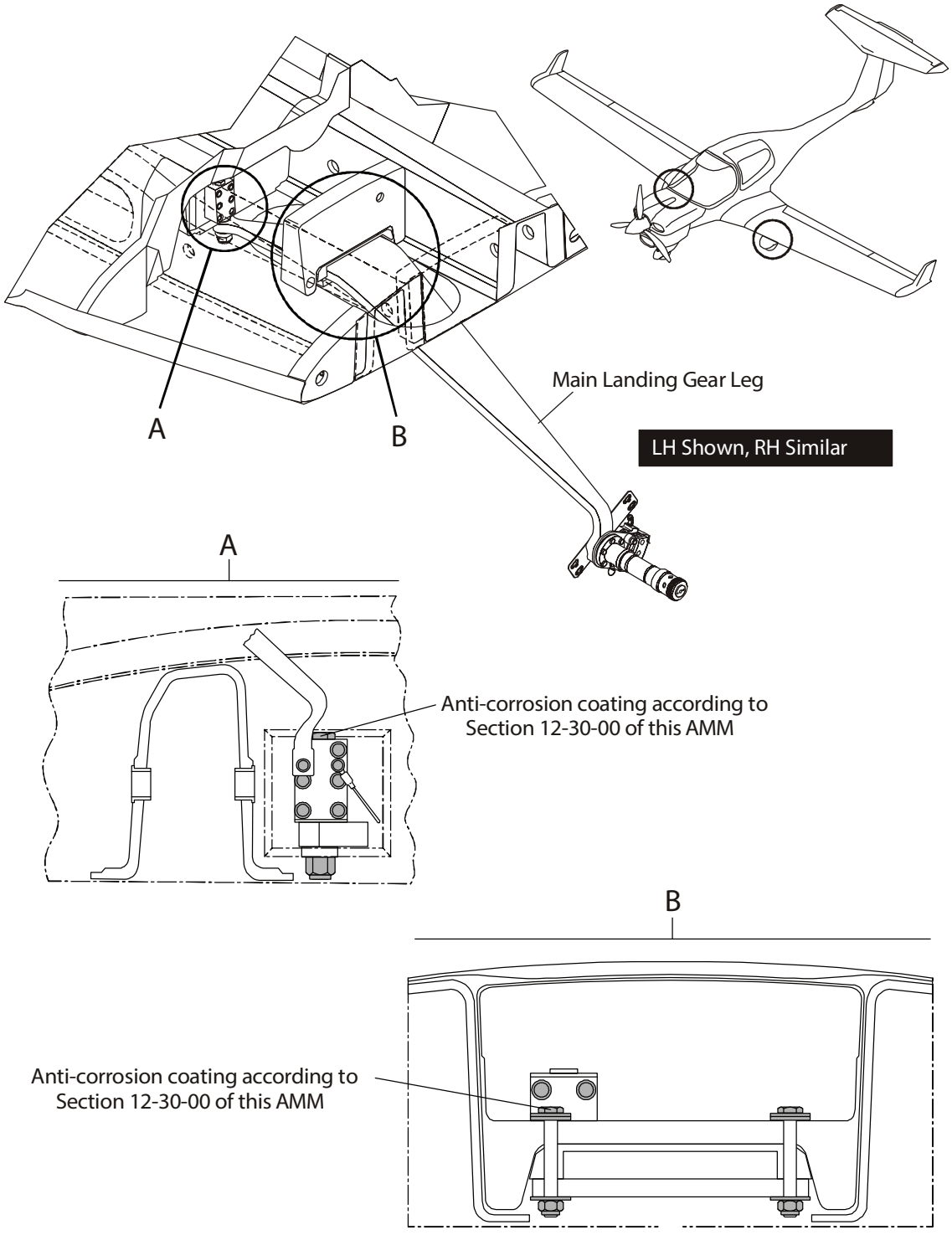

Figure 4 : Anti-Corrosion Coating - Main Landing Gear LH/RH (2)

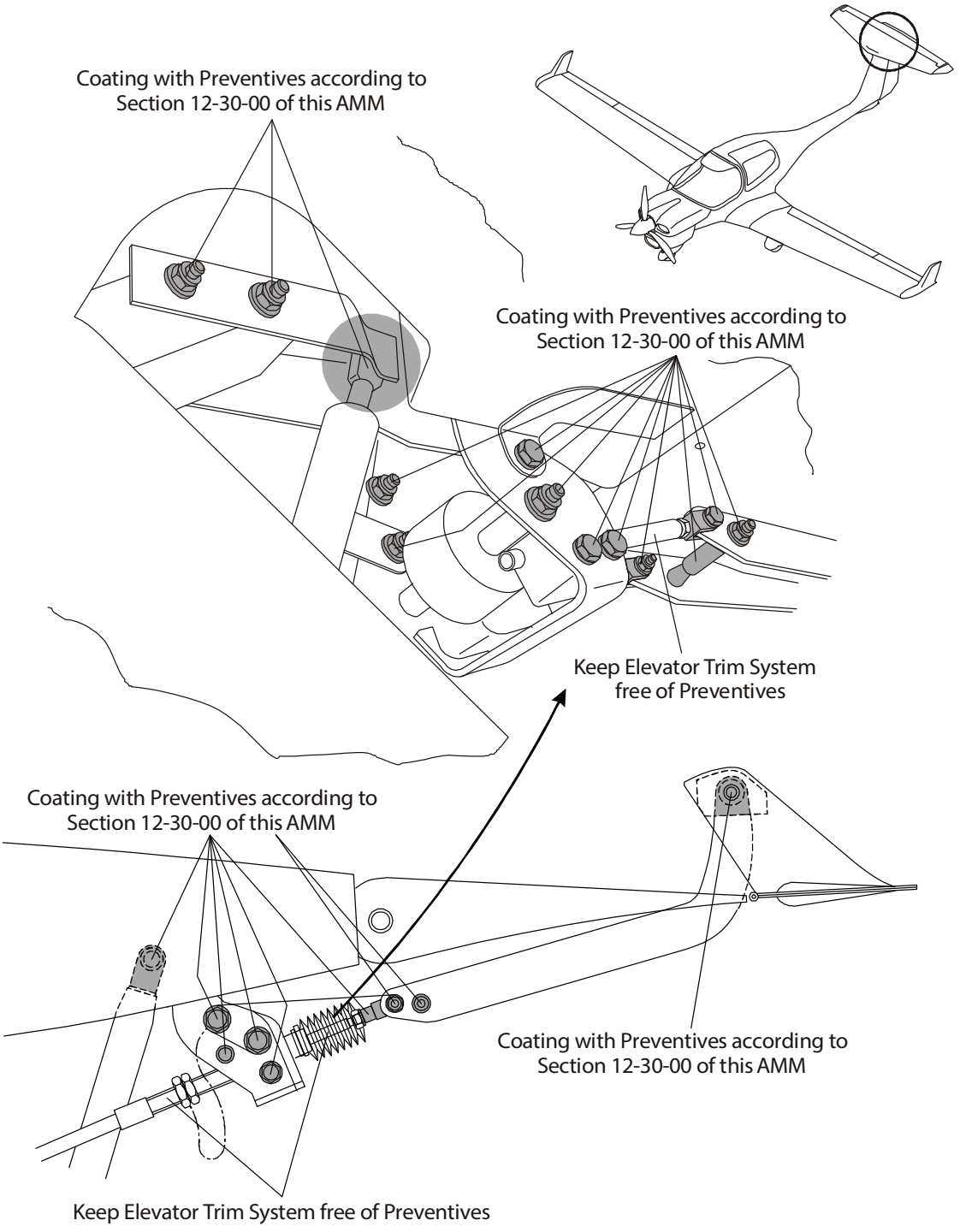

Figure 5 : Anti-Corrosion Coating - Elevator and Elevator Trim System (1)

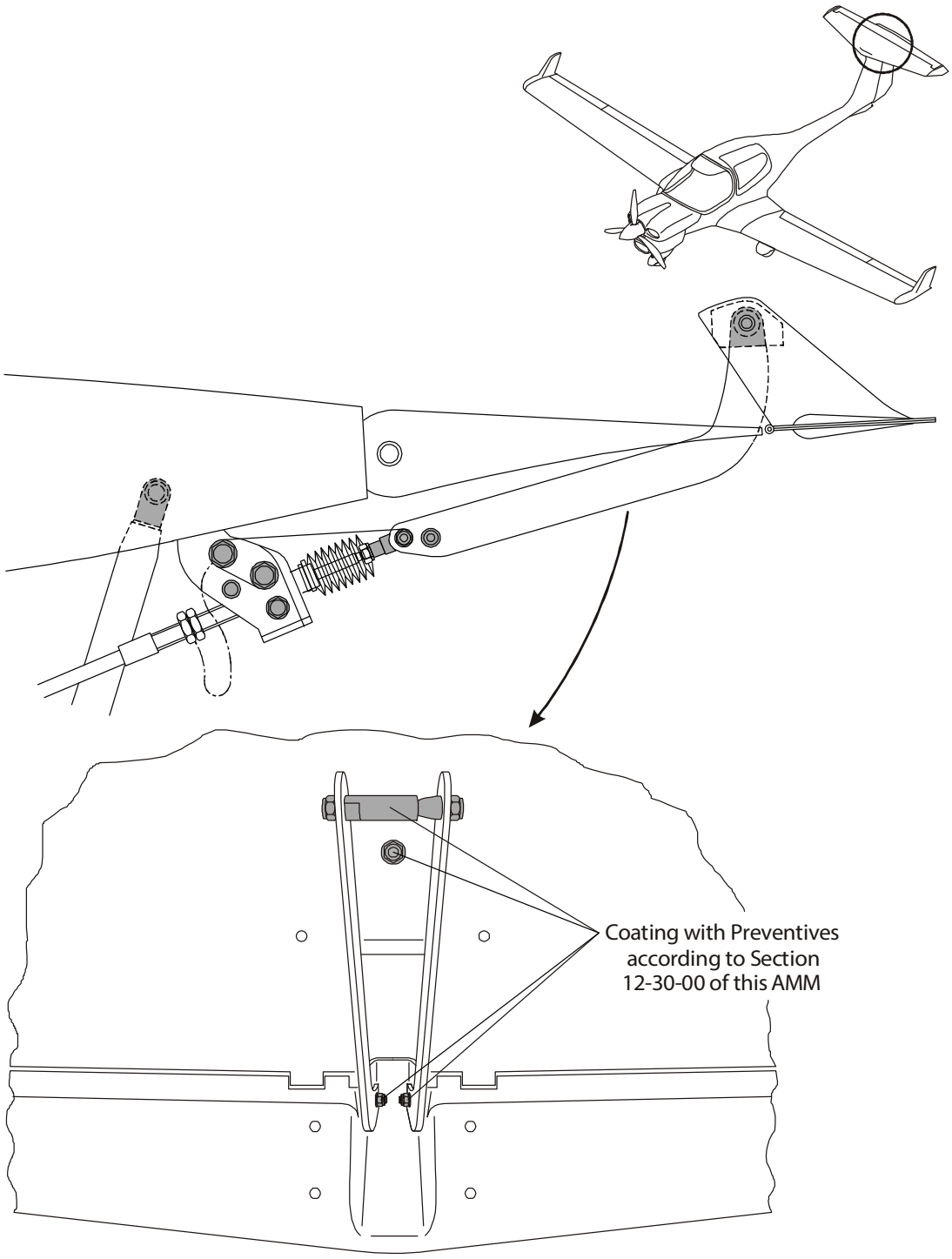

Figure 6 : Anti-Corrosion Coating - Elevator and Elevator Trim System (2)

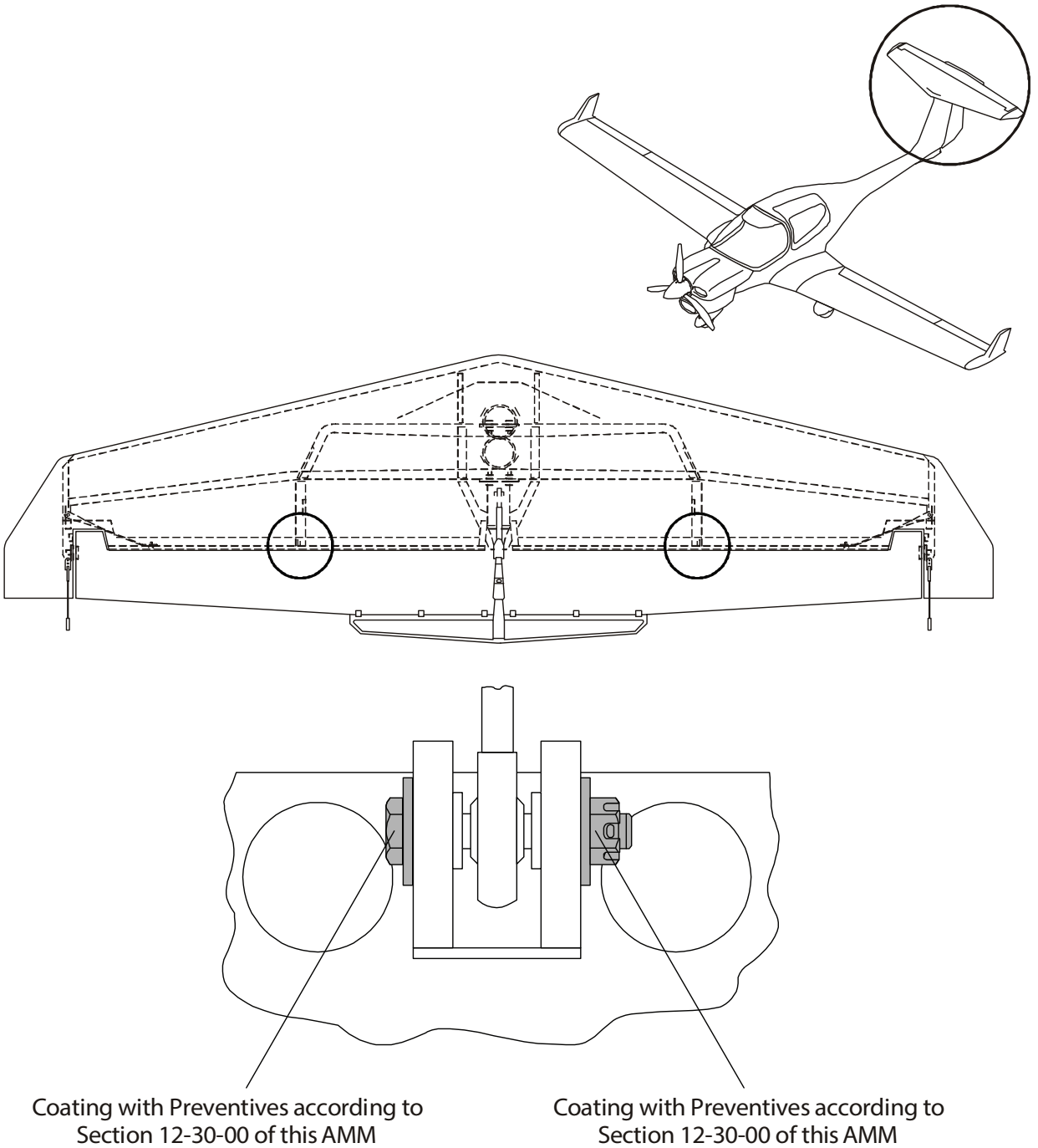

Figure 7 : Anti-Corrosion Coating - Elevator and Elevator Trim System (3)

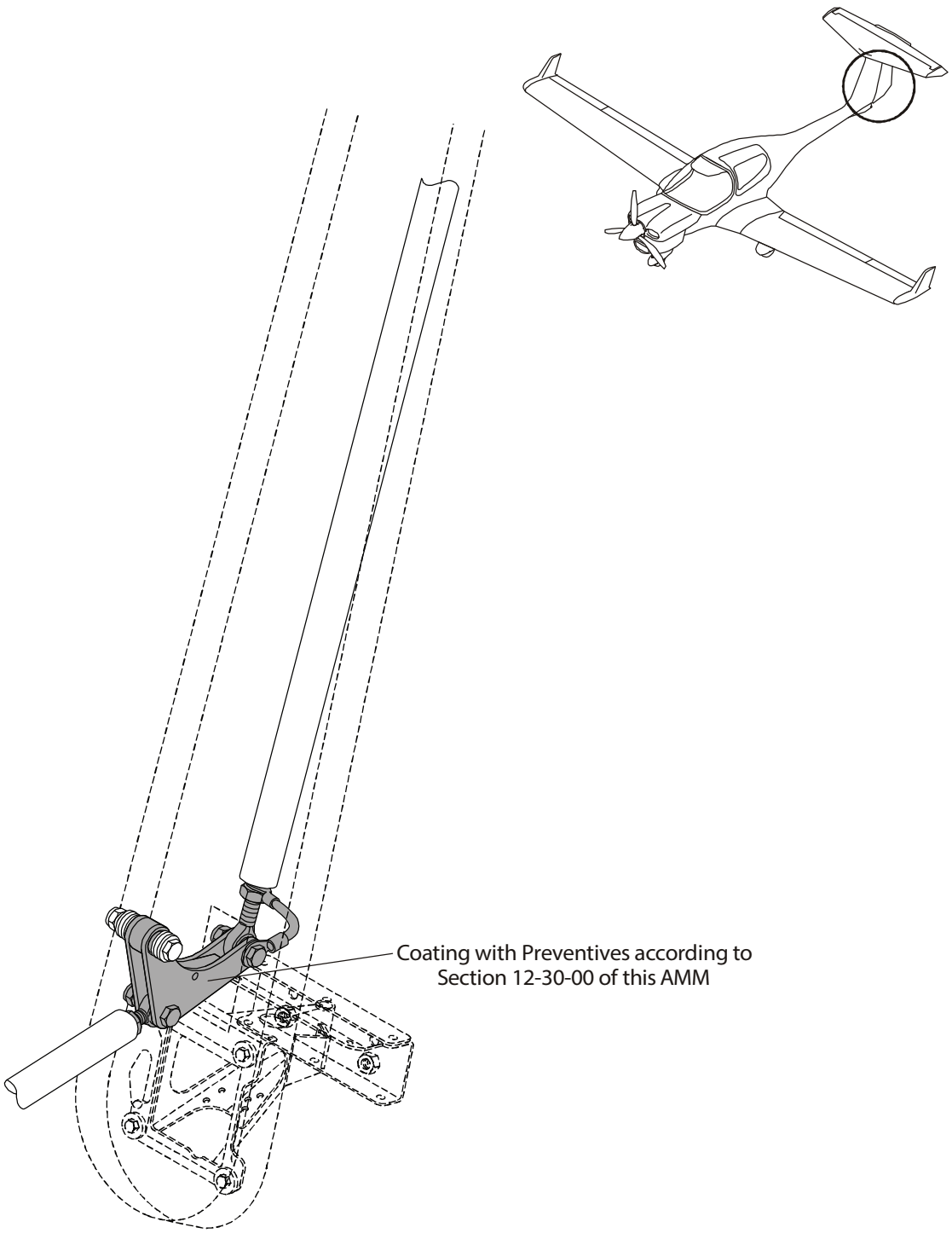

Figure 8 : Anti-Corrosion Coating - Elevator Controls

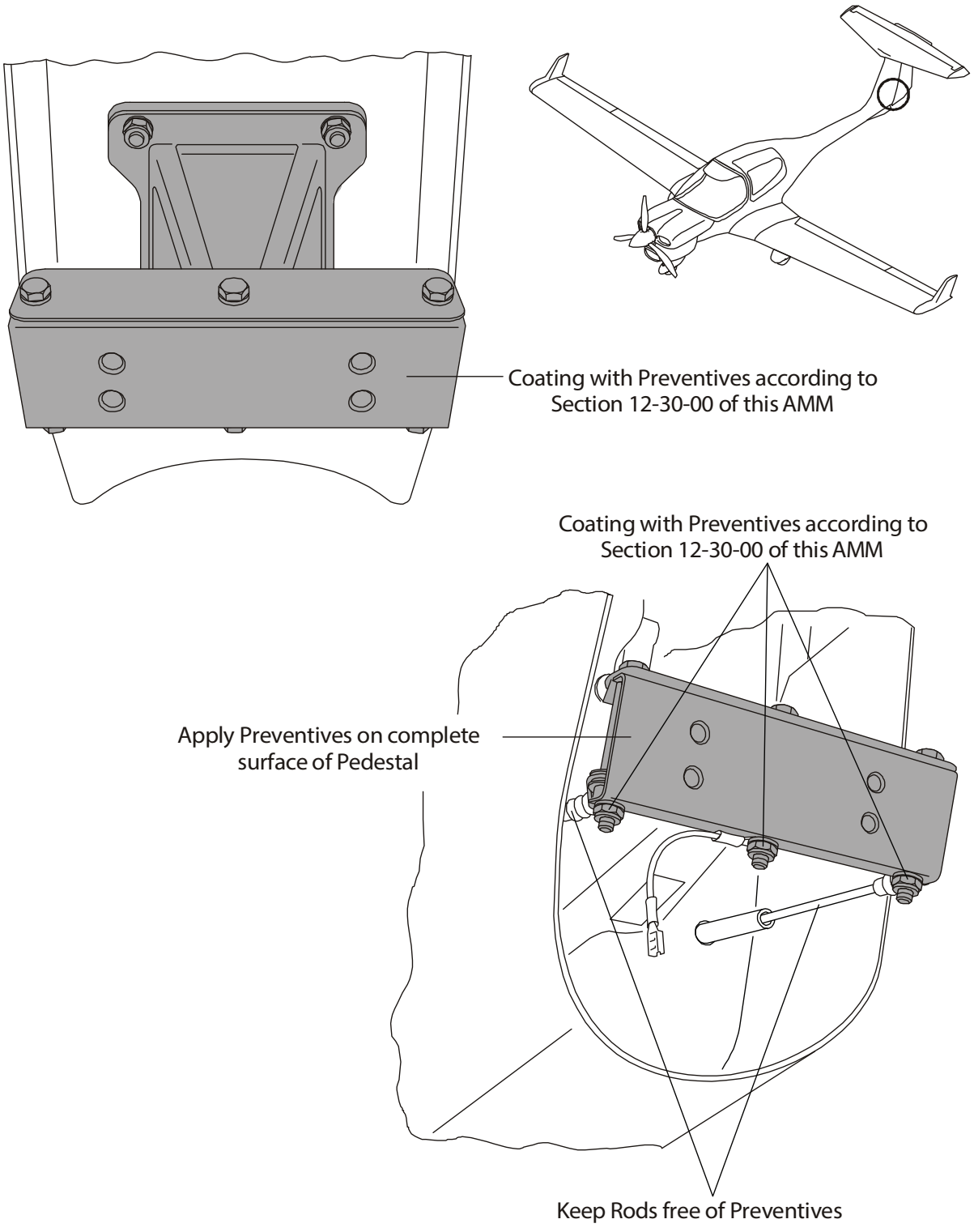

Figure 9 : Anti-Corrosion Coating - Rudder Pedestal

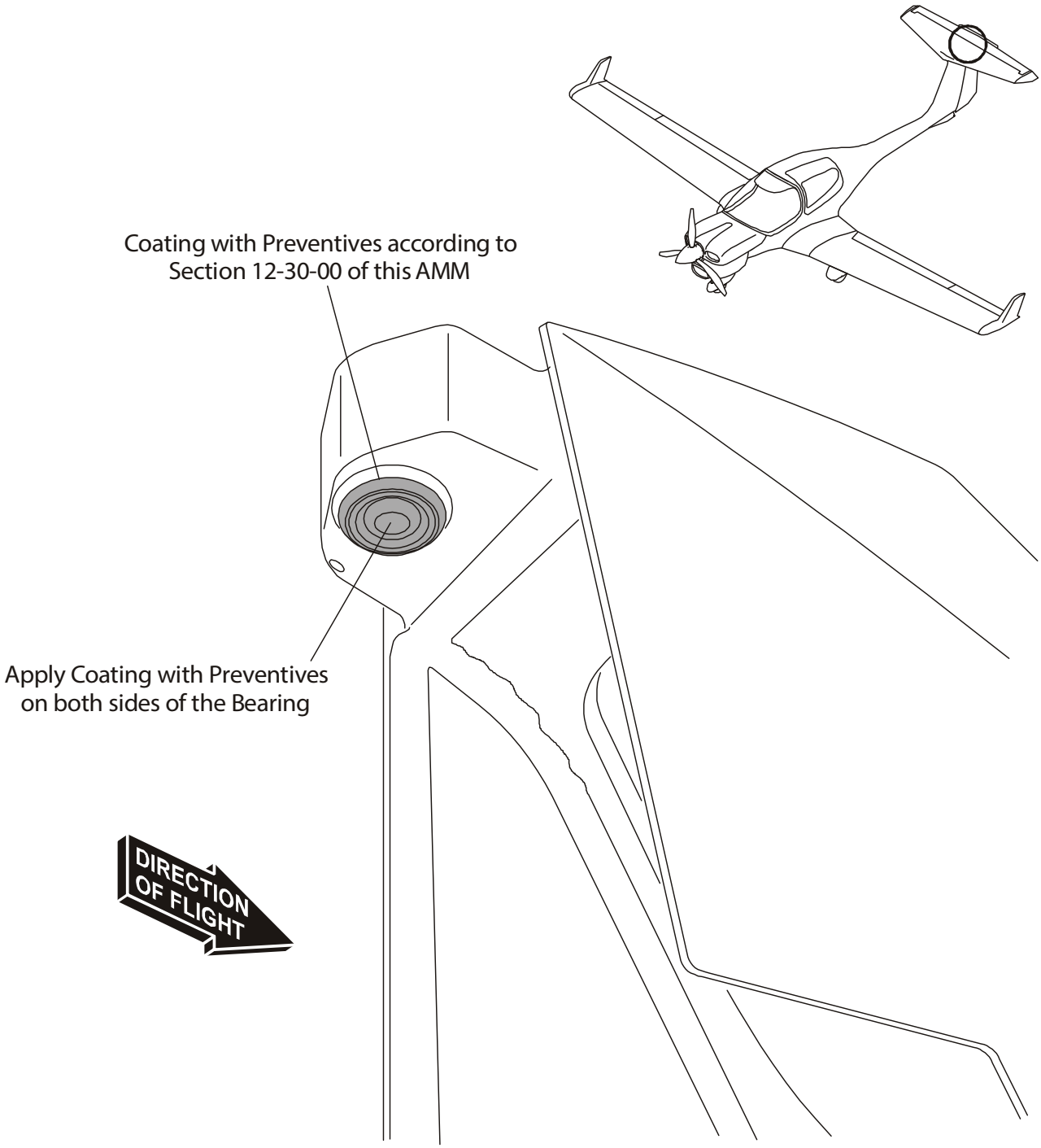

Figure 10 : Anti-Corrosion Coating - Rudder

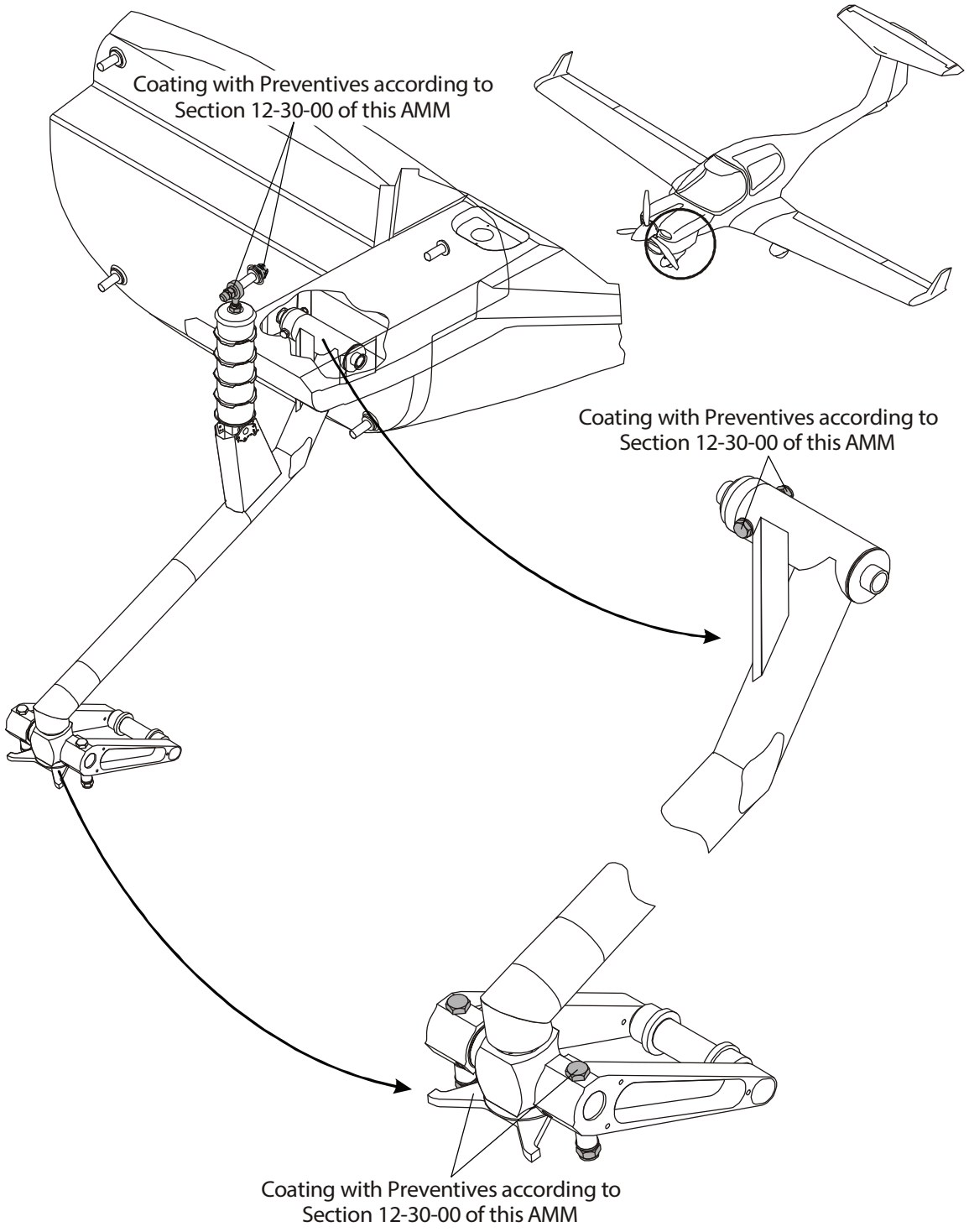

Figure 11 : Anti-Corrosion Coating - Nose Landing Gear

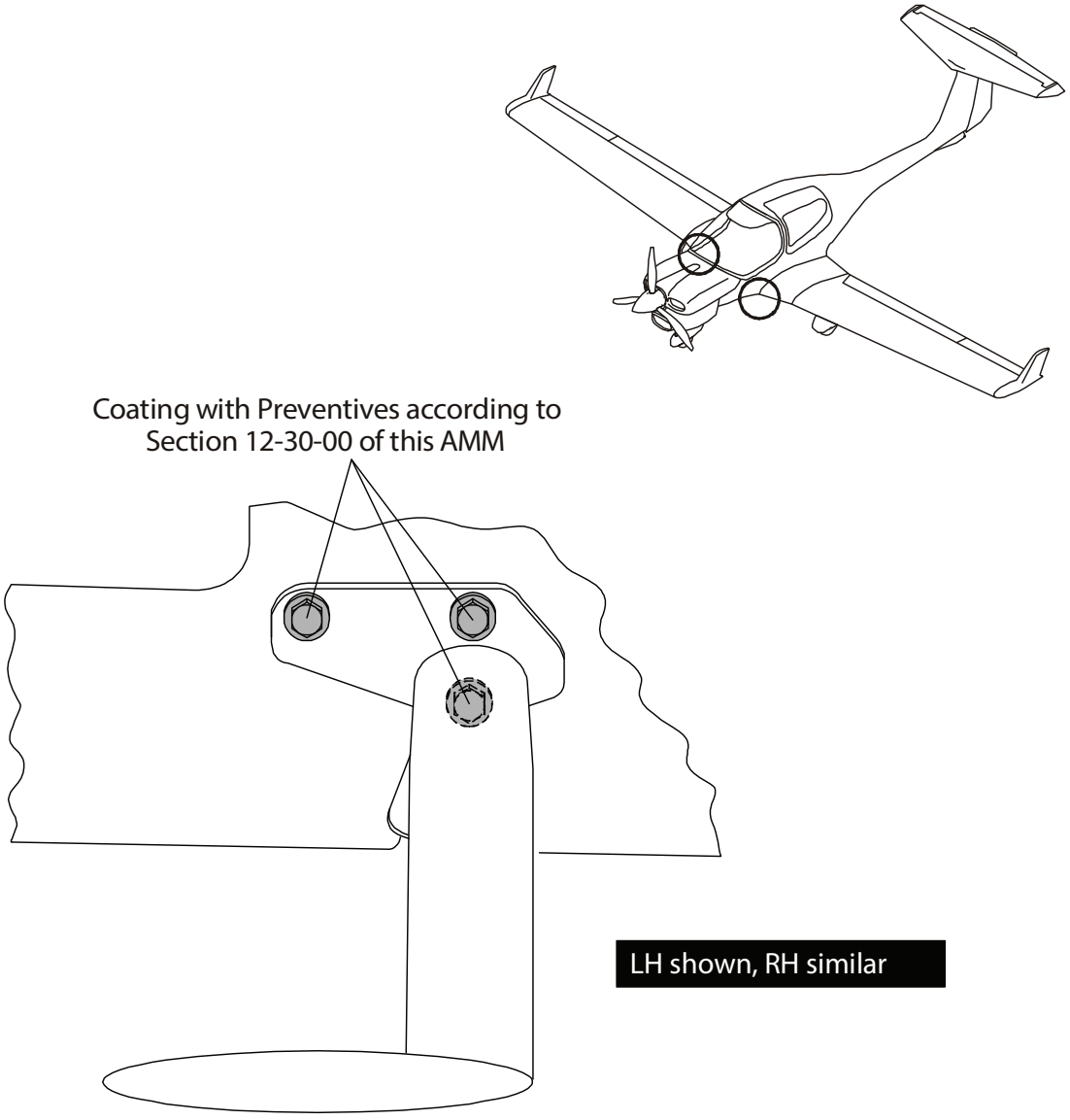

Figure 12 : Anti-Corrosion Coating - Foot Step Screws

CHAPTER 20
STANDARD PRACTICES

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TABLE OF CONTENTS

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STANDARD PRACTICES

1. General

This Chapter gives you the standard practices for the DA 40 NG airplane. Use industry standard practice where no specific practice is given.

This Chapter has the following Sections:

- Section 20-10. Standard Practices - Airframe.
- Section 20-30. Standard Practices - Electrical.
- Section 20-70. Standard Practices - Engine.

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STANDARD PRACTICES - AIRFRAME

1. General

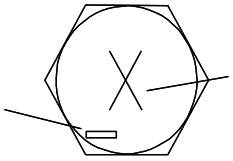
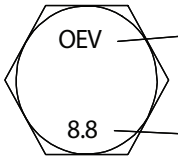
There are no Maintenance Practices which apply to the DA 40 NG airframe and its systems in general. This Chapter only has data about standard threaded fasteners.

Always tighten the nut or bolt to the torque shown in the tables below. Always use the correct locking device with the nut or bolt.

CAUTION: DISCARD SELF-LOCKING NUTS AFTER REMOVAL. THE FRICTION TORQUE REDUCES WITH USE.

2. Bolt and Nut Types Used in the Airplane

The DA 40 NG uses three types of standard bolts: DIN 931 and LN9037 metric specifications and AN3 through AN20 American specifications. You can identify the bolt type by the marking on the head and the surface treatment.

Bolt Type	Marking on Head	Surface Treatment
AN-Bolt Corrosion resistant steel bolts have a dash Non-corrosion resistant steel bolts have an X		Cadmium
DIN-Bolt OEV: Manufacturer 8.8: Property class		Zink coated

The DA 40 NG uses these types of standard nuts: DIN 934, DIN 985, AN364, AN365, MS21042, MS21044.

3. Standard Torques for Screwed Connections

A. Obey the safety precautions for the torque procedures that follow:

(1) Do not put lubricant or anti−seize compounds on the threaded fasteners unless it is specified.

(2) Do not remove the lubricant or corrosion−preventive compound that is applied by the manufacturer.

(3) Remove unwanted materials such as contamination, paint or corrosion from the threads before you tighten the fastener.

(4) Turn the torque wrench with a slow and stable movement when you do the torque procedure.

(5) When it is possible, turn the nut when you tighten the fastener assemblies.

(6) When it is not possible to turn the nut, turn the bolt or screw to tighten the fastener assembly.

CAUTION: DO NOT TIGHTEN A FASTENER TO MORE THAN THE MAXIMUM RANGE FOR THE SPECIFIED TORQUE VALUE. ALSO, FOR FASTENERS WITH MORE THAN THREE-SIXTEENTHS OF AN INCH DIAMETER, DO NOT TIGHTEN TO MORE THAN 10 PERCENT ABOVE THE SPECIFIED TORQUE VALUE. YOU CAN CAUSE DAMAGE TO THE EQUIPMENT.

(7) Torque the bolt or screw as follows:

(a) Do not torque to more than the maximum specified torque value.

(b) For fasteners with a diameter of more than 3/16 in., torque the bolt or screw to not more than 10% more than the specified torque.

(8) For nuts locked with cotter pins or lockwire, do the steps that follow:

(a) Tighten the nut to the minimum specified torque range.

(b) If necessary, continue to tighten the nut until the slot (in the nut) aligns with the hole (in the bolt) but not more than the maximum specified torque.

(c) Do not loosen the nut to align the slot with the hole.

(9) If necessary, use a torque wrench adaptor and calculate the correct dial indication.

4. Standard Torque Values

These tables show the correct torque values for bolts and nuts to AN and DIN specifications. Use the following torque values for all bolts, nuts and screws which meet the specifications unless they are in the list of special torque values in para 7.

A. AN Fine Thread Series.

Bolt Size	Torque (Nm)	Torque (lbf.ft.)
10 - 32	1.6	1.2
1/4 - 28	6.2	4.6
5/16 - 24	13.6	10
3/8 - 24	20.7	15.3
7/16 - 20	37.7	27.8
1/2 - 20	54.2	40
9/16 - 18	90.4	66.7
5/8 - 18	124.3	91.7

B. AN Coarse Thread Series.

Bolt Size	Torque (Nm)	Torque (lbf.ft.)
10 - 24	1.6	1.2
1/4 - 20	5.7	4.2
5/16 - 18	10.2	7.5
3/8 - 16	20.9	15.4
7/16 - 14	28.9	21.3
1/2 - 13	54.2	40
9/16 - 12	79.0	58.3
5/8 - 11	101.6	75

C. DIN and LN Specifications.

Metric Thread	Torque (Nm)	Torque (lbf.ft.)
M4	1.8	1.3
M5	3.6	2.7
M6	6.4	4.7
M8	16	11.8
M10	32	23.6
M12	60	44.3

5. Standard Torques for Fittings

These tables show the standard torque values for fittings.

A. Steel Fittings

Size	Torque Decanewton metre (daNm)	Torque (lbf-ft)
-3	1.07 - 1.35	7.89 - 9.95
-4	1.53 - 2.14	11.28 - 15.78
-6	2.43 - 3.16	17.92 - 23.30
-8	5.31 - 6.21	39.16 - 45.80
-10	7.00 - 8.41	51.62 - 62.02

B. Aluminum Fittings

Size	Torque Decanewton metre (daNm)	Torque (lbf-ft)
-3	0.56 - 0.90	4.13 - 6.63
-4	1.13 - 1.58	8.33 - 11.65
-6	1.69 - 2.20	12.46 - 16.22
-8	3.00 - 3.95	22.12 - 29.13
-10	4.07 - 4.85	30.01 - 35.77

6. Standard Torques for Hose Clamps

The standard torques are valid for standard worm drive hose clamps, if not otherwise stated in the referring design data.

If other hose clamps are required and the referring design data doesn't state tightening torques, instructions of the hose-clamp manufacturer apply.

A. Clamp width: Less than12mm

Range of Diameter (mm)	Torque (Nm)	Torque (lbf-in)
8 - 12	2.5 ±0.5	22.5 ±4.4
10 - 160	3.0 ±0.5	26.5 ±4.4

B. Clamp width: 12mm or larger

Range of Diameter (mm)	Torque (Nm)	Torque (lbf-in)
8 - 160	5.0 ±0.5	44.2 ±4.4

7. Special Torque Values

Part		Torque (Nm)	Torque (lbf.ft.)
Alternator bracket bolts		25 ± 3	18.4 ± 2.2
Propeller governor nut torque.		28	20.7
V-clamp turbo charger.		5.0 ± 0.5	3.7 ± 0.4
V-clamp turbo charger (if MÄM 40-853/c & MÄM 40-873 are installed).		5.5 ± 0.5	4.0 ± 0.4
Bolts attaching the engine mount to the firewall.	corners	40	29.5
	center	60	44.3
Bolts attaching the engine mounting arms to shock mounts (forward).		85 ± 8	62.7 ± 5.9
Rear shock mounts to engine mount.		28 ± 2.8	20.64 ± 2.06
Nose wheel fork pivot nut.		Refer to the procedure given in Section 32-40.	
Main landing gear outer attaching bolts (2x M10 per side).	unloaded	25	18.4
	at static load	23	17.0
If OÄM 40-334, MÄM 40-574, or OÄM 40-398 is installed: Main landing gear outer attaching bolts (2x M12 per side).	unloaded	30	22.1
	at static load	28	20.7
Main landing gear inner fitting attachment bolts (6x M8 per side).		15	11.1
Main landing gear inner attaching bolt.	height of spring washers	4 mm (+0.5 mm / -0 mm)	0.16 in (+0.02 in / -0 in)
Bolts attaching the MLG axle to the MLG strut.		6.5	4.8
If OÄM 40-334 is installed: Bolts attaching the MLG axle to the MLG strut.		12	8.9
MLG wheel rim bolts.		Refer to the Cleveland/Parker Maintenance Manual, latest revision or placard on the part.	
NLG wheel rim bolts.			
Brake back plate tie bolts.			
Horizontal stabilizer attaching bolts		45	33.2

Part	Torque (Nm)	Torque (lbf.ft.)
Main wheel.	Refer to the procedure given in Section 32-40.	
Nose wheel.	Refer to the procedure given in Section 32-40.	
Horizontal stabilizer attaching bolts.	45	33.2
Fuel drain valve.	1 - 3	0.7 - 2.2

8. Torque Measurement

For self-locking nuts, add the torque value of the locking device (friction or brake torque) to the value in the table. Read the friction value from the torque wrench before the nut seats.

Where a bolt is tightened from the bolt-head, add the value of the shaft friction (the friction of the bolt in the attached part) to the value in the table. Read the friction value from the torque wrench before the bolt seats.

9. Torque Identification

A. If applicable, identify all torqued threaded fasteners with a mark as follows:

Refer to Figure 2.

NOTE: Use the examples given in the illustration for the correct location of the identification mark.

(1) Apply a mark (blob or stripe) with the specified lacquer to identify the assembly as follows:

(a) If possible, put the mark on the surface of the nut.

(b) If this is not possible, put the mark on the head of the bolt or screw.

(c) Make sure that the edges of the mark are easy to see.

(d) If the torqued fastener moves, examine the parts of the stripe or blob.

(e) If the parts of the stripe or blob are not correctly aligned, it is necessary to torque the fastener again.

(f) Identify the fastener with a new blob or stripe.

(2) If you identify the fastener assembly with a stripe, do it as follows:

(a) To identify a bolt assembly with the head shown, apply a continuous straight stripe of lacquer across the head of the bolt.

(b) Continue the stripe down the two sides of the head and on the adjacent surfaces.

(c) To identify a bolt assembly with the nut shown, apply a continuous straight stripe of lacquer across the nut and the external threads of the bolt.

(d) Continue the stripe down the two sides of the nut.

(e) To identify a screw assembly, apply a continuous straight stripe of lacquer across the head of the screw and on the adjacent surfaces.

(3) If you identify the fastener assembly with a blob, do it as follows:

(a) To identify a bolt assembly with the head shown, apply the blob of lacquer on a part of the head of the bolt and on the adjacent surfaces.

(b) To identify a bolt assembly with the nut shown, apply the blob of lacquer on a part of the nut and on the external threads of the bolt.

(c) To identify a screw assembly, apply the blob of lacquer on the head of the screw and on the adjacent surfaces.

(4) Do not apply a mark or stripe of lacquer to the torqued fasteners if the conditions that follow occur:

(a) On the heads of the countersunk bolts or screws that are installed on the external surfaces of the aircraft.

(b) When the fastener is internal to the aircraft systems (for example, the fuel, hydraulic, or pneumatic systems).

(c) When the fastener is internal to the fuel tanks that are part of the wing or fuselage.

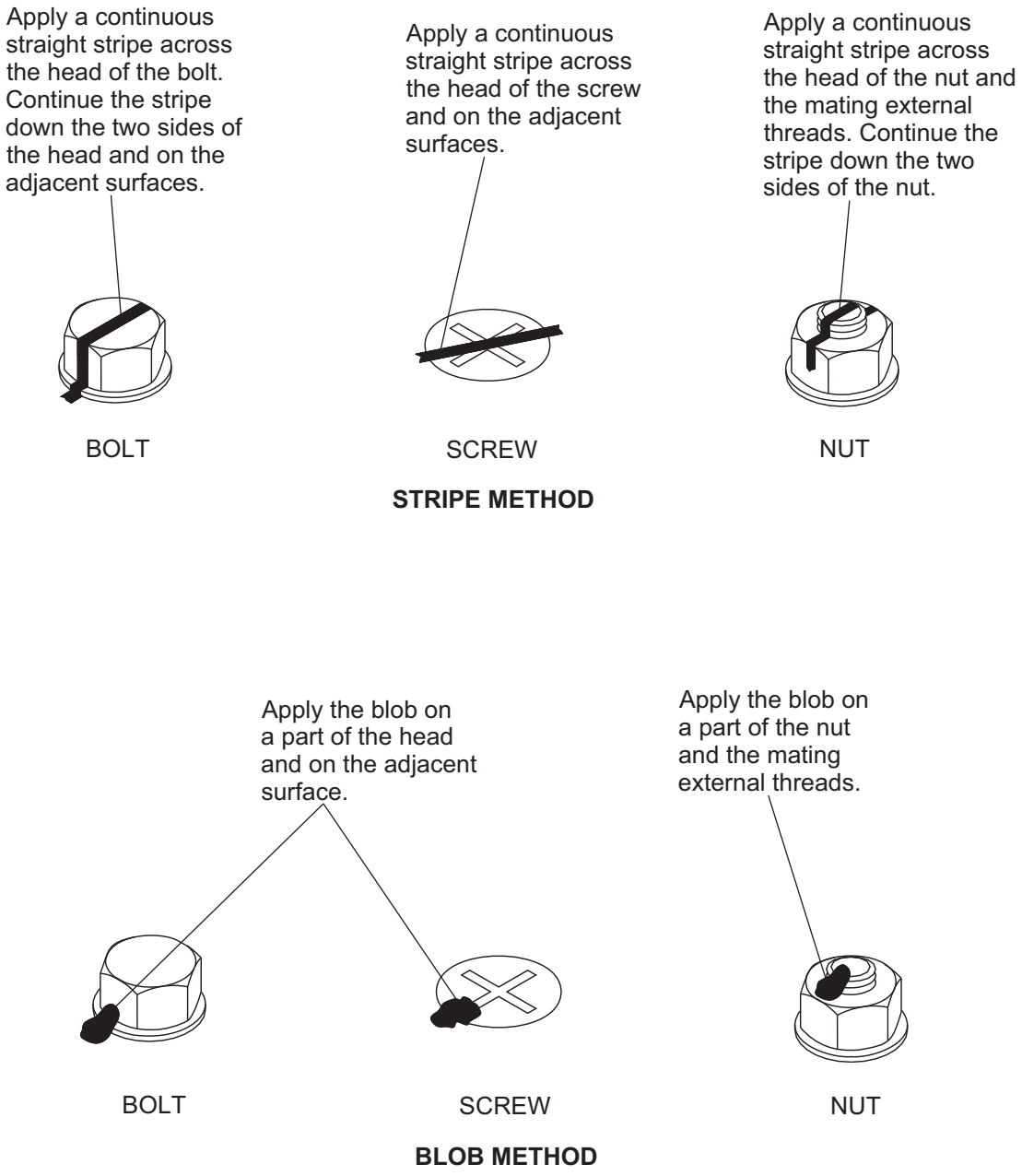
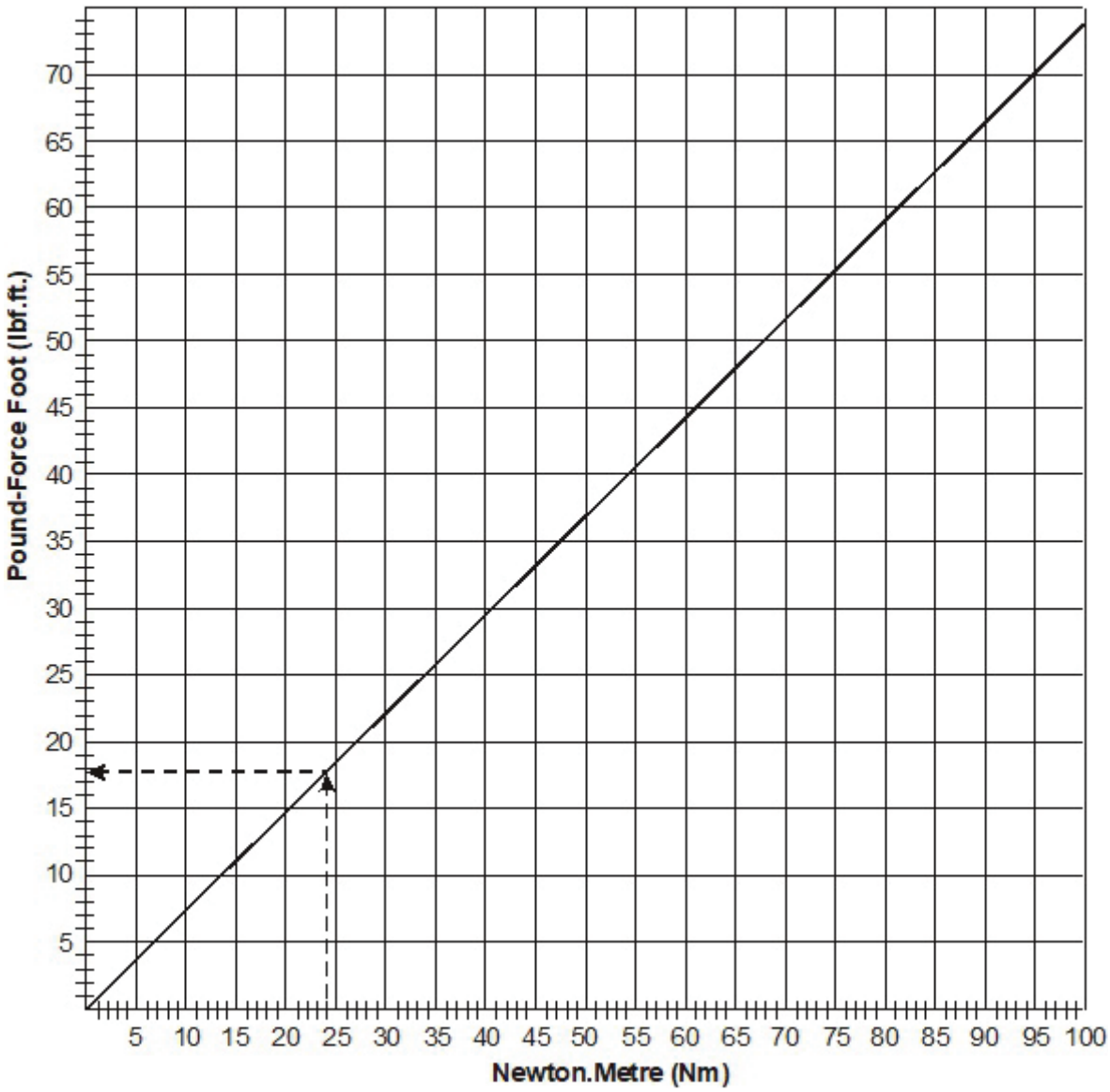


Figure 2 - Identification Marks on Torqued Fasteners

10. Torque Conversion Graphs

Use graph 1 for conversion of torque values (Nm - lbf-ft) and use graph 2 for conversion of (Nm - lbf-in)

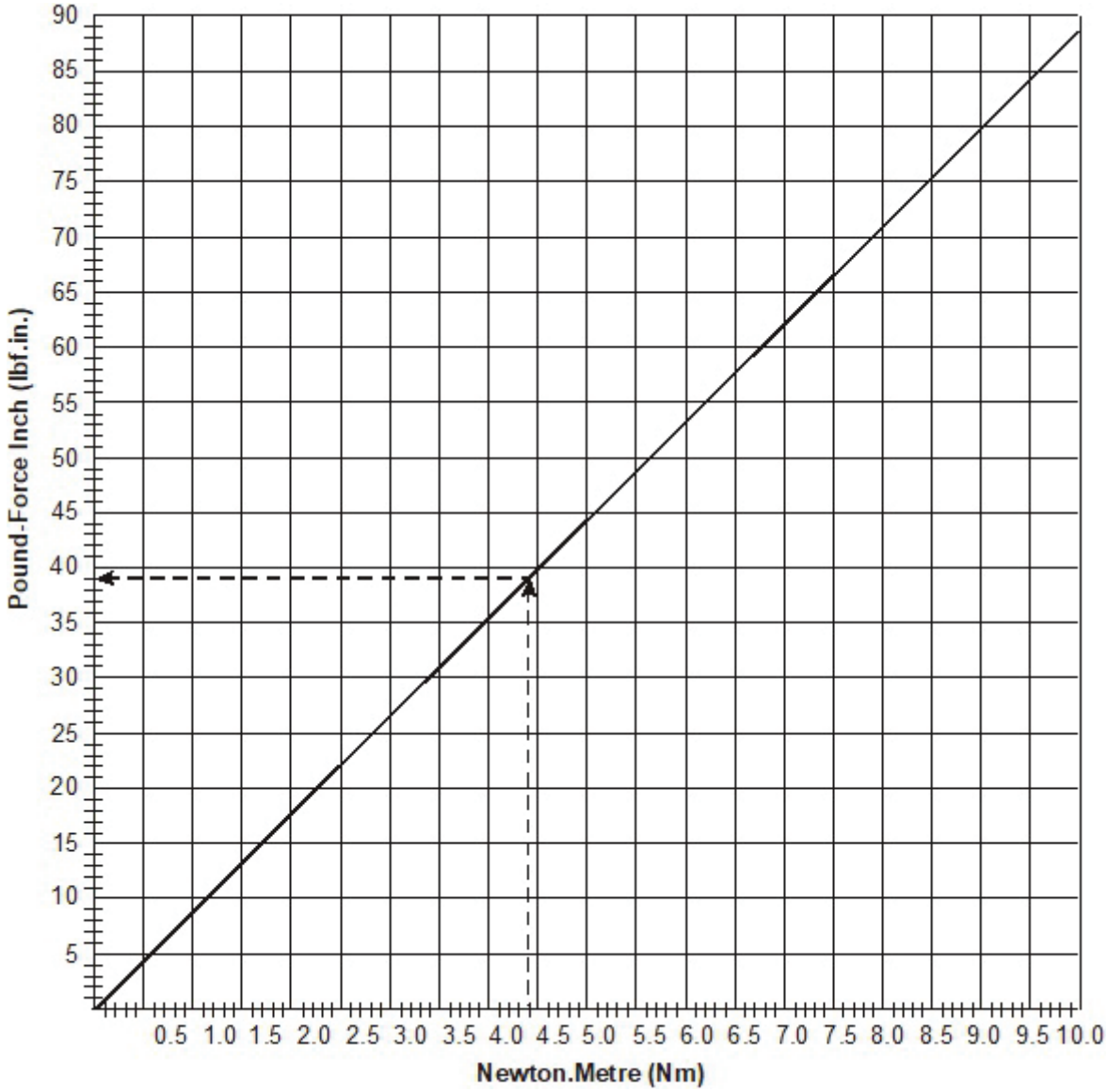
.



Find the Nm value on the horizontal axis. Move vertically to the solid black diagonal line. Then move horizontally to the vertical axis. Read the value in lbf.ft.

Example: To convert 24 Nm to lbf.ft., find 24 Nm on the horizontal axis (see the dashed line). Follow the dashed line vertically to the solid black diagonal line. Then follow the dashed line horizontally to the vertical axis. Read the value of 17.7 lbf.ft.

Graph 1 - Nm - lbf.ft.



Find the Nm value on the horizontal axis. Move vertically to the solid black diagonal line. Then move horizontally to the vertical axis. Read the value in lbf.in.

Example: To convert 4.4 Nm to lbf.in., find 4.4 Nm on the horizontal axis (see the dashed line). Follow the dashed line vertically to the solid black diagonal line. Then follow the dashed line horizontally to the vertical axis. Read the value of 39 lbf.in.

Graph 2 - Nm - lbf.in.

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STANDARD PRACTICES - ELECTRICAL

1. General

This Section gives you the standard practices for the electrical system. Modern airplanes reliability depends on proper function of the electric and electronic systems to a greater extent than previous certified airplanes. Maintenance carried out must be of good workmanship strictly considering the guidelines of AC 43-13.1B. Any time you work on the engine harness refer to AE Maintenance Manual, Doc. No. E4.08.04, latest revision.

The satisfactory performance of a modern airplane, like the DA 40 NG, depends to a great extent, on reliability of its electrical systems. Improperly or carelessly maintained wiring can be a source of potential danger, and many malfunctions and failures of an electrical system can be traced to this cause. The continued proper performance of the electrical systems depends on the knowledge of the personal who do the inspection and repair.

It is therefore important that maintenance is carried out in accordance with the best available techniques and properly trained maintenance personal, in order to eliminate possible failures.

2. Thread Locking

Many electrical terminals are locked with electrical varnish or lacquer. If you release a terminal that has been thread locked with lacquer or varnish then use Loctite 222 or equivalent to lock the thread when you re-assemble the terminal.

3. Repair and Maintenance

Repair and maintenance of the electrical system wiring, not covered in a separate document (e.g. Service Bulletin, Work Instruction) is limited to the extent of:

- Replacement of wires and cables.
- Replacement of ring terminals.

A. Crimp Tools.

Following crimp tools are commonly used for crimp contacts in the DA 40 NG. Refer to the equipment manufacturer for more details of the tools and their use.

- Tyco, P/N 69478-1
- Tyco CERTI-LOK, P/N 169400
- Tyco SUPER CHAMP FT, P/N 720781-3
- Tyco CERTI-CRIMP, P/N 91523-1
- Tyco CERTI-CRIMP, P/N 91512-1
- Commercial, M22520/1-01
- Commercial, M22520/2-01
- Commercial, M22520/37-01

B. Wires and Cables.

(1) Wires.

For the purpose of electric and electronic installation, an insulated wire consists of a metal conductor covered with a dielectric or insulating material. Wires used in the airplane contain stranded conductors for flexibility. The insulation may consist of several materials and layers to provide:

- Dielectric insulation
- Thermal protection
- Abrasion resistance
- Moisture resistance
- Fluid resistance

Approved wires for the DA 40 NG:

- M22759/16
- M22759/34

(2) Cables.

The term “cable”, may refer to any of the following:

- Two conductors twisted together (twisted pair).
- A single center conductor with a metallic braided outer conductor (coaxial cable).
- Two or more insulated conductors contained in a common covering (multi conductor cable).
- One or more insulated conductors with an overall shield (shielded cable).

Approved cables for the DA 40 NG are:

- M27500
- M17/60-RG142
- M17/128

(3) Wire Marking.

Locating a specific wire within a large wiring loom would be extremely difficult without individual identification of each wire, or cable. To simplify maintenance, each interconnecting wire and cable installed in the airplane is marked with a combination of numbers and letters. If a wire or cable must be replaced, the wire must be marked according to the wiring diagrams in Chapter 92.

C. Testing.

After a wire, cable or ring terminal has been replaced, testing must be done as listed below:

- Visual inspection of the crimp connection (all leads within the crimp, insulation not crimped etc.).
- Check for continuity between the two ends of the conductor.
- Check for NO continuity between the conductor and aircraft electrical ground.
- The crimp contact is not damaged of bend.

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STANDARD PRACTICES - ENGINE

1. General

This Section gives you data about the fasteners used on the AE E4-A engine installed in the DA 40 NG airplane. It also gives you the procedures for tightening the fasteners.

Refer to the AE Maintenance Manual, latest revision for more data.

2. Torque Values

Use the torque values given in tables 1 thru 4 for standard fasteners on the engine and use the torque values given in table 5 for the components listed.

3. Special Torque Procedures

When you use self-locking nuts, add the safety torque (friction torque or braking torque) to the table values. Set this value on the dial of the torque meter before you tighten the nut.

If a bolt has an additional torque due to shaft friction, add this torque value to the table value. Set this calculated value on the dial of the torque meter before you tighten the bolt.

Lubricate threads unless shown differently.

CAUTION: YOU MUST ADD THE SAFETY TORQUE (OR THE FRICTION TORQUE) TO THE FOLLOWING VALUES FOR SELF-LOCKING NUTS (OR BOLTS WITH SHAFT FRICTION).

Table 1 : Standard Torque Values for Engine Bolts and Nuts		
Inch Thread	**Torque (Nm)**	**Torque (lbf.ft.)**
1/4	11	8
5/16	23	17
3/8	41	30
7/16	68	50
1/2	102	75
9/16	149	110
5/8	203	150
3/4	366	270

Metric Thread	**Torque (Nm)**	**Torque (lbf.ft.)**
M4	1.8	1.3
M5	3.6	2.7
M6	6.4	4.7
M8	16	11.8
M10	32	23.6
M12	60	44.3

Table 2 : Standard Torque Values for Engine Pipe Plugs		
Taper Thread	**Torque (Nm)**	**Torque (lbf.ft.)**
1/16 - 27 NPT	4.5	3.3
1/8 - 27 NPT	4.5	3.3
1/4 - 18 NPT	9.5	7
3/8 - 18 NPT	12.3	9
1/2 - 14 NPT	18	13.3
3/4 - 14 NPT	26	19

Table 3 : Standard Torque Values for Engine Crush-Type Asbestos Gaskets		
Thread Pitch	**Angle of Turn**	
Threads per Inch	**Aluminum Asbestos**	**Copper Asbestos**
8	135°	67°
10	135°	67°
12	180°	90°
14	180°	90°
16	270°	135°
18	270°	135°
20	270°	135°
24	360°	180°
28	360°	180°

NOTE: Install all crush type gaskets (except the self-centering type) with the continuous surface against the flange of the plug or against the part which you will tighten against the gasket. Turn the part until the surfaces which you must seal, touch the gasket. Then tighten to the angle of turn shown for the thread size as given in Table 3.

Table 4 : Standard Torque Values for Engine Flexible Hose (or Tube) Connections			
Tube Size	**Thread**	**Torque (Nm)**	**Torque (lbf.ft.)**
(-4) 1/4	7/16 - 20	11 - 16	7 -11
(-6) 3/8	9/16 - 18	17 - 22	11 - 16
(-10) 5/8	7/8 - 14	41 - 48	30 - 36

Table 5 : Special Torque Values for the Engine			
Tube Size	**Thread**	**Torque (Nm)**	**Torque (lbf.ft.)**
Engine oil filter	-	25	18.5
Coolant silicate pouch cartridge	-	32.5 ± 2.5	24.0 ± 1.8
Coolant tank filler cap (if MÄM 40-763 is installed)	-	12-15	8.85-11.06
Pressure relief valve	-	12-15	8.85-11.06
Coolant level sensor	Loctite 243 O-Ring	25-30	18.44-22.13

4. Installation and Tightening Torques of Worm Drive Clamps

The Figures and tables show the proper installation and the tightening torques of worm drive clamps.

A. General.

Worm drive clamps are for single use only. Replace clamp with a new clamp every time the clamp is loosened or removed. Secure each worm drive clamp with safety wire once they are installed and tightened to the appropriate torque (see Paragraph D. Tightening Torques for Worm Drive Clamps).

CAUTION: CAUTION:REUSE OF WORM DRIVE CLAMPS CAN LEAD TO A FAILURE OF THE CLAMPS AND MAY CAUSE LOSS OF ENGINE POWER.

B. Single Worm-Drive Clamp.

CAUTION: DO NOT PLACE A WORM DRIVE CLAMP ON A TUBE BEAD. THIS CAN DAMAGE THE HOSE AND MAY (IN CASE OF ENGINE CHARGE AIR INSTALLATION) CAUSE LOSS OF ENGINE POWER.

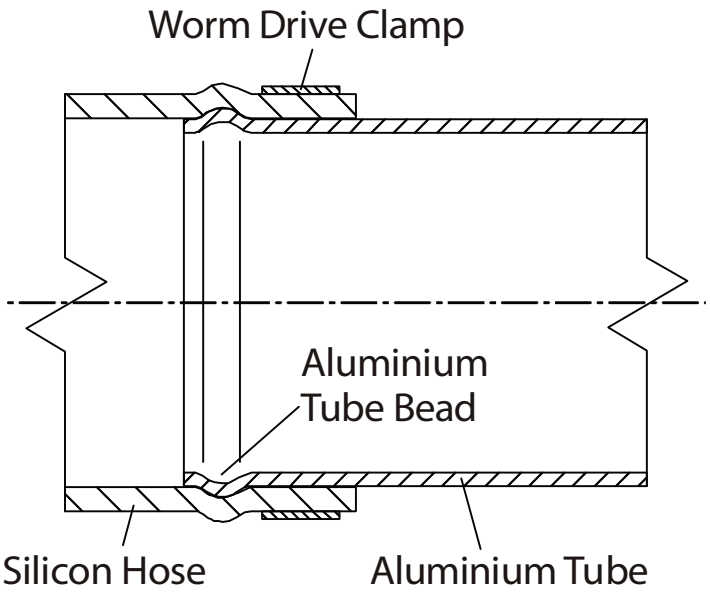

Figure 1 : Installation with a Single Worm-Drive Clamp

C. Two Worm-Drive Clamps.

(1) Axial Placement

CAUTION: DO NOT PLACE A WORM DRIVE CLAMP ON A TUBE BEAD. THIS CAN DAMAGE THE HOSE AND MAY (IN CASE OF ENGINE CHARGE AIR INSTALLATION) CAUSE LOSS OF ENGINE POWER.

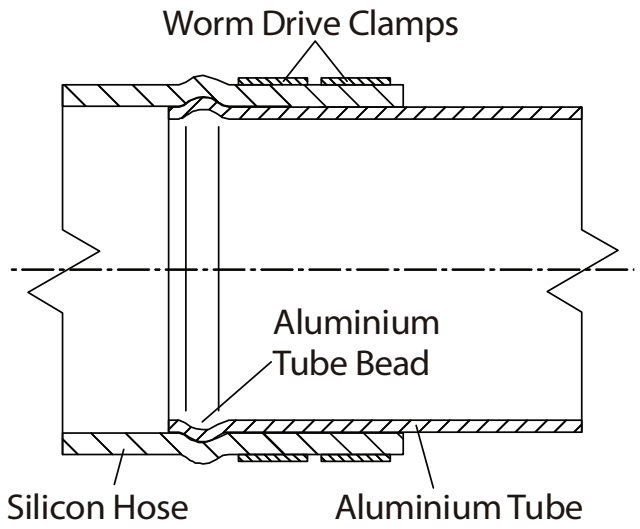

Figure 2 : Installation with Two Worm-Drive Clamps and Single Bead (Axial Placement)

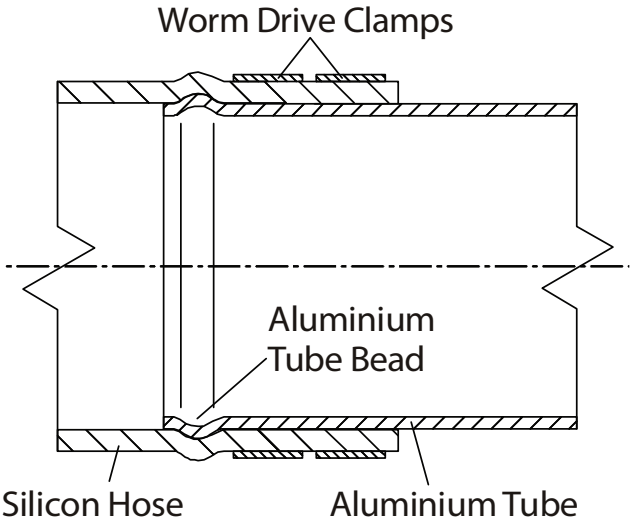

Figure 3 : Installation with Two Worm-Drive Clamps and Two Beads (Axial Placement)

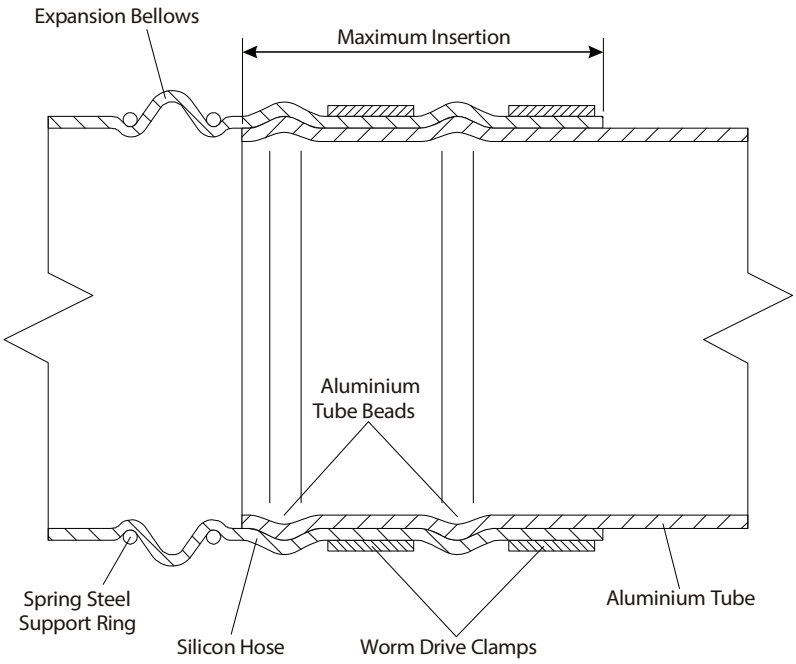

Figure 4 : Installation with Two Worm-Drive Clamps, Two Beads (Axial Placement) and a Hose with Flexible Bellows (if MÄM 40-820 is installed)

(2) Radial Placement

For soft silicon coated hoses with a wall thickness of more than 4 mm (0.16 in):

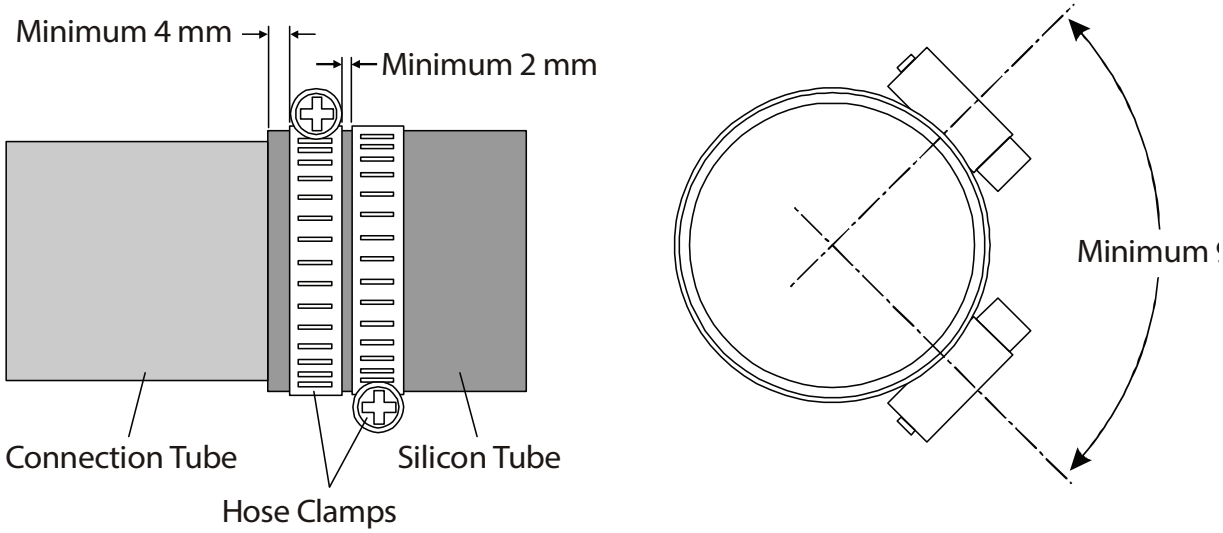

Figure 5 : Installation with Two Worm-Drive Clamps (Radial Placement)

For rigid-coated silicon hoses with a wall thickness less than 4 mm (0.16 in) positive clearance between the hose clamps and visible hose overlapping has to be assured.

D. Tightening Torques for Worm Drive Clamps.

CAUTION: WORM DRIVE CLAMPS MUST BE TIGHTENED ACCORDING TO THE TABLE BELOW. OVER-TIGHTENING A WORM DRIVE CLAMP CAN DAMAGE THE HOSEAND MAY (IN CASE OF ENGINE INSTALLATIONS) CAUSE LOSS OF ENGINE POWER.

CAUTION: FOR WORM DRIVE CLAMP INSTALLATION THE ENGINE MUST BE COLD. INSTALLATION ON A HOT ENGINE CAN CAUSE DAMAGE TO THE HOSE AND MAY (IN CASE OF ENGINE INSTALLATIONS) CAUSE LOSS OF ENGINE POWER.

CAUTION: DO NOT RE-TIGHTEN A WORM DRIVE CLAMP ON A SILICONE HOSE PERFORMING AN AIRPLANE INSPECTION UNLESS IT IS LOOSE. REFER TO THE TABLE BELOW FOR THE CORRECT TIGHTENING TORQUES OF WORM DRIVE CLAMPS.

(1) Tightening Torques for Clamp Widths Below 12 mm (0.47 in).

Clamp Diameter	Torque (Nm)	Torque (lbf.ft.)
8-12	2.5 ± 0.5	1.8 ± 0.4
10-160	3.0 ± 0.5	2.2 ± 0.4

(2) Tightening Torques for Clamp Widths of 12 mm (0.47 in) and Higher.

Clamp Diameter	Torque (Nm)	Torque (lbf.ft.)
8-160	5.0 ± 0.5	3.7 ± 0.4

(3) Tightening Torques for Murray Clamp.

Clamp Diameter (mm)	Torque (Nm)	Torque (lbf.ft.)
50-73	5.6 ± 0.5	4.1 ± 0.4

CHAPTER 21
AIR CONDITIONING, HEATING AND VENTILATION

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21-00 - HEATING AND VENTILATION

1. General

This Chapter describes the heating and ventilation system of the DA 40 NG. It provides information about the operation and trouble-shooting of the heating and ventilation system. Refer to Section 75-00 for more maintenance data of the coolant heat-exchanger.

If OÄM 40-316 is installed, a recirculating air - cabin cooling (RACC) system is installed. Refer to Section 21-50 (if OÄM 40-316/h or earlier is installed) or Section 21-51 (if OÄM 40-316/i or later is installed) for more details about the RACC system.

2. Description and Operation

The DA 40 NG has two separate systems, one for heating and one for cooling/ventilating the cabin. Figure 1 shows the heating system and Figure 2 shows the cooling and ventilation system.

A. Cabin Heating

A heat exchanger is attached to the engine mount and provides the warm air for heating. Hot cooling liquid from the engine's cooling system flows through the matrix of the heat exchanger. Ambient air flows from an air inlet in the engine nacelle through the heat exchanger. The temperature of the air raises and flows from the heat exchanger through a control valve to the airplane cabin. The heated air is then used for cabin heating and windscreen defrosting. Levers in the center control console of the cockpit connect to the control valve with Bowden cable and control the flow of heated air.

A flap inside the heat valve has an opening either to the atmosphere or to a distributor valve on the rear face of the firewall. A lever in the cockpit controls the flap. The lever is marked ‘CABIN HEAT, ON OFF’.

The distributor valve has also a flap. The flap connects to the pilot and passenger floor areas or the front of the canopy. A lever in the cockpit controls the flap. The lever is marked ‘DEFROST - FLOOR'.

If the heat valve is set to OFF, the hot air is released into the bottom of the engine cowling. If it is set to ON, the hot air is guided through the firewall to the distributor valve. The valve can be set to any position between OFF and ON. If the valve is set to a middle position, only part of the airflow will reach the distributor valve.

If the distributor valve is set to FLOOR, air flows to the pilots' and passengers' footwells. If it is set to DEFROST, the air flows to the front of the canopy. This prevents mist or frost from forming at the canopy. The valve can be set to any position between FLOOR and DEFROST. If the valve is set to a middle position, part of the airflow goes to the footwells and part to the canopy.

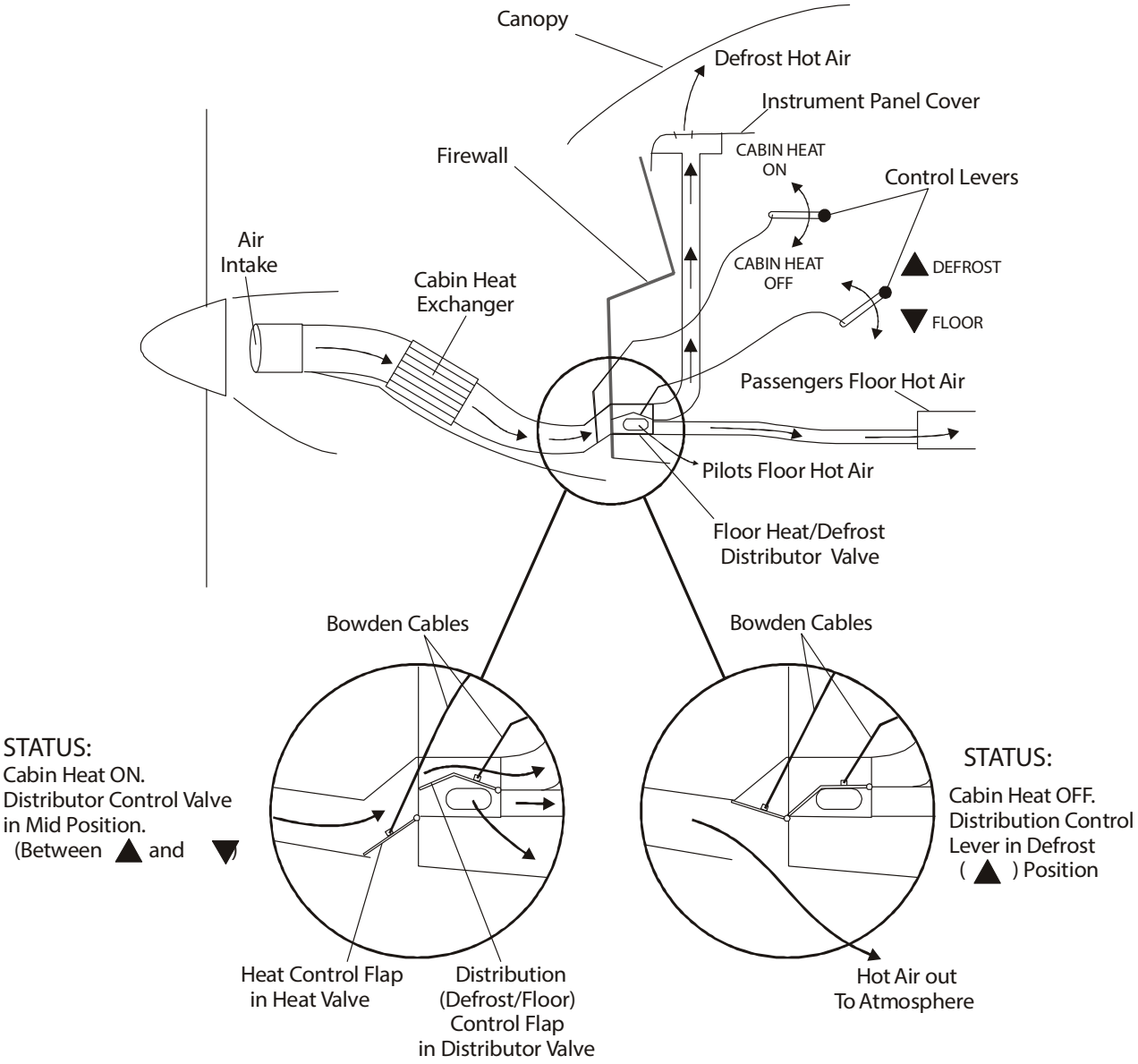

Figure 1 : Cabin Heat Schematic Diagram

B. Cooling and Ventilation

Figure 2 shows the cooling and ventilation system.

Refer to Section 21-50 for more details about the RACC system (if OÄM 40-316/h or earlier is installed).

Refer to Section 21-51 for more details about the RACC system (if OÄM 40-316/i or later is installed).

(1) Pilots' Cabin Air

Air enters the system through two NACA air inlets in the front fuselage on the left and right side. Hoses connect the air inlets to two adjustable outlets in the instrument panel.

(2) Passengers' Cabin Air

Air enters the system through a NACA air inlet below the leading edge of the left stub-wing. The front main spar and the inner and outer closing ribs make a collector box. Air can only leave the area through an opening in the closing rib.

The front of the rib connects to a hose across the fuselage to the front closing rib of the right stub-wing.

The top part of the inner closing rib on each side connects to the fuselage side ducts. The side ducts connect to the roll bar.

Air from both front closing ribs can flow up through the fuselage side ducts. Four adjustable outlets in the roll bar give cool air to the passengers.

C. Air Exit

Both hot and cold air leave the cockpit through slots in the baggage compartment frame. The air flows through the rear fuselage and leaves the airplane through the gap between the fuselage and the rudder.

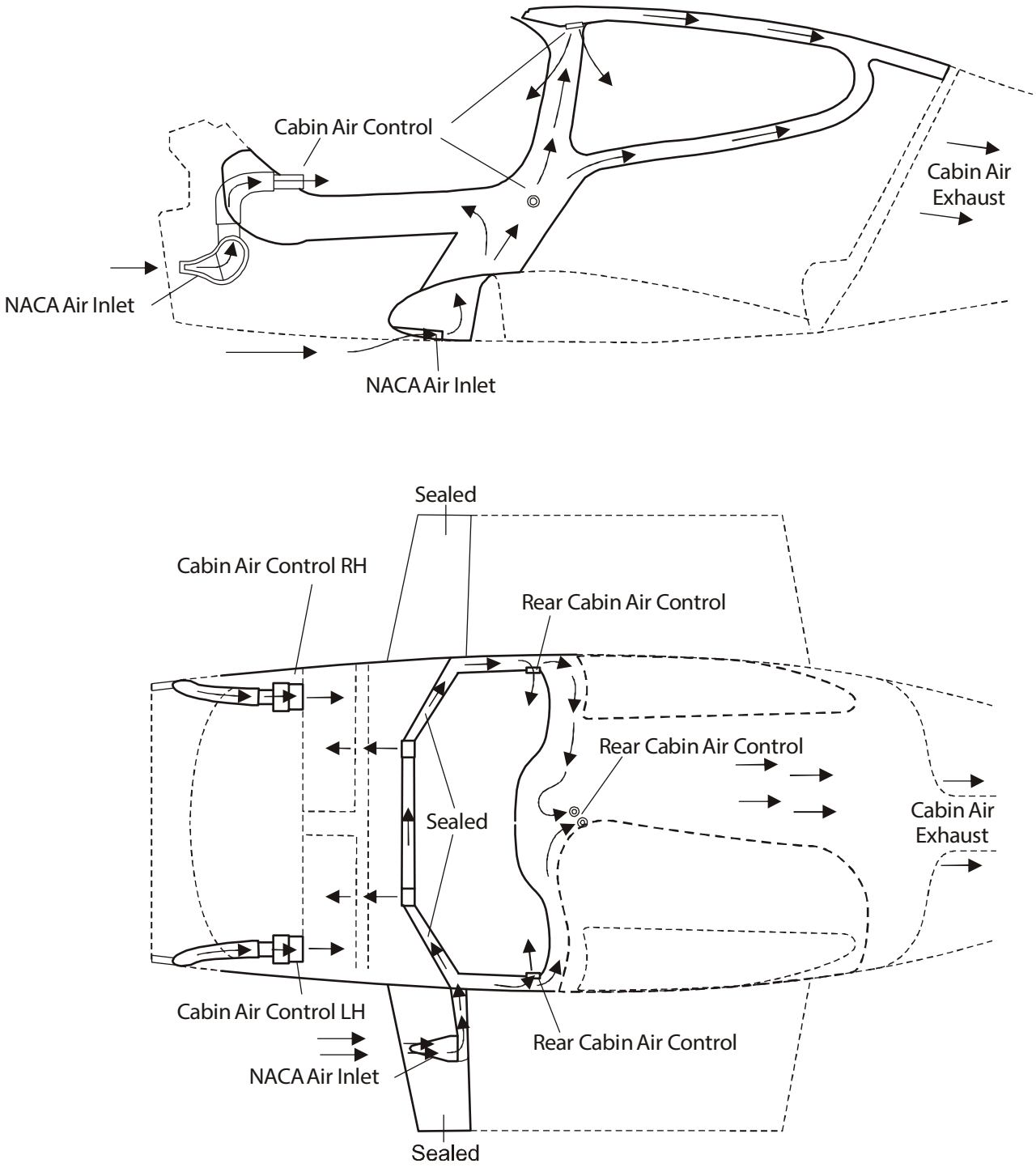

Figure 2 : Cabin Ventilation System Schematic Diagram

21-00 - TROUBLE-SHOOTING

1. General

The table below lists the defects you could have with the control panel in the center console. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
No hot air flows to the system at any setting.	Heat valve control cable out of adjustment.	Adjust the heat valve control cable.
	Heat valve control cable broken.	Replace the heat valve control cable.
	Defective heat exchanger.	Trouble-shoot in accordance with Section 75-00.
	Defective engine cooling system	Trouble-shoot in accordance with Section 75-00.
Heating system supplies warm air when set to OFF.	Heat valve control cable out of adjustment.	Adjust the heat valve control cable.
	Heat valve control cable broken.	Replace the heat valve control cable.
No hot air flows to the canopy.	Distributor valve control cable out of adjustment.	Adjust the distributor valve control cable.
	Distributor valve control cable broken.	Replace the distributor valve control cable.
	Canopy defrost hose disconnected.	Re-connect hose.
No hot air flows to the footwells.	Distributor valve control cable out of adjustment.	Adjust the distributor valve control cable.
	Distributor valve control cable broken.	Replace the distributor valve control cable.
	Air hose to footwell disconnected.	Re-connect the hose.
No cool air from one outlet. Other outlet operates correctly.	Outlet defective.	Replace the cool air outlet.
	Air duct blocked.	Remove the blockage.

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21-00 - MAINTENANCE PRACTICES

1. General

This Section gives you the Maintenance Practices for the cabin heating system and tells you how to replace outlets for the cooling system. Refer to Section 75-00 for maintenance data on the heat-exchanger.

2. Remove/Install the Heat Valve

Refer to Figure 201

A. Remove the Heat Valve.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Reference section 71-10.
WARNING:	**IF THE ENGINE HAS BEEN RUNNING, TAKE CARE WHEN TOUCHING THE HEAT VALVE. THE HEAT VALVE GETS HOT AND CAN CAUSE BURNS.**	
(2)	Release the worm-drive-clamp which holds the flexible hose to the heat valve. Then disconnect the hose from the valve.	
(3)	Set the CABIN HEAT control lever to ON.	
(4)	Loosen the screw which holds the control cable to the swivel fitting in the heat valve.	Access through the front of the valve.
(5)	Remove the four nuts and washers which attach the heat valve to the firewall.	
(6)	Remove the heat valve from the firewall.	

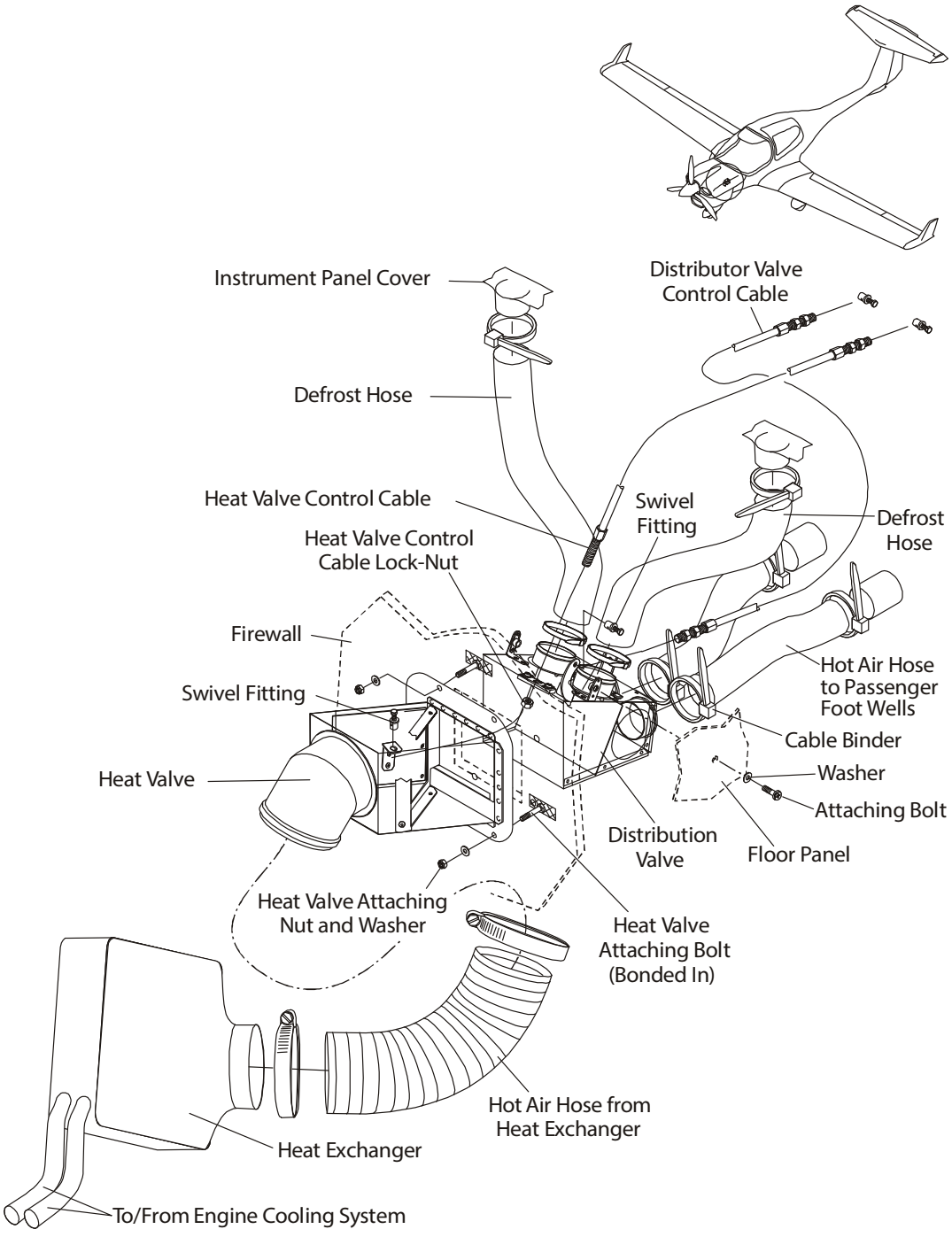

Figure 201 : Heat Valve and Distributor Valve Installation

B. Install the Heat Valve.

	Detail Steps/Work Items	Key Items/References
(1)	Examine the copper seal between the distributor valve and the firewall.	Replace defective seal. Use self-adhesive copper tape.
(2)	Put the heat valve in position on the firewall.	Apply fire resistant sealant. Use PR 812 or equivalent.
(3)	Install the four washers and nuts which attach the heat valve to the firewall.	
(4)	Set the CABIN HEAT control lever to ON. Then move the cabin heat flap 3 mm (1/8 in) before full open.	
(5)	Attach the control cable: - Put the control cable through the hole in the swivel fitting. - Make sure that the flap is 3 mm (1/8 in) before full open. - Tighten the screw in the swivel fitting.	
(6)	Do a test for correct operation of the heat valve.	Refer to Paragraph 3.
(7)	Connect the flexible hose to the heat valve. Tighten the worm drive clamp.	
(8)	Install the engine cowlings.	Refer to Section 71-10.

3. Test/Adjust the Heat Valve

WARNING: MAKE SURE THAT THE FLAP ON THE HEAT VALVE FULLY CLOSES THE FIREWALL OUTLET WHEN YOU SET THE CABIN HEAT CONTROL LEVER TO "OFF". THIS IS TO STOP FIRE OR EXHAUST FUMES FROM ENTERING THE COCKPIT IN AN EMERGENCY.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Reference section 71-10.
	WARNING: IF THE ENGINE HAS BEEN RUNNING, TAKE CARE WHEN TOUCHING THE HEAT VALVE. THE HEAT VALVE GETS HOT AND CAN CAUSE BURNS.	
(2)	Release the worm-drive-clamp which holds the flexible hose to the heat valve. Then disconnect the hose from the heat valve.	Refer to Figure 201.
(3)	Set the CABIN HEAT control lever in the cockpit to ON.	The flap should stop 3 mm prior to the right wall valve limit.
(4)	Set the CABIN HEAT control lever in the cockpit to OFF.	The flap must be completely against the closed valve limit.
(5)	Make sure that the flap fully closes the outlet to the distributor valve	Access through the front of the valve.
(6)	If necessary, adjust the control cable in the swivel fitting to assure complete closure of the valve during "OFF" position.	Access through the front of the valve.
(7)	Connect the flexible hose to the heat valve and tighten the worm-drive-clamps.	
(8)	Install the engine cowlings.	Refer to Section 71-10.

4. Remove/Install the Distributor Valve

Refer to Figure 201.

A. Remove the Distributor Valve.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-10.
(2)	Disconnect the battery.	Refer to Section 24-31.
(3)	Remove the instrument panel cover.	Refer to Section 25-10.
(4)	Remove the pilots' seats.	Refer to Section 25-10.
(5)	Disconnect the two hot air hoses from the passengers' footwells.	Cut the cable binders.
(6)	Remove the heat valve.	Refer to Paragraph 2.
(7)	Remove the two screws which attach the distributor valve to the side walls of the floor panel.	In the cockpit.
(8)	Remove the copper seal between the distributor valve and the firewall.	
(9)	Move the valve forward through the firewall.	To give access to the rear of the valve.
(10)	Remove the bottom locknut from the control cable for the heat valve.	Where the cable outer sheath attaches to the distributor valve.
(11)	Move the heat valve control cable clear of the distributor valve.	
(12)	Loosen the screw which holds the control cable to the swivel fitting in the distributor valve.	
(13)	Remove the front locknut from the control cable for the distributor valve.	
(14)	Move the control cable clear of the valve.	
(15)	Disconnect the two canopy defrost hoses from the valve.	
(16)	Disconnect the two hot air hoses to the passengers' footwells from the valve.	
(17)	Remove the valve from the airplane.	

B. Install the Distributor Valve

	Detail Steps/Work Items	Key Items/References
(1)	Hold the distributor valve in front of the firewall.	
(2)	Attach the two hot air hoses which go from the passengers' footwells to the bottom outlets.	Use cable binders.
(3)	Attach the two defrost hoses which go to the instrument panel cover to the top outlets.	Use cable binders.
(4)	Attach the outer sheath of the distributor valve control cable to the bracket at the top rear of the distributor valve: - Put the cable through the hole. - Attach the locknut.	
(5)	Set the distribution control lever to DEFROST. Then move it down about 3 mm (1/8 in).	
(6)	Attach the distributor valve control cable: - Put the control cable through the hole in the swivel fitting. - Make sure that the flap is hard against the bottom of the valve. - Tighten the screw in the swivel fitting.	
(7)	Do a test for correct operation of the flap in the distributor valve.	Refer to Paragraph 5.
(8)	Attach the outer sheath of the heat valve control cable to the top front of the distributor valve: - Put the cable through the hole. - Attach the locknut.	Where the cable outer sheath attaches to the distributor valve. Turn the threaded adjuster into the hole.
(9)	Move the distributor valve aft through the hole in the firewall.	Make sure that the control cables and hoses do not catch.
(10)	Move the valve into position on the cockpit side of the firewall.	The hole in the firewall holds the front of the valve.
(11)	Install the two attaching bolts and washers.	In the side walls of the floor panel in the cockpit. Torque: 6.4 Nm (4.7 lbf.ft.).
(12)	Install a new copper seal between the distributor valve and the firewall.	Use self-adhesive copper tape.

	Detail Steps/Work Items	Key Items/References
(13)	Install the heat valve.	Refer to Paragraph 2.
(14)	Connect the two flexible hot air hoses to the passengers' footwells.	Use cable binders.
(15)	Install the pilots' seats.	Refer to Section 25-10.
(16)	Install the instrument panel cover.	Refer to Section 25-10.
(17)	Connect the battery.	Refer to Section 24-31.
(18)	Install the engine cowlings.	Refer to Section 71-10.

5. Test/Adjust the Distributor Valve.

	Detail Steps/Work Items	Key Items/References
(1)	Set the distribution control lever in the cockpit to DEFROST.	There should be a gap of about 3 mm (1/8 in) between the back of the lever and the cockpit stop.
	WARNING: IF THE ENGINE HAS BEEN RUNNING, TAKE CARE WHEN TOUCHING THE DISTRIBUTOR VALVE. THE DISTRIBUTOR VALVE GETS HOT AND CAN CAUSE BURNS.	
(2)	Make sure that the flap is hard against the bottom of the distributor valve.	Reach through the outlet hole for the pilots' footwells in the floor panel. Push against the bottom of the flap. Then let it return.
(3)	Set the distribution control lever in the cockpit to FLOOR.	There should be a gap of about 3 mm (1/8 in) between the back of the lever and the cockpit stop.
(4)	Make sure that the flap is hard against the top of the of the distributor valve.	Reach through the outlet hole for the pilots' footwells in the floor panel.
(5)	If the valve is not correctly adjusted, do the following items.	
(6)	Remove the top cover plate from the engine control assembly.	Refer to Section 31-10.
(7)	Adjust the control cable in the swivel fitting to give the correct bounce: - Set the distribution control lever close to DEFROST. - Loosen the screw in the swivel fitting. - Move the flap a small distance. - Tighten the screw in the swivel fitting.	At the cockpit end of the control cable. If there was no gap in the DEFROST position, then move the flap down. If there was too much gap in the DEFROST position, then move the flap up.
(8)	Set the distribution control lever in the cockpit to DEFROST.	There should be a gap of about 3 mm (1/8 in) between the back of the lever and the cockpit stop.
	NOTE: If you cannot get bounce at both ends of the range of movement, adjust the cable to give bounce at the DEFROST end.	
(9)	Do steps 7 and 8 as necessary to get the correct adjustment.	
(10)	Install the top cover plate to the engine control assembly.	Refer to Section 31-10.

21-50 - COOLING

1. General

If OÄM 40-316 is installed, a recirculating air - cabin cooling (RACC) system is installed. The RACC system is an independent subsystem of the airplane and is electrically powered. It consists of the central unit (installed aft of baggage compartment) and a control panel (in the cabin, center console).

2. Description

A. Central Unit

The central unit operates with a refrigerant R134a vapor cycle cooling circuit. The system requires electrical power (28 V DC, max. 65 A) for operation, which is provided by an additional alternator.

The central unit is subdivided into the following components:

- Compressor assembly (part of refrigerant circuit).
- Condenser assembly (part of refrigerant circuit).
- Evaporator assembly (part of refrigerant circuit).
- Condenser fan.
- Evaporator radial fan.
- Cabin radial fan.
- Electrical control system.

Refer to Figure 1 for a system schematic of the RACC system.

NOTE: The refrigerant vapor cooling system is a hermetically sealed and pressurized circuit and contains the refrigerant R134a.

WARNING: ALL MAINTENANCE AND REPLENISHMENT WHICH REQUIRES TO OPEN AND DEPRESSURIZE THE REFRIGERANT CIRCUIT MUST BE DONE BY AUTHORIZED PERSONNEL ACCORDING TO NATIONAL AND INTERNATIONAL REGULATIONS FOR REFRIGERANT SYSTEMS.

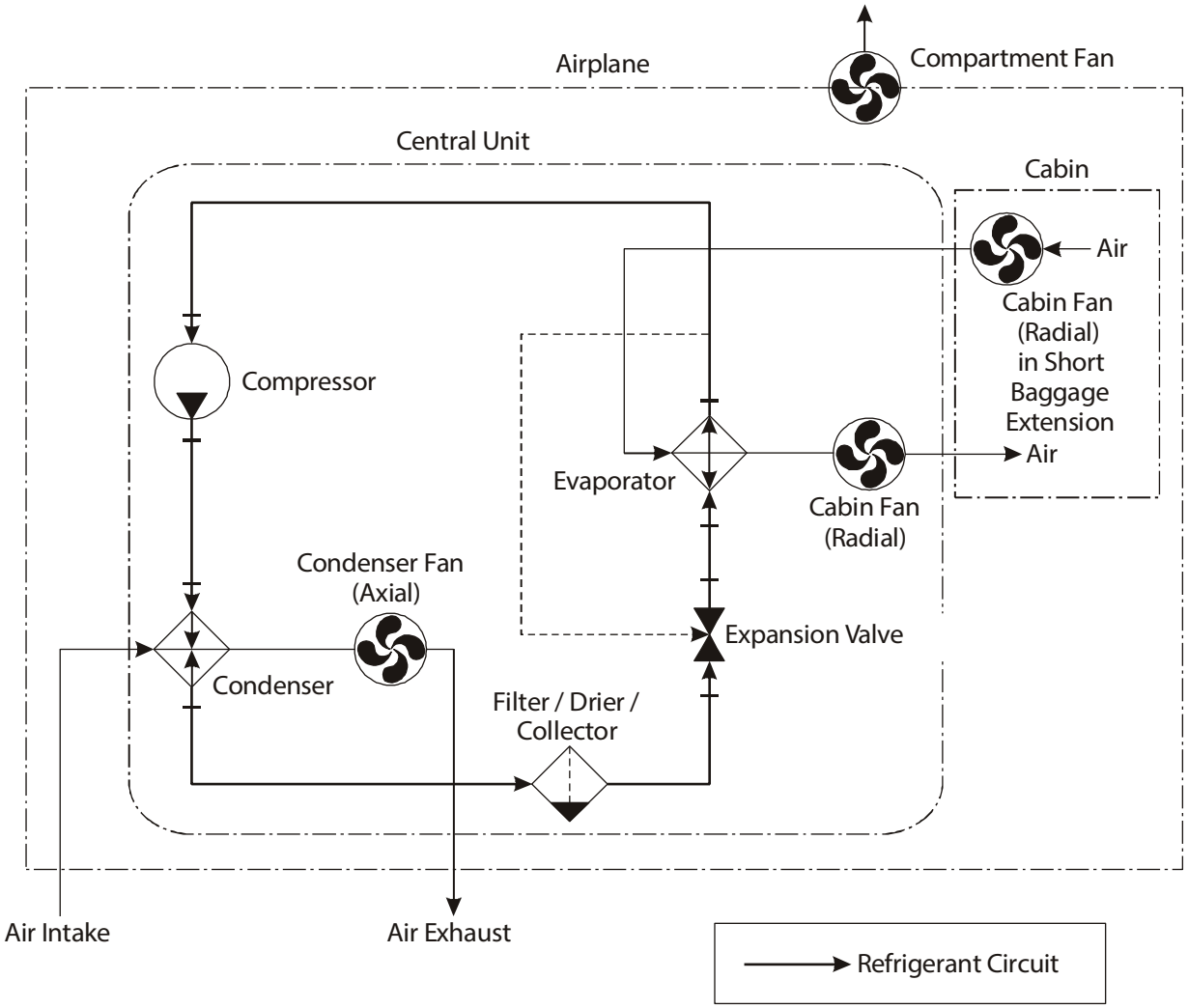

Figure 1 : RACC System Schematic

B. Control Panel

The control panel is situated on the center console in the cabin. It is electrically connected to the RACC controller and provides all necessary elements to control the center unit. An integrated display shows the preset air temperature.

Refer to Figure 2 for details about the RACC control panel

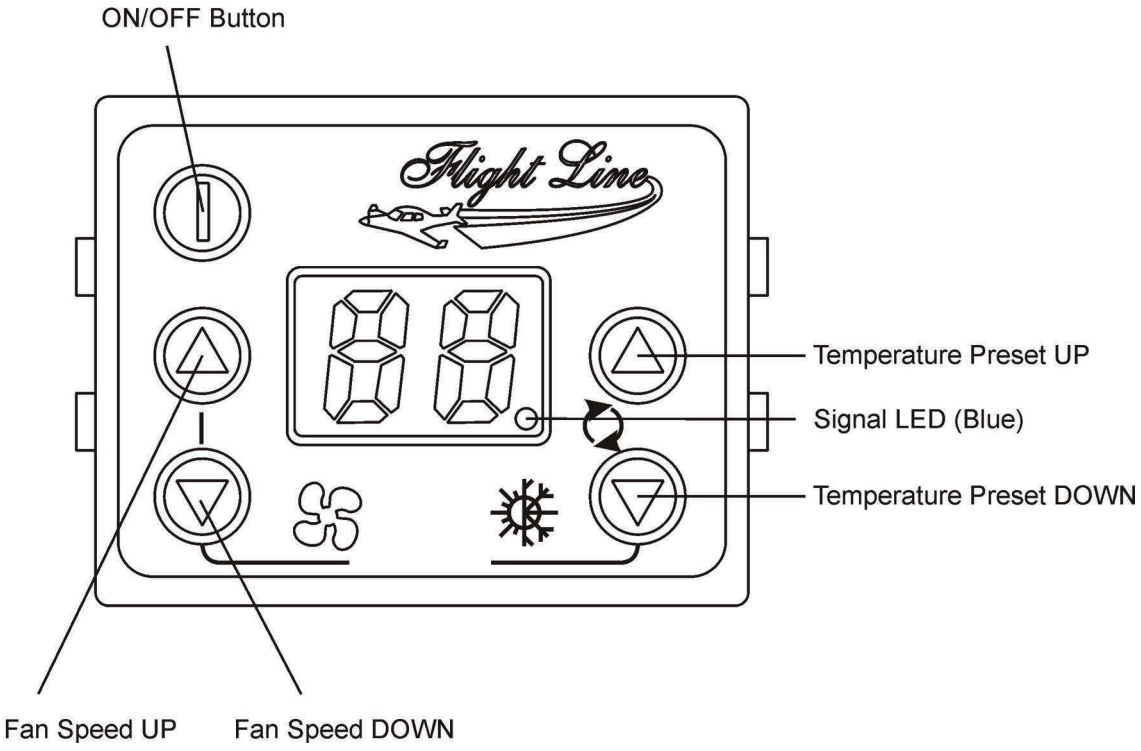

Figure 2 : RACC Control Panel

3. Operation

If electrical power is provided to the RACC system, the blue LED on the control panel flashes.

The control panel of the RACC system in the center console allows the crew to control the fan speed and the cabin temperature. A two digit display shows the preset cabin air temperature in °F.
A push-button is used to set the RACC system to ON (if short depressed; display is illuminated) and OFF (if pressed and held for approximately one second).

During power-up the software version of the control panel is displayed.

The central unit is located aft of the baggage compartment. The RACC controller is located on top of the central unit and controls the refrigerant circuit valves and the compressor with respect to the control panel settings. With the control panel set to ON and a temperature preset lower than the current cabin air temperature, the refrigerant cooling circuit is activated. An electrically powered compressor takes the low-pressure low-temperature refrigerant gas and compresses it to a high-temperature gas. A pressure switch on the compressor assembly regulates the compressor discharge pressure.

The hot refrigerant gas is cooled down in the condenser and condenses to a high pressure liquid. An axial condenser fan forces outside air through the condenser coils and vents the thus heated air overboard. The filter / drier / collector bottle removes moisture from the refrigerant and stores the refrigerant. The expansion valve controls the amount of refrigerant liquid flowing to the evaporator. The refrigerant boils in the evaporator and turns back into a low-pressure low-temperature gas while cooling the coils of the evaporator.

Two radial cabin fans force cabin air through the cooling coils and thus remove heat from the cabin air. The cool cabin air cannot hold the moisture and water condensates on the evaporator cooling coils. The condensate is collected under the evaporator and is drained overboard. The refrigerant gas returns to the compressor.

A cooling fan vents air through the RH air outlet on top of the fuselage and ensures ventilation of the rear fuselage.

21-50 - TROUBLE-SHOOTING

1. General

The table below lists the defects you could have with the control panel in the center console. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Blue LED on control panel does not illuminate.	RACC circuit breaker open.	Set.
	Additional alternator defective.	Check RACC power supply of the airplane.
Central unit does not power up.	Control panel defective.	Replace.
	Electrical control unit defective.	Replace.
Insufficient cooling.	Air inlet filter contaminated.	Clean or replace filter.
	Hot air outlet on LH fuselage blocked.	Remove blockage.
	Leak in refrigerant circuit.	Perform a leak test. Repair leak. Charge the system.
	Condenser faulty.	Check condenser coils for dirt accumulation and remove dirt.
	Expansion valve faulty.	Replace expansion valve.
	Compressor faulty.	Replace compressor.
	Electrical power source insufficient.	Check ground power source respective RACC power supply of the airplane.

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21-50 - MAINTENANCE PRACTICES

1. Remove/Install the RACC Central Unit

CAUTION THE EXTERNAL POWER UNIT MUST BE DISCONNECTED PRIOR TO THE REMOVAL OR INSTALLATION OF THE RACC CENTRAL UNIT. THIS IS NECESSARY TO PREVENT THE POSSIBILITY OF AN ELECTRICAL SHORT.

Refer to Figures 201, 202 and 203.

A. Remove the RACC Central Unit.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the passenger seats.	Refer to Section 25-10.
(2)	Remove the seatbelt pulleys of the passenger seats.	Refer to Section 25-10.
(3)	Unplug the electrical connection of the cabin fan: - Open the baggage tray. - Unplug the electrical connector on the rear wall of the short baggage extension.	
(4)	Remove the short baggage extension.	Refer to Section 25-10.
(5)	Remove short baggage extension fan and the drip tray.	
(6)	Remove the air ducts from the RACC central unit.	
(7)	Remove the metal air duct tube from the LH air outlet.	
(8)	Disconnect the electrical connections from the RACC central unit to: - Two 4AWG cables marked 24600C4 and 24413A6 (Cap and stow wires 24600C4 and 24413A6). - One 4AWG cable marked 24601A4N connected to the ground stud of the RACC central unit. - One plug coming from the RACC control panel.	Electrically insulate wires 24600C4 and 24413A6 to prevent an electrical short while the RACC central unit is disconnected or removed.

	Detail Steps/Work Items	Key Items/References
(9)	Remove the four bolts which connect the mounting panel of the RACC central unit to the mounting panel supports.	
(10)	Slide the RACC central unit forward.	
(11)	Lift the RACC central unit clear of the airplane.	

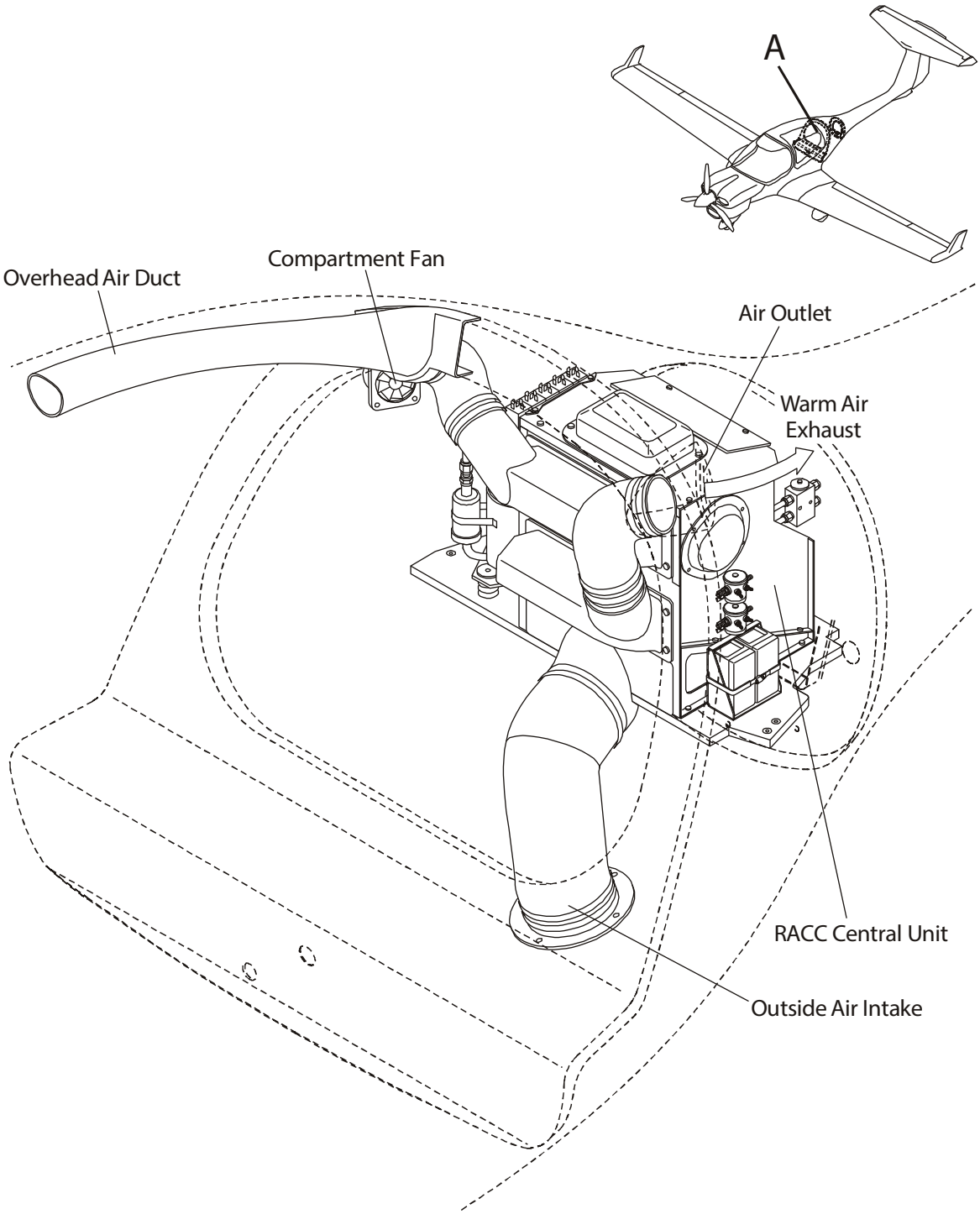

Figure 201 : RACC Central Unit Installation

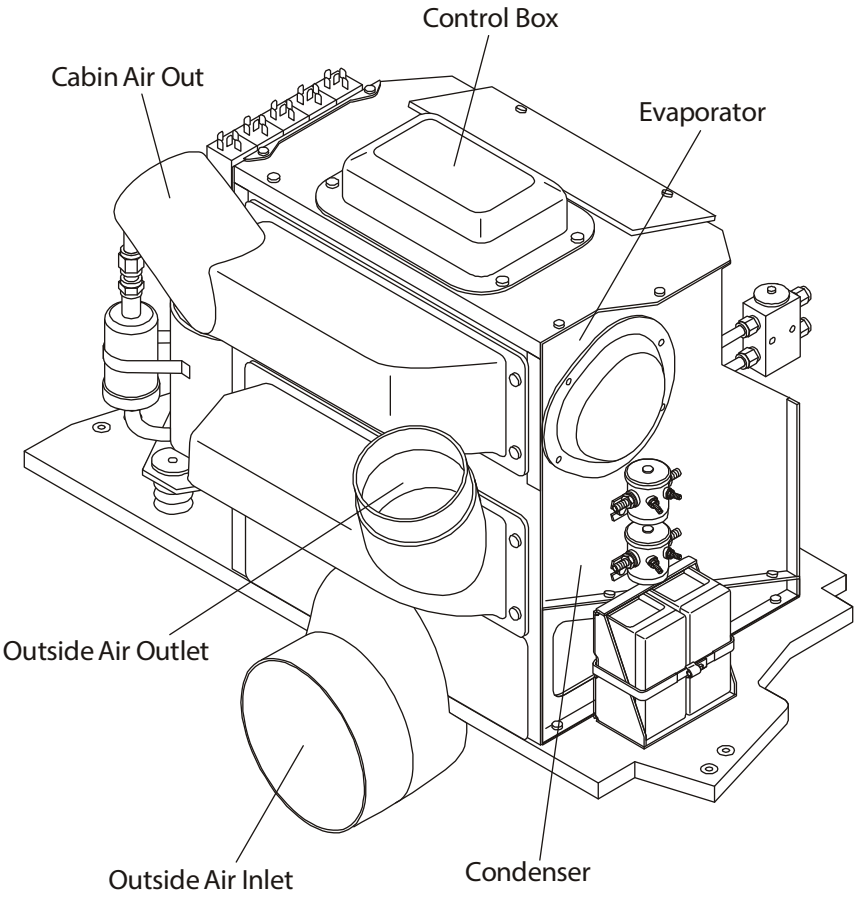

Figure 202 : Central Unit - Front and LH Side

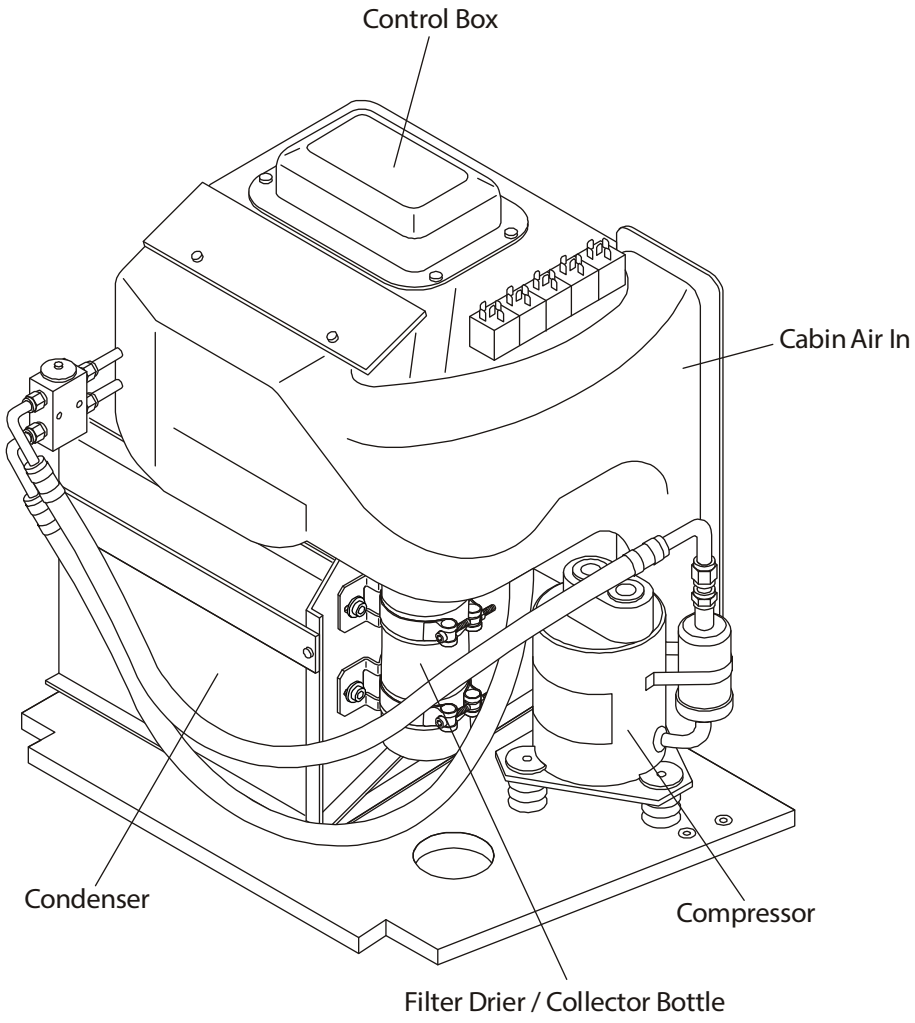

Figure 203 : Central Unit - Back and RH Side

B. Install the RACC Central Unit.

	Detail Steps/Work Items	Key Items/References
(1)	Lift the RACC central unit into the airplane.	
(2)	Slide the RACC central unit backward. Make sure to position the mounting panel on the mounting panel supports in the fuselage.	
(3)	Install the four screws which connect the mounting panel of the RACC central unit to the mounting panel supports.	
(4)	Connect the electrical cables to the RACC central unit to: - Three 4AWG cables marked 24600C4, 24413A6 and 24601A4N - One plug coming from the RACC control panel.	Remove the electrically insulating material from the 4 AWG cables marked 24600C4 and 24413A6 and connect them to the terminal block of the RACC central unit. Connect the other 4 AWG cable marked 24601A4N to the ground stud of the RACC central unit.
(5)	Install the metal air duct tube to the RH air outlet.	
(6)	Install the air ducts on the RACC central unit.	
(7)	Install the short baggage extension fan and the drip tray.	
(8)	Position the short baggage extension in front of the RACC central unit.	
(9)	Connect the air duct of the RACC central unit to the short baggage extension.	
(10)	Install the short baggage extension.	Refer to Section 25-10.

	Detail Steps/Work Items	Key Items/References
(11)	Connect the cabin fan electrically: - Open the baggage tray. - Plug in the electrical connector on the rear wall of the short baggage extension.	
(12)	Install the seatbelt pulleys of the passenger eats.	Refer to Section 25-10.
(13)	Install the passenger seats.	Refer to Section 25-10.
(14)	Perform a cooling test of the RACC system.	

2. Remove/Install the RACC Control Panel

Refer to Figure 204.

A. Remove the RACC Control Panel.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the center console.	Refer to Section 25-10.
(2)	Unplug the electrical connectors of the RACC control panel.	
(3)	Unclip the RACC control panel from the center console.	
(4)	Remove the RACC control panel from the airplane	

B. Install the RACC Control Panel

	Detail Steps/Work Items	Key Items/References
(1)	Move the RACC control panel in position on the center console.	
(2)	Push the RACC control panel into the center console until the clips hold the panel in place on the center console.	
(3)	Connect the electrical connectors to the RACC control panel.	
(4)	Install the center console.	Refer to Section 25-10.
(5)	Perform a RACC System Test.	Refer to Paragraph 3.

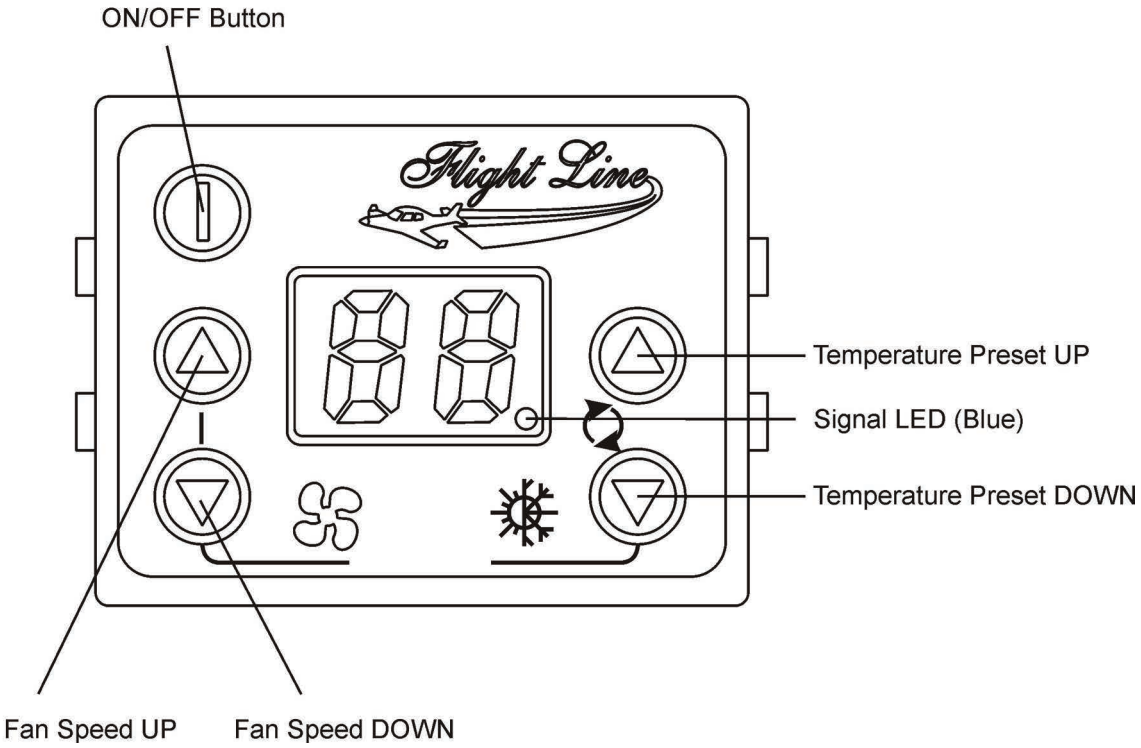

Figure 204 : RACC Control Panel

3. RACC System Test Procedure.

	Detail Steps/Work Items	Key Items/References
(1)	Perform an engine ground test.	Refer to Section 71-00.
(2)	Set the engine to 1000 to 1200 RPM.	
(3)	Set the AUX POWER switch to ON.	The blue LED on the RACC control panel must flash.
(4)	Push the ON/OFF button on the RACC control panel once to switch the RACC system ON.	The preset temperature display on the RACC control panel must illuminate.
(5)	Push the Preset Temperature DOWN button until the preset temperature shows ‘LO’.	
(6)	Verify that the cabin outlet air temperature is significantly lower than the cabin air temperature.	
(7)	Set the cabin air preset temperature to a convenient temperature level.	Use the preset temperature UP and DOWN buttons on the control panel.
(8)	Push the ON/OFF button on the RACC control panel for approximately 1 second to switch the RACC system to OFF.	
(9)	Set the AUX POWER switch to OFF.	

4. Remove/Install Parts of the Refrigerant Unit

NOTE: The refrigerant vapor cooling system is a hermetically sealed and pressurized circuit and contains the refrigerant R134a.

WARNING: ALL MAINTENANCE AND REPLENISHMENT WHICH REQUIRES TO OPEN AND DEPRESSURIZE THE REFRIGERANT CIRCUIT MUST BE DONE BY AUTHORIZED PERSONNEL ACCORDING TO NATIONAL AND INTERNATIONAL REGULATIONS FOR REFRIGERANT SYSTEMS.

Before you do any maintenance on parts of the refrigerant circuit you must remove the central unit from the airplane. Refer to Paragraph 1. Make sure to obey the regulations for handling the refrigerant.

A. Discharge/Charge the Refrigerant Circuit

(1) Equipment

One of the following automated discharge and charging stations or equivalent must be used:

Item	Quantity	Part Number
Silco CS 199.	1	Commercial
Silco CS 195.	1	Commercial
Silco CS 150.	1	Commercial

(2) Discharge the Refrigerant Circuit.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the central unit from the airplane.	Refer to Paragraph 1.
(2)	Connect the RACC system to the discharge/ charging station.	Follow the instructions of the discharge/ charging station.
(3)	Discharge the refrigerant.	Follow the instructions of the discharge/ charging station.
(4)	Print the protocol of the discharge/charging station and add it to the RACC system documentation.	Follow the instructions of the discharge/ charging station.

(3) Charge the Refrigerant Circuit.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that all connectors of the refrigerant circuit are tight.	
(2)	Charge the refrigerant circuit.	Follow the instructions of the discharge/ charging station.
(3)	Print the protocol of the discharge/charging station and add it to the RACC system documentation.	Follow the instructions of the discharge/ charging station.
(4)	Disconnect the RACC system from the discharge/charging station.	Follow the instructions of the discharge/ charging station.
(5)	Install the RACC central unit in the airplane.	Refer to Paragraph 1.
(6)	Perform a RACC System Test.	Refer to Paragraph 3.

B. Remove/Install the Compressor

(1) Remove the Compressor .

	Detail Steps/Work Items	Key Items/References
(1)	Discharge the refrigerant circuit.	Refer to Paragraph 4.A.(2).
(2)	Unplug the electrical connectors from the compressor.	
(3)	Loosen the hose connections of the refrigerant circuit on the compressor.	Use caps to plug the hose connectors.
(4)	Remove the three screws which attach the compressor to the RACC mounting panel.	
(5)	Move the compressor clear of the central unit.	
(6)	Remove the compressor from the airplane.	

(2) Install the Compressor .

	Detail Steps/Work Items	Key Items/References
(1)	Position the compressor on the RACC mounting panel.	
(2)	Use the three screws to attach the compressor to the RACC mounting panel.	
(3)	Connect the refrigerant circuit hoses to the compressor.	Remove the caps from the hose connectors.
(4)	Connect the electrical connectors to the compressor.	
(5)	Charge the refrigerant circuit.	Refer to Paragraph 4.A.(3).

C. Remove/Install the Filler/Drier Assembly

(1) Remove the Filler/Drier Assembly.

	Detail Steps/Work Items	Key Items/References
(1)	Discharge the refrigerant circuit.	Refer to Paragraph 4.A.(2).
(2)	Remove the electrical connectors from the pressure sensor.	
(3)	Loosen the hose connections of the refrigerant circuit on the filler/drier assembly.	Use caps to plug the hose connectors.
(4)	Remove the two screws which attach the filler/drier assembly to the central unit.	
(5)	Move the filler/drier assembly clear of the central unit.	
(6)	Remove the filler/drier assembly from the airplane.	

(2) Install the Filler/Drier Assembly .

	Detail Steps/Work Items	Key Items/References
(1)	Position the filler/drier assembly on the RACC mounting panel.	
(2)	Use the two screws to attach the filler/drier assembly to the central unit.	
(3)	Connect the refrigerant circuit hoses to the filler/drier assembly.	Remove the caps from the hose connectors.
(4)	Connect the electrical connectors to the filler/drier assembly.	
(5)	Charge the refrigerant circuit.	Refer to Paragraph 4.A.(3).

D. Remove/Install the Expansion Valve

(1) Remove the Expansion Valve.

	Detail Steps/Work Items	Key Items/References
(1)	Discharge the refrigerant circuit.	Refer to Paragraph 4.A.(2).
(2)	Loosen the hose connections of the refrigerant circuit to the expansion valve.	Use caps to plug the hose connectors.
(3)	Open the pressure line fittings which connect the expansion valve to the evaporator.	
(4)	Move the expansion valve clear of the central unit.	
(5)	Remove the expansion valve from the airplane.	

(2) Install the Expansion Valve .

	Detail Steps/Work Items	Key Items/References
(1)	Position the expansion valve on the central unit.	
(2)	Attach the expansion valve to the evaporator with the pressure line fittings.	Use new O-rings.
(3)	Connect the refrigerant circuit hoses to the expansion valve.	Remove the caps from the hose connectors.
(4)	Charge the refrigerant circuit.	Refer to Paragraph 4.A.(3).

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21-51 - COOLING (OÄM 40-316/i or later installed)

1. General

If OÄM 40-316/i or later is installed, an improved recirculating air - cabin cooling (RACC) system is installed. The RACC system is an independent subsystem of the airplane and is electrically powered. It consists of the central unit (installed aft of baggage compartment) and a control panel (in the cabin, center console).

2. Description

A. Central Unit

The central unit operates with a refrigerant R134a vapor cycle cooling circuit. The system requires electrical power (28 V DC, max. 65 A) for operation, which is provided by an additional alternator.

The central unit is subdivided into the following components:

- Compressor assembly (part of refrigerant circuit).
- Condenser assembly (part of refrigerant circuit).
- Evaporator assembly (part of refrigerant circuit).
- Condenser fan.
- Evaporator radial fan.
- Electrical control system.

Refer to Figure 1 for a system schematic of the RACC system.

NOTE: The refrigerant vapor cooling system is a hermetically sealed and pressurized circuit and contains the refrigerant R134a.

WARNING: ALL MAINTENANCE AND REPLENISHMENT WHICH REQUIRES TO OPEN AND DEPRESSURIZE THE REFRIGERANT CIRCUIT MUST BE DONE BY AUTHORIZED PERSONNEL ACCORDING TO NATIONAL AND INTERNATIONAL REGULATIONS FOR REFRIGERANT SYSTEMS.

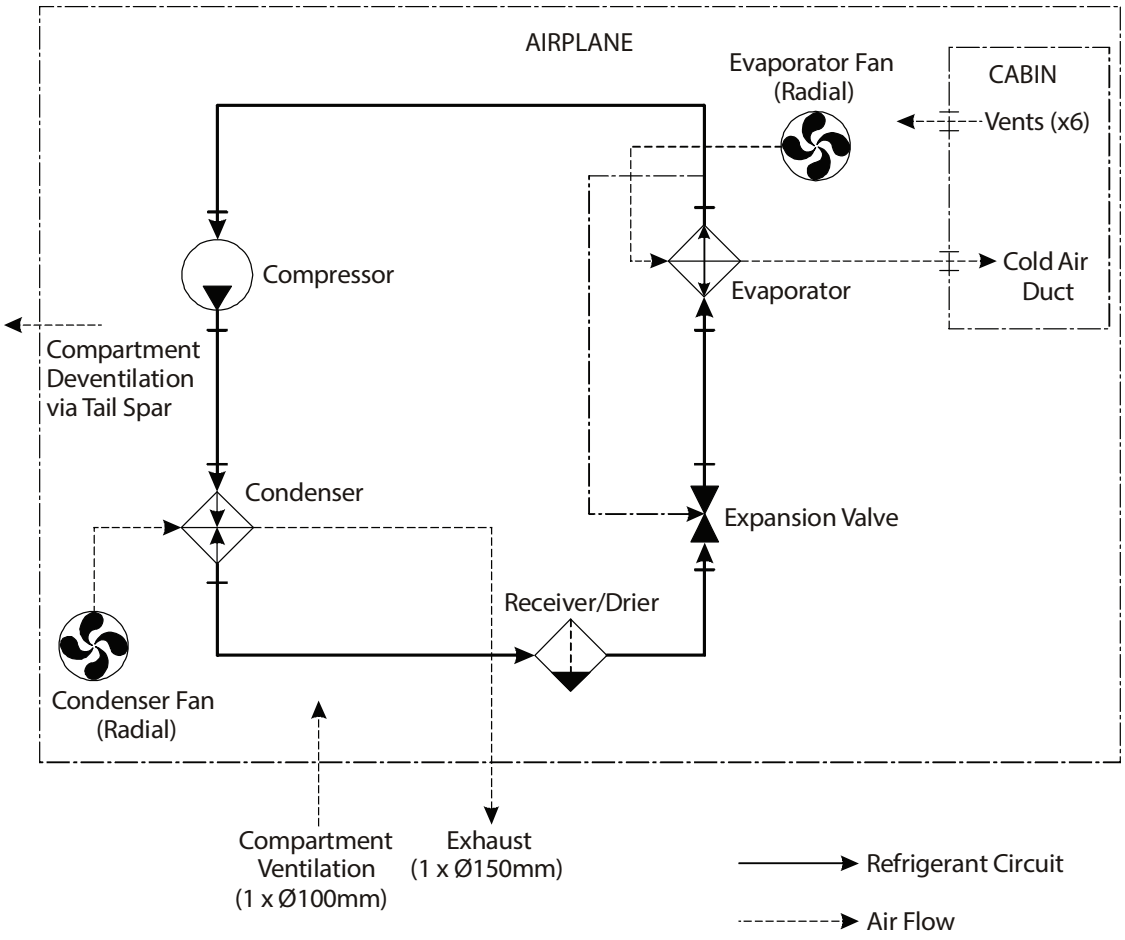

Figure 1 : RACC System Schematic

B. Control Panel

The control panel is situated on the center console in the cabin. It is electrically connected to the RACC controller and provides all necessary elements to control the center unit. An integrated display shows the preset air temperature.

Refer to Figure 2 for details about the RACC control panel

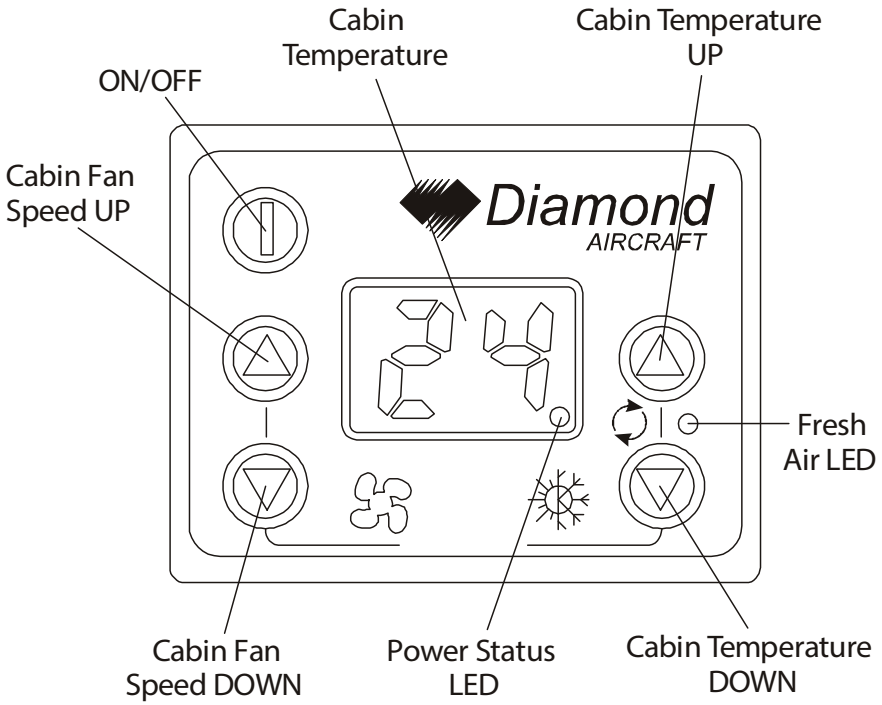

Figure 2 : RACC Control Panel

3. Operation

If electrical power is provided to the RACC system, the power status LED on the control panel flashes.

The control panel of the RACC system in the center console allows the crew to control the fan speed and the cabin temperature. A two digit display shows the preset cabin air temperature in °C.
A push-button is used to set the RACC system to ON (if short depressed; display is illuminated) and OFF (if pressed and held for approximately one second).

During power-up the software version of the control panel is displayed.

The central unit is located aft of the baggage compartment. The RACC controller is located below the condenser unit and controls the refrigerant circuit valves and the compressor with respect to the control panel settings. With the control panel set to ON and a temperature preset lower than the current cabin air temperature, the refrigerant cooling circuit is activated. An electrically powered compressor takes the low-pressure low-temperature refrigerant gas and compresses it to a high-temperature gas. A pressure switch on the compressor assembly regulates the compressor discharge pressure.

The hot refrigerant gas is cooled down in the condenser and condenses to a high pressure liquid. A radial condenser fan forces outside air through the condenser coils and vents the thus heated air overboard. The drier / receiver bottle separates moisture from liquid and filter contaminants from the refrigerant. The expansion valve controls the amount of refrigerant liquid flowing to the evaporator. The refrigerant boils in the evaporator and turns back into a low-pressure low-temperature gas while cooling the coils of the evaporator.

A radial evaporator fan forces cabin air through the cooling coils and thus removes heat from the cabin air. The cool cabin air cannot hold the moisture and water condensates on the evaporator cooling coils. The condensate is collected under the evaporator and is drained overboard. The refrigerant gas returns to the compressor.

An inlet including a drip tray and an air filter enables ambient air to enter the RACC compartment ensuring sufficient compartment ventilation.

21-51 - TROUBLE-SHOOTING (OÄM 40-316/i or later installed)

1. General

The table below lists the defects you could have with the control panel in the center console. If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair Column.

Trouble	Possible Cause	Repair
The Power Status LED on the control panel does not illuminate.	RACC circuit breaker open.	Set.
	Additional alternator defective.	Check RACC power supply of the airplane.
Central unit does not power up.	Control panel defective.	Replace.
	Electrical control unit defective.	Replace.
Insufficient cooling.	Hot air outlet on fuselage bottom blocked.	Remove blockage.
	Leak in refrigerant circuit.	Perform a leak test. Repair leak. Charge the system.
	Condenser faulty.	Check condenser coils for dirt accumulation and remove dirt.
	Expansion valve faulty.	Replace the expansion valve.
	Compressor faulty.	Replace the compressor.
	Electrical power source insufficient.	Check ground power source respective RACC power supply of the airplane.
	Filter/dryer assembly inoperative	Replace the filter/dryer assembly

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21-51- MAINTENANCE PRACTICES (OÄM 40-316/i or later installed)

1. Remove/Install the RACC Central Unit

CAUTION: THE EXTERNAL POWER UNIT MUST BE DISCONNECTED PRIOR TO THE REMOVAL OR INSTALLATION OF THE RACC CENTRAL UNIT. THIS IS NECESSARY TO PREVENT THE POSSIBILITY OF AN ELECTRICAL SHORT.

Refer o Figures 201, 202 and 203.

A. Remove the RACC Central Unit.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the passenger seats.	Refer to Section 25-10.
(2)	Remove the seatbelt pulleys of the passenger seats.	Refer to Section 25-10.
(3)	Remove the short baggage extension.	Refer to Section 25-10.
(4)	Remove the flexible air hoses from the RACC central unit: - Flexible cold air hose. - Flexible hot air hose.	
(5)	Remove the hot exhaust air-duct from the RACC central unit.	
(6)	Disconnect the electrical connections from the RACC central unit to: - One 4AWG cable marked 24600C4 (Cap and stow wire 24600C4). - One 4AWG cable marked 24601A4N connected to the ground stud of the RACC central unit - One plug coming from the RACC control panel.	Electrically insulate wire 24600C4 to prevent an electrical short while the RACC central unit is disconnected or removed.
(7)	Remove drain hoses from RACC central unit: - The drip tray drain hose. - The evaporator drain hose.	
(8)	Remove the drip tray.	

	Detail Steps/Work Items	Key Items/References
(9)	Remove the four bolts which connect the base plate of the RACC central unit to the RACC brackets on the LH and RH side of the airplane.	
(10)	Slide the RACC central unit forward.	
(11)	Lift the RACC central unit clear and remove it from the airplane.	

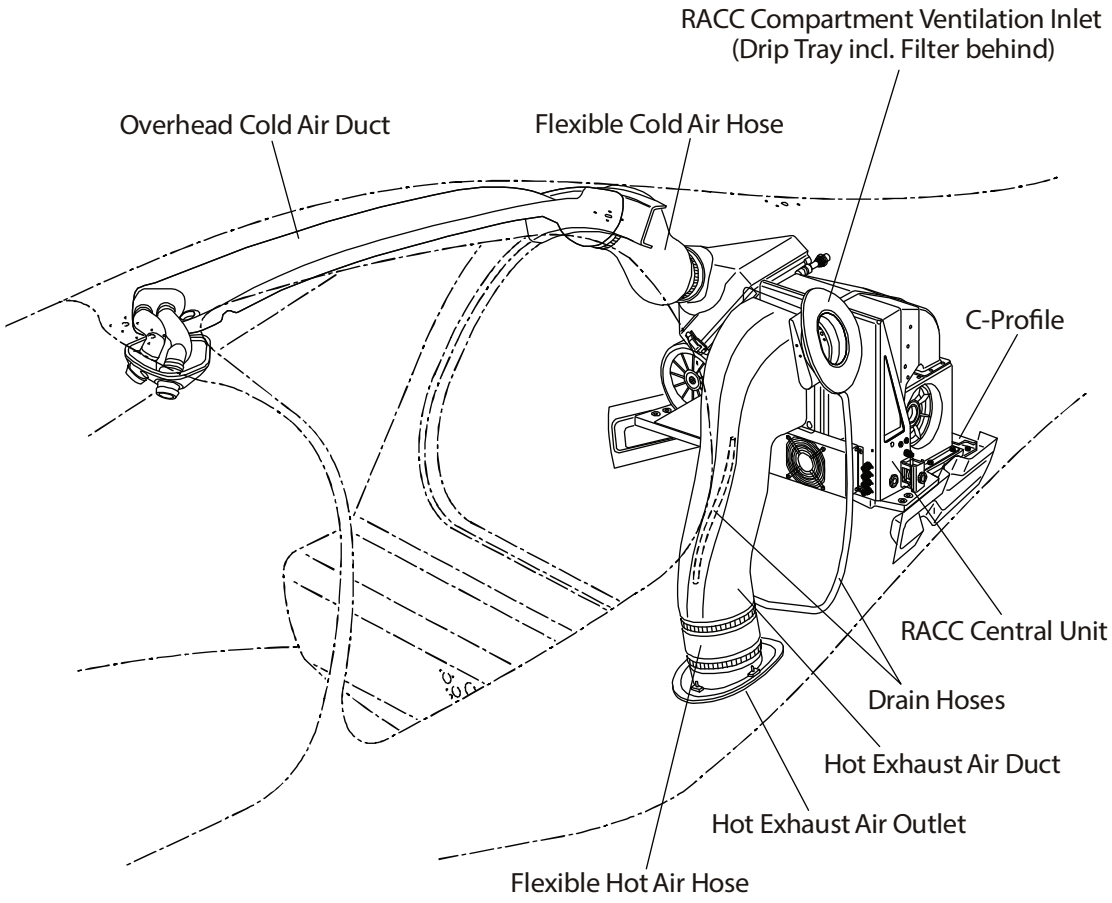

Figure 201 : RACC Central Unit Installation (if OÄM 40-316/i or later installed)

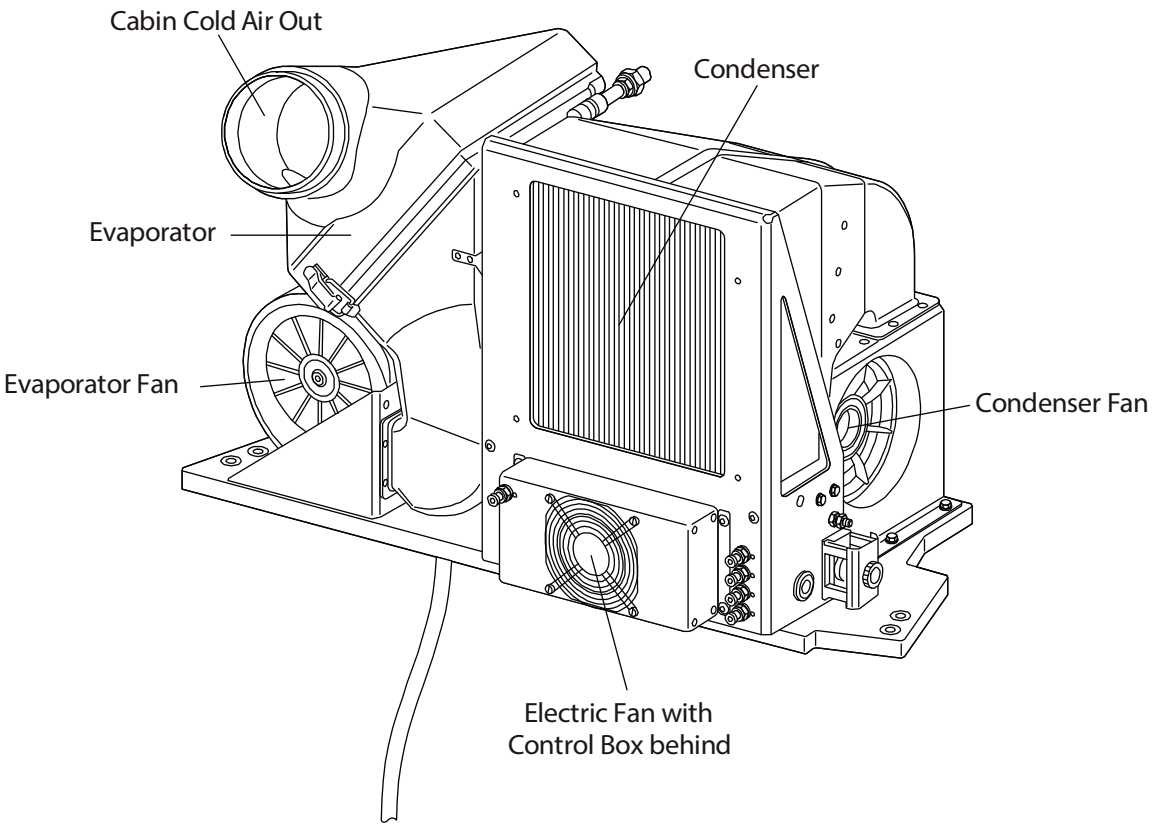

Figure 202 : Central Unit - Front and LH Side (if OÄM 40-316/i or later installed)

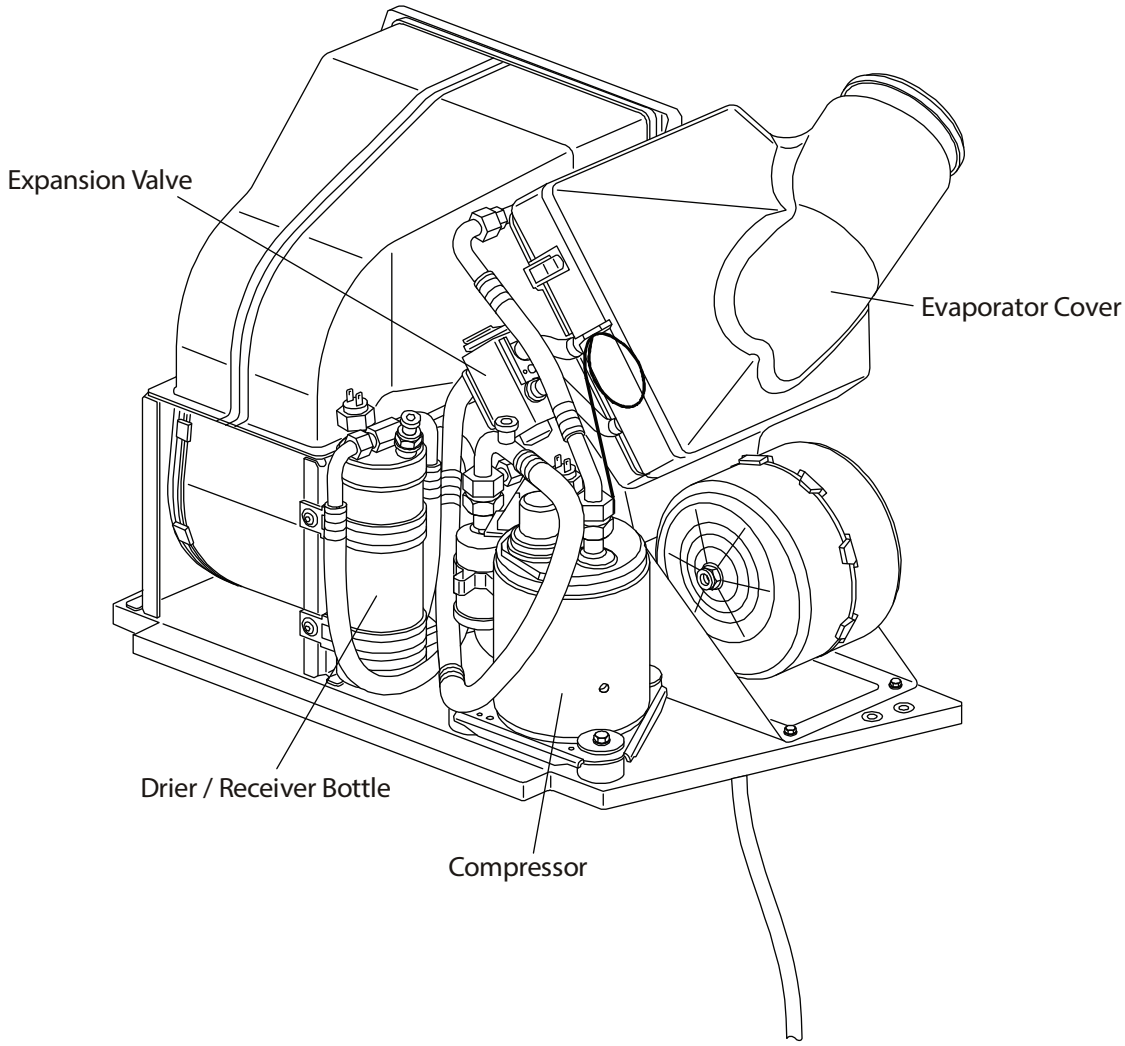

Figure 203 : Central Unit - Back and RH Side (if OÄM 40-316/i or later installed)

B. Install the RACC Central Unit.

	Detail Steps/Work Items	Key Items/References
(1)	Lift the RACC central unit into the airplane.	
(2)	Slide the RACC central unit backward. Make sure to position the baseplate of the RACC central unit above the RACC brackets and trailing edge of the baseplate inside the C-profile.	
(3)	Install the four bolts which connect the baseplate of the RACC central unit to the RACC brackets on the LH and RH side of the airplane.	
(4)	Install the drip tray.	
(5)	Install drain hoses to the RACC central unit: - The drip tray drain hose. - The evaporator drain hose.	
(6)	Connect the electrical cables to the RACC central unit to: - Two 4AWG cables marked 24600C4 and 24601A4N. - One plug coming from control panel.	Remove the electrically insulating material from the 4 AWG cable marked 24600C4 and connect it to the terminal block of the RACC central unit. Connect the other 4 AWG cable marked 24601A4N to the ground stud of the RACC central unit.
(7)	Install the hot exhaust air-duct to the RACC central unit.	
(8)	Install the flexible air hoses to the RACC central unit: - Flexible cold air hose. - Flexible hot air hose.	
(9)	Install the short baggage extension.	Refer to Section 25-10.
(10)	Install the seatbelt pulleys to the passenger seats.	Refer to Section 25-10.
(11)	Install the passenger seats.	Refer to Section 25-10.
(12)	Perform a cooling test of the RACC system.	

2. Remove/Install the RACC Control Panel

Refer to Figure 204.

A. Remove the RACC Control Panel.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the center console.	Refer to Section 25-10.
(2)	Unplug the electrical connectors of the RACC control panel.	
(3)	Unclip the RACC control panel from the center console.	
(4)	Remove the RACC control panel from the airplane	

B. Install the RACC Control Panel.

	Detail Steps/Work Items	Key Items/References
(1)	Move the RACC control panel in position on the center console.	
(2)	Push the RACC control panel into the center console until the clips hold the panel in place on the center console.	
(3)	Connect the electrical connectors to the RACC control panel.	
(4)	Install the center console.	Refer to Section 25-10.
(5)	Perform a RACC System Test.	Refer to Paragraph 3.

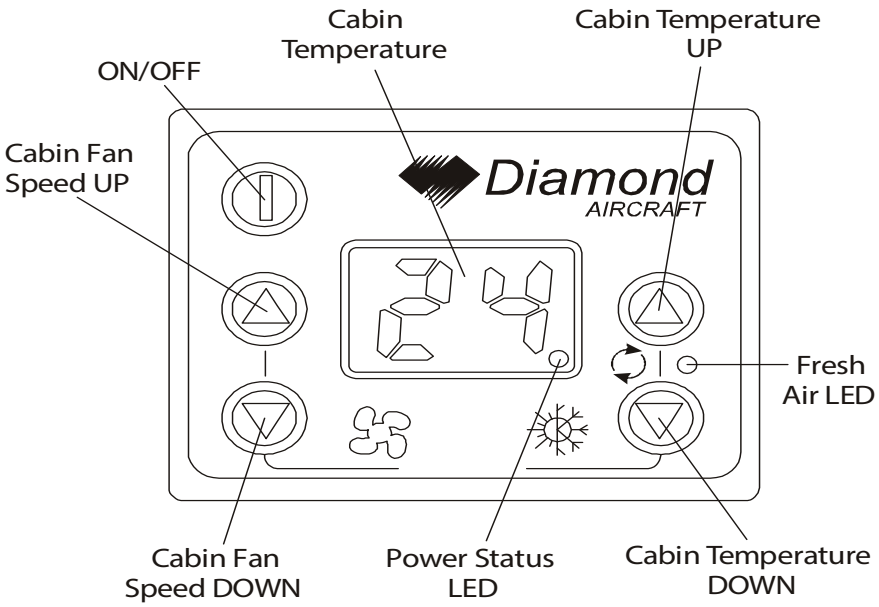

Figure 204 : RACC Control Panel (if OÄM 40-316/i or later installed)

3. RACC System Test Procedure.

	Detail Steps/Work Items	Key Items/References
(1)	Perform an engine ground test.	Refer to Section 71-00.
(2)	Set the engine to 1000 to 1200 RPM.	The test procedure may be alternatively performed with power supplied by a GPU.
(3)	Set the AUX POWER switch to ON.	The power status LED on the RACC control panel must flash.
(4)	Push the ON/OFF button on the RACC control panel once to switch the RACC system ON.	The preset temperature display on the RACC control panel must illuminate.
(5)	Push the Preset Temperature DOWN button until the preset temperature shows “LO” and switch the cabin fan speed to the highest stage (3).	
(6)	Verify that the cabin air temperature, at the outlet, is significantly lower than the outside air temperature.	Perform the test at ambient temperature of (20-30°C) and relative humidity of (20-90%). The cabin air temperature at outlet must be 8-15°C less than the ambient temperature.
(7)	Set the cabin air preset temperature to a convenient temperature level.	Use the preset temperature UP and DOWN buttons on the control panel.
(8)	Push the ON/OFF button on the RACC control panel for approximately 1 second to switch the RACC system to OFF.	
(9)	Set the AUX POWER switch to OFF.	

4. Remove/Install Parts of the Refrigerant Unit

NOTE: The refrigerant vapor cooling system is a hermetically sealed and pressurized circuit and contains the refrigerant R134a.

WARNING: ALL MAINTENANCE AND REPLENISHMENT WHICH REQUIRES TO OPEN AND DEPRESSURIZE THE REFRIGERANT CIRCUIT MUST BE DONE BY AUTHORIZED PERSONNEL ACCORDING TO NATIONAL AND INTERNATIONAL REGULATIONS FOR REFRIGERANT SYSTEMS.

Before you do any maintenance on parts of the refrigerant circuit you must remove the central unit from the airplane. Refer to Paragraph 1.

Make sure to obey the regulations for handling the refrigerant.

If the refrigerant circuit is open for more than 30 min and the filter/dryer assembly is not sealed, Diamond Airplane recommends to replace the filter/dryer assembly with a new one.

A. Discharge/Charge the Refrigerant Circuit

(1) Equipment

One of the following automated discharge and charging stations or equivalent must be used:

Item	Quantity	Part Number
Silco CS 199.	1	Commercial
Silco CS 195.	1	Commercial
Silco CS 150.	1	Commercial

(2) Discharge the Refrigerant Circuit.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the central unit from the airplane.	Refer to Paragraph 1.
(2)	Connect the RACC system to the discharge/ charging station.	Follow the instructions of the discharge/ charging station.
(3)	Discharge the refrigerant.	Follow the instructions of the discharge/ charging station.
(4)	Print the protocol of the discharge/charging station and add it to the RACC system documentation.	Follow the instructions of the discharge/ charging station.

(3) Charge the Refrigerant Circuit.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that all connectors of the refrigerant circuit are tight.	
(2)	Charge the refrigerant circuit with R134a (500 ± 25 g if OÄM 40-316/i and subsequent or 450 ± 25 g if OÄM40-316/h and earlier is installed) and add 15 ccm ± 5 ccm of oil (type PVE 68 cSt acc. to ISO 68). If refrigerant circuit and compressor was completely discharged add a total of 290 ccm of oil instead of the amount described above.	Follow the instructions of the discharge/ charging station.
(3)	Perform a Leakage Test if not automatically performed by the discharge / charging station.	Refer to Paragraph 4.A.(4).
(4)	Print the protocol of the discharge/charging station and add it to the RACC system documentation.	Follow the instructions of the discharge/ charging station.
(5)	Disconnect the RACC system from the discharge/charging station.	Follow the instructions of the discharge/ charging station.
(6)	Install the RACC central unit in the airplane.	Refer to Paragraph 1.
(7)	Perform a RACC System Test.	Refer to Paragraph 3.

(4) Leakage Test of the Refrigerant Circuit

After every discharge/charge of the refrigerant system it must be checked for leakages.

Most of the charging stations run automatically a leakage check before charging the air condition system. If the applied service station was equipped with this function, but does not automatically perform a test, engage manually the check before charging the air condition system.

If leakage in the air condition system was detected or the air condition unit lost more than 150g/year of refrigerant, then one of the below described checks must be performed:.

	Detail Steps/Work Items	Key Items/References
(1)	Use a detection spray or soapy water at the suspicious areas and watch for bubbles and foam. If a leak is detected, repair the leakage. To order spare parts contact DAI.	
(2)	Use an electronic leak detector suitable to detect the R134a refrigerant with a minimum leakage detection sensitivity of 5 g per year. If a leak is detected, repair the leakage. To order spare parts contact DAI.	

B. Remove/Install the Compressor

(1) Remove the Compressor .

	Detail Steps/Work Items	Key Items/References
(1)	Discharge the refrigerant circuit.	Refer to Paragraph 4.A.(2).
(2)	Unplug the electrical connectors from the compressor.	
(3)	Loosen the hose connections of the refrigerant circuit on the compressor.	Use caps to plug the hose connectors.
(4)	Remove the three screws which attach the compressor to the RACC mounting panel.	
(5)	Move the compressor clear of the central unit.	
(6)	Remove the compressor from the airplane.	

(2) Install the Compressor .

	Detail Steps/Work Items	Key Items/References
(1)	Position the compressor on the RACC mounting panel.	
(2)	Use the three screws to attach the compressor to the RACC mounting panel.	
(3)	Connect the refrigerant circuit hoses to the compressor.	Remove the caps from the hose connectors and replace O-rings of the circuit-hoses.
(4)	Connect the electrical connectors to the compressor.	
(5)	Charge the refrigerant circuit.	Refer to Paragraph 4.A.(3).
(6)	Perform a leakage test of the refrigerant circuit.	Refer to Paragraph 4.A.(4).

C. Remove/Install the Filler/Drier Assembly

(1) Remove the Filler/Drier Assembly.

	Detail Steps/Work Items	Key Items/References
(1)	Discharge the refrigerant circuit.	Refer to Paragraph 4.A.(2).
(2)	Remove the electrical connectors from the pressure sensor.	
(3)	Loosen the hose connections of the refrigerant circuit on the filler/drier assembly.	Use caps to plug the hose connectors.
(4)	Remove the two screws which attach the filler/drier assembly to the central unit.	
(5)	Move the filler/drier assembly clear of the central unit.	
(6)	Remove the filler/drier assembly from the airplane.	

(2) Install the Filler/Drier Assembly .

	Detail Steps/Work Items	Key Items/References
(1)	Position the filler/drier assembly on the RACC mounting panel.	
(2)	Use the two screws to attach the filler/drier assembly to the central unit.	
(3)	Connect the refrigerant circuit hoses to the filler/drier assembly.	Remove the caps from the hose connectors replace O-rings of the circuit-hoses.
(4)	Connect the electrical connectors to the filler/drier assembly.	
(5)	Charge the refrigerant circuit.	Refer to Paragraph 4.A.(3).
(6)	Perform a leakage test of the refrigerant circuit.	Refer to Paragraph 4.A.(4).

D. Remove/Install the Expansion Valve

(1) Remove the Expansion Valve.

	Detail Steps/Work Items	Key Items/References
(1)	Discharge the refrigerant circuit.	Refer to Paragraph 4.A.(2).
(2)	Open the latches of evaporator cover and remove the cover.	
(3)	Remove the evaporator from the fixing cover.	
(4)	Loosen the hose connections of the refrigerant circuit to the expansion valve and remove the associated evaporator fixing plate.	Note and mark the correct position of the refrigerant hoses evaporator-fixing-plate on the expansion valve.
(5)	First, remove the two bolts from the expansion valve and the second evaporator fixing plate, then remove the expansion valve from evaporator.	Note and mark the correct position of the expansion valve.
(6)	Move the expansion valve clear of the central unit.	
(7)	Remove the expansion valve from the airplane.	

(2) Install the Expansion Valve .

	Detail Steps/Work Items	Key Items/References
(1)	Position the expansion valve on the evaporator.	Use new O-rings on the evaporator-hoses.
(2)	Install the associated expansion valve fixing plate with two bolts	Check for correct position.
(3)	Connect the refrigerant circuit hoses and the second evaporator fixing plate to the expansion valve.	Use new O-rings on refrigerant-hoses and check for correct position.
(4)	Install the evaporator inside the fixing cover.	
(5)	Install the evaporator cover and close the cover latches.	
(6)	Charge the refrigerant circuit.	Refer to Paragraph 4.A.(3).
(7)	Perform a leakage test of the refrigerant circuit.	Refer to Paragraph 4.A.(4).

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CHAPTER 22
AUTO FLIGHT

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22-00 - AUTO FLIGHT

1. General

This Chapter tells you about the auto flight (autopilot) system which may be installed in the DA 40 NG airplane. This Chapter tells you about the components of the GFC 700 autopilot system of the airplane. This Chapter does not tell you about the workshop maintenance of the equipment. For more data about the equipment refer to the equipment manufacturer's manuals.

For more details refer to the following Sections:

- Section 22-10. Autopilot, GFC 700.
- Section 22-11. Autopilot, KAP 140.

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AUTOPILOT, GFC 700

1. General

This Section tells you about the GFC 700 autopilot system which may be installed in the DA 40 NG.

2. Description

The GFC 700 autopilot system is a digital flight control system that provides roll, pitch, pitch trim with altitude control. The system has the following components (refer to Figure 1):

- Flight director (integral part of the Garmin G1000 system).
- GSA 81 roll servo and GSM 86 servo clutch.
- GSA 81 pitch servo and GSM 86 servo clutch.
- GSA 81 pitch trim servo and GSM 86 servo clutch.
- The GFC 700 autopilot system is controlled via the MFD of the Garmin G1000 integrated cockpit system (ICS).

The GFC 700 roll axis features include wing leveler, heading select, and VOR/LOC intercept and tracking. The GFC 700 is also coupled to the ICS for navigation information. Attitude information is derived from the AHRS.

Pitch axis features include vertical speed, flight level change, glideslope and altitude hold along with altitude preselect. Pitch information is derived from AHRS and GDC. Internal monitors keep constant track of the GFC 700's status and provide for automatic shutdown of the autopilot or trim system in the event of a malfunction.

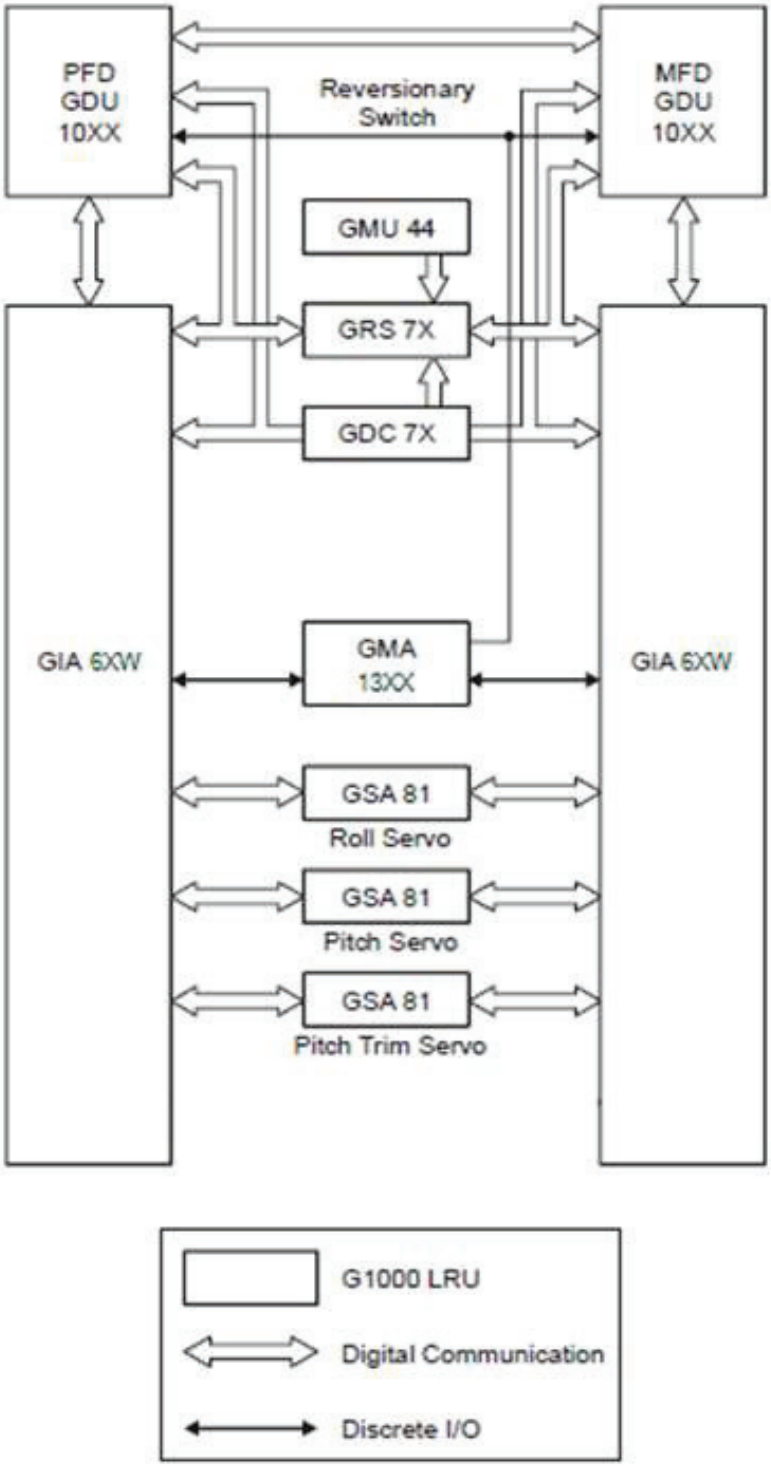

Figure 1 : GFC 700 Autopilot Schematic Diagram

A. GFC 700 Flight Control

For details about operation and the indications concerning GFC 700 functions refer to Garmin DA 40 NG Pilot's Guide, latest revision.

B. GSA 81 Roll Servo

The roll servo is located behind the rear main bulkhead on the right side. It is mounted on a mounting plate which is made from sheet aluminum. Two aluminum clamps connect a bridle cable to the aileron push-rod.

C. GSA 81 Pitch Servo

The pitch servo is located aft of the baggage compartment frame. It is mounted on a mounting plate which is made from sheet aluminum. Two aluminum clamps connect a bridle cable to the elevator push-rod.

D. GSA 81 Pitch Trim Servo

The pitch trim servo is located under the co-pilot's seat. It is mounted on a mounting plate which is made from sheet aluminum and mounting bracket which is made from GFRP. Servo movement is transmitted to the trim wheel through a chain gear on the servo, a cardan shaft, and a chain gear next to the trim wheel on the right side

E. GSM 86 servo clutch

A GSM 86 servo clutch is attached to each GSA 81 servo. The GSM 86 servo clutch/gearbox is mounted to the aircraft structure, via a custom mounting bracket, and is responsible for transferring the output torque of the GSA 81 servo to the mechanical flight control surface linkage.

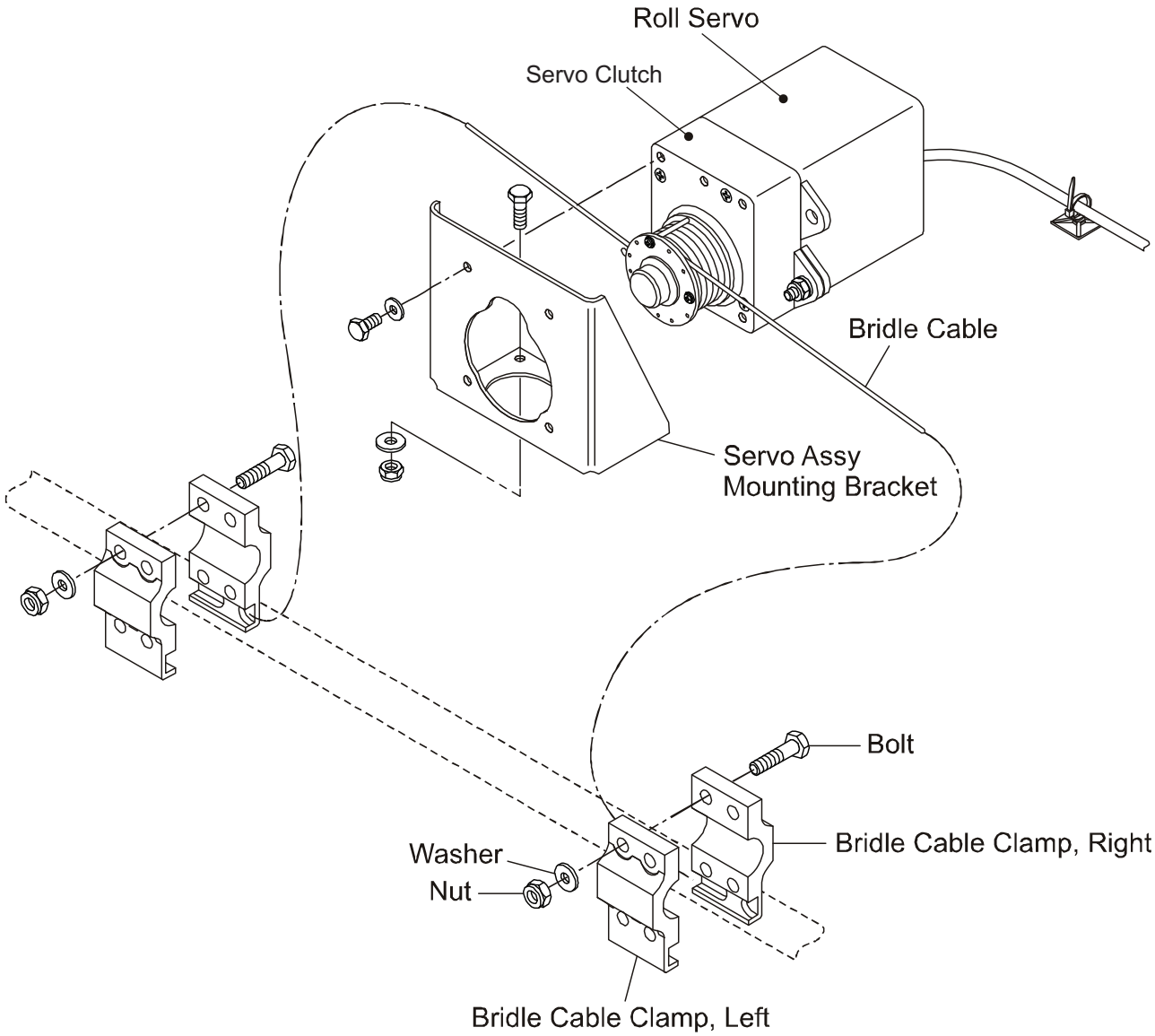

Figure 2 : Roll Servo Installation

MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to install the components of the autopilot system. They also tell you how to test and adjust the autopilot system.

2. Remove/Install the Roll Servo

Refer to Figure 2 (22-10-00 Page 4).

A. Remove the Roll Servo.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the passenger seats.	Refer to Section 25-10.
(2)	Dis-connect the connector from the servo.	
(3)	Remove the mounting screws (2 or 4) which attach the servo to the clutch.	Hold the servo.
(4)	Remove the servo from the airplane.	

B. Install the Roll Servo.

	Detail Steps/Work Items	Key Items/References
(1)	Put the servo in place on the clutch.	
(2)	Install the mounting screws (2 or 4) which attach the servo to the mounting plate and clutch.	
(3)	Connect the connector to the servo.	
(4)	Do a test of the autopilot system: - Set ELECTRIC MASTER key switch to ON. - Set AVIONIC MASTER switch to ON. - Observe the self-test of the flight control computer. - Set AVIONIC MASTER switch to OFF. - Set ELECTRIC MASTER key switch to OFF.	If no error message appears, then the system is operative.
(5)	Install the passenger seats.	Refer to Section 25-10.

3. Remove/Install the Roll Servo Clutch

Refer to Figure 2 (22-10-00 Page 4).

A. Equipment:

Item	Quantity	Part Number
Cable tension gauge.	1	Commercial

B. Remove the Roll Servo Clutch.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the roll servo.	Refer to Paragraph 2.
(2)	Release the clamps which connect the bridle cable to the aileron push-rod.	
(3)	Remove the cable guard.	
(4)	Remove the four screws which attach the clutch to the mounting plate.	Hold the clutch.
(5)	Remove the clutch from the airplane.	

C. Install the Roll Servo Clutch.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the pilot's seat or the co-pilot's seat.	Refer to Section 25-10. To give access for the rigging pin.
(2)	Put the clutch in place on the mounting plate.	
(3)	Install the four screws which attach the clutch to the mounting plate.	
(4)	Center the aileron control system with a rigging pin at one control stick.	Refer to Section 27-10.
(5)	Center the capstan.	The recess for the ball in the middle of the bridle cable must be in the upper most position.
(6)	Install bridle cable to capstan.	The ball in the middle of the bridle cable must engage in the recess on the capstan. Wrap the bridle cable around capstan 1.5 turns to each side.
(7)	Connect the ends of the bridle cable to the aileron push-rod with the clamps.	Tighten clamps lightly to allow adjustment. (see the next step)
(8)	Using a small plastic hammer, move the clamps along the push-rod to adjust the bridle cable tension.	Adjust tension to 156 ± 9 N (35 ± 2 lb). Measure cable tension with cable tension gauge.
(9)	Tighten the clamps.	
(10)	Install the cable guard.	
(11)	Remove the rigging pin from the control stick.	
(12)	Install the front seat which was removed.	Refer to Section 25-10.
(13)	Install the roll servo.	Refer to Paragraph 2.

4. Remove/Install the Pitch Servo

Refer to Figure 201.

A. Remove the Pitch Servo.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the trim/cover from the front face of the baggage compartment and remove the lower access panel from the baggage compartment insert.	
(2)	Dis-connect the connector from the servo.	
(3)	Remove the mounting screws (2 or 4) which attach the servo to the clutch.	Hold the servo.
(4)	Remove the servo from the airplane.	

B. Install the Pitch Servo.

	Detail Steps/Work Items	Key Items/References
(1)	Put the servo in place on the clutch.	
(2)	Install the mounting screws (2 or 4) which attach the servo to the clutch.	
(3)	Connect the connector to the servo.	
(4)	Do a test of the autopilot system: - Set ELECTRIC MASTER key switch to ON. - Set AVIONIC MASTER switch to ON. - Observe the self-test of the flight control computer. - Set AVIONIC MASTER switch to OFF. - Set ELECTRIC MASTER key switch to OFF.	If no error message appears, then the system is operative.
(5)	Install the baggage compartment lower access panel and install the trim/cover to the front face of the baggage compartment.	

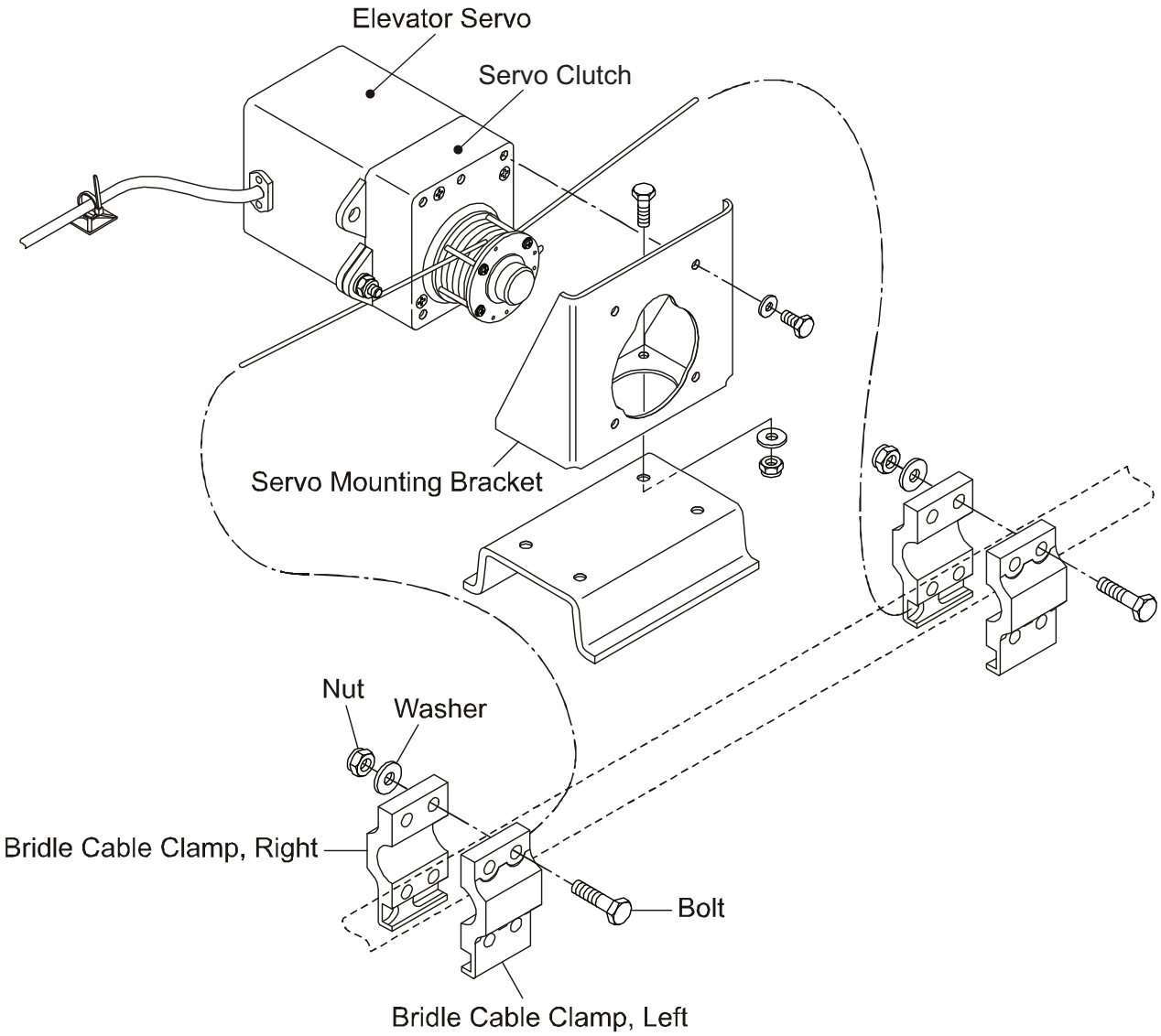

Figure 201 : Pitch Servo Installation

5. Remove/Install the Pitch Servo Clutch

Refer to Figure 201.

A. Equipment:

Item	Quantity	Part Number
Cable tension gauge.	1	Commercial

B. Remove the Pitch Servo Clutch.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the pitch servo.	Refer to Paragraph 4.
(2)	Release the clamps which connect the bridle cable to the elevator push-rod.	
(3)	Remove the cable guard.	
(4)	Remove the four screws which attach the clutch to the mounting plate.	Hold the clutch.
(5)	Remove the clutch from the airplane.	

C. Install the Pitch Servo Clutch.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the pilot's seat or the co-pilot's seat.	Refer to Section 25-10. To give access for the rigging pin.
(2)	Put the clutch in place on the mounting plate.	
(3)	Install the four screws which attach the clutch to the mounting plate.	
(4)	Center the elevator control system with a rigging pin at one control stick.	Refer to Section 27-30.
(5)	Center the capstan.	The recess for the ball in the middle of the bridle cable must be in the under most position.
(6)	Install bridle cable to capstan.	The ball in the middle of the bridle cable must engage in the recess on the capstan. Wrap the bridle cable around capstan 1.5 turns to each side.
(7)	Connect the ends of the bridle cable to the elevator push-rod with the clamps.	Tighten the clamps lightly to allow adjustment (see next step).
(8)	Using a small plastic hammer, move the clamps along the push-rod to adjust the bridle cable tension.	Adjust tension to 156 ± 9 N (35 ± 2 lb). Measure cable tension with the cable tension gauge.
(9)	Tighten the clamps.	
(10)	Install the cable guard.	
(11)	Remove the rigging pin from the control stick.	
(12)	Install the front seat which was removed.	Refer to Section 25-10.
(13)	Install the pitch servo.	Refer to Paragraph 4.

6. Remove/Install the Pitch Trim Servo

Refer to Figure 202.

A. Remove the Pitch Trim Servo.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the co-pilot's seat.	Refer to section 25-10.
(2)	Dis-connect the connector from the servo.	
(3)	Remove the mounting screws (2 or 4) which attach the servo to the clutch.	Hold the servo.
(4)	Remove the screw, washers and lock nut from the mounting brace.	Hold the servo.
(5)	Remove the servo from the airplane.	

B. Install the Pitch Trim Servo.

	Detail Steps/Work Items	Key Items/References
(1)	Put the servo in place on the clutch.	
(2)	Install the mounting screws (2 or 4) which attach the servo to the clutch.	
(4)	Install the screw, washers and lock nut to the mounting brace.	
(5)	Connect the connector to the servo.	
(6)	Do a test of the autopilot system: - Set ELECTRIC MASTER key switch to ON. - Set AVIONIC MASTER switch to ON. - Observe the self-test of the flight control computer. - Set AVIONIC MASTER switch to OFF. - Set ELECTRIC MASTER key switch to OFF.	If no error message appears, then the system is operative.
(7)	Install the co-pilot's seat.	Refer to Section 25-10.

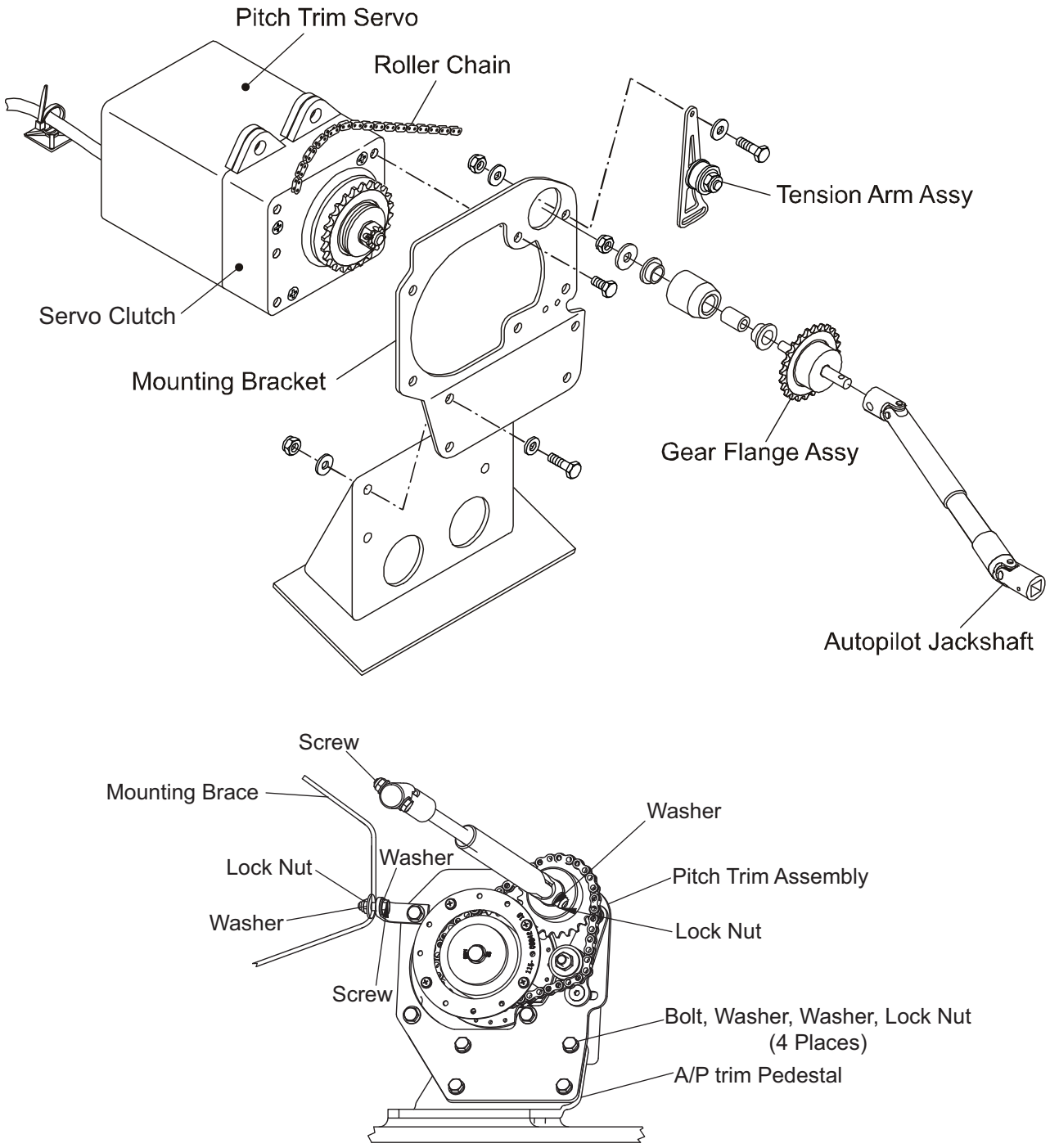

Figure 202 : Pitch Trim Servo Installation

7. Remove/Install the Pitch Trim Servo Clutch

Refer to Figure 202.

A. Remove the Pitch Trim Servo Clutch.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the pitch trim servo.	Refer to Paragraph 6.
(2)	Remove the screws which hold the cap to the capstan.	
(3)	Remove the cap from the capstan.	
(4)	Release chain tension with chain adjuster.	On the chain gear next to the servo.
(5)	Remove the chain from the chain gear.	
(6)	Remove the four screws which attach the clutch and the chain adjuster to the mounting plate.	Hold the clutch and the chain adjuster.

B. Install the Pitch Trim Servo Clutch.

	Detail Steps/Work Items	Key Items/References
(1)	Put the clutch and the chain adjuster in place on the mounting plate.	
(2)	Install the four screws which attach the clutch and the chain adjuster to the mounting plate.	
(3)	Install the chain to the chain gear.	
(4)	Put the cap in place on the capstan.	
(5)	Install the screws which hold the cap to the capstan.	
(6)	Install the pitch trim servo.	Refer to Paragraph 6.

8. Adjust the Bridle Cable Tensio of the Roll and Pitch |Servos

A. Equipment:

Item	Quantity	Part Number
Cable tension gauge.	1	Commercial

B. Adjustment Procedure.

	Detail Steps/Work Items	Key Items/References
(1)	Loosen the bolts in the clamps which connect the bridle cable to the push-rod.	Do not remove the bolts. Loosen just enough so that the next step can be done.
(2)	Using a small plastic hammer, move the clamps along the push-rod to adjust the bridle cable tension.	Adjust the tension to 156 ± 9 N (35 ± 2 lb) for the pitch and roll servos. Measure cable tension with the cable tension gauge.
(3)	Tighten the bolts in the clamps which connect the bridle cable to the push-rod.	

9. Adjust/Check the Servo Clutch Torques (with the GSM 85/85A Servo Clutch Installed

A. Equipment:

Item	Quantity	Part Number
Garmin slip-clutch fixture	1	T10-00110-01

B. Adjustment/Check Procedure.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the applicable clutch from the airplane.	Refer to this Section.
(2)	Clean the servo output gears.	
(3)	Install the clutch assembly on the Garmin slip clutch test stand.	Refer to the equipment manufacturers' documentation. Garmin GSA 8X/GSM 85, 85A Installation Manual # 190-00303-72
(4)	Measure clockwise (CW) and counter-clockwise (CCW) clutch torque, adjust if necessary.	Refer to the equipment manufacturers' documentation. The correct clutch torques are: Roll servo 4.52 ± 0.56 Nm (40 ± 5 lbf.in.) Pitch servo 5.08 ± 0.68 Nm (45 ± 6 lbf.in.) Pitch trim servo 4.07 ± 0.56 Nm (36 ± 5 lbf.in.
(5)	Remove the clutch assembly from the slip clutch test stand.	
(6)	Apply grease to the servo output gears.	
(7)	Install the clutch in the airplane.	Refer to this Section for the applicable clutch to install.

10. Adjust/Check the Servo Clutch Torques (MÄM 40-561 GSM 86 Servo Clutch Installed)

A. Equipment:

Item	Quantity	Part Number
Calibrated torque wrench with 7/32 in. hex tool	1	Commercial

B. Adjustment/Check Procedure.

	Detail Steps/Work Items	Key Items/References
(1)	On the ground, with the autopilot set OFF, make sure each control axis with an autopilot servo actuator (including secondary control axes) can be freely moved throughout its full range of travel.	
(2)	Remove the GSA 81 servo actuator from the flight control axis to be tested.	Keep the GSM 86 servo mount installed and attached to the associated aircraft control system.
	NOTE: Care should be taken around the exposed O-ring seals of the GSM 86 any time the GSA81 servo actuator is removed, to make sure that damage does not occur to the seals. O-ring seals are unprotected and loose while the GSA 81 is removed.	
(3)	Insert the hex tool into the recess on the exposed main shaft of the GSM 86.	Refer to Figure 203.
(4)	Determine slip clutch torque values. Preferred Method: - Install aircraft rigging pins for the flight control axis to be tested. - Apply a load to the control system by rotating the torque wrench with the hex tool in a smooth and controlled manner.	The aircraft control system is fixed during testing and should not move. Record the maximum value indicated by the torque wrench during motion. Do this test and record the values in each rotational direction.
	OR	
(5)	Determine slip clutch torque values. Alternate Method: - Firmly hold the torque wrench handle with the hex tool so that it cannot be moved when the control system moves. - Have an assistant operate the aircraft control system from the pilot station in a smooth and controlled manner.	Record the maximum value indicated by the torque wrench during motion. Do this test and record the values in each rotational direction.

	Detail Steps/Work Items	Key Items/References
(6)	The values recorded in steps 4 and 5 are the slip clutch torque slip values for both directions of overpower rotation.	Verify the recorded torque values are within the specified tolerance, reference Table 1 for the nominal specification and tolerance.
(7)	Install the GSA 81 servo removed back into the airplane.	Refer to this Section for the applicable servo to install.

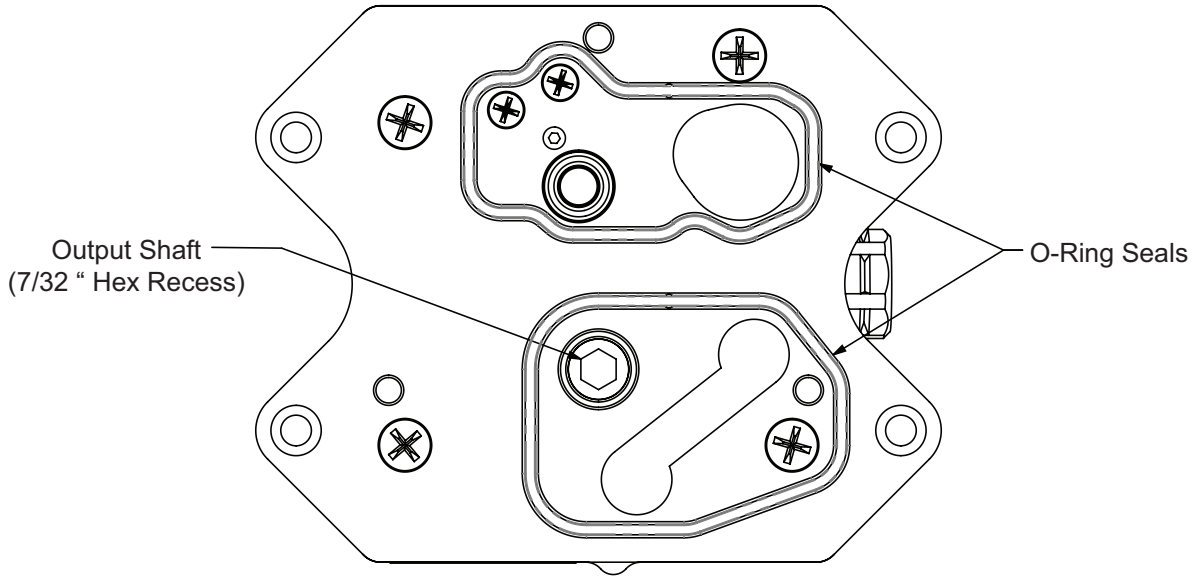

Figure 203 : GSM 86 Servo Gear Box/Clutch - Rear View

Slip-Clutch	Clutch Torque	Torque Tolerance
Roll Servo Clutch	4.40 ± 0.68 Nm (39 ± 6 lbf.in.)	± 15%
Pitch Servo Clutch	4.07 ± 0.56 Nm (36 ± 5 lbf.in.)	± 15%
Pitch Trim Servo Clutch	4.07 ± 0.56 Nm (36 ± 5 lbf.in.)	± 15%

Table 1 : Torque Specifications

11. Mechanical Check of the Autopilot System (if MÄM 40-561 (GSM 86 Servo Mounts) **is not installed**)

Do this check at the intervals given in Section 05-10.

	Detail Steps/Work Items	Key Items/References
(1)	Check bridle cable tension for the roll servo, adjust if necessary.	Refer to this Section.
(2)	Check bridle cable tension for the pitch servo, adjust if necessary.	Refer to this Section.
(3)	Check the clutch torque settings for the roll servo, adjust if necessary.	Refer to this Section.
(4)	Check the clutch torque settings for the pitch servo, adjust if necessary.	Refer to this Section.
(5)	Check the clutch torque settings for the pitch trim servo, adjust if necessary.	Refer to this Section.

12. Mechanical Check of the Autopilot System (if MÄM 40-561 (GSM 86 Servo Mounts) **is installed**)

Do this check at the intervals given in Section 05-10.

	Detail Steps/Work Items	Key Items/References
(1)	Check bridle cable tension for the roll servo, adjust if necessary.	Refer to this Section.
(2)	Check bridle cable tension for the pitch servo, adjust if necessary.	Refer to this Section.
(3)	Perform a slip clutch override procedure.	Refer to this Section.

13. Slip Clutch Override Procedure

	Detail Steps/Work Items	Key Items/References
(1)	With the autopilot disengaged, check freedom of control movement in all control axes, including pitch trim.	
(2)	Power up the Garmin G1000 in Configuration Mode.	Refer to G1000 System Maintenance Manual, latest revision.
(3)	Navigate to the second of the GFC pages.	
(4)	Engage the pitch servo: - Select the ENG CLCH soft-key. - Set the DRIVE SERVO speed to zero. - Select the DRV SRVO soft-key.	
(5)	Manually override the servo actuator slip clutch by moving the control stick forward and back through its range of motion.	The control should move with some resistance through its range of motion.
(6)	Verify the servo motor does not turn by viewing the SPEED in the SERVO DATA area of the screen.	The motor of the servo actuator should remain stationary.
(7)	Disengage the pitch servo: - Select the STP SRVO soft-key. - Select the DIS CLCH soft-key.	Verify freedom of movement of the pitch axis.
(8)	Repeat steps 4 to 7 for each axis including pitch trim.	

AUTOPILOT, KAP 140

NOTE: The information contained in this Section refers to airplanes with an optional autopilot installed.

1. General

This Section tells you about the KAP 140 autopilot system which may be installed in the DA 40 NG.

2. Description

The KAP 140 autopilot system is a digital flight control system that provides roll, pitch, and pitch trim steering with altitude preselect. The system has the following components (refer to Figure 1):

- KC 140 flight control computer (FCC).
- KCM 100 configuration module.
- Turn co-ordinator with autopilot pick-off.
- KS 271C roll servo.
- KS 270C pitch servo.
- KS 272C pitch trim servo.
- KM 275 and KM 277 servo mounts.
- Coupling to the Garmin G1000 integrated cockpit system (ICS).

Heading input is supplied for the KAP 140 autopilot by the Garmin G1000 integrated cockpit system (ICS). Refer to Section 31-40 for more data about the ICS.

The KAP 140 roll axis features includes wing leveler, heading select, and VOR/LOC intercept and tracking. The KAP 140 is also coupled to the ICS for navigation information. Roll rate information is derived from the turn coordinator.

Pitch axis features include vertical speed, glideslope and altitude hold along with the optional altitude preselect. Pitch information is derived from a pressure sensor and accelerometer. Internal monitors keep constant track of the KAP 140's status and provide for automatic shutdown of the autopilot or trim system in the event of a malfunction.

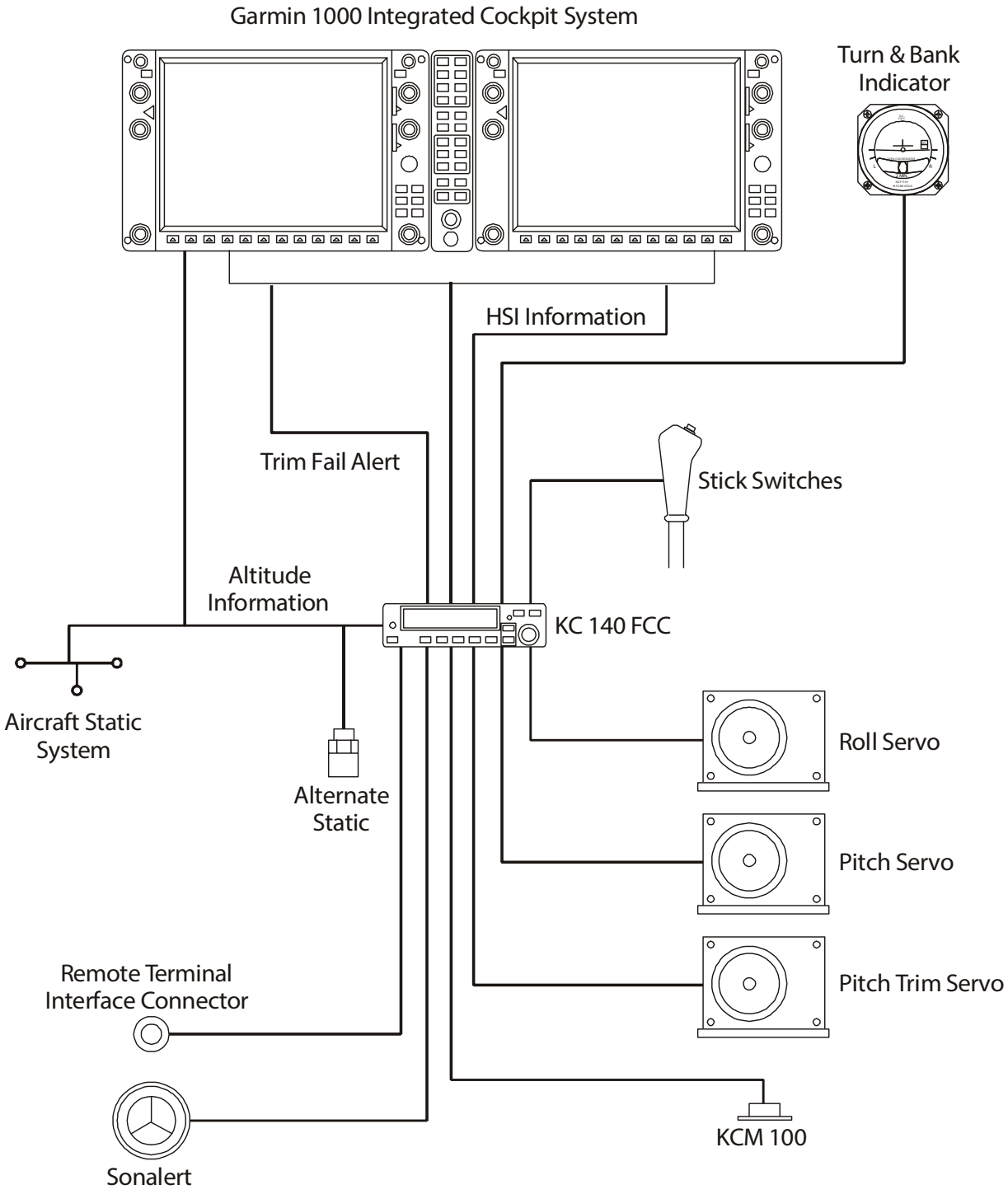

Figure 1 : Autopilot System Schematic Diagram

A. Bendix/King KAP 140 Flight Control Computer

Figure 2 shows the Bendix/King KAP 140 flight control computer. It is located in the instrument panel, at the bottom.

The Bendix/King KAP 140 has the following annunciators on the front panel, above the AP button:

- P (pitch axis) annunciator. It indicates failure of the pitch axis and will either disengage the autopilot or does not allow engagement of the pitch axis. The P annunciator may illuminate with the autopilot disengaged. This condition can occur during maneuvering flight when g-thresholds are exceeded. The autopilot monitor will not allow engagement during illumination.

- R (roll axis) annunciator. It indicates failure of the roll axis and will disengage the autopilot or does not allow engagement.

The Bendix/King KAP 140 controls the following annunciator on the ICS alerts panel (also see Section 31-40):

TRIM FAIL annunciator. It illuminates whenever the automated pre-flight self test detects a pitch trim fault or a continuous monitoring system detects a pitch trim fault in flight.

The Bendix/King KAP 140 has a display which shows the following:

Pitch and roll mode displays. Displays the active pitch modes (VS, ALT, ARM, ALT, GS ARM, GS) and roll modes (ROL, HDG, NAV ARM, NAV, APR ARM, APR, REV ARM, REV). Also displayed will be a flashing AP annunciation (5 seconds) at each autopilot disconnect, accompanied by an aural alert (for 2 seconds).

PT (pitch trim) annunciation. It indicates the direction of required pitch trim. With electric trim installed, the annunciation simply provides status to the autopilot request for auto trim. A solid indication represents the lowest demand level for trim, whereas a flashing annunciation implies a greater demand. A solid PT annunciation without an arrow head is an indication of a pitch trim fault. During MET operation, this annunciation can be caused by a stuck MET switch. If the stuck switch fault clears, trim operation will resume.

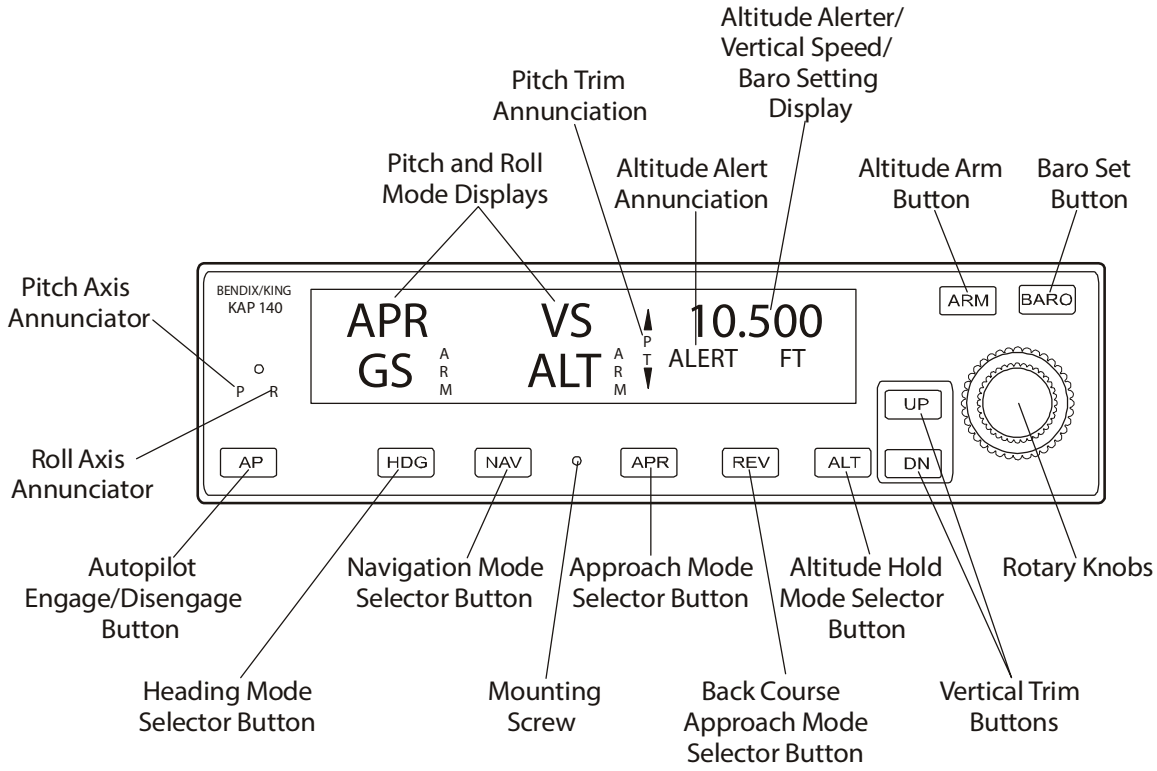

Figure 2 : Bendix/King KAP 140 Flight Control Computer

ALERT (altitude alert) annunciation. This annunciation is used when the altitude preselect option is installed.

- It illuminates continuously in the region of from 200 to 1000 feet from the selected altitude if the airplane was previously outside of this region.
- It flashes for two seconds the first time the airplane crossed the selected altitude.
- If flashes continuously in the 200 to 1000 feet region if the airplane was previously inside of this region (i.e., at the selected altitude). Associated with the visual alerting is an aural alert (5 short tones) which occurs 1000 feet from the selected altitude upon approaching the altitude and 200 feet from the selected altitude on leaving the altitude.
- Altitude alert/vertical speed/baro setting display. This feature is used only if the altitude preselect option is installed. Normally the altitude alerter selected altitude is displayed. If the UP or DN button is pushed while in VS hold, the display changes to the command reference for the VS mode in FPM for 3 seconds. If the BARO button is pushed, the display changes to the autopilot baro setting in either IN HG or HPA for 3 seconds.

The flight control computer has these controls on the front panel:

- Rotary knobs. These are used to set the altitude alert reference altitude; or may be used immediately after pressing the BARO button, to adjust the autopilot baro setting to match that of the airplane’s altimeter when manual adjustment is required.
- AP (autopilot engage/disengage) button. When pushed, it engages the autopilot if all logic conditions are met. The autopilot will engage in the basic roll (ROL) mode which functions as a wing leveler and in the vertical speed (VS) hold mode. The commanded vertical speed may be displayed manually in the upper right corner of autopilot display area if either UP or DN button is pressed. The captured VS will be the vertical speed present at the moment of AP button press. When pressed again, it will disengage the autopilot.
- HDG (heading) mode selector button. When pushed, it will select the 'heading' mode, which commands the airplane to turn to and maintain the heading selected by the heading bug on the HSI. A new heading may be selected at any time and will result in the airplane turning to the new heading. The button can also be used to toggle between HDG and ROL modes. This button may be used to engage the autopilot.
- NAV (navigation) mode selector button. When pushed, will select the navigation mode. The mode provides automatic beam capture and tracking of VOR, LOC or GPS as selected for presentation on the HSI. NAV mode is recommended for enroute navigation tracking.
- APR (approach) mode selector button. When pushed, it will select the navigation mode. The mode provides automatic beam capture and tracking of VOR, GPS, LOC, and glideslope (GS) on an ILS, as selected for presentation on the ICS. APR mode tracking sensitivity is recommended for instrument approaches.
- REV (back course approach) mode selector button. When pushed, it will select the back course approach mode. This mode functions identically to the approach mode except that the autopilot response to LOC signals is reversed.

- ALT (altitude hold) mode select button. When pushed, it will select the altitude hold mode. This mode provides capture and tracking of the selected altitude. The selected altitude is the altitude at the moment the ALT button is pressed. If the ALT button is pressed with an established VS rate present, there will be approximately a 10% (of VS rate) overshoot, with the airplane returned positively to the selected altitude. This button may be used to engage the autopilot.

- UP/DN (vertical trim) buttons. The action of these buttons is dependent upon the vertical mode present when pressed. If VS mode is active, the initial button stroke will bring up the commanded vertical speed in the display. Subsequent immediate button strokes will increment the vertical commanded either up or down at the rate of 100 ft/min per button press, or at the rate of approximately 300 ft/min per second if pressed continuously. If the ALT mode is active, incremental button strokes will move the altitude hold reference altitude either up or down by 20 feet per press, or if held continuously will command the airplane up or down at the rate of 500 ft/min, synchronizing the altitude hold reference to the actual airplane altitude upon button release. (Note that the altitude hold reference is not displayed. The display will continue to show the altitude alert reference.)

- ARM (altitude arm) button (only if altitude preselect option is installed). It toggles altitude arming on or off. When ALT ARM is annunciated, the autopilot will capture the altitude alert displayed altitude (provided the airplane is climbing or descending in VS to the displayed altitude). ALT hold arming when the autopilot is engaged is automatic upon altitude alert altitude selection via the rotary knobs. Note that the alert functions are independent of the arming process, thus providing ful time alerting, even when the autopilot is disengaged.

- BARO (baro set) button. When pushed and released, it will change the display from the altitude alert selected altitude to the baro setting display (either IN HG or HPA) for 3 seconds. If pushed and held for 2 seconds, it will change the baro setting display from IN HG to HPA or vice versa. Once the baro setting display is visible, the rotary knobs may be used to manually adjust the baro setting if the system configuration does not employ automatic correction.

The flight control computer is connected to these controls on the control sticks:

- AP DISC (autopilot disconnect) switch on pilot’s and co-pilot’s stick. When pressed, it will disengage the autopilot, and interrupt electric trim power.

- Manual electric trim switches on the pilot’s stick. When both switches are pressed in the same direction, they will activate pitch trim in the selected direction. If only one switch is moved, the trim system will not operate. If one switch fails or is moved and held for 3 seconds, the trim monitoring system will detect a switch failure resulting in a PT annunciation on the autopilot display and the disabling of the electric trim system. Autopilot power will have to be cycled to clear the fault. Use of manual electric trim during autopilot operation will disengage the autopilot.

- CWS (control wheel steering) mode button on the pilot’s stick. When pressed and held, it disengages the pitch, roll and pitch trim clutches allowing the pilot to maneuver the airplane by hand. Pressing the CWS button will also sync the autopilot ALT or VS commands to the actual altitude or vertical speed present at the time the button is released

B. KCM 100 Configuration Module

The data which is specific to the DA 40 NG (for example: gain settings) is stored in the KCM 100 configuration module. It is located on the instrument panel floor, between the instrument panel and the instrument panel frame.

C. KS 271C Roll Servo

The roll servo is located behind the rear main bulkhead on the right side. It is mounted on a mounting plate which is made from sheet aluminum. Two aluminum clamps connect a bridle cable to the aileron push-rod.

D. KS 270C Pitch Servo

The pitch servo is located aft of the baggage compartment frame. It is mounted on a mounting plate which is made from sheet aluminum. Two aluminum clamps connect a bridle cable to the elevator push-rod.

E. KS 272C Pitch Trim Servo

The pitch trim servo is located under the co-pilot's seat. It is mounted on a mounting plate which is made from sheet aluminum and mounting bracket which is made from GFRP. Servo movement is transmitted to the trim wheel through a chain gear on the servo, a cardanshaft, and a chain gear next to the trim wheel on the right side.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to install the components of the autopilot system. They also tell you how to test and adjust the autopilot system.

2. Remove/Install the Flight Control Computer

A. Remove the Flight Control Computer.

	Detail Steps/Work Items	Key Items/References
(1)	Open the AUTOPILOT circuit-breaker.	
(2)	Put a 3/32 Allen wrench into the access hole for the locking screw. Engage the screw.	
(3)	Turn the screw counter-clockwise until the unit disengages from the mounting rack.	
CAUTION: DO NOT PULL ON THE KNOBS. DO NOT PRY THE FACE-PLATE. IF YOU PULL ON THE KNOBS, OR PRY THE FACE- PLATE, YOU CAN DAMAGE THE UNIT. CAUTION: DO NOT TOUCH THE CONNECTOR CARD AT THE REAR OF THE UNIT. THE ELECTROSTATIC CHARGE ON YOUR BODY CAN DAMAGE THE UNIT.		
(4)	Pull gently on the sides of the unit to remove it from the mounting rack.	
(5)	Install the protective covers on the rear connectors of the flight control computer.	

B. Install the Flight Control Computer.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the protective covers from the connectors on the replacement unit.	
(2)	Slide the unit into the rack. Engage the locking screw so that the latch front-lobe touches the rack.	
(3)	Turn the locking screw clockwise so that the rear lobe engages the mounting rack.	
	CAUTION: DO NOT OVER-TIGHTEN THE LOCKING SCREW. YOU CAN DAMAGE THE LOCKING MECHANISM.	
(4)	Continue to turn the screw until the unit is fully installed in the mounting rack.	
(5)	Close the AUTOPILOT circuit-breaker.	
(6)	Check and adjust the servo nulls.	Refer to the Installation Manual for the KAP 140 Flight Control System.
(7)	Do a test of the autopilot system: - Set the ELECTRIC MASTER key switch to ON. - Set AVIONIC MASTER switch to ON. - Observe self-test of the flight control computer. - Set AVIONIC MASTER to OFF. - Set ELECTRIC MASTER key switch to OFF.	If no error message appears, then the system is operative.

3. Remove/Install the KCM 100 Configuration Module

A. Remove the KCM 100 Configuration Module.

	Detail Steps/Work Items	Key Items/References
(1)	Open the AUTOPILOT circuit-breaker.	Instrument panel, right side.
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Remove the KCM 100: - Remove the two screws that attach the KCM 100 to the instrument panel floor. - Disconnect the electric cable. - Move the configuration module free of the instrument panel.	

B. Install the KCM 100 Configuration Module.

	Detail Steps/Work Items	Key Items/References
	CAUTION: WHEN A NEW CONFIGURATION MODULE IS INSTALLED, YOU MUST MAKE SURE THAT IT HAS THE PART NUMBER WHICH IS SHOWN IN THE EQUIPMENT LIST IN CHAPTER 6 OF THE AIRPLANE FLIGHT MANUAL. THE CONFIGURATION MODULE CONTAINS INFORMATION WHICH IS SPECIFIC FOR THE DA 40 NG AIRPLANE.	
(1)	Slide the KCM 100 into position. Connect the electric cable and engage the two locking screws.	
(2)	Install the instrument panel cover.	Refer to Section 25-10.
(3)	Close the AUTOPILOT circuit-breaker.	Instrument panel, right side.
(4)	Upload the software.	
(5)	Check and adjust the servo nulls.	Refer to the Installation Manual for the KAP 140 Flight Control System.
(6)	Do a test of the autopilot system: - Set the ELECTRIC MASTER key switch to ON. - Set AVIONIC MASTER switch to ON. - Observe self-test of the flight control computer. - Set AVIONIC MASTER to OFF. - Set ELECTRIC MASTER key switch to OFF.	If no error message appears, then the system is operative.

4. Remove/Install the Roll Servo

A. Remove the Roll Servo.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the passenger seats.	Refer to Section 25-10.
(2)	Dis-connect the connector from the servo.	
(3)	Remove the two screws which attach the servo to the mounting plate and clutch.	Hold the servo.
(4)	Remove the servo from the airplane.	

B. Install the Roll Servo.

	Detail Steps/Work Items	Key Items/References
(1)	Put the servo in place on the mounting plate.	
(2)	Install the two screws which attach the servo to the mounting plate and clutch.	
(3)	Connect the connector to the servo.	
(4)	Do a test of the autopilot system: - Set ELECTRIC MASTER key switch to ON. - Set AVIONIC MASTER switch to ON. - Observe the self-test of the flight control computer. - Set AVIONIC MASTER switch to OFF. - Set ELECTRIC MASTER key switch to OFF.	If no error message appears, then the system is operative.
(5)	Install the passengers' seat.	Refer to Section 25-10.

5. Remove/Install the Roll Servo Clutch

A. Equipment :

Item	Quantity	Part Number
Cable tension gauge.	1	Commercial

B. Remove the Roll Servo Clutch .

	Detail Steps/Work Items	Key Items/References
(1)	Remove the roll servo.	Refer to Paragraph 4.A.
(2)	Release the clamps which connect the bridle cable to the aileron push-rod.	
(3)	Remove the cable guard.	
(4)	Remove the two screws which attach the clutch to the mounting plate.	Hold the clutch.
(5)	Remove the clutch from the airplane.	

C. Install the Roll Servo Clutch.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the pilot's seat or the co-pilot's seat.	Refer to Section 25-10. To give access for the rigging pin.
(2)	Put the clutch in place on the mounting plate.	
(3)	Install the two screws which attach the clutch to the mounting plate.	
(4)	Center the aileron control system with a rigging pin at one control stick.	Refer to Section 27-10.
(5)	Center the capstan.	The recess for the ball in the middle of the bridle cable must be in the uppermost position.
(6)	Install bridle cable to capstan.	The ball in the middle of the bridle cable must engage in the recess on the capstan. Wrap the bridle cable around the capstan one turn to each side.
(7)	Connect the ends of the bridle cable to the aileron push-rod with the clamps.	Tighten clamps lightly to allow adjustment. (see the next step)
(8)	Using a small plastic hammer, move the clamps along the push-rod to adjust the bridle cable tension.	Adjust tension to 89 ± 22 N (20 ± 5lbf). Measure cable tension with the cable tension gauge.
(9)	Tighten the clamps.	
(10)	Remove the rigging pin from the control stick.	
(11)	Install the front seat which was removed.	Refer to Section 25-10.
(12)	Install the roll servo.	Refer to Paragraph 4.B.

6. Remove/Install the Pitch Servo

A. Remove the Pitch Servo.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the trim/cover from the front face of the baggage compartment and remove the lower access panel from the baggage compartment insert.	
(2)	Dis-connect the connector from the servo.	
(3)	Remove the two screws which attach the servo to the mounting plate and clutch.	Hold the servo.
(4)	Remove the servo from the airplane.	

B. Install the Pitch Servo.

	Detail Steps/Work Items	Key Items/References
(1)	Put the servo in place on the mounting plate.	
(2)	Install the two screws which attach the servo to the mounting plate and clutch.	
(3)	Connect the connector to the servo.	
(4)	Do a test of the autopilot system: - Set ELECTRIC MASTER key switch to ON. - Set AVIONIC MASTER switch to ON. - Observe the self-test of the flight control computer. - Set AVIONIC MASTER switch to OFF. - Set ELECTRIC MASTER key switch to OFF.	If no error message appears, then the system is operative.
(5)	Install the baggage compartment lower access panel and install the trim/cover to the front face of the baggage compartment.	

7. Remove/Install the Pitch Servo Clutch

A. Equipment :

Item	Quantity	Part Number
Cable tension gauge.	1	Commercial

B. Remove the Pitch Servo Clutch .

	Detail Steps/Work Items	Key Items/References
(1)	Remove the pitch servo.	Refer to Paragraph 6.A.
(2)	Release the clamps which connect the bridle cable to the elevator push-rod.	
(3)	Remove the cable guard.	
(4)	Remove the two screws which attach the clutch to the mounting plate.	Hold the clutch.
(5)	Remove the clutch from the airplane.	

C. Install the Pitch Servo Clutch.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the pilot's seat or the co-pilot's seat.	Refer to Section 25-10. To give access for the rigging pin.
(2)	Put the clutch in place on the mounting plate.	
(3)	Install the two screws which attach the clutch to the mounting plate.	
(4)	Center the elevator control system with a rigging pin at one control stick.	Refer to Section 27-30.
(5)	Center the capstan.	The recess for the ball in the middle of the bridle cable must be in the uppermost position.
(6)	Install bridle cable to the capstan.	The ball in the middle of the bridle cable must engage in the recess on the capstan. Wrap the bridle cable around capstan one turn to each side.
(7)	Connect the ends of the bridle cable to the elevator push-rod with the clamps.	Tighten the clamps lightly to allow adjustment (see next step).
(8)	Using a small plastic hammer, move the clamps along the push-rod to adjust the bridle cable tension.	Adjust tension to 89 ± 22 (20 ± 5 lbf). Measure cable tension with the cable tension gauge.
(9)	Tighten the clamps.	
(10)	Remove the rigging pin from the control stick.	
(11)	Install the front seat which was removed.	Refer to Section 25-10.
(12)	Install the pitch servo.	Refer to Paragraph 6.B.

8. Remove/Install the Pitch Trim Servo

A. Remove the Pitch Trim Servo.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the co-pilot's seat.	Refer to section 25-10.
(2)	Dis-connect the connector from the servo.	
(3)	Remove the two screws which attach the servo to the mounting plate and clutch.	Hold the servo.
(4)	Remove the servo from the airplane.	

B. Install the Pitch Trim Servo.

	Detail Steps/Work Items	Key Items/References
(1)	Put the servo in place on the mounting plate.	
(2)	Install the two screws which attach the servo to the mounting plate and clutch.	The upper forward screw also holds the chain adjuster. Make sure of proper chain tension.
(3)	Connect the connector to the servo.	
(4)	Do a test of the autopilot system: - Set ELECTRIC MASTER key switch to ON. - Set AVIONIC MASTER switch to ON. - Observe the self-test of the flight control computer. - Set AVIONIC MASTER switch to OFF. - Set ELECTRIC MASTER key switch to OFF.	If no error message appears, then the system is operative.
(5)	Install the co-pilot's seat.	Refer to Section 25-10.

9. Remove/Install the Pitch Trim Servo Clutch

A. Remove the Pitch Trim Servo Clutch.

	Detail Steps/Work Items	Key Items/References
	CAUTION: DO NOT APPLY STRONG FORCES TO THE CARDAN SHAFT. THE UPPER CARDAN JOINT CONNECTS TO A PART WHICH IS WEAK BY DESIGN TO GIVE OCCUPANT PROTECTION IN AN EMERGENCY LANDING.	
(1)	Remove the pitch trim servo.	Refer to Paragraph 8.A.
(2)	Remove the screws which hold the cap to the capstan.	
(3)	Remove the cap from the capstan.	
(4)	Release chain tension with the chain adjuster.	On the chain gear next to the servo.
(5)	Remove the chain from the chain gear.	
(6)	Remove the two screws which attach the clutch and the chain adjuster to the mounting plate.	Hold the clutch and the chain adjuster.

B. Install the Pitch Trim Servo Clutch.

	Detail Steps/Work Items	Key Items/References
(1)	Put the clutch and the chain adjuster in place on the mounting plate.	
(2)	Install the two screws which attach the clutch and the chain adjuster to the mounting plate.	
(3)	Install the chain to the chain gear.	
(4)	Put the cap in place on the capstan.	
(5)	Install the screw which holds the cap to the capstan.	
(6)	Install the pitch trim servo.	Refer to Paragraph 8.B.

10. Adjust the Bridle Cable Tension

A. Equipment :

Item	Quantity	Part Number
Cable tension gauge.	1	Commercial

B. Adjustment Procedure.

	Detail Steps/Work Items	Key Items/References
(1)	Loosen the bolts in the clamps which connect the bridle cable to the push-rod.	Do not remove the bolts. Loosen just enough so that the next step can be done.
(2)	Using a small plastic hammer, move the clamps along the push-rod to adjust the bridle cable tension.	Adjust the tension to 89 ± 22 N (20 ± 5lbf). Measure cable tension with the cable tension gauge.
(3)	Tighten the bolts in the clamps which connect the bridle cable to the push-rod.	

11. Adjust the Servo Clutch Torques

A. Equipment :

Item	Quantity	Part Number
Goodrich slip clutch test stand	1	20-9855-03

B. Adjustment/Check Procedure.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the clutch from the airplane.	Refer to this Section.
(2)	Install the clutch assembly on the slip clutch test stand.	Refer to the equipment manufacturers' documentation.
(3)	Measure clockwise (CW) and counter-clockwise (CCW) the clutch torque, adjust if necessary.	Refer to the equipment manufacturers' documentation. The correct clutch torques are: Roll servo 2.03 ± 0.23 Nm (18 ± 2 lbf.in.) Pitch servo 3.39 ± 0.34 Nm (30 ± 3 lbf.in.) Pitch trim servo 4.07 ± 0.45 Nm (36 ± 4lbf.in.)
(4)	Remove the clutch assembly from the slip clutch test stand.	
(5)	Install the clutch in the airplane.	Refer to this Section.

12. Mechanical Test of the Autopilot

Do this check at the intervals given in Section 05-10. .

	Detail Steps/Work Items	Key Items/References
(1)	Check bridle cable tension for the roll servo, adjust if necessary.	Refer to this Section.
(2)	Check bridle cable tension for the pitch servo, adjust if necessary.	Refer to this Section.
(3)	Check the clutch torque settings for the roll servo, adjust if necessary.	Refer to this Section.
(4)	Check the clutch torque settings for the pitch servo, adjust if necessary.	Refer to this Section.
(5)	Check the clutch torque settings for the pitch trim servo, adjust if necessary.	Refer to this Section.
(6)	Perform Pitot and Static System Leak Tests.	Refer to section 34-10.

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CHAPTER 23
COMMUNICATIONS

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COMMUNICATIONS

1. General

This Chapter tells you about the communications system in the DA 40 NG. This Section tells you about the intercom system which lets the pilots and passengers talk to each other. It also tells you about the radio system which lets the pilots talk to the ground and other airplane.

This Chapter does not tell you about the communications equipment. Refer to the equipment manufacturers' manual for data about the equipment. Refer to Chapter 92 for the wiring diagrams.

NOTE: Equipment which is certified for installation in the DA 40 NG is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

2. Description

A. Communication System if G1000 System Is Installed

The DA 40 NG communication system can have these components:

- GMA 1347 audio panel.
- NAV/COM transceivers (integral with the Garmin GIA 6X integrated avionics units).
- COM VHF antennas.
- NAV antenna (integral with the horizontal stabilizer).
- Push-to-talk (PTT) switches. A PTT switch is located in each of the pilots control sticks.
- Head-set-sockets. Head-set-sockets are located on the back of the center console for both the pilots and the passengers.
- Cabin speaker. A cabin speaker is mounted in the roof of the cockpit.

B. Communication System if Conventional Cockpit Is Installed

The DA 40 NG communication system can have these components:

- NAV/COM transceiver.
- Intercom system.
- COM VHF antenna.
- NAV (VOR/LOC/GS) antenna.
- Push-to-talk (PTT) switches. A PTT switch is located on each of the pilots' control sticks.
- Head-set-sockets. Head-set-sockets are located on the back of the center console for both the pilots and the passengers.
- Cabin speaker. The cabin speaker is located in the roof of the cockpit.

SPEECH COMMUNICATIONS

WITH G1000 SYSTEM INSTALLED

1. General

This Section tells you about the speech communication system in the DA 40 NG. It does not tell you about the speech communication equipment. Refer to the equipment manufacturers' manuals for more data about the equipment.

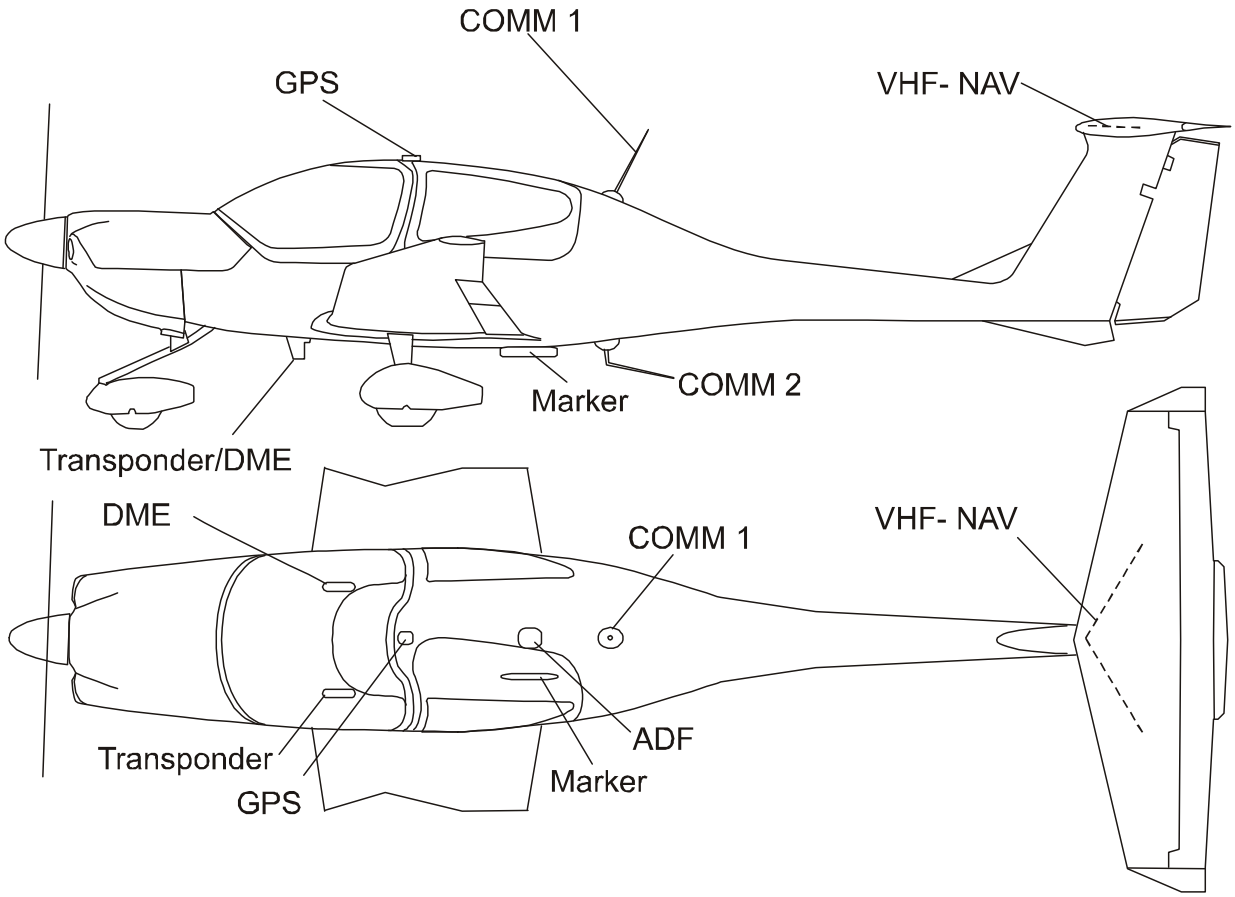

Figure 1 : Antenna Locations

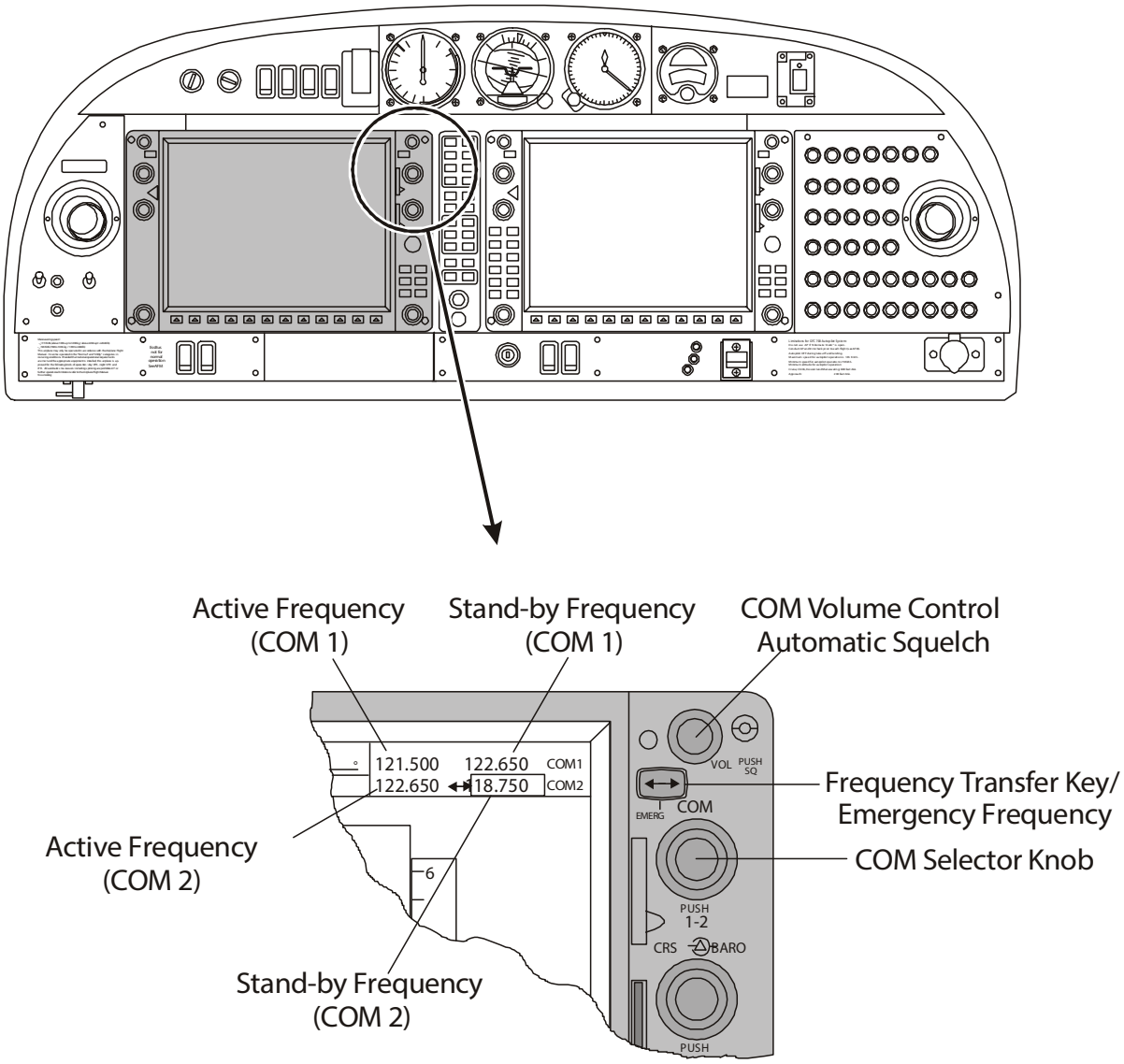

Figure 2 : Garmin G1000 Primary Flight Display Panel

2. Description

The DA 40 NG has dual VHF radio communications transceivers (COM 1 and COM 2) which are integral with the GIA 6X integrated avionics units. The No.1 GIA 6X and No.2 GIA 6X units are remotely located in the aft fuselage avionics rack. The COM 1 antenna is located on the upper surface of the fuselage, aft of the cockpit. The COM 2 antenna is located on the lower surface of the fuselage, aft of the cockpit. Refer to Section 31-40 for more data about the Garmin 1000 ICS.

Figure 2 shows the Garmin 1000 primary flight display (PFD). The speech communication system is integral with the Garmin 1000 integrated cockpit system (ICS). Power is supplied to the dual VHF communications transceivers when the ICS is switched on. The COM selector knob is located at the top-right corner of each ICS display panel. A digital display in the top right corner of the primary flight display (PFD) screen shows which COM system and frequency is in use.

Both the active and stand-by frequencies are shown for both COM 1 and COM 2 systems. Pushing the inner knob of the COM selector will toggle the active COM system between COM 1 and COM 2. Push the COM FREQUENCY TRANSFER key to toggle between the active and standby frequency of the selected communication system. A box is displayed around the stand by frequency.

Pressing and holding the COM FREQUENCY TRANSFER key for approximately 2 seconds will over-ride all previous selections and select the EMERGENCY COM frequency of 121.5 MHz.

You can only change the frequency that is currently selected as the stand by frequency. You must rotate the large outer COM selector knob to select the MHz value of the frequency and rotate the small inner knob of the COM selector to select the KHz value of the frequency.

Above the COM knob is the VOL knob. You control the volume level of the active radio receiver with the VOL knob. Press the knob to toggle the ON/OFF selection of the automatic squelch control.

The pilots use the audio control panel to control all the audio systems of the DA 40 NG. Both speech and navigational audio can be sent to the pilots or passengers headphones. Or can be played on the cockpit loudspeaker. Refer to Section 23-50 for more data about the audio control unit.

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TROUBLE-SHOOTING

1. General

This table tells you how to trouble-shoot the speech communication system. See Section 23-50 for trouble-shooting the audio integrating system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column..

Trouble	Possible Cause	Repair
Radio check reports readability good, strength poor due to low modulation on COM 1/COM 2.	Mic. output low. Faulty related GIA 6X IAU.	Replace the defective mic. Replace the related GIA 6X IAU.
Radio check reports readability poor, strength good.	Faulty related GIA 6X IAU. Faulty mic.	Replace the related GIA 6X IAU. Replace the mic.
Radio check reports readability poor, strength poor on COM 1/COM 2 Received audio is poor.	Co-ax connector faulty. Faulty related GIA 6X IAU. Faulty antenna.	Examine the co-ax and connections for condition and security. Replace the related GIA 6X IAU. Replace the antenna.
Short range in transmit mode, but reception is OK, COM 1/COM 2.	Faulty related GIA 6X IAU.	Replace the related GIA 6X IAU.
No voice modulation when transmitting from one pilots side. The other pilots side OK.	Audio integrating fault. Related head-set defective.	Refer to Section 23-50. Replace related head-set.
Cannot transmit. Transmit annunciator not shown in COM display.	Faulty PTT switch. PTT wiring circuit defective. Faulty related GIA 6X IAU.	Replace PTT switch. Do a test of the PTT wiring circuit. Refer to Chapter 92 for the wiring diagrams. Replace the related GIA 6X IAU.
Air enters cockpit through speaker.	Speaker membrane broken.	Replace speaker.

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MAINTENANCE PRACTICES

1. General

This Section tells you how to replace the main components of the speech communication system. Refer to the equipment manufacturers' manuals for more data about the equipment. The communications transceivers are integral with the GIA 6X integrated avionics units (IAU). Refer to Section 31-40 for data about replacing the GIA 6X IAUs.

2. Remove/Install a COM VHF Antenna

Use this procedure for both COM 1 and COM 2 antennas.
Access to both the antennas is through the rear baggage compartment.

A. Remove a COM VHF Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Remove the aft baggage compartment.	Refer to Section 25-10.
(2)	Identify the antenna that you will replace.	Lower antenna COM 2, top antenna COM 1.
(3)	Disconnect the co-axial cable from the antenna.	At the bayonet connector.
(4)	Remove the antenna: - Remove the 3 nuts and washers that attach the antenna to the airplane structure. - Move the antenna clear of the airplane.	If necessary, cut the sealant around the base of the antenna. You must not damage the fuselage skin.

B. Install a COM VHF Antenna.

	Detail Steps/Work Items	Key Items/References
(1)	Carefully remove any sealant from the area where the antenna attaches to the fuselage.	Take care not to damage the fuselage. If necessary, use a commercial solvent.
(2)	Install the antenna: - Move the antenna into position on the fuselage. - Make sure that the bonding strip for the antenna is correctly located. - Install the 3 washers and nuts that attach the antenna to the fuselage.	
(3)	Connect the co-axial cable to the antenna.	At the bayonet connector.
(4)	Do a test for the correct operation of the related speech communications system.	Refer to the Airplane Flight Manual.
(5)	Install the aft baggage compartment.	Refer to Section 25-10.
(6)	Seal the outer edge of the antenna to the fuselage skin with sealant.	Use Terostat MS 9380 or equivalent. Follow the sealant manufacturer’s instructions.

3. Remove/Install a Press to Talk (PTT) Switch

A. Remove a PTT Switch.

	Detail Steps/Work Items	Key Items/References
(1)	Set the ELECTRIC MASTER key switch to OFF.	Instrument panel, center.
(2)	Open the AUDIO circuit breaker.	Instrument panel, right side.
(3)	Remove the PTT switch: - Leverage the switch with a small screwdriver out of the stick's bar end. - Disconnect the electrical cable from the switch and move the switch clear of the pilot's compartment.	Handle with care. You must not damage the bar end.
(4)	Remove the electrical cable, if necessary: - Remove the appropriate pilot's seat. - Unplug the cable. - Pull the cable downward out.	Refer to Section 25-10. At the connector behind the main bulkhead. Through the hole in the stick.

B. Install a PTT Switch.

	Detail Steps/Work Items	Key Items/References
(1)	Install the electrical cable, if removed before: - Push the cable through the inside of the stick. - Connect the lower end of cable.	Through the hole in the stick. At the connector behind the main bulkhead.
(2)	Install the PTT switch: - Connect the electrical cable to the switch and move the switch into position at the bar end of the stick. - Push the switch in to the cut out of the bar end.	Put the single cables to the switch. Push carefully. You must not damage the switch.
(3)	Install the pilot's seat.	If removed. Refer to Section 25-10.
(4)	Reset the AUDIO circuit breaker.	Instrument panel, right side.

4. Remove/Install the Cabin Speaker

A. Remove the Cabin Speaker.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the map light for the passenger compartment from the overhead console.	Clean up the silicone from the hole.
(2)	Disconnect the connectors from the map light for the passenger compartment.	
(3)	Remove the air vent on the co-pilot's side from the overhead console.	Clean up the silicone from the hole.
(4)	Remove the map light for the co-pilot from the overhead console.	Clean up the silicone from the hole.
(5)	Disconnect the connectors from the map light for the co-pilot.	
(6)	Remove the cabin speaker cover.	
(7)	Disconnect the cabin speaker connector.	
(8)	Remove the speaker from the overhead console.	

B. Install the Cabin Speaker.

	Detail Steps/Work Items	Key Items/References
(1)	Install the cabin speaker in the overhead console.	
(2)	Connect the cabin speaker connector.	
(3)	Install the cabin speaker cover.	
(4)	Connect the map light for the co-pilot.	
(5)	Install the map light for the co-pilot.	Seal with silicone.
(6)	Install the air vent on the co-pilot's side.	Seal with silicone.
(7)	Connect the map light for the passenger compartment.	
(8)	Install the map light for the passenger compartment.	Seal with silicone. Do not use excessive silicone because of the emergency latch.

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SPEECH COMMUNICATIONS

WITH CONVENTIONAL COCKPIT INSTALLED

1. General

This Section tells you about the speech communication system in the DA 40 NG with conventional cockpit installed. It does not tell you about the speech communication equipment. Refer to the equipment manufacturers' manuals for more data about the equipment.

This Section also tells you about the NAV function of the NAV/COM receivers. Refer to Section 34-52 for more information about the VOR/LOC/GS system. Refer to Section 23-51 for information about the audio system.

The NAV/COM system can have the following components:

- NAV/COM (Garmin SL 30).
- COM antenna.
- NAV (VOR/LOC/GS) antenna.

Figure 1 shows the antenna locations.

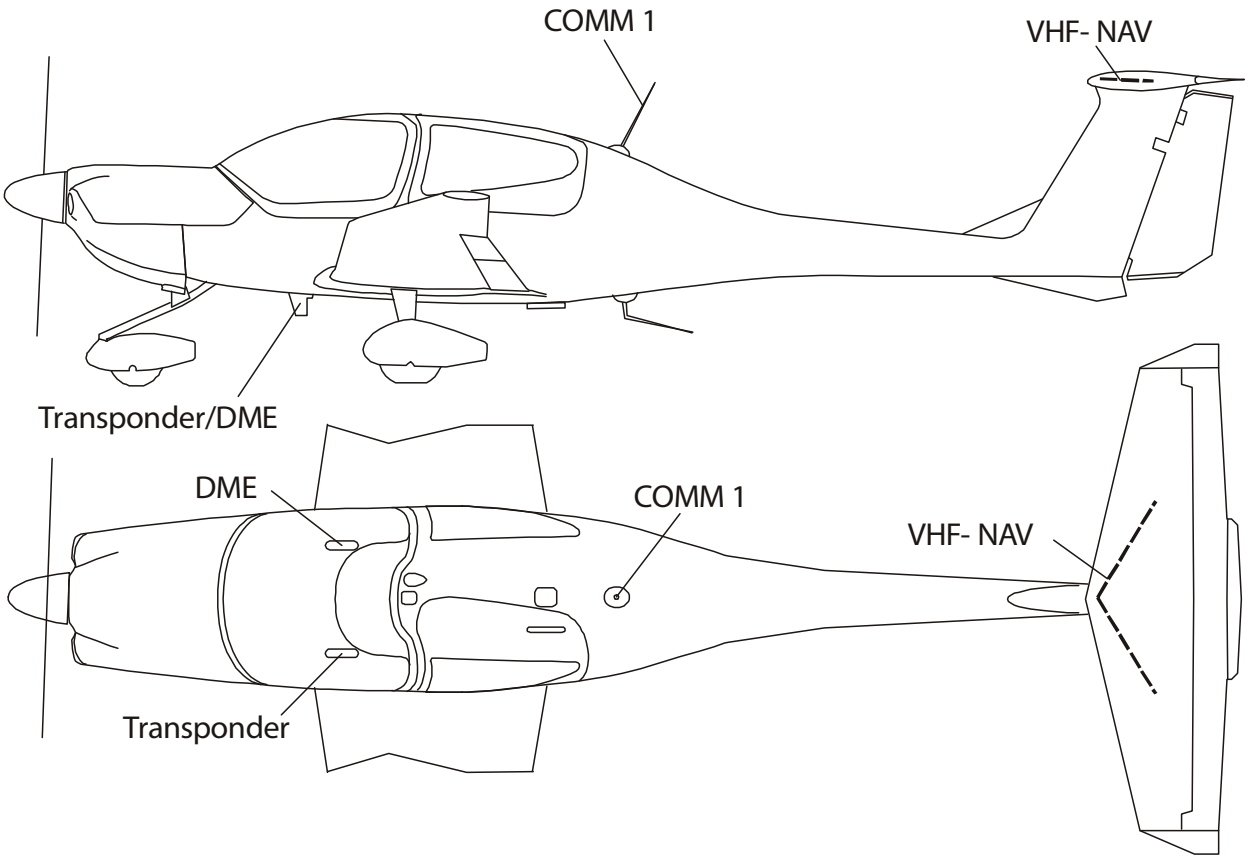

Figure 1 : Antenna Locations

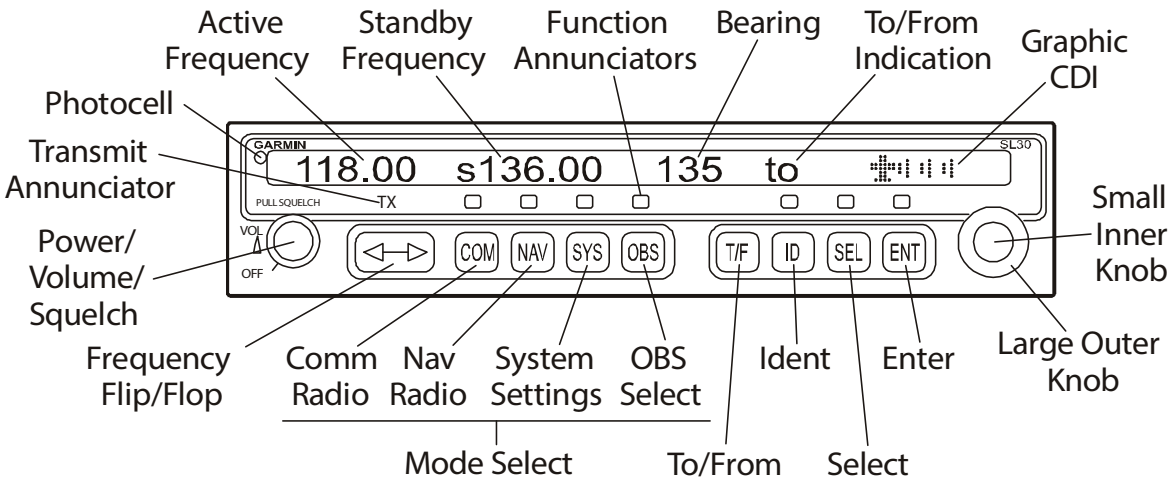

Figure 2 : Garmin SL 30 NAV/COM

2. Description

The Garmin SL 30 NAV/COM consists of a transmitter/receiver for communication (COM) and a receiver for navigation information (NAV). These are combined with operating controls and course deviation indicator (CDI) in one unit. For the COM part 760 channels are spaced 25 kHz apart and cover a frequency range from 118.000 MHz to 136.975 MHz. In the NAV part 200 VOR/LOC-channels are spaced 50 kHz apart and cover a frequency range from 108.00 MHz to117.95 MHz.

Refer to the Garmin SL 30 Pilot's Guide, Garmin P/N 190-00486-00 for complete descriptions of the SL 30 and operating procedures.

The SL 30 NAV/COM uses a single line by 32-character 5x7 dot matrix alphanumeric display. A photocell is located in the top left corner of the from panel display. The photocell automatically controls the light intensity of the display LEDs from low brightness at night to high brightness during daylight operation. The lens is polarized to reduce reflections. Using polarized sunglasses may make it difficult to view the display.

- Power On/Off - Volume - Squelch. The knob on the left side of the SL 30 control power on/off, volume, and squelch test. Rotate the knob clockwise (CW) past the detent to turn the power on. Continuing to rotate the knob to the right increases speaker and headphone amplifier volume level. Rotate the knob to the left to reduce the volume level. Pull the knob out to disable automatic squelch.

- Large/Small knobs. The dual concentric knobs on the right side of the SL 30 are sed to select frequencies, to view the features within a function, or make changes. Details are provided in the appropriate sections of the SL 30 Pilot's Guide.

- Flip/Flop. Press the FLIP/FLOP button to switch between the active (left-most) and standby (right-most) frequency. Switching between COM frequencies is disabled during transmissions.

- COM. Press COM to select the COM radio mode. The annunciator will light above the button when you are in COM mode. Press COM a second time to monitor the Standby frequency.

- NAV. Press NAV to select the NAV radio mode. The annunciator above the button will light when you are in NAV mode. Press NAV a second time to monitor the Standby frequency.

- SYS. Press SYS to reach the System mode. The annunciator above the button will light when you are in the System mode.

- OBS. Press OBS to see the current OBS setting and graphic CDI. If the annunciator above the OBS button lights, you may use the large and small knobs to change the displayed OBS values.

- T/F. Press T/F to toggle between the bearing TO or radial FROM the active VOR. The T/F button does not operate for localizer frequencies.

- ID. Press ID to select the NAV audio and toggle between voice or ident. Pressing ID will cancel the VOR monitor function. Selecting the monitor function will suspend the ID function until the monitor function is disabled.

- SEL. Press SEL to choose from a list of channel types or to change values. In COM or NAV modes, press SEL to choose frequencies from the available lists. Press SEL again if you want to cancel the selection process. The annunciator will light above the button when this function is active.

- ENT. Press ENT to save selected values, confirm a prompt, or to save the standby frequency.

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TROUBLE-SHOOTING

1. General

The table below lists the defects you could have with the speech communication system. Refer to Section 34-52 for Trouble-Shooting the VOR/LOC/GS system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column..

Trouble	Possible Cause	Repair
LCD display hard to read.	Contrast adjustment not correct.	Adjust the contrast.
Radio check reports readability good, strength poor due to low modulation.	Mic. output low. Faulty radio.	Replace the defective mic. Replace the radio.
Radio check reports readability poor, strength good.	Faulty radio. Faulty mic.	Replace the radio. Replace the mic.
Radio check reports readability poor, strength poor. Received audio is poor.	Co-ax connector faulty. Faulty radio. Faulty antenna.	Examine the co-ax and connections for condition and security. Replace the radio. Replace the antenna.
Short range in transmit mode, but reception is OK.	Faulty radio.	Replace the radio.
No voice modulation when transmitting from one pilot's side. The other pilot's side is OK.	Audio integrating fault. Related head-set defective.	Refer to Section 23-51. Replace related head-set.
Cannot transmit. Transmit annunciator not shown in COM display.	Faulty PTT switch. PTT wiring circuit defective. Faulty radio.	Replace PTT switch. Do a test of the PTT wiring circuit. Refer to Chapter 92 for the wiring diagrams. Replace the radio.

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MAINTENANCE PRACTICES

1. General

This Section tells you how to remove/install the main components of the speech communication system. Refer to the equipment manufacturer's manuals for more data about the equipment.

2. Remove/Install the NAV/COM Unit

A. Remove the NAV/COM Unit

	Detail Steps/Work Items	Key Items/References
(1)	Open the COM1 and NAV1 circuit breakers.	
(2)	Put a 3/32 Allen wrench into the access hole for the locking screw. Engage the wrench into the screw.	
(3)	Turn the screw counter-clockwise until the unit disengages from the mounting rack.	
CAUTION:	DO NOT PULL ON THE KNOBS. DO NOT PRY THE FACE-PLATE. YOU CAN DAMAGE THE UNIT.	
CAUTION:	DO NOT TOUCH THE CONNECTOR CARD AT THE REAR OF THE UNIT. THE ELECTROSTATIC CHARGE OF YOUR BODY CAN DAMAGE THE UNIT.	
(4)	Pull gently on the side of the unit to remove it from the mounting rack.	
(5)	Install the protective covers on the rear connectors of the unit.	

B. Install the NAV/COM Unit.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the protective covers from the connectors on the rear of the unit.	
(2)	Slide the unit into the rack. Engage the locking screw so that the lobe of the front latch touches the rack.	
(3)	Turn the locking screw so that the rear lobe engages the mounting rack.	
CAUTION: DO NOT OVER-TIGHTEN THE LOCKING SCREW. YOU CAN DAMAGE THE LOCKING MECHANISM.		
(4)	Continue to turn the locking screw until the unit is fully installed in the mounting rack.	
(5)	Close the COM1 and NAV1 circuit breakers.	
(6)	Do a function test of the system.	Refer to Paragraph 4.

3. Remove/Install a COM VHF Antenna

A. Remove a COM VHF Antenna.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the screws which attach the antenna to the fuselage.	
(2)	Carefully pull the antenna clear of the fuselage and hold it.	If necessary, carefully cut the sealant around the base of the antenna. You must not damage the fuselage skin.
(3)	Release the co-axial connector from the antenna.	
(4)	Release the bonding cable from the antenna.	
(5)	Move the antenna clear of the airplane.	

B. Install a COM VHF Antenna.

	Detail Steps/Work Items	Key Items/References
(1)	Carefully remove any sealant from the area where the antenna attaches to the fuselage.	
(2)	Move the antenna close to where it attaches to the fuselage and: - Attach the co-axial connector to the antenna. - Attach the bonding cable to the antenna.	
(3)	Put the antenna in position on the fuselage and install the screws which attach the antenna to the fuselage.	
(4)	Seal the outer edge of the antenna to the fuselage skin with sealant.	Use Terostat MS 9380 or equivalent. Follow the sealant manufacturer’s instructions.
(5)	Do a function test of the system.	Refer to Paragraph 4.

4. NAV/COM Test

If possible, do an operational flight check after the radio has been replaced. Alternatively use a NAV/COM test set to make sure that the system operates correctly. Refer to the manufacturer's Installation Manual for performance specifications.

	Detail Steps/Work Items	Key Items/References
(1)	Do a test of each control function.	Refer to Section 23-11 and Section 34-52.
(2)	At a sufficient altitude, contact a ground station at least 50 NM away and another close by.	If possible, select stations with frequencies at both the high and low end of the NAV/COM band.
(3)	Test the VOR system at 4000 ft. Select a VOR frequency within a 40 NM range. Listen to the station identifier. Test the operation of the tone identifier filter. Fly inbound and outbound on a selected VOR radial. Look for the correct LEFT/RIGHT and TO/FROM indications. Monitor the VOR accuracy.	
(4)	Do a test of localizer (LOC) and glideslope (GS) operation and accuracy on a suitable runway.	
(5)	If necessary, adjust the viewing contrast of the LCD display.	Through the access hole in the front panel.

AUDIO INTEGRATING

WITH G1000 SYSTEM INSTALLED

1. General

The DA 40 NG has a voice-operated (VOX) intercom. This gives full hands-free intercom when head-sets are used. The pilot controls the intercom system with the audio control panel. The audio control panel is located in the instrument panel between the integrated cockpit system (ICS) display screens. Figure 1 shows the audio control panel.

Push to talk (PTT) switches are installed in the handles of both control sticks. The jack sockets for all the head-sets are located at the back of the center console.

An amplifier in the radio receiver system operates a loudspeaker located in the roof of the passenger cabin.

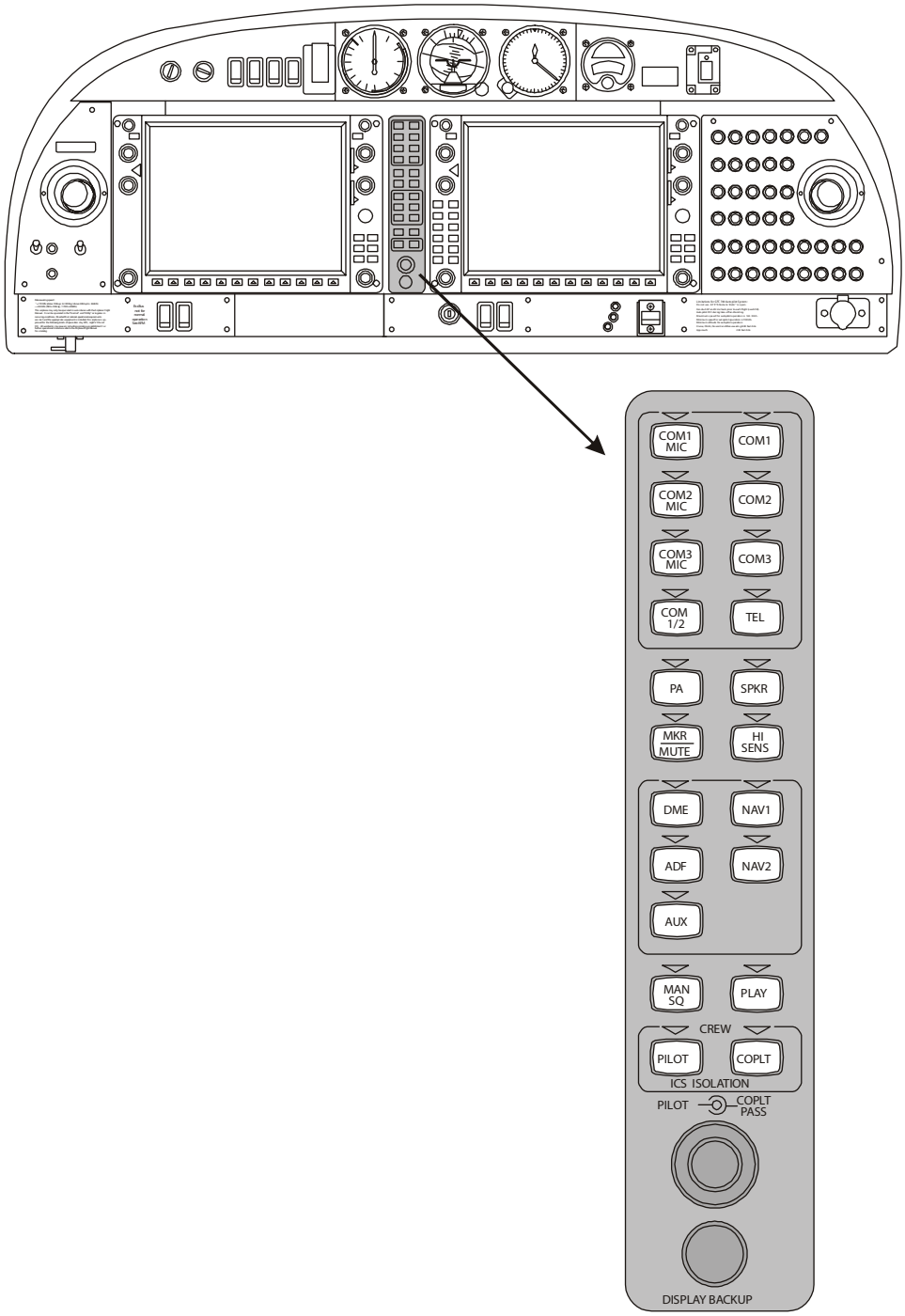

Figure 1 : Audio Control Panel

2. Description and Operation

Figure 1 shows the GMA 1347 Audio Control Panel of the DA 40 NG airplane. The audio control panel is powered with the Garmin 1000 ICS and is an integral component of the integrated cockpit system. The audio control panel makes an interface between the audio systems of the integrated cockpit system (ICS) and the pilot's/crew headsets.

The audio control panel is located in the instrument panel between the ICS displays. The control panel keys have LED annunciator labels and has backlighting which is controlled by the ICS. When a key is active the annunciator is lit by the LED. The control panel performs a self-test when power is applied to the panel which then re-sets the panel to the operating condition that was set when the panel was last powered-off. If the control panel fails the self-test the panel switches to a fail-safe mode and all fail-safe audio output is directed to the pilot's headset.

The control panel has these keys and selectors:

- COM 1 MIC key. Press this key to select COM 1 as the active microphone source and to automatically de-select any COM MIC key that may have been previously selected. The COM 1 MIC key annunciator illuminates and the COM 1 caption on the ICS display screen is highlighted.

- COM 2 MIC key. Press this key to select COM 2 as the active microphone source and to automatically de-select any COM MIC key that may have been previously selected. The COM 2 MIC key annunciator illuminates and the COM 2 caption on the ICS display screen is highlighted.

- COM 3 MIC key. This key is not active in the DA 40 NG installation.

- COM 1/2 key. Press this key to toggle the selection of the split com function. When COM 1/2 is selected COM 1 becomes the dedicated COM system for the pilot's mic/audio and COM 2 becomes the dedicated COM system for the co-pilot's mic/audio. When the split com function is selected both the pilot and co-pilot can transmit simultaneously using separate COM systems. The pilot can also monitor all the NAV audio as selected. The co-pilot can only monitor the COM 2 audio.

- COM 1 key. Press this key to select COM 1 as the active audio source. Selecting COM 1 audio using this key maintains COM 1 as an audio source independent of any other selection. The annunciator illuminates when the COM 1key is activated.

- COM 2 key. Press this key to select COM 2 as the active audio source. Selecting COM 2 audio using this key maintains COM 2 as an audio source independent of any other selection. The annunciator illuminates when the COM 2 key is activated.

- COM 3 key. This key is not active in the DA 40 NG installation.

- TEL key. This key is not active in the DA 40 NG installation.

- PA key. This key is not active in the DA 40 NG installation.

- SPKR key. Press this key to select the cabin speaker. When selected, the cabin speaker will broadcast all the selected audio channels and all unswitched/unmuted audio warnings. The speaker will be muted when a COM microphone is keyed. The annunciator illuminates when the SPKR key is activated.

- MKR/MUTE key. Press this key to select MKR audio. When selected the key annunciator is illuminated. When a marker beacon audio tone is generated it can be heard over the headsets and the related caption will show on the ICS primary flight display. Pressing the MKR/MUTE key while a marker beacon tone is being generated will cause the audio to be muted but the caption on the ICS display will remain. When the next marker beacon signal is generated the it will be heard over the headsets. Pressing the MKR/MUTE key while the marker beacon audio system is in the mute mode will cause the audio signal to be deactivated and the key annunciator will go out.

- HI SENS key. Press this key to increase the sensitivity of the marker beacon receiver. The annunciator illuminates when the HI SENS key is activated.

- DME, ADF, NAV 1, NAV 2 keys. Press one of these keys to select the related audio source. The related annunciator illuminates when the key is activated.

- AUX key. This key is not active in the DA 40 NG installation.

- MAN SQ key. Press this key to make the pilot/co-pilot/pass ICS volume control knob a push toggle switch for setting ICS squelch levels manually. The annunciator illuminates when the MAN SQ key is activated.

- PLAY key. Press this key to replay the digital recording made by the ICS. The digital recording of recent audio activity will be heard over the headsets. The annunciator illuminates when the PLAY key is activated.

- PILOT, COPLT keys. These keys control the intercom system (ICS) isolation system. The ICS isolation system has four modes of operation which can all be selected using a combination of the PILOT and COPLT keys. The system has these modes of operation:

    - Pilot Mode. Pilot mode is selected when only the PILOT key is annunciated. In pilot mode the pilot can hear the selected radios. The co-pilot and passengers can only communicate with each other.

    - Co-Pilot Mode. Co-pilot mode is selected when only the COPLT key is annunciated. In co-pilot mode the co-pilot’s headset is isolated. The pilot and passengers can hear the selected radios, and communicate with each other.

    - Crew Mode. Crew mode is selected when both the PILOT and CO-PILOT keys are annunciated. In crew mode both the pilot and co-pilot can hear the selected radios and communicate with each other.

    - All Mode. All mode is selected when neither the PILOT or CO-PILOT keys are annunciated. In all mode both the pilots and the passengers can hear the selected radios and are able to communicate with each other.

- VOLUME/SQ knob. This knob has two functions depending on the selection of the MAN SQ key.

- MAN SQ key deselected. When the MAN SQ key is deselected the ICS squelch levels are set automatically. The VOLUME/SQ knob acts as a volume control and the VOL caption to the lower left of the knob illuminates. Rotate the inner knob clockwise to increase the volume level of the pilot's ICS and rotate the inner knob counter-clockwise to reduce the volume of the pilot's ICS. Rotate the outer knob clockwise to increase the volume level of the co-pilot's and passenger's ICS. Rotate the outer knob counter-clockwise to reduce the volume level of the co-pilot's and passenger's ICS.

- MAN SQ key selected. When the MAN SQ is selected the ICS squelch levels can set manually and pressing the VOLUME/SQ knob toggles the manual squelch ON/OFF. Manual squelch is toggled ON when the SQ caption to the lower right of the knob illuminates. Rotate the inner knob clockwise to increase the squelch threshold of the pilot's ICS and rotate the inner knob counter-clockwise to reduce the squelch threshold of the pilot's ICS. Rotate the outer knob clockwise to increase the squelch threshold of the co-pilot's and passenger's ICS. Rotate the outer knob counter-clockwise to reduce the squelch threshold of the co-pilot's and passenger's ICS.

- DISPLAY BACKUP button. Pressing the red DISPLAY BACKUP button at the bottom of the audio control panel selects the backup mode for all the displays.

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TROUBLE-SHOOTING

1. General

The table below lists the defects you could have with the audio integrating system. Refer to Section 23-10 for Trouble-Shooting the speech communication system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column..

Trouble	Possible Cause	Repair
No voice modulation when transmitting from co-pilot's side on head-set. Pilot's side OK.	Faulty head-set. Open mic audio line. Faulty GMA 1347.	Replace head-set. Do a test of the mic audio wiring. Refer to Chapter 92 for the wiring diagrams. Replace GMA 1347.
No voice modulation when transmitting from pilot's side on head-set. Co-pilot's side OK.	Faulty head-set. Open mic audio line. Faulty GMA 1347.	Replace head-set. Do a test of the mic audio wiring. Refer to Chapter 92 for the wiring diagrams. Replace GMA 1347.
No intercom audio on pilot's head-set. Receives radio transmissions correctly.	ICS mode set incorrectly. Faulty GMA 1347.	Set mode to required position, refer to Section 23-50 Paragraph 2 Replace the GMA 1347.
No audio on pilot's head-set with the ICS set to OFF.	Faulty head-set. Open audio line.	Replace head-set. Do a test of the head-set audio wiring. Refer to Chapter 92 for the wiring diagrams.
No audio on co-pilot's or passenger's headsets.	Open audio line. Faulty GMA 1347.	Do a test of the head-set audio wiring. Refer to Chapter 92 for the wiring diagrams. Replace the GMA 1347.

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MAINTENANCE PRACTICES

1. General

This Section tells you how to remove/install the GMA 1347 audio control panel. It also tells you how to adjust/test the ICS. Refer to the equipment manufacturers manuals for more data about the audio integrating system.

2. Remove/Install the GMA 1347 Audio Control Panel

A. Remove the GMA 1347 Audio Control Panel

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	Instrument panel, lower center.
(2)	Remove the audio control unit: - Insert a 3/32 in hexagonal drive wrench into the access hole in the front of the panel. - Rotate the locking mechanism counter-clockwise to release the lock. - Pull the audio control panel towards you and clear of the instrument panel.	Refer to 23-50-00 Page 2, Figure 1.

B. Install the GMA 1347 Audio Control Panel

	Detail Steps/Work Items	Key Items/References
(1)	Examine the connectors at the rear of the audio control panel. Look specially for bent or damaged pins.	
(2)	Insert a 3/32 in hexagonal drive wrench into the access hole in the front of the panel and rotate the locking mechanism 90° counter-clockwise to make sure that the locking mechanism is in the unlocked position.	
(3)	Install the audio control panel: - Move the audio control panel into position at the instrument panel. - Carefully slide the panel into position in the instrument panel. - Insert a 3/32 in hexagonal drive wrench into the access hole in the front of the panel and rotate the locking mechanism clockwise to lock the panel into position.	Make sure that the audio control panel fully engages with the connectors at the rear of the panel. Make sure that you cannot pull the audio control panel towards you!
(4)	Do a test for the correct operation of the audio control panel. If you have installed a replacement audio control panel you may have to update the Garmin G1000 integrated cockpit system software.	Refer to the G1000 Line Maintenance Manual for data about installing software and testing the audio control panel.

AUDIO INTEGRATING

WITH CONVENTIONAL COCKPIT INSTALLED

1. General

The audio system in the DA 40 NG with conventional cockpit has the following components:

- PM 1000 II voice-activated (VOX) intercom, see Figure 1.
- Sockets for four head-sets on the rear face of the center console.
- Push-to-talk (PTT) switches in the handles of both control sticks.
- Cockpit speaker in the roof of the cockpit.
- Socket for hand-held microphone on the bottom left side.

The voice-activated intercom gives full hands-free intercom when head-sets are used.

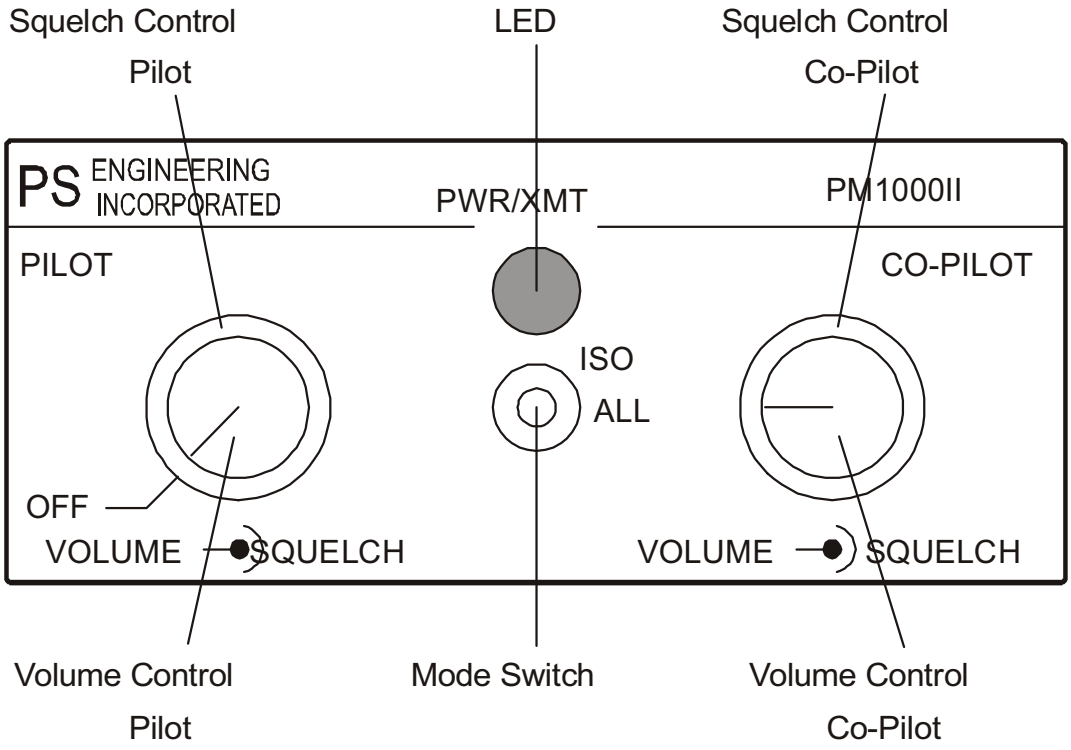

Figure 1 : PM 1000 II Intercom

2. Description

Figure 1 shows the PM 1000 II Intercom. It is mounted above the NAV/COM 1 set in the avionics rack in the instrument panel, see Chapter 31.

The PM 1000 II is a four channel VOX intercom with individual amplifiers for each outlet. The headset jack-plugs connect to the PM 1000 II. When the unit is set to OFF (or when the power fails), an internal relay connects the pilots head set to the airplane radio. This gives fail-safe operation. A two-color LED in the control panel shows green when the power is on and red during radio transmissions. The LED functions as stuck mic indicator.

The PM 1000 II has these controls:

- A pilot's ON/OFF/VOLUME/SQUELCH switch. Turn the inner knob clockwise to switch the intercom ON. Turn the knob to control the volume in the pilots headset. The outer (squelch) knob adjusts the level at which the mic operates the intercom. When the knob is set fully counter-clockwise the ambient noise will operate the intercom. This gives a “hot mic” effect. Set the squelch to operate at a level that is correct for you. The VOX system has a one second delay, this prevents “choppy” speech.

- A co-pilot's VOLUME/SQUELCH switch. Turn the inner knob to adjust the volume in the co-pilots headset. The outer (squelch) knob adjusts the level at which the co-pilots and passenger mics operate the intercom. When the knob is set fully counter-clockwise the ambient noise will operate the intercom. This gives a “hot mic” effect. Set the squelch to operate at a level that is correct for you. The VOX system has a one second delay, this prevents “choppy” speech.

- An ISO/ALL/CREW switch. The PM 1000 II has three modes of operation:

  - ALL. The pilot, co-pilot and passengers can all hear the radio. Both the pilots and the passengers can communicate on the intercom.

  - ISO. The pilot is connected only to the airplane radio. He is isolated from the intercom. The co-pilot can communicate with the passengers but the co-pilot can not make or hear transmissions on the airplane radio.

  - CREW. The pilot and co-pilot are connected on one intercom channel while the passengers are on a separate and independent channel. The pilot and co-pilot are connected to the airplane radio. Passengers can continue to communicate with themselves without disturbing the pilot and co-pilot.

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TROUBLE-SHOOTING

1. General

The table below lists the defects you could have with the audio integrating system and the marker beacon receiver system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
No voice modulation when transmitting from co-pilot's side on head-set. Pilot's side OK.	Faulty head-set. Open mic audio line. Faulty Intercom.	Replace head-set. Do a test of the mic audio wiring. Refer to Chapter 92 for the wiring diagrams. Replace the intercom.
No voice modulation when transmitting from pilot's side on head-set. Co-pilot's side OK.	Faulty head-set. Open mic audio line. Faulty Intercom.	Replace head-set. Do a test of the mic audio wiring. Refer to Chapter 92 for the wiring diagrams. Replace the intercom.
Cannot transmit. Transmit annunciator (if available) not showing on COM display.	Faulty mic PTT switch. PTT wiring circuit open. Faulty COM unit.	Replace the defective PTT switch. Do a test of the PTT wiring. Refer to Chapter 92 for the wiring diagrams. Replace the COM unit..
No intercom audio on pilot's head-set. Receives radio transmissions correctly.	ISO mode (PM 1000 II selected. Faulty intercom.	Select All mode. Replace the intercom.

Trouble	Possible Cause	Repair
No audio on pilot's head-set with the intercom or audio panel switched OFF.	Faulty head-set. Open audio line.	Replace head-set. Do a test of the head-set audio wiring. Refer to Chapter 92 for the wiring diagrams.
No audio on co-pilot's or passenger headsets.	Open audio line. Faulty intercom.	Do a test of the head-set audio wiring. Refer to Chapter 92 for the wiring diagrams. Replace the intercom.

MAINTENANCE PRACTICES

1. General

This Section tells you how to remove/install the intercom. It also tells you how to test the intercom. Refer to the equipment manufacturers manuals for more data about the audio integrating system.

2. Remove/Install the PM 1000 II Intercom

A. Remove the PM 1000 II Intercom

	Detail Steps/Work Items	Key Items/References
WARNING:	**MAKE SURE THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE AIRPLANE. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE INJURY OR DEATH.**	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to IDLE.	
(2)	Disconnect the airplane battery.	Refer to Section 24-31.
(3)	Remove the instrument panel cover.	Refer to Section 25-10.
(4)	Disconnect the connector from the PM 1000 II.	
(5)	Remove the attaching screws and knobs from the PM 1000 II.	Hold the PM 1000 II.
(6)	Remove the unit from the instrument panel.	

B. Install the PM 1000 II Intercom

	Detail Steps/Work Items	Key Items/References
(1)	Put the PM 1000 II in position in the instrument panel.	
(2)	Install the attaching screws and knobs.	
(3)	Connect the connector to the PM 1000 II.	
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Connect the airplane battery.	Refer to Section 24-31.
(6)	Do a function test of the PM 1000 II.	Refer to paragraph 3.

3. Test the PM 1000 II Intercom

	Detail Steps/Work Items	Key Items/References
(1)	Make sure all the head-sets are connected.	
(2)	Select the mode switch to ALL.	
(3)	Turn the VOLUME control to switch the unit ON.	
(4)	Do a test for communication between the pilot, co-pilot and passenger head-sets.	
(5)	Test the function of the VOLUME control.	
(6)	Test the function of the SQUELCH control.	
(7)	Set the mode switch to ISO.	Make sure that there is no intercom between the pilot, co-pilot and passenger head-sets.
(8)	Pull the AUDIO circuit-breaker.	Make sure that radio transmission and reception is possible from the pilot's head-set.
(9)	Set the mode switch to CREW.	Make sure that the pilot and co-pilot can communicate and transmit on the airplane radio. Make sure that the passengers can communicate with themselves but not to the pilot or co-pilot.

GDL 69A SXM DATALINK SYSTEM

1. General

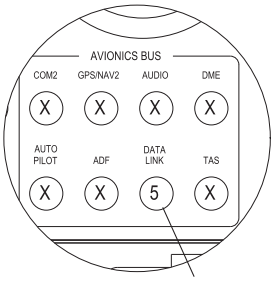
This section tells you about the GDL 69A SXM datalink system that may be installed in the DA 40 NG. The GDL 69A SXM provides real-time weather information, and audio entertainment to both pilots and passengers. The GDL 69A SXM communicates with the MFD via an Ethernet connection. The GDL 69A SXM receiver is located in the avionics rack in the rear fuselage, just aft of the rear baggage frame.

The GA 37 antenna includes GPS/WAAS with SiriusXM combination antenna. The coax cable interface to the receiving equipment provides both power to the antenna preamp from the receiving equipment and signal back to the receiving equipment.

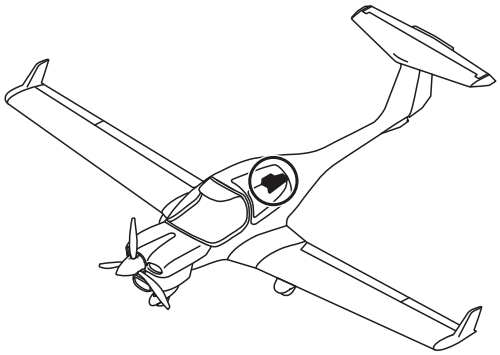
The DA 40 NG GDL 69A SXM Data Link System has the following components:

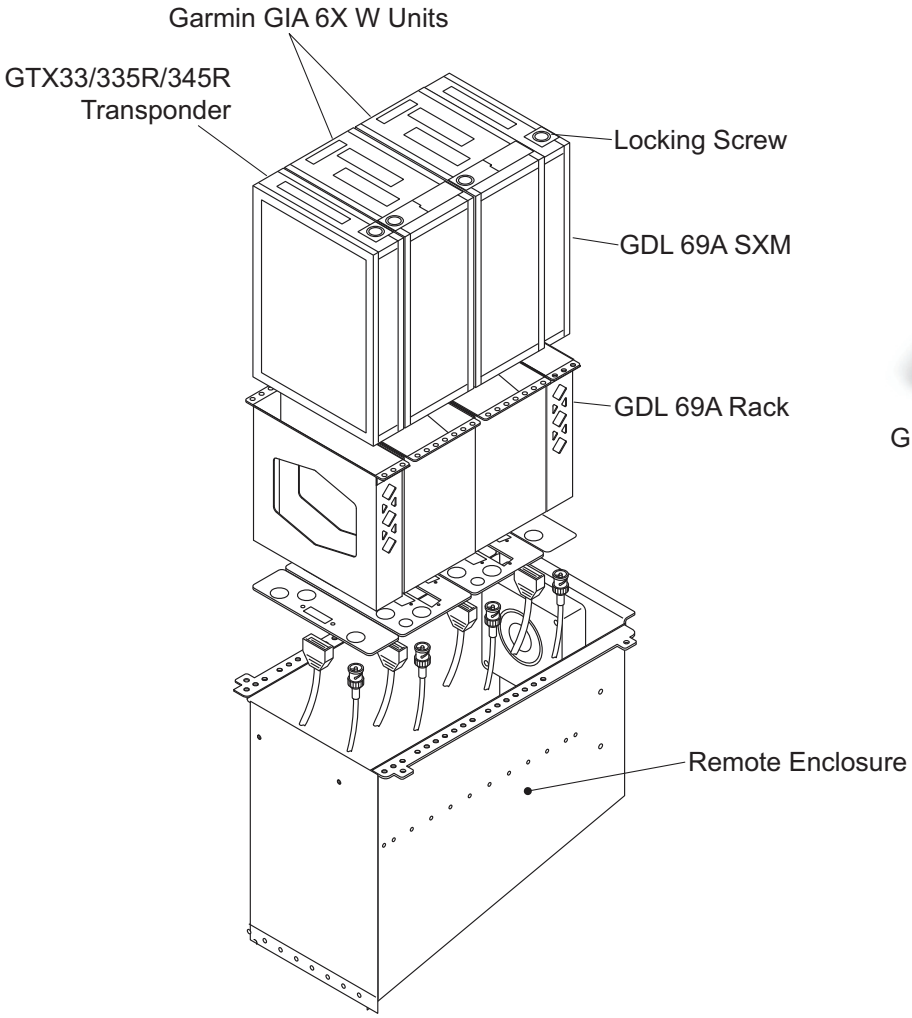
- The GDL 69 A SXM Data Link Receiver, see Figure 1.
- The GDL 69 A SXM Data Link antenna, see Figure 2.

For troubleshooting of the GDL 69A SXM Data Link System, refer to the G1000 NXi Line Maintenance Manual - 190-02631-00_01, latest revision.



5 Amp
Circuit Breaker





GDL 69A SXM Receiver

Figure 1 : GDL 69A SXM Receiver

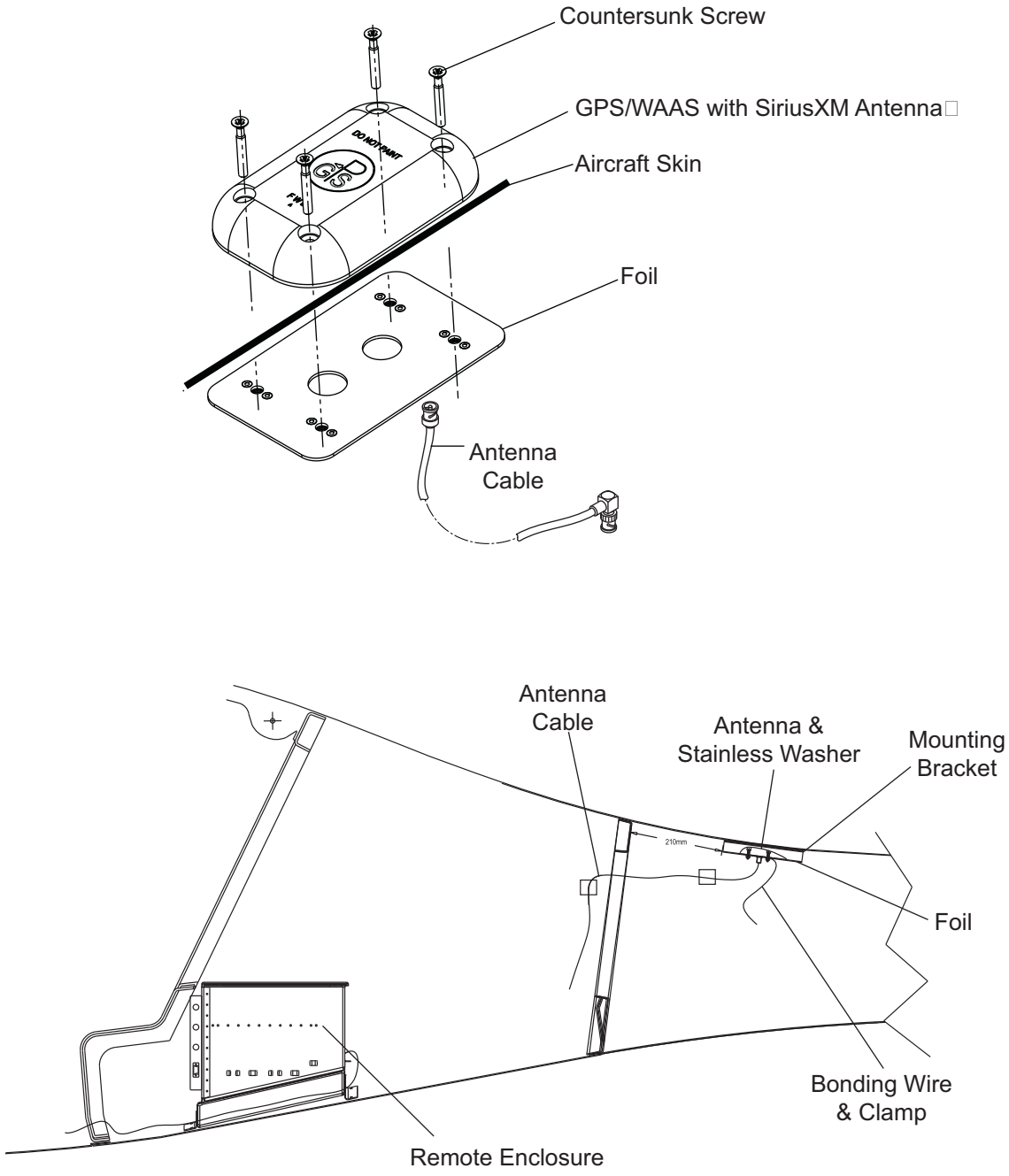


Figure 2 : GDL 69A SXM Antenna

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MAINTENANCE PRACTICES

1. General

This Section tells you how to remove/install the GDL 69A SXM Data Link system components. It also tells you how to test the system
Refer to the equipment manufacturers manuals for more data about the GDL 69A SXM Data Link system.

2. Remove/Install the GDL 69A SXM Data Link Receiver

Refer to Figure 1 in the Description and Operation page block 23-52-00.

A. Remove the GDL 69A SXM Data Link Receiver

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	
(2)	Pull open the DATA LINK circuit breaker on the AVIONICS BUS.	
(3)	Remove the lower access panel from the rear baggage compartment for access to the HIRF box.	Refer to Figure 2 in the Description and Operation page block 23-52-00.
(4)	Remove the HIRF box cover.	
(5)	Remove the GDL 69A SXM receiver: - Identify the GDL 69A SXM unit for removal. - Release the locking screw from the retainer. - Lift the retainer clear of the unit. - Lift the GDL 69A SXM receiver clear of the mounting rack and remove it from the airplane.	
(6)	Install protective covers on the rear connectors of the unit.	

B. Install the GDL 69A SXM Data Link Receiver

	Detail Steps/Work Items	Key Items/References
(1)	Remove the protective covers from the rear connectors of the unit.	
(2)	Install the GDL 69A SXM receiver: - Move the unit into position at the mounting and insert the unit into its position in the rack. - Move the retainer into position and secure it with the locking screw.	Make sure that the unit is seated correctly. Do not force the unit into position.
(3)	Install the HIRF box cover.	
(4)	Install the lower access panel to the rear baggage compartment.	Refer to Figure 2 in the Description and Operation page block 23-52-00.
(5)	Close the DATA LINK circuit breaker on the AVIONICS BUS.	
(6)	Do a test of the datalink system.	Refer to the Garmin G1000 NXi Integrated Avionics System - Line Maintenance Manual, Doc # 190-02361-00_01, most current revision.

3. Remove/Install the GDL 69A SXM Data Link Antenna

Refer to Figure 2 in the Description and Operation page block 23-52-00.

A. Remove the GDL 69A SXM Data Link Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	
(2)	Pull open the DATA LINK circuit breaker on the AVIONICS BUS.	
(3)	Remove the insulation, as necessary, to get access to the coaxial cable connected to the antenna.	From inside the airplane.
(4)	Disconnect the cable connector at the datalink antenna.	
(5)	Remove the datalink antenna: - Remove the four countersunk screws that attach the antenna to the airplane structure. - If necessary, use a knife to carefully remove the sealant that seals the antenna to the airplane outer surface. - Remove the antenna from the airplane.	Working outside of the airplane Take care not to damage the airplane surface.

B. Install the GDL 69A SXM Data Link Antenna

	Detail Steps/Work Items	Key Items/References
(1)	Carefully remove any sealant from the area where the antenna attaches to the fuselage.	Take care not to damage the fuselage. If necessary, use a commercial solvent.
(2)	Move the antenna into position.	
(3)	Install the four countersunk screws that attach the antenna to the airplane structure.	Make sure that the foil for the antenna is correctly located.
(4)	Connect the cable connector to the antenna.	From inside the airplane.
(5)	Close the DATA LINK circuit breaker on the AVIONICS BUS.	
(6)	Do a test of the datalink system.	Refer to the Garmin G1000 NXi Integrated Avionics System - Line Maintenance Manual, Doc # 190-02361-00_01, most current revision
(7)	Seal the outer edge of the antenna where it contacts the airplane surface with sealant.	Use Terostat MS 9380 or equivalent. Follow the sealant manufacturer's instructions.
(8)	Remove the excess sealant that has been forced out of the joint between the antenna and the airplanes surface.	

STATIC DISCHARGING

1. General

The static discharging system has two main parts, the electrical bonding system and the surface static discharging system. Refer to Section 51-80 for the electrical bonding system. Section 51-80 also describes the resistance measurements for the static discharge wicks.

The build-up of static electricity can affect the quality of radio communications on all COM and NAV equipment. It can also affect the quality of all NAV indications.

2. Description and Operation

The static discharging system removes the electro-static charge which collects on the airplane surfaces. The composite structure of the DA 40 NG does not let electricity flow through it. The airplane surfaces are covered with a special conductive filler through which the electricity flows to the static discharge wick.

The location and quantity of the static discharge wicks are given in the following table.

Location	Quantity
LH wing tip, trailing edge.	1
RH wing tip, trailing edge.	1
LH horizontal tail tip, trailing edge.	1
RH horizontal tail tip, trailing edge.	1
Rudder, trailing edge, bottom.	1

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MAINTENANCE PRACTICES

1. General

This Section tells you how to remove/install the static wick, the static wick mount and the mount base.

2. Remove/Install the Static Wick, the Static Wick Mount and Mount Base

A. Remove the Static Wick, the Static Wick Mount and Mount Base

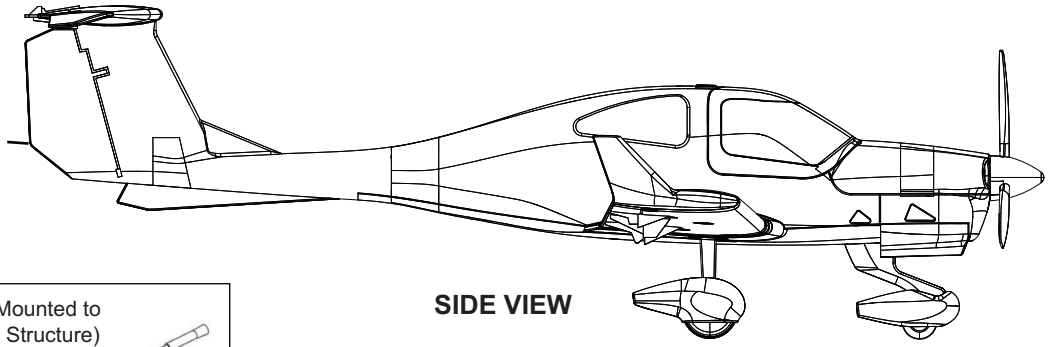
Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
NOTE:	The removal of one static wick, static wick mount and mount base is given. The removal procedure is the same for all five locations	
(1)	Get access to the static wick location for the removal.	A ladder or stool might be required for access to some locations.
(2)	Remove the two screws (1) from the static wick mount (2).	The static wick (3) is attached to the mount (2).
(3)	Remove the static wick (3) and mount (2) from the aircraft.	
(4)	Make sure that the base mounted to the airplane structure is in satisfactory condition. If it is not, remove the base as follows: - Remove the screw that holds the mount base to the airplane. - Remove the mount base from the airplane. - Clean the conductive epoxy from the area under the mount base.	 Use an appropriate cleaner. Be careful to not scratch the airplane surface.

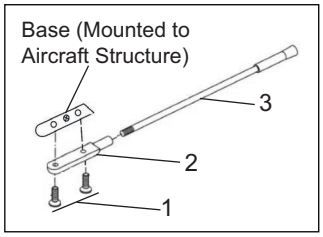
B. Install the Static Wick, the Static Wick Mount and Mount Base

Refer to Figure 201.

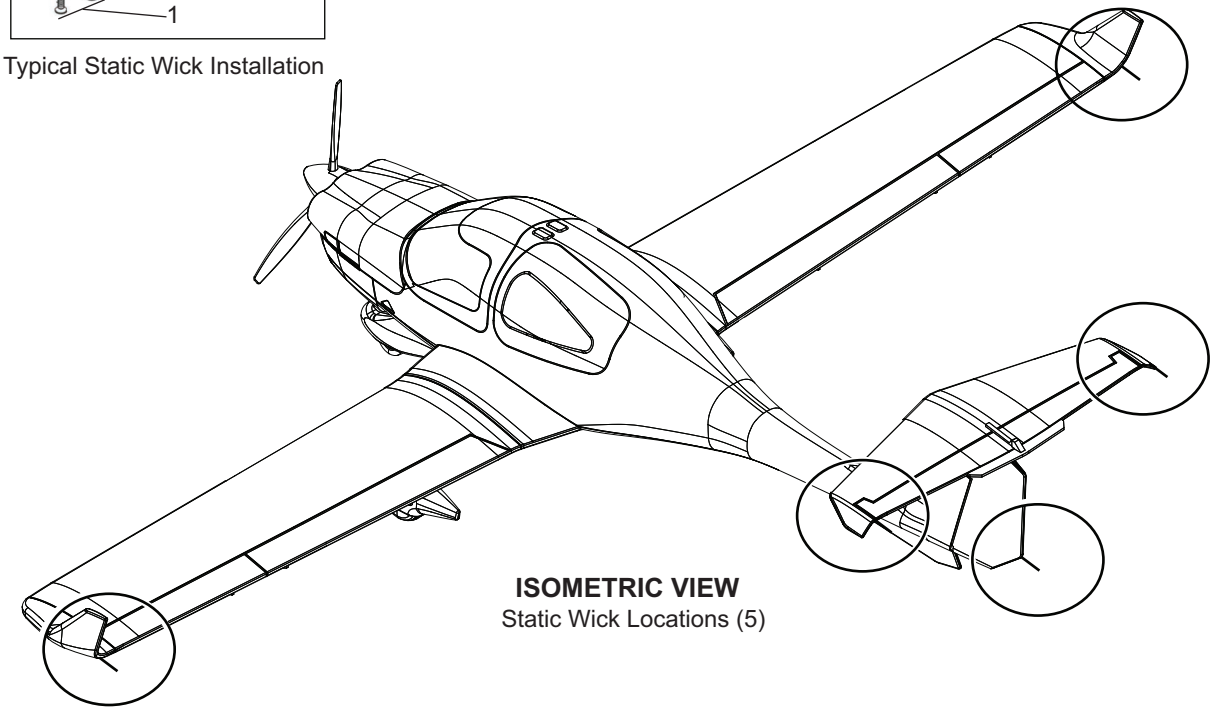
	Detail Steps/Work Items	Key Items/References
NOTE:	The installation of one static wick, static wick mount and mount base is given. The installation procedure is the same for all five locations	
(1)	If the base mounted to the airplane structure was removed, replace the base as follows: - Apply conductive epoxy to the area where the mount base will be installed. - Put the mount base in place and install the screw to attach the mount base to the airplane.	Make sure that the area for installation of the mount base is clean before applying the epoxy.
(2)	Put the static wick (3) and mount (2) in place and install the two screws (1). NOTE: Because the mount hole threads are metric, replace the two screws (1) that come with the static wick and mount with DIN965A-M3 X 8-A2 screws.	Make sure that one screw attaches to the lightening protection strapping.
(3)	Do a test for the correct bonding of the static discharge wick to the airplane bonding system.	Refer to Section 51-80, Maintenance Practices.



SIDE VIEW



Typical Static Wick Installation



ISOMETRIC VIEW
Static Wick Locations (5)

Figure 201 : Static Wick, Static Wick Mount and Mount Base - Removal/Installation

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CHAPTER 24
ELECTRICAL POWER

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ELECTRICAL POWER

1. General

The DA 40 NG has a 28 VDC electrical system. This Chapter describes the complete system from the power supplies to the circuit-breakers or other interface with the consumers. This Chapter has only simplified schematic diagrams and location diagrams. Refer to Chapter 92 for the wiring diagrams. Refer to the related Chapter for data about systems. For example, refer to Chapter 80 for data about the starter system.

For Trouble-Shooting and Maintenance Practices for this system, refer to these Sections:

- Section 24-30. Electrical power generation.
- Section 24-31. Battery system.
- Section 24-32. Emergency battery system.
- Section 24-33. Additional alternator (if OÄM 40-314 is installed).
- Section 24-40. External power.
- Section 24-60. Power distribution.

NOTE: Equipment which is certified for installation in the DA 40 NG is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

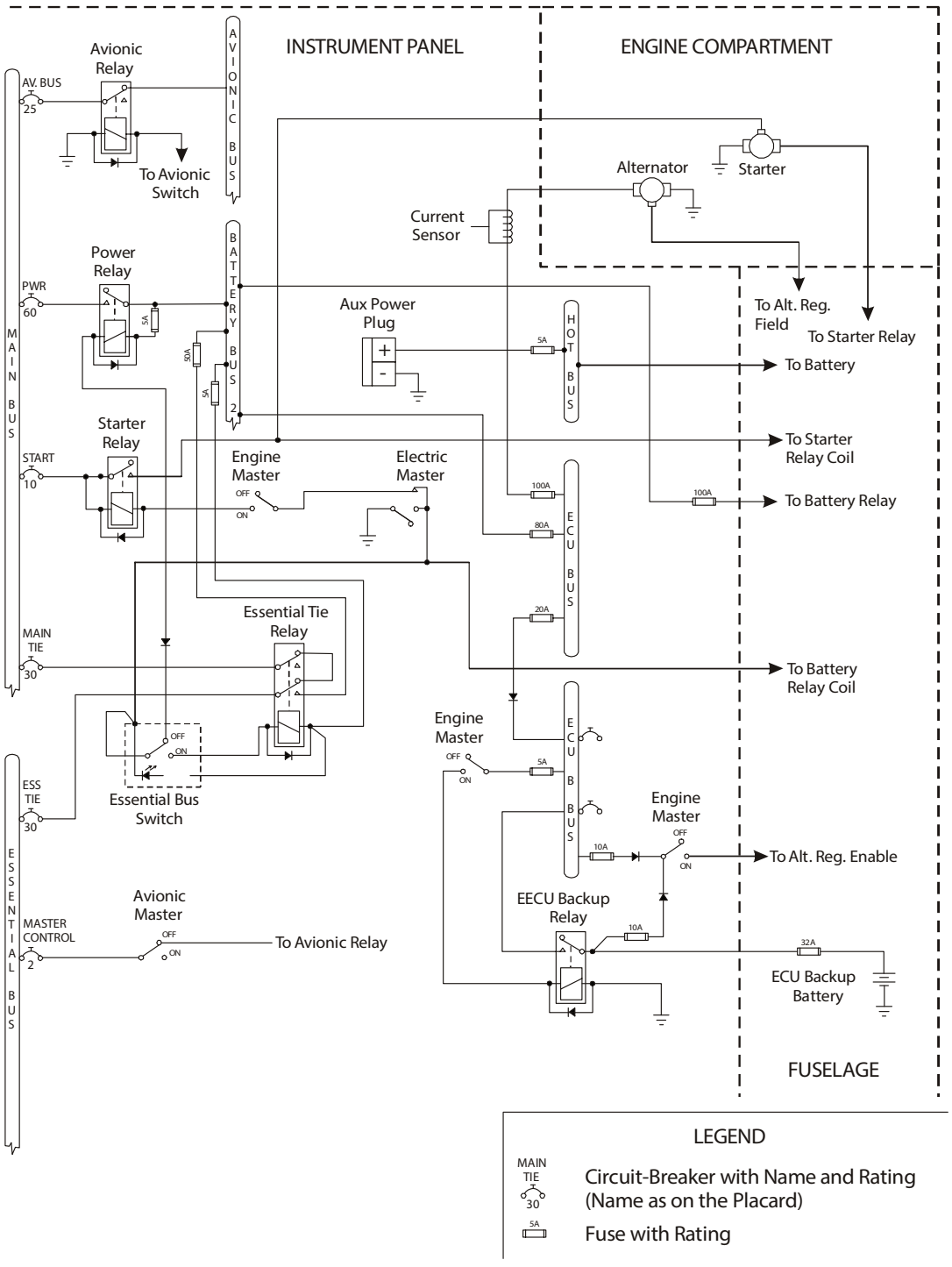

Figure 1 : Electrical System Schematic Diagram

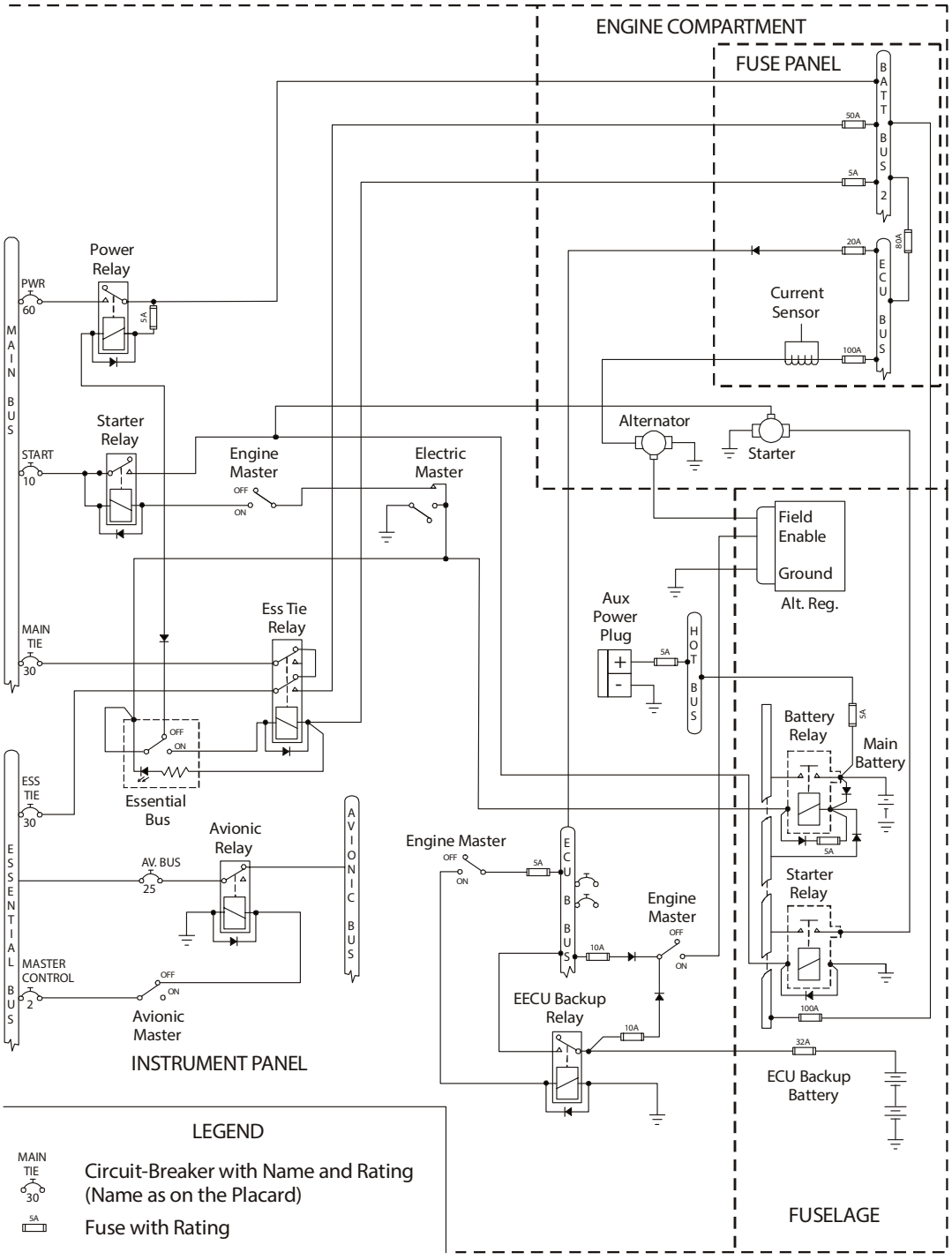

Figure 2 : Electrical System Schematic Diagram
(if Conventional Cockpit (OÄM 40-321) is installed)

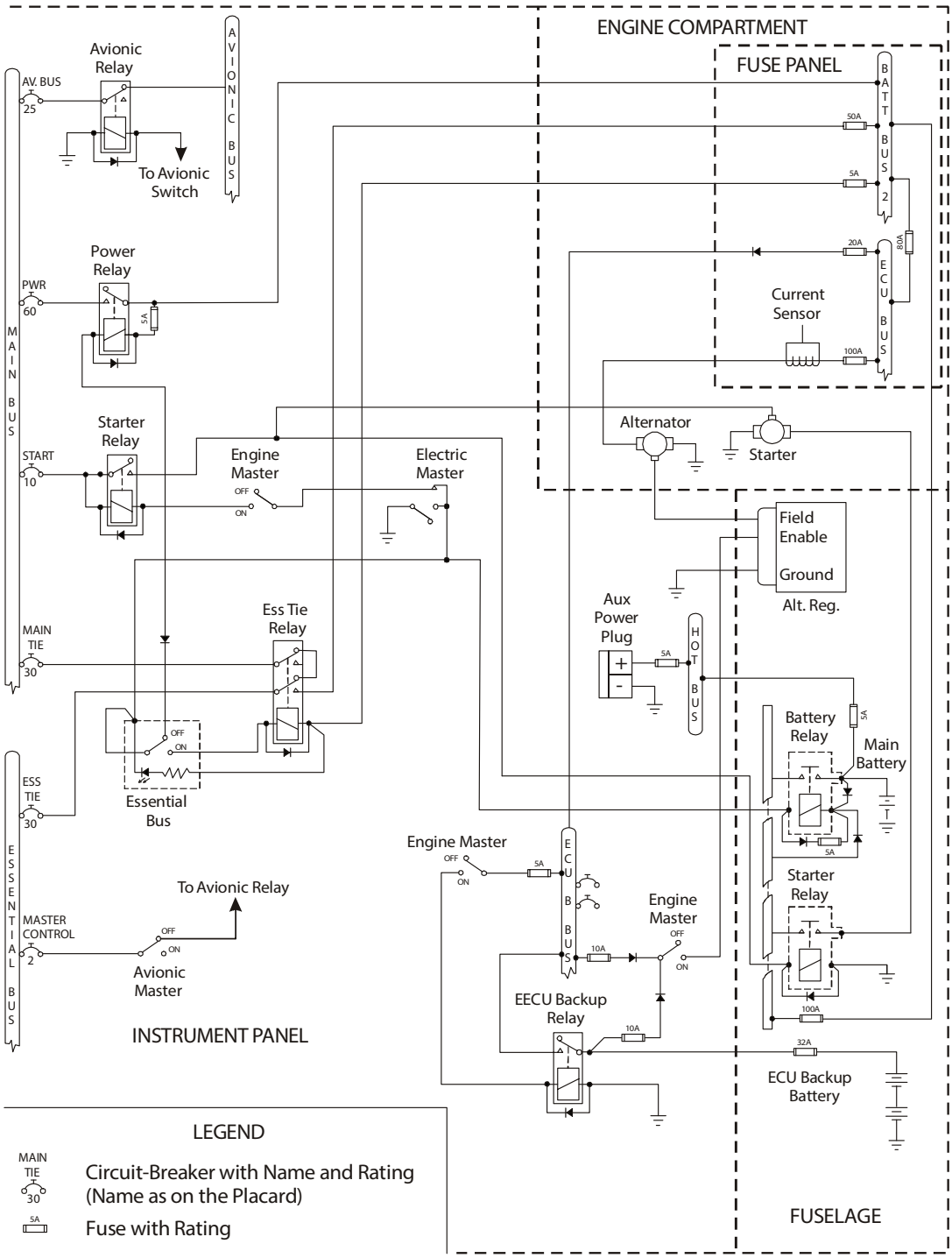

Figure 3 : Electrical System Schematic Diagram
(if OÄM 40-329 or OÄM 40-330) is installed)

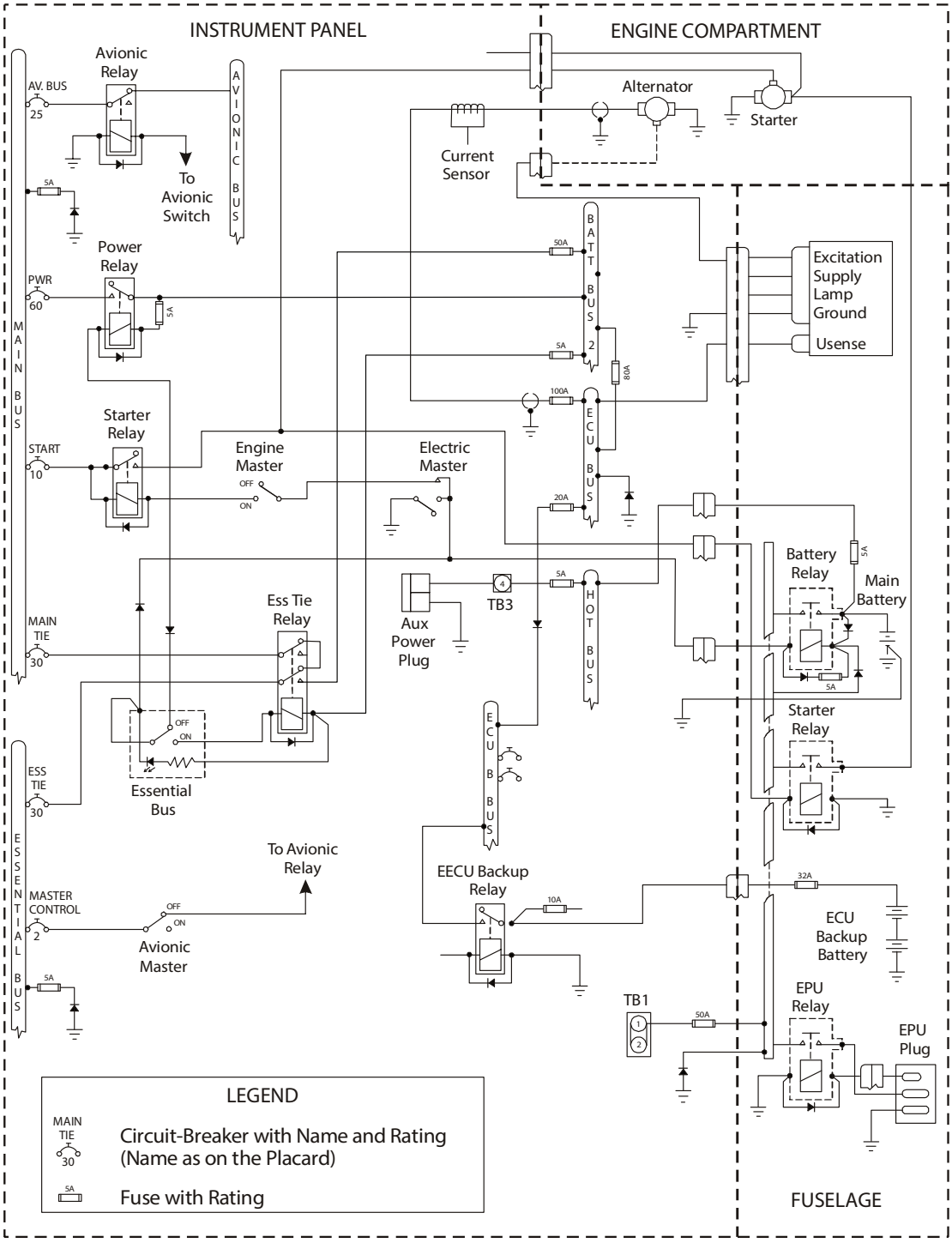

Figure 4 : Electrical System Schematic Diagram (if MÄM 40-551) is installed)

2. 28 VDC System Description and Operation

Figure 1 shows the electrical system schematic diagram, if the G1000 system with GFC 700 autopilot is installed.

Figure 2 shows the electrical system schematic diagram, if the conventional cockpit (OÄM 40-321 is installed).

Figure 3 shows the electrical system schematic diagram, if the G1000 system with KAP 140 autopilot (OÄM 40-329) or without autopilot (OÄM 40-330) is installed.

Figure 4 shows the electrical system schematic diagram, if the alternator regulator E4A-91-200-000 (MÄM 40-551) is installed.

A. Power Supplies

(1) Main Battery

The main battery is located in the rear fuselage on the LH side. It is a 24 V, 13.6 Ah sealed battery. It connects to the instrument panel ground point, the lightning protection system, the hot battery bus and the battery relay.

(2) Alternator

The alternator is located at the bottom, left rear of the engine. A flat multi-V belt with automatic tensioner turns the alternator. The alternator is connected to an external regulator, located under the pilot's seat. The output connects to the ECU bus bar via a 100 Amp fuse. The field can be energized directly by the ECU backup battery if the main battery fails.

(3) Engine Control Unit (ECU) Backup Battery

The ECU backup battery is located in the rear fuselage. It consists of two 12 V, 7.2 Ah sealed batteries, connected in series. The ECU backup battery connects directly to the ECU B bus.

The ECU backup battery is also used as alternator excitation battery.

(4) External Power Connector

The external power connector is located on the left side of the rear fuselage, near the relay junction box. The external power connector connects to the external power relay in the relay junction box on the baggage compartment frame.

- The control pin connects to the relay coil through a diode to prevent reverse connection.
- The + pin connects to the relay main input connection.
- The - pin connects to ground.

B. Power Supply Control

(1) Battery Relay

The battery relay is located in the relay junction box on the baggage compartment frame. The output connects directly to the relay junction box bus bar. The coil + of the battery relay is tied to the battery + connection to the relay. The ELECTRIC MASTER key switch provides the coil ground when set to the ON or START position.

(2) External Power Relay

The external power relay is located in the relay junction box on the baggage compartment frame. The output connects directly to the relay junction box bus bar.

If 28 VDC external power is connected, the +28 VDC on the control pin energizes the relay. The relay connects the external power to the relay junction box bus bar.

(3) Bus Structure

All buses are flat metal strips connecting rows of circuit-breakers. The circuit-breakers are located on the instrument panel on the right side.

(4) Relay Junction Box Bus

The relay junction box bus is located in the relay junction box on the baggage compartment frame. It is a flat metal strip connecting these relays:

- The external power relay.
- The battery relay.
- The starter relay.

The bus has three outputs:

- The battery bus in the instrument panel.
- The glow plugs.
- The engine starter motor solenoid.

(5) ECU Bus

The ECU bus is located at the circuit breakers. The ECU bus has power when the any one of the following are connected to the ECU bus:

- The main battery.
- External power.
- The alternator.

The ECU bus provides power for Engine Control Unit A (ECU A) and ECU B and their fuel pumps. Circuit-breakers protect each circuit.

The ECU B and its fuel pump is connected to the ECU bus via a diode and a fuse. The ECU backup battery is also connected to ECU B and its fuel pump.

(6) Main Bus

The main bus provides power for the consumers. Each consumer has a circuit breaker to protect the circuit. The main bus also connects to the switch contact of the starter relay. A circuit-breaker protects the supply to the relay.

(7) Power Relay

The power relay connects the battery bus in the instrument panel to the main bus. The essential bus switch controls the power relay.

(8) Essential Tie Relay

In the usual (de-energized) condition, the essential tie relay connects the main bus to the essential bus.

In the emergency (energized) condition, the essential tie relay connects the battery bus in the instrument panel to the essential bus.

The essential bus switch controls the essential tie relay.

(9) Essential Bus Switch (Marked ESS BUS)

The ESS BUS switch is located in the switch panel at the bottom left of the instrument panel.

In the OFF position, the ESS BUS switch gives a ground to the power relay coil. The relay closes and connects the battery bus in the instrument panel to the main bus. This is the usual position when all systems are operating correctly.

In the ON position, the ESS BUS switch disconnects the ground from the power relay coil. The power relay opens and disconnects the main bus from the power supply (the battery bus). It also gives a ground to the coil of the essential tie relay. The relay energizes to break the connection between the main bus and the essential bus. At the same time, it connects the battery bus to the essential bus.

There is a light emitting diode in the essential bus switch. If there is power on the battery bus, and the ELECTRIC MASTER key switch is set to ON or START, the light emitting diode comes ON.

(10) Starter Relay

The starter relay contacts and coil connect to the main bus. A 10 A circuit-breaker protects the circuit.

When the ENGINE MASTER switch set to ON and the ELECTRIC MASTER key switch is set to START, they give a ground to the relay coil. The relay connects the main bus to the starter solenoid (part of the starter). The solenoid engages the starter and operates a heavy-current contactor to connect the relay junction box bus to the starter.

(11) Avionics Master Relay

The avionics master relay connects the main bus (if G1000 system is installed) or the essential bus (if the conventional cockpit is installed) to the avionics bus. The AVIONIC MASTER switch controls the relay.

(12) AVIONIC MASTER Switch

With the AVIONIC MASTER switch set to OFF:

- The avionic master relay is energized to disconnect the avionics bus from the main bus.

With the AVIONIC MASTER switch set to ON:

- The avionic master relay is de-energized to connect the avionics bus to the main bus.

(13) ENGINE MASTER Switch

The ENGINE MASTER switch is located on the left, center of the instrument panel switch panel. It has four sets of contacts. When set to ON, each set of contacts connects one input to one output as follows:

- ECU A power supply to ECU A.
- ECU B power supply to ECU B. The ECU backup relay is energized.
- ECU backup battery to the alternator regulator enable connection.
- ELECTRIC MASTER key switch START connection to the starter relay.

DC GENERATION

1. General

The DC generation system for the DA 40 NG has these components:

- Alternator.
- Alternator current sensor.
- Alternator fuse.
- Voltage regulator.
- Alternator excitation battery (ECU backup battery).

This Section gives you only the simplified description, Trouble-Shooting and Maintenance Practices for the generating system. Refer to Section 24-00 for the full system description and operation.

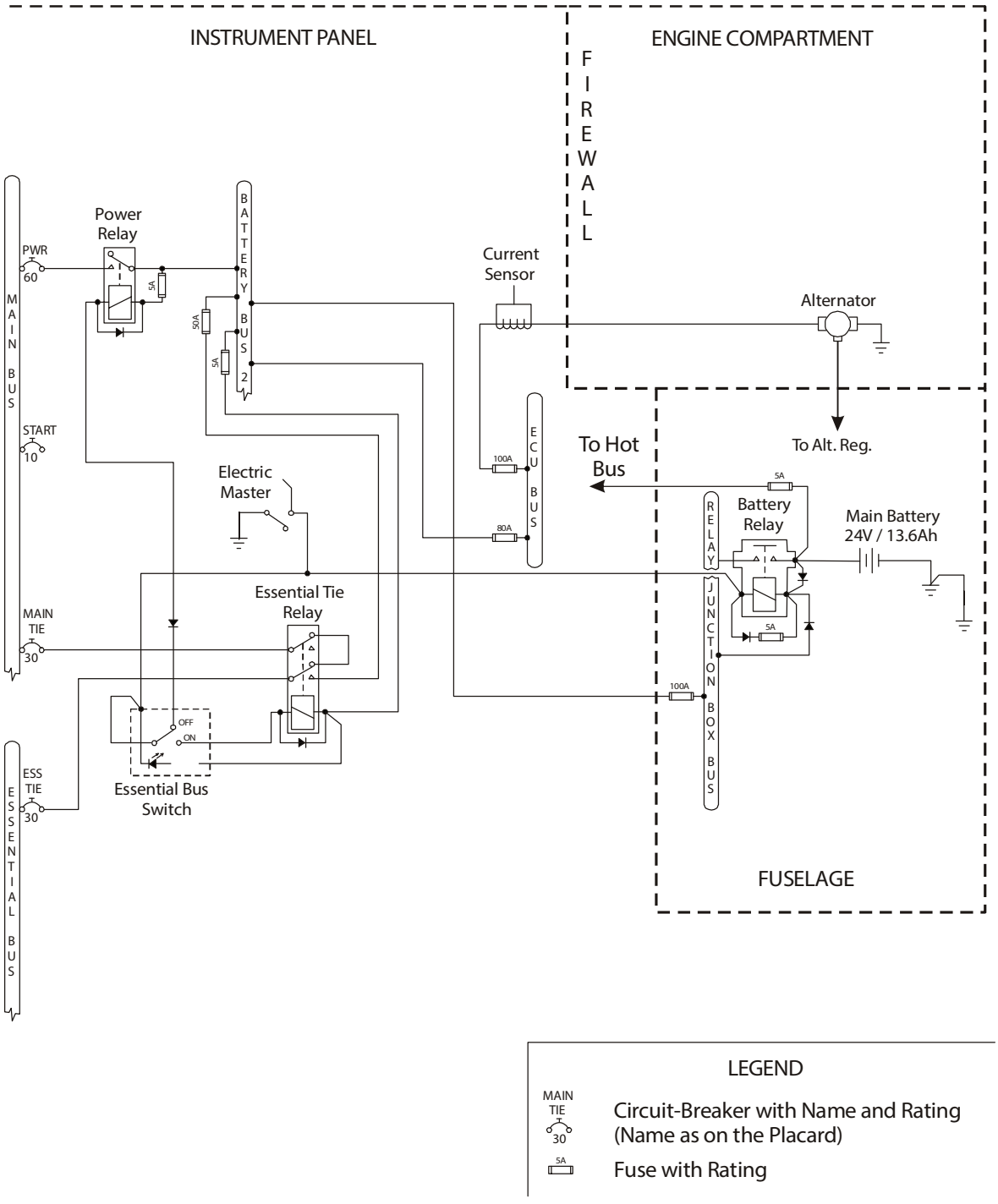

Figure 1 : Electrical Generation System - Simplified Schematic Diagram

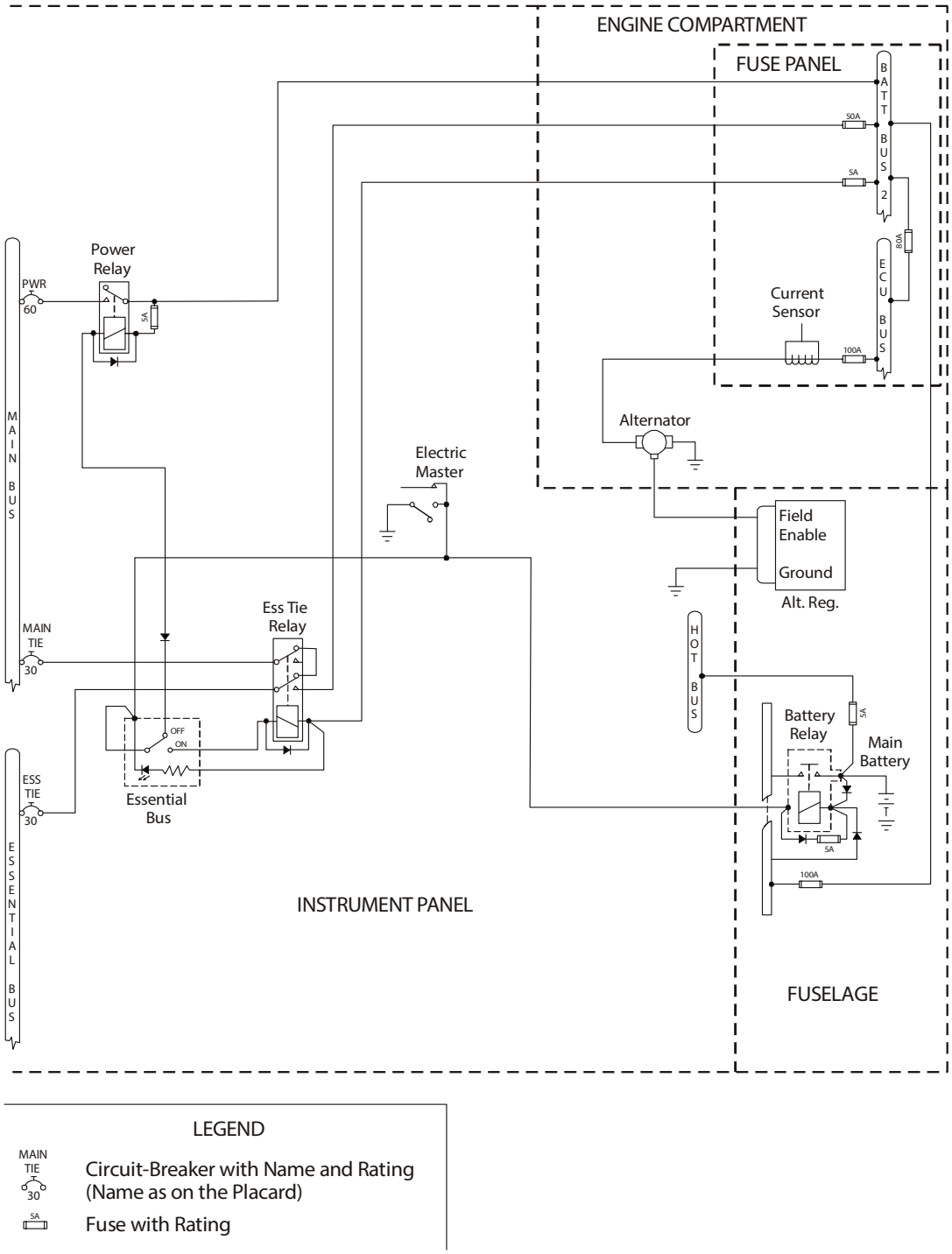

Figure 2 : Electrical Generation System - Simplified Schematic Diagram if Conventional Cockpit (OÄM 40-321), OÄM 40-329 or OÄM 40-330 is installed)

2. Description and Operation

Figure 1 shows the generation system simplified schematic diagram if the G1000 system with the GFC 700 autopilot is installed.

Figure 2 shows the generation system simplified schematic diagram if the conventional cockpit (OÄM 40-321), G1000 system with KAP 140 autopilot (OÄM 40-329) or G1000 system without autopilot (OÄM 40-330) is installed.

A. Alternator

The alternator is supplied as part of the engine. It is a 28 VDC machine with a maximum output of 70 A. It attaches to the rear left of the engine. A multi-V flat belt turns the alternator. An automatic system adjusts the belt tension.

The alternator has an external voltage regulator.

There is no approved maintenance possible on the alternator.

B. Alternator Excitation Battery (ECU Backup Battery)

The ECU backup battery is also used as alternator excitation battery. It is located in the rear fuselage, behind the first ring spar.

The ENGINE MASTER switch controls the circuit to the alternator regulator.

C. Alternator Current Sensor

An alternator current sensor is located in the instrument panel or in the engine compartment.

D. Alternator Fuse

A 100 A fuse is located in the instrument panel or in the engine compartment between the alternator cable and the ECU bus.

E. Alternator Regulator

The alternator regulator is located under the pilot’s seat. It measures the alternator output voltage and controls the current through the alternator field coils via a pulse-width modulated signal. To keep the output voltage stable in all load and speed situations, the alternator field signal is modulated accordingly.

TROUBLE-SHOOTING

1. General

This table below lists the defects that you could have with the generating system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
The Alternator warning light is illuminated.	Alternator is defective.	Refer to the engine manufacturer.
	Alternator regulator is defective.	Refer to the engine manufacturer.

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MAINTENANCE PRACTICES

1. General

This Section gives you the data to remove/install and adjust the components of the 28 VDC electrical generation system on the airplane. Refer to the component manufacturers' manuals for more data and shop data.

2. Electrical Safety

The DA 40 NG has a low voltage DC electrical system. When correctly maintained it is safe to work on. The battery can supply heavy current through low resistance circuits (for example, if you ground the positive output with a wrench by accident).

Always follow the usual safety practices for working on electrical equipment. Allow only qualified persons to maintain the electrical system.

CAUTION: DISCONNECT THE BATTERY BEFORE DOING MAINTENANCE ON THE ELECTRICAL SYSTEM. MAKE SURE THAT YOU DISCONNECT THE NEGATIVE LEAD FIRST.

CAUTION: CAUTION: AFTER DOING ELECTRICAL MAINTENANCE ALWAYS DO A CONFIDENCE TEST OF THE SYSTEM WITH A 24 VOLT POWER SUPPLY THAT HAS OVER-CURRENT PROTECTION. DO THIS BEFORE CONNECTING THE BATTERY.

CAUTION: CAUTION: USE ONLY DA 40 NG SPARE PARTS APPROVED BY THE MANUFACTURER.

3. Replace the Alternator Fuse if OÄM 40-321, OÄM 40-329, OÄM 40-330 Are Not Installed.

	Detail Steps/Work Items	Key Items/References
(1)	Disconnect the airplane main battery: - Disconnect the negative cable from the battery. - Disconnect the positive cable from the battery.	
(2)	Remove the instrument panel cover.	
(3)	Release the 100 Amp alternator fuse.	Dispose of the old fuse.
(4)	Install a new 100 Amp fuse.	
(5)	Install the instrument panel cover.	
(6)	Do an engine ground test.	The ammeter must show an electrical load.

4. Replace the Alternator Fuse if OÄM 40-321, OÄM 40-329, OÄM 40-330 Is Installed.

	Detail Steps/Work Items	Key Items/References
(1)	Disconnect the airplane main battery: - Disconnect the negative cable from the battery. - Disconnect the positive cable from the battery.	
(2)	Remove the engine cowlings.	Refer to Section 71-10.
(3)	Remove the cover of the fuse panel in the engine compartment.	
(4)	Release the 100 Amp alternator fuse.	Dispose of the old fuse.
(5)	Install a new 100 Amp fuse.	
(6)	Install the cover of the fuse panel in the engine compartment.	
(7)	Install the engine cowlings.	Refer to Section 71-10.
(8)	Do an engine ground test.	The ammeter must show an electrical load.

5. Replacement of the Alternator Cable

	Detail Steps/Work Items	Key Items/References
(1)	Disconnect the airplane main battery: - Disconnect the negative cable from the battery. - Disconnect the positive cable from the battery.	Refer to Section 24-31.
(2)	Disconnect the ECU backup battery: - Disconnect the negative cable from the battery. - Disconnect the positive cable from the battery.	Refer to Section 24-31.
(3)	Remove the instrument panel cover.	Refer to Section 25-10.
(4)	Remove the engine cowlings.	Refer to Section 71-10.
(5)	Remove the engine intercooler.	Refer to Section 81-00.
(6)	Note the routing and connections of the alternator cable.	
(7)	Remove the firewall feed-thru from the engine side of the firewall: - Remove the firewall sealant from the feed-thru. - Drill out the two rivets which hold the shields to the firewall. - Remove the shields. - Pull the two parts of the feed-thru clear of the firewall.	Keep the two parts of the feed-thru.
(8)	Disconnect the alternator cable and its shield at the alternator.	
(9)	Disconnect the alternator cable and its shield in the instrument panel.	
(10)	Remove the screws, washers and locknuts connecting the current sensor to the instrument panel floor.	
(11)	Disconnect the current sensor at the in-line connector.	

	Detail Steps/Work Items	Key Items/References
(12)	Remove the alternator cable clear of the airplane and discard (except the insulating boot).	
(13)	Install the new alternator cable into the airplane. Routing as noted in step (6).	
(14)	Connect the alternator cable and its shield in the instrument panel.	
(15)	Install the current sensor with the screws, washers and locknuts onto the instrument panel floor.	
(16)	Connect the current sensor to its in-line connector.	
(17)	Install the insulating boot onto the alternator cable and connect it and its shield at the alternator.	
(18)	Secure the alternator cable and other cables and harnesses with appropriate cable ties.	
(19)	Install the feed-thru to the engine side of the firewall with firewall sealant: - Put the two parts of the feed-thru round the control cable. - Push the feed-thru in the firewall. - Put the two shields in position over the feed-thru. Apply firewall sealant. - Install two pop-rivets to attach the shields to the firewall.	Use PR 812 (MIL-S-38249 Type 1) firewall sealant.
(20)	Clean working areas, check for foreign objects.	
(21)	Install the engine intercooler.	Refer to Section 81-00.
(22)	Install the engine cowlings.	Refer to Section 71-10.
(23)	Install the instrument panel cover.	Refer to Section 25-10.

	Detail Steps/Work Items	Key Items/References
(24)	Connect the cables to the ECU backup battery: - Connect the positive cable to the battery. - Connect the negative cable to the battery.	Refer to Section 24-31.
(25)	Connect the cables to the main battery: - Connect the positive cable to the battery. - Connect the negative cable to the battery.	Refer to Section 24-31.
(26)	Check all altered, replaced, repaired parts for proper function.	
(27)	Test all systems in working area for function.	
(28)	Make all necessary entries in the airplane logs	

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BATTERY SYSTEM

1. General

This Section tells you about the battery systems for DA 40 NG airplanes. See Sections 24-00 and 24-32 for the description and operation of the battery in the electrical generation system.

The airplane has three batteries:

- A main battery located in the rear fuselage behind the baggage compartment frame. This battery provides the usual airplane electrical services.
- An ECU backup battery located in the rear fuselage behind the first ring frame. The ECU backup battery connects directly to the ECU backup relay. This battery provides power to the ECU B and its fuel pump if all other power supplies fail.
- If the G1000 system is installed, an emergency battery located on the instrument panel. Refer to Section 24-32 for information about this battery.

2. Main Battery Description and Operation

The main battery is a 24 V, 13.6 Ah sealed battery. A tray in the fuselage holds the base of the battery. A strap holds the battery in place. The positive and negative cables attach to terminals at the top of the battery. The usual rubber caps protect the connections.

When the alternator voltage is greater than the battery voltage, the alternator charges the battery.

When the alternator is operating, the digital voltmeter shows the alternator voltage. When the alternator is off-line, the digital voltmeter shows the battery voltage.

The battery supplies current to the battery bus through the battery relay. The battery relay is in the relay junction box which is located on the baggage compartment frame adjacent to the battery. There is no circuit-protection.

The battery also supplies the hot battery bus. A 5 A fuse protects the hot battery system.

The main battery is maintenance free.

If OÄM 40-363 is installed, eight heater foils are attached to the main battery. The heater foils can be powered by an external 230 V / 50 Hz power supply via a connector located in the lower aft baggage compartment.

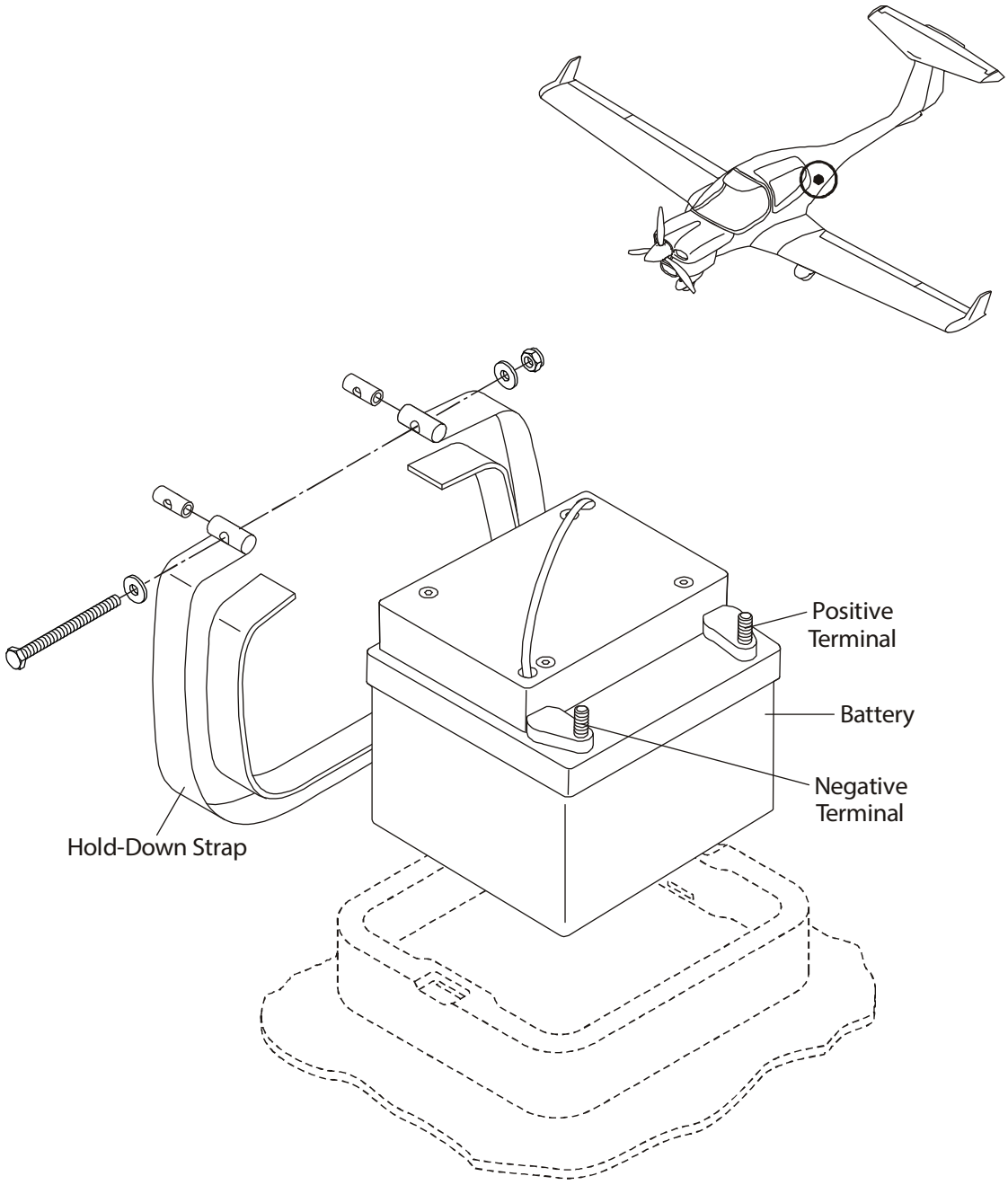

Figure 1 : Main Battery Installation

3. ECU Backup Battery - Description and Operation

The ECU backup battery consists of two 12 V, 7.2 Ah sealed units connected in series. A tray behind the first ring spar holds the battery. The positive and negative cables attach to terminals at the top of the battery.

When the ECU B bus voltage is greater than the battery voltage, the bus charges the battery.

The battery supplies current to the ECU B and its fuel pump through the ECU backup relay. The relay is on the instrument panel shelf. A 32 A fuse protects the circuit.

It also supplies power to the alternator regulator via a 10 A fuse and the ENGINE MASTER switch.

If OÄM 40-363 is installed, three heater foils are attached to the ECU backup battery. The heater foils can be powered by an external 230 V / 50 Hz power supply via a connector located in the lower aft baggage compartment.

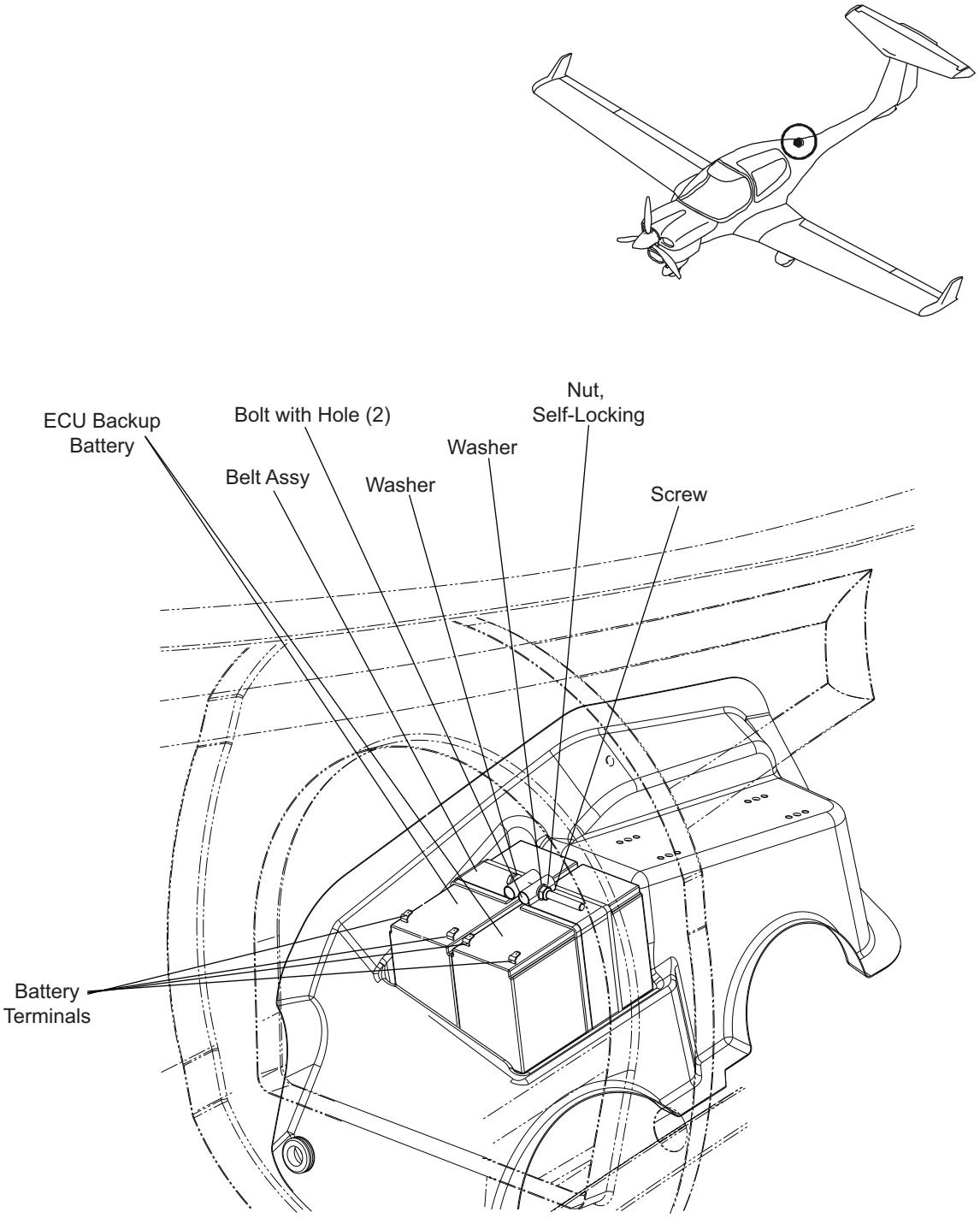

Figure 2 : ECU Backup Battery Installation

TROUBLE-SHOOTING

1. General

This table below lists the defects that you could have with the battery system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Main battery voltage low.	Battery capacity low.	Do a capacity test. If necessary, replace the battery.
	Alternator output low.	Trouble-Shoot the alternator, refer to Section 24-31.
Main battery will not connect to the battery bus.	Battery relay defective.	Replace the battery relay.
	ELECTRIC MASTER key switch defective.	Replace the ELECTRIC MASTER key switch.
	Battery system wiring defective.	Do a test of the battery system wiring. Refer to Chapter 92 for the wiring diagrams
Main battery will not connect to the hot battery bus.	5 A fuse failed.	Replace the 5 A fuse. If the fuse fails again, do a test for a short circuit between the hot battery bus and ground. Repair or replace the defective component.
Ammeter shows zero at all times.	Defective ammeter.	Replace the engine/airframe unit (if G1000 is installed) or SED (if installed).
	Defective ammeter transducer	Replace the transducer.
Voltmeter shows zero.	Defective voltmeter.	Replace the engine/airframe unit (if G1000 is installed) or SED (if installed).
	Defective wiring in the voltmeter system.	Do a test of the wiring. Refer to Chapter 92 for the wiring diagrams.

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MAINTENANCE PRACTICES

1. General

Keep the batteries clean. Remove grease and other contaminants from the battery case. Remove dirt from the area of the terminals. Protect the terminals and cable lugs with Dow Corning compound 4 (DC4).

If you do not use the airplane regularly you must remove the batteries for charging.

CAUTION: INSTALL ONLY A BATTERY WHICH IS APPROVED BY THE AIRPLANE MANUFACTURER.

2. Safety Precautions

Obey the maintenance instructions of the battery manufacturer.

Always disconnect the battery when you do work on the electrical system.
Disconnect the negative cable first. Connect the negative cable last.

3. Remove/Install the Airplane Main Battery

A. Remove the Main Battery from the Airplane

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the baggage extension and baggage tray for access to the battery.	Refer to Section 25-10.
(2)	Disconnect the negative cable from the battery.	
(3)	Disconnect the positive cable from the battery.	
(4)	Remove the battery hold-down strap: - Remove the bolt, nut, two washers and the two bolts with holes from the hold-down strap.	
(5)	If OÄM 40-363 (battery heating system) is installed disconnect the battery heaters.	At the in-line connector.
(6)	Remove the battery from the airplane.	

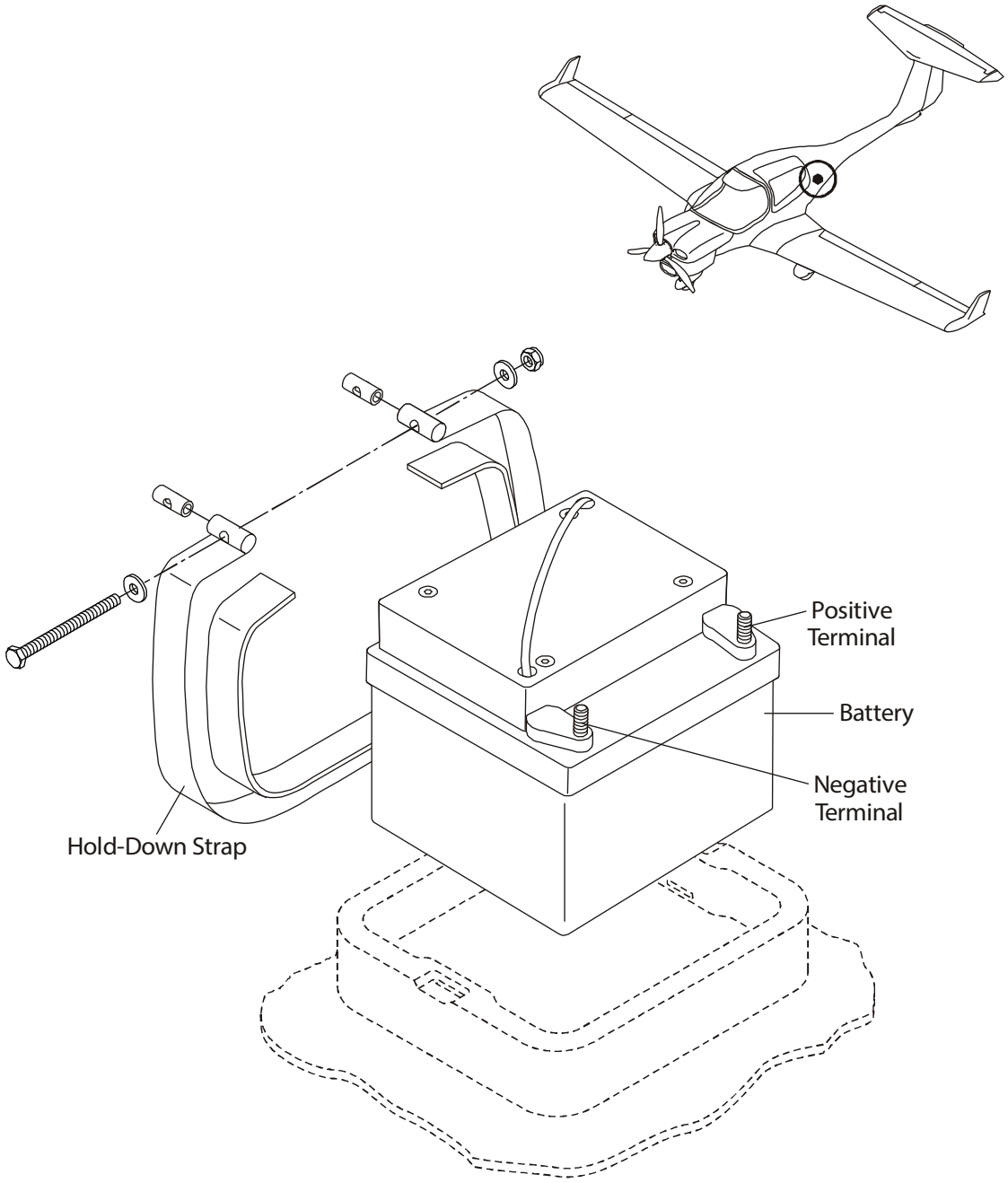

Figure 201 : Airplane Main Battery - Removal/Installation

B. Install the Main Battery in the Airplane.

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the battery is clean and dry.	
(2)	Move the battery into position in the battery mount.	
(3)	If OÄM 40-363 (battery heating system) is installed, connect the battery heaters.	At the in-line connector.
(4)	Install the battery hold-down strap: - Put the battery hold-down strap into position over the battery. - Insert the two bolts with holes into the clamp. - Install the bolt, two washers and nut onto the clamp.	Make sure that the hold-down strap is seated correctly.
CAUTION: MAKE SURE THAT YOU CONNECT THE CABLES TO THE CORRECT TERMINALS. INCORRECT CONNECTION CAN DAMAGE THE ELECTRICAL AND AVIONIC SYSTEMS.		
(5)	Connect the positive cable to the battery.	Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(6)	Connect the negative cable to the battery.	Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(7)	Install the baggage extension and baggage tray.	Refer to Section 25-10.

4. Remove/Install the ECU Backup Batteries

NOTE: The two ECU backup batteries are removed/installed together.

A. Remove the ECU Backup Batteries from the Airplane.

Refer to Figure 202.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the baggage extension and baggage tray for access to the ECU batteries.	Refer to Section 25-10.
(2)	Disconnect the airplane main battery for maintenance.	Refer to Para 5.A.
(3)	Disconnect the negative cables from the two ECU backup batteries.	
(4)	Disconnect the positive cables from the two ECU backup batteries.	
(5)	Remove the battery hold-down belt assembly: - Remove the bolt, nut, two washers and the two bolts with holes from the hold-down belt.	
(6)	Remove the batteries from the airplane.	

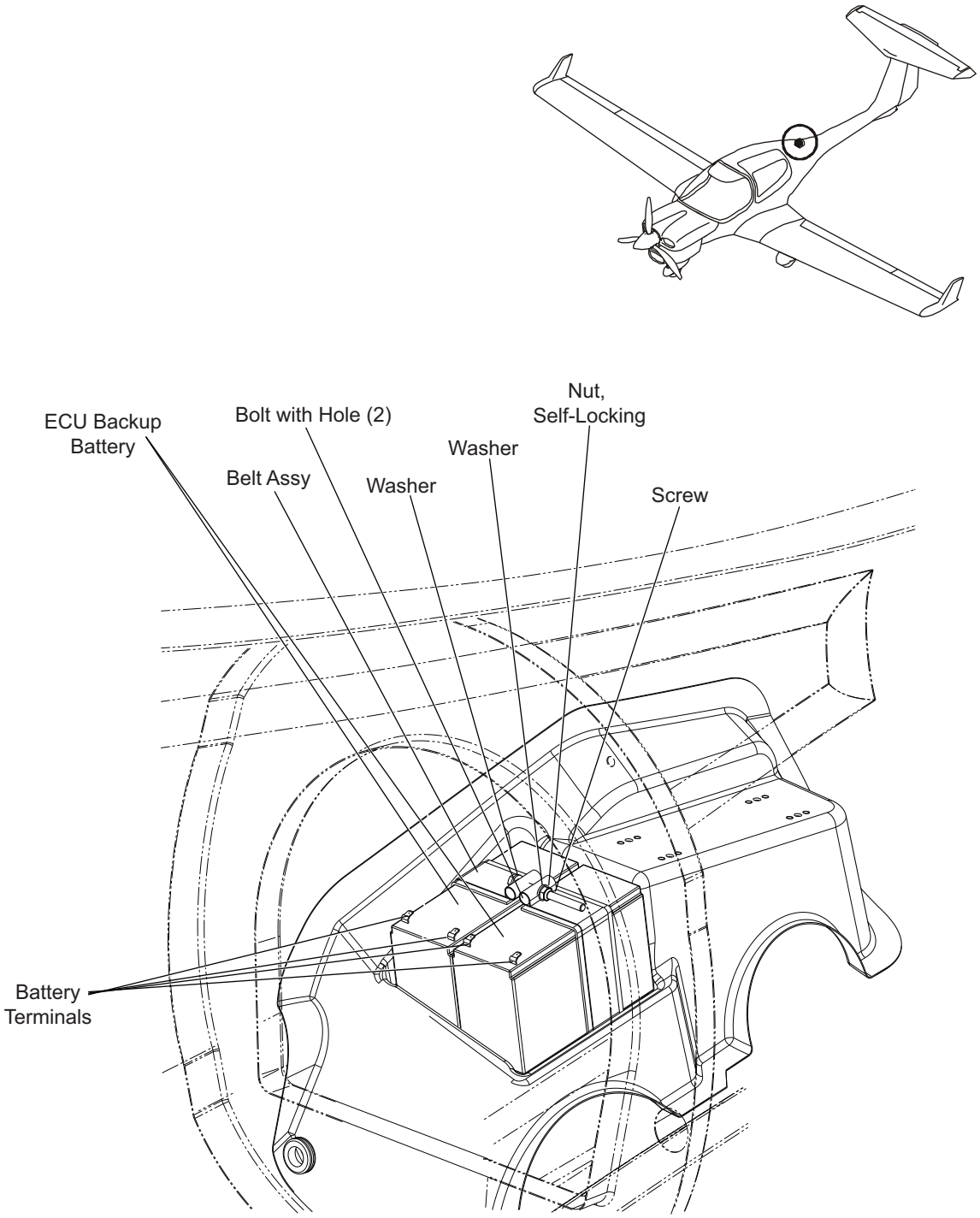

Figure 202 : ECU Backup Batteries - Removal/Installation

B. Install the ECU Backup Batteries in the Airplane.

Refer to Figure 202.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the batteries are clean and dry.	
(2)	Move the batteries into position in the mounting tray.	
(3)	Install the battery hold-down belt assembly: - Put the battery hold-down belt into position over the batteries. - Insert the two bolts with holes into the clamp. - Install the bolt, two washers and nut onto the clamp.	Make sure that the hold-down belt is seated correctly.
CAUTION: MAKE SURE THAT YOU CONNECT THE CABLES TO THE CORRECT TERMINALS. INCORRECT CONNECTION CAN DAMAGE THE ELECTRICAL AND AVIONIC SYSTEMS.		
(4)	Connect the positive cables to the batteries.	Apply Dow Corning compound (DC4) to the battery terminals and the cable lugs.
(5)	Connect the negative cables to the batteries.	Apply Dow Corning compound (DC4) to the battery terminals and the cable lugs.
(6)	Connect the airplane main battery after maintenance.	Refer to Para 5.B.
(7)	Install the baggage extension and baggage tray.	Refer to Section 25-10.

5. Disconnect/Connect the Battery for Maintenance

A. Disconnect the Battery for Maintenance

	Detail Steps/Work Items	Key Items/References
(1)	Remove the baggage extension and baggage tray.	Refer to Section 25-10.
(2)	Disconnect the negative cable from the battery.	
(3)	Disconnect the positive cable from the battery.	

B. Connect the Battery after Maintenance

	Detail Steps/Work Items	Key Items/References
CAUTION: MAKE SURE THAT YOU CONNECT THE CABLES TO THE CORRECT TERMINALS. INCORRECT CONNECTION CAN DAMAGE THE ELECTRICAL AND AVIONIC SYSTEMS.		
(1)	Connect the positive cable to the battery.	Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(2)	Connect the negative cable to the battery.	Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(3)	Install the baggage extension and baggage tray.	Refer to Section 25-10.

6. Remove/Install the Battery Relay

A. Remove the Battery Relay

	Detail Steps/Work Items	Key Items/References
(1)	Remove the baggage extension and baggage tray.	Refer to Section 25-10.
(2)	Disconnect the airplane main battery: - Disconnect the negative cable from the battery. - Disconnect the positive cable from the battery.	
(3)	Disconnect the ECU backup battery: - Disconnect the negative cable from the battery. - Disconnect the positive cable from the battery.	
(4)	Remove the bolts and washers attaching the bus bar and cables to the relay.	
(5)	Disconnect the electrical cables of the battery relay from the terminal block.	
(6)	Remove the relay from the airplane.	

B. Install the Battery Relay

	Detail Steps/Work Items	Key Items/References
(1)	Put the relay in position in the relay box and connect the control cables to the terminal block.	Check for correct polarity.
(2)	Connect the battery positive cable and the four smaller cables to the battery relay: - Move the two smaller cables on the forward side into position and install the bolt and washer that attaches the cables to the relay through all two cables and into the relay mounting. - Move the battery positive cable and the two smaller cables on the aft side into position and install the bolt and washer that attaches the cables to the relay through all three cables and into the relay mounting.	Refer to Chapter 92 for the wiring diagrams.
(3)	Connect the cables to the main battery: - Connect the positive cable to the battery. - Connect the negative cable to the battery.	Refer to Section 24-31. Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(4)	Connect the cables to the ECU backup battery: - Connect the positive cable to the battery. - Connect the negative cable to the battery.	Refer to Section 24-31. Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(5)	Install the baggage extension and baggage tray.	Refer to Section 25-10.
(6)	Do a test for correct operation of the battery relay.	Refer to Paragraph 6.

7. Battery Relay Operational Test

	Detail Steps/Work Items	Key Items/References
(1)	Set the ELECTRIC MASTER key switch to ON.	The voltmeter must indicate the battery voltage.
(2)	Set the ELECTRIC MASTER key switch to OFF.	

EMERGENCY BATTERY SYSTEM

1. General

This Section tells you about the emergency battery system for DA 40 NG airplanes (if G1000 is installed). Regular maintenance of the emergency battery system is necessary.

Refer to Chapter 92 for the wiring diagrams.

2. Description

The emergency battery system consists of:

- An emergency battery pack.
- A sealed EMERGENCY switch.

The emergency battery pack consists of 10 lithium manganese batteries, 3 V, 1,300 mAh. Refer to the Equipment List in Section 6.5 of the Airplane Flight Manual for the approved battery type.

The emergency battery pack is mounted behind the instrument panel, on the co-pilot's side.

When all other sources of electrical power fail during flight, the EMERGENCY switch on the left side of the instrument panel is set to ON to use the emergency battery. It supplies the attitude gyro (horizon) and the flood light with power for at least 1 hour.

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TROUBLE-SHOOTING

1. General

This table below lists the defects that you could have with the emergency battery system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Batteries leaking.	Batteries expired.	Replace battery pack. Clean all items that are contaminated.
Voltage on the back side of the emergency switch less than 30 Volts.	Batteries are expired.	Replace the battery pack.
	Batteries have been used.	Replace the battery pack.
	Emergency battery system wiring defective.	Repair the emergency battery system wiring.

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MAINTENANCE PRACTICES

1. General

This Section tells you how to replace the emergency battery pack. It also tells you how to test the emergency battery system.

Refer to Chapter 92 for the wiring diagrams.

2. Remove/Install the Emergency Battery Pack

A. Remove the Emergency Battery Pack

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Disconnect the electrical plug of the battery pack.	
(3)	Remove the GEA 71 off its mounting rack.	
(4)	Remove the two screws and nuts of the battery pack.	Hold the battery pack.
(5)	Remove the battery pack from the airplane.	

CAUTION: THE BATTERY PACKS CANNOT BE RE CHARGED. DO NOT TRY TO RECHARGE THE BATTERY PACKS. IF YOU TRY TO RECHARGE THE BATTERY PACKS, THEY CAN EXPLODE OR LEAK.

CAUTION: CAUTION: DISPOSE OF THE BATTERY PACKS PROPERLY (ASK YOUR BATTERY DEALER FOR ADVISE). BATTERIES CONTAIN POISONS WHICH HARM THE ENVIRONMENT. DO NOT THROW THE USED BATTERY PACKS INTO THE GARBAGE. DO NOT EXPOSE BATTERIES TO FIRE. DO NOT DISMANTLE BATTERY PACKS.

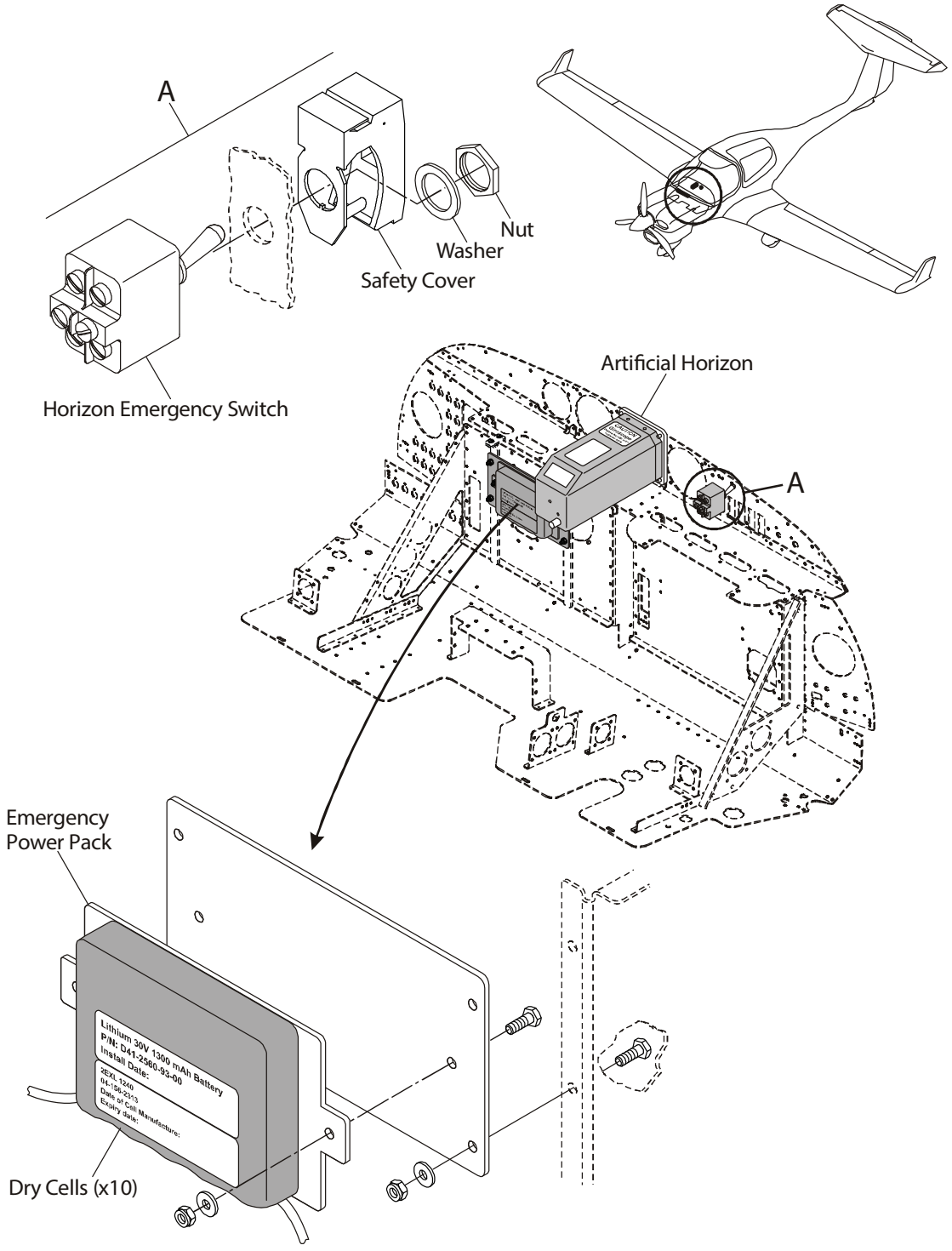

Figure 201: Emergency Battery Pack - Removal/Installation

B. Install the Emergency Battery Pack

Refer to Figure 201

CAUTION: USE ONLY NEW BATTERY PACKS. REFER TO THE EQUIPMENT LIST IN THE AIRPLANE FLIGHT MANUAL, SECTION 6.5, FOR THE CORRECT BATTERY TYPE.

CAUTION: DO NOT SHORT CIRCUIT THE BATTERY PACK.

	Detail Steps/Work Items	Key Items/References
(1)	Measure the voltage of the battery pack.	On the connector for the electrical plug. If the voltage is less than 30 V, then the batteries are used, or at least one battery was installed incorrectly. Use a new battery pack.
(2)	Put the battery pack in place in the instrument panel on the co-pilot's side.	
(3)	Install the two screws and nuts of the battery pack.	
(4)	Connect the electrical plug of the battery pack.	Make sure of the correct polarity.
(5)	Install the GEA 71.	
(6)	Measure the voltage on the back side of the EMERGENCY HORIZON switch.	If the voltage is below 30 V, it is probable that the wiring is defective. Repair wiring.
(7)	Install the instrument panel cover.	Refer to Section 25-10.

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ADDITIONAL ALTERNATOR

1. General

If OÄM 40-314 is carried out, an additional alternator is installed. The additional alternator generates electrical DC - power for optional airplane equipment. The additional alternator and its consumers form an additional electrical system which is not connected to the airplanes standard electrical system.

The additional alternator system has the following components:

- Alternator.
- Alternator fuse.
- Voltage regulator.
- Excitation battery.
- AUX POWER switch.

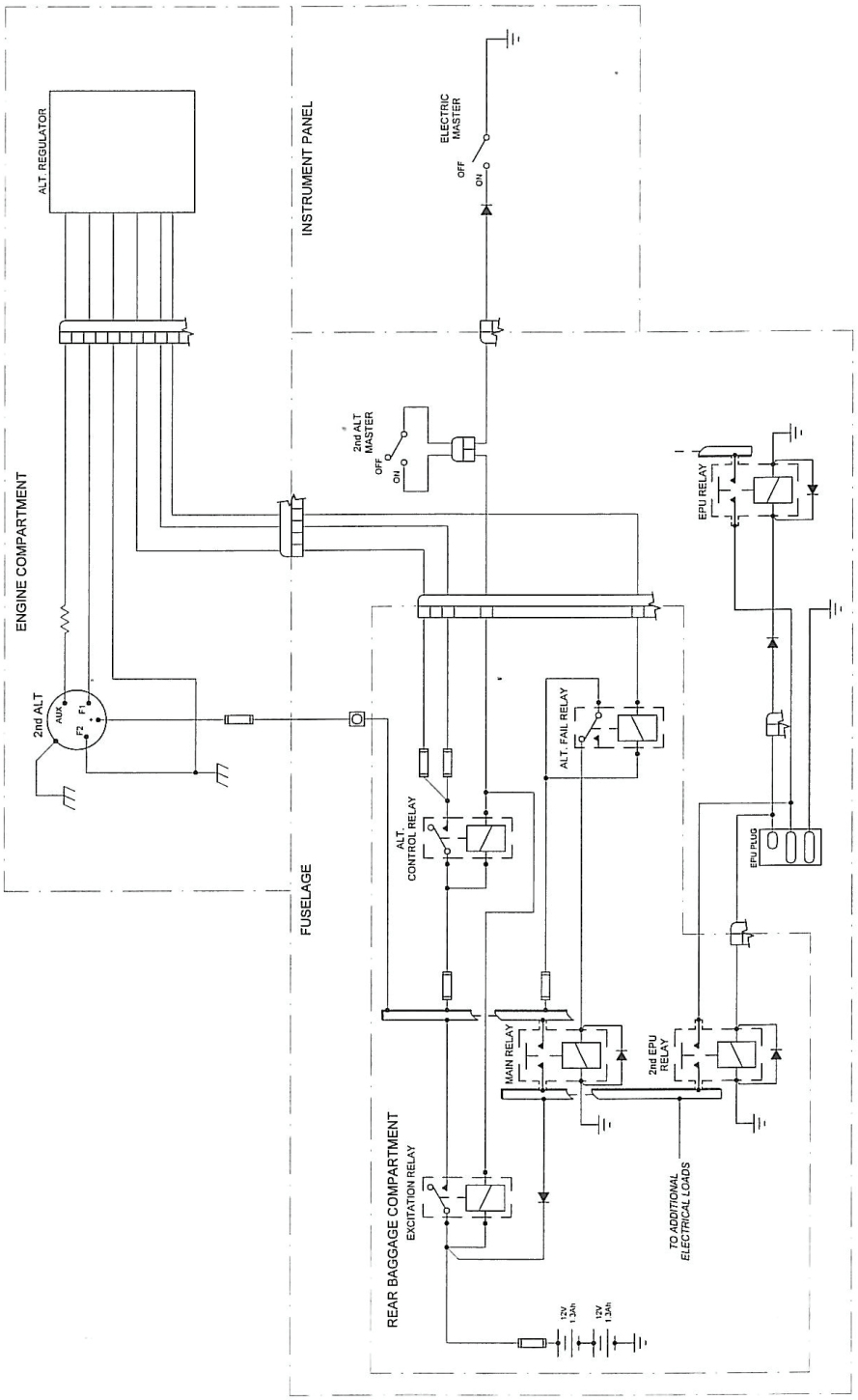

Figure 1 : Additional Alternator - Electrical System Schematic Diagram

2. Description and Operation

Figure 1 shows the additional alternator electrical system schematic diagram.

A. Additional Alternator

The additional alternator is mounted to the engine gearbox and to the forward RH engine mounting arm. The alternator is driven via a v-belt and generates up to 100 A at 28 V. The alternator has an external voltage regulator.

There is no scheduled maintenance for the additional alternator.
If the additional alternator fails, it must be replaced.

B. Additional Alternator Excitation Battery

A separately installed small battery is used for the excitation of the additional alternator.

C. Alternator Fuse

A 100 A fuse is located in the engine compartment.

D. Additional Alternator Regulator

The alternator regulator is located in the engine compartment. It measures the alternator output voltage and controls the current through the alternator field coils via a pulse-width modulated signal. To keep the output voltage stable at all load and speed conditions, the alternator field signal is modulated accordingly.

The AUX POWER switch controls the circuit to the alternator regulator.

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TROUBLE-SHOOTING

1. General

This table below lists the defects that you could have in the additional alternator electrical system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Alternator provides no electrical power.	Alternator is defective.	Replace the alternator.
	Voltage regulator is defective.	Replace the voltage regulator.
	Alternator fuse is open.	Replace the fuse.
	Alternator control fuse is open.	Replace the fuse.

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MAINTENANCE PRACTICES

1. General

This Section provides instructions how to remove/install and adjust the components of the additional 28 VDC electrical generating system. Refer to the component manufacturers' manuals for more detailed information and instructions.

2. Electrical Safety

The additional electrical system is a low voltage DC system.
When correctly maintained it is safe to work on.

Always follow the usual safety practices for working on electrical equipment.
Allow only qualified persons to maintain the electrical system.

Maintenance carried out must be of good workmanship strictly considering the guidelines of AC 43-13.1B. It is important that maintenance is carried out in accordance with the best available techniques and properly trained maintenance personnel, in order to eliminate possible failures.

CAUTION: AFTER DOING ELECTRICAL MAINTENANCE ALWAYS DO A CONFIDENCE TEST OF THE SYSTEM WITH A 24 VOLT POWER SUPPLY THAT HAS OVER-CURRENT PROTECTION. DO THIS BEFORE CONNECTING THE BATTERY.

CAUTION: USE ONLY DA 40 NG SPARE PARTS APPROVED BY THE MANUFACTURER.

3. Remove/Install the AUX POWER Switch

A. Remove the AUX POWER Switch.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the center console.	Refer to Section 25-10.
(2)	Unplug the electrical connector of the AUX POWER switch.	
(3)	Remove the nut and washer of the AUX POWER switch.	
(4)	Move the AUX POWER switch clear of the center console.	

B. Install the AUX POWER Switch.

	Detail Steps/Work Items	Key Items/References
(1)	Position the AUX POWER switch in place in the center console.	
(2)	Insert the washer and the nut of the AUX POWER switch. Tighten the nut.	
(3)	Install the electrical connectors on the AUX POWER switch.	
(4)	Install the center console.	Refer to Section 25-10.

4. Remove/Install the Additional Alternator Regulator

A. Remove the Voltage Regulator

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE ADDITIONAL ALTERNATOR REGULATOR. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Remove the engine cowling.	Refer to Section 71-10.
(3)	Disconnect the voltage regulator wiring harness.	Refer to Figure 1 in the Description and Operation Pageblock, 24-33-00.
(4)	Remove the two attachment bolts with the two bushings of the regulator.	
(5)	Remove the voltage regulator from the airplane.	

B. Install the Voltage Regulator

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE ADDITIONAL ALTERNATOR REGULATOR. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Position the alternator regulator on the regulator mounting bracket.	Refer to Figure 1 in the Description and Operation Pageblock, 24-33-00.
(3)	Install the two bolts with the two bushings which attach the alternator regulator on the regulator mounting bracket.	
(4)	Connect the electrical wiring harness to the alternator regulator.	Refer to Section 24-33.
(5)	Install the engine cowlings.	Refer to Section 71-10.
(6)	Do an engine run-up. Do a test for correct operation of the regulator.	Refer to Section 71-00.

EXTERNAL POWER

1. General

The DA 40 NG has an external power socket located on the left side of the fuselage, near the relay junction box. It is a standard 28 Volt DC power socket. When you connect external power to the external power socket, the external power control relay is energized and the external power comes on-line.

2. Description

Figure 1 shows a simple schematic diagram of the external power system. The external power system has these components:

A. 28 Volt Socket

The 28 VDC power socket is located on the left side of the fuselage, near the relay junction box. The socket has 3 pins:

- A large negative pin.
- A large positive pin.
- A small positive pin.

A diode connected between the external power relay solenoid and the small positive pin protects the system of reverse polarity.

B. External Power Relay

The external power relay is located in the relay junction box mounted on the baggage compartment frame. Heavy duty cable connects the large positive pin to the input terminal of the relay. Another heavy duty cable connects the large negative pin to the negative pole on the main battery.

The small positive pin connects to the solenoid of the external power relay via the diode.

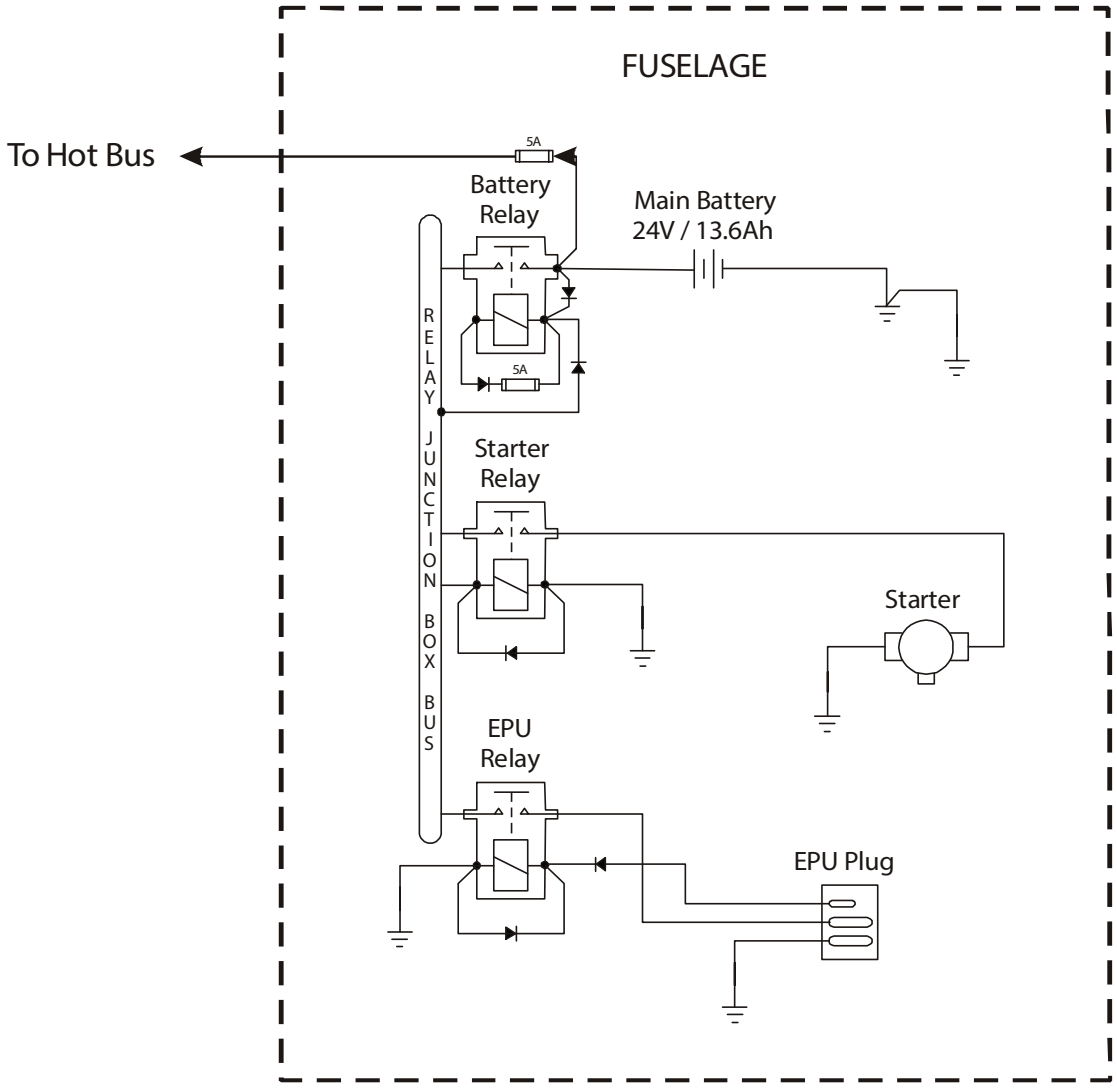

Figure 1 : External Power System - Schematic Diagram

3. Operation

When you connect a 24 to 28 V DC power supply to the external power socket these things happen:

- Current can flow from the small positive pin to the solenoid, the solenoid operates and closes the relay.
- Current can flow from the large positive pin through the external power relay to the battery bus system.
- The large negative pin is connected to ground.

If the polarity of the power supply is incorrect, then the diode will prevent current from flowing through the solenoid. The solenoid will nt operate and current cannot flow through the external power relay to the bus system.

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TROUBLE-SHOOTING

1. General

This table below lists the defects that you could have with the external power system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
External power will not come on line.	No external power.	Make sure that the external power plug is securely in the socket. Make sure that the external power is operating correctly.
	External power relay is defective.	Do a test of the external power relay, if necessary, replace the external power relay.

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MAINTENANCE PRACTICES

1. General

This Section tells you how to remove/install the external power relay. Refer to the component manufacturers manuals for more data and shop data.

2. Electrical Safety

The DA 40 NG has a low voltage DC electrical system. When correctly maintained it is safe to work on. The battery can supply heavy current through low resistance circuits (for example, if you ground the positive output with a wrench by accident).

Always follow the usual safety practices for working on electrical equipment. Allow only qualified persons to maintain the electrical system.

CAUTION: DISCONNECT THE BATTERY BEFORE DOING MAINTENANCE ON THE ELECTRICAL SYSTEM. MAKE SURE THAT YOU DISCONNECT THE NEGATIVE LEAD FIRST.

CAUTION: AFTER DOING ELECTRICAL MAINTENANCE ALWAYS DO A CONFIDENCE TEST OF THE SYSTEM WITH A 24 VOLT POWER SUPPLY THAT HAS OVER-CURRENT PROTECTION. DO THIS BEFORE CONNECTING THE BATTERY.

CAUTION: USE ONLY DA 40 NG SPARE PARTS APPROVED BY THE MANUFACTURER.

3. Remove/Install the External Power Relay

A. Remove the External Power Relay.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the baggage extension and baggage tray.	Refer to Section 25-10.
(2)	Disconnect the battery: - Disconnect the negative cable from the battery. - Disconnect the positive cable from the battery.	
(3)	Disconnect the electrical cables of the external power relay from the terminal block.	
(4)	Remove the bolts and washers which attach the bus bar and cables to the external power relay.	
(5)	Remove the relay from the airplane.	

B. Install the External Power Relay.

	Detail Steps/Work Items	Key Items/References
(1)	Put the relay in position in the relay junction box and connect the control cables to the terminal block.	Check for correct polarity.
(2)	Connect the cable to the external power relay: - Move the cable into position at the external power relay. - Install the bolts and washers that attach the cable to the relay through the cable and into the relay mounting.	Refer to Chapter 92 for the wiring diagrams.
(3)	Connect the positive cable to the battery.	Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(4)	Connect the negative cable to the battery.	Apply Dow Corning compound (DC4) to the battery terminal and the cable lug.
(5)	Install the baggage compartment and baggage tray.	Refer to Section 25-10.

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DC ELECTRICAL LOAD DISTRIBUTION

1. General

This Section tells you about the system which supplies DC electrical power for other systems. The DC electrical load distribution system has these components:

- Main bus.
- Relay junction box bus.
- ECU bus.
- Avionic bus.
- Essential bus.
- Hot battery bus.
- Battery relay.
- Power relay.
- Avionics master relay.
- Essential tie relay.
- Switches.
- Circuit-breakers.
- Fuses.

Figure 1 shows the electrical system bus structure diagram of the electrical distribution system.

Figure 2 shows the instrument panel layout with the Garmin G1000 system installed.

Figure 3 shows the electrical system bus structure diagram of the electrical distribution system, if the conventional cockpit (OÄM 40-321) is installed.

Figure 4 shows the instrument panel layout if the conventional cockpit (OÄM 40-321) is installed.

Figure 5 shows the generation system simplified schematic diagram, if the G1000 system with KAP 140 autopilot (OÄM 40-329) or G1000 system without autopilot (OÄM 40-330) is installed.

This Section gives you the Trouble-Shooting and Maintenance Practices for the electrical distribution system. Refer to Section 24-00 for the full system description and operation.

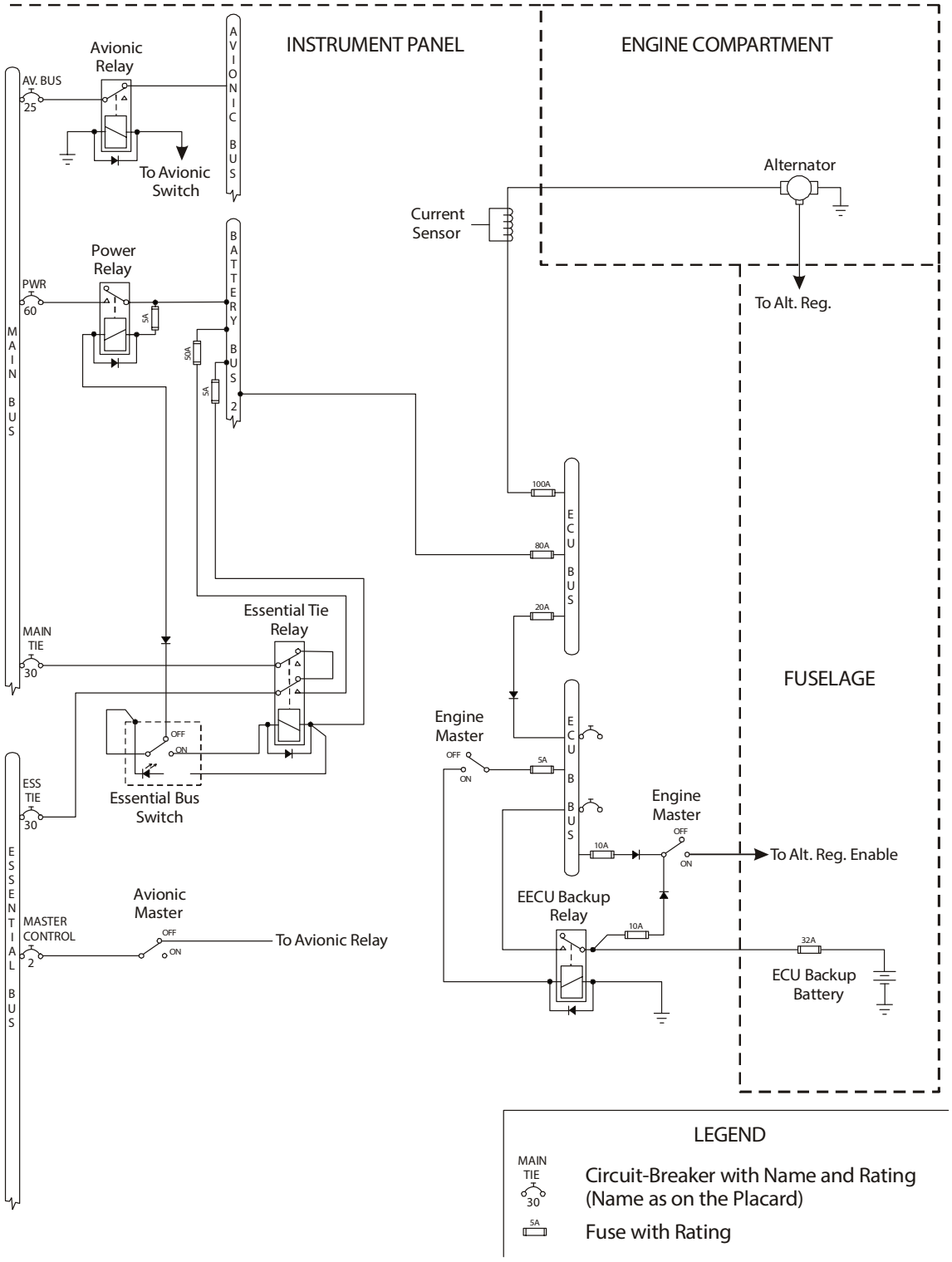


Figure 1 : Electrical System Bus Structure Diagram

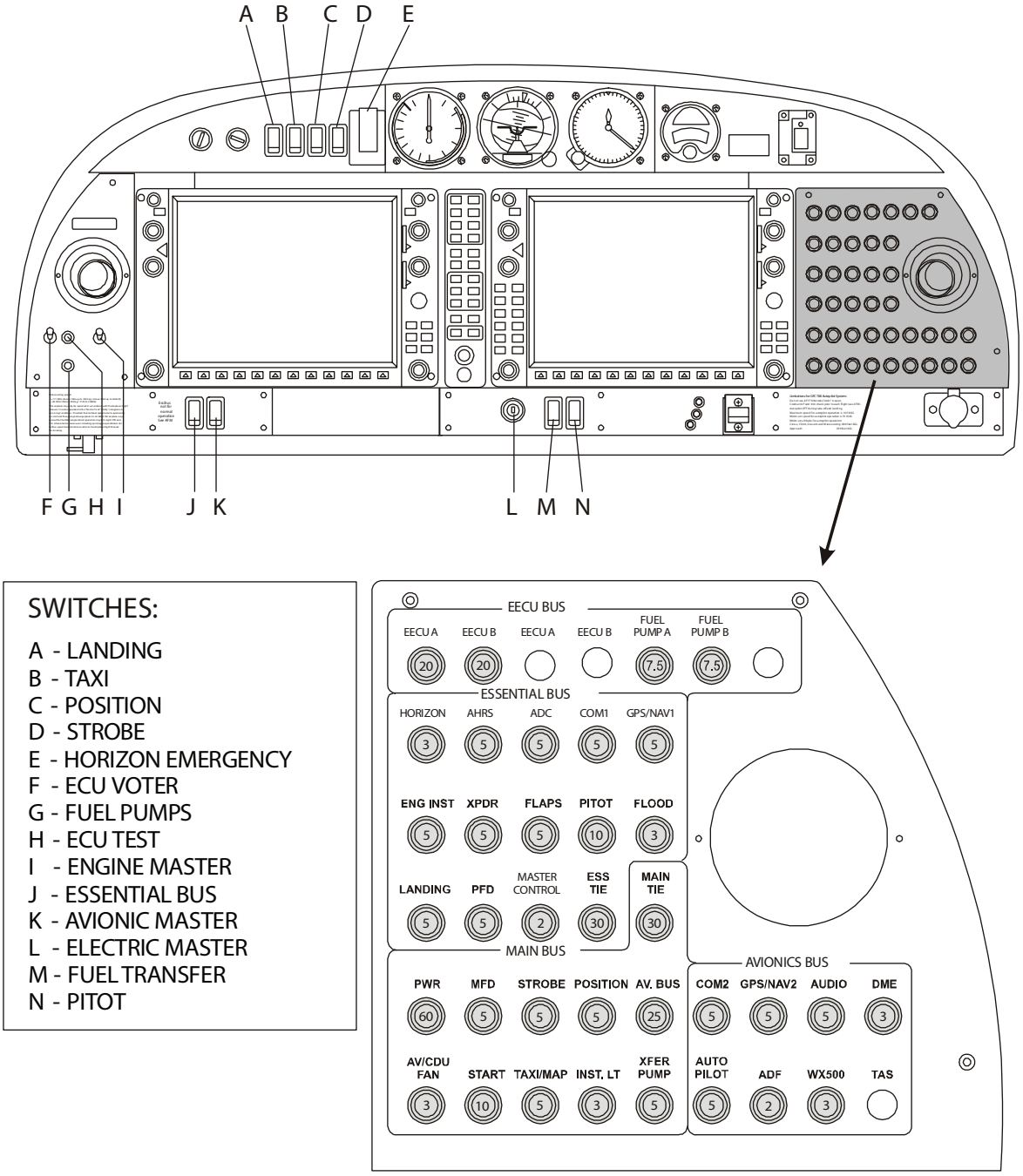


Figure 2 : Electrical Switches and Circuit Breakers

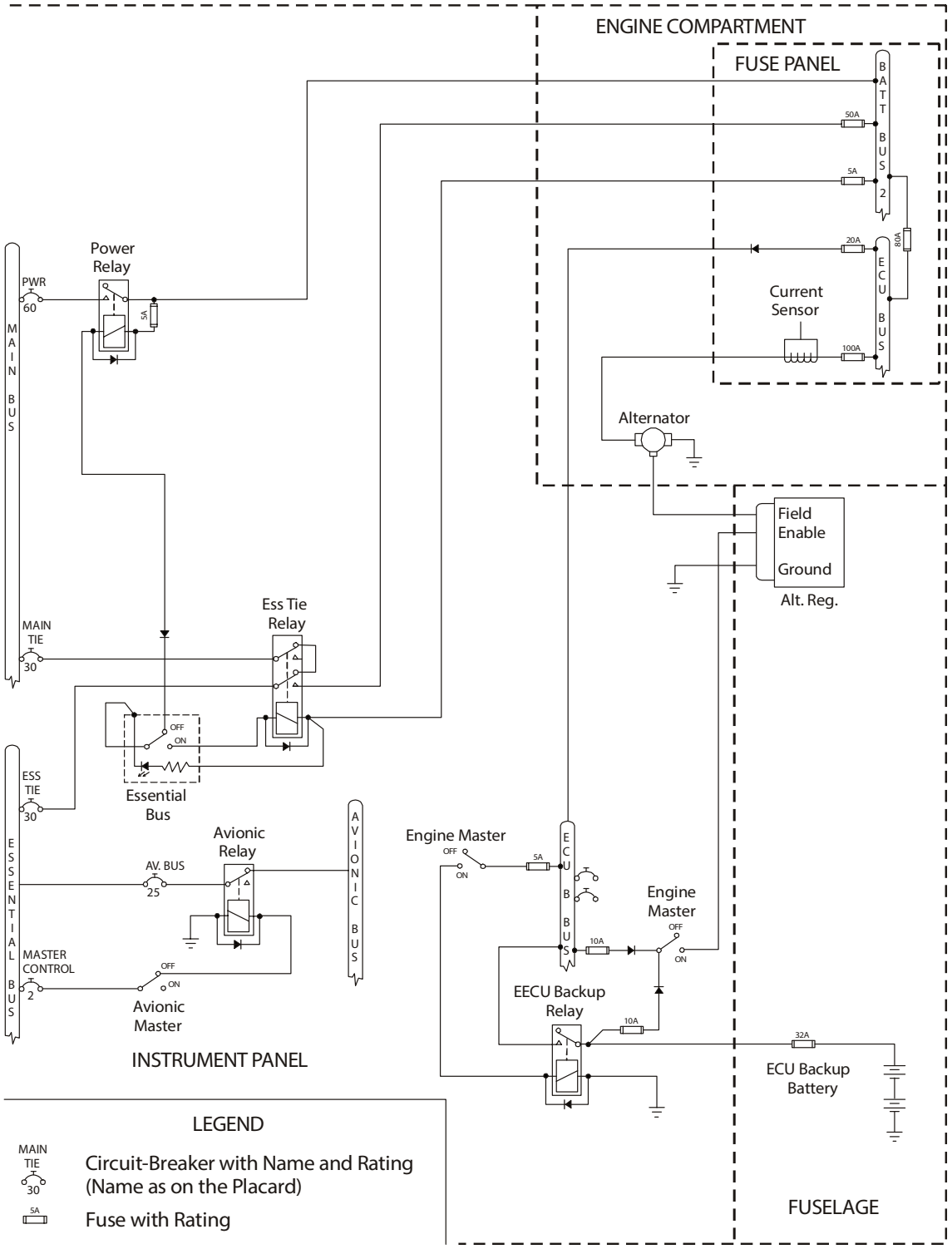
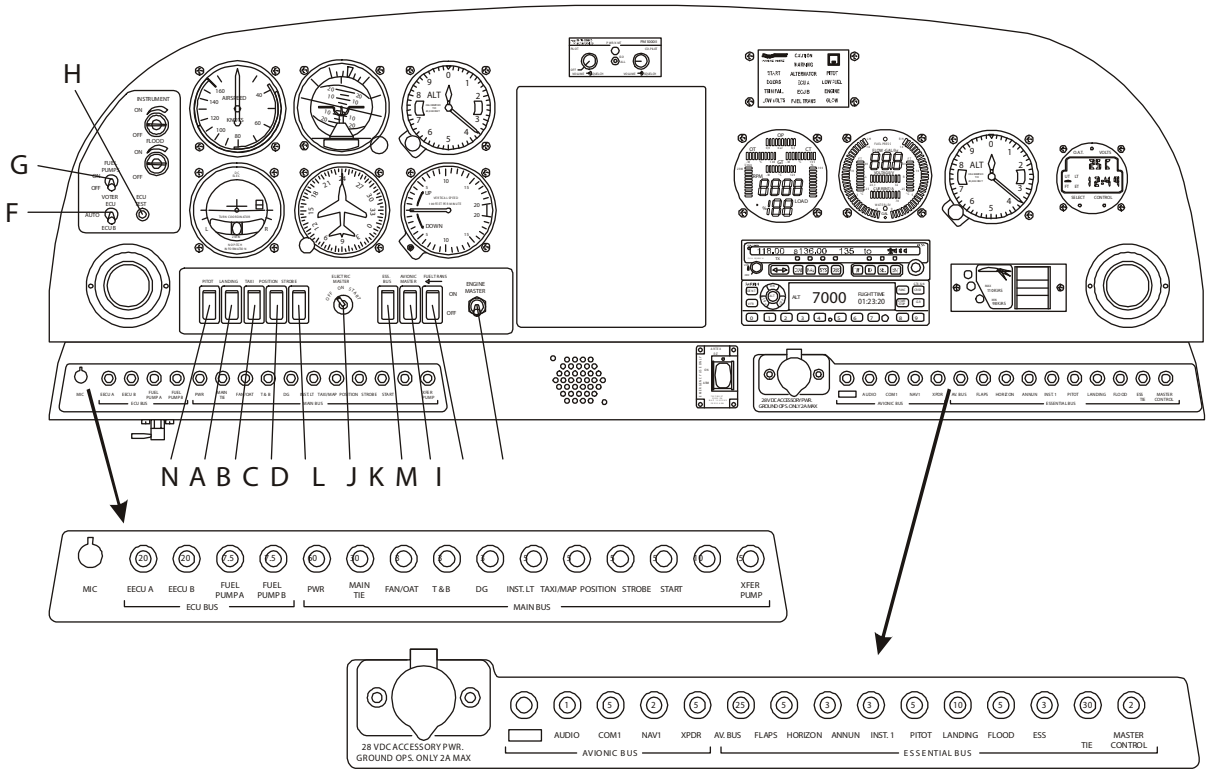


Figure 3 : Electrical System Bus Structure Diagram if Conventional Cockpit (OÄM 40-321) Is Installed



SWITCHES:

A - LANDING
B - TAXI
C - POSITION
D - STROBE
F - ECU SWAP
G - FUEL PUMPS
H - ECU VOTER
I - ENGINE MASTER
J - ESSENTIAL BUS
K - AVIONIC MASTER
L - ELECTRIC MASTER
M - FUEL TRANSFER
N - PITOT

Figure 4 : Electrical Switches and Circuit Breakers if Conventional Cockpit (OÄM 40-321) Is Installed

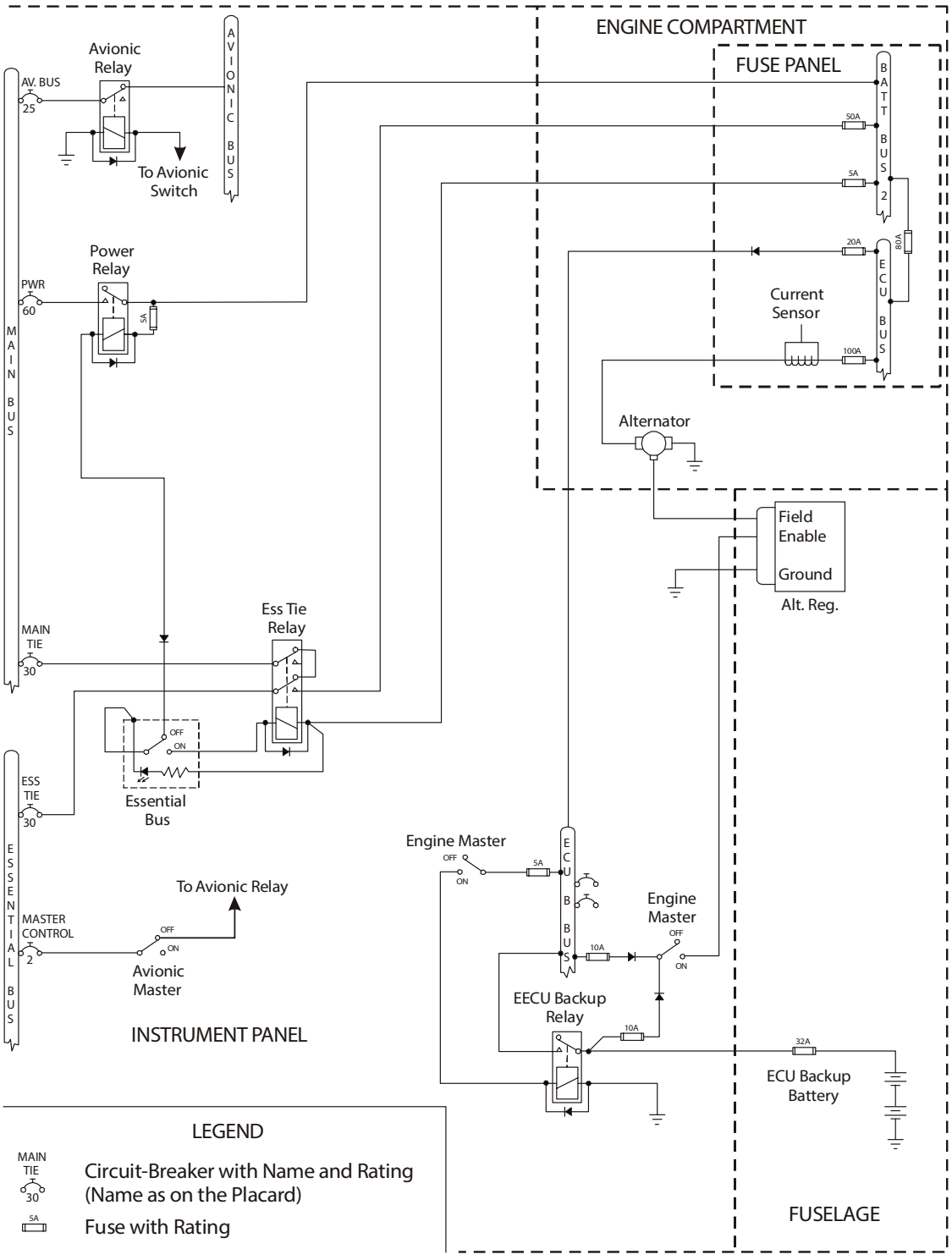


Figure 5 : Electrical System Bus Structure Diagram if OÄM 40-329 or OÄM 40-330 Is Installed

TROUBLE-SHOOTING

1. General

Make sure that the alternator is supplying power and that there is 28 VDC on the main bus. Refer to Section 24-32. For faults on a piece of equipment, or a system, refer to the applicable Chapter. For example, for no oil pressure indication, see Chapter 77 - Engine Indicating. The table below lists the defects you could have with the DC load distribution system

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column.

Trouble	Possible Cause	Repair
There is 28 VDC on the main bus (if G1000 is installed) or essential bus (if OÄM 40-321 is installed) but not on the avionic bus.	AVIONIC MASTER switch set to OFF.	Set the AVIONIC MASTER switch to ON.
	AV. BUS circuit-breaker not set.	Set the AV. BUS circuit breaker.
	Avionics master relay defective.	Replace the avionics master relay.
	A failure of the cables which connect the main bus to the avionics bus.	Do a continuity test of the cables. Refer to Chapter 92 for the wiring diagrams. Repair/replace defective cables.
There is 28 VDC on the main bus but not on the essential bus with the essential bus switch set to OFF.	MAIN TIE circuit-breaker not set.	Set the MAIN TIE circuit breaker.
	ESS TIE circuit breaker not set.	Set the ESS TIE circuit breaker.
	Essential tie relay defective.	Replace the essential tie relay.
	A failure of the cables which connect the main bus to the essential tie relay and essential bus.	Do a continuity test of the cables. Refer to Chapter 92 for the wiring diagrams. Repair/replace defective cables.

Trouble	Possible Cause	Repair
There is 28 VDC on the battery bus but not an the main bus with the essential bus switch set to OFF.	Power relay defective.	Replace the power relay.
	5 A power relay fuse failed.	Replace the power relay fuse.
	A failure of the cables which connect the battery bus to the power relay and main bus.	Do a continuity test of the cables. Refer to Chapter 92 for the wiring diagrams. Repair/replace defective cables.
	A failure of the cables which connect the power relay coil to the essential bus switch.	Do a continuity test of the cables. Refer to Chapter 92 for the wiring diagrams. Repair/replace defective cables.
	ESSENTIAL BUS switch defective.	Replace the ESSENTIAL BUS switch.

MAINTENANCE PRACTICES

1. General

This Section tells you how to remove/install components of the DC load distribution system. Refer to the component manufacturers' manuals for more data and shop data.

2. Electrical Safety

The DA 40 NG has a low voltage DC electrical system. When correctly maintained it is safe to work on. The battery can supply heavy current through low resistance circuits (for example, if you ground the positive output with a wrench by accident).

Always follow the usual safety practices for working on electrical equipment. Allow only qualified persons to maintain the electrical system.

CAUTION: DISCONNECT THE BATTERY BEFORE DOING MAINTENANCE ON THE ELECTRICAL SYSTEM. MAKE SURE THAT YOU DISCONNECT THE NEGATIVE LEAD FIRST.

CAUTION: AFTER DOING ELECTRICAL MAINTENANCE ALWAYS DO A CONFIDENCE TEST OF THE SYSTEM WITH A 24 VOLT POWER SUPPLY THAT HAS OVER-CURRENT PROTECTION. DO THIS BEFORE CONNECTING THE BATTERY.

CAUTION: USE ONLY DA 40 NG SPARE PARTS APPROVED BY THE MANUFACTURER.

3. Remove/Install the Avionics Master Relay

A. Remove the Avionics Master Relay.

	Detail Steps/Work Items	Key Items/References
(1)	Disconnect the battery for maintenance.	Refer to Section 24-31.
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Disconnect the electrical cables from the relay.	
(4)	Remove the bolts which attach the relay to the instrument panel floor.	
(5)	Remove the relay from the airplane.	

B. Install the Avionics Master Relay.

	Detail Steps/Work Items	Key Items/References
(1)	Put the relay in position on the instrument floor.	
(2)	Install the bolts which attach the relay to the instrument panel floor.	
(3)	Connect the cables to the relay.	Refer to Chapter 92 for the Wiring Diagrams.
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Connect the battery.	Refer to Section 24-31. Connect the positive cable first.
(6)	Do a test of the relay: - Set the ELECTRIC MASTER key switch to ON. - Set the AVIONIC MASTER switch to ON. - Set the AVIONIC MASTER switch to OFF. - Set the ELECTRIC MASTER key switch to OFF.	The equipment connected to the avionic bus must operate.

4. Remove/Install a Circuit Breaker

A. Remove a Circuit Breaker.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the baggage extension and baggage tray.	Refer to Section 25-10.
(2)	Disconnect the main battery: - Disconnect the negative cable from the battery. - Disconnect the positive cable from the battery.	Refer to Section 24-31.
(3)	Disconnect the ECU backup battery: - Disconnect the negative cable from the battery. - Disconnect the positive cable from the battery.	Refer to Section 24-31.
(4)	Remove the instrument panel cover.	Refer to Section 25-10.
(5)	Remove the nuts and washers which attach the circuit-breakers to the instrument panel.	Do this for all circuit-breakers attached to the same bus bar.
(6)	Remove the screw which connects the circuit breaker to the copper bus bar.	
(7)	Disconnect the wires from the circuit-breaker.	
(8)	Shift back the copper bus bar together with the remaining circuit-breakers.	
(9)	Remove the circuit-breaker from the instrument panel.	

B. Install a Circuit Breaker.

	Detail Steps/Work Items	Key Items/References
(1)	Put the circuit-breaker in position in the instrument panel.	
(2)	Move the copper bus bar forward together with the remaining circuit-breakers.	
(3)	Connect the wires to the circuit breaker.	Refer to Chapter 92 for the Wiring Diagrams.
(4)	Install the screw which attaches the circuit-breaker to the copper bus bar.	
(5)	Install the nuts and washers which attach the circuit-breakers to the instrument panel.	
(6)	Install the instrument panel cover.	Refer to Section 25-10.
(7)	Connect the main battery.	Refer to Section 24-31. Connect the positive cable first.
(8)	Connect the ECU backup battery.	Refer to Section 24-31. Connect the positive cable first.
(9)	Install the baggage extension and baggage tray.	Refer to Section 25-10.
(10)	Do a functional test of the circuit-breaker: - Set the ELECTRIC MASTER key switch to ON. - Operate the electrical system related to the circuit-breaker you will test. - Pull the circuit-breaker. - Close the circuit-breaker. - Set the ELECTRIC MASTER key switch to OFF.	Apply the full electrical load to the system. The system must stop operating. Make sure there is no power to the system.

5. Remove/Install an Instrument Panel Switch

This procedure applies to the following switches:

- PITOT.
- LANDING, TAXI, POSITION and STROBE lights.
- ESS. BUS.
- AVIONIC MASTER.
- FUEL TRANS

A. Remove an Instrument Panel Switch.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the baggage extension and baggage tray.	Refer to Section 25-10.
(2)	Disconnect the main battery: - Disconnect the negative cable from the battery. - Disconnect the positive cable from the battery.	Refer to Section 24-31.
(3)	Remove the instrument panel cover.	Refer to Section 25-10.
(4)	Disconnect the electrical cables from the switch that you will remove.	
(5)	Remove the switch from the instrument panel: - Press the locking clips at the side of the switch to release the switch from the instrument panel. - Move the switch backwards through the instrument panel and clear of the airplane.	With your fingers from the back of the instrument panel.

B. Install an Instrument Panel Switch.

	Detail Steps/Work Items	Key Items/References
(1)	Hold the spring clips on the switch compressed and put the switch in position in the instrument panel.	From the front of the instrument panel. Make sure that the clips have expanded and that the switch is correctly located.
(2)	Connect the electrical cables to the switch.	Refer to Chapter 92 for the Wiring Diagrams.
(3)	Install the instrument panel cover.	Refer to Section 25-10.
(4)	Connect the main battery.	Refer to Section 24-31. Connect the positive cable first.
(5)	Install the baggage extension and baggage tray.	Refer to Section 25-10.
(6)	Do a functional test of the switch: - Set the ELECTRIC MASTER key switch to ON. - Set the switch that was installed to ON. - Set the switch that was installed to OFF. - Set the ELECTRIC MASTER key switch to OFF.	 The system must operate correctly. The system must switch off.

6. Remove/Install the ENGINE MASTER Switch

A. Remove the ENGINE MASTER Switch.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the baggage extension and baggage tray.	Refer to Section 25-10.
(2)	Disconnect the main battery: - Disconnect the negative cable from the battery. - Disconnect the positive cable from the battery.	Refer to Section 24-31.
(3)	Disconnect the ECU backup battery: - Disconnect the negative cable from the battery. - Disconnect the positive cable from the battery.	Refer to Section 24-31.
(4)	Remove the instrument panel cover.	Refer to Section 25-10.
(5)	Remove the nut and washers that attach the switch.	
(6)	Move the switch towards the firewall.	To give access to the electrical cable connection on the switch.
(7)	Disconnect the electrical cables from the ENGINE MASTER switch.	
(8)	Remove the switch from the instrument panel.	

B. Install the ENGINE MASTER Switch.

	Detail Steps/Work Items	Key Items/References
(1)	Put the switch in position adjacent to the switch electrical cables.	
(2)	Connect the electrical cables to the switch.	Refer to Chapter 92 for the Wiring Diagrams.
(3)	Push the switch into position in the instrument panel.	
(4)	Install the washers and nut to the switch.	
(5)	Install the instrument panel cover.	Refer to Section 25-10.
(6)	Connect the main battery.	Refer to Section 24-31. Connect the positive cable first.
(7)	Connect the ECU backup battery.	Refer to Section 24-31. Connect the positive cable first.
(8)	Install the baggage extension and baggage tray.	Refer to Section 25-10.
(9)	Do an engine ground run-up.	All engine systems and the alternator must operate correctly.

7. Operational Test of the Essential BUS

A. Do an Operational Test of the Essential BUS.

	Detail Steps/Work Items	Key Items/References
(1)	Set the ELECTRIC MASTER switch to ON.	
(2)	Set all installed systems on	
(3)	Set the ESS BUS switch to ON.	
(4)	Make sure that the following systems operate: - G1000 PFD / AHRS /ADC - Transponder - GPS / NAV / COM #1 - Landing Light - Flood Light - Pitot Heat - Flaps (without advisory light indication) - Standby Attitude Indicator (Standby Horizon). Make sure that all systems powered from the Main Bus do not operate.	If a system does not operate, fault isolate that system.
(5)	Set the ESS BUS switch to OFF.	
(6)	Set all installed systems off.	All systems that were set on.
(7)	Set the ELECTRIC MASTER switch to OFF.	

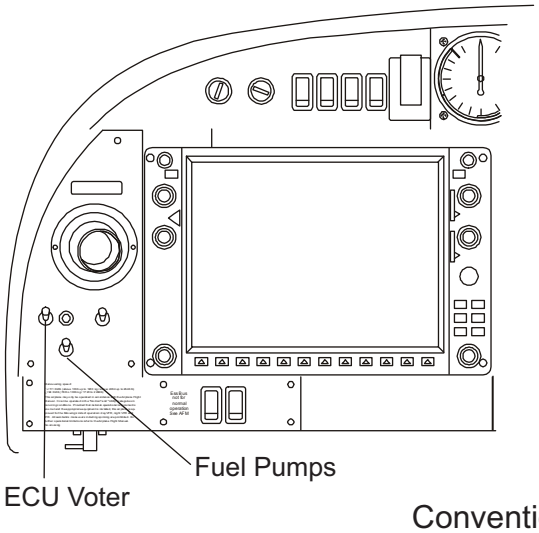
8. Remove/Install the ECU VOTER or the FUEL PUMPS Toggle Switch

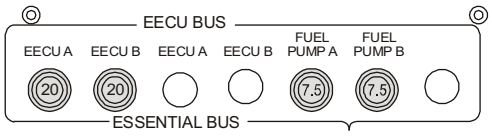
A. Remove the ECU VOTER or the FUEL PUMPS Toggle Switch

NOTE: The removal procedure for each switch is similar. Differences will be identified.

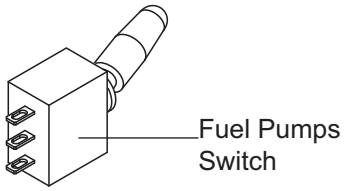
Refer to Figure 201.

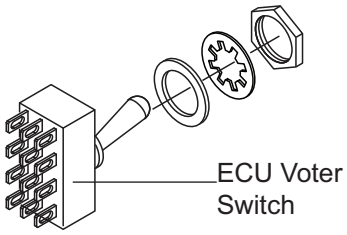
	Detail Steps/Work Items	Key Items/References
(1)	For the removal of the FUEL PUMPS toggle switch open the following circuit breakers. - FUEL PUMP A - FUEL PUMP B	On the CB panel on the RH side of the instrument panel for the conventional cockpit. On the CB panel on the lower side of the LH instrument panel for the conventional cockpit with OÄM 40-321 installed.
(2)	For the removal of the ECU VOTER toggle switch open the following circuit breakers. - EECU A - EECU B	On the CB panel on the RH side of the instrument panel for the conventional cockpit. On the CB panel on the lower side of the LH instrument panel for the conventional cockpit with OÄM 40-321 installed.
(3)	Remove the instrument panel cover.	Refer to Section 25-10.
(4)	At the front of the instrument panel, remove the nut and washers that attach the switch.	
(5)	Move the switch towards the firewall.	To give access to the electrical cable connections on the switch.
(6)	From behind the instrument panel, disconnect the electrical cables from the toggle switch.	Identify the cables for the installation procedure.
(7)	Remove the toggle switch from the instrument panel.	

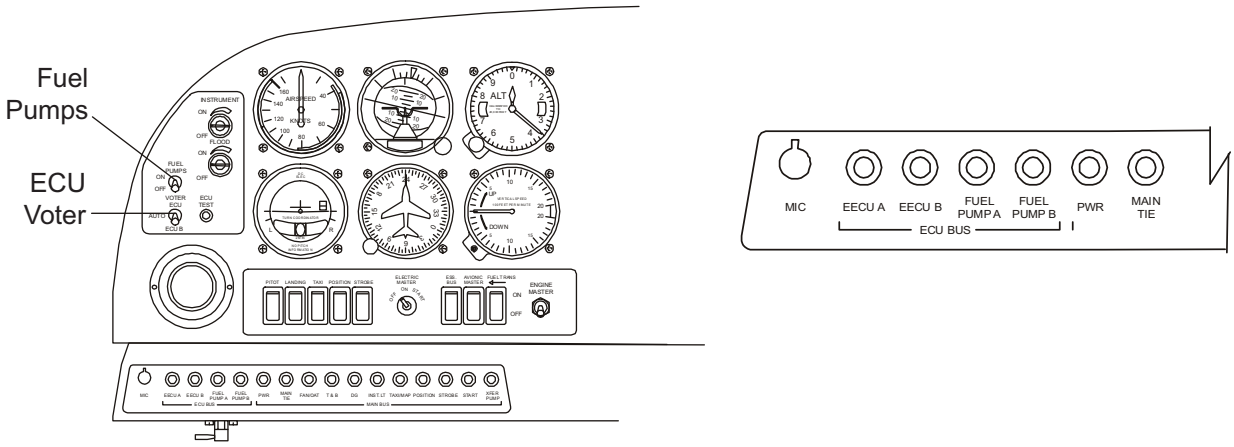




Conventional Cockpit







if Conventional Cockpit (OÄM 40-321) Is Installed

Figure 201 : Toggle Switch - Removal Installation

B. Install the ECU VOTER or the FUEL PUMPS Toggle Switch

NOTE: The installation procedure for each switch is similar. Differences will be identified.

Refer to Figure 201..

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the airplane is in the same configuration as in the removal task.	
(2)	From behind the instrument panel, connect the electrical cables to the toggle switch.	Refer to the removal procedure for the identification of the cables or the applicable wiring diagram in Chapter 92.
(3)	Move the toggle switch into its position in the instrument panel.	
(4)	At the front of the instrument panel, install the washers and nut that attach the switch.	
(5)	If the FUEL PUMPS toggle switch was installed, close the following circuit breakers. - FUEL PUMP A - FUEL PUMP B Conduct an engine ground run to verify that each fuel pump operates with the switch selection.	On the CB panel on the RH side of the instrument panel for the conventional cockpit. On the CB panel on the lower side of the LH instrument panel for the conventional cockpit with OÄM 40-321 installed. Refer to Section 71-00.
(6)	If the ECU VOTER toggle switch was installed, close the following circuit breakers. - EECU A - EECU B Conduct an engine ECU test to verify the operation.	On the CB panel on the RH side of the instrument panel for the conventional cockpit. On the CB panel on the lower side of the LH instrument panel for the conventional cockpit with OÄM 40-321 installed. Refer to Section 71-00-00 Maintenance Practices Para 3 ‘Engine Test - General’.

CHAPTER 25
EQUIPMENT/FURNISHINGS

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EQUIPMENT/FURNISHINGS - GENERAL

1. General

This Chapter tells you about the equipment and furnishing in the flight compartment. Section 25-10 includes the cabin trim panels, pilots' seats, passenger's seat and safety belts. Section 25-60 gives the data for the Emergency Location Transmitter (ELT).

NOTE: Equipment which is certified for installation in the DA 40 NG is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

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FLIGHT COMPARTMENT

1. General

The flight compartment contains fixed seats for two pilots and two passengers. Each seat has a safety belt. If OÄM 40-252 or OÄM 40-375 is carried out, the pilots' seats are equipped with adjustable backrests. The fuselage shell has fabric wall panels. Carpets cover the floor areas and baggage compartment floor. Map pockets are located on the cockpit side by each pilot.

The extended baggage compartment consists of the standard baggage compartment behind the rear seats and the optional baggage extension mounted in the rear bulkhead.

GFRP moldings make the instrument panel cover and the center console. See Section 25-60 for data about the ELT.

2. Description and Operation

A. Pilots' Seats

(1) Fixed Pilots' Seats

Figure 1 shows the pilot's seat installation. Each pilot's seat is a GFRP/Carbon/Kevlar molding. Rivets attach a metal plate to the bottom of the seat pan at the back. Two bolts go through the seat pan and the metal plate to hold the lap straps of the safety belt. These bolts also hold metal anchor plates which attach to anchor nuts in the large cut-out in the front main bulkhead.

The front of the seat pan curves down to locate over the rear wall of the floor panel. Two bolts with washer plates attach the front of the seat to the floor panel.

A padded seat cushion covers the GFRP/Carbon/Kevlar molding. Press-studs attach the forward part of the seat cushion to the seat pan. A flexible gaiter attaches to the seat pan with press-studs. The control stick passes through the gaiter. A velcro seals the top of the gaiter to the stick.

(2) Pilots' Seats with Adjustable Backrest (if OÄM 40-252 or OÄM 40-375 is carried out)

Figure 1, 2 and 3 show the variants of pilots' seats with adjustable backrest installations. Each pilots' seat consists of a seat pan and a backrest made of GFRP/Carbon/Kevlar. Rivets attach a metal plate to the bottom of the seat pan at the back. Two bolts go through the seat pan and the metal plate to hold the lap straps of the safety harness. These bolts also hold metal anchor plates which attach to anchor nuts in the large cut-out in the front main bulkhead. The front of the seat pan curves down to locate over the rear vertical wall of the front floor panel.

The backrest is attached to the seat pan via an inboard and an outboard hinge. If OÄM 40-252 is installed, each hinge is formed by two lamella packages - one is bolted to the seat pan, the other to the backrest with hexagon head bolts. The lamella packages act as a friction brake controlled by a friction adjustment screw and the seat lever on the outboard side of each backrest. To preload the friction brake to the correct setting refer to the Maintenance Practices in this Section. Additionally the backrest is forced forward by a GFRP/Carbon spring element mounted to the bottom of the seat pan.

If OÄM 40-375 is installed, the seat pan and backrest are bolted similarly to the inboard and outboard hinges. The hinges are linked twice, once thru brackets with the Hydrolok cylinder and once with a bolt allowing rotation. A button operates via Bowden cable a valve allowing the Hydrolok cylinder retract/extend forcing the hinges rotating around their connecting bolt. Additionally the backrest is forced forward by a spring integrated in the Hydrolok cylinder.

The upright position of the backrest is determined by a placard on the roll-over bar.

A lumbar support cushion is integrated to the lower part of the backrest. The cushion is operated via a Bowden cable by use of a lever mounted to the outboard side of the seat pan.

A padded cushion covers the seat pan molding and the backrest. Press studs attach the forward part of the seat cushion to the seat pan. A flexible gaiter attaches to the front seat pan with press-studs. The control-stick passes through the gaiter. A velcro band seals the top of the gaiter to the control stick.

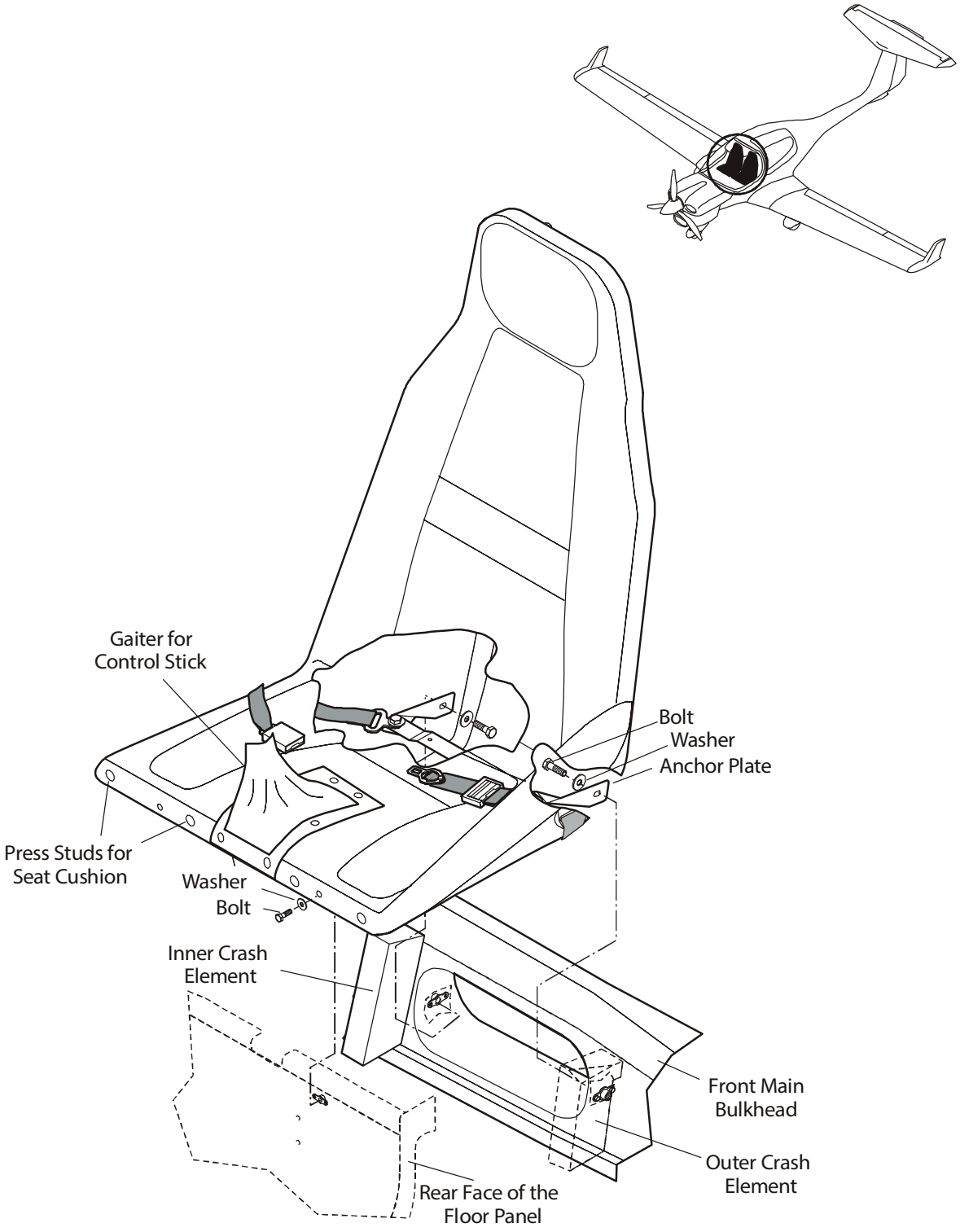

Figure 1 : Pilot's Seat Installation

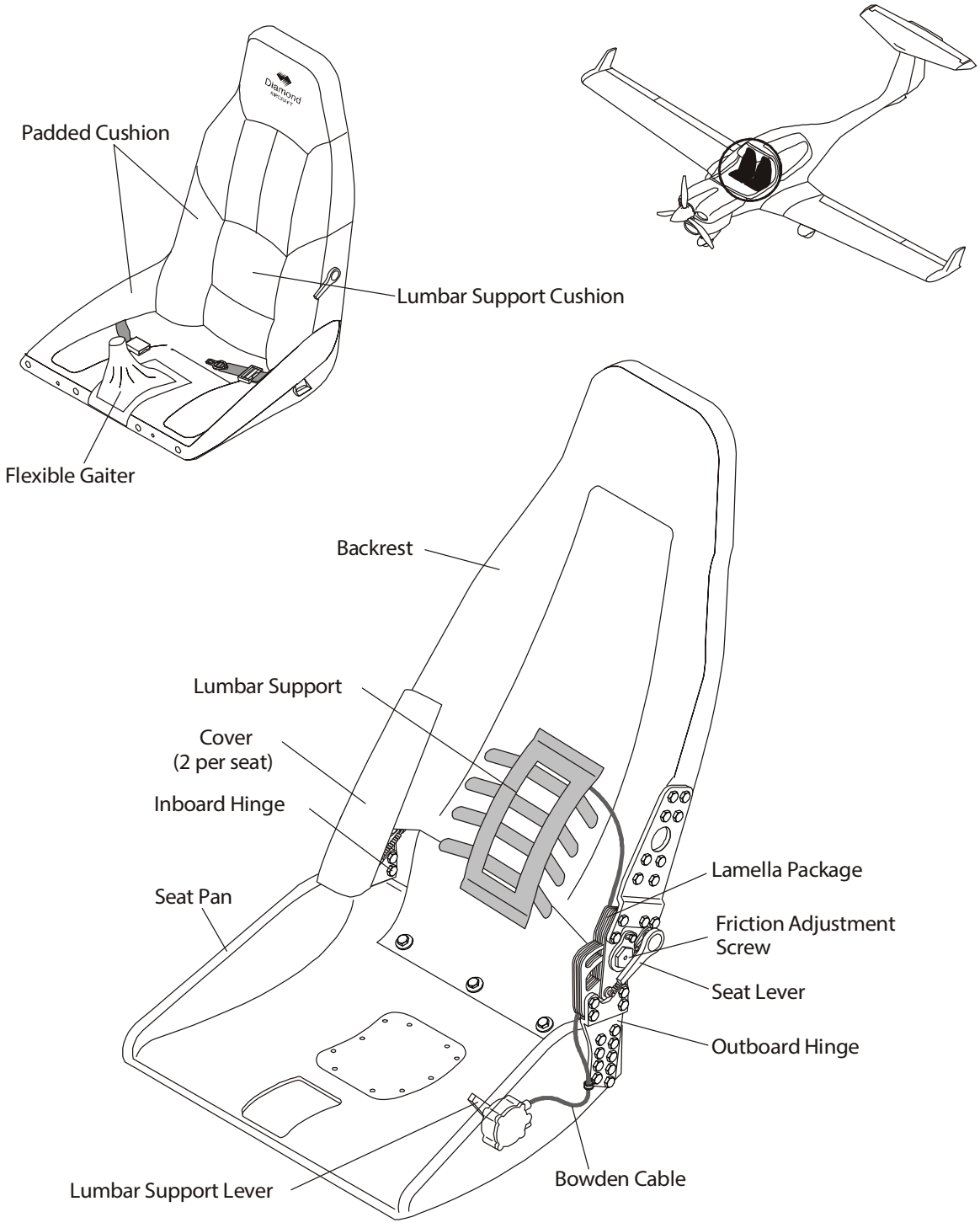

Figure 2 : Pilot's Seat Installation (if OÄM 40-252 is installed)

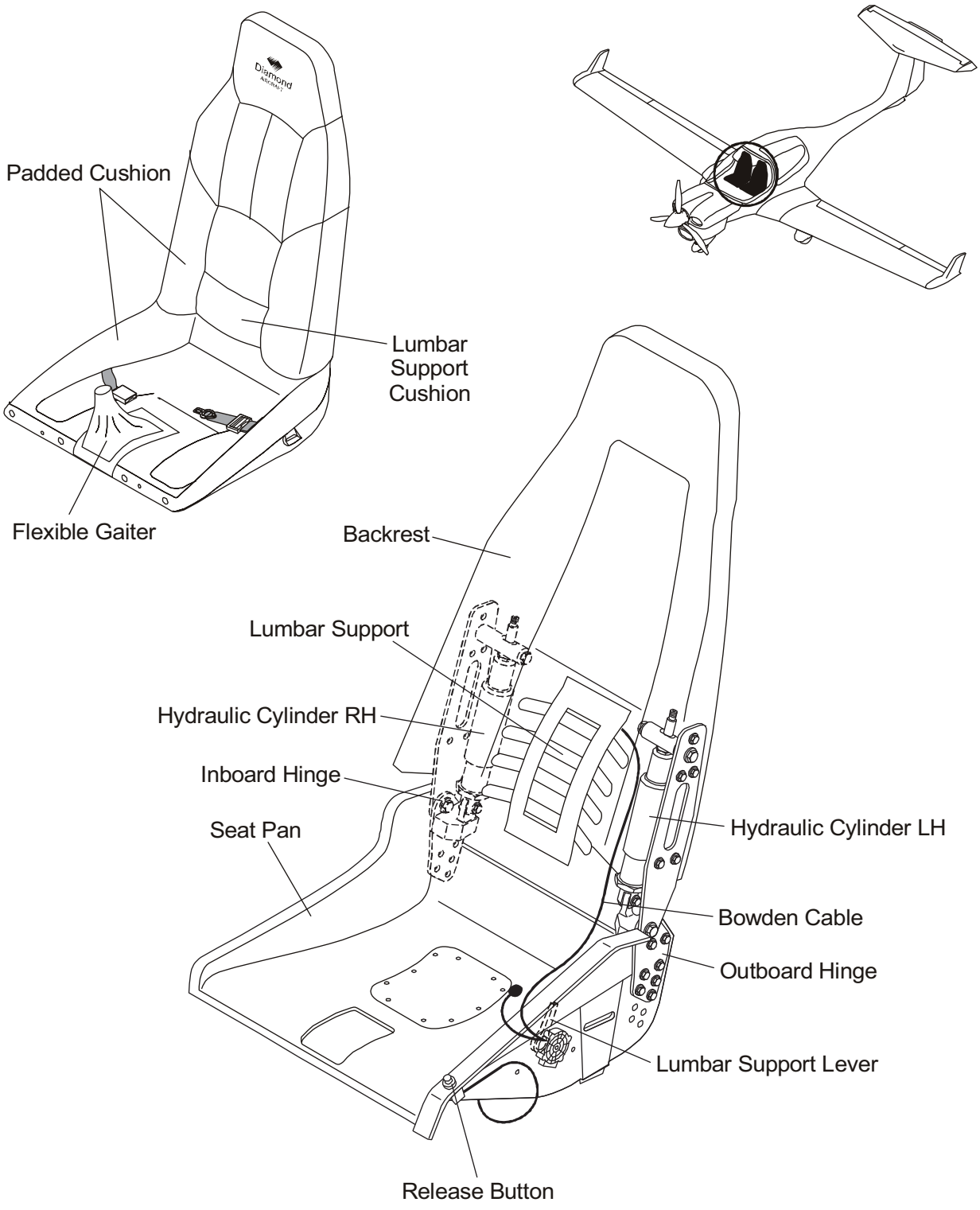

Figure 3 : Pilot's Seat Installation (if OÄM 40-252 is installed)

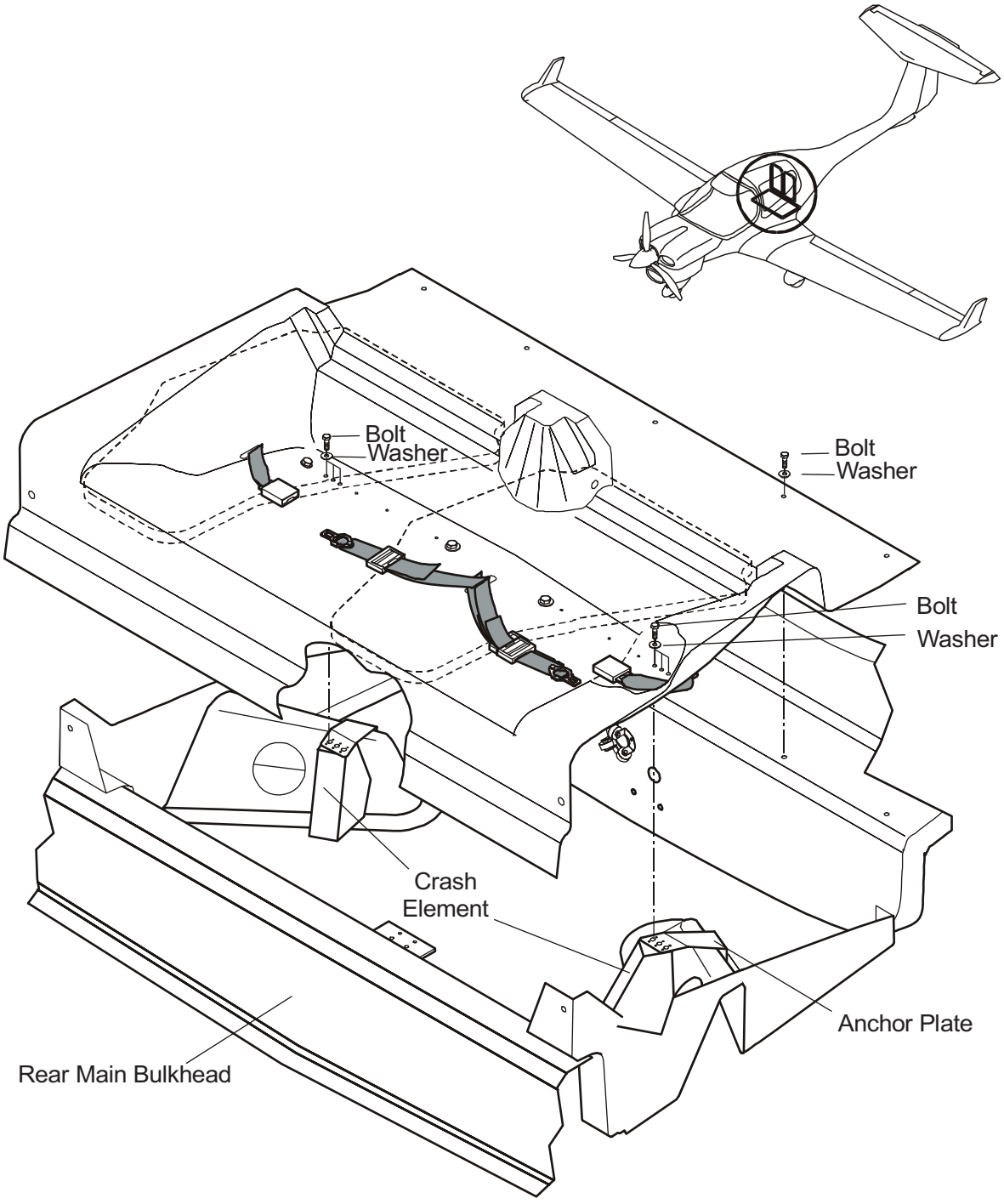

Figure 4 : Passenger Seat Installation

B. Passenger Seat

Figure 4 shows the passenger seat installation. The passenger seat has three main parts. It has a double seat pan which is the full width of the cockpit. The rear part of the seat pan also makes the baggage compartment floor. The passenger seat also has two seat-backs which attach to the seat pan with hinges. A latch pin at the left side of each seat-back locks the seat-back in the upright position. You can lift the latch to fold the seat-back forward for access to the baggage compartment.

A padded seat cushion covers the GFRP/Carbon/Kevlar molding. Press-studs attach the forward part of the seat cushion to the seat pan. Padded cushions also cover the seat-backs.

Rivets attach a metal plate under each half of the seat pan at the back. Two bolts go through each half of the seat pan and the metal plate to hold the lap straps of the safety belt. Three bolts with washer plates on each side of the seat pan go through the seat pan and metal plate to anchor nuts in metal anchor plates. The anchor plates are bolted to the fuselage structure. Two bolts with washer plates attach the front of the seat pan to ribs on top of the rear main bulkhead. Five bolts with washer plates attach the rear of the seat pan to the top face of the baggage compartment frame.

C. Crash Elements

Each seat rests on crash elements. Each crash element has layers of carbon fiber composite and a special rigid foam bonded together. The crash elements compress under the high loads which occur in accidents. They reduce the injury to the pilot or passenger in an accident.

The rear of each pilot’s seat rests on two crash elements. They are located just outboard of the safety belt attachments. The passenger seat pan rests on two crash elements. They are located under the anchor plates on each side

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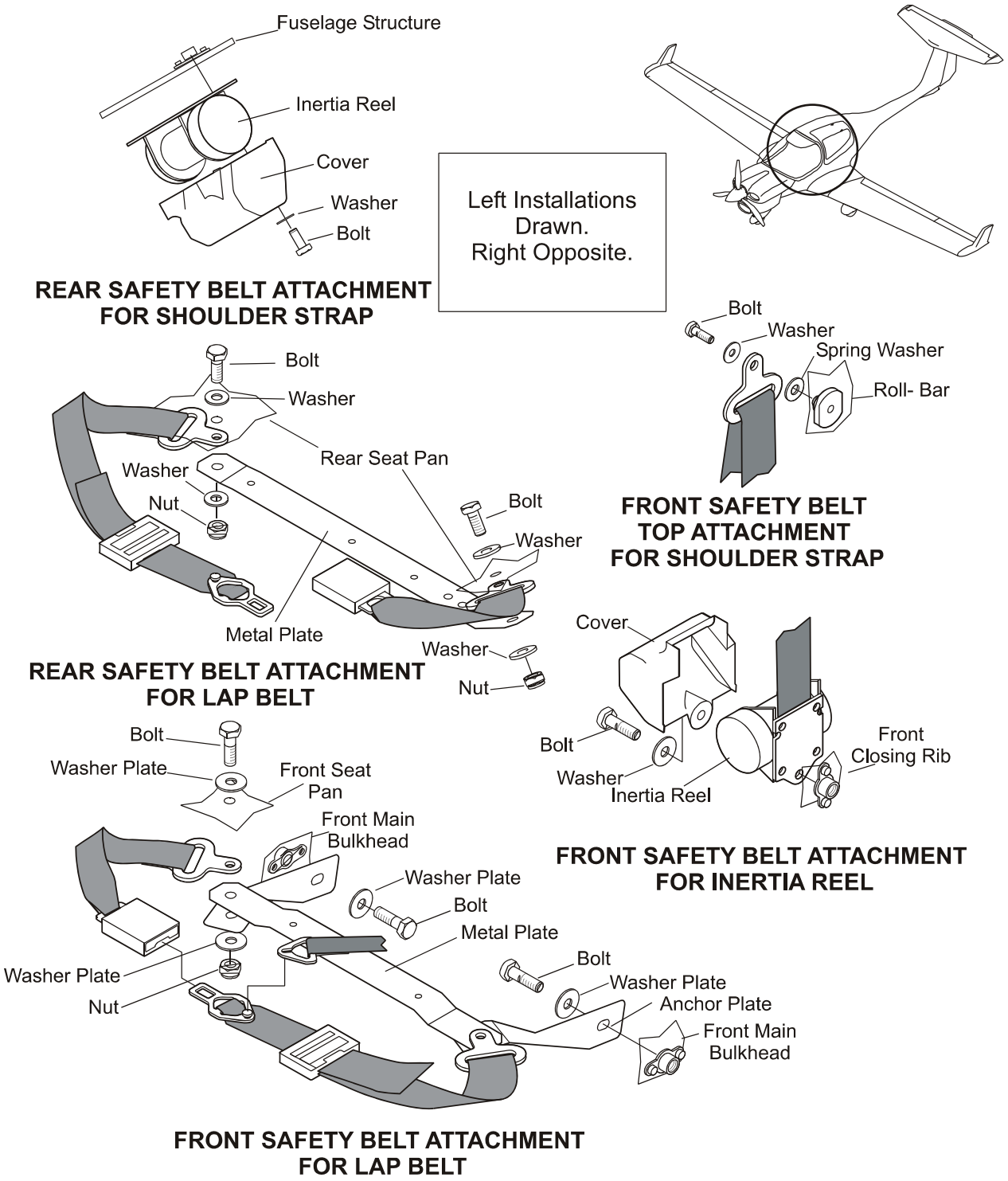

Figure 5 : Safety Belt Installation

D. Safety Belts

Figure 5 shows the safety belt installation. Each seat has a fixed lap belt and an inertia sensitive shoulder strap. The lap belt has two straps. The outboard strap has an adjuster to tighten the belt in use. It also has a tongue to engage the buckle on the inboard belt. The inboard strap has a fixed length. The buckle has a button at the outboard end to release the tongue of the outboard lap strap. Push the tongue into the end of the buckle to lock them together.

Bolts with washer plates and self-locking nuts attach each lap strap to the seat pan. You must remove the seat to remove the lap belt.

The shoulder strap attaches to an inertia reel. The inertia reel has a latch which senses acceleration. With the airplane flying straight and level, the inertia reel lets the shoulder strap pull out against a light spring. If the airplane is accelerated (for example in turbulence), the latch stops the shoulder strap from pulling out.

The inertia reel for the pilot’s safety belt is located on the fuselage wall behind the pilot’s seat. The strap passes up through a guide attached to the roll-bar just above the pilot’s shoulder and down to the tongue on the outboard lap strap. The end fitting on the shoulder strap hooks onto a stud on the tongue.

The inertia reel for the rear passenger's safety belt is located above and to the rear of the passengers. It is on the fuselage top-inner surface.

E. Fabric Wall Panels

Fabric wall panels bond to the inside of the fuselage shell. Each front panel has a map pocket.

F. Instrument Panel Cover

A GFRP cover goes over the instrument panel. Screws attach the cover to the instrument panel. The instrument panel cover has a defrost manifold. Two hoses connect the defrost manifold to the cabin heating system. The manifold supplies warm air to the front of the canopy to prevent misting.

G. Center Console Panel

A GFRP panel goes between the rear wall of the floor panel and the front face of the front main bulkhead. The center console panel covers the trim mechanism. It also seals the gap between the pilots' seats.

H. Baggage Extension and Baggage Tray

Baggage extension and baggage tray are optional equipment.

The baggage extension has a door that may be hinged up to keep items from sliding aft or hinged down to carry long items. The baggage extension also has a removable panel in the bottom to allow access for inspection of the rear fuselage area.

The baggage tray may be installed in the bottom of the standard baggage compartment. The lid of the baggage tray and the bottom of the baggage extension form a flat loading surface. The lid has mounting provisions for the tow bar. The space under the lid may be used to carry small items such as the gust lock and the fuel quantity measuring device.

If OÄM 40-331 is installed, a short baggage extension is installed.

MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to remove/install the seats, the safety belts and other furnishings. See Section 25-60 for data about the ELT.

2. Remove/Install a Pilot's Seat

NOTE: Some maintenance procedures described in this AMM require the removal of a front seat. However, if the maintenance hole in the seat gives sufficient access to the system beneath it, it is acceptable to leave the seat in place and remove only the maintenance access panel. Refer to Paragraph 4.

A. Remove a Pilot's Seat.

	Detail Steps/Work Items	Key Items/References
If the adjustable front seats (OÄM 40-252 or OÄM 40-375) are installed: **WARNING: DO NOT ENGAGE THE LEVER OR THE BUTTON FOR THE ADJUSTABLE BACK REST OF THE FRONT SEATS UNINTENTIONALLY. THE SPRING LOADED BACKREST MAY SNAP FORWARD AND CAN CAUSE INJURY.**		
(1)	If the adjustable front seats (OÄM 40-252 or OÄM 40-375) are installed: Set backrest to the upright position: - Sit down in the front seat. - Lift the seat lever or engage button. - Adjust the backrest to the upright position. - Release the button or seat lever.	
(2)	Release the velcro at the top of the gaiter for the control stick.	In the Description and Operation Pageblock 25-10-00, Refer to Figure 1 (fixed backrest) or Figures 2 and 3 (adjustable backrests).
(3)	Release the press-studs at the front of the seat cushion.	Move the cushion back far enough to give access to the attaching bolts for the seat.
(4)	Remove the two bolts with washer plates which attach the anchor plates to the front main bulkhead.	From the passenger compartment behind the pilot's seat.
(5)	Remove the two bolts with washer plates which attach the front of the seat to the rear wall of the floor panel.	

	Detail Steps/Work Items	Key Items/References
(6)	Remove the lap belt from the seat.	
(7)	Lift the seat forward and up out of the cockpit.	Take care that the stick gaiter does not catch on the top of the stick.

B. Install a Pilot's Seat.

	Detail Steps/Work Items	Key Items/References
If the adjustable front seats (OÄM 40-252 or OÄM 40-375) are installed: **WARNING:** **DO NOT ENGAGE THE LEVER OR THE BUTTON FOR THE ADJUSTABLE BACKREST OF THE FRONT SEATS UNINTENTIONALLY. THE SPRING LOADED BACKREST MAY SNAP FORWARD AND CAN CAUSE INJURY.**		
(1)	Examine the crash elements. Look specially for delamination and buckling.	Refer to Figure 1 In the Description and Operation Pageblock, 25-10-00.
(2)	Do a check for unwanted items in the area below the seat.	For example: tools.
(3)	Put the seat in position so that the anchor plates go through the large hole in the front main bulkhead.	Make sure that the stick gaiter does not catch on the stick top.
(4)	Install the bolts with washer plates which attach the seat to the floor panel.	Torque: 6.4 Nm (4.7 lbf.ft.).
(5)	Install the bolts with washer plates which attach the anchor plates to the front main bulkhead.	From the passenger compartment behind the pilot's seat. Torque: 16 Nm (11.8 lbf.ft.).
(6)	Fasten the press-studs which attach the seat cushion.	
(7)	Tighten the velcro at the top of the stick gaiter.	Make sure that the aileron and elevator controls are free to move throughout their range.
(8)	If the adjustable front seats (OÄM 40-252 or OÄM 40-375) are installed: - Do a test of the backrest adjustment mechanism. - Do a test of the lumbar support mechanism.	 Refer to Paragraph 3. Refer to Paragraph 3.

3. Additional Maintenance Practices for Seats with an Adjustable Backrest

Perform the following test of the Adjustable Backrest Mechanism. If the test fails refer to Paragraphs B and C.

A. Test Procedures

(1) Test the Backrest Adjustment Mechanism of a Front Seat (if OÄM 40-252 or OÄM 40-375 is installed).

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT ENGAGE THE LEVER OR THE BUTTON FOR THE ADJUSTABLE BACKREST OF THE FRONT SEATS UNINTENTIONALLY. THE SPRING LOADED BACKREST MAY SNAP FORWARD AND CAN CAUSE INJURY.	
	NOTE: If the adjustable backrest mechanism does not pass the following test, perform a visual inspection. Refer to Paragraph C.	
(1)	Sit down in the front seat.	
(2)	Lean against the backrest.	Counteract the spring loaded backrest mechanism.
(3)	Carefully lift the seat lever or press button.	
(4)	Move the backrest fully rearward: - Check for limited range of movement and interference. - Release the seat lever or button in different backrest angles and check for improper fixation.	Release the seat lever or button to ensure proper locking. Apply a test load of 90 daN (200 lbf) to the top of the backrest at room temperature.
(5)	Allow the backrest to move forward to the upright position: - Check for interference. - Check for lack of spring force.	The spring must be strong enough to move the backrest from the full rearward position to the upright position designated by a placard on the roll-over bar.

	Detail Steps/Work Items	Key Items/References
(6)	Pull forward on the backrest to move it forward beyond the designated upright position: - Check for limited range of movement and interference. - Let the seat lever move to the locking position or release the button at different backrest angles and check for improper fixation.	 Press down the seat lever to ensure proper locking. Apply a test load of 90 daN (200 lbf) to the top of the backrest at room temperature.
(7)	Move the seat back to the upright position.	
(8)	Let the seat lever move to the locking position.	Press down the seat lever to ensure proper locking.

(2) Test the Lumbar Support Mechanism of a Front Seat (if OÄM 40-252 or OÄM 40-375 is installed).

	Detail Steps/Work Items	Key Items/References
(1)	Sit down in the front seat.	
(2)	Turn the lumbar support lever.	You must feel the mechanism increasing and decreasing the effect of the lumbar support cushion in the backrest.

B. Adjust the Friction of the Backrest (if OÄM 40-252 is installed).

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT ENGAGE THE LEVER OR THE BUTTON FOR THE ADJUSTABLE BACKREST OF THE FRONT SEATS UNINTENTIONALLY. THE SPRING LOADED BACKREST MAY SNAP FORWARD AND CAN CAUSE INJURY.	
(1)	Remove the seat from the airplane.	
(2)	Pull away the lining from the inboard hinge to gain access to the inboard friction adjustment screw.	Through the access hole in the cover.
(3)	Adjust the friction: - Set the locking lever to the “unlocked“ position. - Loosen the friction adjustment screws (LH and RH). - Tighten friction adjustment screws (LH and RH) with finger force. - Tighten friction adjustment screws (LH and RH) with 10 mm (0.4 in) hexagon nut in increments of approx. 15 degrees (1/24 turns) until friction in the hinge mechanism increases notably. - Turn back the adjustment screws (LH and RH) one-quarter turn.	
(4)	Re-attach lining to the seat.	
(5)	Install the seat.	
(6)	Do a test of the backrest adjustment mechanism.	Refer to Paragraph A. (1).

C. Visual Inspection of the Adjustment Mechanism (if OÄM 40-252 is installed).

	Detail Steps/Work Items	Key Items/References
(1)	Remove the seat from the airplane.	
(2)	Remove the seat lever from the seat: - Remove plug from lever. - Remove lever mounting screw. - Remove lever from seat.	
(3)	Carefully separate the leather lining from the backrest: - Remove cushion from seat pan (attached with velcro). - Drill out one blind rivet each attaching the two plastic brackets for the rubber bands to the seat pan. - Pull off the rubber bands from the plastic brackets. - Untie the knots of the three strings which tie the lower edge of the backrest cushion to the seat pan. - Carefully remove the leather lining from the cover by opening all velcro fasteners.	Turn lining inside out together with the bag while pulling off.
(4)	Move cover forward to remove it from the hinge.	The cover remains attached to the cushion.
(5)	Check lamella package for deformation, corrosion and lack of lubrication.	
(6)	Install the cover by moving it over the hinge.	

	Detail Steps/Work Items	Key Items/References
(7)	Re-install the leather lining to the seat: - Attach the leather lining to the cover using the velcro fasteners. - Tie the backrest cushion to the seat pan with the three strings. - Put the rubber bands into the plastic brackets. - Use blind rivets to fasten the plastic brackets to the seat pan. - Attach the cushion to the seat pan using the velcro.	
(8)	Install the seat lever: - Put the lever onto the adjustment mechanism in correct position. - Install the lever mounting screw. - Install plug to lever.	

D. Visual Inspection of the Adjustment Mechanism (if OÄM 40-375 is installed).

	Detail Steps/Work Items	Key Items/References
(1)	Remove the seat from the airplane.	
(2)	Carefully separate the leather lining from the backrest.	Turn lining inside out together with the bag while pulling off.
(3)	Check the Hydrolok cylinder for leakage, contamination, check the actuator cable for damage. Replace items if necessary, for disassembly of the mechanism refer to Paragraph E and Figure 201.	Use a mirror and flashlight to be able to inspect the mechanism installed in the backrest tunnel.
(4)	Re-install the leather lining to the seat.	

E. Disassemble/Assemble the Adjustable Backrest Mechanism

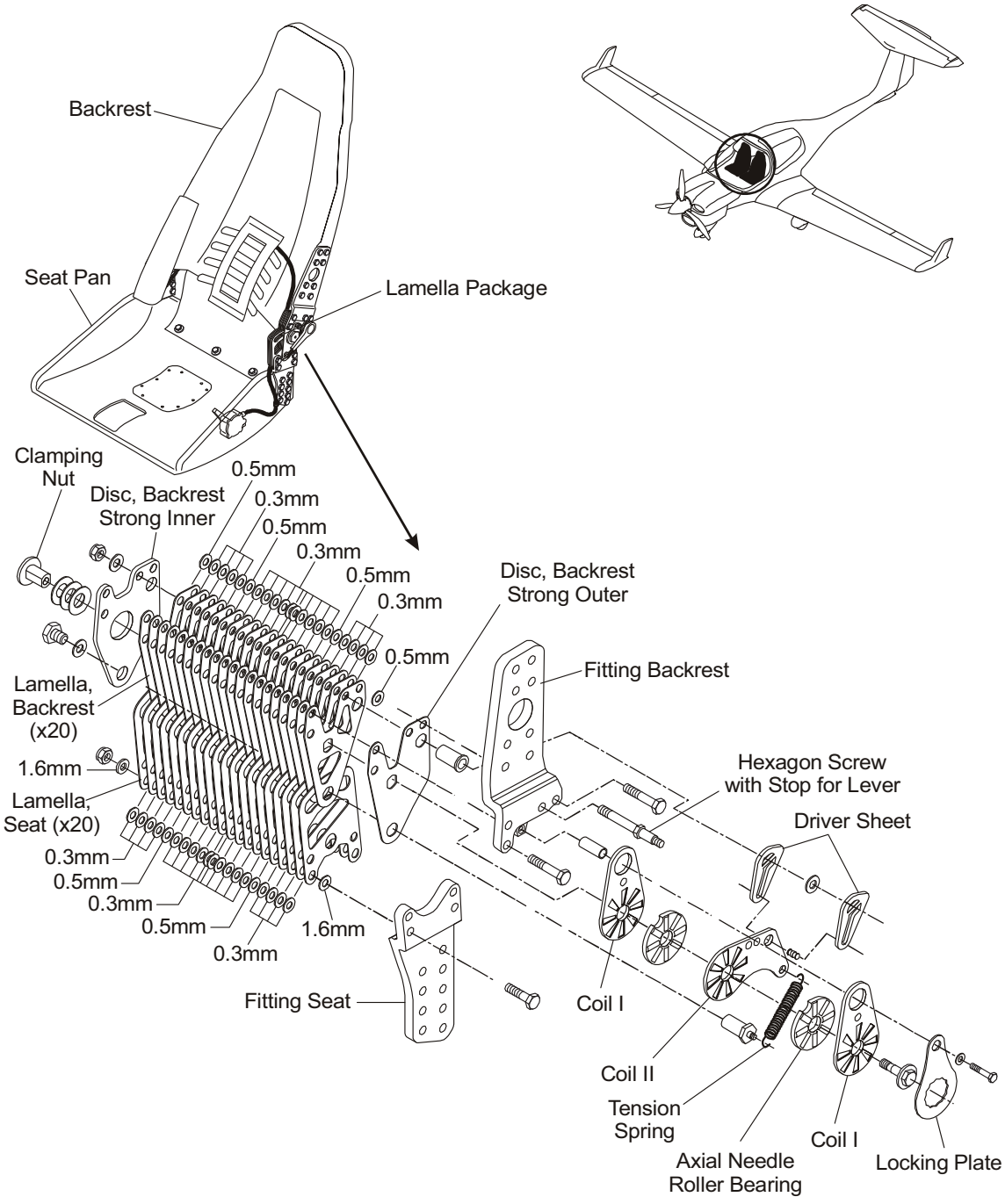

Figure 201 : Pilot's Seat Installation (if OÄM 40-252 is installed)

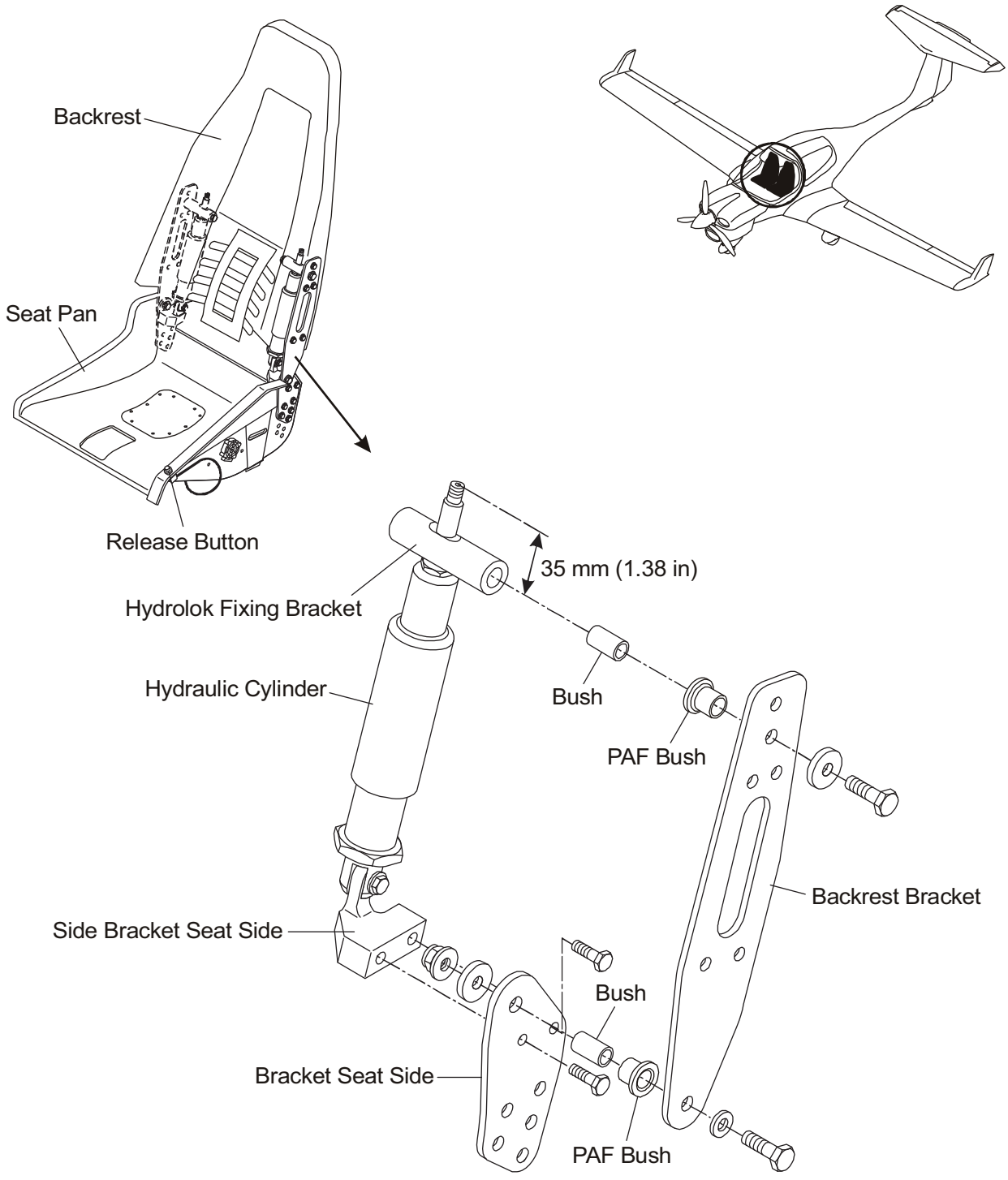

Figure 202 : Seat Adjustment Mechanism (if OÄM 40-375 is installed)

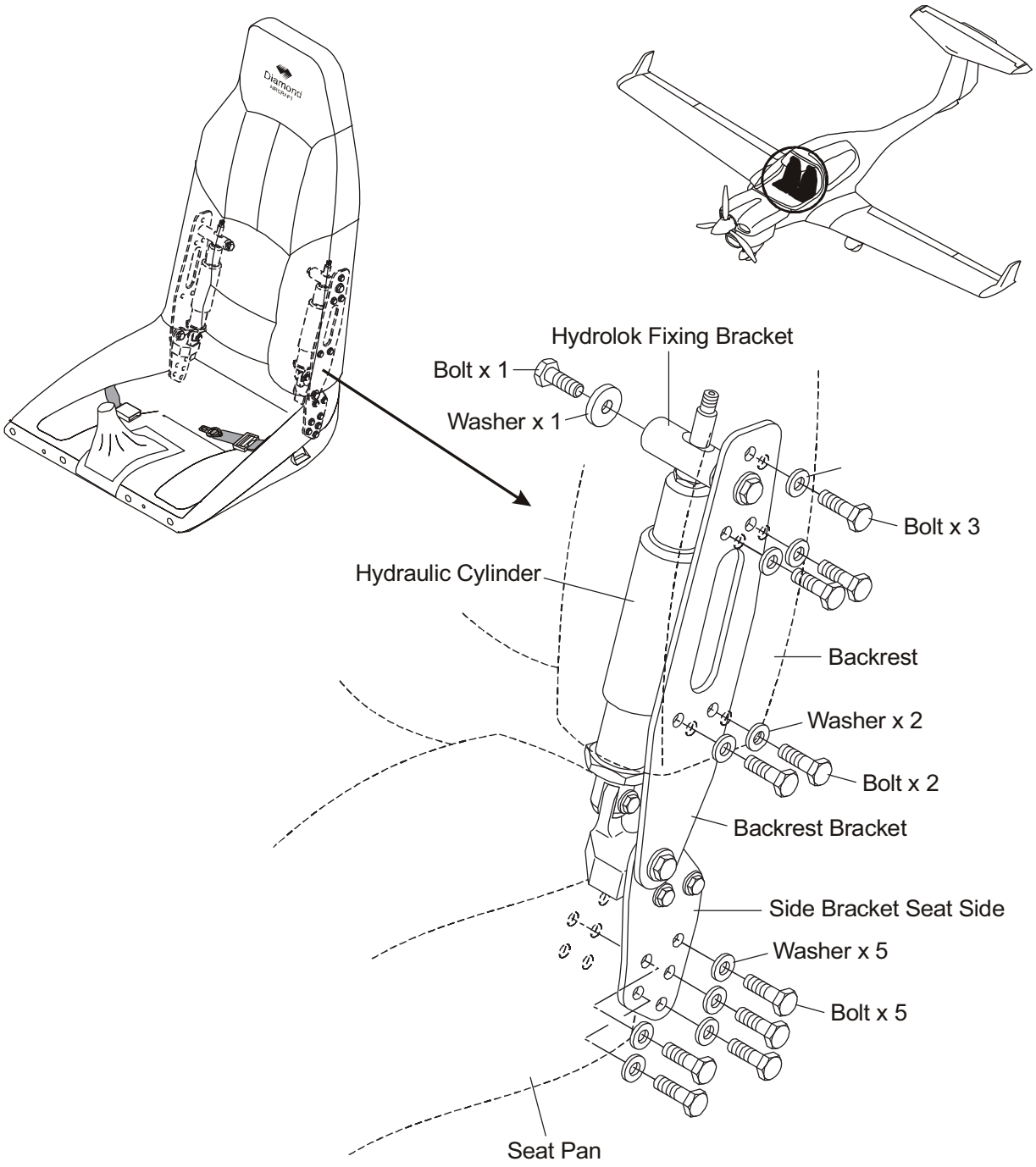

Figure 203 : Adjustable Backrest Assembly (if OÄM 40-375 is installed)

(1) Remove the Backrest Assembly from the Seat (if OÄM 40-252 is installed)

Each seat contains a left and right side mechanism. Before you can disassemble the backrest mechanism you must carry out the following steps:

	Detail Steps/Work Items	Key Items/References
(1)	Remove the seat from the airplane.	
(2)	Remove the seat lever from the seat: - Remove plug from lever. - Remove lever mounting screw. - Remove lever from seat.	
(3)	Carefully separate the leather lining from the backrest: - Remove cushion from seat pan (attached with velcro). - Drill out one blind rivet each attaching the two plastic brackets for the rubber bands to the seat pan. - Pull off the rubber bands from the plastic brackets. - Untie the knots of the three strings which tie the lower edge of the backrest cushion to the seat pan. - Carefully remove the leather lining from the cover by opening all velcro fasteners.	Turn lining inside out together with the bag while pulling off.
(4)	Move cover forward to remove it from the hinge.	The cover remains attached to the cushion.
(5)	Peel away the leather lining from the bottom of the seat pan on the side which points towards the middle of the fuselage. The nine hexagon screws of the seat fitting become accessible.	
(6)	Remove the screw with the distancing bushing and the washer from the torsion bar.	
(7)	Remove the nine hexagon screws on both sides of each seat fitting.	

	Detail Steps/Work Items	Key Items/References
(8)	Remove the eight hexagon screws on both sides of the backrest fitting.	
(9)	Remove the LH and the RH mechanism.	
(10)	Remove the torsion bar from the backrest.	

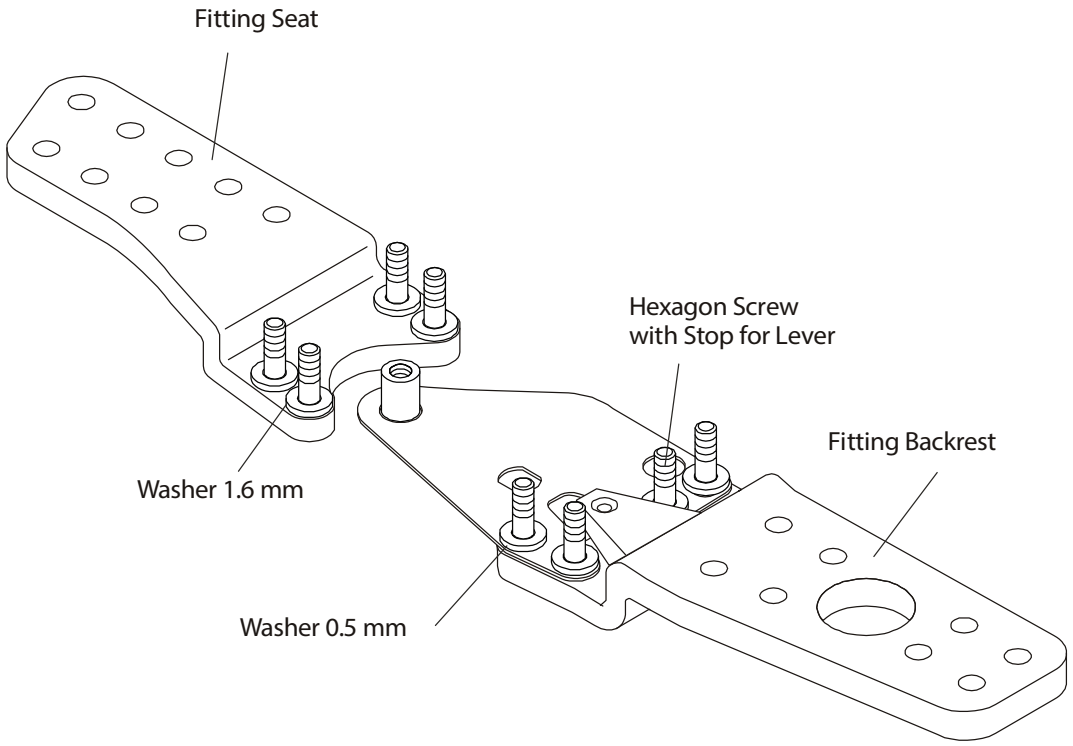

Figure 204 :Arrangement of the Fitting Seat, Fitting Backrest and Screws (LH side shown, if OÄM 40-252 is installed)

(2) Remove the Backrest Assembly from the Seat (if OÄM 40-375 is installed)

Each seat contains a left and right side mechanism. Before you can disassemble the backrest mechanism you must carry out the following steps:

	Detail Steps/Work Items	Key Items/References
(1)	Remove the seat from the airplane.	
(2)	Carefully separate the leather lining from the backrest:	Turn lining inside out together with the bag while pulling off.
(3)	Disconnect the lumbar actuator Bowden cable.	
(4)	Remove the 5 outboard and 1 inboard hexagon screws from the backrest brackets as they become accessible on both sides.	Refer to Figure 203.
(5)	Pull off the backrest shell.	

(3) Disassemble the Adjustable Backrest Mechanism (if OÄM 40-252 or OÄM 40-375 is installed)

Disassemble the adjustable backrest mechanism carefully. Refer to the table in:
Section (4) - Assemble the Adjustable Backrest Mechanism (if OÄM 40-252 is installed).
Carry out the steps in the opposite order of the assembly
OR
Section (5) - Assemble the Adjustable Backrest Mechanism (if OÄM 40-375 is installed).
Carry out the steps in the opposite order of the assembly.

(4) Assemble the Adjustable Backrest Mechanism (if OÄM 40-252 is installed)

The following table describes the assembling of a single backrest mechanism. The assembly procedure is used for both sides.

Step No.	Seat Fitting	Thickness	Backrest Fitting	Thickness	Remarks
(1)	Arrange the seat fitting and the backrest fitting and place the seven hexagon screws (M6x32) and a hexagon screw with stop for lever as shown in Figure 201. Use some adequate bars to put under the fittings.				
(2)	4 Washers	1.6 mm	Disc, Backrest Strong Outer	1.6 mm	
(3)	Stick the bolt (10 mm) through the outer backrest disc.				
(4)	Lamella	0.3 mm	4 Washers	0.5 mm	
(5)	4 Washers	0.3 mm	Lamella	0.3 mm	Repeat Steps (5) and (6) four times
(6)	Lamella	0.3 mm	4 Washers	0.3 mm	
(7)	4 Washers	0.5 mm	Lamella	0.3 mm	
(8)	Lamella	0.3 mm	4 Washers	0.5 mm	
(9)	4 Washers	0.3 mm	Lamella	0.3 mm	Repeat Steps (9) and (10) four times
(10)	Lamella	0.3 mm	4 Washers	0.3 mm	
(11)	4 Washers	2 x 0.3 mm	Lamella	0.3 mm	
(12)	Lamella	0.3 mm	4 Washers	2 x 0.3 mm	
(13)	4 Washers	0.3 mm	Lamella	0.3 mm	Repeat Steps (13) and (14) four times
(14)	Lamella	0.3 mm	4 Washers	0.3 mm	
(15)	4 Washers	0.5 mm	Lamella	0.3 mm	
(16)	Lamella	0.3 mm	4 Washers	0.5 mm	
(17)	4 Washers	0.3 mm	Lamella	0.3 mm	Repeat Steps (17) and (18) four times
(18)	Lamella	0.3 mm	4 Washers	0.3 mm	
(19)	4 Washers	1.6 mm	Lamella	0.3 mm	

Step No.	Seat Fitting	Thickness	Backrest Fitting	Thickness	Remarks
(20)	4 Self Locking Hexagon Nuts	M5	4 Washers	0.5 mm	
(21)	--	--	Disc, Backrest Strong Inner	4 mm	
(22)	Screw the hexagon screw (M5x6) with the washer (17 mm) into the thread of the bolt and apply Loctite 262 screw locking or equivalent.				
(23)	In order to check the correct arrangement of the lamella, view the assembly from side and observe the regular pattern of the lamella formed the varying thicknesses of the washers.				
(24)	Screw the thinner hexagon nuts on the 4 hexagon screws of the strong backrest disc and apply Loctite 262 screw locking or equivalent.				
(25)	Insert the brass bushing next to the seat fitting side.				
(26)	Insert the clamping nut from the backside with the 3 disc springs, ensuring the outer diameter of the disc springs points towards the backrest disc and the inner diameter points towards the clamping nut.				
(27)	LH side: Place coil 1 so that 1 stamped point can be seen, place one bearing on the coil 1, place coil 2 onto the bearing so that 2 stamped points can be seen, place a bearing on coil 2, place another coil 1 on the bearing so that 1 stamped point can be seen.				
(28)	RH side: Place coil 1 so that 2 stamped point can be seen, place one bearing on the coil 1, place coil 2 onto the bearing so that 1 stamped point can be seen, place a bearing on coil 2, place another coil 1 on the bearing so that 2 stamped point can be seen.				
(29)	Screw the clamping screw into the internal thread of the clamping nut, and just tighten it by hand.				
(30)	Insert the distancing bushing through the holes of the two coils.				
(31)	Put the M4x20 screw with the washer and the locking plate through the distancing bushing, screw it into the backrest fitting, but do not tighten it yet.				
(32)	Tighten the clamping screw as far as possible by hand and apply a quarter additional turn with the screw wrench.				
(33)	Place the locking plate over the hexagon screw and tighten the distancing bushing with the hexagon screw (M4x20) and the washer and secure it with Loctite 262 screw locking.				
(34)	Put the driver into the hole of coil 2, mount the lower driver sheet, mount the upper driver sheet and insert the washer between the driver sheets.				
(35)	Fix the driver sheets and the washer to the brass bushing with a cable-clip.				

(5) Assemble the Adjustable Backrest Mechanism (if OÄM 40-375 is installed)

The following table describes the assembling of a single backrest mechanism. The assembly procedure is used for both sides.

	Detail Steps/Work Items	Key Items/References
(1)	Screw the Hydrolok hydraulic cylinder into the actuating shaft, so that the cylinder rod end and the center of the actuating shaft are 35 mm (1.4 in) apart.	Refer to Figure 202.
(2)	Attach the lower end of the hydraulic cylinder to the side bracket seat shell.	
(3)	Attach the side bracket seat shell to the seat bracket seat side using 2 hexagon screws.	
(4)	Attach the backrest bracket to the actuating shaft using a bush and a hexagon screw.	
(5)	Attach the backrest and the seat bracket with a hexagon screw and nut thru the rotation hole.	

(6) Assemble a Pilots' Seat (if OÄM 40-252 is installed)

After assembling the adjustable backrest mechanism, carry out the steps that follow:

	Detail Steps/Work Items	Key Items/References
(1)	Fix the inboard mechanism with the 17 hexagonal screws.	
(2)	Insert the torsion bar into the backrest, insert the torsion bar through the driver blades of the mechanism.	
(3)	Insert the outboard mechanism through the clearance (hole) of the seatpan.	
(4)	Place the mechanism on the backrest and insert the torsion bar through the driver blades of the mechanism.	
(5)	Fix the outboard mechanism with the 17 hexagon screws.	
(6)	Screw the torsion bar screw with the washer and the distance bushing into the inside thread.	
(7)	Install cover by moving it over the hinge.	
(8)	Re-install the leather lining to the seat: - Attach the leather lining to the cover using the velcro fasteners. - Tie the backrest cushion to the seat pan with the three strings. - Put the rubber bands into the plastic brackets. - Use blind rivets to fasten the plastic brackets to the seat pan. - Attach the cushion to the seat pan using the velcro.	
(9)	Install the seat lever: - Put the lever onto the adjustment mechanism in correct position. - Install the lever mounting screw. - Install plug to lever.	

(7) Assemble a Pilots' Seat (if OÄM 40-375 is installed)

After assembling the adjustable backrest mechanism on both sides, install the backrest assembly using the steps in the opposite sequence as described in Paragraph E. (2). "Remove the Backrest Assembly from the Seat (if OÄM 40-375 is installed)"

4. Remove/Install a Pilot's Seat Access-Panel (if installed)

A. Remove a Pilot's Seat Access-Panel

	Detail Steps/Work Items	Key Items/References
(1)	Remove the cloth coating from the seat.	
(2)	Remove the 12 (10) bolts which attach the access panel to the seat.	
(3)	Remove the access panel from the airplane.	

B. Install a Pilot's Seat Access-Panel

	Detail Steps/Work Items	Key Items/References
(1)	Move the access panel in place in the seat.	
(2)	Install the 12 (10) bolts which attach the access panel to the seat.	
(3)	Fasten the cloth coating on the seat.	

5. Remove/Install the Passenger Seat Access-Panel (if installed)

A. Remove the Passenger Seat Access-Panel

	Detail Steps/Work Items	Key Items/References
(1)	Remove the cloth coating from the passenger seat.	
(2)	Remove the 12 fixing bolts of the access panel..	
(3)	Remove the access panel from the airplane.	

B. Install the Passenger Seat Access-Panel

	Detail Steps/Work Items	Key Items/References
(1)	Put the access panel in place on the passenger seat.	
(2)	Install the access panel with the 12 fixing bolts.	
(3)	Fasten the cloth coating on the passenger seat.	

6. Remove/Install the Access Panel in the Baggage Extension

A. Remove the Access Panel in the Baggage Extension

	Detail Steps/Work Items	Key Items/References
(1)	Fold rear seat-backs forward.	
(2)	Peel back each side of baggage extension carpet to expose 1/4-turn fasteners.	Carpet is held with velcro.
(3)	Release the four 1/4-turn fasteners holding the access panel to the baggage extension.	
(4)	Release latch holding baggage tray lid (if fitted).	
(5)	Remove access panel from baggage extension.	

B. Install the Access Panel in the Baggage Extension

	Detail Steps/Work Items	Key Items/References
(1)	Do a check for unwanted items in the area below the access panel.	For example: tools.
(2)	Put the access panel in position in the baggage extension.	Make sure that baggage tray lid latch fits to baggage tray, if fitted.
(3)	Engage latch which holds baggage tray lid (if fitted).	
(4)	Fasten the four 1/4-turn fasteners on the baggage extension.	Latch baggage tray lid, if fitted.
(5)	Fasten baggage extension carpet.	

7. Remove/Install the Baggage Extension and Baggage Tray

A. Remove the Baggage Extension and Baggage Tray

	Detail Steps/Work Items	Key Items/References
(1)	Remove the access panel in the baggage extension.	Refer to Paragraph 6A.
(2)	Release the four screws with washers which attach the front of the baggage tray (if fitted) to the rear seats.	
(3)	Release the two screws with washers which attach the rear of the tray (if fitted) to the baggage bulkhead.	
(4)	Remove the upholstery pieces which cover the sides of the baggage bulkhead.	Attached with velcro.
(5)	Release the four 1/4-turn fasteners which attach the baggage extension to the baggage bulkhead.	
(6)	Remove the baggage extension from the airplane.	Do not damage the upholstery.

B. Install the Baggage Extension and Baggage Tray

	Detail Steps/Work Items	Key Items/References
(1)	Do a check for unwanted items in the area below the baggage extension.	For example: tools.
(2)	Put the baggage extension in place in the baggage bulkhead.	Do not damage the upholstery.
(3)	Fasten the four 1/4-turn fasteners which attach the baggage extension to the baggage bulkhead.	
(4)	Install the upholstery pieces which cover the sides of the baggage bulkhead.	Attached with velcro.
(5)	Put the baggage tray (if fitted) in place on the baggage floor.	

	Detail Steps/Work Items	Key Items/References
(6)	Fasten the four screws with washers that attach the front of the baggage tray to the rear seat base.	Torque: 3.6 Nm (2.7 lbf.ft.).
(7)	Fasten the two screws with washers that attach the rear of the baggage tray to the baggage bulkhead.	Torque: 3.6 Nm (2.7 lbf.ft.).
(8)	Install the access panel in the baggage extension.	Refer to Paragraph 6B.

8. Remove/Install the Short Baggage Extension and Baggage Tray (OÄM 40-331 is installed)

A. Remove the Short Baggage Extension and Baggage Tray

	Detail Steps/Work Items	Key Items/References
(1)	Remove the access panel in the baggage extension.	Refer to Paragraph 6A.
(2)	Release the four screws with washers which attach the front of the baggage tray to the rear seats.	
(3)	Release the two screws with washers which attach the rear of the tray to the baggage bulkhead.	
(4)	Remove the upholstery pieces which cover the sides of the baggage bulkhead.	Attached with velcro.
(5)	Open the baggage tray and unplug the electrical connectors of the cabin fan (if installed).	
(6)	Release the seven 1/4-turn fasteners which attach the short baggage extension to the baggage bulkhead.	
(7)	Remove the short baggage extension from the airplane.	Do not damage the upholstery.

B. Install the Short Baggage Extension and Baggage Tray

	Detail Steps/Work Items	Key Items/References
(1)	Do a check for unwanted items in the area below the baggage extension.	For example: tools.
(2)	Put the short baggage extension in place in the baggage bulkhead.	Do not damage the upholstery.
(3)	Fasten the seven 1/4-turn fasteners which attach the short baggage extension to the baggage bulkhead.	
(4)	Install the upholstery pieces which cover the sides of the baggage bulkhead.	Attached with velcro.
(5)	Put the baggage tray in place on the baggage floor.	
(6)	Fasten the four screws with washers that attach the front of the baggage tray to the rear seat base.	Torque: 3.6 Nm (2.7 lbf.ft.).
(7)	Fasten the two screws with washers that attach the rear of the baggage tray to the baggage bulkhead.	Torque: 3.6 Nm (2.7 lbf.ft.).
(8)	Plug the electrical connectors of the cabin fan (if installed) to the plug on rear panel of the short baggage extension.	
(9)	Install the access panel in the baggage extension.	Refer to Paragraph 6B.

9. Remove/Install the Passenger Seat

A. Remove the Passenger Seat

	Detail Steps/Work Items	Key Items/References
(1)	Release the press-studs at the front of the seat cushion.	Refer to Figure 4 In the Description and Operation Pageblock, 25-10-00. Move the cushion back far enough to give access to the attaching bolts for the seat.
(2)	Remove the six bolts with washer plates which attach the seat pan to the anchor plates.	
(3)	Remove the two bolts with washer plates which attach the front of the seat pan to the rib on top of the rear main bulkhead.	
(4)	Fold the seat-backs forward.	Lift the release catch at the left side of each seat-back.
(5)	Remove the five bolts with washer plates which attach the rear of the seat pan to the baggage compartment frame.	
(6)	Remove the two seat belt attach points in center section of the seat.	
(7)	Lift the seat forward, up and out of the cockpit.	

B. Install the Passenger Seat

	Detail Steps/Work Items	Key Items/References
(1)	Examine the crash elements. Look specially for delamination and buckling.	Refer to Figure 4 In the Description and Operation Pageblock, 25-10-00.
(2)	Do a check for unwanted items in the area below the seat.	For example: tools.
(3)	Put the seat in position in the fuselage with the seat-backs folded forward.	Lift the release catch at the left side of each seat-back.
(4)	Attach the seat belt fastener to the center section of seat.	
(5)	Install the five bolts with washer plates which attach the rear of the seat pan to the baggage compartment frame.	Torque: 6.4 Nm (4.7 lbf.ft.).
(6)	Install the six bolts with washer plates which attach the seat pan to the anchor plates.	Torque: 16 Nm (11.8 lbf.ft.).
(7)	Install the two bolts with washer plates which attach the front of the seat pan to the rib on top of the rear main bulkhead.	Torque: 6.4 Nm (4.7 lbf.ft.).
(8)	Fasten the press-studs which hold the seat cushion.	

10. Remove/Install a Safety Belt

This procedure applies to the pilots' seats and the passenger seat.

A. Remove a Safety Belt

	Detail Steps/Work Items	Key Items/References
(1)	Remove the seat.	Refer to Paragraph 2 or 3.
(2)	Remove the self-locking nuts, washer plates and bolts which attach the straps to the seat.	Refer to Figure 5 In the Description and Operation Pageblock, 25-10-00. For the pilots' seats only: - Make a note of the position of the anchor plates which these bolts also hold.
(3)	Move the straps through the holes in the seat pan and remove them.	
(4)	Release the bolt and washer which attach the inertia reel and its cover to the structure.	
(5)	Release the bolt, washer plate and spring washer which attach the guide to the roll-bar.	For the pilots' seats only: - Make a note of the position of the washers.
(6)	Remove the shoulder strap.	

B. Install a Safety Belt

	Detail Steps/Work Items	Key Items/References
(1)	Install the bolt and washer which attach the inertia reel and its cover to the structure.	Refer to Figure 5 In the Description and Operation Pageblock, 25-10-00.
(2)	Install the bolt, washer plate and spring washer which attach the guide to the roll-bar.	For the pilots’ seats only.
(3)	Put the lap straps through the holes in the seat pan.	The buckle goes to the inboard side of the pilots' seats (front) and the outboard side of the passenger seat (rear).
(4)	Put the lap straps between the seat pan and the metal plate. Install the bolts with washer plates from the top of the seat pan.	
(5)	Put the anchor plates in position on the bolts.	For the pilots’ seats only.
(6)	Install washer plates and self-locking nuts on the bolts.	Torque: 16 Nm (11.8 lbf.ft.).
(7)	Install the seat.	Refer to Paragraph 2 or 3.

11. Remove/Install the Instrument Panel Cover

A. Remove the Instrument Panel Cover

	Detail Steps/Work Items	Key Items/References
(1)	Remove the screws which attach the instrument panel cover to the instrument panel and the fuselage.	
(2)	Lift the cover far enough to give access to the defrost hoses.	
(3)	Loosen the hose clamps on the defrost hoses. Remove the hoses from the cover.	
(4)	Remove the cover from the airplane.	

B. Install the Instrument Panel Cover

	Detail Steps/Work Items	Key Items/References
(1)	Do a check for unwanted items in the area between the firewall and the instrument panel.	For example: tools.
(2)	Put the instrument panel cover in position just above the instrument panel.	
(3)	Connect the defrost hoses to the cover.	
(4)	Tighten the hose clamps on the defrost hoses.	
(5)	Lower the cover into position on the instrument panel.	
(6)	Install the attaching screws.	

12. Cleaning

A. Seats

The seat cushions are made from a fire-resistant material. Clean the cushions with a vacuum cleaner. Use a mild soap solution to remove stains. Make sure that the area is well ventilated after cleaning to remove all moisture.

B. Safety Belts

Use a mild soap solution to remove stains from the safety belts.

EMERGENCY

1. General

This Section tells you about the optional Emergency Location Transmitter (ELT) Artex ME 406/ Artex 1000. It also tells you about the Remote Control switch (RCS) for the Artex ME 406/Artex 1000. Refer to the manufacturer's Operator's Manual for more data.

2. Description

A. ELT Equipment

(1) Location

The Artex ME 406/Artex 1000 is located in the rear fuselage, below the aft baggage compartment. A velcro strap attached to a mounting bracket holds the Artex ME 406/ Atrex 1000 in position. The ELT antenna is mounted on a bracket in the aft fuselage, above the ELT. A Remote Control switch (RCS) is mounted on the instrument panel, right side.

(2) Signal Transmission

The Artex ME 406/Artex 1000 transmit signals automatically after a crash on the emergency frequencies of 121.5 and 406 Megahertz (MHz). Every 50 seconds the transmitter transmits a signal on the 406 MHz frequency to a satellite. The signal to the satellite contains the serial number of the ELT transmitter or the airplane ID, a country code and a unique identity code. The satellite will also give the emergency services a more accurate location for the airplane.

(3) Functional Test

Do a regular functional test (see the Maintenance Practices in this Section).

B. ELT Batteries

The ELT has its own battery pack to supply electrical power. When the ELT is ON and transmitting the batteries will keep the ELT transmitting until battery power is gone on the 121.5 MHz frequency and for up to 24 hours on the 406 MHz frequency.

It is important to monitor the battery expiry dates for the battery pack. The expiry date for the battery pack is shown on the identity plate for the transmitter. The battery pack must be replaced:

- After use in an emergency.
- After the transmitter has been accidentally switched ON for an unknown period of time.
- After 1 hour of accumulated use (testing).
- On or before the battery pack expiry date.

You must do regular functional tests. Refer to the Maintenance Practices in this Section.

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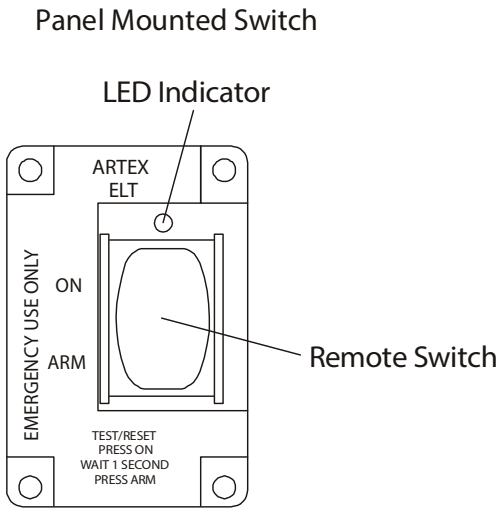

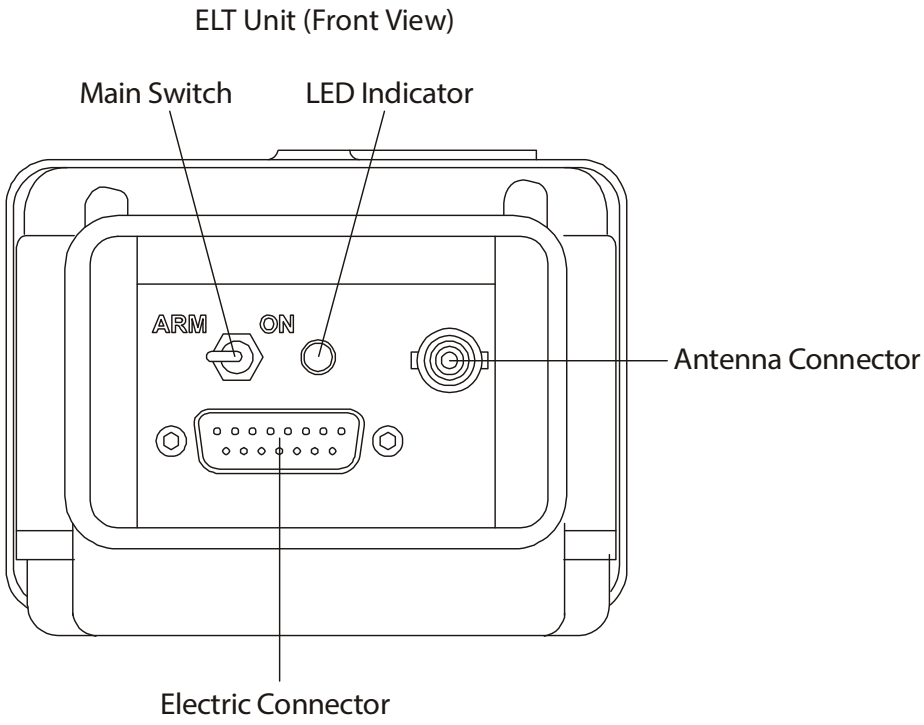

Figure 1 : ELT Artex ME 406/Artex 1000

3. Operation

A. ELT

The ELT has a switch with these two positions:

- ON.
- OFF/ARM.

The ON position is for ground test. When the airplane is in use the switch must be in the ARM position.

(1) Emergency Operation

If the airplane crashes, then the accelerometer senses the crash. The accelerometer sets the transmitter to ON. The transmitter transmits the international distress frequency and on 406 MHz. The battery in the ELT supplies power to the transmitter. The battery can operate the ELT for at least 50 hours.

(2) Test

If you switch the RCS to ON, then the following occurs:

- A LED flashes in the RCS and the ELT unit.
- If you set the radio to 121.5 MHz, you can hear the audio sweep tone from the ELT.

B. Remote Control Switch (RCS)

The RCS is installed on the right side of the instrument panel and has a red LED to indicate the activation of the ELT. When it is switched to ON it does a test of the ELT. When you switch it back to ARM the switch stops the test of the ELT. The red LED flashes when you test the ELT. If a problem has been detected the LED provides a coded signal following the initial 1 second pulse.

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TROUBLE-SHOOTING

1. General

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then do the repair given in the Repair column..

Trouble	Possible Cause	Repair
ELT does not operate on test.	ELT batteries discharged.	Replace the ELT batteries.
	ELT defective.	If the ELT batteries are serviceable, then replace the ELT.

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MAINTENANCE PRACTICES

1. General

This Section tells you how to remove and install the ELT and the RCS. It tells you how to test the ELT in the airplane. It also tells you how replace the batteries in the ELT. This Section also gives you the periodic maintenance necessary to maintain the ELT equipment in a serviceable condition.

See the ELT manufacturer's Operator's Manual for more data.

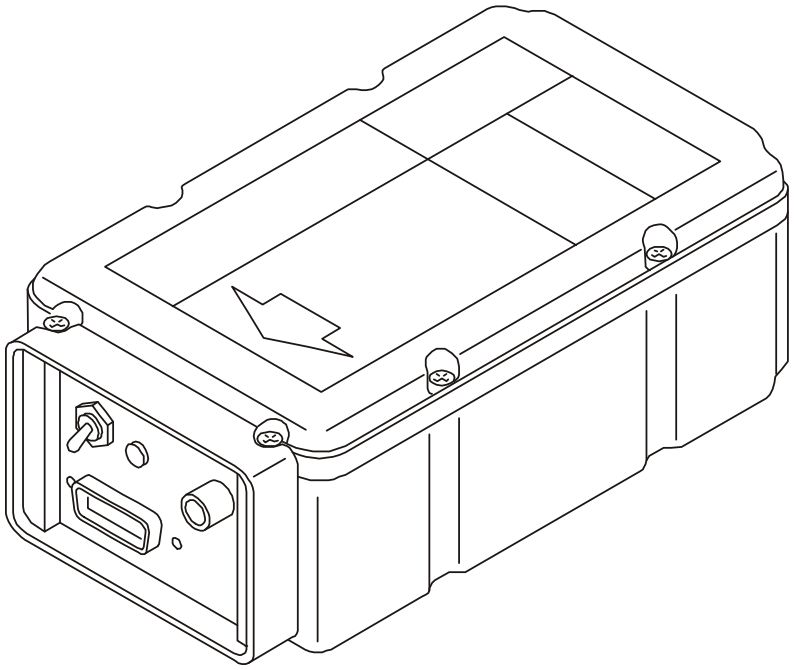
2. Remove/Install the ELT

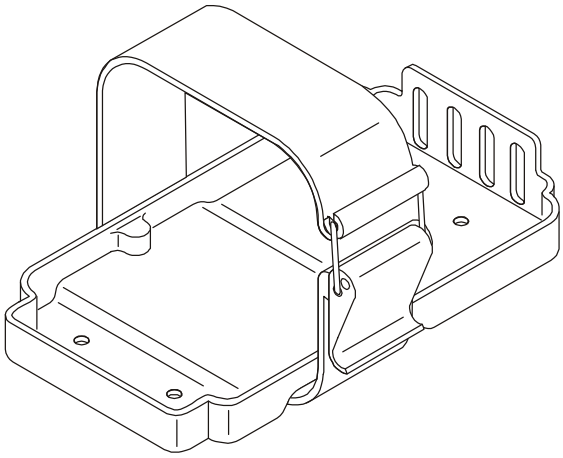
A. Remove the ELT

Refer to Figure 201..

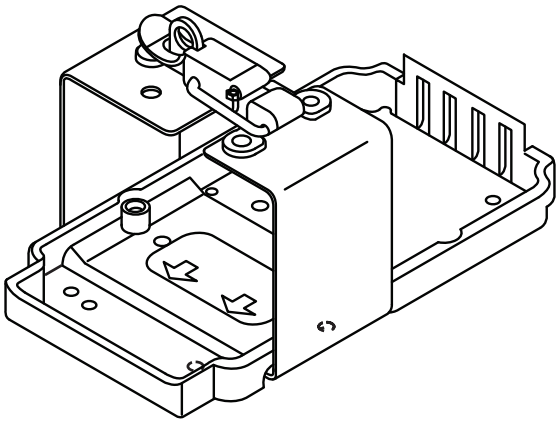
	Detail Steps/Work Items	Key Items/References
(1)	Remove the trim/cover from the front face of the baggage compartment frame.	Pull the rear seat-backs forward.
(2)	Loosen the thumb screws on the end cap. Pull the end cap away from the ELT unit. Move the protective top cover up and backward and remove.	
(3)	Disconnect the co-axial cable for the antenna at the ELT BNC connector and all other cables.	At the ELT.
(4)	Release the strapping which hold the ELT in its mounting and remove the ELT from the airplane.	It could be metal or velcro strapping

WARNING: **IF THE ELT IS MOVED TO A DIFFERENT AIRPLANE THAN WHICH IT WAS ORIGINALLY REGISTERED WITH, THE ELT MUST BE RE-REGISTERED AND THE PRODUCT LABEL RE-MARKED TO INDICATE THE NEW PROGRAMMING AND/OR NEW COUNTRY OF REGISTRY.**





ARTEX ME406 Mounting Tray



ARTEX ELT 1000 Mounting Tray

Figure 201 : Artex ME 406 ELT /Artex 1000 ELT Installation

B. Install the ELT

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
	WARNING: IF THE ELT IS MOVED TO A DIFFERENT AIRPLANE THAN WHICH IT WAS ORIGINALLY REGISTERED WITH, THE ELT MUST BE RE-REGISTERED AND THE PRODUCT LABEL RE-MARKED TO INDICATE THE NEW PROGRAMMING AND/OR NEW COUNTRY OF REGISTRY.	
(1)	Move the ELT into position into its mounting.	At an angle so that the locking ears at the end opposite the direction-of-flight arrow fit into the mounting tray locking slots.
(2)	Close and secure the straps which hold the ELT.	It could be metal or velcro strapping
(3)	Feed the coax cable through the hole in the end cap and connect it to the ELT. Fit the top cover onto the ELT unit. Position the end cap and connector assembly onto the ELT and tighten the thumb screws securely.	Ensure that the slots at the end of the cover fit over the locking ears on the ELT prior to fitting the cover onto the connector end.
(4)	Do a test for the correct operation of the ELT.	Refer to Paragraph 3.
(5)	Install the trim/cover to the front face of the baggage compartment frame.	

3. ELT Functional Test

NOTE: Do this test only during the first 5 minutes of each hour. If you are at a location with a control tower or other monitoring facility, tell them before you do the test.

NOTE: For maintenance done to FAR 91 (airplanes registered in the USA) an additional functional test of the ELT is required. Refer to FAA Action Notice 8150.3 for more data.

CAUTION: DO NOT ALLOW THE TEST DURATION TO EXCEED 5 SECONDS. THE ELT WILL TRANSMIT A 406 MHZ SIGNAL AFTER THE ELT IS ACTIVE FOR APPROXIMATELY 50 SECONDS. THE SATELLITE SYSTEM CONSIDERS THIS TRANSMISSION TO BE A VALID DISTRESS SIGNAL.

	Detail Steps/Work Items	Key Items/References
(1)	Set the ELECTRIC MASTER key switch to ON.	
(2)	Set the AVIONIC MASTER switch to ON.	
(3)	Set the radio to receive on 121.5 MHz.	
(4)	Set the Remote Control switch to ON.	
(5)	Monitor the radio for 3 ELT sweep tones.	
(6)	Set the Remote Control switch to ARM.	Pay special attention to the LED activity upon entering the ARM (OFF) condition. If a problem is detected, the LED provides a coded signal following the initial 1 second pulse. Refer to the ELT manufacturer's Operator’s Manual for coded signals.
(7)	Set the AVIONIC MASTER switch to OFF.	
(8)	Set the ELECTRIC MASTER key switch to OFF.	

4. Replace the ELT Batteries

Refer to Figure 202.

You must only use a battery pack that is supplied by the equipment manufacturer.

NOTE: The battery pack contains components that are sensitive to static electricity. You must take electro-static discharge precautions before doing work on the battery pack.

NOTE: The battery pack is connected to the ELT by a short electrical cable assembly. You must take care not to strain this cable when you separate the battery pack from the ELT.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the ELT from the airplane ELT mounting.	Refer to Paragraph 2 A.
Replace the ELT Battery. Refer to the Artex Installation and Maintenance Manual for ME 406/1000, Doc. No. 570-1600.		
(2)	Install the ELT in the airplane mounting and attach the Battery Pack Replacement Date label to the top surface of the ELT protective cover where it can be easily seen.	Refer to Paragraph 2 B.
(3)	Record the details of the ELT battery pack replacement date in the airplane log-book.	
(4)	Do a functional test of the ELT.	Refer to Paragraph 3.

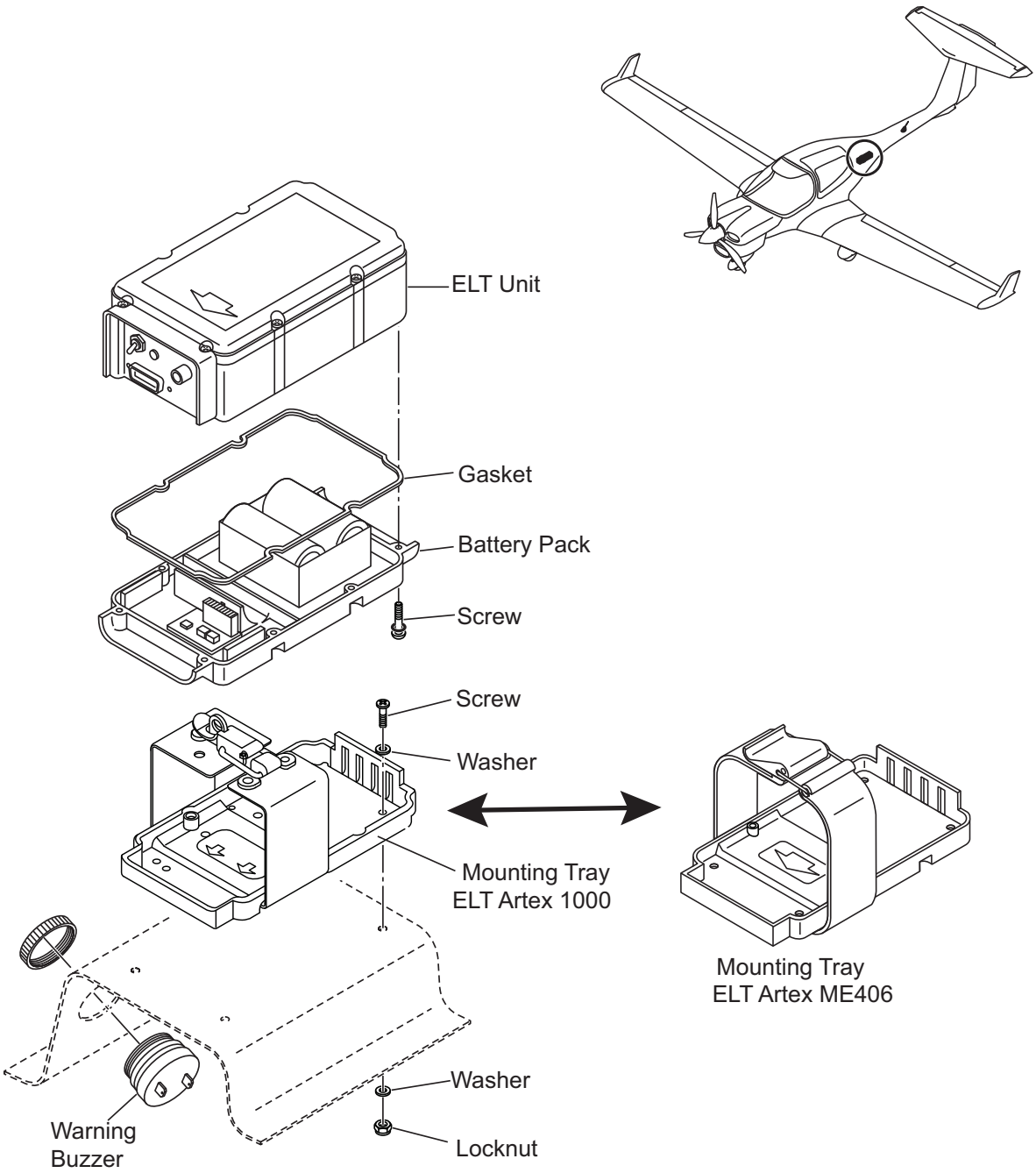


Figure 202: ELT Batteries - Removal/Installation

5. Remove/Install the Remote Control Switch (RCS)

A. Remove the RCS

Refer to Figure 203..

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Disconnect the electrical cable from the rear of the RCS.	At the in-line connector.
(3)	Remove the four screws which attach the RCS to the instrument panel.	
(4)	Move the RCS forward and remove it from the airplane.	

B. Install the RCS

Refer to Figure 203..

	Detail Steps/Work Items	Key Items/References
(1)	Move the RCS into position in the instrument panel.	
(2)	Install the four screws which attach the RCS to the instrument panel.	
(3)	Connect the electrical cable to the rear of the RCS.	At the in-line connector.
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Do a functional test of the ELT system.	Refer to Paragraph 3.

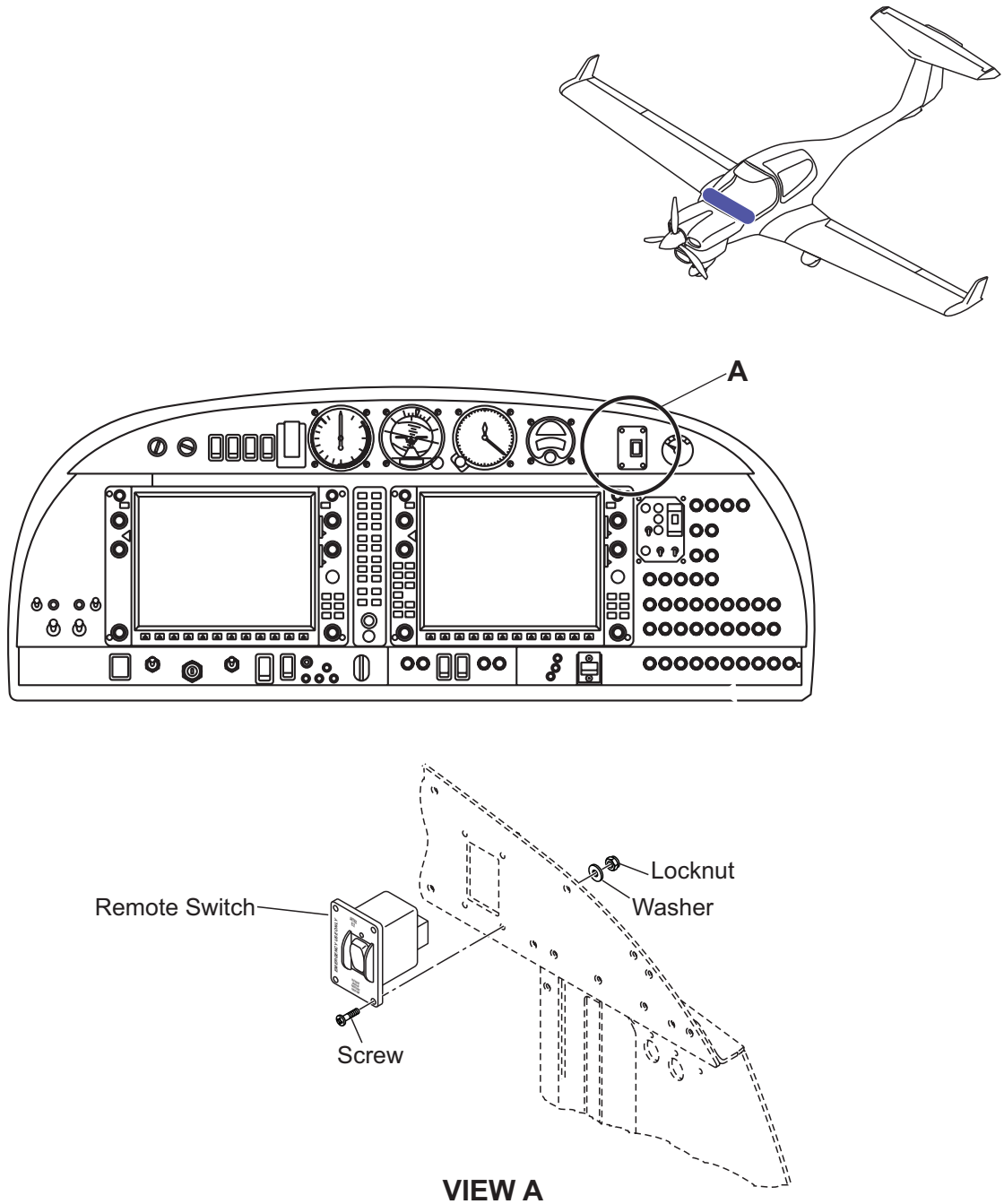


Figure 203: Remote Control Switch - Removal/Installation

6. ELT Periodic Inspection

The ELT installation must be inspected at least once every 12 months to maintain serviceability.

	Detail Steps/Work Items	Key Items/References
(1)	Examine the ELT and the ELT mounting tray, look specially for: - Security of the fasteners. - Security of all mechanical assemblies.	
(2)	Examine the co-axial cable from the ELT to the antenna. Look specially for: - Cuts or abrasions to the outer sheath of the co-axial cable.	
(3)	Disconnect the co-axial cable from the antenna and the ELT. Examine the connectors at each end of the co-axial cable, the antenna and the ELT for corrosion or damage. Reconnect the co-axial cable.	
(4)	Examine the cable which connects the ELT to the RCS. Look specially for: - Cuts or abrasions to the outer sheath of the cable.	
(5)	Check the expiry date of the system battery and replace the battery if necessary.	Refer to Paragraph 4.

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CHAPTER 26
FIRE PROTECTION

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FIRE PROTECTION - GENERAL

1. General

This Chapter tells you only about the fire extinguisher installed in the airplane. See the fire extinguisher manufacturer's manual for more data about the extinguisher.

NOTE: Equipment which is certified for installation in the DA 40 NG is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

2. Description

Figure 1 shows the installation of the fire extinguisher in the airplane. The Amerex 337TS fire extinguisher is installed horizontally (fore/aft) on the side floor behind the co-pilot seat. The fire extinguisher is held into the bracket with a quick release metal strap. Screws, washers and nuts attach the fire extinguisher mounting bracket to the floor. The fire extinguisher utilizes Halotron BrX (2-BTP) as the extinguishing agent, which is non-toxic and does not have a residue.

The only on-airplane maintenance for the fire extinguisher is:

- Monitor the pressure indicator. It must show in the green sector.
- Make sure that the plastic protection that keeps the pin from sliding out is not broken.
- Make sure that the extinguisher is correctly held in the mounting.

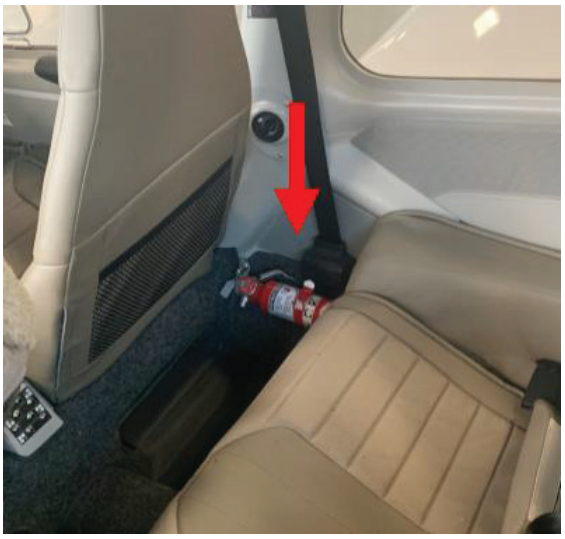
If the plastic protection is broken, remove the extinguisher for weighing. Weight data is given on the label attached to the extinguisher body.

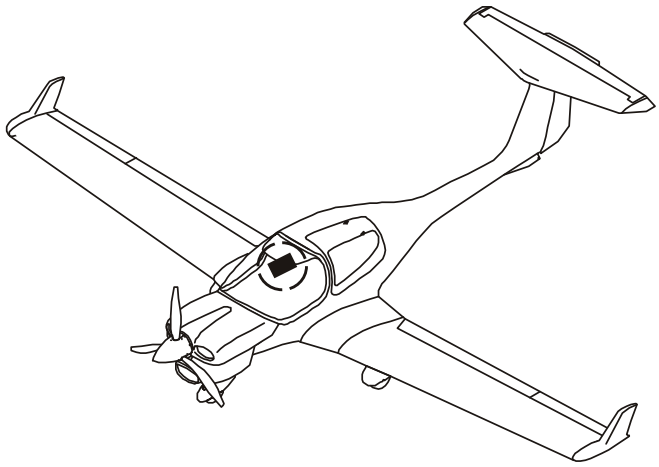
You must replace the fire extinguisher (or return it to the manufacturer for repair):

- When the weight is incorrect.
- When the pressure is too low.
- When the fire extinguisher has been used.
- If the fire extinguisher is damaged.

MODEL	337TS
Manufacturer	Amerex
UL Rating	2B:C
Agent Capacity	0.87 kg (1.92 lb.)
Filled Weight	1.44 kg (3.17 lb.)
Height	285.75 mm (11.25 in.)
Width	101.6 mm (4 in.)
Depth	82.6 mm (3.25 in.)
Discharge Time	9 seconds

Table 1 : Fire Extinguisher Data





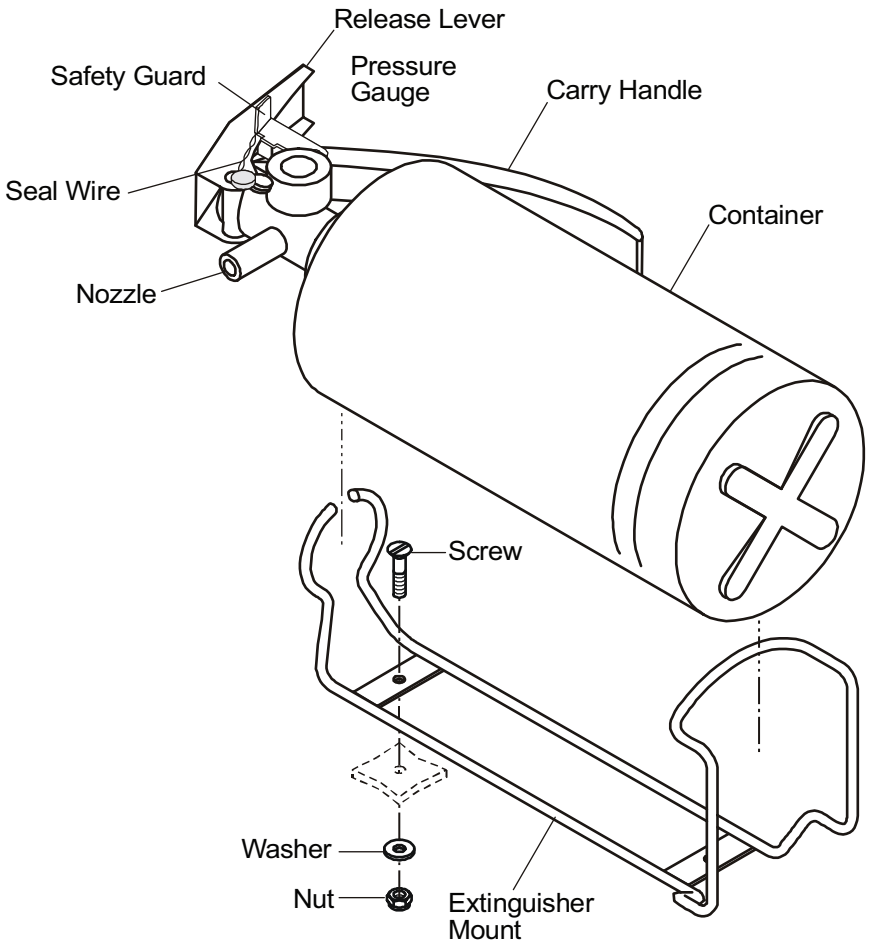


Figure 1 : Fire Extinguisher Installation

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CHAPTER 27
FLIGHT CONTROLS

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FLIGHT CONTROLS

1. General

This Section tells you about the operation and the adjustment of the flight controls. It also tells you about the assembly of the flight controls. Refer to the related Section for the data on a specified system.

This Section tells you how standard parts are used to make the flight controls for each system.

NOTE: Equipment which is certified for installation in the DA 40 NG is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

2. Description

The DA 40 NG has the usual flight controls. An elevator attached to the horizontal stabilizer gives longitudinal control. Ailerons attached to the trailing edge of each wing give lateral control. The rudder attached to the vertical stabilizer gives yaw control. Flaps attached to the trailing edge of each wing give extra lift for landing and for take-off.

The DA 40 NG has a control stick for each pilot. The pilot can set the elevator trim with a control wheel in the center console.

Each pilot has a rudder pedal assembly. The assembly attaches to the cockpit floor. The pilot can adjust the position of the rudder pedals with an adjuster handle on the rudder pedal assembly.

The pilot moves each primary control through a system of push-rods and bellcranks. Cables operate the rudder. An electric actuator operates the flaps.

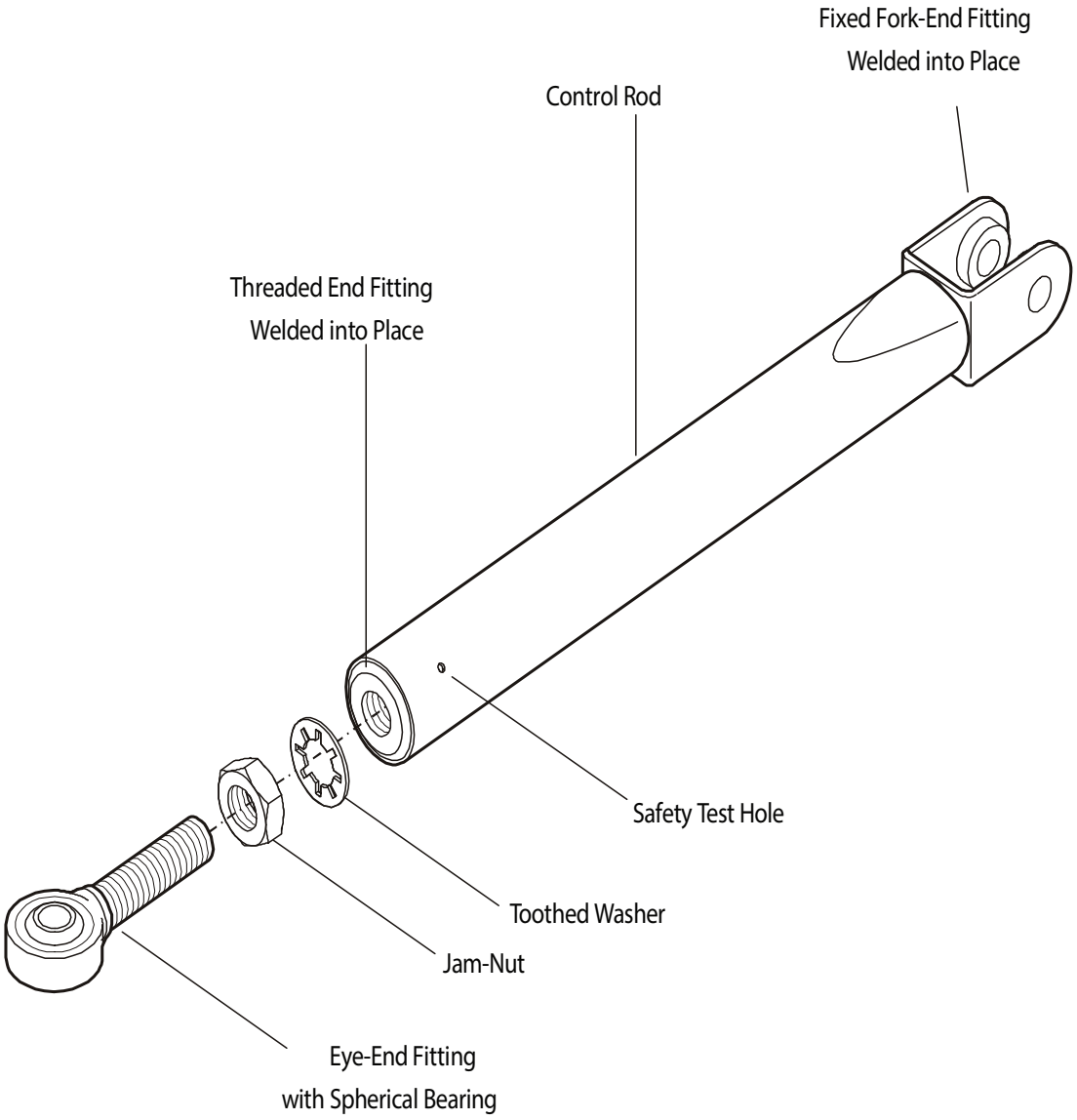

Figure 1 : Standard Push-Rod

3. Push-Rods

The push-rods used in the DA 40 NG have standard end fittings. Also most rods use a standard diameter tube. Only the length of the rods is special. Some rods have one fixed fork end and one adjustable eye-end fitting. Other rods have two adjustable eye-end fittings.

Figure 1 shows an example of a standard push-rod. The rod has one adjustable end fitting. The end fitting has an eye-end with a threaded shaft. The eye-end has a spherical bearing. A jam-nut on the threaded shaft locks the eye-end in position. A toothed washer locks the nut. You can turn the eye-end to adjust the length of the rod.

A steel tube connects the end fittings. A threaded insert is welded into the steel tube to take the eye-end. A safety hole is drilled in the end of the steel tube with the adjustable end fitting. The safety hole shows you if the installation of the eye-end to the insert in the steel tube is correct. If you can push the safety wire through the hole to the other side, the eye-end installation is not correct. But, if you cannot push the safety wire through the hole, the eye-end installation is correct.

A fixed fork-end is welded to the steel tube.

Refer to Maintenance Practices in this Section for the procedures for adjusting push-rods.

4. Control Rigging

The flight controls of the DA 40 NG have been designed to make correct rigging as easy as possible. All levers and bellcranks have holes for rigging pins. The rigging pins lock the levers in the neutral position.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to do the procedures that follow:

- Push-rod adjustment, which applies to all of the control systems.
- Remove/Install bellcranks and levers, which applies to all of the control systems.
- Remove/Install a control stick handle.

2. Push-Rod Adjustment

WARNING: IF YOU DO AN ADJUSTMENT OF A PUSH-ROD, YOU MUST MAKE SURE THAT THE PUSH-ROD IS STILL IN SAFETY. IF YOU DO NOT DO THIS, THE PUSH-ROD CAN DISCONNECT. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.

	Detail Steps/Work Items	Key Items/References
(1)	Release the bolt attaching the push-rod to the lever or bellcrank.	At the end with an adjustable end fitting.
(2)	Loosen the jam-nut on the adjustable end fitting.	Refer to Figure 1.
(3)	Turn the eye-end to adjust the length of the rod.	Turn clockwise to make the rod shorter. Turn counter-clockwise to make the rod longer.
(4)	Do a test for safety of the eye-end. Push a piece of lock-wire through the safety test hole.	The wire must not go through the hole and out the other side.
(5)	Tighten the jam-nut.	Torque: 16 Nm (11.8 lbf.ft.).
(6)	Put the end-fitting in position in the lever or bellcrank.	
(7)	Install the bolt, washer and self-locking nut.	Torque: 6.4 Nm (4.7 lbf.ft.). You must always use a new self-locking nut.
(8)	Do an inspection of the control that you have adjusted. - If necessary for your Airworthiness Authority, do a second inspection of the control.	

3. Remove/Install Bellcranks and Levers

The DA 40 NG has standard attachments for bellcranks and levers in the flight control systems. Refer to the tables at the end of each Section for access data. Refer to the Figures in the related Section for the correct orientation.

A. Remove a Bellcrank or Lever.

	Detail Steps/Work Items	Key Items/References
(1)	Release the bolts attaching the push-rods to the lever or bellcrank.	
(2)	Remove the pivot bolt from the lever or bellcrank.	
(3)	If necessary, remove the mounting bracket: - Remove the attaching bolts and washers.	Where you have access to both sides of the attachment, bolts with washers and nuts are used. In all other cases, anchor-nuts are used.

B. Install a Bellcrank or Lever.

	Detail Steps/Work Items	Key Items/References
(1)	Put the mounting bracket in position.	If removed.
NOTE: You must always use new self-locking nuts when installing control levers or bellcranks. Do not use a self-locking nut more than once.		
(2)	Install the attaching bolts, washers and nuts.	Torque: 6.4 Nm (4.7 lbf.ft.).
(3)	Put the bellcrank or lever in position in the mounting bracket.	Make sure that the bushes and spacer are in position.
(4)	Install the pivot bolt, washer and nut.	Torque: 6.4 Nm (4.7 lbf.ft.).
(5)	Install the bolts, washers and self-locking nuts which attach the push-rods.	Torque: 6.4 Nm (4.7 lbf.ft.).
(6)	Do a test of the control system.	Refer to the related Section.
(7)	Do an inspection of the control that you have installed or adjusted. - If necessary for your Airworthiness Authority, do a second inspection of the control.	

4. Remove/Install a Control Stick Handle

The control stick consists of two sections:

- The control stick handle. Made of flexible strength rubber that holds the PTT switch, the AP CWS switch and the AP Disc switch.
- The control stick assembly. The rigid metal tube section that inserts inside the stick handle assembly and controls the flight controls.

A. Remove a Control Stick Handle.

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(1)	Pull open the AUDIO circuit breaker and the AUTO PILOT circuit breaker on the AVIONICS BUS.	
(2)	Remove the PTT switch at the control stick handle to be removed: - Leverage the switch with a small screwdriver out of the control stick's handle. - Pull the switch out from the handle and disconnect the electrical cable. - Remove the PTT switch from the control stick handle.	Handle with care. You must not damage the handle.
(3)	Remove the AP Disc switch at the control stick handle to be removed: - Remove the bezel and spacer and carefully pull out the switch to get access to the soldered wires. - Remove the heatshrink and unsolder the wires to the switch. - Remove the AP Disc switch from the control stick handle.	Identify the wire connections for the installation.

	Detail Steps/Work Items	Key Items/References
(4)	Remove the AP CWS switch at the control stick handle to be removed: - Carefully pull out the switch to get access to the soldered wires. - Remove the heatshrink and unsolder the wires to the switch. - Remove the AP CWS switch from the control stick handle.	Identify the wire connections for the installation.
	NOTE: In most cases the control stick handle will be removed because it has been physically damaged and will be replaced with a new handle.	
(5	With great care, remove the control stick handle from the control stick assembly. The handle has been installed with a sealant.	Be careful not to damage the wires leading into the control stick assembly.
(6)	With the control stick handle removed, make a careful examination of the item to determine if it can be re-installed.	

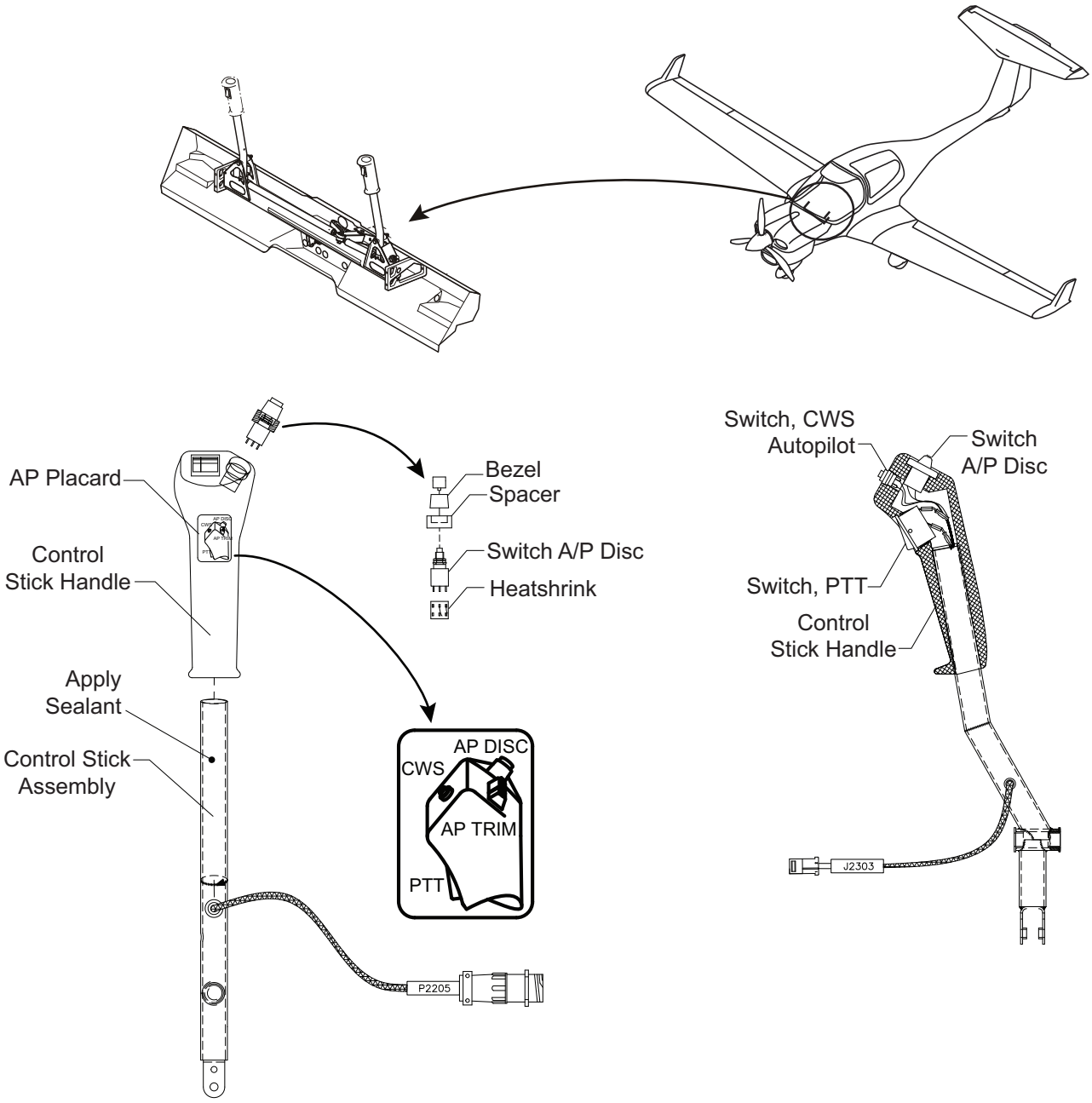

Figure 201 : Control Stick Handle - Removal/Installation

B. Install a Control Stick Handle.

(1) Equipment

Item	Quantity	Part Number
Control Grip Installation Tool.	1	D41-2213-12/1-SO1C
Sealant.	A/R	ADTHANE 1800

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(1)	If the control stick handle that was removed will be installed, make sure that: - The handle is not damaged in any way shape or form. - The handle is completely clean of any sealant. - The handle is not deformed and has good quality flexible strength rubber. If any discrepancies are found, a new control stick handle must be installed.	
(2)	Prepare for the installation of the control stick handle: - Run a cord through the PTT switch opening in the handle and tie it to the PTT switch wiring. - Run a cord through the AP Disc switch opening in the handle and tie it to tie to the AP Disc switch wiring. - Run a cord through the AP CWS switch opening in the handle and tie it to tie to the AP CWS switch wiring. This will permit easier access to the wiring once the handle is installed.	
(3)	Apply a sealant (ADTHANE 1800) to the area of the control stick assembly where the control stick handle will fit over.	
(4)	Use the control grip installation tool and install the control stick handle over the control stick assembly.	Make sure to install the handle in the correct orientation. Make sure that the wiring is accessible through the openings of the handle.

	Detail Steps/Work Items	Key Items/References
(5)	Pull the AP Disc switch wiring through the applicable opening. Secure the wiring and remove the cord.	
(6)	Install the AP Disc switch: - Solder the wires to the switch connections. - Install the heatshrink. - Push the AP Disc connect switch in place in the handle. - Secure the switch in the bezel.	Refer to the identification made during the removal procedure or the wiring schematic
(7)	Pull the AP CWS switch wiring through the applicable opening. Secure the wiring and remove the cord.	
(8)	Install the AP CWS switch: - Solder the wires to the switch connections. - Install the heatshrink. - Push the AP CWS switch in place in the handle and make sure that it is secure.	Refer to the identification made during the removal procedure or the wiring schematic
(9)	Pull the PTT switch wiring through the applicable opening. Secure the wiring and remove the cord.	
(10)	Install the PTT switch: - Connect the PTT switch connector to the wiring connector. - Push the PTT switch in place in the handle and make sure that it is secure.	
(11)	If a new control stick handle was installed. install a new placard.	
(12)	Push closed the AUDIO circuit breaker and the AUTO PILOT circuit breaker on the AVIONICS BUS.	

	Detail Steps/Work Items	Key Items/References
(13)	Do a test of the AP Disc switch: - Select the autopilot on and disconnect the autopilot from the AP Disc switch.	
(14)	Do a test of the AP CWS switch.	Refer to the Airplane Flight Manual.
(15)	Do a test of the PTT switch.	Refer to the Airplane Flight Manual.

FLIGHT CONTROLS - AILERONS AND TABS

1. General

The DA 40 NG has two control sticks that operate the ailerons. The aileron control system uses push-rods and bellcranks.

Figure 1 shows the aileron controls in the fuselage.

Figure 2 shows the aileron controls in the wing.

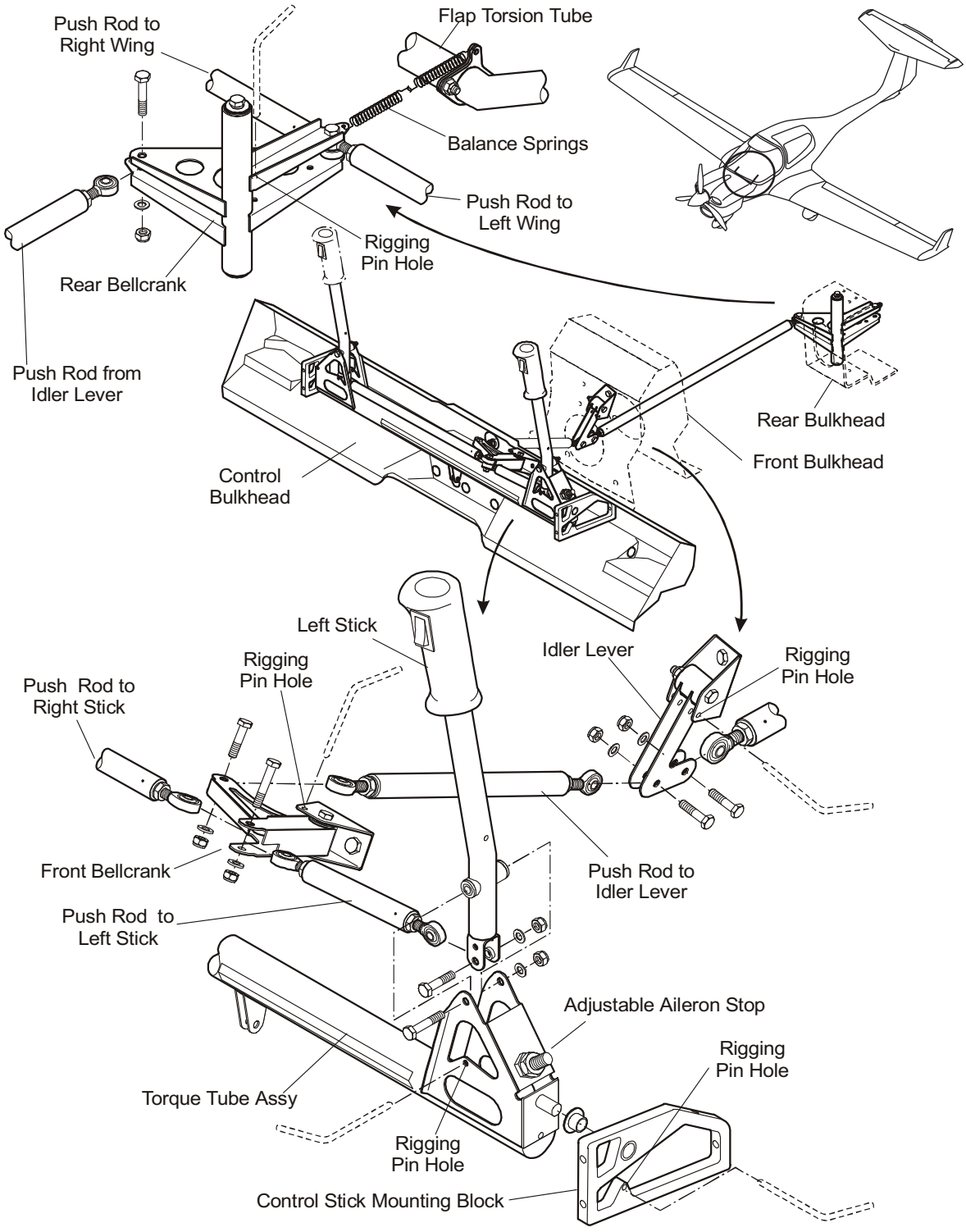

Figure 1 : Aileron Controls in the Fuselage

2. Description

The DA 40 NG has a control stick for each pilot for the aileron and elevator controls. Aileron push-rods connect to the bottom of the control sticks. The push-rods connect to the aileron front bellcrank at the control bulkhead. The front bellcrank at the control bulkhead connects to a short push-rod under the center console.

The push-rod under the center console connects to an idler lever attached to the front main bulkhead. A push-rod connects the idler lever to the rear aileron bellcrank on the rear face of the rear main bulkhead.

The rear bellcrank connects to the two push-rods in the center section. Each rod connects to a long push-rod in the wing.

Each long push-rod has three push-rod guides. The first push-rod guide attaches to the root rib. The second attaches to the flap-control rib. A small rib holds the third push-rod guide. The two long push-rods connect to the two aileron bellcranks, one in each wing.

Short push-rods connect the aileron bellcranks to the aileron horns. You can adjust the short pushrods to move the range up or down.

The aileron stop which limits the stick movement to the right side (right aileron up, left aileron down) is located left of the pilot's control stick (refer to Figure 1). The aileron stop which limits the stick movement to the left side (left aileron up, right aileron down) is located right of the co-pilot's control stick. Each aileron stop consists of a nut which is welded to the torque tube assembly, a bolt which is held by that nut, and a jam-nut which secures the bolt.

Additional, non-adjustable stops are located in front of the leading edge of the LH and RH aileron. Each stop consists of a GFRP block with rubber coating, bonded to the inside of the upper wing skin. When the aileron is deflected fully downward, the aileron paddle is deflected fully upward and contacts the stop.

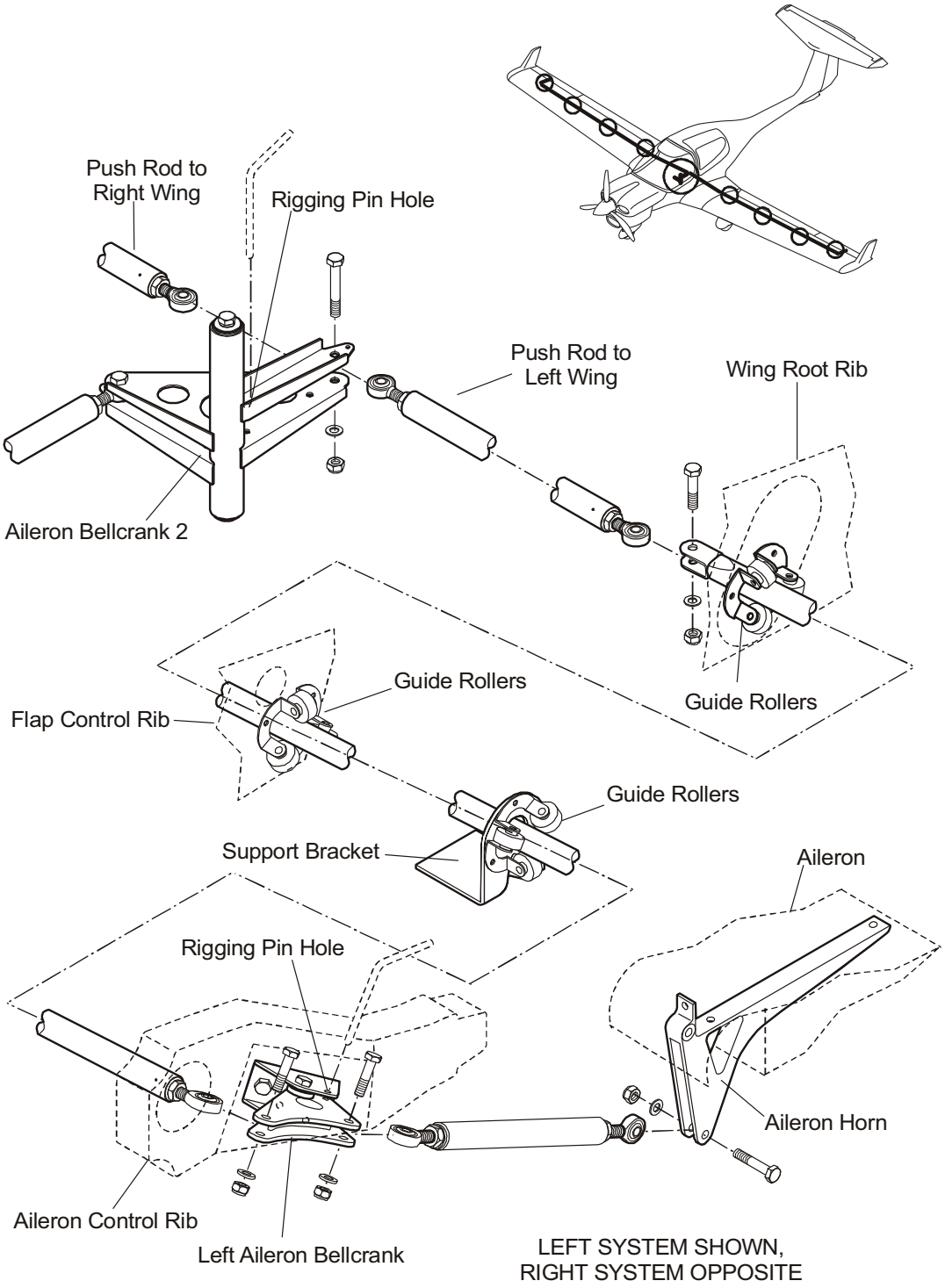

Figure 2 : Aileron Controls in the Wings

3. Operation

If you move the control sticks to the left:

- The push-rods connected to the stick move to the right.
- The front bellcrank moves the push-rod below the center console to the rear.
- The push-rod below the center console moves the idler lever and second short push-rod to the rear.
- The second short push-rod moves the rear bellcrank so that the long push-rods in the wing move to the left.
- The left aileron bellcrank in the left wing moves the short push-rod attached to the left aileron horn to the rear.
- The left aileron moves up.
- The push-rod in the right wing also moves to the left. It pulls the aileron bellcrank in the wing which moves the push-rod attached to the right aileron horn forward.
- The right aileron moves down.

If you move the control sticks to the right:

- The left aileron moves down.
- The right aileron moves up.

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TROUBLE-SHOOTING

1. General

The table below lists the defects you could have in the aileron control system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Airplane moves about its longitudinal axis in flight.	Aileron push-rods need adjusting.	Adjust the aileron push-rods.
Aileron controls stiff/catch.	Bearings defective. Control rod guides defective. Push-rod bent.	Replace the defective bearing. Replace the guides. Replace the push-rod.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to do tests on the aileron control system. They also tell you how to adjust the aileron control system. Refer to Paragraphs 4 and 5 for removal, installation and access data on the push-rods and bellcranks.

Refer to Section 57-60 to remove/install the ailerons.

WARNING: **WHEN YOU DO WORK ON THE AIRPLANE CONTROLS, YOU MUST MAKE SURE THE AREA AROUND THE CONTROLS/CONTROL SURFACES ARE CLEAR OF PERSONNEL AND EQUIPMENT. IF YOU DO NOT DO THIS, INJURY TO PERSONNEL AND DAMAGE TO CONTROL SURFACES CAN OCCUR.**

WARNING: **WHEN YOU COMPLETE WORK ON THE CONTROLS, MAKE SURE THAT YOU REMOVE ALL LOOSE ITEMS OR TOOLS FROM THAT AREA. LOOSE ITEMS OR TOOLS CAN PREVENT FULL MOVEMENT OF THE AIRPLANE CONTROLS. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.**

2. Aileron Control System Test for Correct Range of Movement

A. Equipment

Item	Quantity	Part Number
Control stick rigging pins.	2	-
Ruler.	1	Commercial
Flap/Aileron deflection gauge.	1	DA4-5750-00-00-PL

B. Aileron Control Test Procedure

NOTE: Use a ruler and the deflection gauge tool to make all measurements at the aileron control surfaces. Make the measurement between the top surface of the aileron, and the top surface of the wing tip.

	Detail Steps/Work Items	Key Items/References
(1)	Make a copy of the Control Surfaces Adjustment Report.	Refer to Section 06-00. Use it to record the measurements.
(2)	Remove the left pilot's seat.	Refer to Section 25-10.
(3)	Install the control stick rigging pins: - At the bottom of the left stick. - Through the left mounting bracket into the torque tube.	Refer to Figure 1. To lock aileron movement. To lock elevator movement.
(4)	Measure the distance between the trailing edge of each aileron and the trailing edge of the wing tip.	Record these measurements. The left aileron must align with the right aileron.
(5)	Remove the rigging pins from the following: - The bottom of each control stick. - The left stick mounting bracket.	
	WARNING: WHEN YOU DO WORK ON THE AIRPLANE CONTROLS, YOU MUST MAKE SURE THE AREAS AROUND THE CONTROLS/CONTROL SURFACES ARE CLEAR OF PERSONS/EQUIPMENT. IF YOU DO NOT DO THIS, INJURY TO PERSONNEL AND DAMAGE TO CONTROL SURFACES CAN OCCUR.	
(6)	Move the control stick fully to the left and hold it against the stop.	

	Detail Steps/Work Items	Key Items/References
(7)	Measure the distance between the trailing edge of the left aileron and the trailing edge of the wing tip.	Record the measurement. The distance must be as shown in the Control Surfaces Adjustment Report.
(8)	Measure the distance between the trailing edge of the right aileron and the trailing edge of the wing tip.	Record the measurement. The distance must be as shown in the Control Surfaces Adjustment Report.
(9)	Move the control stick fully to the right and hold it against the stop.	
(10)	Measure the angle between the trailing edge of the right aileron and the trailing edge of the wing tip.	Record the measurement. The distance must be as shown in the Control Surfaces Adjustment Report.
(11)	Measure the angle between the trailing edge of the left aileron and the trailing edge of the wing tip.	Record the measurement. The distance must be as shown in the Control Surfaces Adjustment Report.
(12)	Install the left pilot’s seat.	Refer to Section 25-10.

3. Aileron Control System Adjustments

If you cannot get the correct range of movement of the aileron control system, use this procedure to adjust the system. Gust travel refers to the amount of travel remaining at the control surface with the control stick held against the cockpit stop.

WARNING: **IF YOU DO AN ADJUSTMENT OF A PUSH-ROD, YOU MUST MAKE SURE THAT THE PUSH-ROD IS STILL IN SAFETY. IF YOU DO NOT DO THIS, THE PUSH-ROD CAN DISCONNECT. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.**

A. Equipment

Item	Quantity	Part Number
Rigging pins.	3	-
Ruler	1	Commercial
Flap/Aileron deflection gauge.	1	DA4-5750-00-00-PL

B. Aileron Adjustment Procedure.

	Detail Steps/Work Items	Key Items/References
(1)	Remove these items for access: - Pilots' seats. - Passenger seat. - Push-rod access panels under the center section. - Aileron bellcrank access panels under each wing.	 Refer to Section 25-10. Refer to Section 52-40.
(2)	Install rigging pins in the following: - The bottom of each control stick. - The left stick mounting bracket. - The front bellcrank. - The idler lever. - The rear bellcrank. - The left aileron bellcrank. - The right aileron bellcrank.	Refer to Figures 1 and 2. To lock the stick to the torque tube. To lock the elevator movement. On the control bulkhead. On the front main bulkhead. On the rear main bulkhead. In the wing. In the wing.
	NOTE: Keep the aileron rigging pins in position until you have completed the adjustments. You can do the procedure with 3 rigging pins. Lock each lever or bellcrank in sequence.	
(3)	If you cannot put a rigging pin into a lever or bellcrank, adjust the push-rods as necessary.	Refer to Section 27-00 for the push-rod adjustment procedure.

	Detail Steps/Work Items	Key Items/References
(4)	Measure the distance between the trailing edge of each aileron and the trailing edge of the wing tip.	Record these measurements. The left aileron must align with the right aileron.
(5)	Remove the rigging pins from the following: - The bottom of each control stick. - The left stick mounting bracket. - The front bellcrank. - The idler lever. - The rear bellcrank. - The left aileron bellcrank. - The right aileron bellcrank.	Refer to Figures 1 and 2. On the control bulkhead. On the front main bulkhead. On the rear main bulkhead. In the wing. In the wing.
(6)	Do the Aileron Control Test Procedure.	Refer to Paragraph 2.
(7)	If necessary, adjust the push-rods between the aileron bellcranks in the wing and the ailerons.	Refer to Section 27-00. Adjust the rods to give the measurements in the original Control Surfaces Adjustment Report supplied with the airplane.
(8)	If necessary, adjust the aileron stop bolts in the torque tube assembly: - Release the jam-nut on the stop bolt. - Adjust the stop bolt to give the correct range of movement. - Tighten the jam-nut on the stop bolt.	Refer to Figure 1. The aileron positions must be the distances shown in the Control Surfaces Adjustment Report. (measured from the neutral position).
(9)	Do an inspection of the controls that you have adjusted. - If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(10)	Install these items: - Pilots' seats. - Passenger seat. - Push-rod access panels under the center section. - Aileron bellcrank access panels under each wing.	 Refer to Section 25-10. Refer to Section 52-40.

4. Aileron Push-Rod Access

Aileron Push-Rod	Remove/Install Access	References
Between the control stick and the bellcrank at the control bulkhead.	Pilots' seats.	Refer to Section 25-10.
Between the bellcrank at the control bulkhead and the idler lever at the front main bulkhead.	Pilots' seats.	Refer to Section 25-10.
Between the idler lever at the front main bulkhead and the bellcrank at the rear main bulkhead.	Pilots' seats. Passenger seat.	Refer to Section 25-10.
Between the bellcrank at the rear main bulkhead. and the wing root rib.	Pilots' seats. Center section access panels.	Refer to Section 25-10. Refer to Section 52-40.
Between the wing root rib and the bellcrank in the left/right wing.	Center section access panels. Aileron bellcrank access panels under each wing.	Refer to Section 52-40.
Between the bellcrank in the left/right wing and the aileron.	Aileron bellcrank access panels under each wing.	Refer to Section 52-40.

5. Aileron Bellcrank and Lever Access

Aileron Bellcrank/Lever	Remove/Install Access	References
Bellcrank at the control bulkhead.	Pilots' seats.	Refer to Section 25-10.
Idler lever at the front main bulkhead.	Pilots' seats.	Refer to Section 25-10.
Bellcrank at the rear main bulkhead.	Passenger seat.	Refer to Section 25-10.
Bellcrank in the wing.	Aileron bellcrank access panels under each wing.	Refer to Section 52-40.

FLIGHT CONTROLS - RUDDER

1. General

The DA 40 NG has the usual rudder control system. Each pilot has a rudder pedal assembly. The pilot can adjust the pedal position. Control cables connect the pedal assembly to the rudder. A fixed trim tab gives a small amount of adjustment to the rudder trim. You can only adjust the fixed trim tab on the ground.

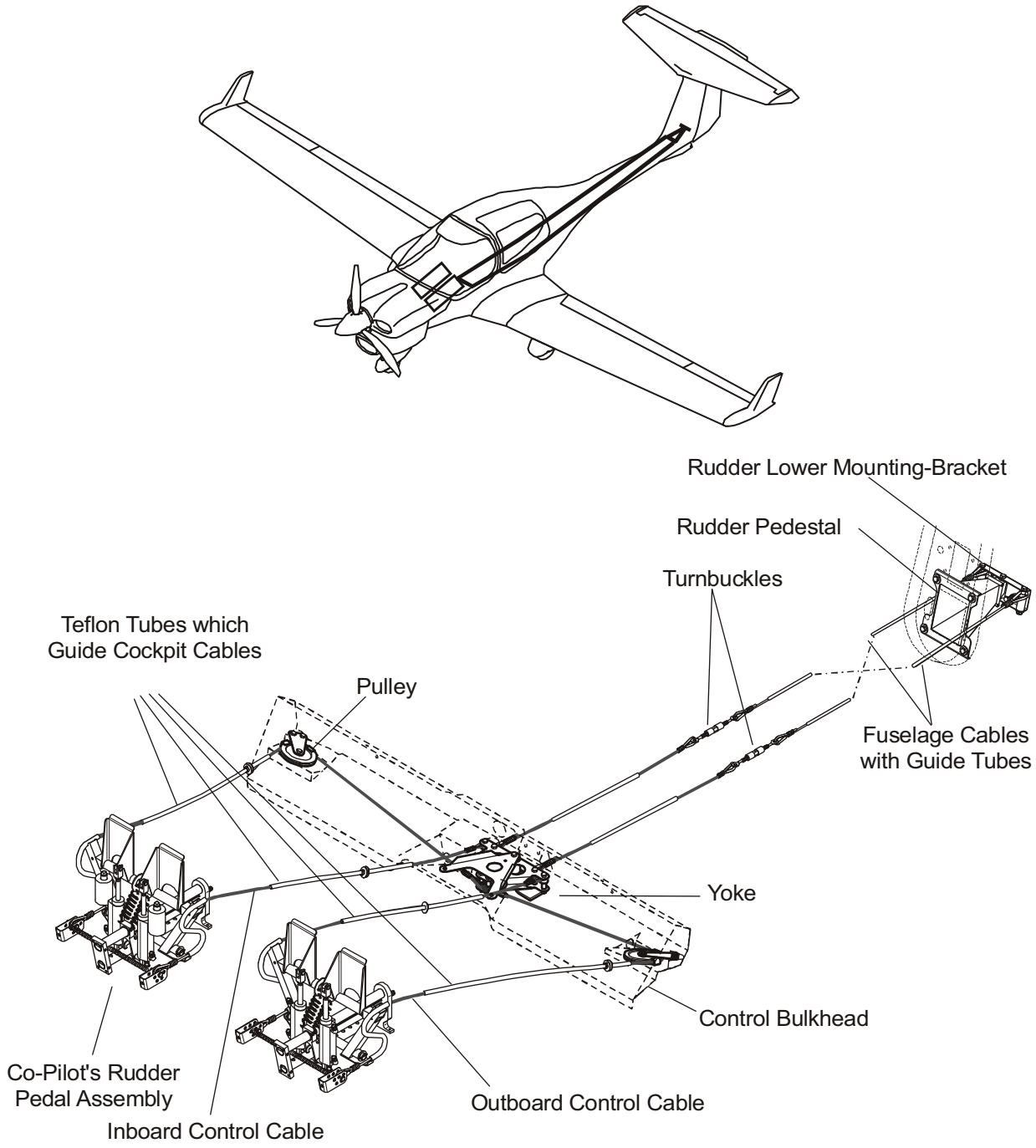


Figure 1: Rudder Control System

2. Description

The DA 40 NG has a set of rudder control pedals for each pilot. The pedal assembly can be adjusted. Figures 1, 4, and 5 show you the rudder control system. Figure 2 shows you the rudder pedal assembly with manual pedal adjustment. Figure 3 shows the rudder pedal assembly with electrical pedal adjustment (optional equipment; if OÄM 40-251 is installed).

The system has these parts:

- A rudder pedal assembly for each pilot at the front of the cockpit. The forward part of each pedal connects to a brake master cylinder (refer to Section 32-40).
- An adjuster handle for each pilot, attached to the aft face of the rudder pedal assembly, or, as optional equipment (if OÄM 40-251 is installed), an adjuster switch for each pilot, located on the floor side panel in the leg room.
- A yoke (a “T”-shaped lever) assembly in the fuselage below the center console. The yoke attaches to the bottom of the control bulkhead and to the fuselage shell.
- A rudder pedestal at the rear of the fuselage. The rudder lower mounting-bracket is attached to the rudder leading edge. It connects the rudder to the rudder pedestal.
- Cable assemblies.

Six bolts attach each rudder pedal assembly to the cockpit floor. Each rudder pedal assembly has two pedals. Each pedal has a lever and a foot pad. The pedal has an "S" shaped tube. The lower part of the "S" shaped tube aligns with the pivot of the pedal. The upper part of the "S" shaped tube aligns with the foot pad of the pedal.

Four control cables ('cockpit cables') go from the firewall to enter the bottom of each "S" shaped tube. A multi-hole fitting at the firewall gives adjustment for each cable. Each cable goes through an “S” shaped tube and comes out at the top. Each cable goes from the pedal assembly to the yoke.

Each outboard control cable goes through a Teflon tube in the aft face of the floor panel. Each outboard control cable goes inboard through a guide pulley on the control bulkhead. The cables connect each outer pedal to the front arm of the yoke. Each inboard control cable goes through a Teflon tube in the aft face of the floor panel. The cables connect each inner pedal to the side arms of the yoke.

Two cable assemblies ('fuselage cables') attach to the rear of the yoke. Each cable assembly has a short front cable and a long rear cable. All cables go through Teflon tubes. A turnbuckle connects the front and rear cables. The turnbuckle can adjust the tension in the fuselage cables and the neutral position of the rudder. The two fuselage cables go through Teflon tubes in the rear fuselage. The cables attach to the rudder lower mounting-bracket. The cables cross over each other in the rear fuselage.

The rudder stop which limits the rudder deflection to the left side is located left of the rudder lower hinge (refer to Figure 5). The rudder stop which limits the rudder deflection to the right side is located right of the rudder lower hinge. Each rudder stop consists of a nut which is welded to the rudder lower mounting-bracket, a bolt which is held by that nut, and a jam-nut which secures the bolt.

3. Operation

If you move the left rudder pedal forward:

- The top of the "S" shaped tube moves forward.
- The "S" shaped tube pulls the left cockpit cable.
- The left cockpit cable moves the yoke counter-clockwise (seen from above).
- The yoke pulls the fuselage cable attached to its right arm forward. This cable connects to the left of the rudder.
- The fuselage cable moves the rudder to the left.
- The rudder movement pulls the other fuselage cable aft. This cable connects to the left of the yoke.
- The fuselage cable moves aft with the left side of the yoke.
- The left side of the yoke pulls both of the right cockpit cables aft. And the cables pull the "S" shaped tubes on the right rudder pedals aft.

If you move the right rudder pedal forward each part moves in the opposite sense. The rudder moves to the right and pulls the left pedals aft.

A. Manual Adjustment

You can adjust the position of the rudder pedals. When you pull on the adjuster handle, the latch disengages from the bottom sledge tube. If you pull further, the pedal assembly moves along the sledge tubes towards you. Release the handle, then push with your feet on both pedals. The latch will lock.

If you push with both feet while you pull the handle, the pedal assembly moves along the sledge tubes away from you. Release the handle, then push with your feet on both pedals. The latch will lock.

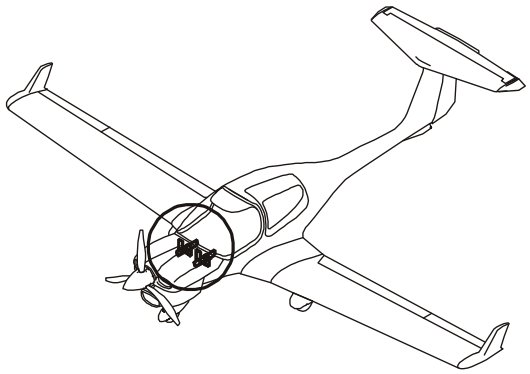
When you adjust the position of the pedals, the control cables move through the "S" shaped tubes.

B. Electrical Adjustment (Optional Equipment, if OÄM 40-251 is installed)

Positioning switches are located on the LH and RH side, on the floor side panel in the leg room. The Positioning switch causes the rudder pedals on the corresponding side to move along the guide rail.

To move the pedals towards you, press the lower side of the switch. Press the upper end of the switch and the pedals will move away from you.

Releasing switch will cause motor to be switched off and the pedals will remain in the current position.



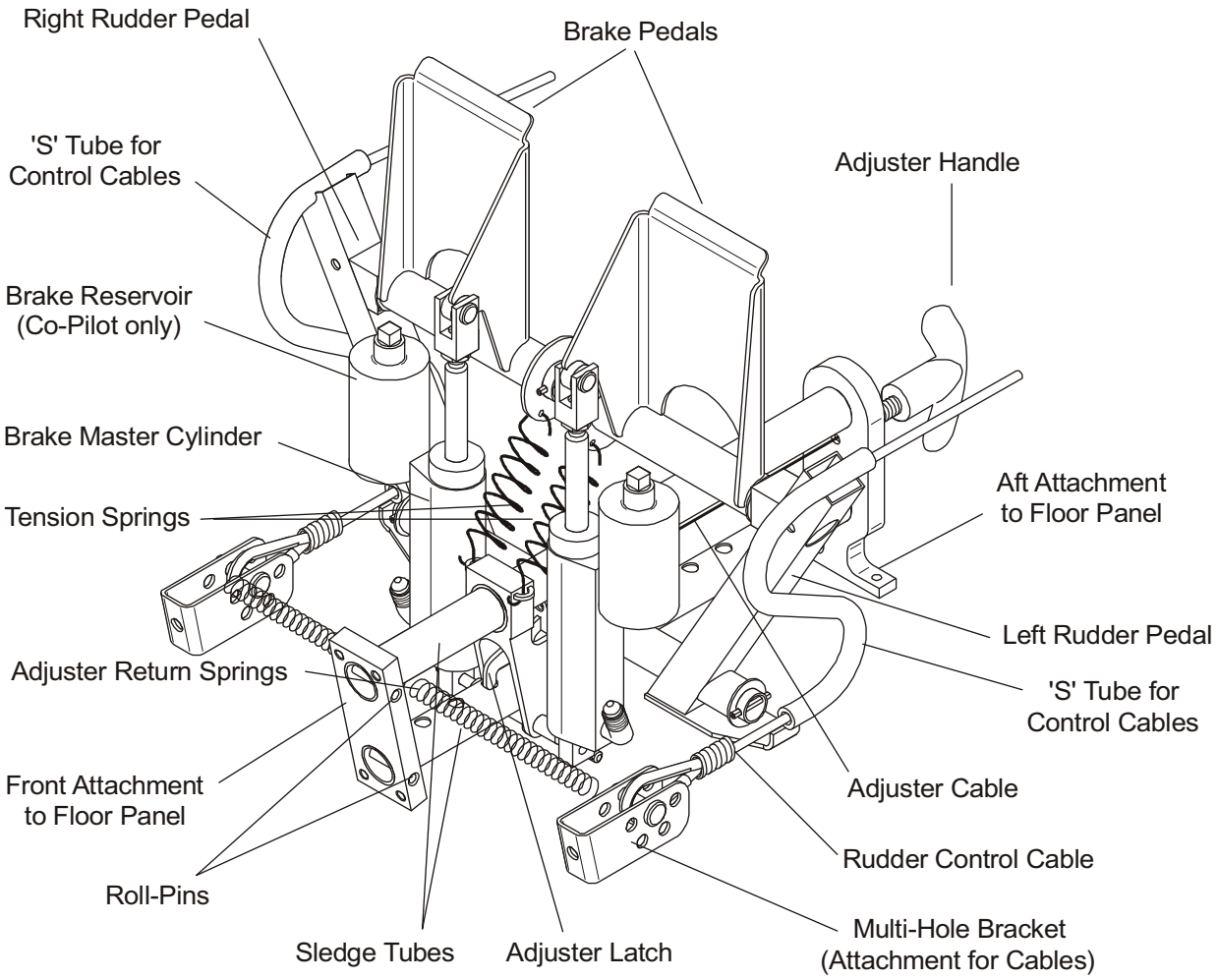
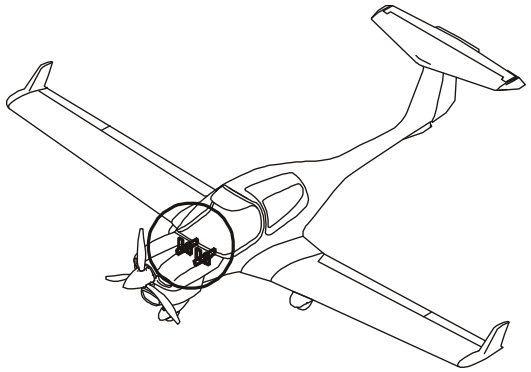


Figure 2: Rudder Pedal Assembly



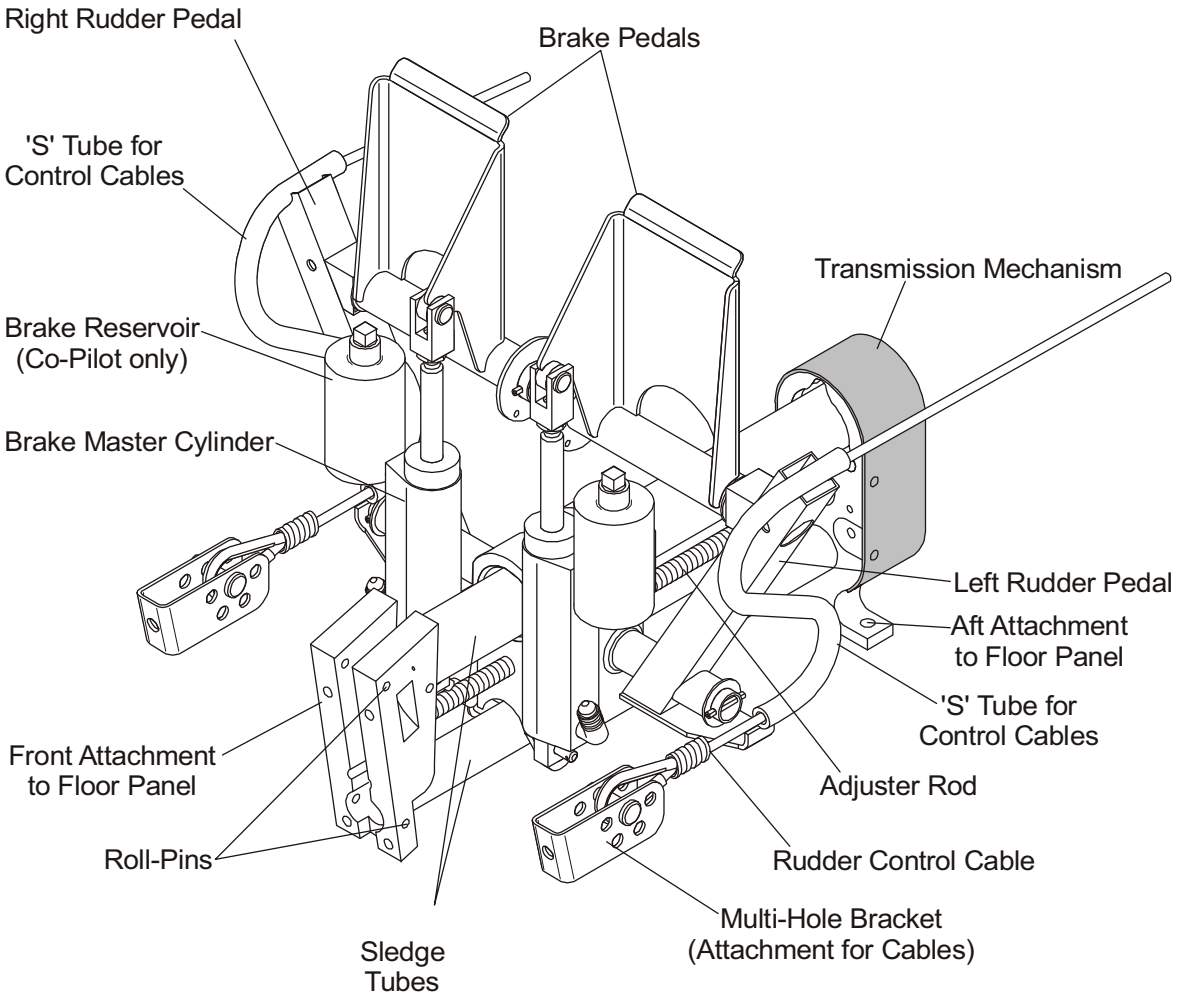


Figure 3: Rudder Pedal Assembly with Electrical Adjustment (OÄM 40-251 incorporated)

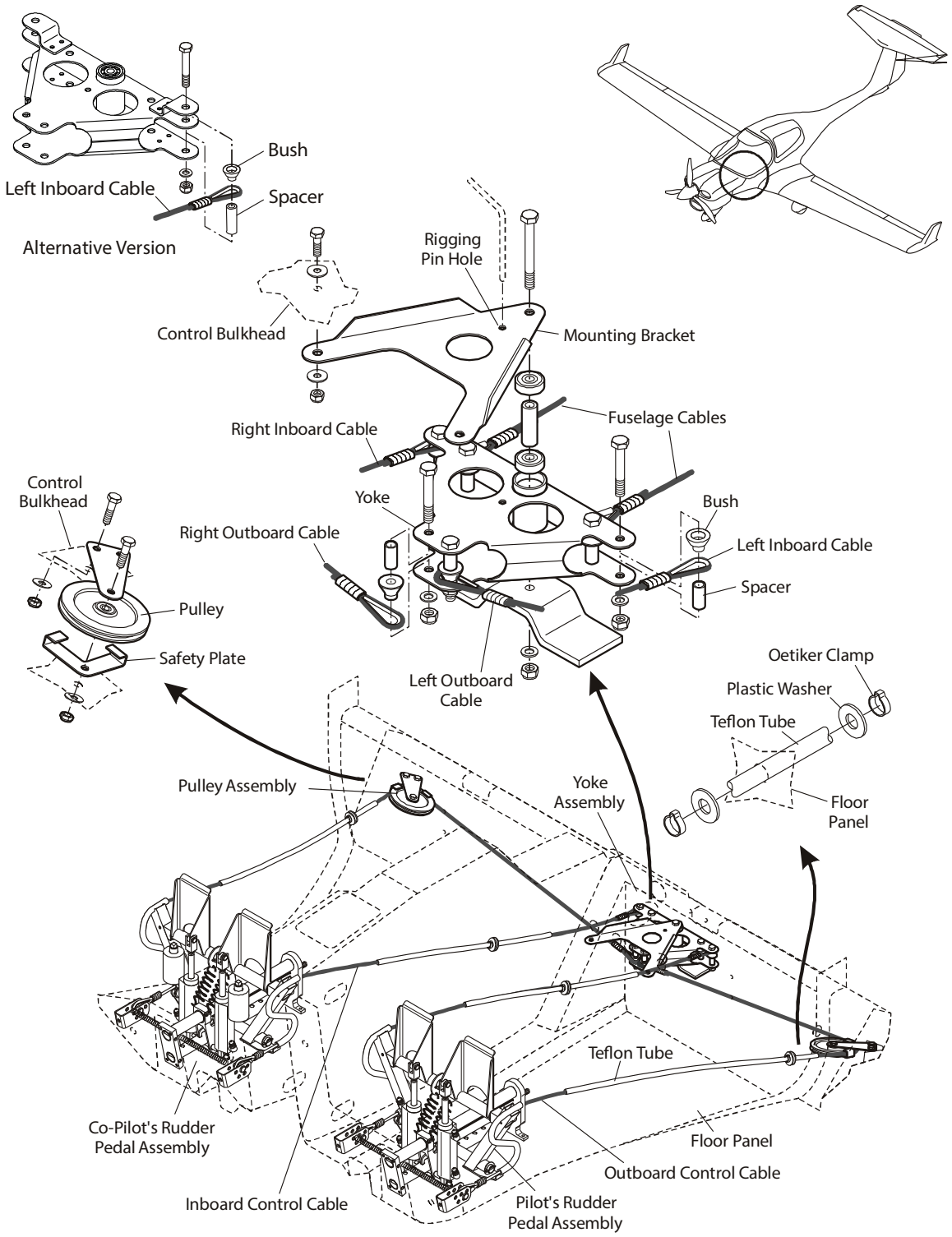


Figure 4: Rudder Controls Installation in the Cockpit

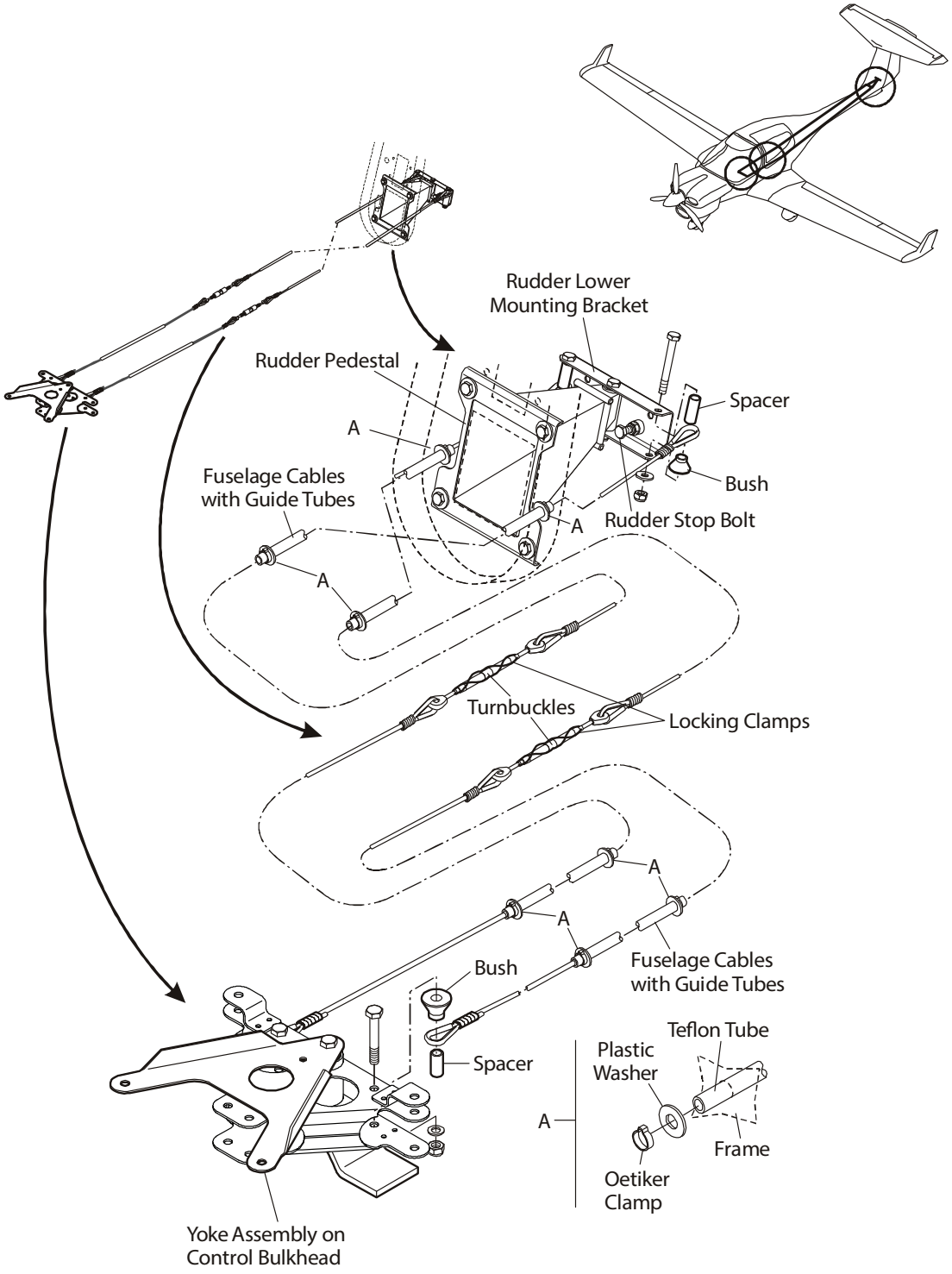


Figure 5: Rudder Controls Installation in the Rear Fuselage

TROUBLE-SHOOTING

1. General

The table below lists the defects you could have in the rudder control system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Airplane moves about its yaw axis in flight.	Rudder control cables need adjusting. Fixed trim tab needs adjusting.	Adjust the rudder control cables. Adjust the fixed trim tab.
Rudder controls stiff/catch.	Bearings defective. Cables chafing in guide tubes.	Replace the defective bearings. Replace the cables and guide tubes.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to test for the correct range of movement on the rudder control system.

They also give instructions on how to:

- Adjust the rudder control system.
- Remove and install the rudder control cables.
- Replace a rudder pedal adjustment-cable if OÄM 40-251 is not Installed.
- Remove and install the rudder/brake pedal assembly.
- Remove and install the pedal assembly.

Refer to Section 55-40 to remove/install the rudder.

WARNING: **WHEN YOU DO WORK ON THE AIRPLANE CONTROLS, YOU MUST MAKE SURE THE AREA AROUND THE CONTROLS/CONTROL SURFACES ARE CLEAR OF PERSONNEL AND EQUIPMENT. IF YOU DO NOT DO THIS, INJURY TO PERSONNEL AND DAMAGE TO CONTROL SURFACES CAN OCCUR.**

WARNING: **WHEN YOU COMPLETE WORK ON THE CONTROLS, MAKE SURE THAT YOU REMOVE ALL LOOSE ITEMS OR TOOLS FROM THAT AREA. LOOSE ITEMS OR TOOLS CAN PREVENT FULL MOVEMENT OF THE AIRPLANE CONTROLS. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.**

2. Rudder Control System Test for Correct Range of Movement

A. Equipment

Item	Quantity	Part Number
Rudder deflection gauge.	1	DA4-5540-00-00_1-PL

B. Rudder Control Test Procedure

Refer to Figure 1 in the Description and Operation Pageblock 27-20-00.

	Detail Steps/Work Items	Key Items/References
(1)	Make a copy of the Control Surfaces Adjustment Report.	Refer to Section 06-00. Use it to record the measurements.
WARNING:	**WHEN YOU DO WORK ON THE AIRPLANE CONTROLS, YOU MUST MAKE SURE THE AREAS AROUND THE CONTROLS/CONTROL SURFACES ARE CLEAR OF PERSONS/EQUIPMENT. IF YOU DO NOT DO THIS, INJURY TO PERSONNEL AND DAMAGE TO CONTROL SURFACES CAN OCCUR.**	
(2)	Set both rudder pedals fully forward.	
(3)	Set the rudder pedals central.	The left pedal must align with the right pedal. Make sure the rudder is in the neutral position shown in the Control Surfaces Adjustment Report for the airplane.
(4)	Set the rudder pedals to fully left.	The rudder must hit the stops at the rudder pedestal. The rudder position must be the distance to the left shown in the Control Surfaces Adjustment Report for the airplane. (Measured from the neutral position).
(5)	Set the rudder pedals to fully right.	The rudder must hit the stops at the rudder pedestal. The rudder position must be the distance to the right shown in the Control Surfaces Adjustment Report for the airplane. (Measured from the neutral position).
(6)	Make sure the left and right rudder pedals are free to move when they are set in all of the adjustable positions.	

3. Rudder Control System Adjustments

If you cannot get the correct range of movement of the rudder control system, use this procedure to adjust the system.

A. Equipment

Item	Quantity	Part Number
Cable tension gauge.	1	Commercial
Rudder deflection gauge.	1	DA4-5540-00-00_1-PL

B. Rudder Adjustment Procedure

Refer to Figure 5 in the Description and Operation Pageblock 27-20-00.

	Detail Steps/Work Items	Key Items/References
(1)	Remove these items for access: - Pilots' seats. - Passenger seat.	Refer to Section 25-10.
(2)	Set both rudder pedals fully forward.	
(3)	Set the rudder pedals central.	Make sure the rudder is in the neutral position. The left pedal must align with the right pedal.
(4)	If necessary, adjust the length of the cables between the yoke and the rudder lower mounting bracket. - Remove the lock-wire from the turnbuckles. - Adjust the turnbuckles to set the rudder to neutral. - Do a test for correct cable tension. - Tighten the turnbuckles and install the lock-wire.	 Below the passenger seat. Refer to the Adjustment Report.
(5)	Set the rudder pedals to fully left.	The rudder must hit the stops at the rudder pedestal. The rudder position must be the distance to the left shown in the Control Surfaces Adjustment Report. (Measured from the neutral position).

	Detail Steps/Work Items	Key Items/References
(6)	If necessary, adjust the rudder stop bolt on the left side of the rudder lower mounting-bracket: - Release the jam-nut on the left stop bolt. - Adjust the stop bolt to give the correct range of movement. - Tighten the jam-nut on the stop bolt.	The rudder position must be the distance to the left shown in the Control Surfaces Adjustment. (Measured from the neutral position).
(7)	Set the rudder pedals to fully right.	The rudder must hit the stops at the rudder pedestal. The rudder position must be the distance to the right shown in the Control Surfaces Adjustment Report. (Measured from the neutral position).
(8)	If necessary, adjust the rudder stop bolt on the right side of the rudder lower mounting-bracket: - Release the jam-nut on the right stop bolt. - Adjust the stop bolt to give the correct range of movement. - Tighten the jam-nut on the stop bolt.	The rudder position must be the distance to the right shown in the Control Surfaces Adjustment Report. (Measured from the neutral position).
(9)	Do a test for the correct range of rudder movement.	Refer to Paragraph 2.
(10)	Do an inspection of all the controls that you have adjusted. - If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(11)	Install these items: - The pilots' seats. - The passenger seat.	Refer to Section 25-10.

4. Remove/Install Rudder Control Cables

A. Equipment

Item	Quantity	Part Number
Cable tension gauge.	1	Commercial
Swaging tool.	1	Commercial
Rigging pin.	1	-
Nicopress oval & stop sleeve gauge ('go-no-go gauge') for 1/8 inch sleeves.	1	--

B. Remove the Rudder Control-Cables (from the Bulkhead to the Yoke Assembly)

NOTE: The removal procedure is given for the pilot's side inboard and outboard control cables. The procedure for the co-pilot's side is similar.

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(1)	Remove these items for access: - Pilots' seats. - The passenger seat.	Refer to Section 25-10.
(2)	Install a rigging pin before removal of a cable.	The rigging pin is installed in the rigging pin hole in the yoke assembly.

(3)	Remove the cable between the front bulkhead and the yoke assembly:
	- Remove the nut, washers, bolt and spacer that attach the control cable to the multihole bracket at the bulkhead.
	- Remove the nut, washer, bolt, bush and spacer that attach the cable to the yoke assembly.
	- Cut the eye-end from the cable that you will remove, at the bulkhead end.
	- The oetiker clamps might have to be removed to pull the cable through the teflon tube.
	- Remove the old cable.
	  - Outboard - Pull the cable out of the 'S' tube, through the teflon tube and pulley assembly, and remove it from the yoke assembly end.
	  - Inboard- Pull the cable out of the 'S' tube, through the teflon tube and remove it from the yoke assembly end.
		Discard the eye-end.
		If the oetiker clamps have to be removed, replace them on cable installation.
		Discard the old cable.

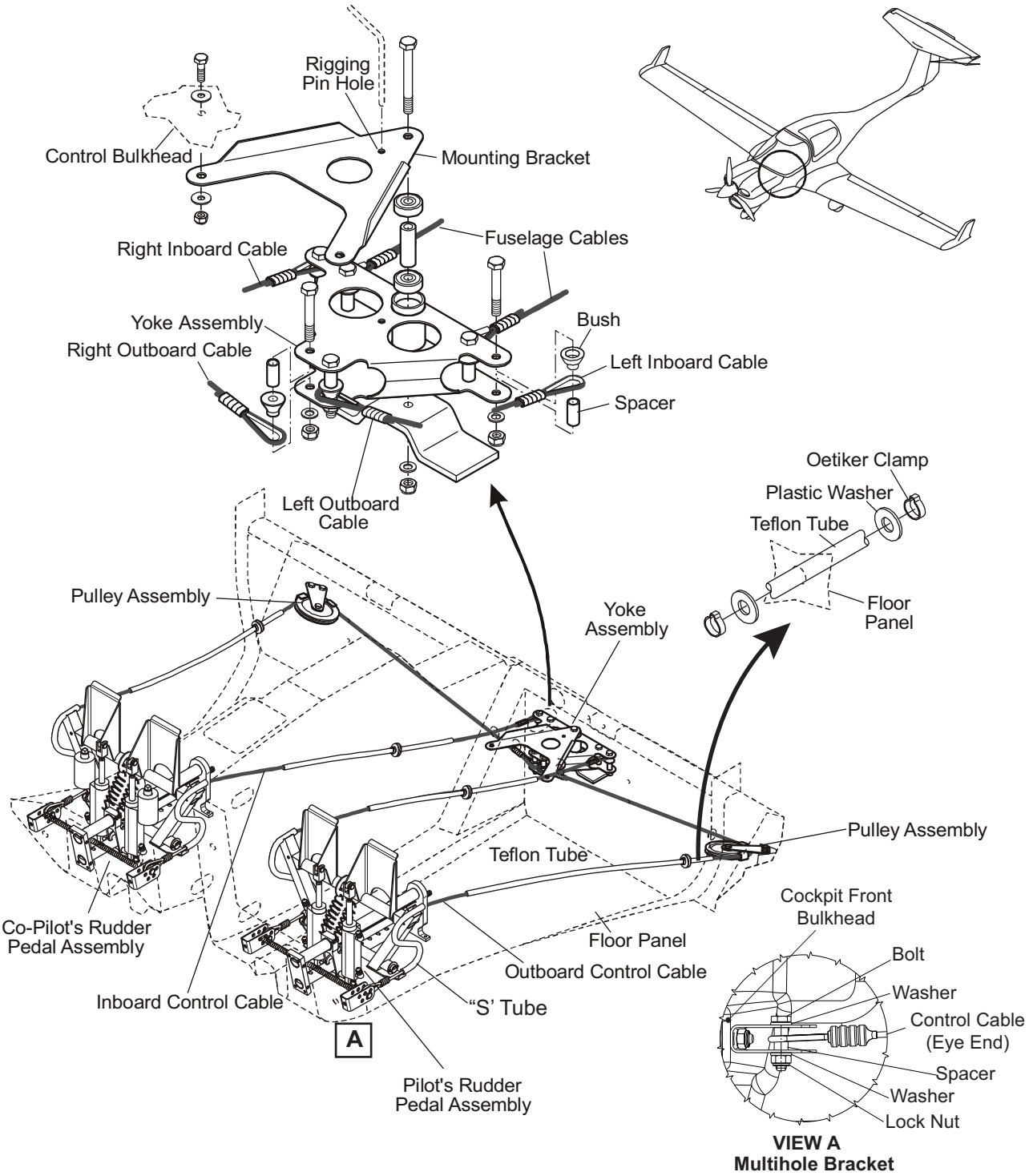

Figure 201 : Rudder Control-Cables (from the Bulkhead to the Yoke Assembly) - Removal/Installation

C. Install the Rudder Control-Cables (from the Bulkhead to the Yoke)

NOTE: The installation procedure is given for the pilot's side inboard and outboard control cables. The procedure for the co-pilot's side is similar.

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
	WARNING: ONLY TRAINED AND AUTHORIZED PERSONS SHOULD INSTALL CABLE EYE-ENDS. IF THE EYE-ENDS ARE NOT INSTALLED CORRECTLY, THE RUDDER CONTROLS CAN FAIL. THIS CAN CAUSE DEATH OR INJURY TO PERSONNEL.	
	NOTE: Install eye-ends in accordance with FAA AC 43.13-1B, Chapter 7, Section 8.	
	NOTE: To make the work easier, install an eye-end on the yoke assembly end of the new cable before you install it in the airplane.	
(1)	Install a new eye-end to the yoke assembly end of the cable before you install it in the airplane:	Use cables to specification LN9374 or ISO 2020 or MIL-DTL-83420. Use Locoloc thimbles and Nico-Press clamps appropriate to the installed 3.2 mm (1/8 inch) diameter steel cables.
	- Inspect the cable eye-end for correct assembly.	Inspect the cable swage with go-no-go gauge for 1/8 inch Nicopress oval sleeve, in accordance with FAA AC 43.13-1B, Chapter 7, Section 8.
	- If necessary for your Airworthiness Authority, send a sample for proof test.	
(2)	Push the control cable through the Teflon tube from the rear.	
(3)	Make sure the cable is in the correct position on the pulley (for the outer cables only).	
(4)	Push the cable in position through the "S" tube on the rudder pedal assembly.	

	Detail Steps/Work Items	Key Items/References
(5)	Install a new eye-end to the cable at the front bulkhead end: - Inspect the cable eye-end for correct assembly. - If necessary for your Airworthiness Authority, send a sample for proof test.	Use Locoloc thimbles and Nico-Press clamps appropriate to the installed 3.2 mm (1/8 inch) diameter steel cables. Inspect cable swage with go-no-go gauge for 1/8 inch Nicopress oval sleeve in accordance with FAA AC 43.13-1B, Chapter 7, Section 8.
(6)	Install the cable to the yoke assembly: - Install the bolt, bush and spacer that attach the cable eye-end to the yoke. - Install a washer and self-locking nut.	Torque to 6.4 Nm (4.7 lbf.ft.). Use a new self-locking nut.
(7)	Install the cable to the mulihole bracket at the front bulkhead: - Install the bolt and spacer that attach the cable eye-end to the bracket. - Install a washer and self-locking nut.	Adjust the position of the bolt in the multi-hole bracket to give the correct rudder pedal position. The rudder pedal lever must be vertical when the rudder is neutral. Torque to 6.4 Nm (4.7 lbf.ft.). Use a new self-locking nut.
(8)	If the oetiker clamps were removed to pull the cable through the teflon tube, install new clamps.	
(9)	Remove the rigging pin.	
(10)	Do a test for the correct range of rudder movement. If necessary, adjust the rudder controls.	Refer to Paragraph 2. Refer to Paragraph 3.
(11)	Do an inspection of all the controls that you have adjusted. - If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(12)	Install these items: - The pilots' seats. - The passenger seat.	Refer to Section 25-10.

D. Remove the Fuselage Rudder Control-Cables (from the Yoke Assembly to the Rudder)

Refer to Figure 202.

	Detail Steps/Work Items	Key Items/References
(1)	Remove these items for access: - Pilots' seats. - The passenger seat.	Refer to Section 25-10.
(2)	Install a rigging pin before removal of a cable.	The rigging pin is installed in the rigging pin hole in the yoke assembly.
(3)	Remove the cable between the yoke assembly and the turnbuckle: - Remove the nut, washer, bolt, bush and spacer that attach the cable to the yoke assembly. - Cut the eye-end from the old cable at the yoke assembly. - Remove the old cable aft. - The oetiker clamps might have to be removed to pull the cable through the teflon tube. - Cut the eye-end (B) from the turnbuckle. - Remove the old cable from the airplane.	If the oetiker clamps have to be removed, replace them on cable installation. Discard the old cable.
(4)	Remove the cable between the turnbuckle and the rudder: - Remove the nut, washer, bolt, bush and spacer that attach the cable to the rudder lower mounting-bracket. - Cut the eye-end from the old cable at the rudder end. - Remove the old cable forward. - The oetiker clamps might have to be removed to pull the cable through the teflon tube. - Cut the eye-end (C) from the turnbuckle. - Remove the old cable from the airplane.	If the oetiker clamps have to be removed, replace them on cable installation. Discard the old cable.

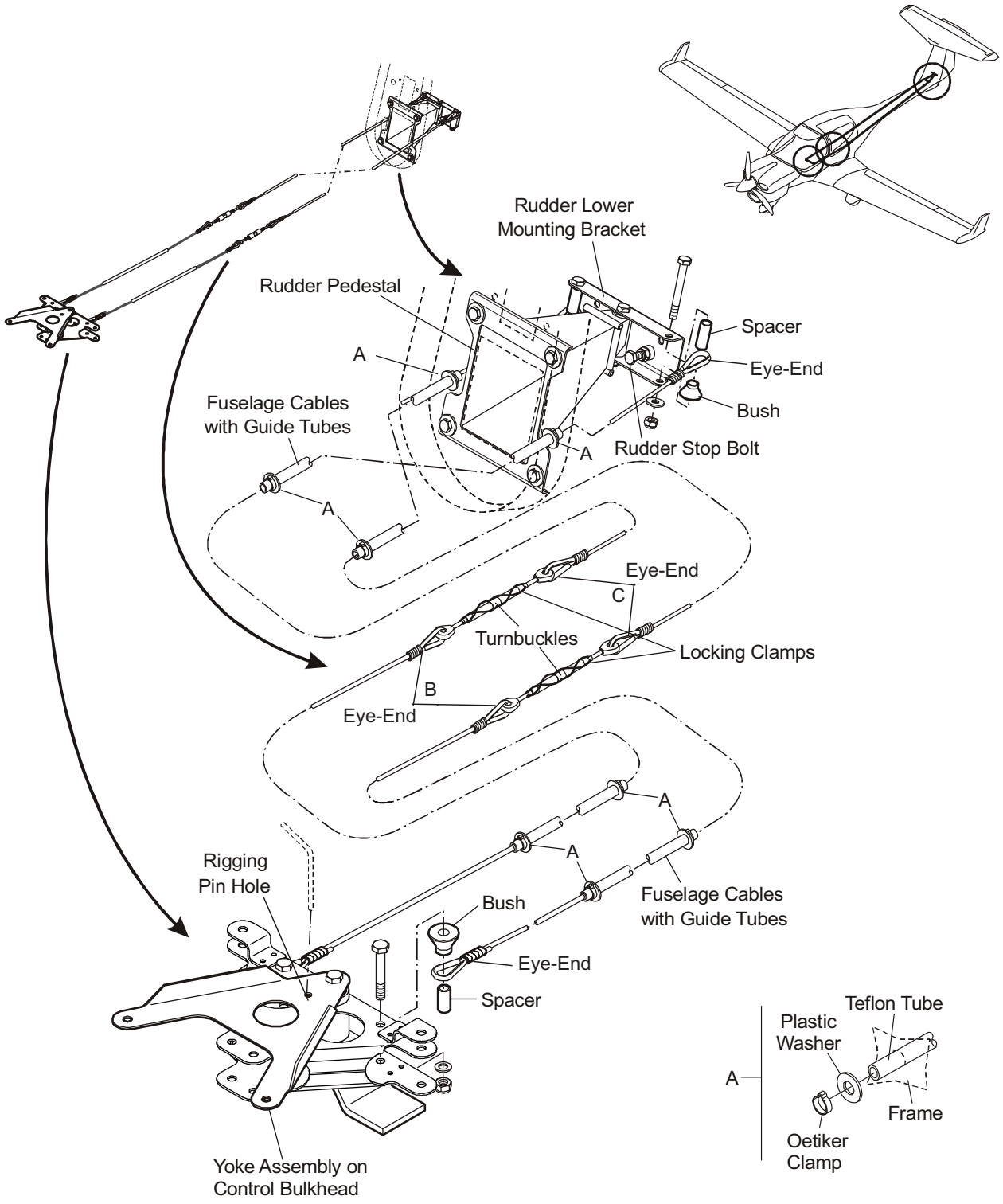

Figure 202 : Rudder Control-Cables (from the Yoke Assembly to the Rudder) - Removal/Installation

E. Install the Fuselage Rudder Control-Cables (from the Yoke Assembly to the Rudder)

Refer to Figure 202.

	Detail Steps/Work Items	Key Items/References
	WARNING: ONLY TRAINED AND AUTHORIZED PERSONS SHOULD INSTALL CABLE EYE-ENDS. IF THE EYE-ENDS ARE NOT INSTALLED CORRECTLY, THE RUDDER CONTROLS CAN FAIL. THIS CAN CAUSE DEATH OR INJURY TO PERSONNEL.	
	NOTE: Install eye-ends in accordance with FAA AC 43.13-1B, Chapter 7, Section 8.	
	NOTE: To make the work easier, install an eye-end on one end of the cable before you install it in the airplane.	
(1)	Install one new eye-end to the front cable at the yoke end before you install it in the airplane: - Inspect the cable eye-end for correct assembly. - If necessary for your Airworthiness Authority, send a sample for proof test. - Do not install the cable eye-end to the yoke at this step.	Use cables to specification LN9374 or ISO 2020 or MIL-DTL-83420. Use Locoloc thimbles and Nico-Press clamps appropriate to the installed 3.2 mm (1/8 inch) diameter steel cables. Inspect cable swage with go-no-go gauge for 1/8 inch Nicopress oval sleeve in accordance with FAA AC 43.13-1B, Chapter 7, Section 8.
(2)	Push the control cable through the Teflon tube from the front.	Through the front and rear main bulkheads.
(3)	Install a new eye-end (B) to the cable at the turnbuckle end: - Inspect the cable eye-end for correct assembly. - If necessary for your Airworthiness Authority, send a sample for proof test.	Use Locoloc thimbles and Nico-Press clamps appropriate to the installed 3.2 mm (1/8 inch) diameter steel cables to specification LN9374. Inspect cable swage with go-no-go gauge for 1/8 inch Nicopress oval sleeve in accordance with FAA AC 43.13-1B, Chapter 7, Section 8.

	Detail Steps/Work Items	Key Items/References
(4)	Install a new eye-end to the cable at the rudder end before you install it in the airplane:	Use cables to specification LN9374 or ISO 2020 or MIL-DTL-83420. Use Locoloc thimbles and Nico-Press clamps appropriate to the installed 3.2 mm (1/8 inch) diameter steel cables to specification LN9374.
	- Inspect the cable eye-end for correct assembly.	Inspect cable swage with go-no-go gauge for 1/8 inch Nicopress oval sleeve in accordance with FAA AC 43.13-1B, Chapter 7, Section 8.
	- If necessary for your Airworthiness Authority, send a sample for proof test.	
(5)	Install the cable eye-end to the rudder lower mounting bracket: - Install the bolt, bush and spacer that attach the cable to the rudder. - Install a washer and self-locking nut.	Torque to 6.4 Nm (4.7 lbf.ft.). Use a new self-locking nut.
(6)	Push the control cable through the Teflon tubes from the rear.	From the rudder to the baggage frame.
(7)	Install a new eye-end (C) to the cable at the turnbuckle end:	Use Locoloc thimbles and Nico-Press clamps appropriate to the installed 3.2 mm (1/8 inch) diameter steel cables to specification LN9374.
	- Inspect the cable eye-end for correct assembly.	Inspect cable swage with go-no-go gauge for 1/8 inch Nicopress oval sleeve in accordance with FAA AC 43.13-1B, Chapter 7, Section 8.
	- If necessary for your Airworthiness Authority, send a sample for proof test.	
(8)	Install the cable eye-end to the yoke assembly: - Install the bolt, bush and spacer that attach the cable to the yoke. - Install a washer and self-locking nut.	Torque to 6.4 Nm (4.7 lbf.ft.). Use a new self-locking nut.
(9)	If oetiker clamps were removed to pull a cable through the teflon tube, install new clamps.	
(10)	Remove the rigging pin.	

	Detail Steps/Work Items	Key Items/References
(11)	Adjust both left and right rudder cable turnbuckles to give the correct tension.	Refer to Paragraph 3.
(12)	Do a test for the correct range of rudder movement. If necessary, adjust the rudder controls.	Refer to Paragraph 2. Refer to Paragraph 3.
(13)	Do an inspection of all the controls that you have adjusted. - If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(14)	Install these items: - The pilots' seats. - The passenger seat.	Refer to Section 25-10.

5. Replace a Rudder Pedal Adjustment Cable if OÄM 40-251 is not Installed

NOTE: The procedures written are for the pilot's side, the co-pilot's side procedures are similar.

A. Remove the Rudder Pedal Adjustment Cable.

Refer to Figure 203.

	Detail Steps/Work Items	Key Items/References
(1)	Note the routing of the adjuster cable through the rudder pedal assembly.	
(2)	Position the pedals aft.	
(3)	Remove the adjuster return springs from the adjuster cable. The adjuster return springs hook into a loop in the adjuster cable.	Note the condition of the adjuster return springs. If they are not in satisfactory condition, they will have to be replaced.
(4)	If the adjuster return springs need to be replaced, do as follows: Remove the adjuster return springs from the brackets on either side of the rudder pedal assembly. - They hook into holes in the brackets.	
(5)	Unscrew and remove the adjuster handle from the threaded swage of the adjuster cable.	The relief spring is bonded to the rudder aft-bracket assembly and not removed.
(6)	Pull the adjuster cable, with the cupped washer and threaded swage, out towards the nose of the airplane.	
(7)	Remove the adjuster return springs (2), if they are to be replaced, and the adjuster cable from the aircraft.	

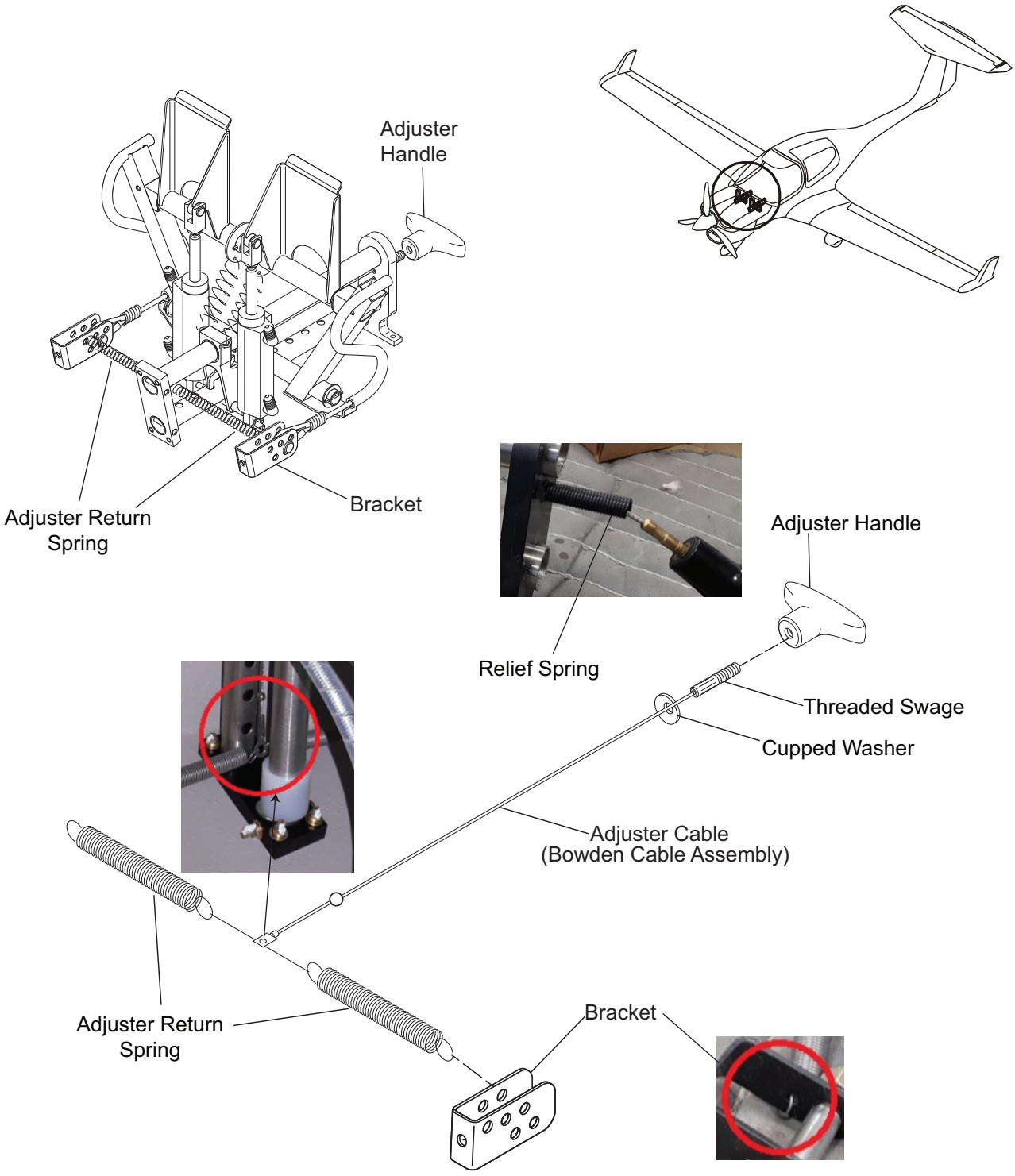

Figure 203 : Rudder Pedal Adjustment-Cable - Replacement

B. Install the Rudder Pedal Adjustment Cable.

Refer to Figure 203.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the pedals are positioned aft. Push the adjuster cable, with the cupped washer and threaded swage, through the rudder pedal assembly.	The cable must run through the eye in the adjuster latch, and through the guide holes in the assembly frame. The threaded swage goes through the relief spring to the adjuster handle.
(2)	If the adjuster return springs were replaced, do as follows: Attach the adjuster return springs to the brackets on either side of the rudder pedal assembly. - They hook into holes in the brackets.	The adjuster return springs are replaced if they are not in satisfactory condition.
(3)	Attach the adjuster return springs to the adjuster cable.	
(4)	Install and tighten the adjuster handle to the threaded swage.	Apply Loctite 222 or Loctite 242 to the threads.
(5)	Check for the full adjustment of pedals to the most forward position.	

6. **Remove/Install the Rudder/Brake Pedal Assembly**

A. Equipment

Item	Quantity	Part Number
Rigging pin.	1	-

B. Remove the Rudder/Brake Pedal Assembly.

NOTE: The removal procedure is given for the pilot's rudder/brake-pedal assembly. The procedure for the co-pilot's rudder/brake-pedal assembly is similar.

Refer to Figure 204 if OÄM 40-251 is NOT Installed.

Refer to Figure 205 if OÄM 40-251 is Installed.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the pilot's seat for access.	Refer to Section 25-10.
(2)	Remove the rudder control cables (from the bulkhead to the yoke assembly).	Refer to Para 4.B.
(3)	Remove the brake master cylinders.	Refer to 32-40-00 Maintenance Practices, Para 4.A.
(4)	If OÄM 40-251 is NOT Installed: - Disconnect the two adjuster return springs from the multi-hole brackets.	They will be removed with the rudder/brake pedal assembly.
(5)	At the cockpit front bulkhead, remove the four luck nuts and bolts, the eight washers and two spacers that secure the front attachment of the rudder/brake pedal assembly to the front bulkhead.	Two persons may be required for this step.
(6)	At the aft attachment of the rudder pedal assembly, remove the two bolts, lock nuts and four washers that secure the aft attachment of the rudder/brake pedal assembly to the floor.	
(7)	Carefully remove the complete rudder/brake pedal assembly from the airplane.	

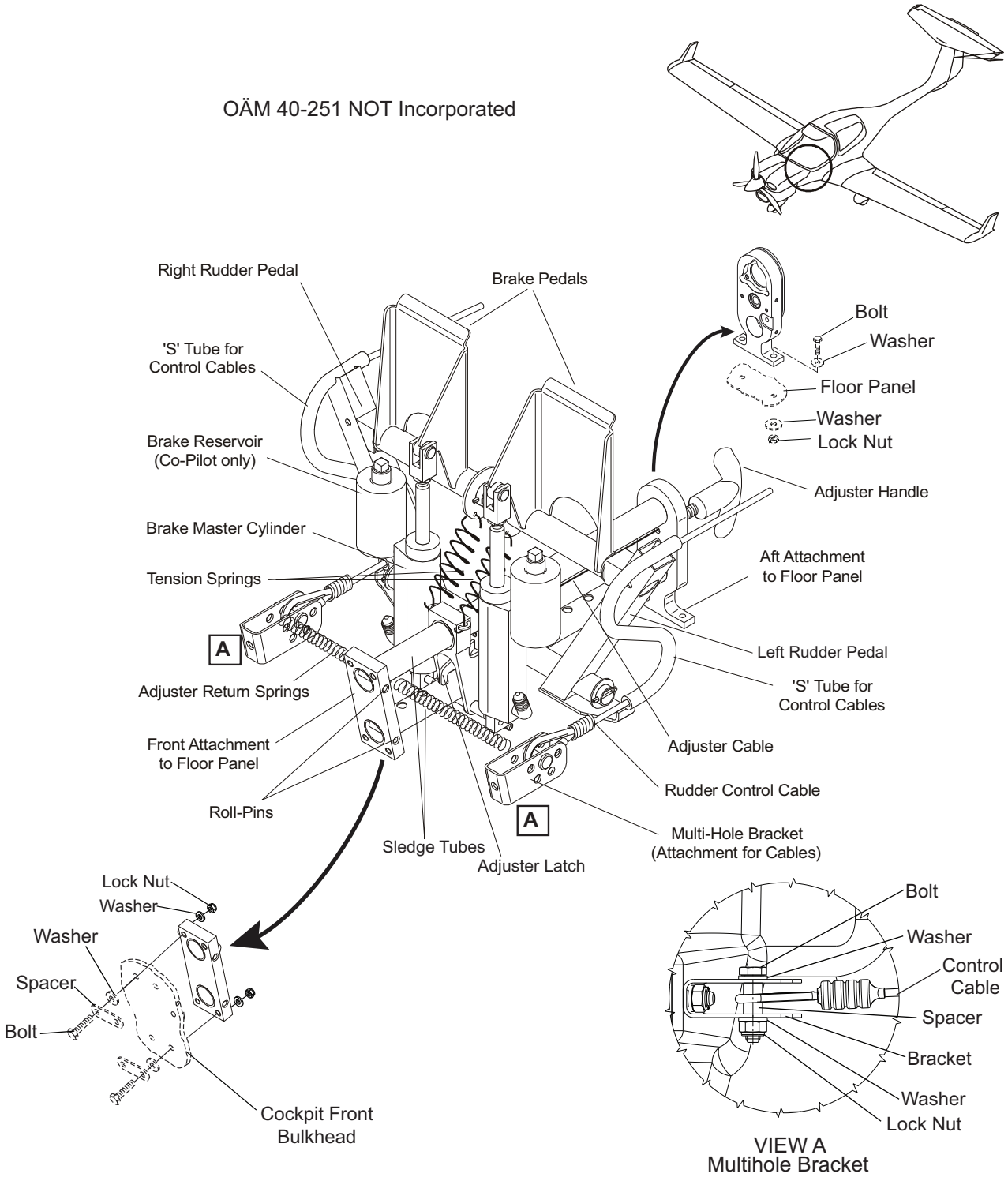

Figure 204 : Rudder/Brake Pedal Assembly (OÄM 40-251 is NOT Installed) - Removal/Installation

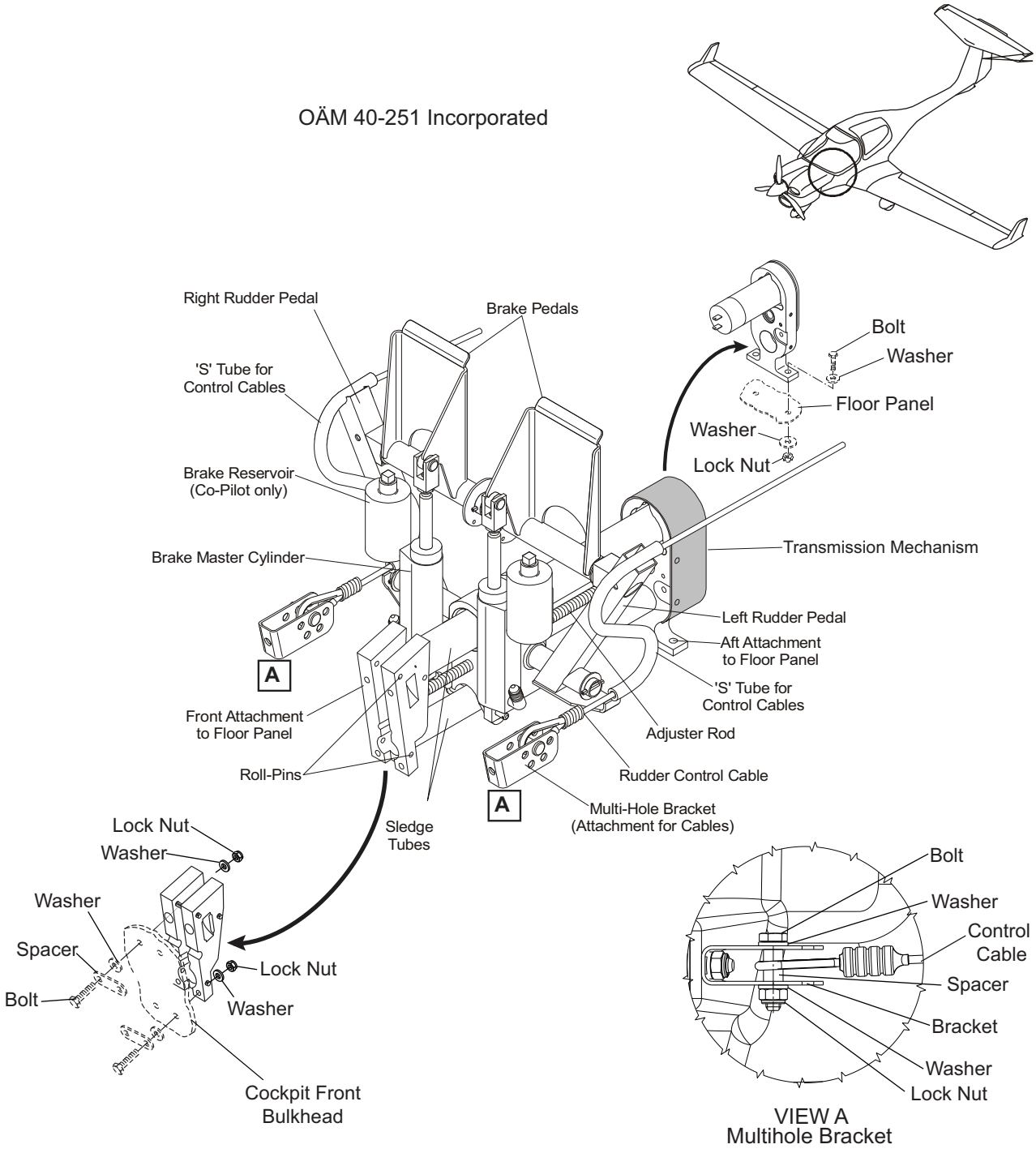

Figure 205 : Rudder/Brake Pedal Assembly (OÄM 40-251 is Installed) - Removal/Installation

C. Install the Rudder/Brake Pedal Assembly.

NOTE: The installation procedure is given for the pilot's rudder/brake-pedal assembly. The procedure for the co-pilot's rudder/brake-pedal assembly is similar.

Refer to Figure 204 if OÄM 40-251 is NOT Installed.

Refer to Figure 205 if OÄM 40-251 is Installed.

	Detail Steps/Work Items	Key Items/References
(1)	Carefully install the complete rudder/brake pedal assembly in the airplane. - Make sure that the aft attachment and front attachment of the assembly are positioned correctly at their locations.	
(2)	At the aft attachment of the rudder/brake pedal assembly, install the two bolts, four washers and two lock nuts that secure the aft attachment of the assembly to the floor.	Always use new self-locking nuts.
(3)	At the cockpit front bulkhead, install the four bolts, the eight washers, two spacers and four lock nuts that secure the front attachment of the rudder/brake pedal assembly to the front bulkhead.	Two persons may be required for this step. Always use new self-locking nuts.
(4)	If OÄM 40-251 is NOT Installed: - Connect the two adjuster return springs to the multi-hole brackets.	
(5)	Install the brake master cylinders.	Refer to 32-40-00 Maintenance Practices, Para 4.B.
(6)	Install the rudder control cables (from the bulkhead to the yoke assembly).	Refer to Para 4.C.
(7)	Install the pilot's seat.	Refer to Section 25-10.
(8)	Do a test for the correct range of rudder movement. If necessary adjust the rudder controls.	Refer to Paragraph 2. Refer to Paragraph 3.
(9)	Do an inspection of all the controls that you have adjusted. If necessary for your Airworthiness Authority do a duplicate inspection of the controls.	

7. **Remove/Install the Pedal Assembly**

NOTE: The pedal assembly includes the brake pedal, the rudder pedal, the center tube and the rudder cable guide ('S' Tube).

NOTE: There are four pedal assemblies, pilot's LH side and RH side and copilot's LH side and RH side. The procedures for the pilot's LH side are given.
All four assemblies are removed/installed in a similar manner

A. Remove the Pedal Assembly.

Refer to Figure 206 if OÄM 40-251 is NOT Installed.

Refer to Figure 207 if OÄM 40-251 is Installed.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the pilot's seat for access.	Refer to Section 25-10.
(2)	Remove only the outboard (front) rudder control cable.	Refer to Para 4.B.
(3)	Remove the top pivot pin from the LH brake master cylinder. - Remove the cotter pin. - Remove the washer. - Remove the pivot pin. Secure the brake master cylinder.	Refer to 32-40-00 Maintenance Practices, "Remove a Brake Master Cylinder". Para 4.A. Step (2). Discard the cotter pin.
(4)	If OÄM 40-251 is NOT Installed: - Unlatch the spring (at the top) that attaches the LH pedal assembly to the pedal adjust cage-assembly. - Secure the spring.	
(5)	Remove the upper bolt and washer that holds the top of the center tube, pedal assembly and 'S' tube in place.	
(6)	Remove the lower bolt and washer that holds the center tube, pedal assembly and 'S' tube in place.	
(7)	Pull the LH pedal assembly out from the pedal adjust cage assembly and sledge tubes.	
(8)	Remove the pedal assembly from the airplane.	

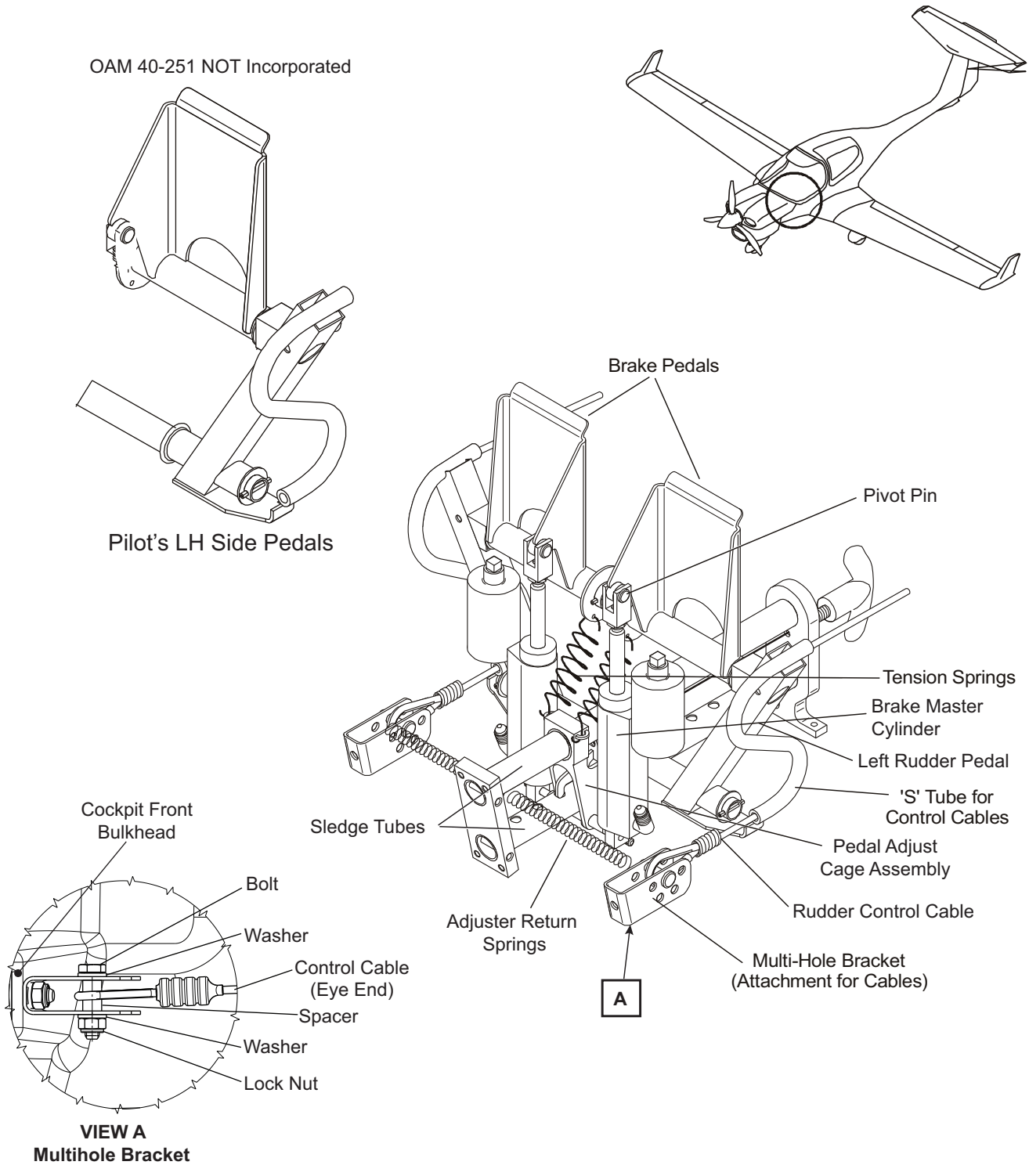

Figure 206 : Pedal Assembly - Removal/Installation (OÄM 40-251 is NOT Installed)

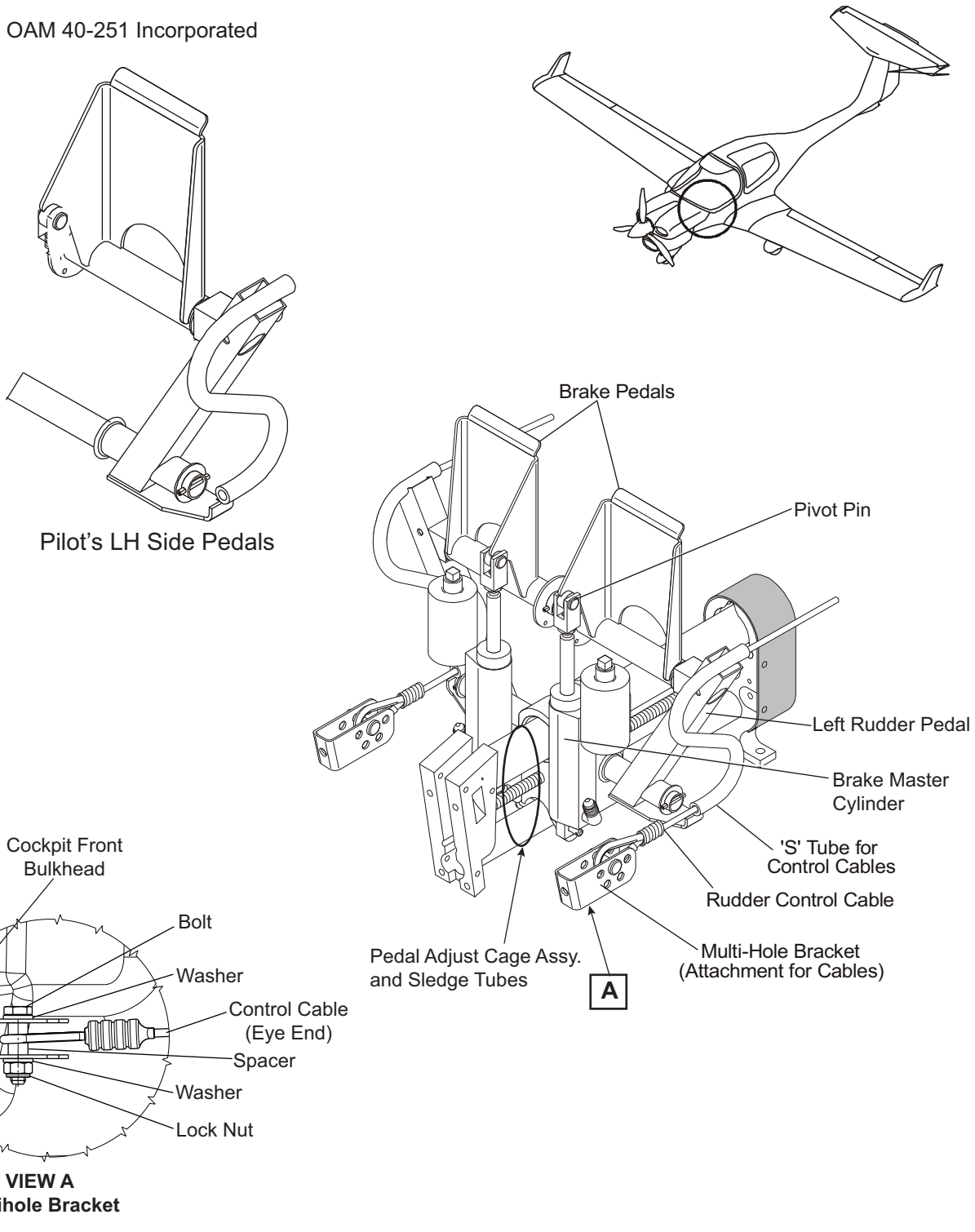

Figure 207 : Pedal Assembly - Removal/Installation (OÄM 40-251 is Installed)

B. Install the Pedal Assembly.

Refer to Figure 206 if OÄM 40-251 is NOT Installed.

Refer to Figure 207 if OÄM 40-251 is Installed.

	Detail Steps/Work Items	Key Items/References
(1)	Position the LH pedal assembly carefully in place on the pedal adjust cage assembly and sledge tubes.	
(2)	Install the lower bolt and washer that holds the center tube, pedal assembly and 'S' tube in place.	
(3)	Install the upper bolt and washer that holds the top of the center tube, pedal assembly and 'S' tube in place.	Bond with Loctite 243.
(4)	If OÄM 40-251 is NOT Installed: - Latch the spring (at the top) that attaches the LH pedal assembly to the pedal adjust cage-assembly.	
(5)	Install the top pivot pin for the LH brake master cylinder. - Align the top of the master cylinder with the mounting on the brake pedal. - Install the pivot pin. - install the washer. - Install the cotter pin.	Refer to 32-40-00 Maintenance Practices, "Install a Brake Master Cylinder". Para 4.B. Step (3). Use a new the cotter pin.
(6)	Install the the outboard (front) rudder control cable.	Refer to Para 4.C.
(7)	Install the pilot's seat.	Refer to Section 25-10.
(8)	Do a test for the correct range of rudder movement. If necessary adjust the rudder controls.	Refer to Paragraph 2. Refer to Paragraph 3.
(9)	Do an inspection of all the controls that you have adjusted. If necessary for your Airworthiness Authority do a duplicate inspection of the controls.	

8. Rudder Control Cable and Yoke Access

Rudder Cable/Yoke	Remove/Install Access	References
Cockpit cables between the firewall and the yoke.	Pilots' seats.	Refer to Section 25-10.
Rear fuselage cables between the yoke and the rudder.	Pilots' seats. Passenger seat. Rudder.	Refer to Section 25-10. Refer to Section 55-40.
Yoke.	Pilots' seats.	Refer to Section 25-10.

FLIGHT CONTROLS - ELEVATOR

1. General

The DA 40 NG has the usual elevator control system. An elevator attached to the horizontal stabilizer gives longitudinal control. The two control sticks operate the elevator.

2. Description

Figure 1 shows the elevator controls in the cockpit. Figure 2 shows the elevator controls in the rear fuselage.

Each pilot has a control stick that attaches to a torque tube assembly. The torque tube assembly has a lever which attaches to a short push-rod. The short push-rod connects to an idler lever on the front main bulkhead. The idler lever connects to a long push-rod.

The long push-rod has three guide bearings. The baggage frame, ring frame 1 and ring frame 2 have push-rod guides. Each guide has three rollers.

The long push-rod attaches to a bellcrank at the bottom of the vertical stabilizer. The bellcrank attaches to a vertical push-rod in the vertical stabilizer. The vertical push-rod connects to the elevator horn.

The elevator stop for the downward movement consists of a GFRP block which is bonded to the inside of the upper skin of the horizontal stabilizer. When the elevator is deflected fully downward, the forward extension of the elevator horn is deflected fully upward and contacts the stop.

The elevator stop for the upward movement consists of a bolt/bush assembly which is installed in the trim actuator mounting bracket in transverse direction (refer to Section 27-38, Figure 2). When the elevator is deflected fully upward, the forward extension of the elevator horn is deflected fully downward and contacts the stop.

You cannot adjust the elevator stops.

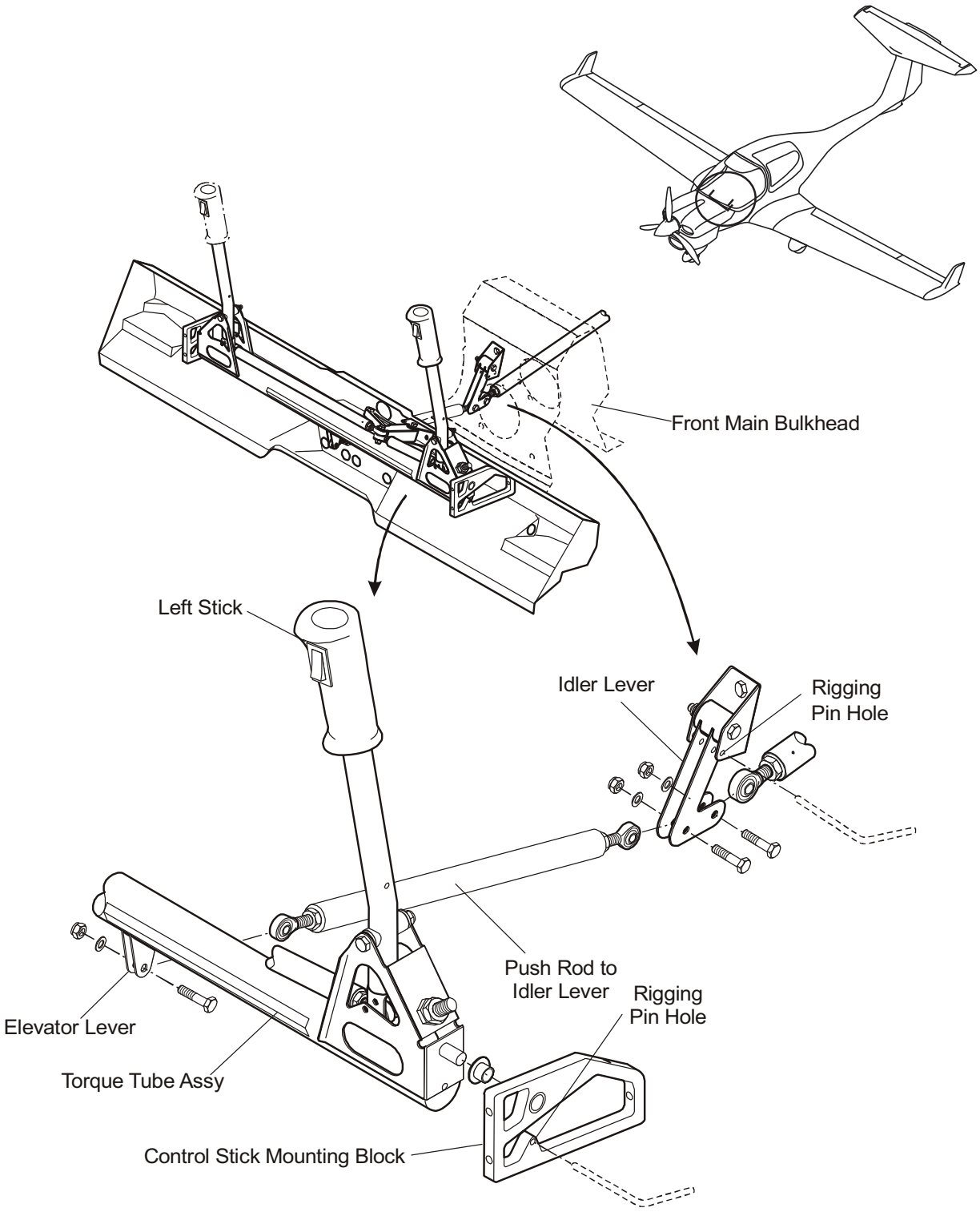

Figure 1: Elevator Controls Installation in the Cockpit

3. Operation

If you move the control stick forward:

- The torque tube assembly turns.
- The lever below the torque tube assembly pushes the short push-rod aft.
- The short push-rod pushes the long push-rod aft.
- The long push-rod pushes the bellcrank rearward.
- The bellcrank pushes the vertical push-rod up.
- The vertical push-rod moves the elevator horn.
- The elevator moves down.

If you move the control stick aft:

- The torque tube assembly turns.
- The short and long push-rods move forward.
- The bellcrank pulls the vertical push-rod down.
- The elevator moves up.

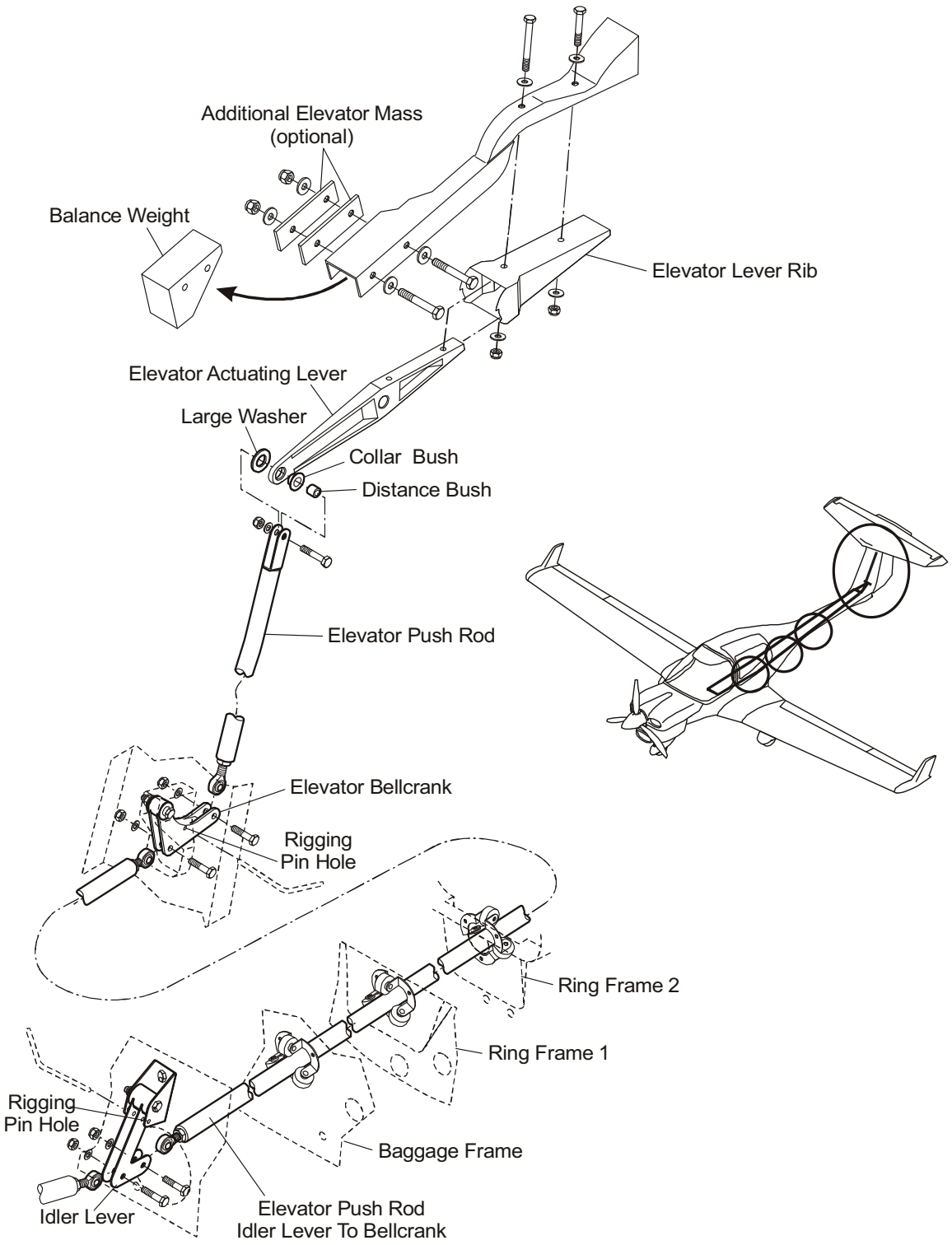

Figure 2: Elevator Controls Installation in the Rear Fuselage

TROUBLE-SHOOTING

1. General

The table below lists the defects you could have in the elevator control system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Control vibration in the air.	Too much backlash in the flight controls.	Examine the system to isolate the problem. Replace the defective part.
Elevator controls stiff/catch.	Bearings defective. Push-rod bent.	Replace the defective bearings. Replace the push-rod.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to do test procedures on the elevator control system. They also tell you how to adjust the elevator control system.

Refer to Section 55-20 to remove/install the elevator.

WARNING: WHEN YOU DO WORK ON THE AIRPLANE CONTROLS, YOU MUST MAKE SURE THE AREA AROUND THE CONTROLS/CONTROL SURFACES ARE CLEAR OF PERSONNEL AND EQUIPMENT. IF YOU DO NOT DO THIS, INJURY TO PERSONNEL AND DAMAGE TO CONTROL SURFACES CAN OCCUR.

WARNING: WHEN YOU COMPLETE WORK ON THE CONTROLS, MAKE SURE THAT YOU REMOVE ALL LOOSE ITEMS OR TOOLS FROM THAT AREA. LOOSE ITEMS OR TOOLS CAN PREVENT FULL MOVEMENT OF THE AIRPLANE CONTROLS. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.

2. Elevator Control System Test for Correct Range of Movement

A. Equipment

Item	Quantity	Part Number
Rigging pin.	1	--
Ruler.	1	Commercial
Elevator deflection gauge.	1	D60-5520-00-00-PL
Fuselage trestle.	1	Commercial

B. Elevator Control Test Procedure

Refer to Figure 1 in the Description and Operation Pageblock 27-30-00.

NOTE: If you use a deflection gauge, make sure that the airplane does not move in pitch during the procedure. It will cause errors in the test.

	Detail Steps/Work Items	Key Items/References
(1)	Make a copy of the Control Surfaces Adjustment Report.	Refer to Section 06-00. Use it to record the measurements.
(2)	If you will use a deflection gauge, put a trestle under the rear fuselage.	To prevent movement in pitch.
(3)	Remove the left pilot's seat.	Refer to Section 25-10.
(4)	Install the rigging pin through the stick mounting block and the torque tube.	
NOTE: Use a ruler or deflection gauge to make all measurements at the elevator control surface. Make the measurement between the top surface of the trailing edge of the horizontal stabilizer and the top surface of the elevator.		
(5)	Make sure that the elevator aligns with the horizontal stabilizer.	At the stabilizer tips.
(6)	Measure the distance between the top surface of the trailing edge of the horizontal stabilizer and the top surface of the elevator.	Record the distance.
(7)	Remove the rigging pin from the stick mounting block.	

	Detail Steps/Work Items	Key Items/References
	WARNING: **WHEN YOU DO WORK ON THE AIRPLANE CONTROLS, YOU MUST MAKE SURE THE AREAS AROUND THE CONTROLS/CONTROL SURFACES ARE CLEAR OF PERSONS/EQUIPMENT. IF YOU DO NOT DO THIS, INJURY TO PERSONNEL AND DAMAGE TO CONTROL SURFACES CAN OCCUR.**	
(8)	Move the control stick fully forward and hold it against the stop.	
(9)	Measure the distance between the top surface of the trailing edge of the horizontal stabilizer and the top surface of the elevator.	Record the measurement. The distance must be as shown in the Control Surfaces Adjustment Report.
(10)	Move the control stick fully aft and hold it against the stop.	
(11)	Measure the distance between the top surface of the trailing edge of the horizontal stabilizer and the top surface of the elevator.	Record the measurement. The distance must be as shown in the Control Surfaces Adjustment Report.
(12)	Install the left pilot's seat.	Refer to Section 25-10.
(13)	Remove the trestle under the rear fuselage.	

3. Elevator Control System Adjustments

If you cannot get the correct range of movement of the elevator control system, use this procedure to adjust the system. Gust travel refers to the amount of travel remaining at the control surface with the control stick held against the cockpit stop.

WARNING: **IF YOU DO AN ADJUSTMENT OF A PUSH-ROD, YOU MUST MAKE SURE THAT THE PUSH-ROD IS STILL IN SAFETY. IF YOU DO NOT DO THIS, THE PUSH-ROD CAN DISCONNECT. THIS CAN CAUSE DEATH OR INJURY TO PERSONNEL.**

A. Equipment

Item	Quantity	Part Number
Rigging pins.	3	--
Ruler.	1	Commercial
Elevator deflection gauge.	1	D60-5520-00-00-PL

B. Elevator Control Adjustment Procedure

Refer to Figures 1 and 2 in the Description and Operation Pageblock 27-30-00.

	Detail Steps/Work Items	Key Items/References
(1)	Remove these items for access: - The pilots' seats. - The rudder.	 Refer to Section 25-10. Refer to Section 55-40.
(2)	Install rigging pins in the following: - Through the stick mounting block and the torque tube. - The idler lever. - The rear bellcrank.	 On the control bulkhead. On the front main bulkhead. On the vertical stabilizer rear web.
(3)	If you cannot put a rigging pin into a lever or bellcrank, adjust the push-rods as necessary.	Refer to Section 27-00 for the push-rod adjustment procedure.
(4)	Make sure that the elevator aligns with the horizontal stabilizer.	At the stabilizer tips.
(5)	If the elevator does not align with the horizontal stabilizer, adjust the vertical push-rod at the rear bellcrank.	Refer to Section 27-00 for the push-rod adjustment procedure.

	Detail Steps/Work Items	Key Items/References
(6)	Remove rigging pins from the following: - The stick mounting block. - The idler lever. - The rear bellcrank.	 On the control bulkhead. On the front main bulkhead. On the vertical stabilizer rear web.
(7)	Do a test for the correct range of elevator movement.	Refer to Paragraph 2.
(8)	Do an inspection of all the controls that you have adjusted. - If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(9)	Install these items: - The pilots' seats. - The rudder.	 Refer to Section 25-10. Refer to Section 55-40.

4. Elevator Push-Rod Access

Elevator Push-Rod	Remove/Install Access	References
Between the control torque tube and the idler lever at the front main bulkhead.	Pilots' seats.	Refer to Section 25-10.
Between the idler lever at the front main bulkhead and the bellcrank at the vertical stabilizer rear web.	Pilots' seats. Rudder.	Refer to Section 25-10. Refer to Section 55-40.
Between the bellcrank at the vertical stabilizer rear web and the elevator.	Rudder.	Refer to Section 55-40.

5. Elevator Bellcrank and Lever Access

Elevator Bellcrank/Lever	Remove/Install Access	References
Idler lever at the front main bulkhead.	Pilots' seats.	Refer to Section 25-10.
Bellcrank at the vertical stabilizer rear web.	Rudder.	Refer to Section 27-20.

FLIGHT CONTROLS - ELEVATOR TRIM

1. General

The DA 40 NG has an elevator with a trim tab. The trim tab is mechanically operated. This lets you trim the airplane for different speeds and center-of-gravity positions.

A handwheel on the center console controls the elevator trim. An indicator tells the pilot the trim setting. A flexible cable moves the trim tab.

2. Description

The trim installation has three main parts:

- A handwheel assembly with a trim indicator.
- A flexible cable which connects the handwheel to the trim tab.
- The trim tab actuator assembly.

Figure 1 shows the elevator trim mechanism in the cockpit.
Figure 2 shows the trim tab actuator assembly.

A. Trim Handwheel Assembly

A handwheel assembly on the center console controls the elevator trim system. The assembly has a metal mounting frame. The frame attaches to the rear of the engine control assembly and the top of the control bulkhead.

A long bolt through the mounting frame carries the handwheel. The bolt also holds friction disks, plain washers and spring washers against the handwheel. Two jam-nuts let you adjust the friction.

A small gear wheel attaches to the handwheel. The small gear wheel engages with a large gear segment with internal teeth. The gear segment has a pivot bolt at the bottom of the mounting frame. A ball-stud attaches the eye-end of a long flexible cable to the gear segment. An extension to the mounting frame to the rear makes the anchor point for the outer sheath of the cable.

The gear segment is also the trim indicator. The top face of the segment has a white line across it mid way between the front and back. The top face can be seen through a slot in the cover plate. The sides of the cover plate have markings to show the trim position.

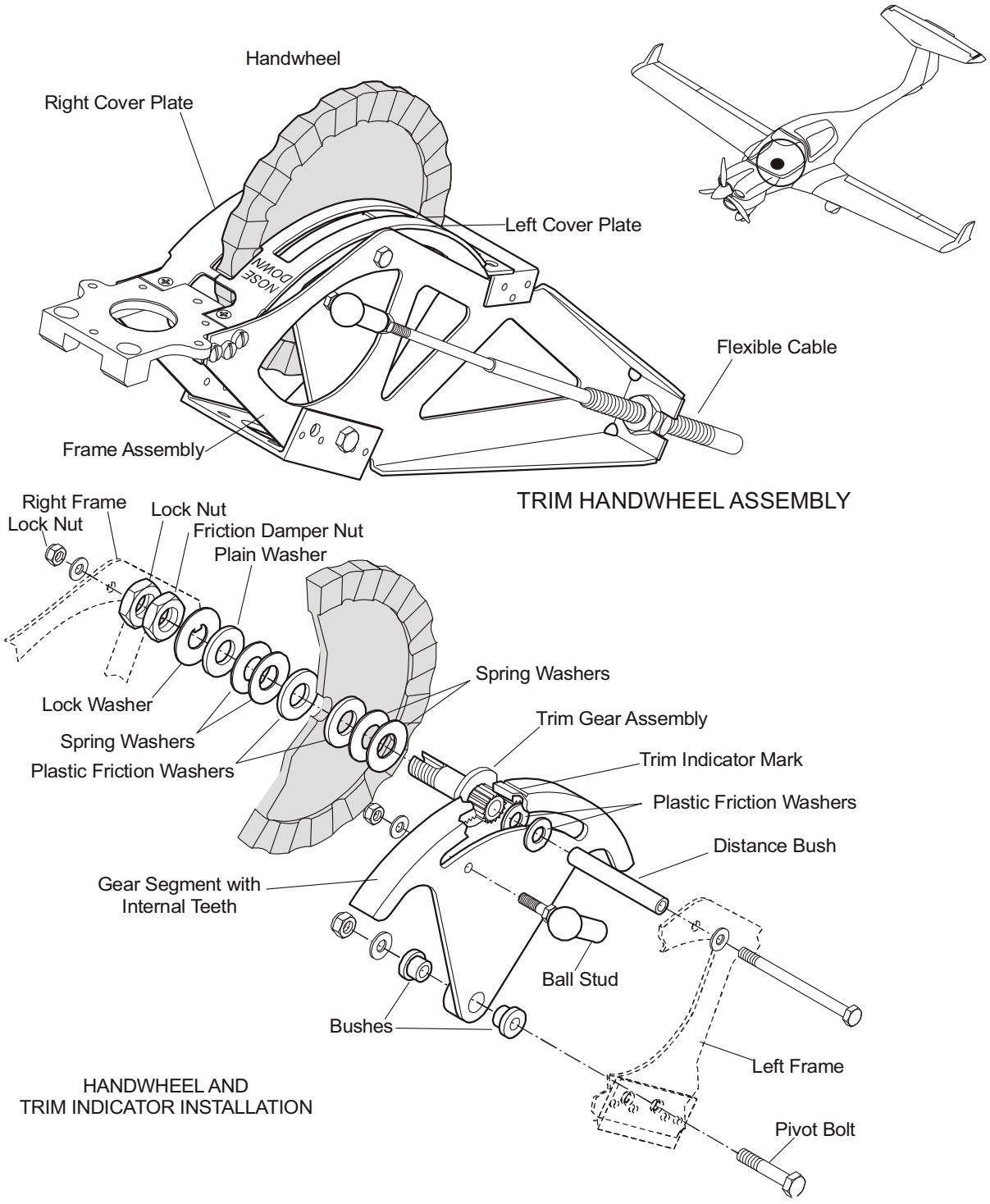


Figure 1: Elevator Trim Mechanism in the Cockpit

B. Flexible Cable

A long flexible cable connects the trim handwheel assembly to the trim tab. The cable goes through holes in the front and rear main bulkheads, the baggage frame and each of the ring frames. It goes up the front face of the front web of the vertical stabilizer and through a slot near the top. It goes through a large hole at the top of the rear web of the vertical stabilizer to the trim tab actuator assembly.

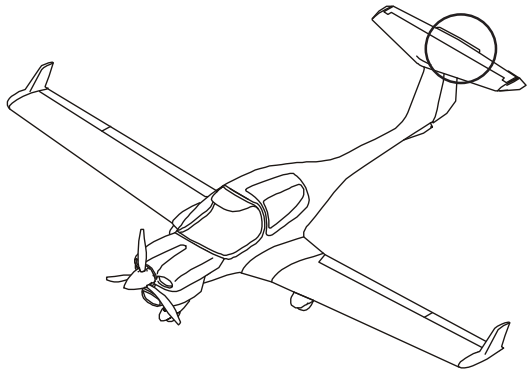
The cable has an inner core with threaded end fittings. Spherical end fittings at each end connect to the gear segment and trim tab actuator assembly.

Clamp blocks hold the outer core to the mounting frame at the front and a bracket from the horizontal stabilizer at the back.

C. Trim Tab Actuator Assembly

The trim tab is a one-piece GFRP molding. The tab has two integral levers. Two cranked actuating levers attach to the integral levers. The left cranked actuating lever connects to the long flexible cable. The right actuating lever connects to a friction damper.

The friction damper has a clamp-block with a hole for a rod. The rod connects to the right actuating lever on the trim tab. You can adjust the friction of the rod in the clamp block.



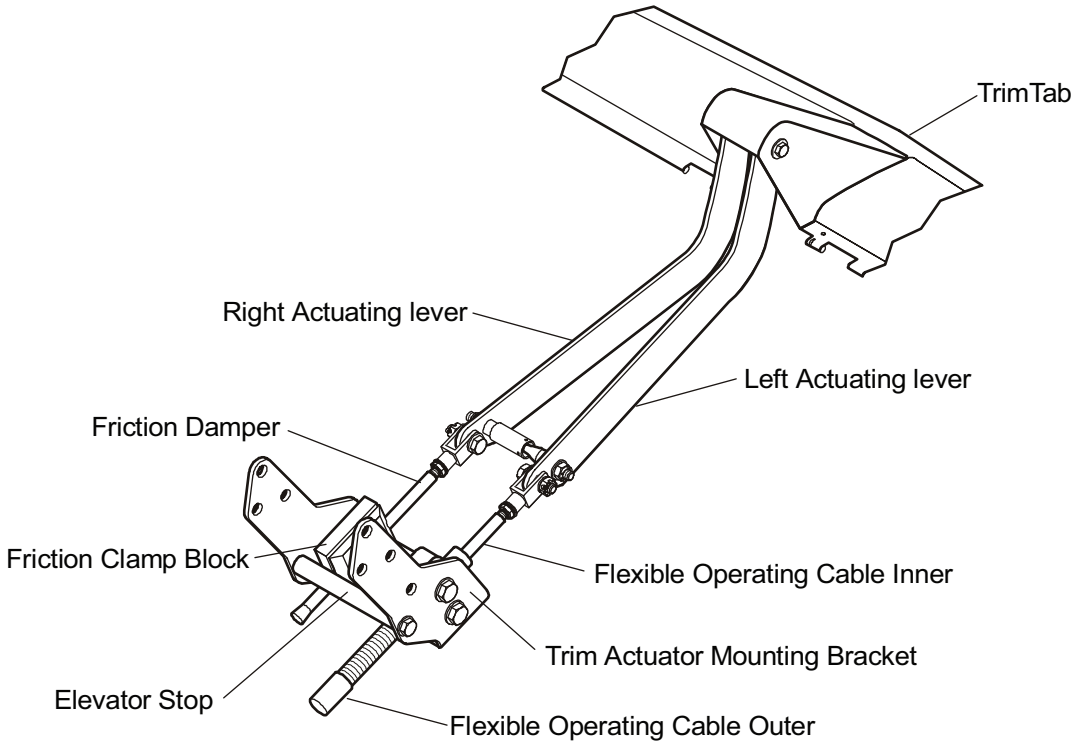


Figure 2: Trim Tab Actuator Assembly

3. Operation

When you move the top of the trim handwheel forward, these things happen:

- The small gear wheel moves the top of the gear segment forward.
- The gear segment pulls the inner core of the flexible cable forward.
- The inner core of the flexible cable pulls the left cranked actuating lever forward.
- The left cranked actuating lever pulls the trim tab lever forward to move the tab up.
- The up movement of the trim tab pushes the elevator down in flight giving nose-down trim.

When you move the top of the handwheel aft, the gear segment moves aft, the cable moves aft and the trim tab moves down. This pushes the elevator up and gives nose-up trim.

In each case, the pilot can see the trim position from the white mark on the gear segment.

4. Emergency Operation

In the event of failure of the trim control system between the handwheel and the trim actuator lever, the friction damper will prevent trim tab flutter.

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TROUBLE-SHOOTING

1. General

The table below lists the defects you could have in the elevator trim-control system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Too much play in the trim system.	Worn bearings or joints.	Replace the defective items.
Trim handwheel stiff to move.	Flexible cable damaged.	Replace the flexible cable.
	Trim damper incorrectly adjusted.	Adjust the trim damper.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to test the elevator trim-control system. They also tell you how to adjust the system.

Refer to Section 55-20 for data on how to remove/install the elevator and trim tab.

WARNING: **WHEN YOU DO WORK ON THE AIRPLANE CONTROLS, YOU MUST MAKE SURE THE AREA AROUND THE CONTROLS/CONTROL SURFACES ARE CLEAR OF PERSONNEL AND EQUIPMENT. IF YOU DO NOT DO THIS, INJURY TO PERSONNEL AND DAMAGE TO CONTROL SURFACES CAN OCCUR.**

WARNING: **WHEN YOU COMPLETE WORK ON THE CONTROLS, MAKE SURE THAT YOU REMOVE ALL LOOSE ITEMS OR TOOLS FROM THAT AREA. LOOSE ITEMS OR TOOLS CAN PREVENT FULL MOVEMENT OF THE AIRPLANE CONTROLS. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.**

2. Elevator Trim-Control System - Test for Correct Range of Movement

A. Equipment

Item	Quantity	Part Number
Control clamp.	1	Commercial
Inclinometer.	1	Commercial
Elevator trim-tab deflection gauge.	1	D60-5525-00-00-PL
Fuselage trestle.	1	Commercial

B. Elevator Trim Control - Test Procedure

NOTE: Make sure that the airplane does not move in pitch during the procedure. It will cause errors in the test.

	Detail Steps/Work Items	Key Items/References
(1)	Make a copy of the Control Surfaces Adjustment Report.	Refer to Section 06-00. Use it to record the measurements.
(2)	Put a trestle under the rear fuselage.	To prevent movement in pitch.
(3)	Hold the trailing edge of the elevator in line with the horizontal stabilizer	Use a clamp at the tips.
(4)	Set the trim handwheel to neutral.	
NOTE: Use an inclinometer and the trim-tab deflection gauge to make all measurements at the trim tab surface. Make the measurement at the center.		
(5)	Put the inclinometer on the top surface of the trim tab. Set the inclinometer to zero.	
(6)	Set the trim handwheel to fully NOSE DOWN.	

	Detail Steps/Work Items	Key Items/References
(7)	Measure the angle of the top surface of the trim tab.	Record the angle of the top surface of the trim tab. The angle must be as shown in the Control Surfaces Adjustment Report.
(8)	Set the trim handwheel to fully NOSE UP.	
(9)	Measure the angle of the top surface of the trim tab.	Record the angle of the top surface of the trim tab. The angle must be as shown in the Control Surfaces Adjustment Report.
(10)	Remove the trestle under the rear fuselage.	

3. Elevator Trim-Control System Adjustments

If you cannot get the correct range of movement of the elevator trim control system, use this procedure to adjust the system.

A. Equipment

Item	Quantity	Part Number
Inclinometer.	1	Commercial
Elevator trim-tab deflection gauge.	1	D60-5525-00-00-PL
Control clamp.	1	Commercial
Fuselage trestle.	1	Commercial
Spring balance.	1	Commercial

B. Elevator Trim Control - Adjustment Procedure

Refer to Figure 1 in the Description and Operation Pageblock 27-38-00.

	Detail Steps/Work Items	Key Items/References
(1)	Remove these items for access: - The pilots' seats. - The center console cover.	Refer to Section 25-10.
(2)	Put a trestle under the rear fuselage.	To prevent movement in pitch.
(3)	Hold the trailing edge of the elevator in line with the horizontal stabilizer.	Use a clamp at the tips.
(4)	Set the trim indicator to neutral.	
(5)	Adjust the flexible cable: - Loosen the nuts which hold the outer sheath of the flexible cable to the mounting frame for the trim handwheel. - Turn the nuts to move the outer sheath forward of aft as necessary. - Tighten the nuts.	Move the outer sheath forward to move the trim tab down. Move the outer sheath aft to move the trim tab up.
(6)	Do a test for the correct range of movement of the trim tab.	Refer to Paragraph 2.
(7)	Do an inspection of all the controls that you have adjusted. - If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(8)	Install these items: - The pilots' seats. - The center console cover.	Refer to Section 25-10.

C. Elevator Trim-Friction Damper - Adjustment Procedure

Refer to Figure 2 in the Description and Operation Pageblock 27-38-00.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the horizontal stabilizer fairing.	Refer to Section 55-10.
(2)	Disconnect the right actuator lever from the friction rod: - Release the spring locking clip from the ball-stud. - Pull the end fitting away from the stud.	
(3)	Measure the force needed to move the damper rod.	Use a spring balance. The friction force must be 15 - 30 N (3.4 - 6.7 lb).
(4)	If necessary, adjust the friction force: - Tighten or loosen the clamping screw a small amount.	
(5)	Do steps 3 and 4 again as necessary.	
(6)	Connect the right actuator lever to the friction rod: - Push the end fitting onto the stud. - Install the spring locking clip in the ball-stud.	
(7)	Do an inspection of all the controls that you have adjusted. - If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(8)	Install the horizontal stabilizer fairing.	Refer to Section 55-10.

D. Elevator Trim-Handwheel Friction-Damper - Adjustment Procedure

Refer to Figure 1 in the Description and Operation Pageblock 27-38-00.

	Detail Steps/Work Items	Key Items/References
(1)	Remove these items for access: - The pilots' seats. - The center console cover.	Refer to Section 25-10.
(2)	Loosen the self-locking nut on the handwheel pivot bolt.	On the right of the mounting frame.
(3)	Loosen the locknut for the handwheel friction damper.	Against the right inner face of the mounting frame.
(4)	Adjust the friction damper nut.	Against the pack of washers and spring washers on the pivot bolt.
(5)	Measure the friction force.	The friction force must be 60 ± 10 Nm (13.5 ± 2.25 lbf. ft.).
(6)	Do steps 4 and 5 as necessary.	
(7)	Tighten the locknut for the handwheel friction damper.	
(8)	Tighten the self-locking nut on the handwheel pivot bolt.	
(9)	Do an inspection of all the controls that you have adjusted. - If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(10)	Install these items: - The pilots' seats. - The center console cover.	Refer to Section 25-10.

STALL WARNING SYSTEM

1. General

The DA 40 NG has a simple mechanical stall warning system.

2. Description and Operation

Figure 1 shows the basic installation of the stall warning system.

Figure 2 shows the stall warning assembly without capillary.

Figure 3 shows the stall warning assembly with capillary.

Figure 4 shows the stall warning assembly with capillary and ball valve.

The stall warning horn is located in the instrument panel. A flexible hose connects the stall warning horn to a hole in the leading edge of the left wing. When the angle of attack of the wing is just less than the stall angle, the airflow through the hole operates the horn. A ball-valve in the tube stops air and water flowing from the outside into the cockpit through the stall warning system.

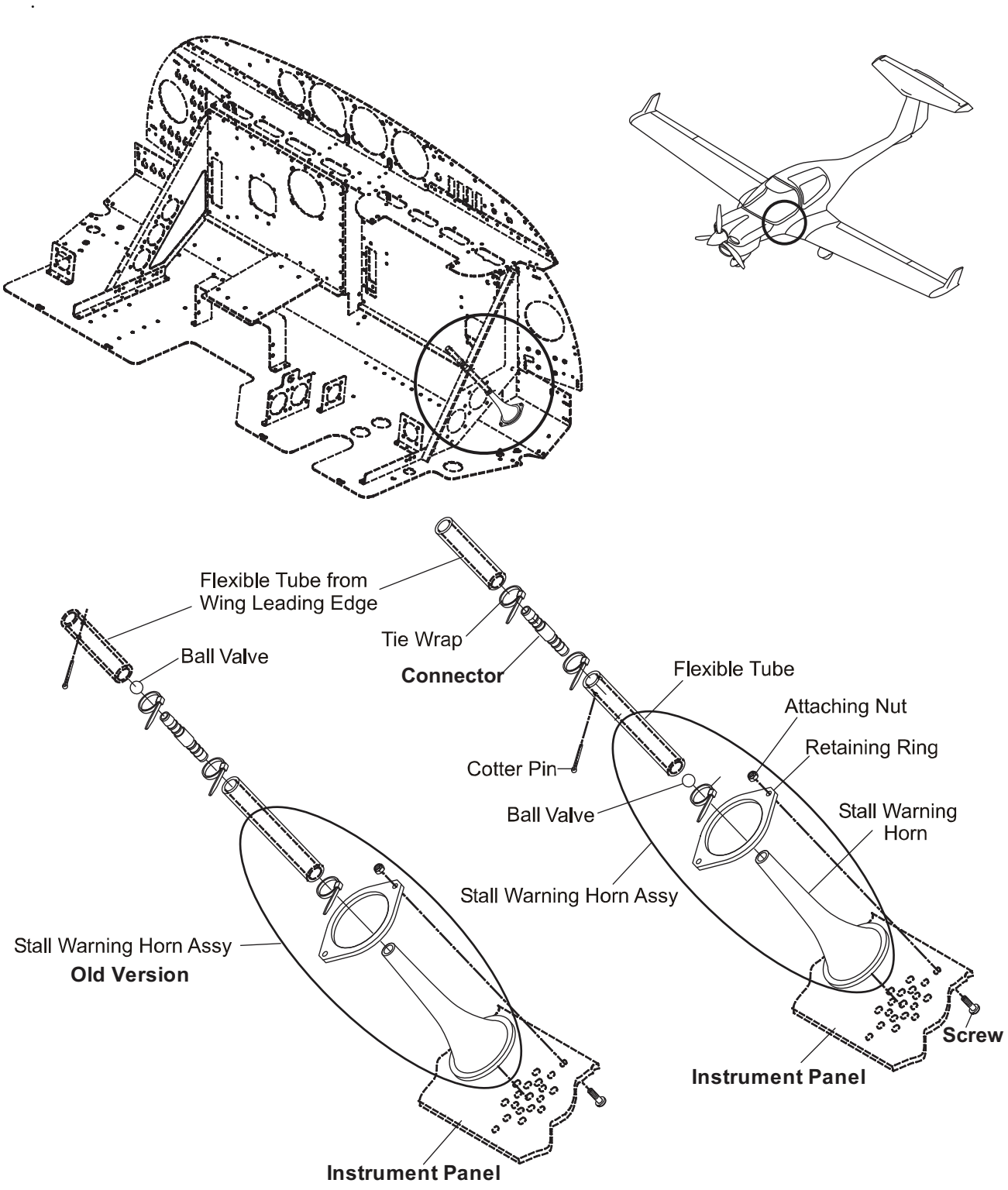

Figure 1: Stall Warning System - Installation

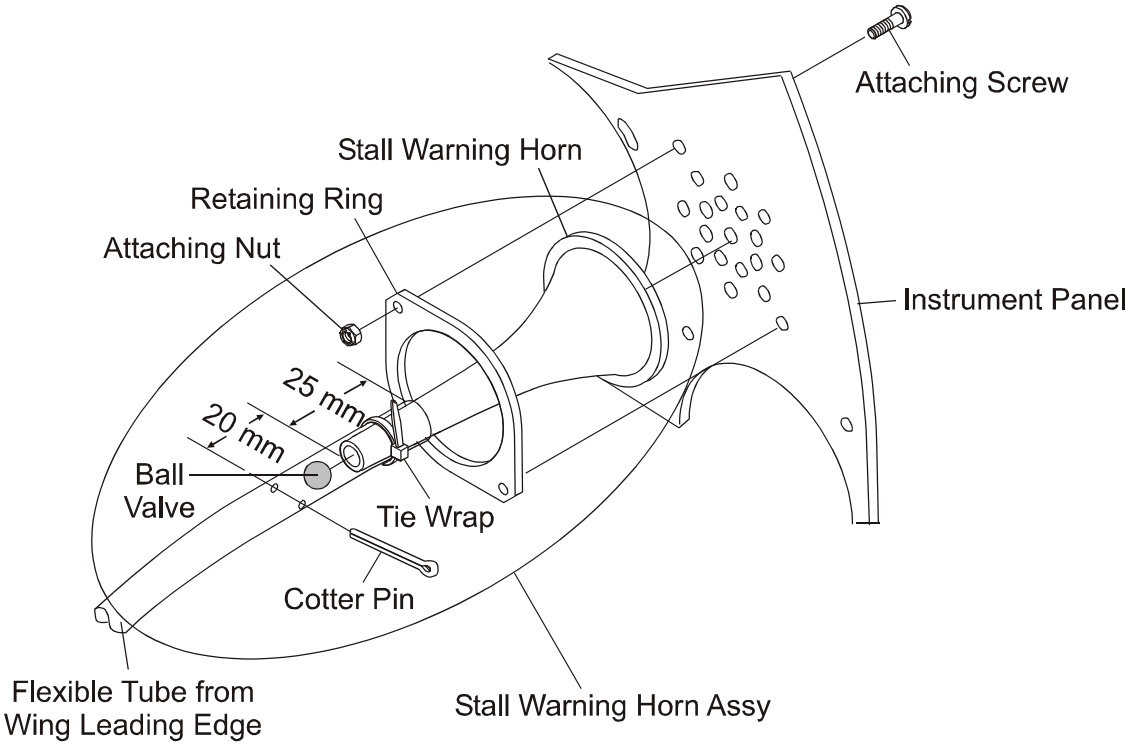

Figure 2: Stall Warning System (Without Capillary)

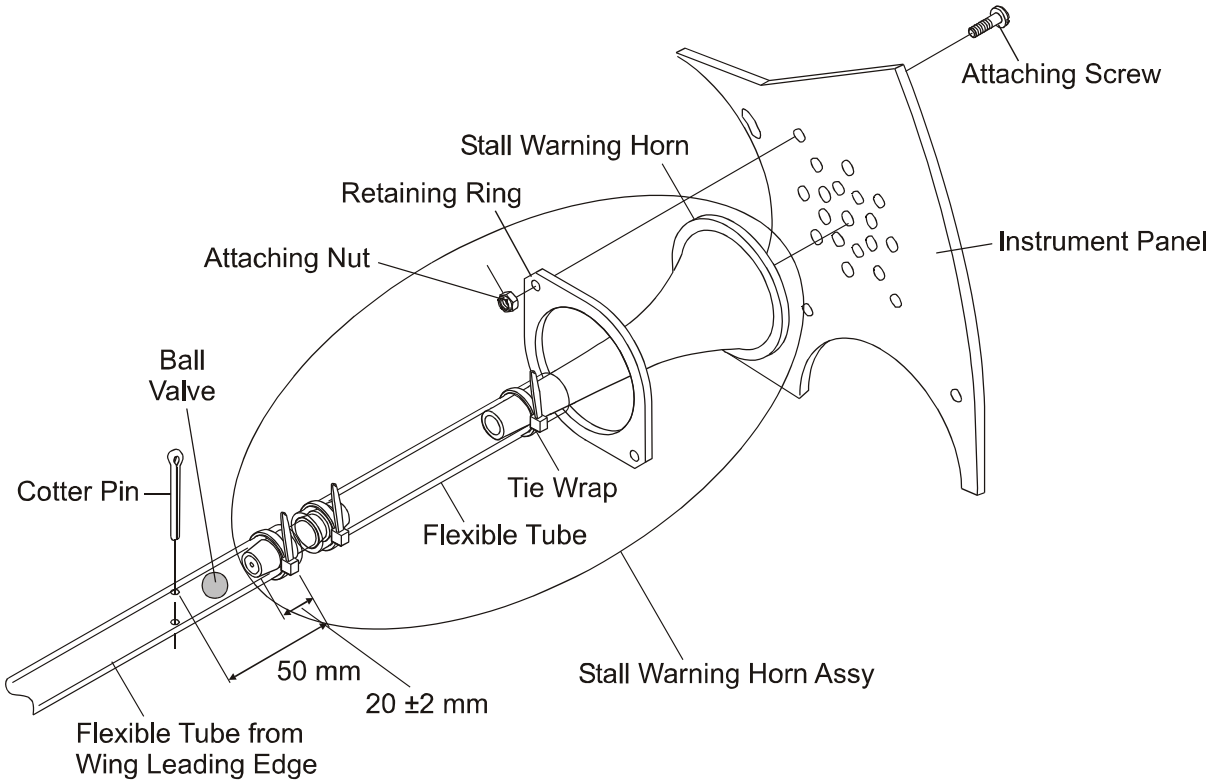

Figure 3: Stall Warning System (With Capillary)

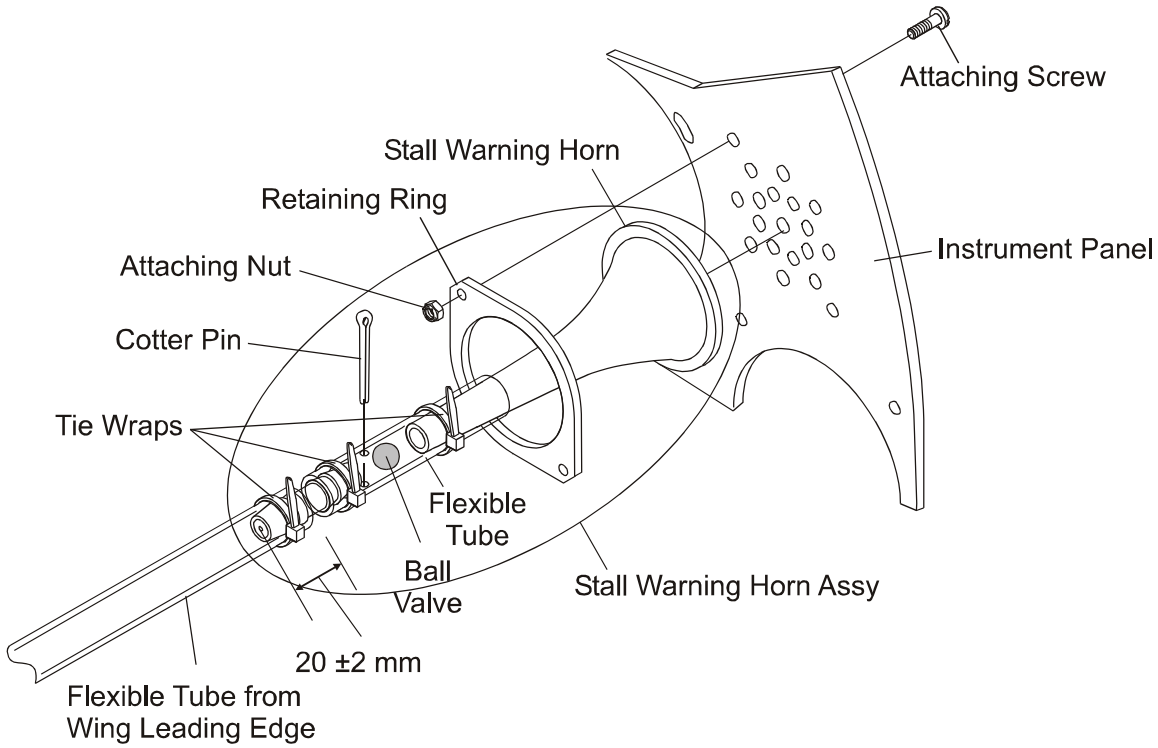

Figure 4: Stall Warning System (With Capillary and Ball Valve)

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TROUBLE-SHOOTING

1. General

The table below lists the defects you could have with the stall warning system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Stall warning horn does not operate.	Stall warning horn defective. Water frozen in the stall warning system.	Replace the stall warning horn. Thaw and drain the water from the stall warning system.
Stall warning operates too early during stall.	Stall warning horn defective.	Replace the stall warning horn.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to remove/install the stall warning horn. They also tell you how to drain water from the stall warning system.

2. Remove/Install a Stall Warning Horn (System without Capillary)

Refer to Figure 1 in the Description and Operation Pageblock 27-39-00.

A. Remove the Stall Warning Horn Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Disconnect the hose from the stall warning horn: - Cut the cable tie that connects the hose to the stall warning horn. - Carefully pull the hose from the stall warning horn. - Remove the ball-valve from the end of the hose.	
(3)	Remove the two screws and nuts that attach the horn to the instrument panel.	
(4)	Remove the stall warning horn from the panel.	

B. Install the Stall Warning Horn Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Perform a stall warning horn classification check.	Refer to Paragraph 6 in this pageblock.
(2)	Make sure to install a stall warning horn with the same classification.	
(3)	Put the stall warning horn in position in the instrument panel.	
(4)	Install the two screws and nuts which attach the horn to the panel.	
(5)	Make sure that the hose has the cotter pin installed correctly.	
(6)	Connect the flexible hose to the horn: - Carefully push the ball-valve into the end of the hose. - Carefully push the hose onto the stall warning horn. - Make sure that there is a 20 mm (0.8 in) clearance between the end of the horn and the cotter pin. - Install the cable tie which connects the hose to the stall warning horn.	
(7)	Install the instrument panel cover.	Refer to Section 25-10.
(8)	Do a flight check of the stall warning system.	Refer to the DA 40 NG Airplane Flight Manual.

3. Remove/Install a Stall Warning Horn (System with Capillary)

Refer to Figure 3 in the Description and Operation Pageblock 27-39-00.

A. Remove the Stall Warning Horn Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Disconnect the hose from the stall warning horn: - Cut the cable tie that connects the hose to the stall warning horn. - Carefully pull the hose from the stall warning horn assembly (fitting). - Remove the ball-valve from the end of the hose.	
(3)	Remove the two screws and nuts that attach the horn to the instrument panel.	
(4)	Remove the stall warning horn from the panel.	

B. Install the Stall Warning Horn Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Perform a stall warning horn classification check.	Refer to Paragraph 6 in this pageblock.
(2)	Make sure to install a stall warning horn with the same classification.	
(3)	Put the stall warning horn in position in the instrument panel.	
(4)	Install the two screws and nuts which attach the horn to the panel.	
(5)	Make sure that the ball valve hose has the cotter pin installed correctly.	
(6)	Connect the flexible hose to the stall warning horn assembly. - Carefully push the ball-valve into the end of the flexible hose. - Carefully push the hose onto the stall warning horn assembly (fitting). - Make sure that there is a 20 mm (0.8 in) clearance between the end of the horn assembly and the cotter pin. - Install the cable tie which connects the hose to the stall warning horn assembly.	
(7)	Install the instrument panel cover.	Refer to Section 25-10.
(8)	Do a flight check of the stall warning system.	Refer to the DA 40 NG Airplane Flight Manual.

4. Remove/Install a Stall Warning Horn (System with Capillary and Integrated Ball Valve)

Refer to Figure 4 in the Description and Operation Pageblock 27-39-00.

A. Remove the Stall Warning Horn Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Disconnect the hose from the stall warning horn assembly: - Cut the cable tie that connects the hose to the stall warning horn assembly. - Carefully pull the hose from the stall warning horn assembly (fitting).	
(3)	Remove the two screws and nuts that attach the horn to the instrument panel.	
(4)	Remove the stall warning horn from the panel.	

B. Install the Stall Warning Horn Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Perform a stall warning horn classification check.	Refer to Paragraph 6 in this pageblock.
(2)	Make sure to install a stall warning horn with the same classification.	
(3)	Put the stall warning horn in position in the instrument panel.	
(4)	Install the two screws and nuts which attach the horn to the panel.	
(5)	Connect the flexible hose to the stall warning horn assembly. - Carefully push the hose onto the stall warning horn assembly (fitting). - Install the cable tie which connects the hose to the stall warning horn assembly.	
(6)	Install the instrument panel cover.	Refer to Section 25-10.
(7)	Do a flight check of the stall warning system.	Refer to the DA 40 NG Airplane Flight Manual.

5. Procedure to Remove Water from the Stall Warning System

	Detail Steps/Work Items	Key Items/References
(1)	Remove the left hand pilot's seat.	Refer to Section 25-10.
(2)	Carefully pull the stall warning hose from the wing root connector.	
(3)	Lower the end of the hose and drain the water from the system.	
(4)	Reconnect the stall warning hose to the connector in the wing root.	
(5)	Do a flight check of the stall warning system.	Refer to the DA 40 NG Airplane Flight Manual.

6. Stall Warning Horn - Classification Test

The stall warning horn is attached to a suction pump via an adjustable valve. The pressure is measured with an altitude indicator, indicating feet. The test starts with the suction pump operating and the adjustable valve in the closed position. The adjustable valve is opened slowly and as soon as the stall warning horn starts whistling, the indication on the altitude indicator is read.

The altitude indicator reading classifies the tested stall warning according to the table below:

Indicated Height at the Moment When It Begins Whistling	Classification
0 ft to 50 ft	Reject
51 ft to 100 ft	A
101 ft to 150 ft	B
151 ft to 200 ft	C
201 ft to 250 ft	D
251 ft to 300 ft	E
301 ft to 350 ft	F
more than 350 ft	Reject

NOTE: If the result of the classification test does not match the labeling on the stall warning horn, the stall warning horn must be replaced by a stall warning horn classified in the same class.

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FLIGHT CONTROLS - FLAPS

1. General

The DA 40 NG has flaps for landing and take-off. An electric flap actuator moves the flaps. See Section 57-50 for data about the flap structure.

A three-position toggle switch controls the flaps. The switch is in the center section or RH section of the instrument panel.

The flap position indicator has marks for UP, T/O and LDG positions.

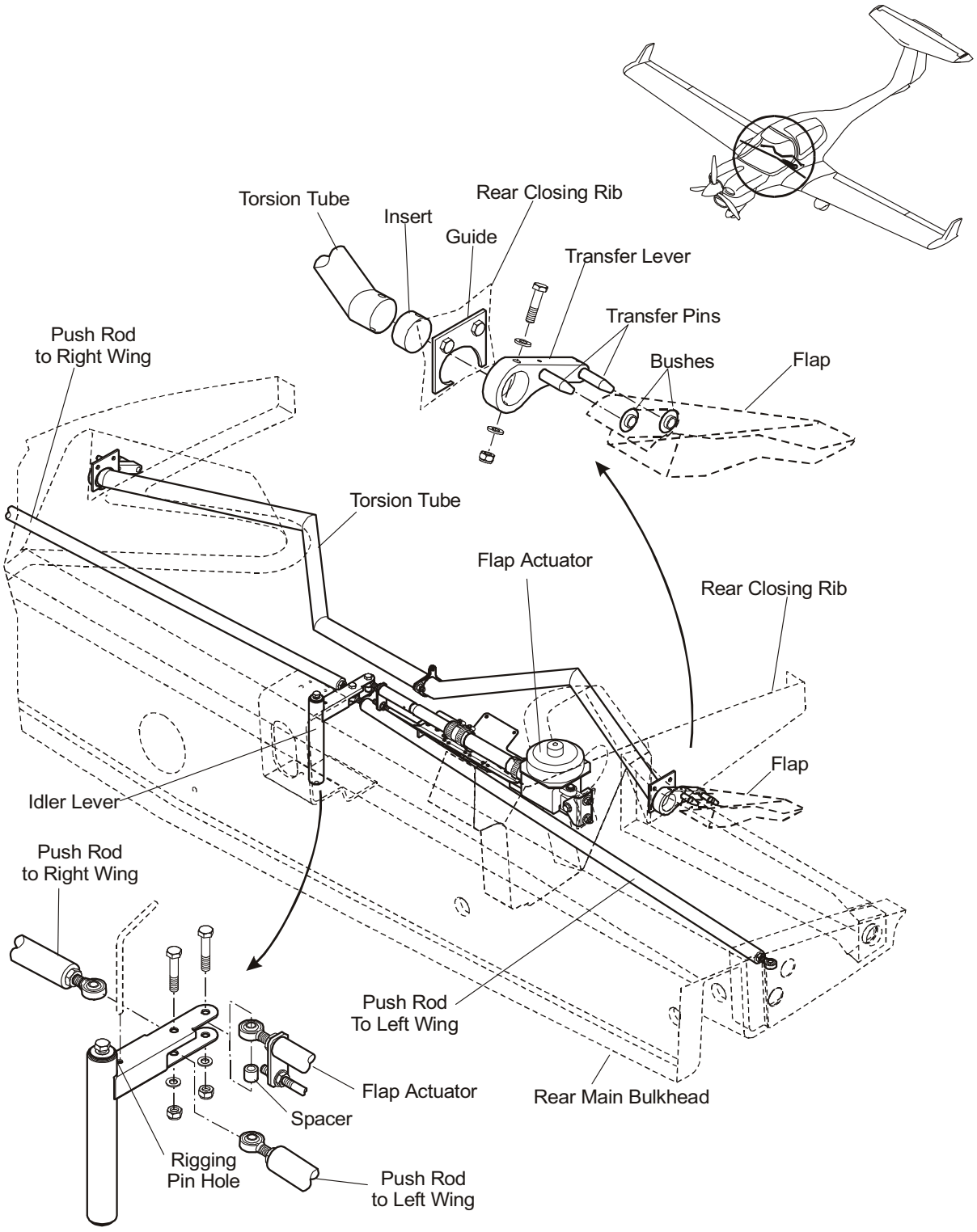

Figure 1: Flap Control System in the Fuselage

2. Description

Figure 1 shows the flap control system in the fuselage.

Figure 2 shows the flap push-rods and bellcranks in the wing.

Figure 3 shows the flap actuator installation.

A. Flap Actuator

An electric actuator operates the flaps. The electric actuator is under the left passenger seat. A mounting bracket on the left rear closing rib attaches the actuator to the structure.

The electric actuator has an electric motor. The motor has a reduction gear which turns a spindle. The spindle operates a push-rod. The push-rod connects to an idler lever attached to the rear main bulkhead.

A cam attached to the push-rod operates five micro-switches. The micro-switches are part of the flaps electronic control circuit.

B. Push-Rods and Bellcranks

The idler lever on the rear main bulkhead connects to two push-rods. The two push-rods connect to the inboard ends of long push-rods at the wing root ribs. The long push-rods connect to the flap bellcranks in the wings. A guide bearing holds each long rod at the root rib. Two short push-rods attach to the flap horns.

C. Torsion Tube

A cranked torsion tube connects to the inboard end of each flap. The torsion tube has two parts. Bolts attach the two parts of the torsion tube to each other in the fuselage.

A transfer lever attaches to the outboard end of each part of the torsion tube. The transfer lever has two transfer pins. The transfer pins engage with bushes in the root rib of the flap.

If there is a failure of the flap mechanical system, the torsion tube transfers movement from one flap to the other flap. It makes sure that the flaps are synchronized.

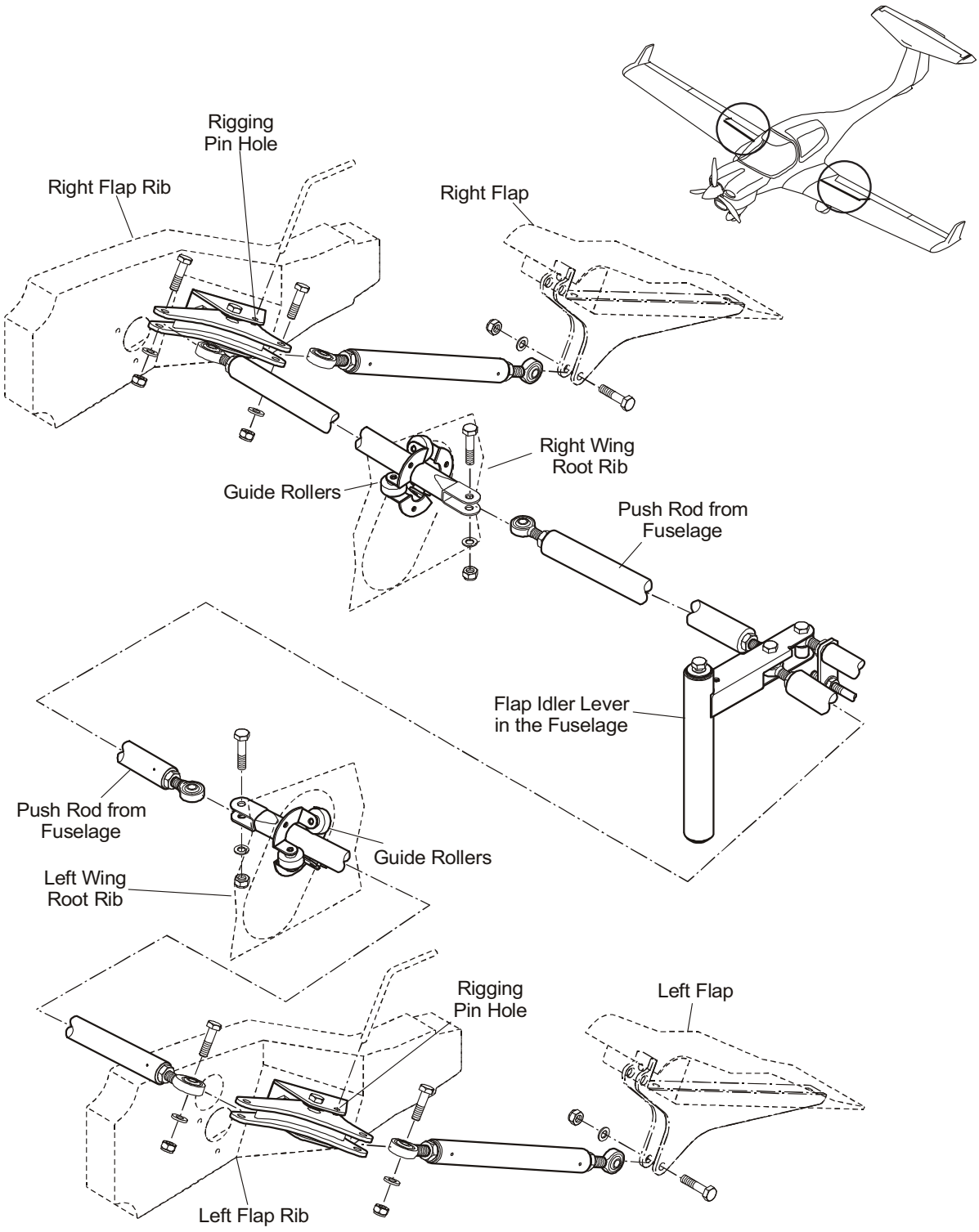

Figure 2: Flap Controls in the Wing

D. Flap Electrical Control

Figure 4 shows the flap electrical control system. The main bus or, if installed, the essential bus supplies power for the flaps. A circuit-breaker protects the circuit (5 A).

See Chapter 92 for the wiring diagram.

The flap electrical control system uses solid-state electronics. It has an electronic control unit and a switchboard. The electronic control unit is located on the instrument panel. The switch board attaches to the flap actuator.

The electronic control unit has a 3-position selector switch and a flap position indicator. The selector switch can be set to:

- UP (fully up). 0º ± 1º
- T/O (take-off). 20º ± 2º
- LDG (landing). 42º ± 1º

The flap position indicator has three light-emitting diodes. The top diode lights when the flaps are in the UP position. The middle diode lights when the flaps are in the T/O position. The bottom diode lights when the flaps are in the LDG position.

The switch board attaches to the body of the flap actuator. The switch board has five micro switches. It also has a solid-state logic circuit board.

The logic circuits monitor the outputs from the selector switch and the micro-switches on the switch board. They control four power transistors. Two of the power transistors can connect the power supply to the flap motor. The other two can connect the motor to ground.

Two screws attach each micro-switch to the switch board. You can adjust the position of the switch board with three worm-drive clamps. The micro-switches have these functions:

- Micro-switch 1 - UP position.
- Micro-switch 2 - UP indication and T/O position moving down.
- Micro-switch 3 - T/O indication.
- Micro-switch 4 - LDG position.
- Micro-switch 5 - LDG indication T/O position moving up.

Cable harnesses with multi-pin connectors connect the components.

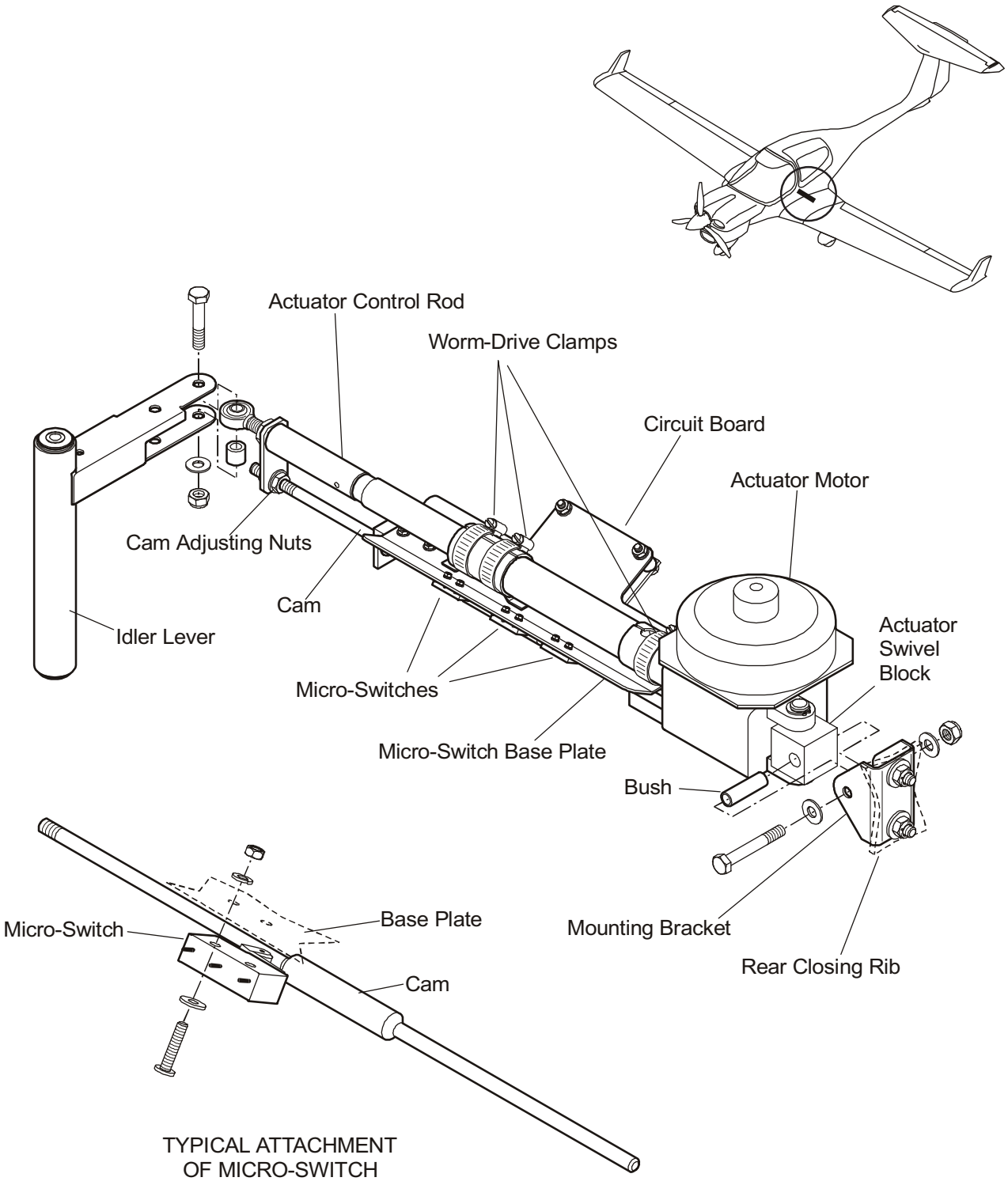

Figure 3: Flap Actuator Installation

3. Operation

If you operate the flap selector switch these things happen:

- The switch energizes the related logic circuit.
- The logic circuit switches on the related transistors to supply power/ground to the flap motor.
- The flap motor turns the reduction gear and spindle. This moves the push-rod towards the new set position.
- The push-rod turns the idler lever around its axis.
- The idler lever moves the push-rods in the fuselage and the wings.
- The push-rods move the bellcranks in the left and right wing.
- The two short push-rods move the flaps.

When the flaps come to the set position:

- The cam on the flap actuator operates the related position and indication micro-switches.
- The logic circuit switches off the related transistors to de-energize the motor.
- The flap position indicator shows the new flap position.

4. Fail-Safe Operation

The flap control system has these safety properties:

- If the LDG position micro-switch fails closed the flap actuator push-rod will continue to travel for about 5 mm (0.2 in) until it reaches an internal stop. This prevents damage to the flaps. The FLAP circuit-breaker opens.
- If the UP position micro-switch fails closed, the actuator push-rod contacts the end of the actuator body after about 5 mm (0.2 in) of movement. This prevents damage to the flaps. The FLAP circuit-breaker opens.
- If there is a mechanical failure in the controls to one flap, the torsion tube prevents asymmetric flap movement.

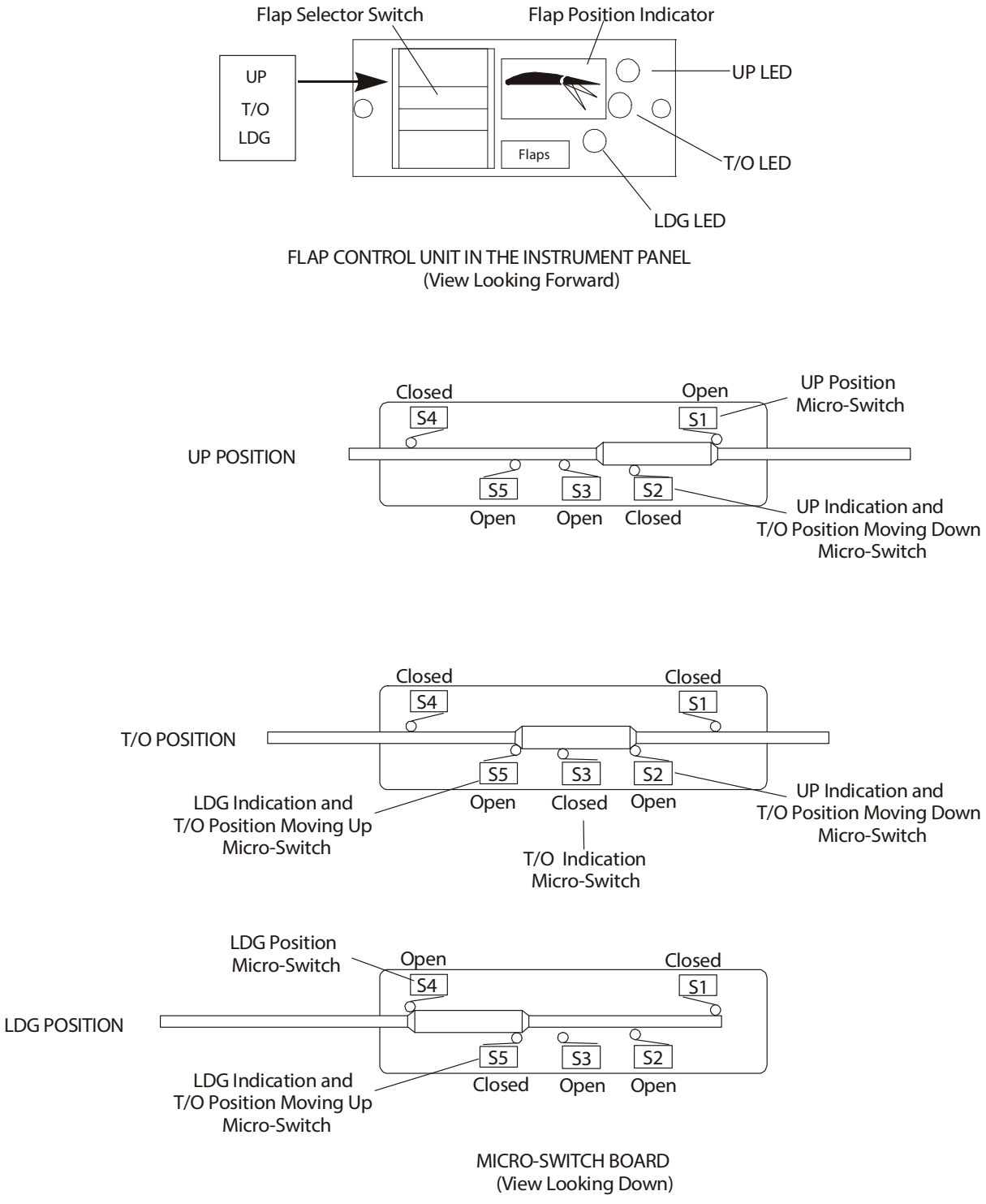

Figure 4: Flap Electrical Control System

TROUBLE-SHOOTING

1. General

The table below lists the defects you could have in the flap control system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Flaps do not operate.	Circuit breaker not set.	Set the flap circuit breaker.
	Airplane electrical system voltage low.	Do a test of the airplane electrical system voltage.
	Flap selector switch defective.	Replace the flap electronic control unit.
Flap circuit-breaker will not stay closed.	Short to ground in the wires to the electrical control unit or the micro-switches.	Do an insulation test between each wire and ground. Repair or replace defective wires.
	Short to ground in the electrical control unit.	Replace the electrical control unit.
	Short to ground in a micro-switch.	Replace the micro-switch.
	Short to ground in a wire between a closed micro-switch and the control unit.	Do an insulation test between each wire and ground. Repair or replace defective wires.
Flap circuit-breaker opens when flap selector switch moved to any down position.	Short to ground in a motor supply wire.	Do an insulation test between each wire and ground. Repair or replace defective wires.
Flap circuit-breaker opens when flap selector switch moved to any up position	Short to ground in a motor supply wire.	Do an insulation test between each wire and ground. Repair or replace defective wires.
Flap circuit-breaker opens when the flaps stop at the chosen position.	Short to ground in the wires to the electrical control unit from the related indication micro-switch.	Do an insulation test between each wire and ground. Repair or replace defective wires.
Flap circuit-breaker opens when the flaps have moved only a short distance from the UP setting.	Short to ground in the wires to the electrical control unit from micro-switch 1.	Do an insulation test between each wire and ground. Repair or replace defective wires.

Trouble	Possible Cause	Repair
Flap circuit-breaker opens when the flaps have moved only a short distance from the LDG setting.	Short to ground in the wires to the electrical control unit from micro-switch 4.	Do an insulation test between each wire and ground. Repair or replace defective wires.
Flaps move slowly.	Airplane electrical system voltage low.	Do a test of the airplane electrical system voltage.
	Flap motor defective.	Do a test for 14 V at the motor with flaps selected. If there is 14 V at the motor, replace the actuator.
	Flap actuator defective.	Examine the actuator. If you find damage, then replace the flap actuator.
Flaps do no not align with the wing trailing edge.	Flaps extended at too high an airspeed.	Examine the flap system. Replace damaged parts.
		Adjust the system.
Flaps will not move to LDG position. Flaps move to T/O and UP correctly.	Micro-switch 4 defective.	Replace the micro-switch.
	Open circuit in the micro-switch 4 wiring.	Do a continuity test of the wiring. Repair or replace the defective wire.
Flaps will not move to UP position. Flaps move to T/O and LDG correctly.	Micro-switch 1 defective.	Replace the micro-switch.
	Open circuit in the micro-switch 1 wiring.	Do a continuity test of the wiring. Repair or replace the defective wire.
No LDG indication when the flaps are in the LDG position. Flaps will not move from LDG to T/O. Flaps move from LDG to UP correctly.	Micro-switch 5 defective.	Replace the micro-switch.
	Open circuit in the micro-switch 5 wiring.	Do a continuity test of the wiring. Repair or replace the defective wire.
No UP indication when the flaps are in the UP position. Flaps will not move from UP to T/O. Flaps move from UP to LDG correctly.	Micro-switch 2 defective.	Replace the micro-switch.
	Open circuit in the micro-switch 2 wiring.	Do a continuity test of the wiring. Repair or replace the defective wire.

Trouble	Possible Cause	Repair
No T/O indication when the flaps are in the T/O position. Flaps move to all positions correctly.	Micro-switch 3 defective. Open circuit in the micro-switch 3 wiring.	Replace the micro-switch. Do a continuity test of the wiring. Repair or replace the defective wire.
Flap circuit-breaker opens at the end of down movement.	Micro-switch 4 defective.	Replace the micro-switch.
Flap circuit-breaker opens at the end of up movement.	Micro-switch 1 defective.	Replace the micro-switch.
LDG LED stays on when the flaps are not in the LDG position. The other indications operate correctly.	Micro-switch 5 defective.	Replace the micro-switch.
UP LED stays on when the flaps are not in the UP position. The other indications operate correctly.	Micro-switch 2 defective.	Replace the micro-switch.
T/O LED stays on when the flaps are not in the T/O position. The other indications operate correctly.	Micro-switch 3 defective.	Replace the micro-switch.
Flaps move to LDG when T/O set from UP.	Micro-switch 2 defective.	Replace the micro-switch.
Flaps move to UP when T/O set from LDG.	Micro-switch 5 defective.	Replace the micro-switch.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to remove and install the components of the flap control system. They also tell you how to test and adjust the system.

See Section 57-50 for data about removing and installing the flaps..

WARNING: **WHEN YOU DO WORK ON THE AIRPLANE CONTROLS, YOU MUST MAKE SURE THE AREA AROUND THE CONTROLS/CONTROL SURFACES ARE CLEAR OF PERSONNEL AND EQUIPMENT. IF YOU DO NOT DO THIS, INJURY TO PERSONNEL AND DAMAGE TO CONTROL SURFACES CAN OCCUR.**

WARNING: **WHEN YOU COMPLETE WORK ON THE CONTROLS, MAKE SURE THAT YOU REMOVE ALL LOOSE ITEMS OR TOOLS FROM THAT AREA. LOOSE ITEMS OR TOOLS CAN PREVENT FULL MOVEMENT OF THE AIRPLANE CONTROLS. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.**

2. Remove/Install the Flap Actuator

Refer to Figures 1 and 3 in the Description and Operation Pageblock 27-50-00.

A. Remove the Flap Actuator

	Detail Steps/Work Items	Key Items/References
(1)	If possible, set the flaps to the T/O position.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Remove the passenger seat.	Refer to Section 25-10.
(4)	Disconnect the electrical supply connector to the flap motor.	
(5)	Disconnect the control harness plug from the switch-board.	
(6)	Remove the bolt which attaches the actuator push-rod to the idler lever.	At the rear main bulkhead. Hold the flaps.
(7)	Lower the flaps by hand until they reach the stop.	
(8)	Remove the bolt which attaches the actuator body to the mounting bracket.	At the left rear closing rib.
(9)	Remove the actuator from the airplane.	

B. Install the Flap Actuator

	Detail Steps/Work Items	Key Items/References
(1)	Put the flap actuator in position in the fuselage.	
(2)	Install the bolt which attaches the actuator body to the mounting bracket.	At the left rear closing rib. Make sure that the bush is in position in the actuator swivel block. Torque: 6.4 Nm (4.7 lbf.ft.).
(3)	Install the bolt which attaches the actuator pushrod to the idle lever.	At the rear main bulkhead. Hold the flaps. Torque: 6.4 Nm (4.7 lbf.ft.).
(4)	Connect the control harness plug for the switch-board.	
(5)	Connect the electrical supply connector to the flap motor.	
(6)	Connect the airplane main battery.	Refer to Section 24-31.
(7)	Do the adjustment procedure.	See Paragraph 4 in this pageblock.
(8)	Do an inspection of all the controls that you have connected. - If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(9)	Install the passenger seat.	Refer to Section 25-10.

3. Test the Flap Control System

A. Equipment

Item	Quantity	Part Number
Inclinometer.	1	Commercial
Flap/Aileron deflection gauge.	1	DA4-5750-00-00-PL
Spring balance.	1	Commercial

B. Test the Flap Control System - Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Make a copy of the Control Surfaces Adjustment Report.	Refer to Section 06-00. Use it to record the measurements.
(2)	Make sure that the flaps are fully UP: - Set the ELECTRIC MASTER key switch to ON. - Set the flaps to T/O. - When the flaps stop moving, set the flaps to UP. - When the flaps stop moving, set the ELECTRIC MASTER key switch to OFF.	
(3)	Do a test for the correct pre-load in the flap UP position: - Put a loop of adhesive tape on the trailing edge of the left flap opposite the up-stop. - Pull down on the loop of tape with the spring balance until the flap just moves from the upstop. - Record the value in the Control Surfaces Adjustment Report.	The value must be as shown in the Control Surfaces Adjustment Report.
(4)	If the pre-load is not correct, adjust the control rod between the bellcrank in the wing and the flap horn. Do steps 3 and 4 again as necessary.	Refer to Section 27-00.
(5)	Do steps 3 and 4 for the right flap.	

	Detail Steps/Work Items	Key Items/References
(6)	Zero the inclinometer to the left flap: - Put the inclinometer on the left flap close to the flap horn. - Zero the inclinometer. - Remove the inclinometer.	
(7)	Set the flaps to T/O: - Set the ELECTRIC MASTER key switch to ON. - Set the flaps to T/O. - When the flaps stop moving, set the ELECTRIC MASTER key switch to OFF.	
(8)	Measure the angle of the left flap. - Record the value in the Control Surfaces Adjustment Report.	Use the inclinometer or flap deflection gauge. The value must be as shown in the Control Surfaces Adjustment Report.
(9)	Do step 8 for the right flap.	
(10)	Set the flaps to LDG: - Set the ELECTRIC MASTER key switch to ON. - Set the flaps to LDG. - When the flaps stop moving, set the ELECTRIC MASTER key switch to OFF.	
(11)	Measure the angle of the left flap. - Record the value in the Control Surfaces Adjustment Report.	Use the inclinometer or flap deflection gauge. The value must be as shown in the Control Surfaces Adjustment Report.
(12)	Do step 11 for the right flap.	
(13)	Set the flaps to UP.	

4. Adjust the Flap Control System

If you cannot get the correct range of movement of the flap control system, use this procedure to adjust the system.

A. Equipment

Item	Quantity	Part Number
Inclinometer.	1	Commercial
Flap/Aileron deflection gauge.	1	DA4-5750-00-00-PL
Rigging pins.	3	--

B. Adjust the Flap Control System - Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Make a copy of the Control Surfaces Adjustment Report.	Refer to Section 06-00. Use it to record the measurements.
(2)	Remove these items for access: - The passenger seat. - The flap bellcrank access panels.	 Refer to Section 25-10. Refer to Section 53-40.
(3)	Disconnect the airplane main battery.	Refer to Section 24-31.
(4)	Remove the bolt, spacer, washer and nut which attach the actuator push-rod to the idler lever.	At the rear main bulkhead. Hold the flaps.
(5)	Put a rigging pin in the idler lever.	At the rear main bulkhead. Refer to Figure 3 in the Description and Operation Pageblock 27-50-00.
(6)	Put rigging pins in the left and right flap bellcranks in the wings. If necessary, adjust the push-rods between the idler lever and the bellcranks.	Refer to Section 27-00.
(7)	Remove the rigging pins from these items: - The idler lever. - The left and right flap bellcranks in the wings.	
(8)	Connect the airplane main battery.	Refer to Section 24-31.

	Detail Steps/Work Items	Key Items/References
(9)	Hold the flaps hard against the up-stops.	
(10)	Make sure that both flaps hit the up stops at the same time. If necessary, adjust the rod between the bellcrank in the wing and the flap.	Refer to Section 27-00.
	WARNING: DO NOT TOUCH THE ACTUATOR WHEN YOU OPERATE IT. THE MOVING PARTS CAN CAUSE INJURY.	
(11)	Set the actuator to the T/O position: - Hold the actuator clear of the structure. - Set the ELECTRIC MASTER key switch to ON. - Set the FLAP switch to T/O. - When the actuator stops moving, set the flap switch to UP. - When the actuator stops moving, set the ELECTRIC MASTER key switch to OFF.	Use a piece of string through the eye end.
(12)	Measure the extension of the actuator push-rod.	The distance between the center of the eye-end of the actuator rod and the center of the actuator swivel block mounting must be 379.7 mm (14.87 in.).
(13)	If the actuator push-rod extension is not correct, adjust the cam rod: - Loosen the nuts which attach the cam rod to the plate at the eye end. - Turn the nuts to move the cam rod. - Tighten the nuts.	Refer to Figure 3 in the Description and Operation Pageblock 27-50-00. One turn clockwise decreases the extension by 1 mm (0.04 in.). Torque: 6.4 Nm (4.7 lbf.ft.).
(14)	Do steps 12 and 13 as necessary to get the correct extension.	

	Detail Steps/Work Items	Key Items/References
(15)	Connect the flap actuator: - Hold the flaps hard against the up-stops. - If necessary, adjust the eye-end to align with the idler lever: - Loosen the jam-nut. - Turn the eye-end to align with the idler lever. - Tighten the jam-nut. - Install the bolt, spacer, washer and nut which attach the eye-end to the idler lever.	 Torque: 16 Nm (11.8 lbf.ft.). Torque: 6.4 Nm (4.7 lbf.ft.).
(16)	Do a test for the correct pre-load in the flap UP position: - Put a loop of adhesive tape on the trailing edge of the left flap opposite the up-stop. - Pull down on the loop of tape with the spring balance until the flap just moves from the up-stop. - Record the value in the Control Surfaces Adjustment Report.	 The value must be as shown in the Control Surfaces Adjustment Report.
(17)	If the pre-load is not correct, adjust the control rod between the bellcrank in the wing and the flap horn. Do steps 16 and 17 again as necessary.	Refer to Section 27-00.
(18)	Do steps 16 and 17 for the right flap.	
(19)	Do a test of the flap system.	See Paragraph 3 in this pageblock.
(20)	Do an inspection of all the controls that you have adjusted. - If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(21)	Install these items: - The passenger seat. - The flap bellcrank access panels.	 Refer to Section 25-10. Refer to Section 53-40.

5. Flap Push-Rod Access

Flap Push-Rod	Remove/Install Access	References
Between the idler lever at the rear main bulkhead and the wing root rib.	Passenger seat. Center section access panels.	Refer to Section 25-10. Refer to Section 52-40.
Between the wing root rib and the bellcrank in the left/right wing.	Center section access panels. Flap bellcrank access panels under each wing.	Refer to Section 52-40.
Between the bellcrank in the left/right wing and the flap.	Flap bellcrank access panels under each wing.	Refer to Section 52-40.

6. Flap Bellcrank and Lever Access

Flap Bellcrank/Lever	Remove/Install Access	References
Idler lever at the rear main bulkhead.	Passenger seat.	Refer to Section 25-10.
Bellcrank in the wing.	Flap bellcrank access panels under each wing.	Refer to Section 52-40.

7. Overspeed Flap Extension

If the flaps are extended above V_{FE} or are left extended above V_{FE} an inspection of the flap system, including the idler lever, must be completed.

	Detail Steps/Work Items	Key Items/References
(1)	Inspect the web at the trailing edge of the wing where the flap is attached. Pay special attention for cracks and delamination.	
(2)	Inspect the flaps, flap attachment brackets/hinges/ horns and flap control rods for any signs of damage.	Refer to Paragraphs 5 and 6 for information regarding access to components. Pay special attention to the hinges and brackets.
(3)	Inspect the idler lever and bellcranks for signs of damage using a bright flashlight and a mirror.	Pay special attention to the welds and to the composite where the idler lever and bellcranks attach.
(4)	If damage is suspected in the idler lever or the bellcranks: - Remove the suspect component. - If cracks are suspected, perform a fluorescent dye penetrant inspection in accordance with ASTM 1417 or equivalent method. - Repeat this inspection every 3000 hours.	A person appropriately certified in NDT shall carry out this inspection.
(5)	If there are signs of damage or cracks, the affected components shall be replaced.	

CHAPTER 28
FUEL SYSTEM

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FUEL SYSTEM

1. General

This Chapter describes the DA 40 NG airplane fuel system. It does not include the fuel system for the engine. For more data on the engine fuel system refer to the AE Operation Manual, latest revision.

The DA 40 NG has a fuel tank in each wing. Two different tank versions are provided. The total usable fuel capacity of the fuel system is 28 US gal (106 liter) in case of the standard tank and 39 US gal (148 liter) in case of the long range tank. One engine-mounted pump and one electrically driven fuel pump (a second parallel electric fuel pump is installed) supply fuel to the engine. A fuel filter provides protection to sensitive components. An electric transfer pump moves fuel from the right wing fuel tank (aux) to the left wing fuel tank (main) as necessary.

The pilot controls the fuel transfer system with a switch which activates the electrically driven fuel transfer pump. A fuel valve provides a backup system for fuel transfer and emergency operation. A fuel quantity indicator shows the quantity of fuel in the fuel tanks. Refer to these Sections for more data on these systems:

- Section 28-10. Fuel storage.
- Section 28-20. Fuel distribution.
- Section 28-40. Fuel quantity indication.
- Section 73-00. Engine fuel system.

NOTE: Equipment which is certified for installation in the DA 40 NG is listed in Chapter 6 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Chapter 6 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

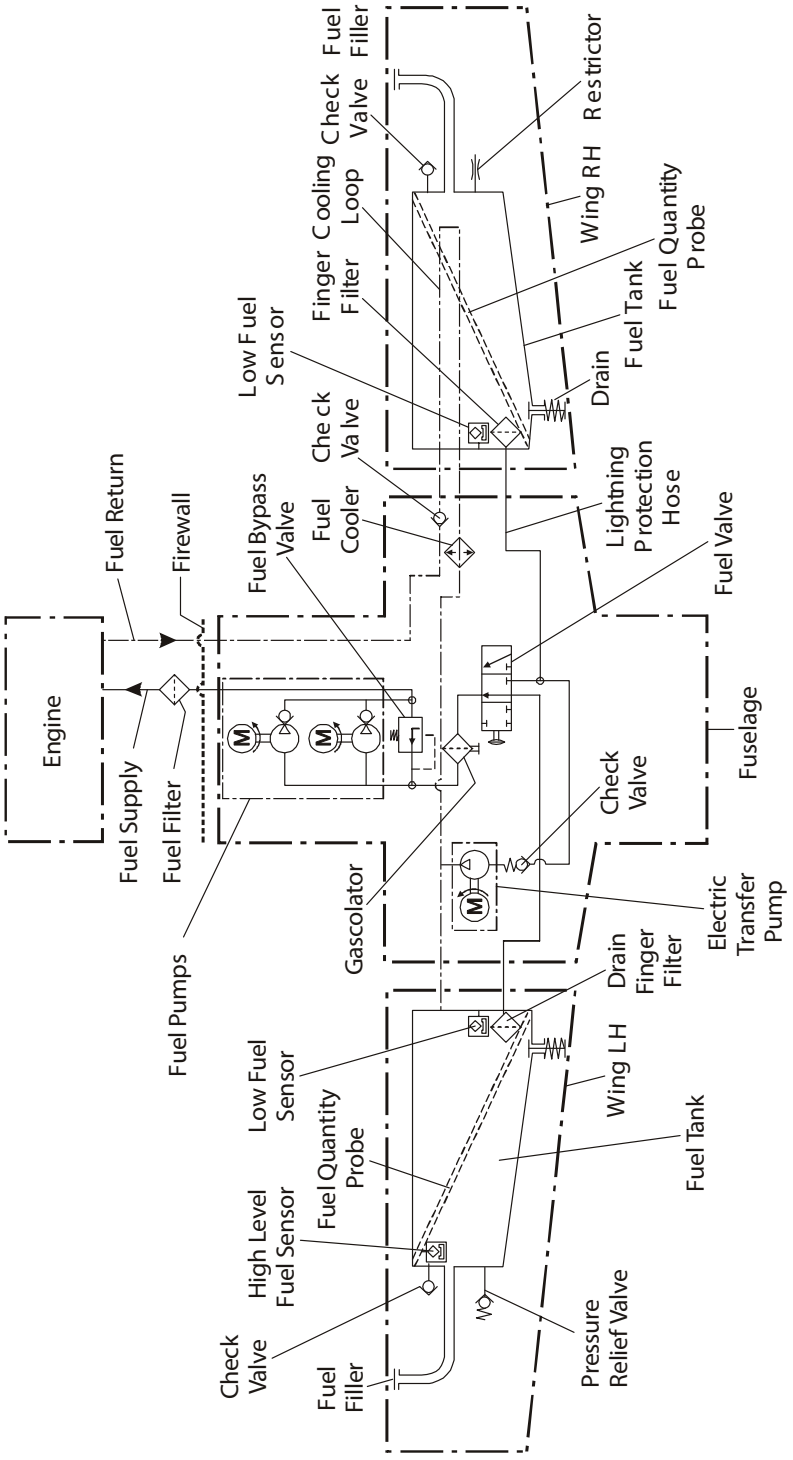

Figure 1 : Fuel System Schematic Drawing (Standard Tank Configuration)

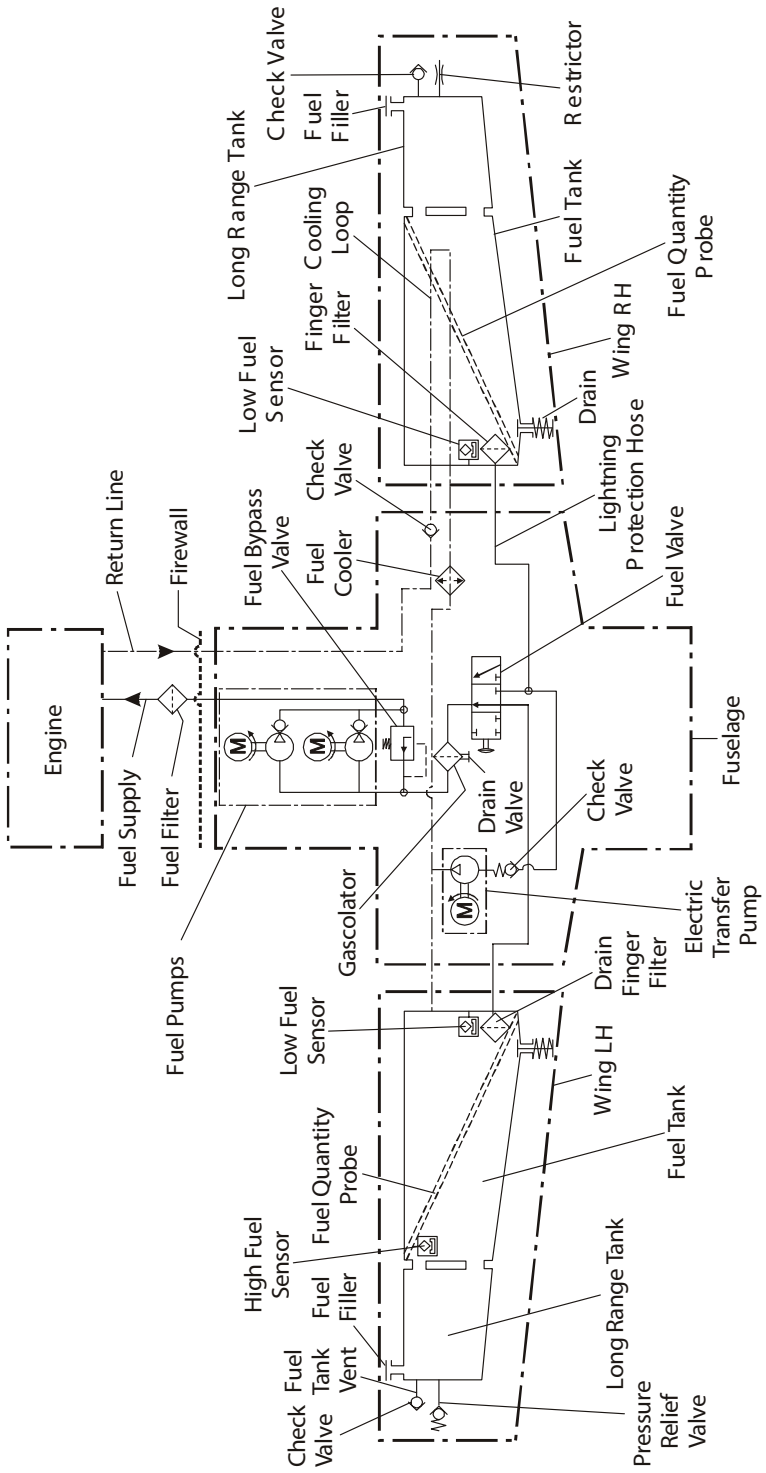

Figure 2 : Fuel System Schematic Drawing (Long Range Tank Configuration)

2. Description

A. Standard Tank Configuration

Figure 1 shows the fuel system schematic of the DA 40 NG (standard tank configuration).

A tank located inboard in each wing holds the fuel. Each tank has a fuel filler assembly and a vent connection at the outboard end. Small diameter flexible hoses connect the top outer corners of the tank to the top of the fuel filler just below the cap. Two short hoses connect to the fuel filler. One is a bleed type check valve. The other is a capillar (RH tank) or a relief valve (LH tank). Each wing tank has an usable fuel capacity of 14.0 US gal (53 liter).

Each tank has a fuel drain and a finger-filter at the connection to the fuel feed line. The fuel feed outlet of the right tank connects to the fuel valve and the transfer pump. The outlet from the transfer pump connects to the fuel return line of the left tank.

Fuel level sensors and fuel quantity probes are installed in both fuel tanks. The right tank has a transfer pump shut-off switch (low fuel sensor) located at the bottom inner corner. The left tank has a transfer pump shut-off switch (high fuel sensor) located at the top outer corner. The left tank also has a switch for the LOW FUEL (if G1000 is installed) or FUEL LOW (if White Wire annunciator panel is installed) caution light (low fuel sensor) located at the bottom inner corner.

The fuel quantity probes go from the bottom inner corner of each tank to the top outer corner. The fuel level changes the probe electrical properties. The fuel quantity system measures the probe capacitance. It uses the value as an analogue of fuel quantity. The value for each tank is shown on the MFD of the G1000 or on the SED.

A fuel temperature sensor is installed in each fuel tank. The LH and RH fuel temperatures are indicated on the MFD of the G1000 or on the SED.

To cool down the hot return fuel a fuel cooler is installed in the return line from the right tank to the left tank direct at the right tank.

Flexible hoses connect the fuel tanks in the wings to the fuel valve and electrically driven fuel pumps in the center fuselage. A gascolator attaches to the fuel valve. The gascolator has a filter and a fuel drain valve. A flexible hose connects the gascolator to the electrically driven fuel pumps. A fuel line with a bypass valve is installed at the electrically driven fuel pumps to keep the fuel pressure constant at the high pressure fuel pump inlet.

One engine-mounted high pressure pump supplies the fuel to the engine fuel injection system. A return line from the engine connects to the right wing tank. A loop of pipe inside the right tank functions as a heat exchanger to cool the return fuel. A flexible hose connects the outlet of the loop via a fuel cooler to the left tank.

B. Long Range Tank Configuration (if OÄM 40-130 is installed)

Figure 2 shows the fuel system schematic of the DA 40 NG (long range tank configuration).

The airplane has two fuel tanks. Each tank is made of two fuel chambers: the inboard fuel chamber and the outboard fuel chamber. Both fuel chambers are interconnected. The fuel chambers are made of aluminum. Baffles in the tank prevent the fuel from moving quickly from one end of the chamber to the other during flight.

Each wing tank has an usable capacity of 19.5 US gal (74 liter).

The tanks have supports welded in the inboard face for the fuel quantity probe, the low fuel sensor, and the fuel temperature sensor.

A finger filter at the tank outlet prevents debris from entering the fuel system. A drain valve is located in the lower surface of the tank. You can use the drain valve to defuel the fuel tank and for doing fuel contamination tests.

The outer face of the inboard fuel tank chamber is connected to the inner face of the outboard fuel tank chamber. The fuel filler opening is integrated into the outboard fuel tank chamber. A smaller adapter on the left tank inboard fuel chamber holds a high fuel sensor.

There are also two small adapters at the top of the outer face of the outboard fuel tank chamber for vent hoses.

On the left side one vent hose includes a pressure relief vent to protect the tank against high pressure due to overfilling during the fuel transfer. The other hose includes a check valve to let the air enter the tank.

On the right side one hose includes the check valve and one hose includes a capillary.

The right tank has two adapters which connect to a pipe loop inside the tank. This is the cooling loop.

A fuel quantity probe attaches to the inboard end of each fuel tank. Refer to Section 28-40 for more data on the fuel quantity indication system.

Two ribs hold each fuel tank chamber in position. Padded rubber strips go between the fuel tank chamber and each rib. The filler cap is attached to the upper skin of the wing with eight screws. It holds the tank assembly in position in spanwise direction.

3. Operation

A. Normal Operation

Fuel flows through the finger filter of the left tank to the fuel valve. From the valve it flows through the gascolator. The gascolator functions also as a water separator. From there the fuel flows to the electrically driven fuel pumps and fuel filter to the engine.

The fuel pumps always supply more fuel than the fuel injection system can use. The residual fuel flows back though the cooling loop in the right fuel tank. Heat transfers from the return fuel to the cold fuel in the right tank. The return fuel flows from the cooling loop to the left tank via an additional fuel cooler.

This process keeps the fuel warm in both tanks when the airplane operates in cold conditions.

As the engine uses fuel, the fuel level in the left tank decreases. A vent system allows to equalize tank and outside pressure. This prevents the tank pressure from decreasing to less than atmospheric pressure, and allows the fuel pumps to continue to take fuel from the tank.

B. Fuel Transfer

As the engine uses fuel, the fuel level in the left tank decreases. The fuel level in the right tank does not change. To balance the tank contents, the electric transfer pump moves fuel from the right tank to the left tank. It is operated through a switch (marked FUEL XFER **<** or FUEL TRANS **<**) on the left of the instrument panel.

The high fuel sensor in the left tank outer top corner automatically switches off the fuel transfer pump when the fuel level is high in the left tank. The low fuel sensor in the right tank inner bottom corner automatically switches off the fuel transfer pump when the fuel level is low in the right tank.

C. Emergency Operation

In an emergency (for example, the transfer pump fails) you can set the fuel valve to connect the right tank transfer line to the fuel supply line. This is the EMERGENCY setting. The engine takes fuel from the right tank. However, the return fuel still flows through the cooling loop to the left tank. As fuel is used from the right tank, the level of fuel in the left tank will increase.

D. Shut-Off Valve Function

During the usual operation, the shut-off function of the fuel valve is used only to isolate the fuel system when the engine is not operating. In an emergency, the shut-off valve function is used to stop all fuel flow to the engine.

E. Refueling

Add fuel to the system through the fuel fillers on top of each wing. Fuel flows down the large filler tube to the related tank. Air in the tank can escape back past the fuel. As the tank becomes full, the air can also escape through the hoses between the tank and the fuel filler.

F. Fuel Drains

You can use the fuel drain valve in each tank and the drain valve in the gascolator (pull to drain) to defuel the airplane. Also use it to drain a small quantity of fuel to test for water or other contamination. Push the bottom part of the valve at the fuel tanks up to release fuel. A spring inside the valve closes it automatically. The gascolator drain has to be pulled down to release fuel.

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FUEL STORAGE SYSTEM

1. General

A. Standard Tank Configuration

This Section describes the following components of the fuel storage system for the DA 40 NG airplane:

- Fuel tanks.
- Fuel filler assembly.
- Fuel tank vents.

Refer to Section 28-00 for a general description of the fuel system and a schematic of the fuel system.

B. Long Range Tank Configuration (if OÄM 40-130 is installed)

This Section describes the following components of the long range tank fuel storage system for the DA 40 NG airplane:

- Inboard fuel tank chamber.
- Outboard fuel tank chamber.
- Fuel tank vents.

Refer to Section 28-00 for a general description of the long range tank fuel system and a schematic of the long range tank fuel system.

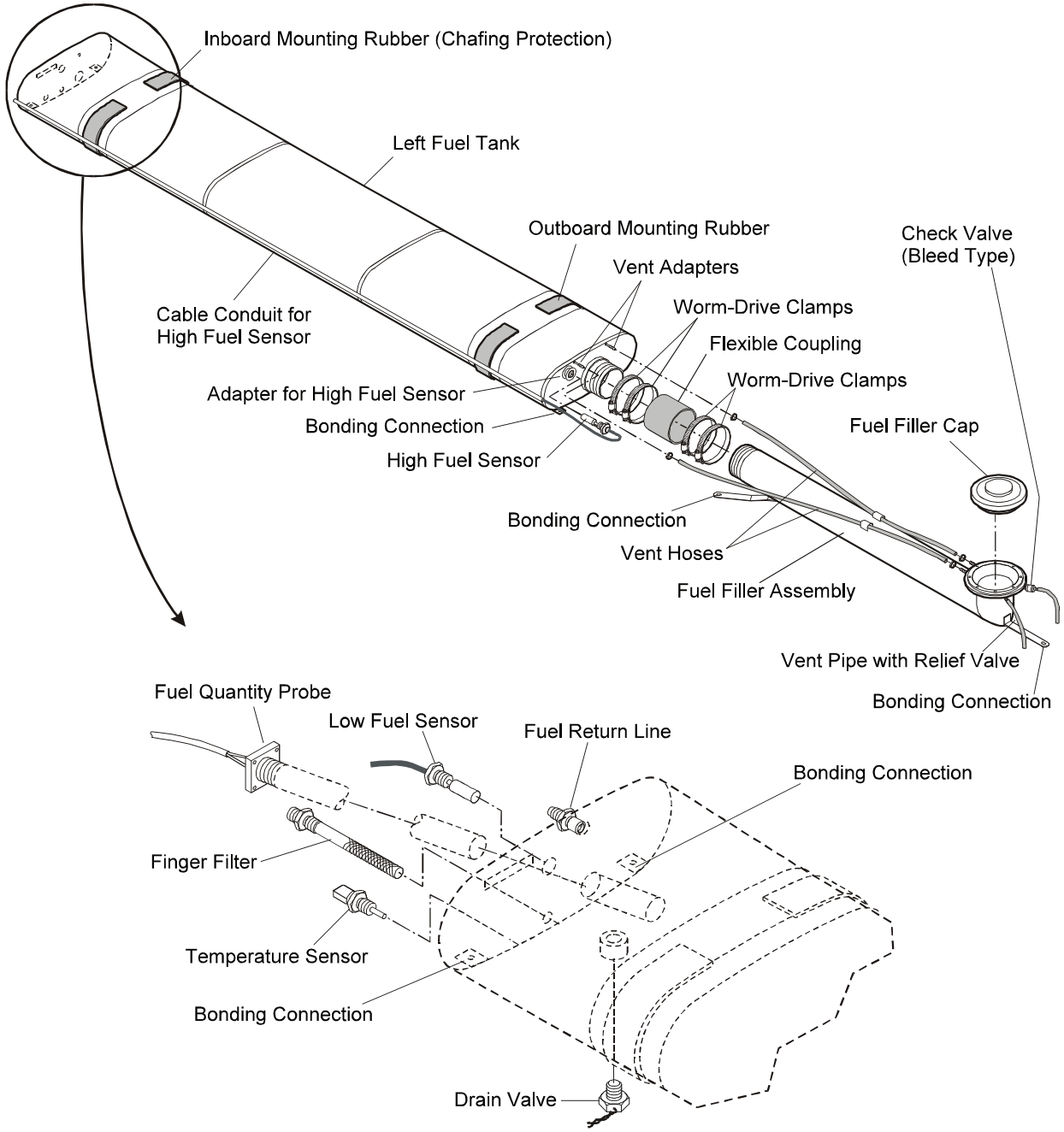

Figure 1 : Left Hand Standard Fuel Tank Installation

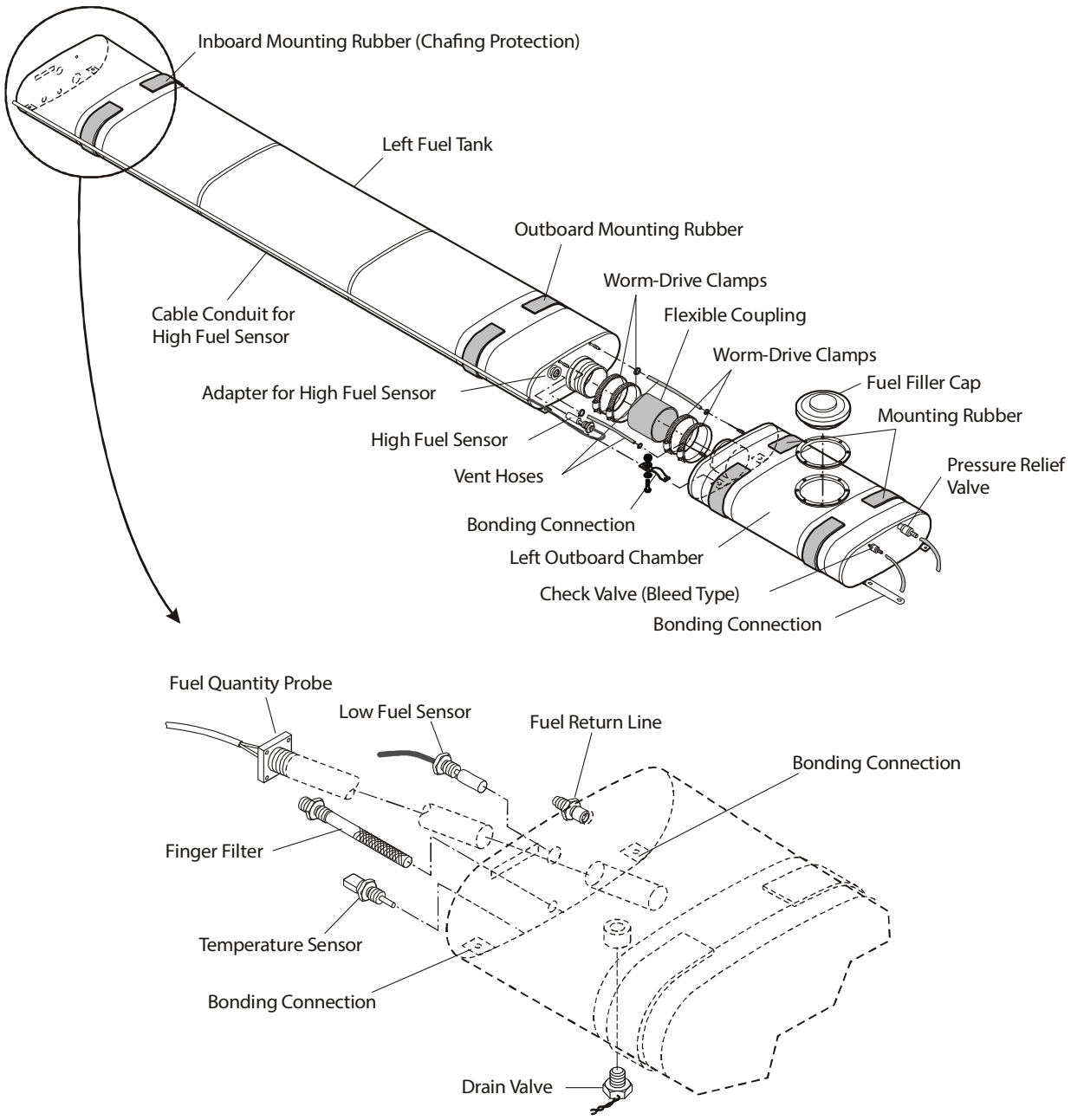

Figure 2 : Left Hand Long Range Tank Installation (if OÄM 40-130 is installed)

2. Fuel Tank Description

A. Standard Tank Description

The airplane has two fuel tanks. Each tank has a usable capacity of 14 US gal (53 liter). The tanks are located in the inner part of each wing. Figure 1 shows the left fuel tank assembly. Figure 3 shows the right fuel tank assembly.

Each tank is a welded aluminum structure. Baffles in the tank prevent the fuel from moving quickly from one end of the tank to the other during flight. The tank has supports welded in the inboard face for the fuel quantity probe, the low fuel sensor, and the fuel temperature sensor. Other welded installations provide connection points for hoses.

A finger filter at the tank outlet prevents debris from entering the fuel system. A drain valve is located in the lower surface of the tank. You can use the drain valve to defuel the fuel tank and for doing fuel contamination tests.

The outer face of the tank has a large adapter for the fuel filler assembly. A smaller adapter on the left tank holds a high fuel sensor. There are also two small adapters at the top of the outer face for vent hoses.

The right tank has two adapters which connect to a pipe loop inside the tank. This is the cooling loop.

A fuel quantity probe attaches to the inboard end of each fuel tank. Refer to Section 28-40 for more data on the fuel quantity indication system.

Two ribs hold each fuel tank assembly in position. Padded rubber strips go between the tank and each rib. The filler cap is attached to the upper skin of the wing with eight screws. It holds the tank assembly in position in spanwise direction.

B. Long Range Tank Description (if OÄM 40-130 is installed)

The airplane has two long range fuel tanks. Each tank has a usable capacity of 19.5 US gal (74 liter). Each wing tank consists of two tank chambers. Figure 2 shows the left long range tank assembly and Figure 4 shows the right long range tank assembly.

Each tank chamber is a welded aluminum structure. Baffles in the chamber prevent the fuel from moving quickly from one end of the tank to the other during flight. The inboard fuel tank chamber has supports welded in the inboard face for the fuel quantity probe, the low fuel sensor, and the fuel temperature sensor. Other welded installations provide connection points for hoses.

A finger filter at the tank outlet prevents debris from entering the fuel system. A drain valve is located in the lower surface of the tank. You can use the drain valve to defuel the fuel tank and for doing fuel contamination tests.

The outer face of the inboard fuel tank chamber has a large adapter for the outboard fuel tank chamber. A smaller adapter on the left tank holds a high fuel sensor. There are also two small adapters at the top of the outer face for vent hoses.

The right tank has two adapters which connect to a pipe loop inside the tank. This is the cooling loop.

A fuel quantity probe attaches to the inboard end of each fuel tank. Refer to Section 28-40 for more data on the fuel quantity indication system.

Two ribs hold each fuel tank chamber in position. Padded rubber strips go between the fuel tank chamber and each rib. The filler cap is attached to the upper skin of the wing with eight screws. It holds the tank assembly in position in spanwise direction.

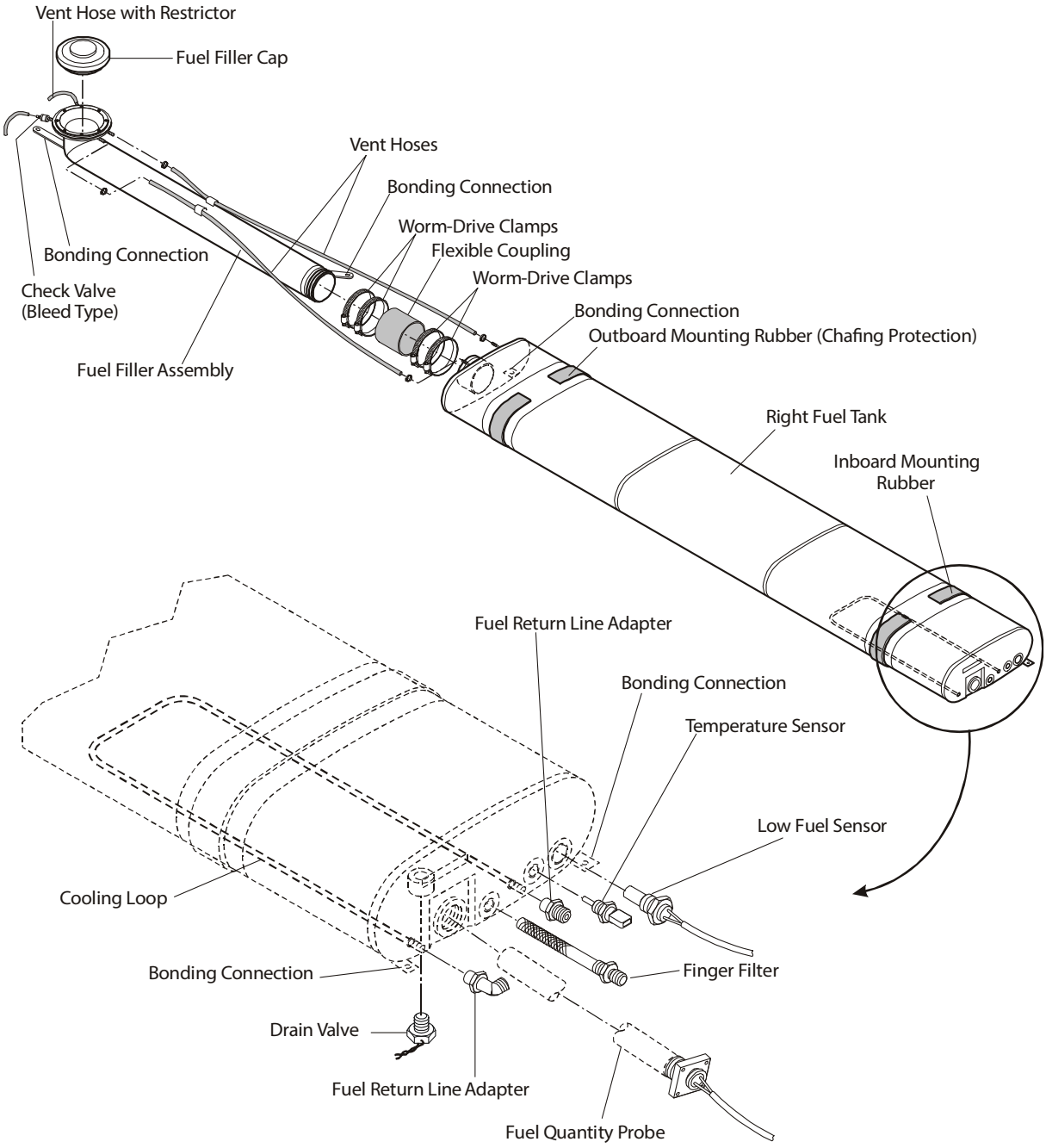

Figure 3 : Right Hand Standard Fuel Tank Installation

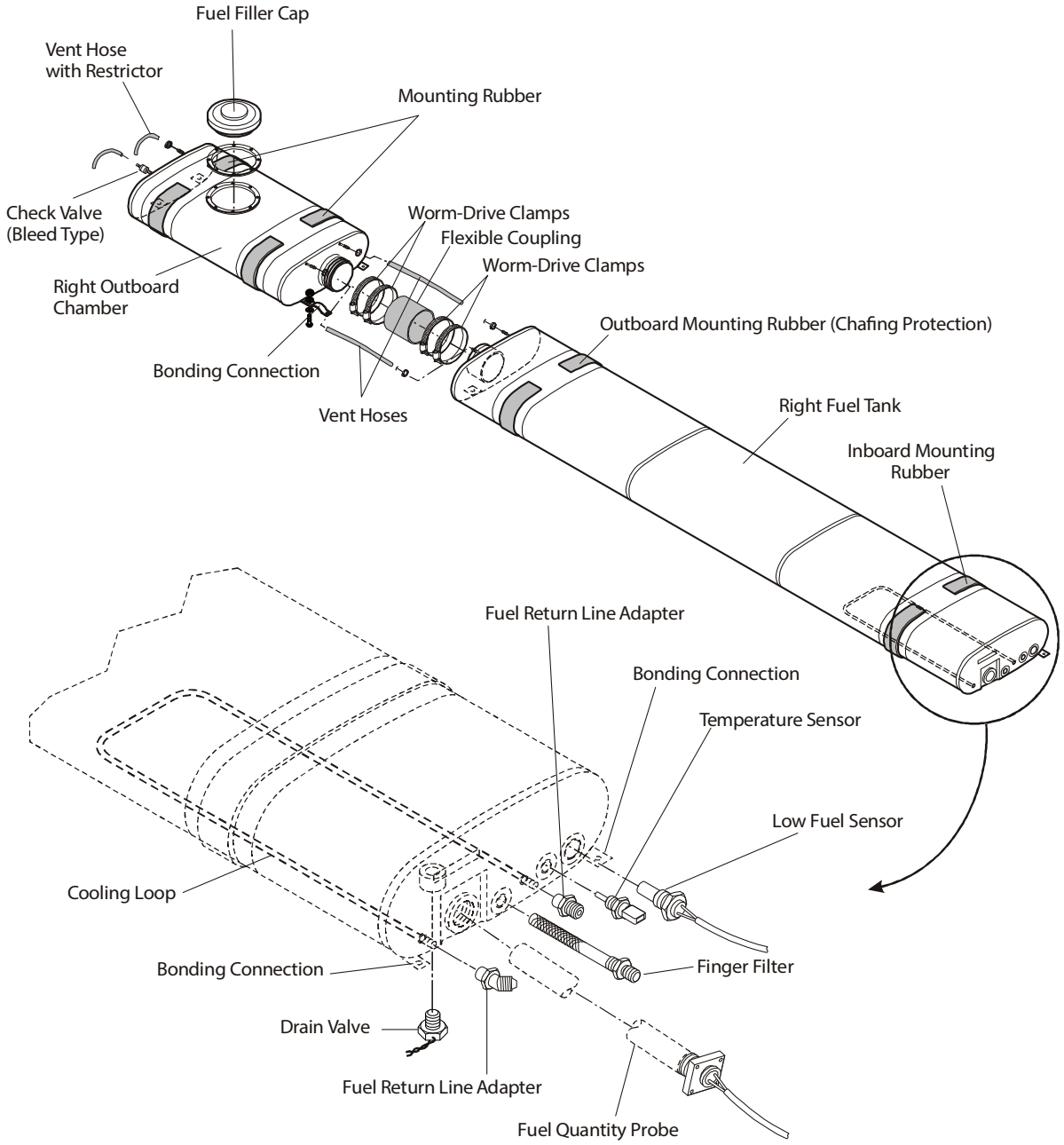

Figure 4 : Right Hand Long Range Tank Installation (if OÄM 40-130 is installed)

3. Fuel Filler Assembly

Figures 1 and 3 also show the fuel filler assembly. It is a welded tubular aluminum component, approximately 75 mm (3 in) in diameter. The outboard end has a flange that attaches to the top skin of the wing. It also has slots that engage the fuel filler cap.

The filler cap has a locking lever. You pull the locking lever up and turn the filler cap counterclockwise to release it. You turn the cap clockwise to install it and push down the locking lever to lock it. The area just below the flange has four adapters for the vent system hoses.

NOTE: If the filler cap operates too easily, then fuel can leak out. Leaking fuel can cause the paint finish to become yellow.

A short flexible coupling attaches the fuel filler assembly to the outer face of the fuel tank. Two worm drive clamps at each end hold the flexible coupling to the tank and the fuel filler assembly. Two small diameter flexible hoses connect the vent adapters at the top of the tank to the two inboard adapters on the fuel filler flange.

A bleed type check valve is screwed into one of the two outer adapters on the filler flange. A short flexible hose connects the bleed type check valve to an adapter in the outer fuel tank access panel at the bottom surface of the wing.

A second short flexible hose connects to the other outer adapter on the fuel filler flange. It has a restrictor (right wing) or relief valve (left wing) in it. It connects to an adapter in the outer fuel tank access panel at the bottom surface of the wing.

Bonding strips connect the tank to the fuel filler assembly and the airplane bonding system.

For the long range tank installation the fuel filler assembly function is identical to the standard tank. The two vent lines connect in the long range tank configuration directly to the outer fuel tank chamber and the filler assembly is integral part of the outer fuel tank chamber. See Figure 2 and Figure 4.

TROUBLE-SHOOTING

1. General

The table below lists the possible defects you could have in the fuel storage system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Filler cap leaking.	Filler cap gasket damaged. Filler cap does not have a tight fit.	Replace filler cap gasket. Tighten the nut on lower side of the cap.
Fuel drain valve leaking.	Drain valve damaged. Contamination in drain valve.	Replace the fuel drain valve. Open and close drain valve. Do this until the drain seals. If the drain does not seal then replace the drain valve.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices describe how to remove/install the fuel tanks. Obey the safety precautions for fuel at all times.

WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE.

WARNING: DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

WARNING: DO NOT BREATH FUEL VAPOR. FUEL VAPOR CAN MAKE YOU ILL.

2. Remove/Disassemble the Fuel Tank Assembly

A. Remove the Fuel Tank Assembly.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the fuel tank that you will remove is empty.	Defuel and drain the fuel tank.
(2)	Remove the wing which has the fuel tank that you will remove and support the wing on trestles.	Refer to Section 57-10.
(3)	Remove the access panels from the wing: - Remove the access panel from the root rib: - Remove the 11 nuts and washers from the studs. - If access panel is made from aluminum remove bonding cable. - Pull the access panel from the studs and clear of the airplane. - Remove the access panel for the fuel drain valve.	Refer to Section 52-40.
(4)	Remove the fuel drain valve: - Cut the lock-wire. - Remove the drain valve from its mounting.	Refer to Figure 3 in the Description and Operation Pageblock, 28-10-00.

	Detail Steps/Work Items	Key Items/References
(5)	Disconnect the following electrical connectors: - Fuel quantity probe. - Low fuel sensor. - High fuel sensor (left wing only). - Fuel temperature sensor.	At the inboard end of the tank.
(6)	Release the bonding strip from the inboard end of the tank: - Remove the nut and washer from the bolt. - Remove the bonding strip from the bolt and move it clear of the tank. - Remove the bolt.	
(7)	Disconnect the two vent hoses from the adapters on the access panel: - Remove the access panel from the outer lower surface of the wing. - Remove the clamps that hold the vent hoses to the adapters on the access panel. - Disconnect the vent hoses from the adapters on the access panel.	Near the outboard end of the filler assembly. Refer to Section 52-40.
(8)	Disconnect the bonding connection at the outboard end of the fuel filler assembly.	Through the access panel in the wing bottom skin.
(9)	Release the fuel filler assembly: - Remove the fuel filler cap and disconnect the bonding cable. - Remove the eight screws which attach the filler flange. - Release the filler flange and the O-ring seal.	 Discard the O-ring seal.
(10)	Gently pull the tank and fuel filler assembly out of the wing through the wing inboard rib. Move the assembly clear of the wing and support it on a clean work bench.	Make sure that the tank does not catch on the wing ribs. Make sure that you do not damage the tanks.

B. Disassemble the Fuel Tank Assembly.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the fuel tank assembly from the wing.	Refer to Paragraph 2.A.
(2)	Remove the connecting link that attaches the tank to the fuel filler assembly: - Remove the two nuts and washers from the bolts. - Remove the link plate. - Remove the two bolts.	Refer to Figures 1 and 3 in the Description and Operation Pageblock, 28-10-00.
(3)	Remove the clips which attach the vent hoses to the tank.	
(4)	Remove the worm drive clamps that attach the flexible coupling to the tank.	
(5)	Pull the fuel filler assembly away from the tank until the vent hoses and flexible coupling disconnect from the tank.	
(6)	If necessary, remove the clips which attach the vent hoses to the fuel filler assembly and pull the hoses from the connectors.	
(7)	If necessary, remove the worm drive clamp which attaches the flexible coupling to the fuel filler assembly and pull the coupling from the fuel filler assembly connector.	

3. Assemble/Install the Fuel Tank Assembly

A. Preparation

	Detail Steps/Work Items	Key Items/References
(1)	Examine the fuel tank. Look specially for: - Damage to the aluminum skins and welded seams of the tank. - Corrosion. - Damage/wear to the rubber mounting bands at the outside of the tanks.	Use a strong light and a magnifying glass.
(2)	Examine the vent hoses which connect the tank and fuel filler assembly. Look specially for: - Cuts or damage, specially at the ends where the attaching clips locate. - Distortion or cracking.	
(3)	Examine the flexible coupling. Look specially for: - Cuts or damage, specially at the ends where the attaching clips are located. - Distortion or cracking.	
(4)	Examine the fuel filler flange. Look specially for: - Corrosion on the mating faces. - Cracking around the flange.	Use a strong light and a magnifying glass.
(5)	Examine the insides of the tank for cleanliness.	

B. Assemble the Tank

	Detail Steps/Work Items	Key Items/References
(1)	Install the flexible coupling: - Push the flexible coupling onto the connector of the fuel filler assembly. - Install the worm drive clamps onto the coupling and tighten the clamps.	Refer to Figure 3 in the Description and Operation Pageblock, 28-10-00. Make sure that the coupling is correctly positioned. Torque: 2.5 Nm (1.84 lbf.ft.).
(2)	Install the vent hoses onto the fuel filler assembly: - Push the hoses onto the connectors. - Install the attaching clips.	Make sure that the hose is correctly positioned.
(3)	Connect the tank to the fuel filler assembly: - Move the tank into position by the fuel filler assembly. Engage the tank vent connectors and the flexible coupling connector into their related hoses/ couplings on the fuel filler assembly. - Push the tank towards the fuel filler assembly until the vent hoses and the flexible coupling are correctly positioned on their related connectors. - Install the worm drive clamps that attach the flexible coupling to the tank connector. - Tighten the worm drive clamps. - Install the clips which attach the vent connecting hoses to the inboard tank connectors.	The surface of the filler flange must be parallel with the upper surface of the fuel tank. Torque: 6 Nm (4.43 lbf.ft.).
(4)	Install the connecting link which attaches the tank to the fuel filler assembly: - Move the link into position on the connecting brackets. - Install the two bolts through the link and the connecting brackets. - Install the two washers and nuts onto the bolts. - Tighten the nuts and bolts.	

C. Install the Tank Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Move the tank assembly into position in the wing.	Make sure that the tank assembly is correctly located.
(2)	Install the fuel filler assembly: - Install a new O-ring seal on the fuel filler flange. - Make sure that the mounting in the fuel filler assembly is correctly aligned with the hole in the top surface of the wing. - Install a new O-ring seal in position on the top surface of the wing. - Apply a thin layer of sealant to the contact area between the fuel filler flange and the ring for the filler cap. - Put the ring for the filler cap in position over the filler flange. - Install the eight screws which attach the fuel filler and the ring for the filler cap to the wing. - When all of the screws are installed, then tighten the screws. - Important: Be sure to remove any excess sealant squeeze-out from the fuel filler assembly. Failure to do so could lead to fuel contamination.	 If necessary, move the tank assembly to give correct alignment. Make sure that the O-ring is correctly positioned. Use DP 300 or equivalent. Finger tight only. Tighten opposite screws.
(3)	Connect two the vent hoses to the adapters on the access panel: - Push the vent hoses onto the adapters on the access panel. - Install the clamps which hold the vent hoses to the adapters on the access panel.	Near the outboard end of the fuel filler assembly.
(4)	Connect the bonding cable to the fuel filler assembly.	
(5)	Install the access panel on the bottom surface of the wing.	Refer to Section 52-40.

	Detail Steps/Work Items	Key Items/References
(6)	Attach the bonding strip to the inboard end of the tank: - Put the bolt up through the bonding tag on the inboard tank. - Move the bonding cable into position on the bolt. - Install the washer and nut onto the bolt. - Tighten the bolt.	
(7)	Connect the following electrical connectors: - Fuel quantity probe. - Low fuel sensor. - High fuel sensor (left wing only). - Fuel temperature sensor.	At the inboard end of the tank.
(8)	Install the access panel at the wing root rib: - Put the access panel into position on the studs. - If access panel is made from aluminum install a bonding cable. - Install the 11 washers and nuts. - Tighten the nuts.	Install on the third bolt from the bottom aft corner.
(9)	Install the drain valve: - Install a new O-ring onto the drain valve assembly. - Install the drain valve assembly into the mounting at the bottom of the inboard tank. - Secure the drain valve assembly with lockwire. - Install the access panel.	Torque: 1 - 3 Nm (0.73 - 2.21 lbf.ft.). Refer to Section 52-40.
(10)	Install the wing onto the airplane.	Refer to Section 57-10.
(11)	Refuel the airplane.	Refer to Section 12-10. Look specially for fuel leaks from the tanks assembly which you have installed.
(12)	Do an engine ground test.	Refer to Section 71-00.

4. Remove/Disassemble the Long Range Tank Assembly (if OÄM 40-130 is installed)

A. Remove the Fuel Tank Assembly.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the fuel tank that you will remove is empty.	Defuel and drain the fuel tank.
(2)	Remove the wing which has the fuel tank that you will remove and support the wing on trestles.	Refer to Section 57-10.
(3)	Remove the access panels from the wing: - Remove the access panel from the root rib: - Remove the 11 nuts and washers from the studs. - Pull the access panel from the studs and clear of the airplane. - Remove the access panel for the fuel drain valve.	Refer to Section 52-40.
(4)	Remove the fuel drain valve: - Cut the lock-wire. - Remove the drain valve from its mounting.	Refer to Figures 3 and 4 in the Description and Operation Pageblock, 28-10-00.
(5)	Disconnect the following electrical connectors: - Fuel quantity probe. - Low fuel sensor. - High fuel sensor (left wing only). - Fuel temperature sensor.	At the inboard end of the tank.
(6)	Release the bonding strip from the inboard end of the inboard fuel tank chamber: - Remove the nut and washer from the bolt. - Remove the bonding strip from the bolt and move it clear of the tank. - Remove the bolt.	

	Detail Steps/Work Items	Key Items/References
(7)	Disconnect the two vent hoses from the adapters on the access panel: - Remove the access panel from the outer lower surface of the wing. - Remove the clamps that hold the vent hoses to the adapters on the access panel. - Disconnect the vent hoses from the adapters on the access panel.	Near the outboard end of the outboard fuel tank chamber. Refer to Section 52-40.
(8)	Disconnect the bonding connection at the outboard end of the outboard fuel tank chamber.	Through the access panel in the wing bottom skin.
(9)	Release the fuel filler flange: - Remove the fuel filler cap and disconnect the bonding cable. - Remove the eight screws which attach the filler flange. - Release the filler flange and the O-ring seal. - Remove the spacer ring.	Discard the O-ring seal.
(10)	Gently pull the inboard tank chamber and the outboard tank chamber out of the wing through the wing inboard rib. Move the assembly clear of the wing and support it on a clean work bench.	Make sure that the tank does not catch on the wing ribs. Make sure that you do not damage the tanks.

B. Disassemble the Fuel Tank Assembly.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the fuel tank assembly from the wing.	Refer to Paragraph 4.A.
(2)	Remove the connecting link that attaches the inboard fuel tank chamber to the outboard fuel tank chamber: - Remove the two nuts and washers from the bolts. - Remove the link plate. - Remove the two bolts.	Refer to Figures 2 and 4 in the Description and Operation Pageblock, 28-10-00.
(3)	Remove the clips which attach the vent hoses to the tank.	
(4)	Remove the worm drive clamps that attach the flexible coupling to the tank.	
(5)	Pull the outboard fuel tank chamber away from the inboard fuel tank chamber until the vent hoses and flexible coupling disconnect from the tank.	
(6)	If necessary, remove the clips which attach the vent hoses to the outboard fuel tank chamber and pull the hoses from the connectors.	
(7)	If necessary, remove the worm drive clamp which attaches the flexible coupling to the outboard fuel tank chamber and pull the coupling from the fuel tank chamber connector.	

5. Assemble/Install the Long Range Tank Assembly (if OÄM 40-130 is installed)

A. Preparation

	Detail Steps/Work Items	Key Items/References
(1)	Examine the fuel tank. Look specially for: - Damage to the skins and welded seams of the tank. - Corrosion. - Damage/wear to the rubber mounting bands at the outside of the tanks.	Use a strong light and a magnifying glass.
(2)	Examine the vent hoses which connect the inboard and the outboard fuel tank chambers. Look specially for: - Cuts or damage, specially at the ends where the attaching clips are located. - Distortion or cracking.	
(3)	Examine the flexible coupling. Look specially for: - Cuts or damage, specially at the ends where the attaching clips are located. - Distortion or cracking.	
(4)	Examine the fuel filler flange. Look specially for: - Corrosion on the mating faces. - Cracking around the flange. Examine the spacer ring. Look specially for: - Corrosion on the mating faces. - Cracking around the flange.	Use a strong light and a magnifying glass. Use a strong light and a magnifying glass.
(5)	Examine the insides of the fuel tank chambers for cleanliness.	

B. Assemble the Tank

	Detail Steps/Work Items	Key Items/References
(1)	Install the flexible coupling: - Push the flexible coupling onto the connector of the outboard fuel tank chamber. - Install the worm drive clamps onto the coupling and tighten the clamps.	Refer to Figures 2 and 4 in the Description and Operation Pageblock, 28-10-00. Make sure that the coupling is correctly positioned.
(2)	Install the vent hoses onto the outboard fuel tank chamber: - Push the hoses onto the connectors. - Install the attaching clips.	Make sure that the hose is correctly positioned.
(3)	Connect the inner to the outboard fuel tank chamber: - Move the inboard fuel tank chamber into position by the outboard fuel tank chamber. Engage the tank vent connectors and the flexible coupling connector into their related hoses/ couplings on the outboard fuel tank chamber. - Push the inboard fuel tank chamber towards the outboard fuel tank chamber until the vent hoses and the flexible coupling are correctly positioned on their related connectors. - Install the worm drive clamps that attach the flexible coupling to the inboard tank chamber connector. - Tighten the worm drive clamps. - Install the clips which attach the vent connecting hoses to the inboard fuel tank chamber connectors.	The upper surface of both fuel tank chambers must be parallel.

	Detail Steps/Work Items	Key Items/References
(4)	Install the connecting link which attaches the inboard fuel tank chamber to the outboard tank chamber: - Move the link into position on the connecting brackets. - Install the two bolts through the link and the connecting brackets. - Install the two washers and nuts onto the bolts. - Tighten the nuts and bolts/	

C. Install the Tank Assembly

	Detail Steps/Work Items	Key Items/References
(1)	Move the tank assembly into position in the wing.	Make sure that the tank assembly is correctly located.
(2)	Install the fuel tank: - Make sure that the fuel filler flange in the outboard tank chamber is correctly aligned with the hole in the top surface of the wing - Apply a thin layer of sealant to the contact area between spacer ring and fuel filler flange. - Install the spacer ring onto the tank filler flange. - Install a new O-ring seal in position on the top surface of the wing. - Apply a thin layer of sealant to the contact area between the spacer ring and the ring for the filler cap. - Put the ring for the filler cap in position over the filler flange. - Install the eight screws which attach the fuel filler and the ring for the filler cap to the wing. - When all of the screws are installed, then tighten the screws. - Important: Be sure to remove any excess sealant squeeze-out from the fuel filler assembly. Failure to do so could lead to fuel contamination.	 If necessary, move the tank assembly to give correct alignment. Use DP 300 or equivalent. Make sure that the O-ring is correctly positioned. Use DP 300 or equivalent Finger tight only. Tighten opposite screws.
(3)	Connect two the vent hoses to the adapters on the access panel: - Push the vent hoses onto the adapters on the access panel. - Install the clamps which hold the vent hoses to the adapters on the access panel.	Near the outboard end of the outboard fuel tank chamber.
(4)	Connect the bonding connection at the outboard end of the outboard fuel tank chamber.	
(5)	Install the access panel on the bottom surface of the wing.	Refer to Section 52-40.

	Detail Steps/Work Items	Key Items/References
(6)	Attach the bonding strip to the inboard end of the inboard fuel tank chamber: - Put the bolt up through the bonding tag on the inboard fuel tank chamber. - Move the bonding cable into position on the bolt. - Install the washer and nut onto the bolt. - Tighten the bolt.	
(7)	Connect the following electrical connectors: - Fuel quantity probe. - Low fuel sensor. - High fuel sensor (left wing only). - Fuel temperature sensor.	At the inboard end of the tank.
(8)	Install the access panel at the wing root rib: - Put the access panel into position on the studs. - Install the 11 washers and nuts. - Tighten the nuts.	
(9)	Install the drain valve: - Install a new O-ring onto the drain valve assembly. - Install the drain valve assembly into the mounting at the bottom of the inboard fuel tank chamber. - Secure the drain valve assembly with lock-wire. - Install the access panel.	Refer to Section 52-40.
(10)	Install the wing onto the airplane.	Refer to Section 57-10.
(11)	Refuel the airplane.	Refer to Section 12-10. Look specially for fuel leaks from the tanks assembly which you have installed.
(12)	Do an engine ground test.	Refer to Section 71-00.

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FUEL DISTRIBUTION SYSTEM

1. General

This Section describes the fuel distribution system of the DA 40 NG airplane. The fuel distribution system supplies fuel from the fuel tanks to the engine. The following components are part of the fuel distribution system:

- Flexible fuel hoses.
- Fuel valve.
- Fuel gascolator with filter.
- Fine fuel filter.
- Electric fuel transfer pump.
- Electrically driven fuel pumps with bypass valve.
- Fuel pressure pulsation damper.
- Fuel cooler and check valve.

Refer to Section 28-00 for a general description of the fuel system and for the schematic diagram of the fuel system.

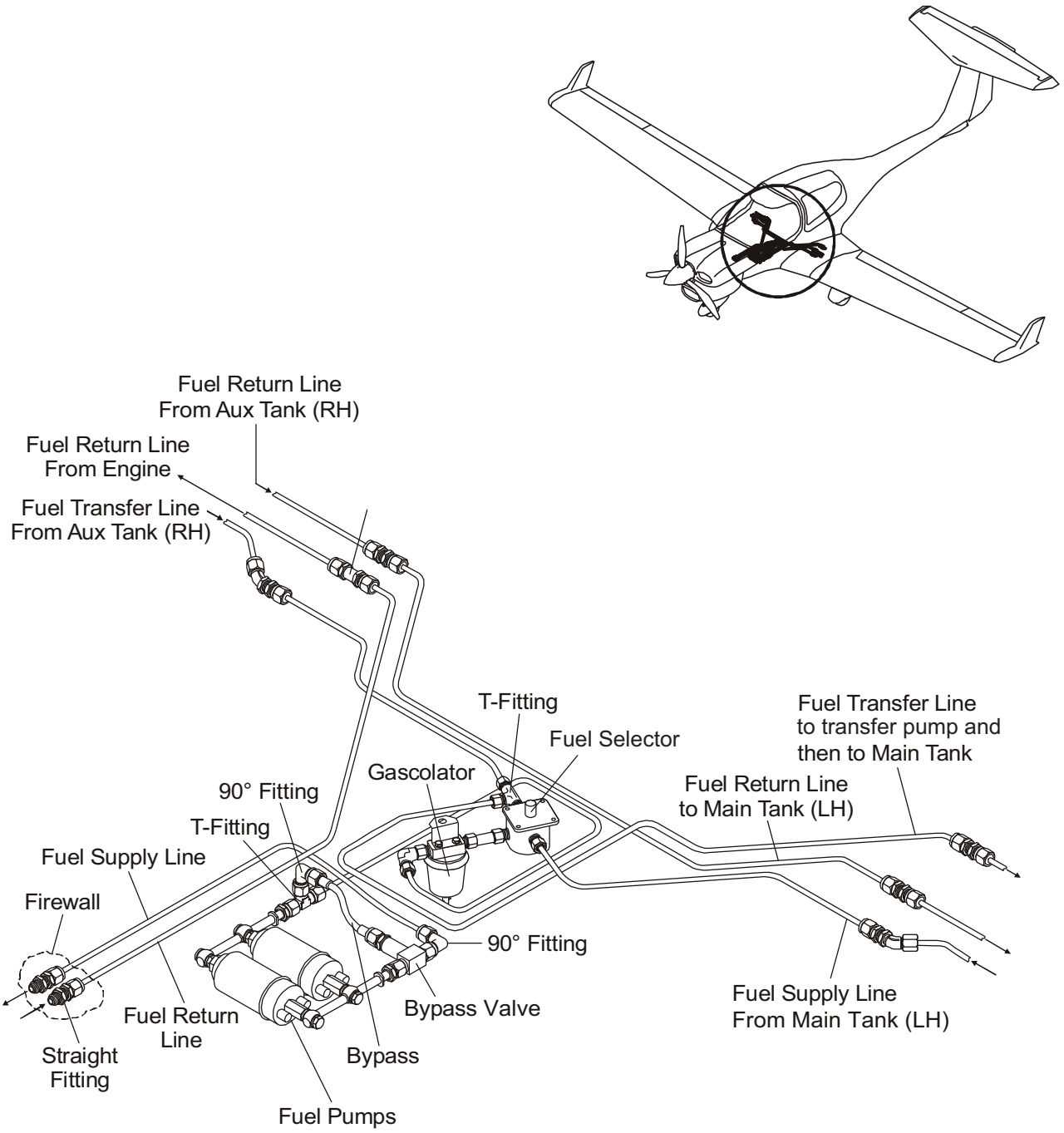

Figure 1 : Fuel System Components in the Fuselage

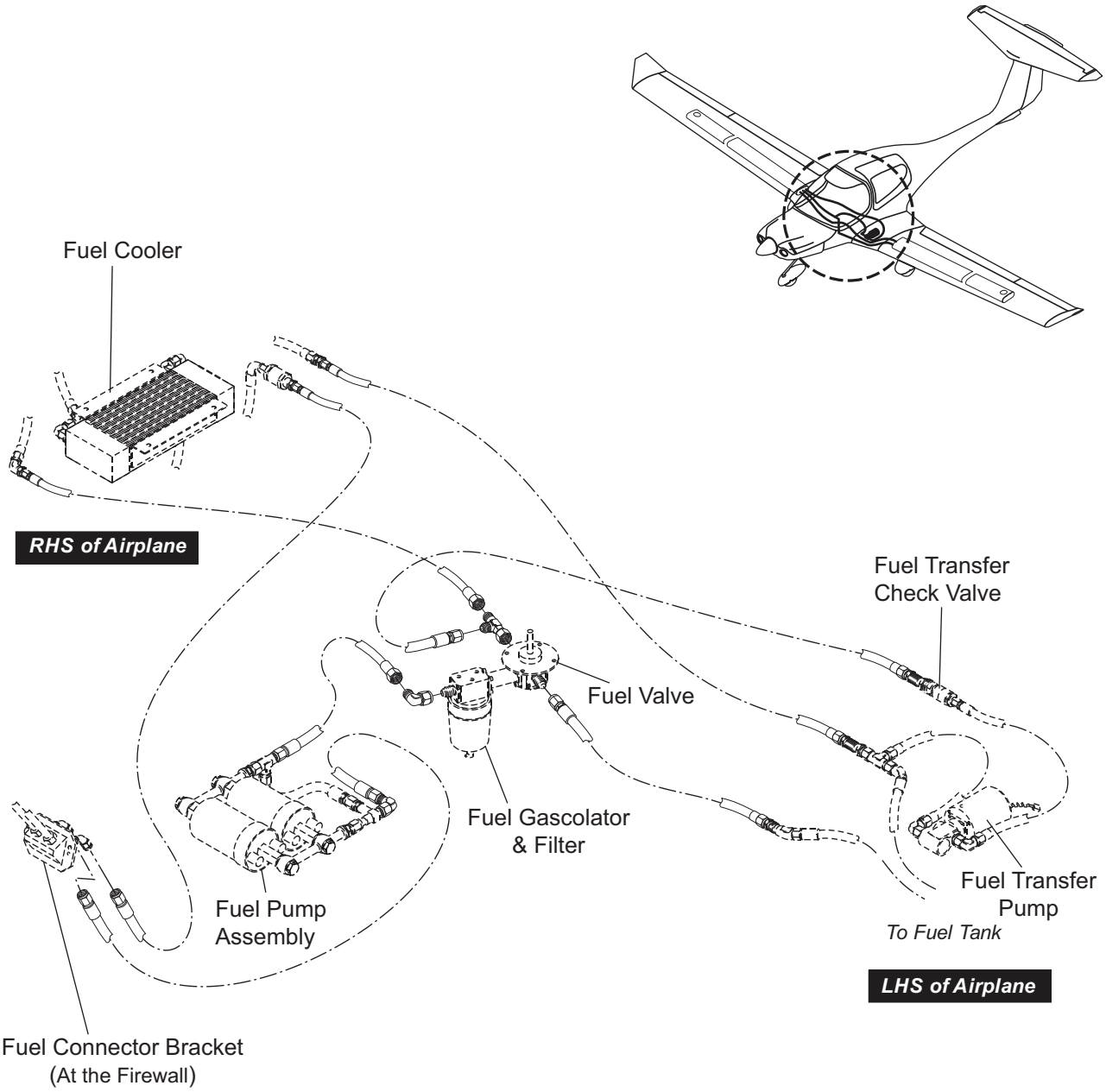

Figure 2 : Fuel System Components in the Fuselage

2. Description

Figures 1 and 2 show the main components of the fuel distribution system for the DA 40 NG in the fuselage section. Figure 3 shows the main components of the fuel distribution system for the airplane forward of the firewall.

A flexible fuel hose connects the left wing fuel tank to the fuel valve. The fuel valve is located in the center fuselage, below the cockpit floor. The fuel valve connects to the gascolator.

Flexible hoses connect the outlet of the gascolator to the fuel pump assy with the bypass loop. The outlet of the bypass valve is connected to the bulkhead fitting via a flexible fuel line. A fuel line with fire sleeve connects the fuel filter to a fuel pressure pulsation damper (if MÄM 40-468 is installed) and then to the engine driven high pressure fuel pump.

The fuel return line from the engine is routed through the firewall and connects to a check valve in the fuselage. From there a fuel line connects to the cooling loop inlet of the right wing tank. The cooling loop outlet from the right tank leads to the fuel cooler and then via the return line to the return inlet of the left fuel tank.

A flexible hose connects the right wing tank outlet to a T-fitting which is attached to the emergency inlet of the fuel valve. A flexible hose from the T-fitting connects to a check valve and further to the inlet of the fuel transfer pump. Another flexible hose leads from the outlet of the fuel transfer pump to a T-fitting in the fuel return line.

3. Fuel System Components

A. Flexible Hoses

The fuel system uses (synthetic) flexible hoses. The flexible fuel lines firewall forward are equipped with integral fire-protection sleeves.

Only approved and pressure tested hoses are suitable for the DA 40 NG fuel system.

B. Fuel Valve

The fuel valve is located below the cockpit floor. It is a three-way valve. A shaft connects the valve to a control lever which is located in the center console of the cockpit, aft of the engine control assembly.

To move the control lever you must lift a safety lock on top of the lever while you turn the control lever.

If the control lever is set to NORMAL only the left wing tank will supply fuel. If the control lever is set to EMERGENCY then only the right wing tank will supply fuel. If the control lever is set to OFF then fuel will not be supplied from the tanks.

C. Fuel Gascolator and Filter

The gascolator connects to the fuel valve and is equipped with a fuel filter and a fuel drain. The filter can be removed for cleaning/replacement. Use the fuel drain to drain the fuel distribution system and to drain fuel to test for fuel contamination.

D. Fine Fuel Filter

A fine fuel filter is located firewall forward and is installed to the engine mount via a bracket.

E. Fuel Transfer Pump

The fuel transfer pump is located in the LH wing stub between the wing spars. Electrical power is supplied from the main electrical bus. The FUEL XFER **<** or FUEL TRANS **<** switch in the lower left side of the instrument panel controls the fuel transfer pump. A 5 A circuit-breaker protects the fuel transfer pump electrical system.

The pump is a high-pressure rotary pump.

F. Electrically Driven Fuel Pumps with Bypass Valve

The two electrically driven fuel pumps with bypass valve are located below the cockpit floor. The bypass valve reduces the fuel pressure during operation of both electrically driven fuel pumps.

G. Fuel Cooler and Check Valves

The fuel cooler is located in the RH wing stub between the wing spars. It is accessible through the RH main landing gear cover on the bottom side of the RH wing stub.

The fuel return line incorporates a check valve which is located in the RH wing stub upstream of the auxiliary fuel tank cooling loop.

H. Fuel Pressure Pulsation Damper

If MÄM 40-468 is installed, a fuel pressure pulsation damper is installed in the fuel supply line firewall forward between the fine fuel filter and the engine driven high pressure fuel pump.

4. Fuel Transfer System Operation

In the usual operation, fuel flows from the left tank, through the fuel valve to the engine. Return fuel from the engine passes through the cooling loop in the right tank and then into the left tank.

If the FUEL XFER **<** or FUEL TRANS **<** switch is set to ON, the transfer pump moves fuel from the right tank to the left tank until either:

- The fuel transfer pump shut-off switch (high fuel sensor) in the left tank senses that the left tank is full. This shuts the pump OFF.
- The fuel transfer pump shut-off switch (low fuel sensor) in the right tank senses that the fuel tank is empty. This shuts the pump OFF.

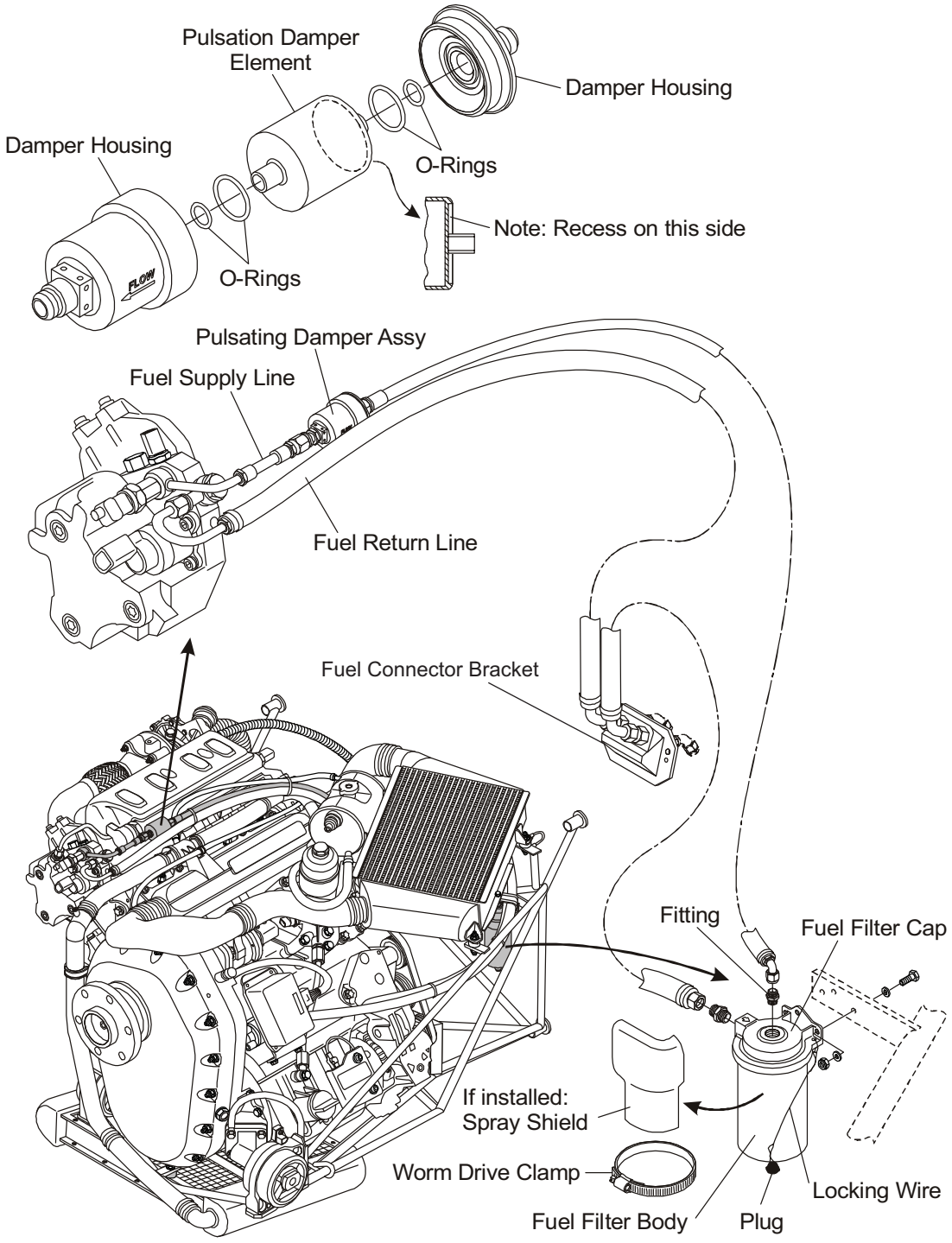

Figure 3 : Fuel System Components Firewall Forward (if MÄM 40-468 is installed)

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TROUBLE-SHOOTING

1. General

The table below lists the possible defects of the fuel distribution system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Airplane smells of fuel.	Hose/Pipe leaking.	Examine all hoses and pipes. Replace defective components.
	Loose connection.	Examine all connections. Tighten loose connections.
	Component leaking.	Examine all components. Replace defective components.
Fuel does not transfer correctly.	Fuel transfer pump circuit breaker not set.	Set the transfer pump circuit breaker.
	Fuel transfer pump defective.	Replace the transfer pump.
	Low fuel sensor in right tank defective.	Replace the sensor.
	High fuel sensor in left tank defective.	Replace the sensor.
	FUEL XFER **<** or FUEL TRANS **<** switch in instrument panel defective.	Replace the switch.
	Wiring defective.	Repair wiring.

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MAINTENANCE PRACTICES

1. **General**

This Section describes the Maintenance Practices for the fuel distribution system. The procedures are limited to the removal/installation of the main components of the system.

Obey the safety precautions for fuel at all times.

WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE.

WARNING: DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

WARNING: DO NOT BREATH FUEL VAPOR. FUEL VAPOR CAN MAKE YOU ILL.

2. **Remove/Install the Fuel Valve and the Gascolator**

Obey the safety precautions for fuel at all times.

A. Remove the Fuel Valve and the Gascolator.

Refer to Figure 201.

Remove the fuel valve and the gascolator as an assembly.

	Detail Steps/Work Items	Key Items/References
(1)	Defuel the airplane.	Refer to Section 12-10.
(2)	Remove the access panel from the bottom of the fuselage around the gascolator drain valve.	Refer to Section 52-40.
(3)	Drain the fuel from the distribution system.	Use a suitable container. Drain the fuel from the gascolator drain valve.
(4)	Disconnect the flexible hose which connects the left fuel tank to the fuel valve, at the valve.	Put caps on the connections.
(5)	Disconnect the T-fitting which connects the fuel transfer line.	Put caps on the connections.
(6)	Disconnect the fuel line to the fuel pumps.	Put caps on the connections.

	Detail Steps/Work Items	Key Items/References
(7)	Remove the fuel valve and the gascolator: - Remove the bolt and washer which attaches the gascolator mounting bracket. - Remove the four bolts and washers which attach the fuel valve to the fuselage. - Lower the fuel valve and the gascolator clear of the airplane.	Hold the fuel valve!
(8)	If the gascolator will be replaced, remove the bracket from the gascolator once the gascolator and fuel valve are removed from the airplane.	The bracket will be re-used if a new gascolator is installed.

B. Install the Fuel Valve and the Gascolator.

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(1)	If the gascolator was replaced, install the bracket on the gascolator while the gascolator and fuel valve are off the airplane.	The bracket will be re-used if a new gascolator is installed.
(2)	Remove the left pilot's seat.	Refer to Section 25-10.
(3)	Move the fuel valve and the gascolator into position in the fuselage.	Make sure that the gascolator mounting bracket is correctly located. Slide connecting shaft into the mating part of the fuel valve. Make sure that both the control lever in the cockpit and the fuel valve are at the same position.
(4)	Install the fuel valve and the gascolator: - Install the four washers on the four bolts. - Put the bolts and washers into position through the fuel valve into the anchor-nuts. - Install the bolt and washer which attach the gascolator mounting bracket. - Tighten the bolts.	
(5)	Connect the pipe from the gascolator to the firewall.	Remove the caps from all the connections that were capped.
(6)	Connect the T-fitting to the selector valve.	
(7)	Connect the flexible hose from the left fuel tank to the selector valve.	
(8)	Refuel the airplane.	Refer to Section 12-10.
(9)	Do a test for fuel leaks from the connections which you have worked on.	
(10)	Install the access panel under the fuselage around the gascolator drain valve.	Refer to Section 52-40.
(11)	Install the left pilot's seat.	Refer to Section 25-10.
(12)	Do an engine ground run-up. Make sure that the fuel system operates correctly.	

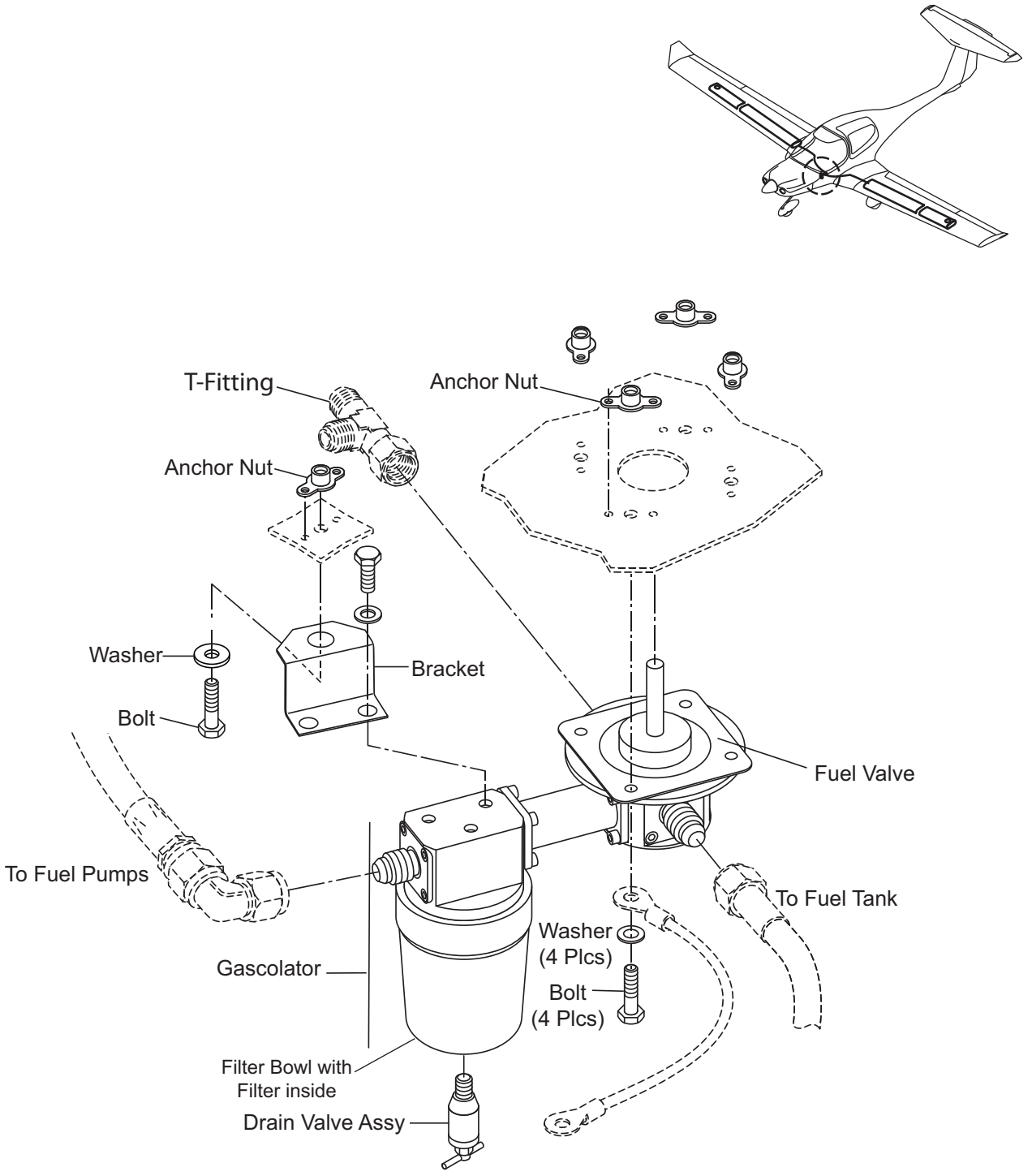


Figure 201 : Fuel Valve and Gascolator - Removal/Installation

3. **Remove/Install the Gascolator Filter**

Obey the safety precautions for fuel at all times.

A. Remove the Gascolator Filter.

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(1)	Set the fuel valve to OFF.	
(2)	Remove the access panel under the fuselage around the gascolator drain valve.	Refer to Section 52-40.
(3)	Drain the fuel from the gascolator drain valve.	Use a suitable container.
(4)	Loosen the retaining ring which holds the gascolator filter bowl to the gascolator.	Remove the lock-wire from the retaining ring and fuel drain. Hold the filter bowl!
(5)	Lower the filter bowl clear of the gascolator and remove the filter.	Discard the seal if it is damaged.

B. Install the Gascolator Filter.

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(1)	Put the filter into position in the gascolator, tighten the filter hand tight.	
(2)	Install a new seal in the filter bowl.	
(3)	Install the filter bowl: - Move the filter bowl into position onto the gascolator. - Align the arrow marks on the filter bowl with the marks on the gascolator. - Tighten the retaining ring which holds the filter bowl in position. - Secure retaining ring and fuel drain with lock-wire.	Make sure that the seal is correctly positioned.
(4)	Do a test for leaks of the gascolator filter bowl: - Make sure that there is fuel in the left tank. - Set the fuel valve to NORMAL. - Examine the gascolator bowl for leaks. - Set the fuel valve to OFF.	
(5)	Install the access panel under the fuselage around the gascolator drain valve.	Refer to Section 52-40.

4. **Remove/Install the Fuel Filter Body**

Obey the safety precautions for fuel at all times.

A. Remove the Fuel Filter Body.

Refer to Figure 202.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the related FUEL SELECTOR lever is set to SHUT-OFF.	In the cockpit.
(2)	Remove the engine cowling.	Refer to Section 71-10.
(3)	Remove the fuel filter element: - Remove the safety wire from the filter body. - Remove the worm drive clamp and the spray shield. - Drain the fuel from the fuel distribution system by removing the screw at the bottom of the filter body. - Unscrew the filter body from the filter assembly.	Use a suitable container to catch spilt fluid.

B. Install the Fuel Filter Body.

Refer to Figure 202.

	Detail Steps/Work Items	Key Items/References
(1)	Install the screw with the seal washer into the new filter body.	Use a new seal washer. Use Loctite 243 on adapter to the fuel filter body connection.
(2)	Install the filter body assembly into the fuel filter cap.	Make sure that the integral sealings at the new fuel filter body are not damaged.
(3)	Install the spray shield and the worm drive clamp to the fuel filter body.	
(4)	Secure the filter body assembly via the screw at the bottom of the fuel filter body to the filter cap with lockwire.	

	Detail Steps/Work Items	Key Items/References
(5)	Do a test for leaks of the filter assembly: - Make sure that there is fuel in the related fuel tank. - Set the FUEL SELECTOR lever to the related tank. - Examine the filter assembly for leaks.	Make sure that there are no leaks.
(6)	Install the engine cowling.	Refer to Section 71-10.

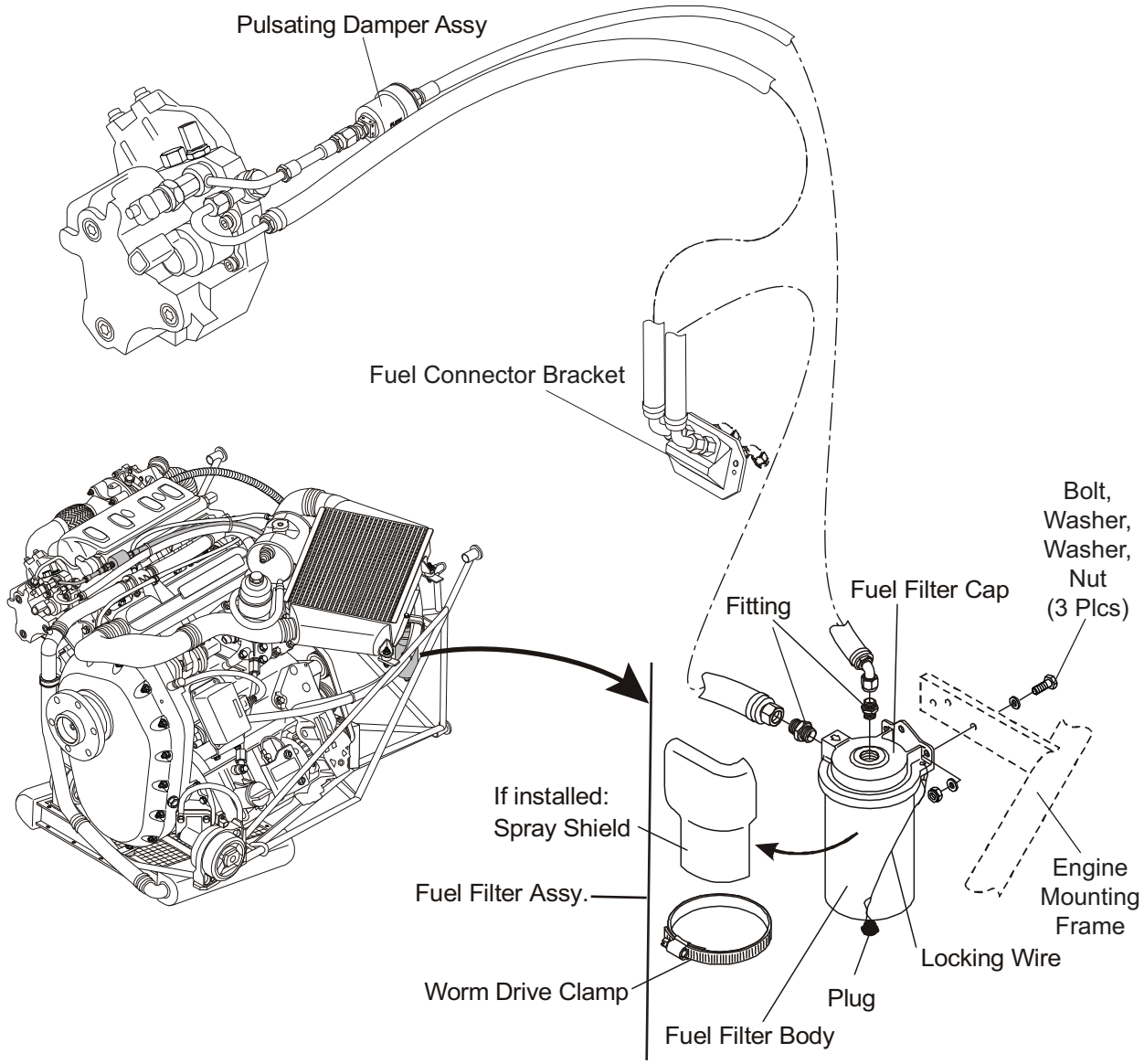


Figure 202 : Fuel Filter Body / Assembly - Removal/Installation

5. **Remove/Install the Fuel Filter Assembly**

Obey the safety precautions for fuel at all times.

A. Remove the Fuel Filter Assembly.

Refer to Figure 202.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the related FUEL SELECTOR lever is set to SHUT-OFF.	In the cockpit.
(2)	Remove the engine cowling.	Refer to Section 71-10.
(3)	Remove the fuel filter assembly: - Remove the safety wire from the screw at the bottom of the fuel filter body to the filter cap. - Drain the fuel from the fuel distribution system by removing the screw and seal washer at the bottom of the filter body. - Remove the worm drive clamp and the spray shield. - Disconnect the two flexible fuel hoses at the fuel filter assembly. - Remove the three bolts and lock-nuts and the six washers that attach the fuel filter assembly to the engine mounting frame.	 Use a suitable container to catch spilt fluid. Mark the hoses for the installation procedure. Use a suitable container to catch spilt fluid. Put caps on the connections. Discard the lock-nuts.

B. Install the Fuel Filter Assembly.

Refer to Figure 202.

	Detail Steps/Work Items	Key Items/References
(1)	Put the fuel filter assembly in position on the engine mounting frame.	
(2)	Install the three bolts, six washers and three new lock-nuts that attach the fuel filter assembly to the engine mounting frame.	Use new lock-nuts.
(3)	Install the screw and seal washer at the bottom of the fuel filter body.	Use a new seal washer. Use Loctite 243 on adapter to the fuel filter body connection.
(4)	Remove the caps from the connectors and connect the two flexible fuel hoses at the fuel filter assembly.	Make sure of the correct connections. Refer to step 3 in the removal procedure.
(5)	Install the spray shield and the worm drive clamp to the fuel filter body.	
(6)	Secure the filter body assembly via the screw at the bottom of the fuel filter body to the filter cap with lockwire.	
(7)	Do a test for leaks of the fuel filter assembly: - Make sure that there is fuel in the related fuel tank. - Set the FUEL SELECTOR lever to the related tank. - Examine the fuel filter assembly for leaks.	Make sure that there are no leaks.
(8)	Install the engine cowling.	Refer to Section 71-10.

6. **Remove/Replace/Install the Fuel Pressure Pulsation-Damper (if MÄM 40-468 is installed)**

Obey the safety precautions for fuel at all times.

A. Remove the Fuel Pressure Pulsation-Damper-Assembly.

Refer to Figure 203.

	Detail Steps/Work Items	Key Items/References
(1)	Set the ENGINE MASTER to OFF.	
(2)	Remove the upper cowling.	Refer to Section 71-10.
(3)	Remove the attaching hardware which positions and holds the damper assembly to the engine.	
(4)	Remove the lock wires at the lines on the fuel damper assembly housing.	
(5)	Disconnect the two fuel lines which are connected to the damper assembly housing.	Use a suitable container to catch spilt fluid. Put caps on the connections.
(6)	Remove the damper assembly from the airplane.	

B. Replace the Fuel Pressure Pulsation-Damper-Assembly.

Refer to Figure 203, top left.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the wire locking of the fuel pressure pulsation damper housing.	
(2)	Open the fuel pressure pulsation damper housing by turning the cover counterclockwise.	
(3)	Remove and discard the fuel pressure pulsation damper element and the four O-rings.	
(4)	Clean the inside of the fuel pressure pulsation damper housing. No contamination allowed.	Flush with fuel approved for the airplane

	Detail Steps/Work Items	Key Items/References
(5)	Install the four new O-rings.	
(6)	Apply 09-25300 “Fuelube EZTurn 1LB” to the outside thread and sealing surface of the fuel pressure pulsation damper housing.	
(7)	Install the new pulsation damper element in the housing. Make sure of the installation direction of the pulsation damper element in the housing	Refer to Figure 203, top left.
(8)	Tighten the fuel pressure pulsation damper housing.	Torque 80 ± 4 Nm (59.0 ± 2.9 lbf.ft).
(9)	Secure the fuel pressure pulsation damper housing with locking wire.	

C. Install the Fuel Pressure Pulsation-Damper-Housing-Assembly.

Refer to Figure 203.

	Detail Steps/Work Items	Key Items/References
(1)	Flush the fuel pressure pulsation damper assy with fuel approved for the airplane. No contamination allowed.	
(2)	Connect the fuel pressure pulsation damper housing to the fuel supply lines and secure with locking wire. Watch out for the flow direction arrow.	Remove the caps from the connections.
(3)	Install the attaching hardware which positions and holds the damper assembly to the engine.	
(4)	Install the upper cowling.	
(5)	Conduct an engine ground run.	
(6)	Inspect the airplane for fuel leakage.	Make sure that there are no fuel leaks.

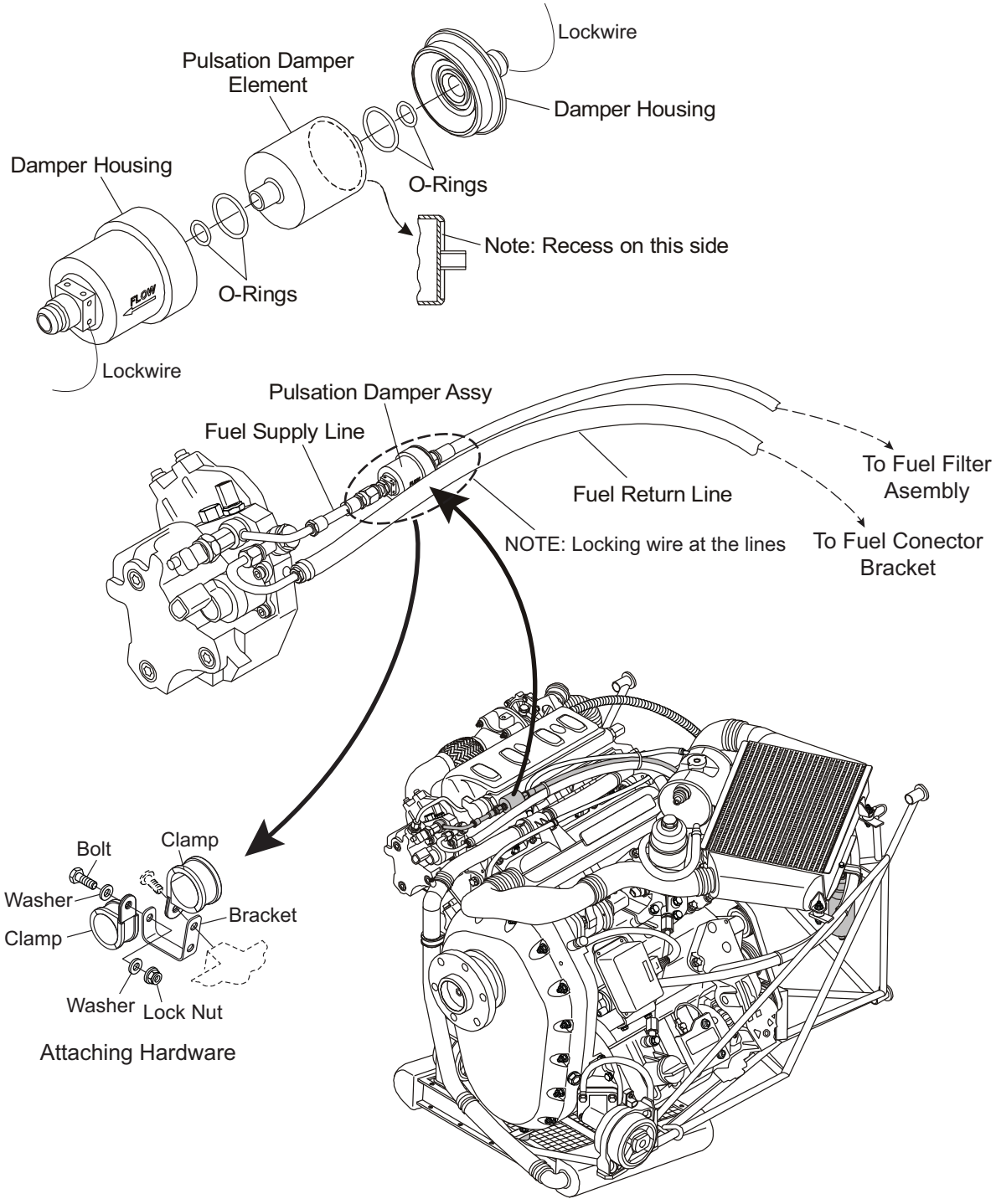


Figure 203 : Fuel Pressure Pulsation-Damper - Removal/Installation

7. **Remove/Install the Electrically Driven Fuel-Pumps with Bypass Valve**

Obey the safety precautions for fuel at all times.

A. Remove the Electrically Driven Fuel-Pumps with Bypass Valve.

Refer to Figure 204.

	Detail Steps/Work Items	Key Items/References
(1)	Set the ENGINE MASTER to OFF.	
(2)	Remove the access panel from the bottom fuselage around the gascolator drain valve.	Refer to Section 52-40.
(3)	Disconnect the electrical wire from the fuel pumps.	
(4)	Set the fuel selector to OFF.	
(5)	Drain the gascolator.	
(6)	Remove the fuel lines to and from the fuel pumps.	Use a suitable container to catch spilt fluid. Put caps on the connections.
(7)	Remove the bypass unit: - Fuel line, bypass valve and T-fitting.	
(8)	Remove the two nuts which attach the fuel pump banjo to the support bracket.	
(9)	Remove the fuel pump assembly: - Loosen the four worm drive clamps. - Move the worm drive clamps to each other. - Remove the fuel pump assembly from the airplane.	

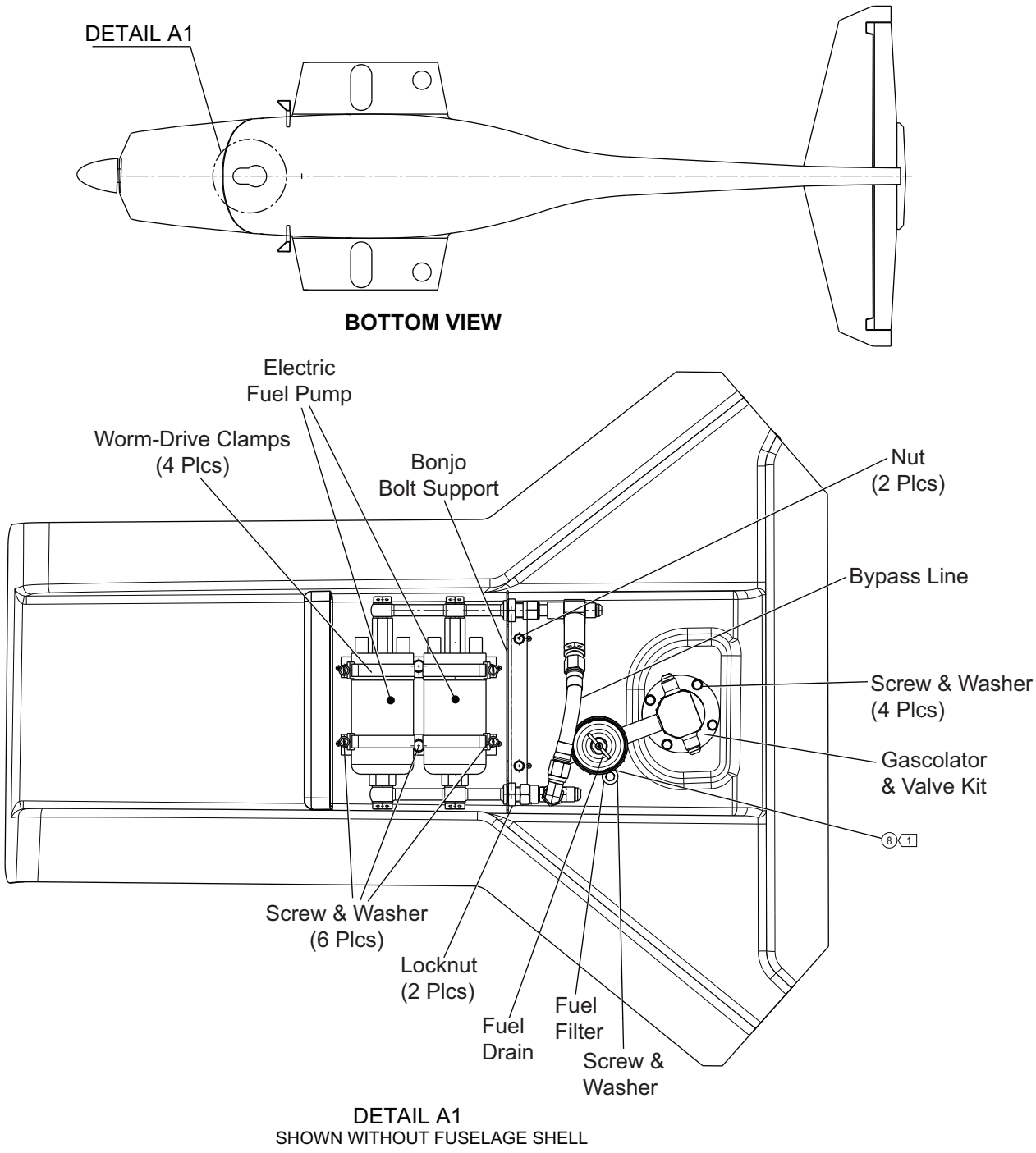


Figure 204 : Electric Fuel Pumps - Removal/Installation

B. Install the Electrically Driven Fuel-Pumps with Bypass Valve.

Refer to Figure 204.

	Detail Steps/Work Items	Key Items/References
(1)	Install the fuel pump assembly and tighten the four worm drive clamps.	
(2)	Install and tighten the two nuts which attach the fuel pump banjo to the support bracket.	
(3)	Connect the fuel lines to and from the fuel pumps.	Remove the caps from the connections.
(4)	Install the bypass unit: - Fuel line, bypass valve and T-fitting.	
(5)	Connect the electrical wires of the fuel pumps to the airplane electrical system.	
(6)	Install the access panel under the fuselage around the gascolator drain valve.	Refer to Section 52-40.
(7)	Conduct an engine ground run.	Refer to Section 71-00.
(8)	Inspect the airplane for fuel leakage.	Make sure that there are no fuel leaks.

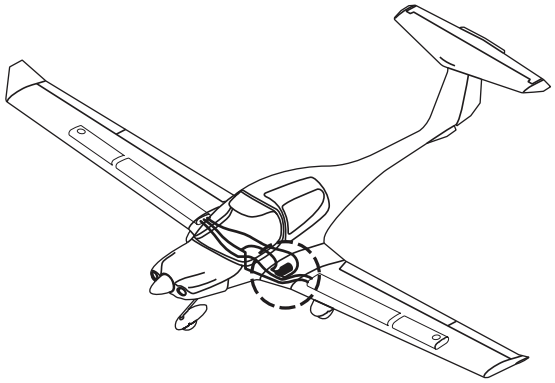
8. **Remove/Install the Fuel Transfer Pump**

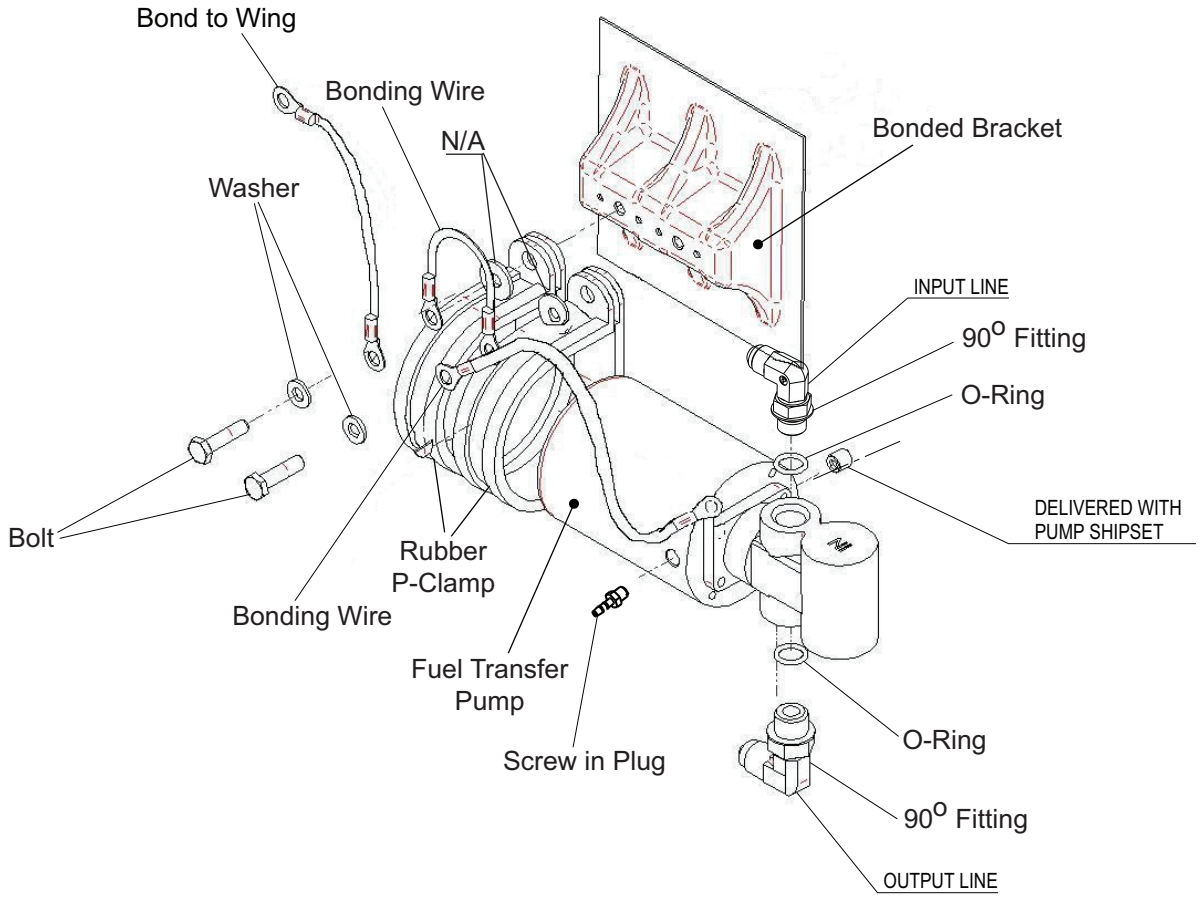
Obey the safety precautions for fuel at all times.

A. Remove the Fuel Transfer Pump.

Refer to Figures 205 and 206.

	Detail Steps/Work Items	Key Items/References
(1)	Defuel the airplane.	Refer to Section 12-10.
(2)	Remove the cover plate at the left main landing gear.	
(3)	Disconnect the electrical connector from the fuel transfer pump.	
(4)	Disconnect both fuel lines from the transfer pump.	Use a suitable container to catch spilt fluid. Mark the fuel lines for ease of assembly. Put caps on the connections.
(5)	Remove the P-clamps and the fuel transfer pump.	
(6)	Disconnect the ground wire from the fuel transfer pump.	Mark the position of the ground wire.
(7)	Remove the fuel transfer pump from the airplane.	





NOTE: Disconnect the fuel lines only. The fittings and O-rings remain on the pump.

Figure 205 : Fuel Transfer Pump - Removal/Installation

CENTER SECTION LH SIDE, BOTTOM VIEW

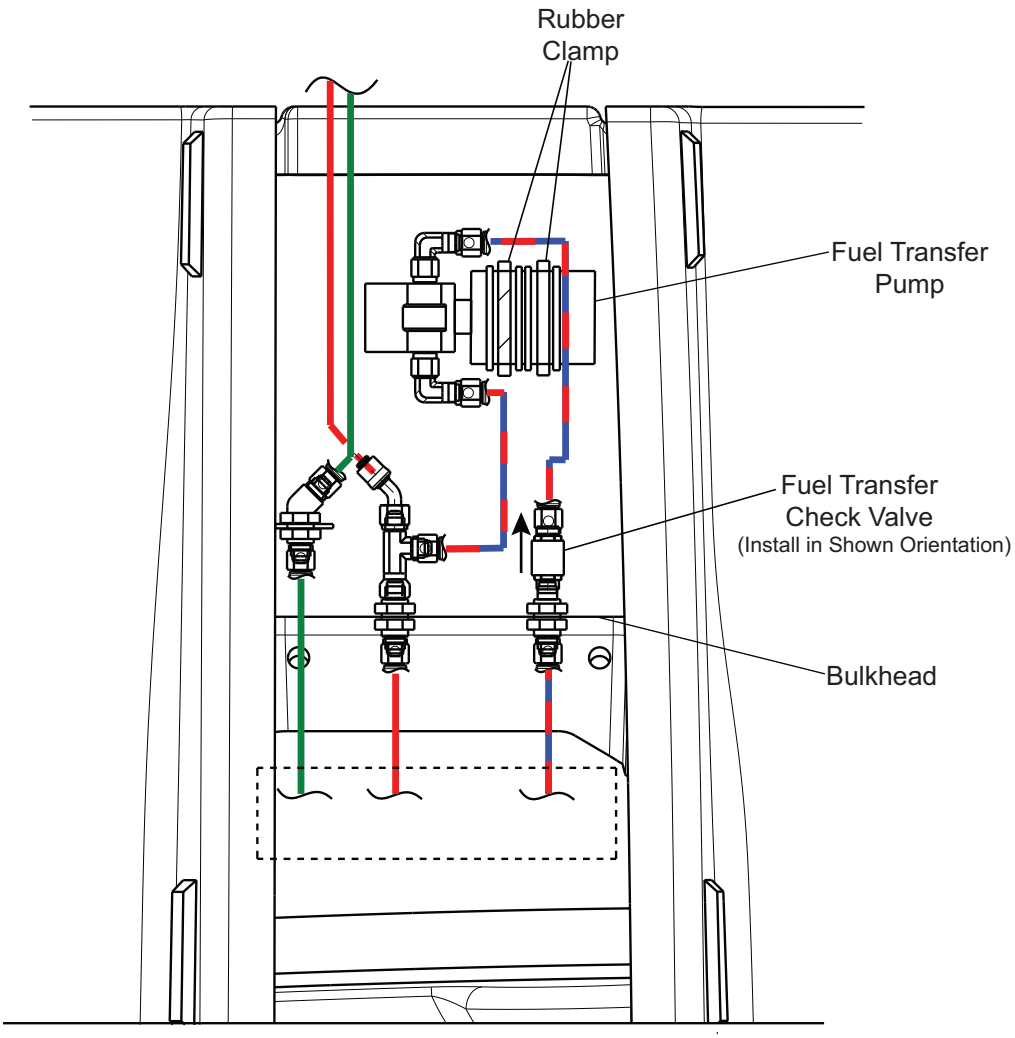


Figure 206 : Fuel Hoses Installation

B. Install the Fuel Transfer Pump.

Refer to Figures 205 and 206.

	Detail Steps/Work Items	Key Items/References
(1)	Move the fuel transfer pump into position.	
(2)	Connect the ground wire to the previous marked position at the fuel transfer pump.	As marked in Paragraph 8A, step (6).
(3)	Install and tighten the P-clamps.	
(4)	Install both fuel lines of the fuel transfer pump.	Remove the caps from the connections.
(5)	Connect electrical wire of the fuel transfer pump.	
(6)	Install the cover plate at the left main landing gear.	
(7)	Conduct an engine ground run.	Refer to Section 71-00.
(8)	Inspect the airplane for fuel leakage.	Make sure that there are no fuel leaks.

9. **Disassemble/Assemble the Fuel Transfer-Pump Assembly**

Obey the safety precautions for fuel at all times.

A. Disassemble the Fuel Transfer-Pump Assembly.

Refer to Figure 205.

	Detail Steps/Work Items	Key Items/References
(1)	Loosen the jam nuts on the 90° fittings and remove the fittings from the “in” and “out” ports of the pump.	Note the installation direction of the fittings.
(2)	Remove the O-rings from the fittings.	Discard the O-rings.
(3)	Remove the drain fitting.	Hold the drain fitting.
(4)	Remove the lock wire from the bolt of the pump housing which holds the bonding cable.	
(5)	Remove the bolt and bonding cable.	Hold the bonding cable.
(6)	Re-install the bolt.	
(7)	Put caps on the open connections.	

B. Assemble a New Fuel Transfer-Pump Assembly.

Refer to Figures 205.

	Detail Steps/Work Items	Key Items/References
(1)	Cut the electrical wires and crimp connectors onto the ends.	Length: 24 cm (9.4 in).
(2)	Fix pins in the housing and apply appropriate chafing protection on the wires.	There is no sensitivity to the polarity.
(3)	Examine the thread and the conical seats of the fittings.	
(4)	Install new O-rings on the fittings.	
(5)	Remove the protective caps from the pump and install the fittings to the pump “in” and “out” ports.	Observe the installation direction of the fittings.
(6)	Tighten the jam nuts.	
(7)	Install the enclosed new screw on top of the pump housing.	“Top” means related to the installation in the airplane.
(8)	Install the drain fitting on the bottom side of the pump housing.	
(9)	Remove one of the top bolts from the pump housing.	Remove the lock wire. “Top” means related to the installation in the airplane.
(10)	Grind the housing around the hole where the bolt is removed.	To get electrical conductivity.
(11)	Install bolt together with the bonding cable and tighten the bolt.	
(12)	Install a new lock wire on the bolts.	
(13)	Seal the grinded area around bolt of the pump housing with paint.	To prevent corrosion.

10. **Remove/Install the Fuel Cooler**

Obey the safety precautions for fuel at all times.

A. Remove the Fuel Cooler.

Refer to Figure 207.

	Detail Steps/Work Items	Key Items/References
(1)	Defuel the airplane.	Refer to Section 12-10.
(2)	Remove the RH main landing gear cover.	On stub wing bottom side.
(3)	Remove the rubber gasket on the air duct.	
(4)	Remove the fuel cooler inlet-air-duct.	
(5)	Dis-connect the two fuel lines at the fuel cooler.	Use a suitable container to catch spilt fluid. Put caps on the connections.
(6)	Remove the four mounting bolts, washers and the bonding wire that attach the fuel cooler to the equipment rack.	Mark the position of bonding wire.
(7)	Remove the fuel cooler from the airplane.	

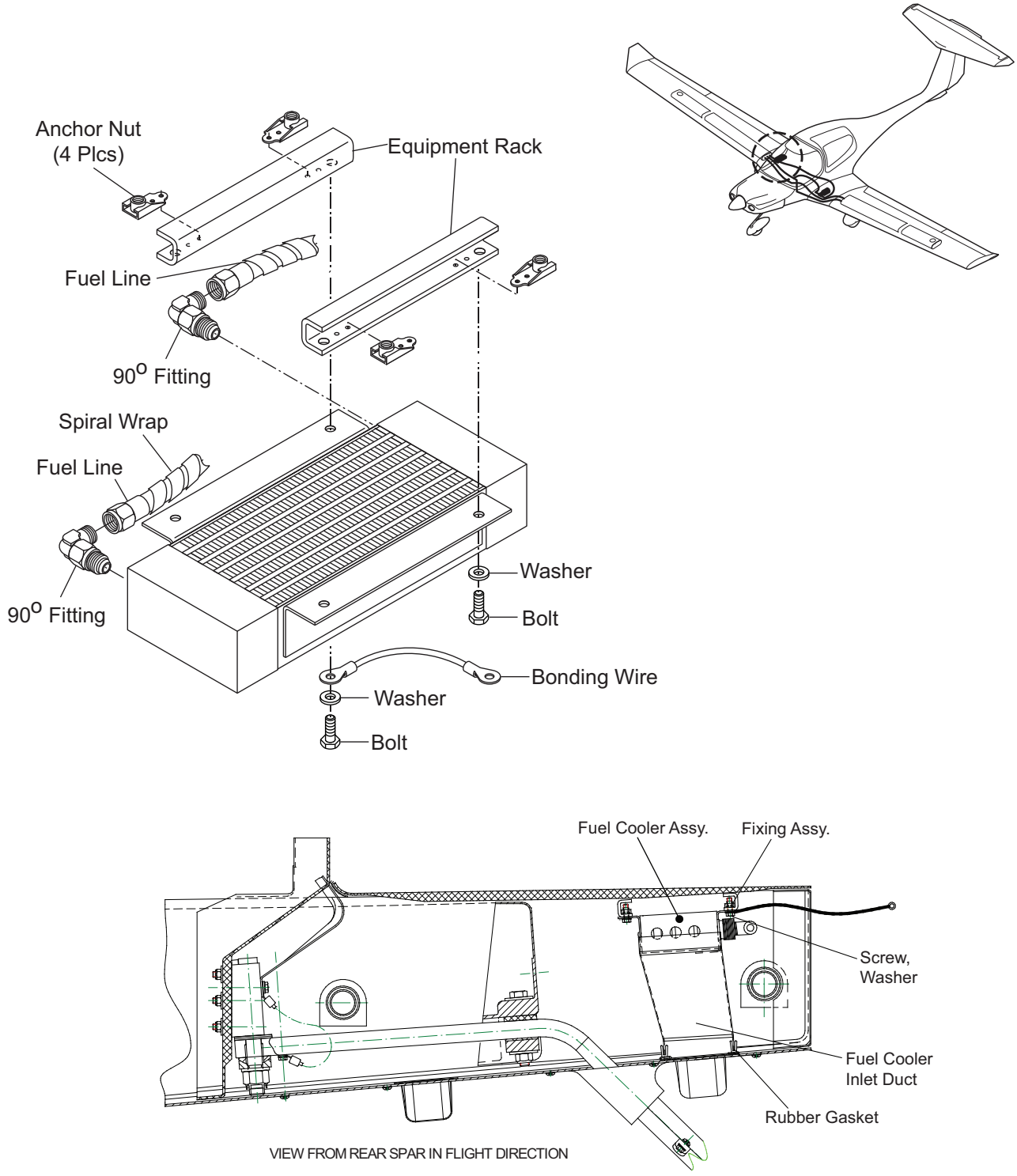


Figure 207 : Fuel Cooler - Removal/Installation

B. Install the Fuel Cooler.

Refer to Figure 207.

	Detail Steps/Work Items	Key Items/References
(1)	Put the fuel cooler in position below the equipment rack.	
(2)	Install the four mounting bolts, washers and the bonding wire that attach the fuel cooler to the equipment rack.	Make sure of the location for the bonding wire. Refer to 10. A step (6).
(3)	Connect the fuel lines to the fuel cooler.	Remove the caps from the connections.
(4)	Install the fuel cooler inlet-air-duct below the fuel cooler.	
(5)	Install the rubber gasket on the air duct.	
(6)	Install the RH main landing gear cover.	
(7)	Conduct an engine ground run.	Refer to Section 71-00.
(8)	Inspect the airplane for fuel leakage.	Make sure that there are no fuel leaks.

11. **Test the Fuel Valve**

CAUTION: YOU MUST REPLACE THE FUEL VALVE IF THE TEST FAILS.

Obey the safety precautions for fuel at all times.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the cowling.	Refer to Section 71-10.
(2)	Set the ENGINE MASTER switch to OFF.	
(3)	Disconnect the fuel return line from the engine driven fuel pump: - Remove lock-wire. - Put caps on open fuel lines.	Refer to AE Maintenance Manual, latest revision.
(4)	Connect the external fuel line to the engine driven fuel pump outlet.	
(5)	Set the fuel valve to NORMAL.	
(6)	Set the ENGINE MASTER switch to ON.	Catch fuel in a suitable container. Fuel must flow with a rate of about 3 liters/min.
(7)	Turn ON the fuel pump.	Flow rate must be increased.
(8)	Turn OFF the fuel pump.	
(9)	Set fuel valve to EMERGENCY.	Verify that fuel level is reducing in auxiliary fuel tank (see G1000 MFD).
(10)	Set the fuel valve to OFF.	Fuel flow must be interrupted.
(11)	Set the ENGINE MASTER switch to OFF.	
(12)	Disconnect the external fuel line from the engine driven fuel pump outlet.	
(13)	Install the fuel return line to the engine driven fuel pump: - Install lock-wire.	
(14)	Install the cowling.	Refer to Section 71-10.

12. **Test the Check Valve in the Fuel Return Line**

CAUTION: YOU MUST REPLACE THE FUEL VALVE IF THE TEST FAILS.

Obey the safety precautions for fuel at all times.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the left fuel tank (main tank) is full.	Refer to Section 12-10.
(2)	Remove the cowling.	Refer to Section 71-10.
(3)	Set the ENGINE MASTER switch to OFF.	
(4)	Disconnect the fuel return line at the firewall forward connection.	
(5)	Connect an external fuel line with the additional fuel pump to the firewall forward fuel return fitting.	
(6)	Turn ON the external fuel pump.	Only a small amount of fuel is allowed to come out of the additional fuel pump.
(7)	Turn OFF the external fuel pump.	
(8)	Disconnect the external fuel line with additional fuel pump from the firewall forward fuel return fitting.	
(9)	Connect the fuel return line from the engine to the firewall forward fuel return fitting.	
(10)	Install the cowling.	Refer to Section 71-10.

13. **Remove/Install the Fuel Transfer Check-Valve**

Obey the safety precautions for fuel at all times.

A. Remove the Fuel Transfer Check-Valve.

Refer to Figure 208.

NOTE: Use two wrenches during fitting installation or during connection of hoses to check valve. Hold the valve with a wrench from the side where the fitting is being installed.

Do not allow torque loads to be transferred through the valve body.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the access panel from the LH wing landing gear stub.	Reference section 52-40-00.
(2)	Disconnect the inboard and outboard fuel transfer lines from the check valve.	Use a suitable container to catch spilt fluid. Put caps on the connections.
(3)	Remove the check valve with fittings from the bulkhead.	Use a suitable container. Drain the fuel from the fuel transfer line.
(4)	Remove fittings from check valve (only if the check valve going to be replaced).	Plug the valve outlets

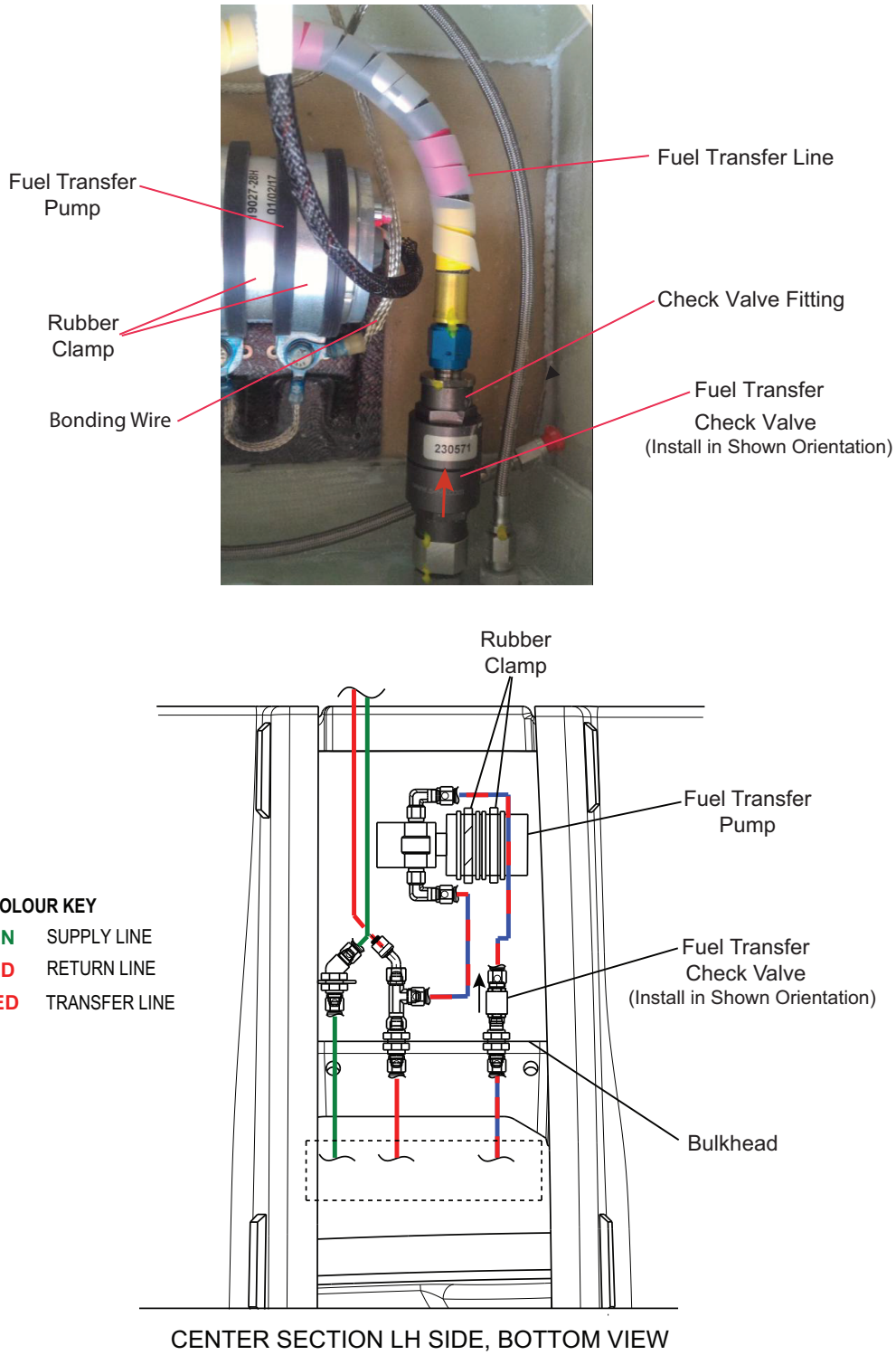


Figure 208 : Fuel Transfer Check-Valve - Removal/Installation

B. Install the Fuel Transfer Check-Valve.

Refer to Figure 208.

	Detail Steps/Work Items	Key Items/References
(1)	Install fittings on the check valve.	Inspect the fittings, replace the fittings if damage is found. Ensure proper fittings orientation (direction of flow toward fuel transfer pump). Apply LOCTITE 545 to the fitting threads.
(2)	Install the fuel transfer check valve on the bulkhead.	Install the valve in proper orientation with direction of flow towards the fuel transfer pump.
(3)	Connect the inboard and outboard fuel transfer lines.	Remove the caps from the connections.
(4)	Conduct an engine ground run.	Reference section 71-00.
(5)	Inspect the airplane for fuel leakage.	Make sure that there are no fuel leaks.
(6)	Install the access panel on the LH wing landing gear stub.	Reference section 52-40-00.

14. **Bleed the Fuel Distribution System**

A. Equipment.

Item	Quantity	Part Number
External fuel pump with power supply.	1	Commercial
Waste fuel container, 25 liters (6.6 US gal)	1	Commercial

Obey the safety precautions for fuel at all times.

B. Procedure.

Refer to Figure 209 throughout the procedure..

	Detail Steps/Work Items	Key Items/References
(1)	Set the ENGINE MASTER to OFF.	
(2)	Set the fuel valve to OFF.	
(3)	On the circuit breaker panel EECU BUS, pull open the FUEL PUMP A and FUEL PUMP B circuit breakers.	
(4)	Remove the access panel from the bottom fuselage around the gascolator drain valve.	Refer to Section 52-40.
(5)	Disconnect the electrical wires from the fuel pumps.	
(6)	Drain the gascolator.	Use a suitable container to catch the fluid.
(7)	Remove the lock-wire and disconnect the fuel line from the intake side of the engine fuel pumps.	Use a suitable container to catch spilt fluid. Put a cap on the connection to the fuel pumps.
(8)	Connect the open fuel line to the external fuel pump.	
(9)	In the cockpit, set the fuel valve to NORMAL.	
(10)	Bleed the fuel distribution system: - Switch the external fuel pump ON and pump fuel into a suitable container until fuel with no air is pumped.	
(11)	Switch the external fuel pump to OFF.	

	Detail Steps/Work Items	Key Items/References
(12)	In the cockpit, set the fuel valve to OFF.	
(13)	Disconnect the external fuel pump from the fuel line.	Use a suitable container to catch the fluid.
(14)	Remove the cap and connect the open fuel line back to the intake side of the engine fuel pumps.	Secure the fuel line with new lock-wire.
(15)	Connect the electrical wires of the fuel pumps to the airplane electrical system.	
(16)	In the cockpit, set the fuel valve to NORMAL.	
(17)	Close the FUEL PUMP A and FUEL PUMP B circuit breakers.	
(18)	Conduct an engine ground run.	Refer to Section 71-00.
(19)	Inspect the airplane for fuel leakage.	Make sure that there are no fuel leaks.
(20)	Install the access panel under the fuselage around the gascolator drain valve.	Refer to Section 52-40.

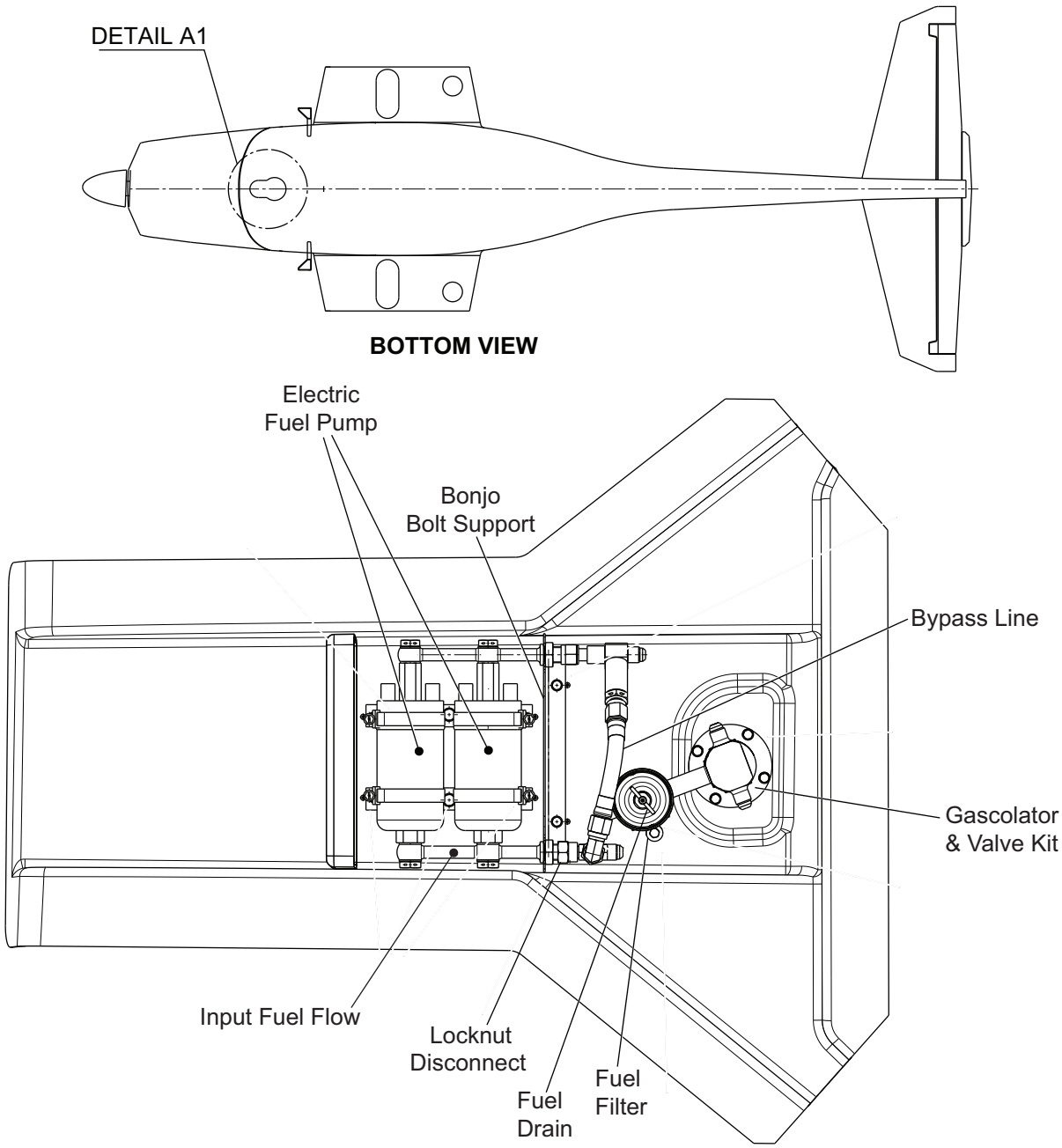


Figure 209 : Bleed the Fuel Distribution System

FUEL QUANTITY INDICATIING

1. General

This Section describes the fuel quantity indicating system of the DA 40 NG. Refer to Section 28-00 for the general data on the fuel system. Refer to Section 31-10 for data on replacing the fuel quantity indicator.

2. Description

A. Standard Tank Configuration

Figure 1 shows the fuel quantity indication system main components. The fuel quantity indication system is part of the engine indicating system. The fuel tank in each wing has a fuel probe with a Teflon sleeve on the outboard end. The fuel quantity indicating system cannot be calibrated in service.

Electric cables connect the fuel probes to the engine indicating system. The system displays the fuel quantity.

Electric cables also connect the low fuel sensor in the left tank to a low fuel caution light in the annunciator panel. Refer to Section 31-10 (if G1000 is installed) or 31-51 (if the conventional cockpit with the White Wire annunciator panel is installed) for more data on the annunciator panel.

B. Long Range Tank Configuration (if OÄM 40-130 is installed)

In the DA 40 NG long range tank the fuel quantity indication is the same as in the standard tank.

The fuel probe is installed in the inboard fuel tank chamber. This fuel probe measures a fuel quantity of maximum 14 US gal (53 liter), which is the maximum quantity of indicated fuel.

3. Operation

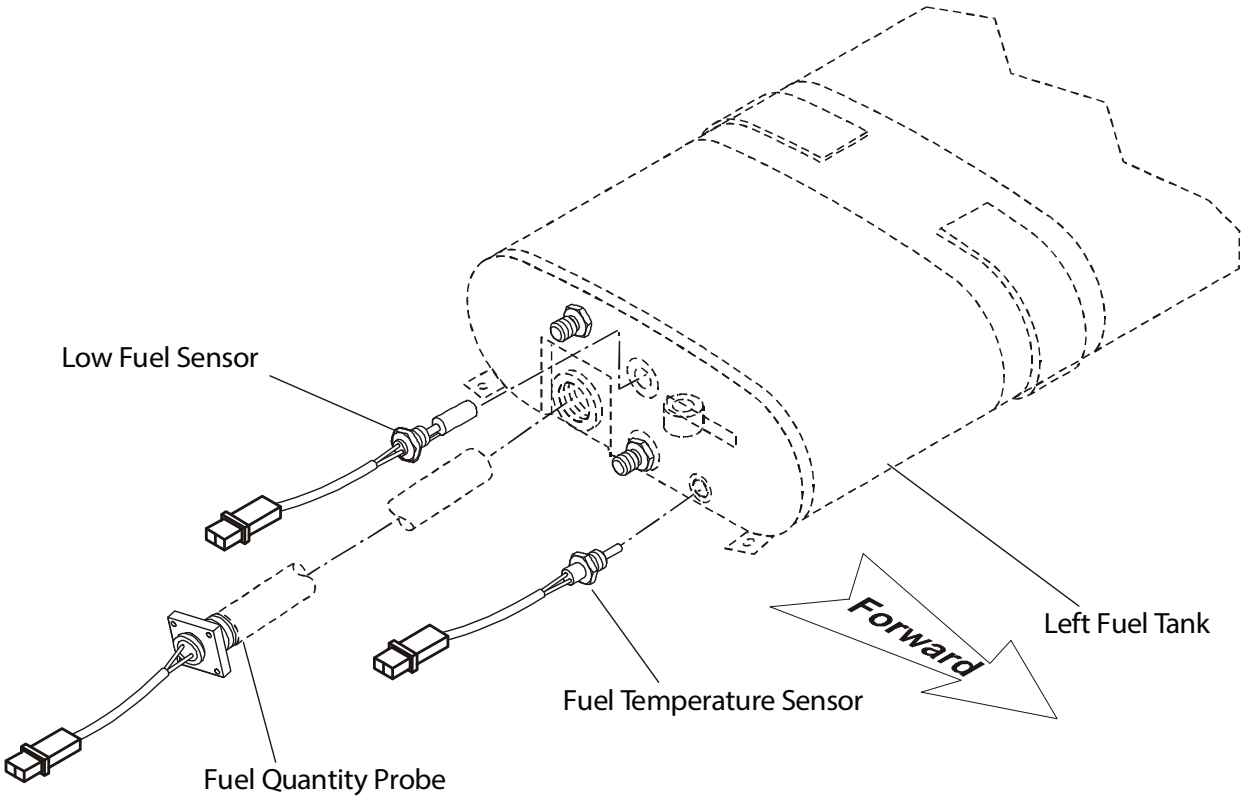
A. Standard Tank Configuration

As the fuel level in the fuel tanks decreases, the area of the fuel probe which is “wetted” with fuel will also decrease. The amount of "wetted" area is converted into an electrical signal which sets the fuel quantity reading at the fuel quantity indicator. The fuel quantity indicator displays the quantity of fuel in the left fuel tank and the right fuel tank. The fuel quantity indicator is shown on the MFD of the G1000 or on the SED. The display shows the fuel quantity in US gallons. The maximum indicated fuel quantity is 14 US gal (53 liter) per tank.

The low fuel sensor in the left tank operates a caution light on the annunciator panel. When the fuel level in the left tank falls below 3 US gal (+2/-1 US gal) the caution light comes on. Refer to Section 31-10 for more data on the LOW FUEL caution light (if G1000 is installed) or to Section 31-51 for more data on the FUEL LOW caution light (if the conventional cockpit with the White Wire annunciator panel is installed).

B. Long Range Tank Configuration (if OÄM 40-130 is installed)

The total useable fuel quantity is 19.5 US gal (73.8 liter) per tank. The indicated fuel quantity is 14 US gal (53 liter) per tank. Thus the remaining 5.5 US gal (20.8 liter) per tank are not indicated on the MFD of the G1000 or on the SED.



VIEW ON INBOARD END OF LEFT FUEL TANK

Figure 1 : Fuel Quantity Indication Components in the Left hand Fuel Tank

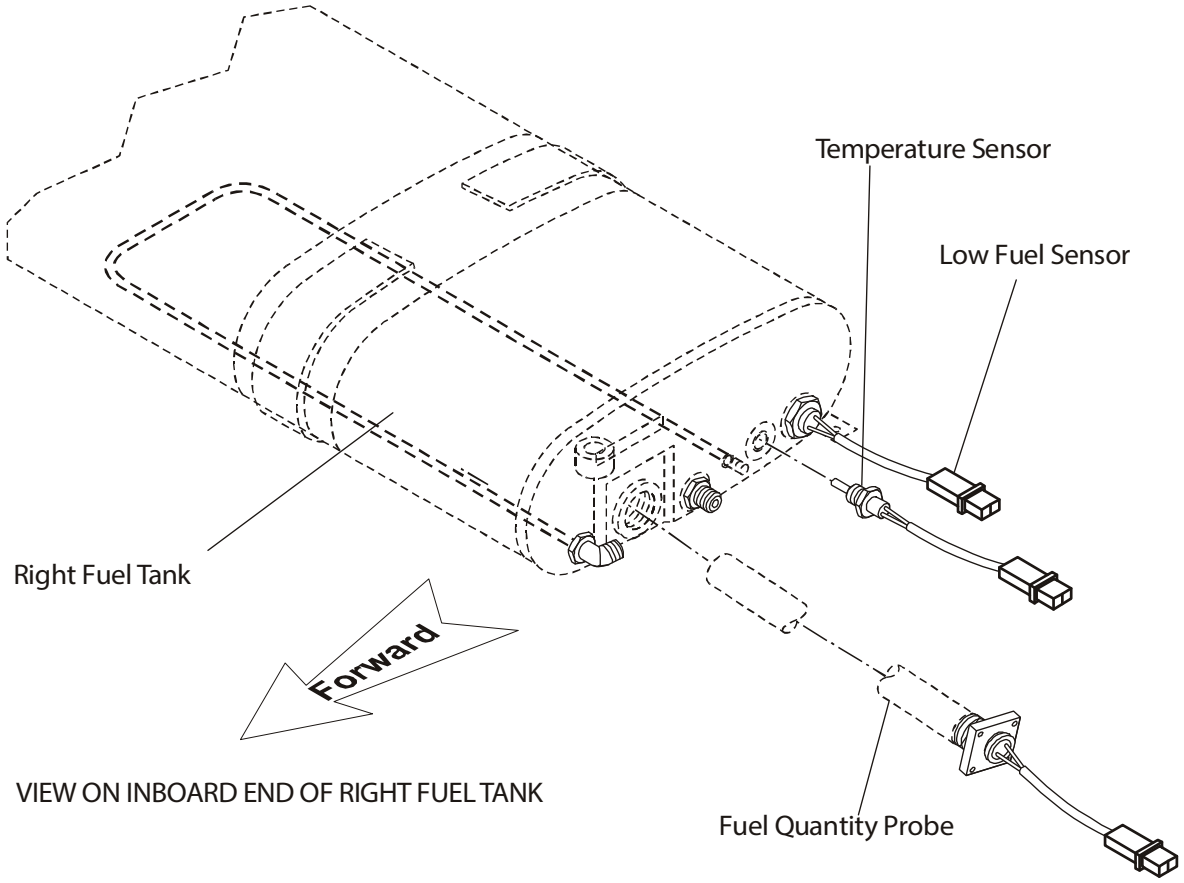


Figure 2 : Fuel Quantity Indication Components in the Right hand Fuel Tank

TROUBLE-SHOOTING

1. General

The table below lists the possible defects of the quantity indicating system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Fuel quantity for one tank incorrect, or first and last LED on fuel quantity indicator illuminated. Other tank reads correctly.	Fuel probe unit in fuel tank defective/contaminated.	Defuel/refuel the related fuel tank to flush the fuel probe. Rock the wings during defueling several times. This will flush the water out of the fuel quantity probe. Repeat defueling / refueling until the fuel quantity probe indicates correct values. If the indication is still incorrect after the third attempt, replace the fuel probe(s).
	Fuel quantity indicating system wiring defective.	Do a test of the fuel quantity indicating system wiring. Refer to Chapter 92-00 for the wiring diagrams.
Fuel quantity indication on both tanks incorrect/blank.	Fuel quantity indicator defective.	Replace the fuel quantity indicator.
	Fuel quantity indication system wiring defective.	Do a test of the indication system wiring. Refer to Chapter 92-00 for the wiring diagrams.
Fuel low level caution shows on the annunciator panel when the left tank has more than 5 US gal (19 liters) of fuel.	Fuel low level sensor defective.	Replace the fuel low level sensor.

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MAINTENANCE PRACTICES

1. General

The Maintenance Practices in this Section describe how to replace a fuel tank probe and a fuel tank sensor.

Refer to Section 31-10 for data on removing/installing a fuel quantity indicator.

Obey the safety precautions for fuel at all times.

WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE.

WARNING: DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

WARNING: DO NOT BREATH FUEL VAPOR. FUEL VAPOR CAN MAKE YOU ILL.

2. Remove/Install a Low Level Sensor

Each tank has a low level sensor.

Obey the safety precautions for fuel at all times.

A. Remove a Low Level Sensor.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the wing where the low fuel sensor will be removed.	Refer to Section 57-10.
(2)	Remove the access panel from the root rib of the wing: - Remove the 11 nuts and washers from the studs. - Pull the access panel off the studs and clear of the airplane.	
(3)	Disconnect the electrical cables of the low fuel sensor.	At the in-line connector.
(4)	Remove the low fuel sensor from the tank.	

B. Install a Low Level Sensor.

	Detail Steps/Work Items	Key Items/References
(1)	Install the low fuel sensor in the fuel tank: - Apply sealant to the thread of the low fuel sensor. - Move the low fuel sensor into position in the fuel tank mount. - Screw the low fuel sensor fully home into the mount. - Tighten the low fuel sensor.	 Use “seal-lube” or “fuel-lube”. The arrow must point down.
(2)	Connect the electrical cables to the low fuel switch.	At the in-line connector.
(3)	Install the access panel at the wing root rib: - Put the access panel into position on the studs. - Install the 11 washers and nuts. - Tighten the nuts.	
(4)	Install the wing, but do not refuel the airplane.	Refer to Section 57-10.
(5)	Do a test for the correct operation of the low fuel sensor.	Right tank: Make sure that it switches off the fuel transfer pump when the fuel level is low. Left tank: Make sure that it switches on the LOW FUEL caution light when the fuel level is at 3 US gal (+2/-1 US gal).
(6)	Refuel the airplane.	Refer to Section 12-10.
(7)	Do a check for leaks.	

3. Remove/Install the High Fuel Sensor

Only the left tank has a high fuel sensor.

Obey the safety precautions for fuel at all times.

A. Remove the High Fuel Sensor.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the left wing.	Refer to Section 57-10.
(2)	Remove the left fuel tank assembly.	Refer to Section 28-10.
(3)	Disconnect the electrical cables of the high fuel sensor.	At the in-line connector near the high fuel sensor.
(4)	Remove the high fuel sensor from the tank.	

B. Install the High Fuel Sensor.

	Detail Steps/Work Items	Key Items/References
(1)	Install the high fuel sensor in the fuel tank: - Apply sealant to the thread of the high fuel sensor. - Move the high fuel sensor into position in the fuel tank mount. - Screw the high fuel sensor fully home into the mount. - Tighten the high fuel sensor.	 Use “seal-lube” or “fuel-lube”. The arrow must point up.
(2)	Connect the electrical cables to the high fuel sensor.	At the in-line connector.
(3)	Install the left fuel tank assembly.	Refer to Section 28-10.
(4)	Install the left wing, but do not refuel the airplane.	Refer to Section 57-10.
(5)	Do a test for the correct operation of the high fuel sensor.	Make sure that the fuel transfer pump switches off when the fuel level in the left tank is high.
(6)	Refuel the airplane.	Refer to Section 12-10.
(7)	Do a check for leaks.	

4. Remove/Install a Fuel Temperature Sensor

Obey the safety precautions for fuel at all times.

A. Remove a Fuel Temperature Sensor.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the fuel from the wing that has the fuel temperature sensor to be removed.	
(2)	Remove the wing and support the wing on trestles.	Refer to Section 57-10.
(3)	Remove the access panel from the wing root rib: - Remove the 11 nuts and washers that attach the access panel to the root rib. - Move the access panel clear of the root rib.	
(4)	Unscrew the temperature sensor from the mounting boss and pull the sensor clear of the tank.	Install a blank on the open tank connector.
(5)	Remove and discard the seal from the sensor.	

B. Install a Fuel Temperature Sensor.

	Detail Steps/Work Items	Key Items/References
(1)	Install a new seal onto the temperature sensor.	
(2)	Screw the temperature sensor into the mounting boss on the fuel tank.	Remove the blanking cap. Make sure that the seal is seated correctly.
(3)	Install the access panel in the wing root rib: - Move the access panel into position over the studs in the wing root rib. - Install the 11 nuts and washers that attach the access panel to the root rib.	
(4)	Install the wing onto the airplane.	Refer to Section 57-10.
(5)	Refuel/transfer fuel into the fuel tank assembly for which you installed the temperature sensor.	
(6)	Bleed the fuel system.	Refer to Section 28-20.
(7)	Do a test for fuel leaks at the temperature sensor that was replaced.	
(8)	Do a test for the correct operation of the related fuel temperature sensor. - Set the ELECT. MASTER switch to ON. - Set the ELECT. MASTER switch to OFF.	Monitor the multi function display screen of the ICS. The fuel temperature indications must both indicate the ambient temperature.

5. Remove/Install a Fuel Quantity Probe

Obey the safety precautions for fuel at all times.

A. Remove a Fuel Quantity Probe.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the wing where the fuel quantity probe will be removed, and support the wing on trestles.	Refer to Section 57-10.
(2)	Remove fuel tank assembly from the wing.	Refer to Section 28-10.
(3)	Remove the fuel quantity probe from the threaded mounting.	

B. Install a Fuel Quantity Probe.

	Detail Steps/Work Items	Key Items/References
(1)	Separate the fuel filler assembly from the fuel tank.	Refer to Section 28-10. To gain access to the guide at the outboard end of the fuel tank.
(2)	Install the fuel quantity probe into the fuel tank: - Apply sealant to the thread of the fuel quantity probe. - Install a new O-ring seal. - Install the Teflon sleeve to the fuel probe. - Carefully move the fuel quantity probe into position in the inboard tank. Engage the thread. - Turn the probe clockwise, by hand, until the fuel quantity probe is fully engaged in its mount. - Tighten the fuel quantity probe until the O-ring seals.	Use “seal-lube” or “fuel-lube”. Make sure that the fuel quantity probe goes into the guide at the outboard end of the fuel tank.
(3)	Re-connect the fuel filler assembly to the fuel tank.	Refer to Section 28-10.
(4)	Install fuel tank assembly into wing.	Refer to Section 28-10.
(5)	Install the wing to the airplane.	Refer to Section 57-10.
(6)	Examine the fuel quantity probe installation for fuel leaks.	
(7)	Install the access panel for the fuel tank.	Refer to Section 52-40.

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CHAPTER 31
INDICATING SYSTEMS

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INDICATING SYSTEMS

1. General

This Chapter tells you about the indicating systems installed in the airplane.
Refer to these Sections for the related data:

- Section 31-10. The instrument and control panels for the DA 40 NG with the G1000 system installed.
- Section 31-11. The instrument and control panels for the DA 40 NG with the conventional cockpit installed.
- Section 31-20. Independent instruments.
- Section 31-40. The integrated cockpit system.
- Section 31-51. Central warning system with the conventional cockpit installed.

The DA 40 NG has these indicating systems:

- An instrument panel. The instrument panel is made in several pieces with a shelf. The shelf goes between the panel and the firewall.
- A control panel in the center console. This panel has the engine controls, fuel controls, cabin heat control levers, parking brake and trim. It has a forward part and an aft part.
- Integrated cockpit system (ICS), if the G1000 system is installed. The airplane has an integrated cockpit system with two displays which give the airplane flight and navigation displays, engine instrument displays and airplane systems indications. The ICS has “softkeys” on the display screens for the option of selecting which indications will be displayed on the screen.
- Main engine display (MED).
- Secondary engine display (SED).
- White wire annunciator panel.

This Section does not tell you about the indicators that belong to systems.
See the related system for data.

NOTE: Equipment which is certified for installation in the DA 40 NG is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

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INSTRUMENT AND CONTROL PANELS

WITH THE G1000 SYSTEM INSTALLED

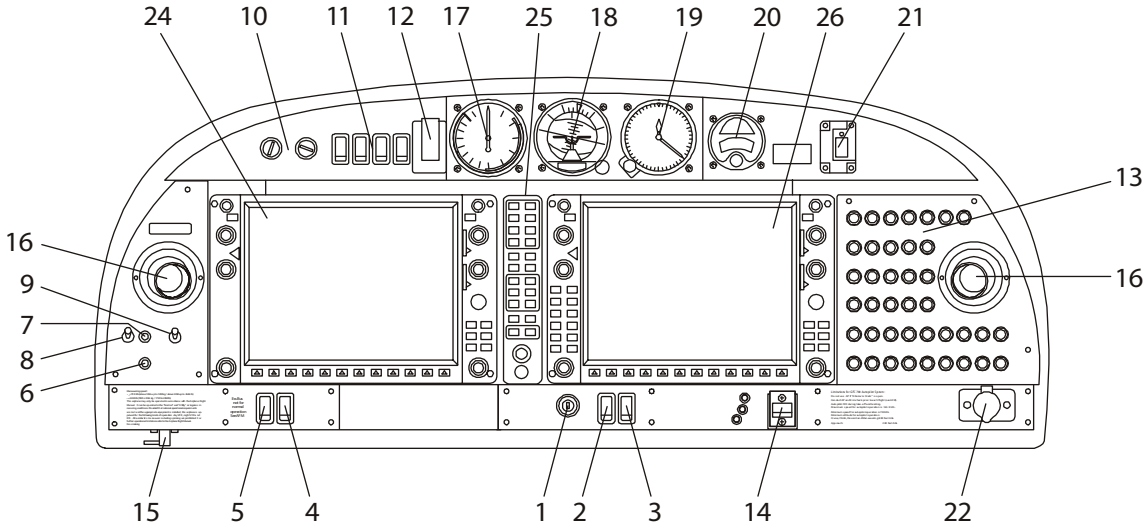
1. General

The DA 40 NG has these instrument and control panels:

- An instrument panel:
  The instrument panel is made in several pieces with a shelf. The shelf goes between the panel and the instrument panel frame.

- A control panel in the center console:
  This panel has a forward cover and an aft cover. The forward cover has the cabin heat control levers, parking brake lever and rudder trim control. The aft cover has the engine controls and fuel transfer/shut-off valve.

See the related Chapter or Section for data about the controls. For example, see Section 76-00 for data on the engine controls.



Major Instruments and Controls			
1	ELECTRIC MASTER key switch	14	FLAP SELECTOR switch
2	FUEL TRANSFER switch	15	Alternate static valve
3	PITOT HEAT switch	16	Ventilation nozzles
4	AVIONIC MASTER switch	17	Backup airspeed indicator
5	ESSENTIAL BUS switch	18	Backup artificial horizon
6	FUEL PUMPS switch	19	Backup altimeter
7	ECU Test button	20	Emergency compass
8	ECU VOTER switch	21	ELT control unit
9	ENGINE MASTER switch	22	Accessory power socket
10	Rotary buttons for instrument lighting and flood light	24	Primary flight display (PFD)
11	Light switches	25	Audio amplifier / Intercom / Marker beacon receiver
12	EMERGENCY switch	26	Multi function display (MFD) including autopilot controls (if autopilot GFC 700 is installed)
13	Circuit breakers		

Figure 1 : Instrument Panel

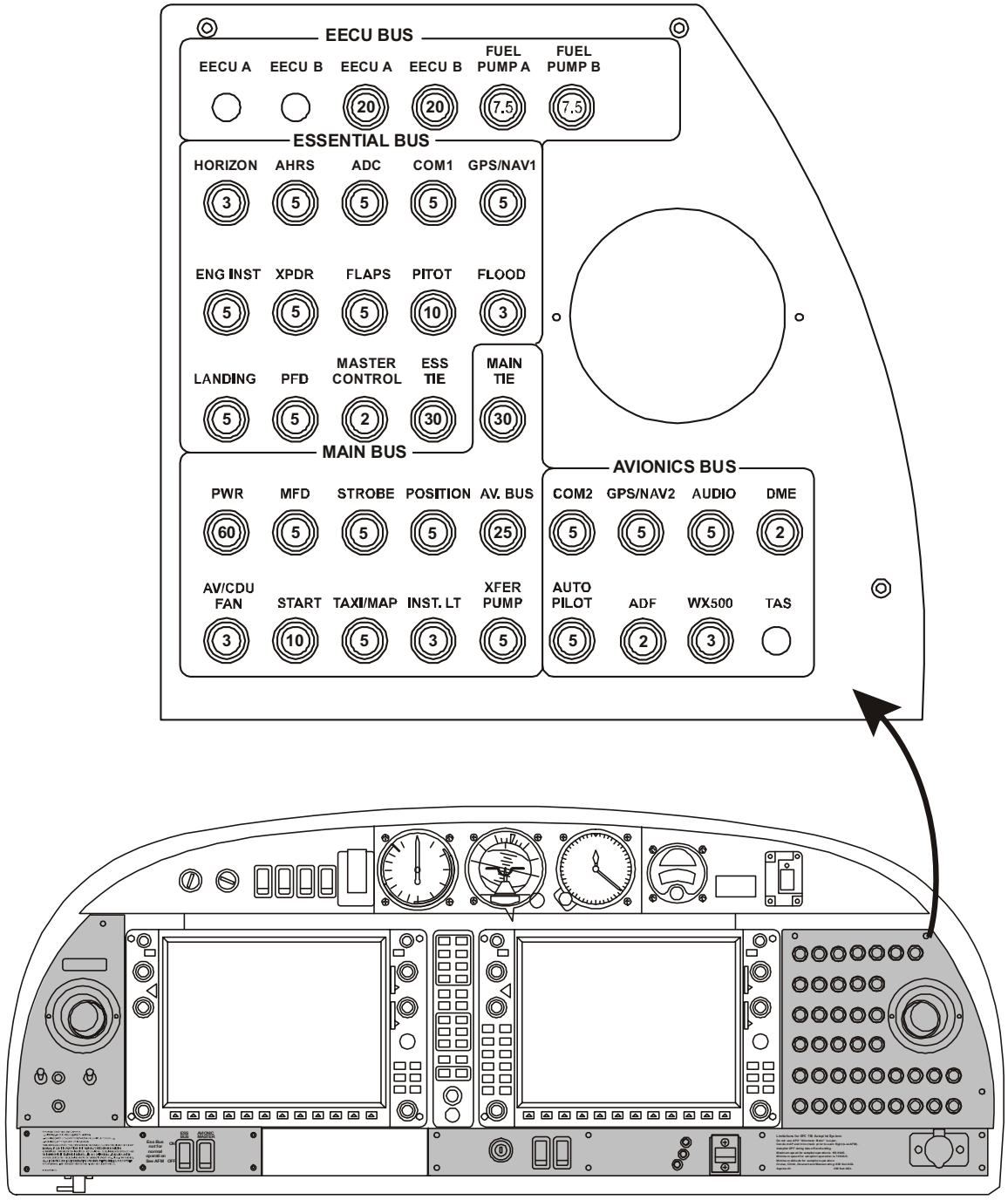


Figure 2 : Circuit Breaker Panel with the G1000 System Installed

Table 1 : CB List with the G1000 System Installed

DESIGNATOR	LOCATION / PANEL	AMP.	CB NAME
EECU BUS	Top part of the CB Panel	Spare	EECU A
EECU BUS	Top part of the CB Panel	Spare	EECU B
EECU BUS	Top part of the CB Panel	20	EECU A
EECU BUS	Top part of the CB Panel	20	EECU B
EECU BUS	Top part of the CB Panel	7.5	FUEL PUMP A
EECU BUS	Top part of the CB Panel	7.5	FUEL PUMP B
ESSENTIAL BUS	Middle part of the CB Panel	3	HORIZON
ESSENTIAL BUS	Middle part of the CB Panel	5	AHRS
ESSENTIAL BUS	Middle part of the CB Panel	5	ADC
ESSENTIAL BUS	Middle part of the CB Panel	5	COM1
ESSENTIAL BUS	Middle part of the CB Panel	5	GPS/NAV1
ESSENTIAL BUS	Middle part of the CB Panel	5	ENG INST
ESSENTIAL BUS	Middle part of the CB Panel	5	XPDR
ESSENTIAL BUS	Middle part of the CB Panel	5	FLAPS
ESSENTIAL BUS	Middle part of the CB Panel	10	PITOT
ESSENTIAL BUS	Middle part of the CB Panel	3	FLOOD
ESSENTIAL BUS	Middle part of the CB Panel	5	LANDING
ESSENTIAL BUS	Middle part of the CB Panel	5	PFD
ESSENTIAL BUS	Middle part of the CB Panel	2	MASTER CONTROL
ESSENTIAL BUS	Middle part of the CB Panel	30	ESS TIE
MAIN BUS	Lower part of the CB Panel	30	MAIN TIE
MAIN BUS	Lower part of the CB Panel	60	PWR

DESIGNATOR	LOCATION / PANEL	AMP.	CB NAME
MAIN BUS	Lower part of the CB Panel	5	MFD
MAIN BUS	Lower part of the CB Panel	5	STROBE
MAIN BUS	Lower part of the CB Panel	5	POSITION
MAIN BUS	Lower part of the CB Panel	25	AV BUS
MAIN BUS	Lower part of the CB Panel	3	AV/CDU FAN
MAIN BUS	Lower part of the CB Panel	10	START
MAIN BUS	Lower part of the CB Panel	5	TAXI/MAP
MAIN BUS	Lower part of the CB Panel	3	INST.LT
MAIN BUS	Lower part of the CB Panel	5	XFER PUMP
AVIONICS BUS	Lower part of the CB Panel	5	COM2
AVIONICS BUS	Lower part of the CB Panel	5	GPS/NAV2
AVIONICS BUS	Lower part of the CB Panel	5	AUDIO
AVIONICS BUS	Lower part of the CB Panel	2	DME
AVIONICS BUS	Lower part of the CB Panel	5	AUTO PILOT
AVIONICS BUS	Lower part of the CB Panel	2	ADF
AVIONICS BUS	Lower part of the CB Panel	3	WX500
AVIONICS BUS	Lower part of the CB Panel	Spare	TAS

2. Instrument Panel Description

Several pieces of aluminum alloy make the instrument panel. The panel has a vertical face with instruments and a horizontal 'shelf' with electrical components. The shelf goes between the firewall and the vertical face of the panel.

The DA 40 NG has an integrated cockpit system (ICS). The ICS has two large LCD display screens which are located in the instrument panel. These two display screens can digitally display all of the flight, navigation and airplane system data. An audio control panel is located between the display screens. The audio control panel integrates with the ICS and is used to control all of the airplane radio and navigation audio systems. Refer to Section 31-40 for more data about the ICS.

An airspeed indicator, artificial horizon, altimeter and magnetic compass are located along the top of the instrument panel. These instrument provide the basic data required to fly the airplane in the event of a power failure and the loss of the ICS. The artificial horizon is a gyroscopic instrument that can be powered from an emergency power pack. An emergency switch is located near the artificial horizon and has a guard installed to prevent accidental selection.

The circuit-breakers (see Figure 2 and Table 1) for the electrical systems are all located on the right side of the instrument panel. The electrical system bus-bars are directly connected to the rear of the circuit-breakers.

The shelf part of the instrument panel holds relays, junction blocks, connectors and ground studs.

The instrument panel has a cover attached by screws.

Refer to Chapter 24 for more data about the electrical system and Chapter 34 for more data about the autopilot system.

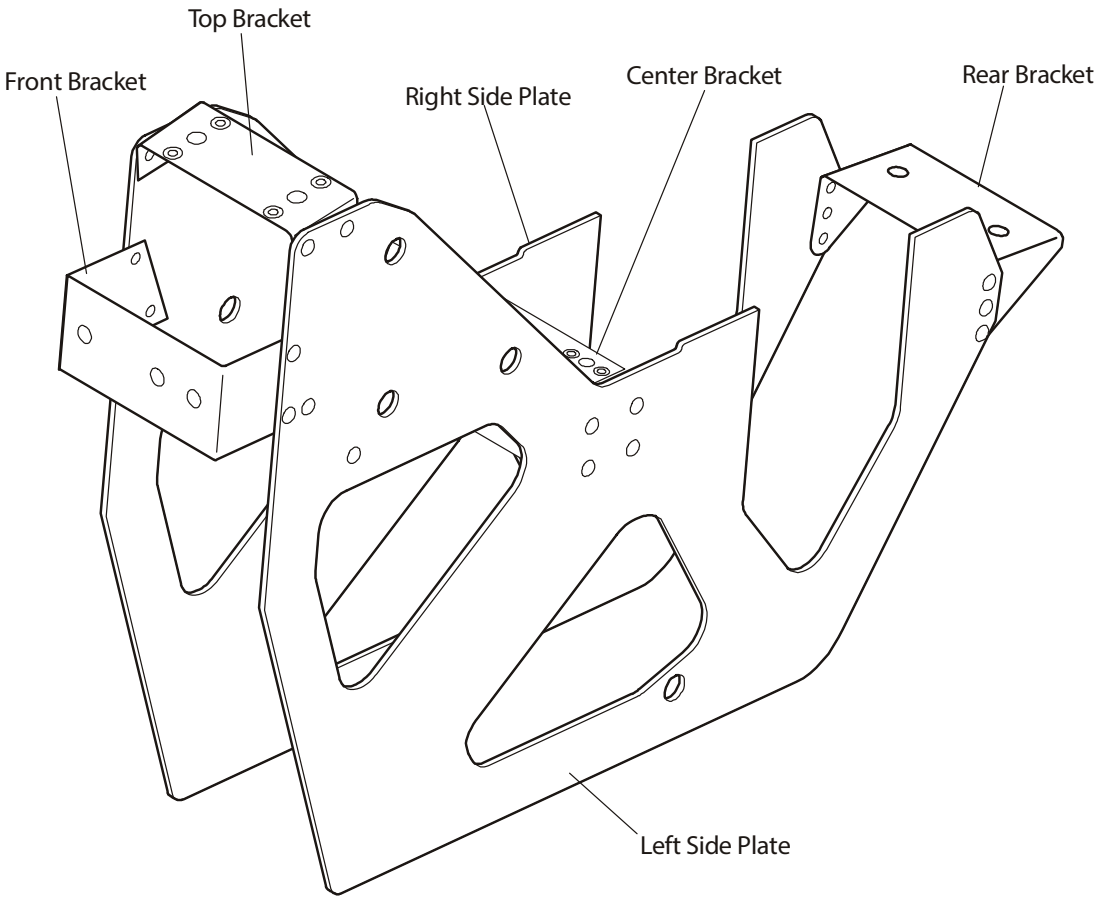


Figure 3 : Engine Control Assembly - Structure

3. Center Console Description

The engine control assembly holds the parking brake and heating controls. It also holds the engine power lever.

Figure 3 shows the center console structure. Refer to the related Chapters for the data on the controls.

The engine control assembly has two aluminum alloy side plates. Four brackets attach to the side plates with rivets. The front bracket has holes to anchor the outer sheaths of the brake and heat control cables. The top bracket has two anchor-nuts. Bolts engage the anchor nuts to attach the engine control assembly to the top of the floor panel.

The center bracket has two anchor nuts for the control cover plates. The rear bracket attaches to the elevator trim control assembly.

There are no user-maintainable parts in the engine control assembly structure.

TROUBLE-SHOOTING

1. General

The table below lists the defects you could have with the control panel in the center console.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column..

Trouble	Possible Cause	Repair
Parking brake or cabin heat control levers do not stay in the set position.	Friction tension too low.	Adjust the friction.
	Too much wear in the friction washers.	Replace the friction washers.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to remove/install the engine control assembly.
See the related Chapter for data about indicators in other systems.

2. Remove/Install the Engine Control Assembly

A. Remove the Engine Control Assembly.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the knob from the emergency fuel valve: - Remove the cross-head screw from the center of the control-knob and pull the knob up and off the fuel selector valve. - Remove the mounting plate.	
(2)	Remove the engine power control lever assembly.	Refer to Section 76-00.
(3)	Remove the bolts that attach the engine control assembly to the floor panel at the front and at the rear.	
(4)	Remove the front cover plate.	
(5)	Move the engine control assembly to a position where you can reach the control cables.	
(6)	Disconnect the following control cables from the center console: - Cabin heat control cable. - Cabin heat distribution control cable. - Parking brake control cable.	 Refer to Section 21-00. Refer to Section 21-00. Refer to Section 32-40.
(7)	Move the engine control assembly clear of the airplane.	

B. Install the Engine Control Assembly.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that there are no loose items, specially in the center console.	
(2)	Move the engine control assembly onto the center console and support it in a position where you can install the control cables.	
(3)	Connect these control cables to the engine control assembly: - Parking brake control cable. - Cabin heat distribution control cable. - Cabin heat control cable.	 Refer to Section 32-40. Refer to Section 21-00. Refer to Section 21-00.
(4)	Move the engine control assembly fully into position in the floor panel.	
(5)	Install the engine control assembly front cover plate: - Move the cover plate into position on the engine control assembly. - Install the two hex-headed bolts which attach the cover plate and engine control assembly to the floor panel.”	 Do not tighten.
(6)	Install the engine power control lever.	Refer to Section 76-00.
(7)	Tighten the two hex-headed bolts in the front cover plate.	
(8)	Do a test for correct range, full and free movement of the cabin heat control system.	Refer to Section 21-00.
(9)	Do a test for correct range, full and free movement of the cabin heat distribution system.	Refer to Section 21-00.
(10)	Install the knob on the emergency fuel valve: - Install the mounting plate. - Push the knob onto the fuel valve selector shaft. - Install the cross-head screw which attaches the knob to the shaft.	

INSTRUMENT AND CONTROL PANELS

WITH CONVENTIONAL COCKPIT INSTALLED

1. General

The DA 40 NG with the conventional cockpit installed has these instrument and control panels:

- An instrument panel:
  The instrument panel is made in one piece with a shelf. The shelf goes between the panel and the firewall.

- A control panel in the center console:
  This panel has a forward cover and an aft cover. The forward cover has the cabin heat control levers and parking brake lever. The aft cover has the engine control and emergency fuel valve.

See the related Chapter or Section for data about the controls. For example, see Section 76-00 for data on the engine controls.

The following Figure shows the instrument panel with conventional instrumentation:

NOTE: The instruments and avionic equipment cannot be installed in any arbitrary combination. The airplane manufacturer must be contacted before removing or installing equipment, with the exception of replacing a unit by an identical unit.

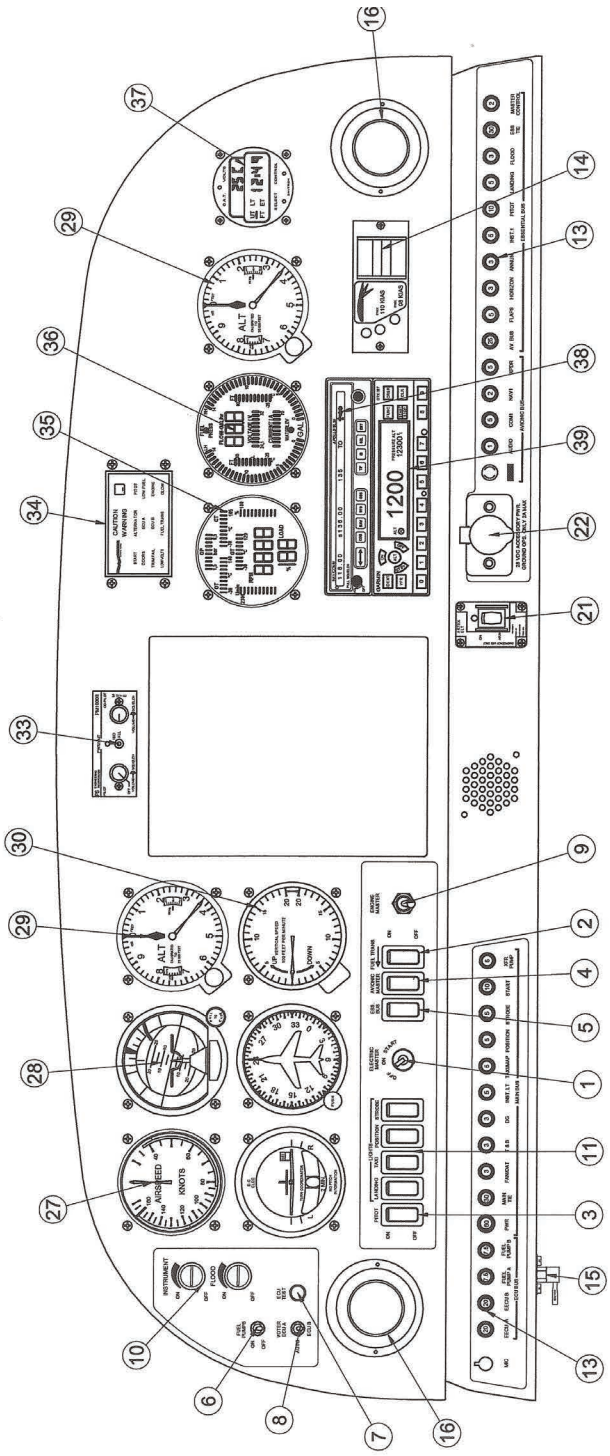

Figure 1 : Instrument Panel with Conventional Instrumentation

Major Instruments and Controls			
1	ELECTRIC MASTER key switch	21	ELT control unit
2	FUEL TRANSFER switch	22	Accessory power socket
3	PITOT HEAT switch	27	Airspeed Indicator
4	AVIONICS MASTER switch	28	Attitude Gyro (artificial horizon)
5	ESSENTIAL BUS switch	29	Altimeter
6	FUEL PUMPS switch	30	Vertical Speed Indicator (VSI)
7	ECU Test button	31	Directional Gyro
8	ECU VOTER switch	32	Turn & Bank indicator
9	ENGINE MASTER switch	33	Intercom
10	Rotary buttons for instrument lighting and flood light	34	Annunciator panel
11	Light switches	35	Main Engine Display (MED)
13	Circuit breakers	36	Secondary Engine Display (SED)
14	FLAP SELECTOR switch	37	Chronometer with OAT Indicator
15	Alternate static valve	38	COM/NAV
16	Ventilation nozzles	39	Transponder

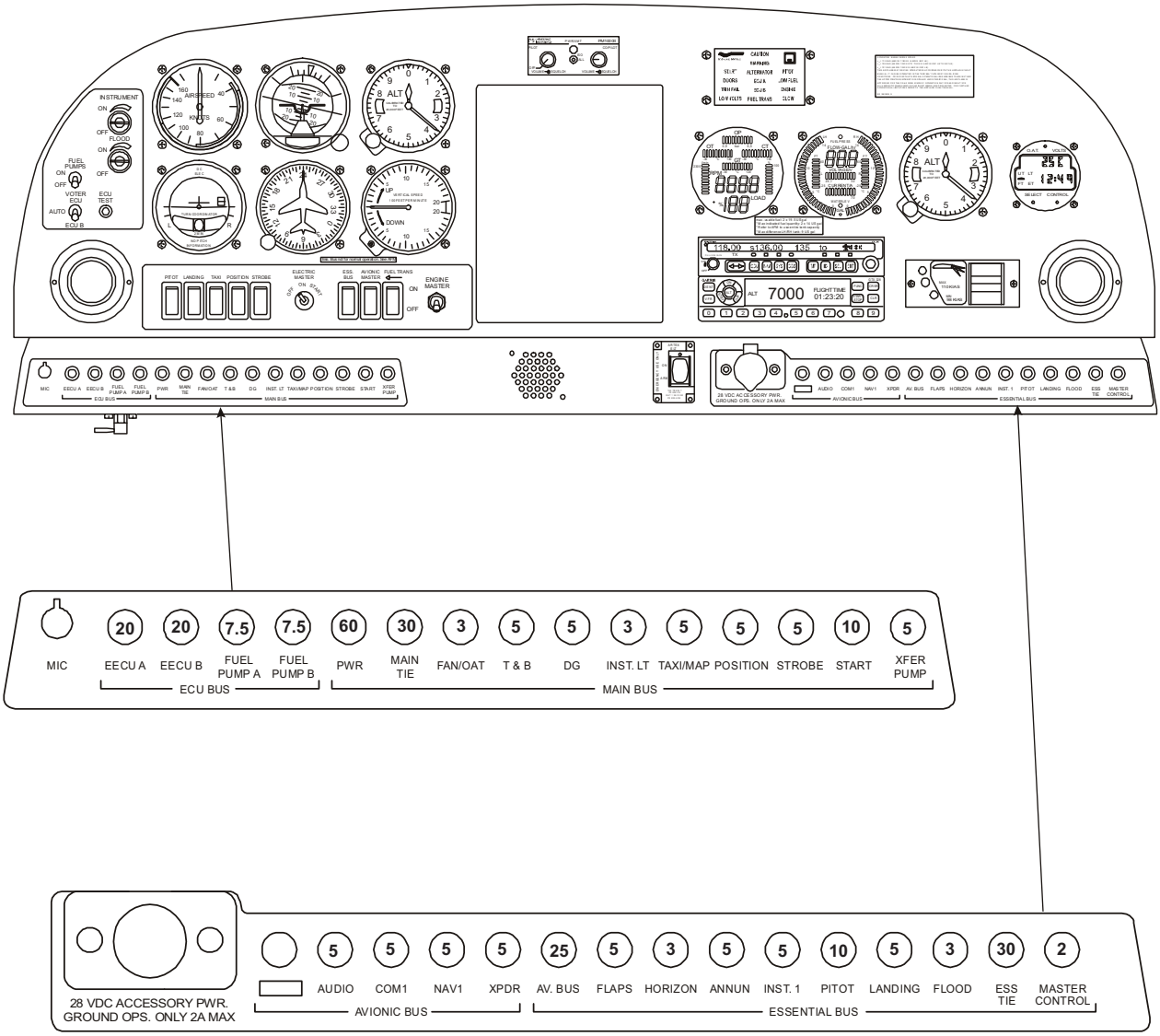

Figure 2 : Circuit Breaker Panel with the Conventional Cockpit Installed

Table 1 : CB List with the Conventional Cockpit Installed

DESIGNATOR	LOCATION / PANEL	AMP.	CB NAME
ECU BUS	Below the LH side Instrument Panel	20	EECU A
ECU BUS	Below the LH side Instrument Panel	20	EECU B
ECU BUS	Below the LH side Instrument Panel	7.5	FUEL PUMP A
ECU BUS	Below the LH side Instrument Panel	7.5	FUEL PUMP B
MAIN BUS	Below the LH side Instrument Panel	60	PWR
MAIN BUS	Below the LH side Instrument Panel	30	MAIN TIE
MAIN BUS	Below the LH side Instrument Panel	3	FAN/OAT
MAIN BUS	Below the LH side Instrument Panel	5	T & B
MAIN BUS	Below the LH side Instrument Panel	5	DG
MAIN BUS	Below the LH side Instrument Panel	3	INST.LT
MAIN BUS	Below the LH side Instrument Panel	5	TAXI/MAP
MAIN BUS	Below the LH side Instrument Panel	5	POSITION
MAIN BUS	Below the LH side Instrument Panel	5	STROBE
MAIN BUS	Below the LH side Instrument Panel	10	START
MAIN BUS	Below the LH side Instrument Panel	5	XFER PUMP
AVIONIC BUS	Below the RH side Instrument Panel	Spare	
AVIONIC BUS	Below the RH side Instrument Panel	5	AUDIO
AVIONIC BUS	Below the RH side Instrument Panel	5	COM1
AVIONIC BUS	Below the RH side Instrument Panel	5	NAV1
AVIONIC BUS	Below the RH side Instrument Panel	5	XPDR
ESSENTIAL BUS	Below the RH side Instrument Panel	25	AV. BUS
ESSENTIAL BUS	Below the RH side Instrument Panel	5	FLAPS

DESIGNATOR	LOCATION / PANEL	AMP.	CB NAME
ESSENTIAL BUS	Below the RH side Instrument Panel	3	HORIZON
ESSENTIAL BUS	Below the RH side Instrument Panel	5	ANNUN
ESSENTIAL BUS	Below the RH side Instrument Panel	5	INST.1
ESSENTIAL BUS	Below the RH side Instrument Panel	10	PITOT
ESSENTIAL BUS	Below the RH side Instrument Panel	5	LANDING
ESSENTIAL BUS	Below the RH side Instrument Panel	3	FLOOD
ESSENTIAL BUS	Below the RH side Instrument Panel	30	ESS TIE
ESSENTIAL BUS	Below the RH side Instrument Panel	2	MASTER CONTROL

2. Instrument Panel Description

A single piece of aluminum alloy makes the instrument panel. The panel has a vertical face with instruments and a horizontal “shelf” with electrical components. The shelf goes between the firewall and the vertical face of the panel.

The left side of the panel has the usual flight instruments. Refer to Chapter 34 for data on these instruments.

The right part of the panel has the standard-size avionic equipment. It holds the trays for the transponder and radio. Refer to Chapters 23 and 34 for data on this equipment.

The right side of the panel also contains the engine instruments. The engine data shows on two digital instruments. There is also a digital OAT indicator and clock that can also show voltage. Refer to Chapter 77 for data on these instruments.

The bottom left of the panel has the switch panel. The ELECTRIC MASTER key switch is a master switch and starter switch (as in motor vehicles). Setting it to the ON position applies power to the bus system. Refer to Chapter 24-01 for data on the electrical system.

The far left of the panel has the rheostat switches for lighting control.

The bottom part of the panel (See Figure 2 and Table 1) has the circuit-breakers. The circuit-breakers are grouped in bus order. Refer to Section 24-61 for more data about the circuit-breakers and bus system.

The shelf part of the instrument panel holds relays, junction blocks, connectors and ground studs.

The instrument panel has a cover attached by screws.

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INDEPENDENT INSTRUMENTS

1. General

This Section tells you about the digital chronometer which can be installed in the DA 40 NG. Refer to the equipment manufacturers' manuals for more data about the equipment.

2. Description

A. Davtron M803 Digital Chronometer

Figure 1 shows the Davtron M803 digital chronometer. It is located in the instrument panel, see Section 31-10 or 31-11. Refer to Section 34-10 for more information about the OAT indication functions of the unit.

The front of the Davtron M803 digital chronometer consists of three buttons and an LCD. The background of the LCD is illuminated.

The chronometer has the following functions:

- Clock function. The time can be displayed in 'Universal Time' format or 'Local Time' format.
- Elapsed Timer Count Up. The unit displays the minutes and seconds during the first hour, then the hours and minutes until 99 hours and 50 minutes.
- Elapsed Timer Count Down. A count down from any time, a maximum of 59 minutes and 59 seconds can be set.
- Flight Time Alarm. The display will flash when the Flight Time equals the previous set alarm time.
- OAT/Volts. One button control steps sequentially through E, F, C. (E-Voltage (EMF), F-OAT Fahrenheit, C-OAT Centigrade).

The chronometer and lighting are supplied with power by the main bus. The chronometer has an internally back-up 1.5 V AA battery.

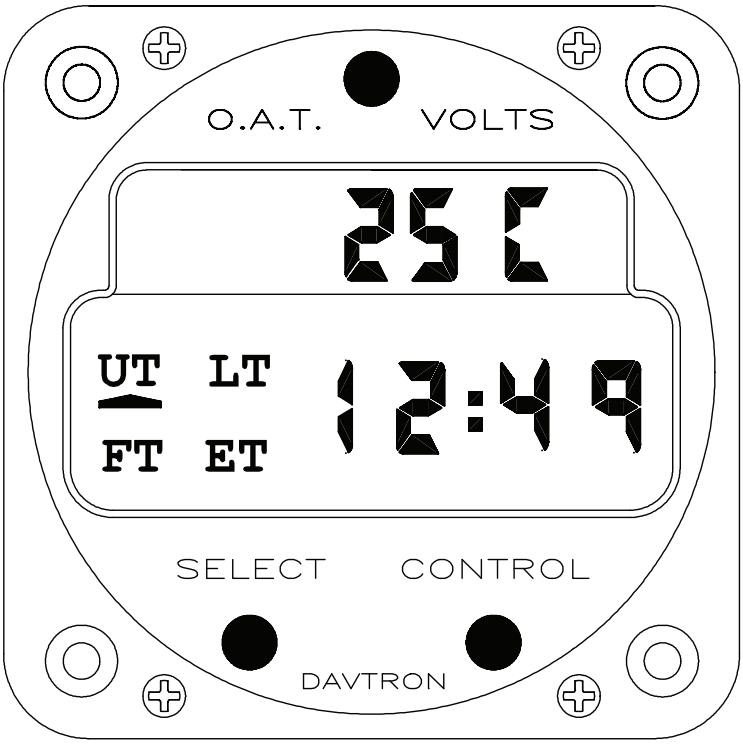

Figure 1 : Davtron M803 Digital Chronometer

MAINTENANCE PRACTICES

1. General

This Section tells you how to replace the digital chronometer.
Refer to the equipment manufacturer's manuals for more data on the digital chronometer.

2. Remove/Install the Digital Chronometer

A. Remove the Digital Chronometer.

	Detail Steps/Work Items	Key Items/References
(1)	Open the OAT circuit-breaker.	
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Disconnect the electrical cable from the chronometer.	
(4)	Remove the screws which attach the chronometer to the instrument panel.	Hold the chronometer.
(5)	Move the chronometer out of the instrument panel and lift it clear of the airplane.	

B. Install the Digital Chronometer.

	Detail Steps/Work Items	Key Items/References
(1)	Move the chronometer into its position in the instrument panel.	
(2)	Install the screws which attach the chronometer to the instrument panel.	
(3)	Connect the electrical cable to the rear of the chronometer.	
(4)	Do a test for correct OAT indication. - Close the OAT circuit-breaker. - Set the ELECTRIC MASTER key switch to ON. - Read OAT indication. - - Set the ELECTRIC MASTER key switch to OFF.	The OAT indicator must indicate the ambient temperature ±2°.
(5)	Davtron M803: - If necessary, set the time.	Refer to the equipment manufacturer's manuals.
(6)	Install the instrument panel cover.	Refer to Section 25-10.

CENTRAL COMPUTERS

1. General

The DA 40 NG has a Garmin G1000 Integrated Cockpit System (ICS). The ICS integrates all the usual flight, avionic and airframe system indications into one system. The system displays the data on two display screens located in the instrument panel. An audio control panel is located between the two display screens. The audio control panel integrates and controls the airplane radio, navigation and intercom systems.

Refer to Section 23-50 for more data about the audio control panel.

Electrical power is supplied to the ICS control and display screens when the ELECTRIC MASTER key switch is set to ON. Power is supplied to the audio control panel when the AVIONIC MASTER switch is set to ON.

During normal operation the left display screen is referred to as the primary flight display (PFD) and the right display screen as the multi function display (MFD). Either display can be used as PFD or MFD. If one display fails the remaining screen can be switched to the reversionary mode. Reversionary mode is a mode of operation in which both the PFD and MFD are identically configured to display all of the important flight parameters in the event of display failure.

For more detailed data about the ICS refer to the G1000 Cockpit Reference Guide for the DA 40 NG Airplane, and the G1000 Pilot's Guide for the DA 40 NG.

Figure 1 shows the ICS system schematic.

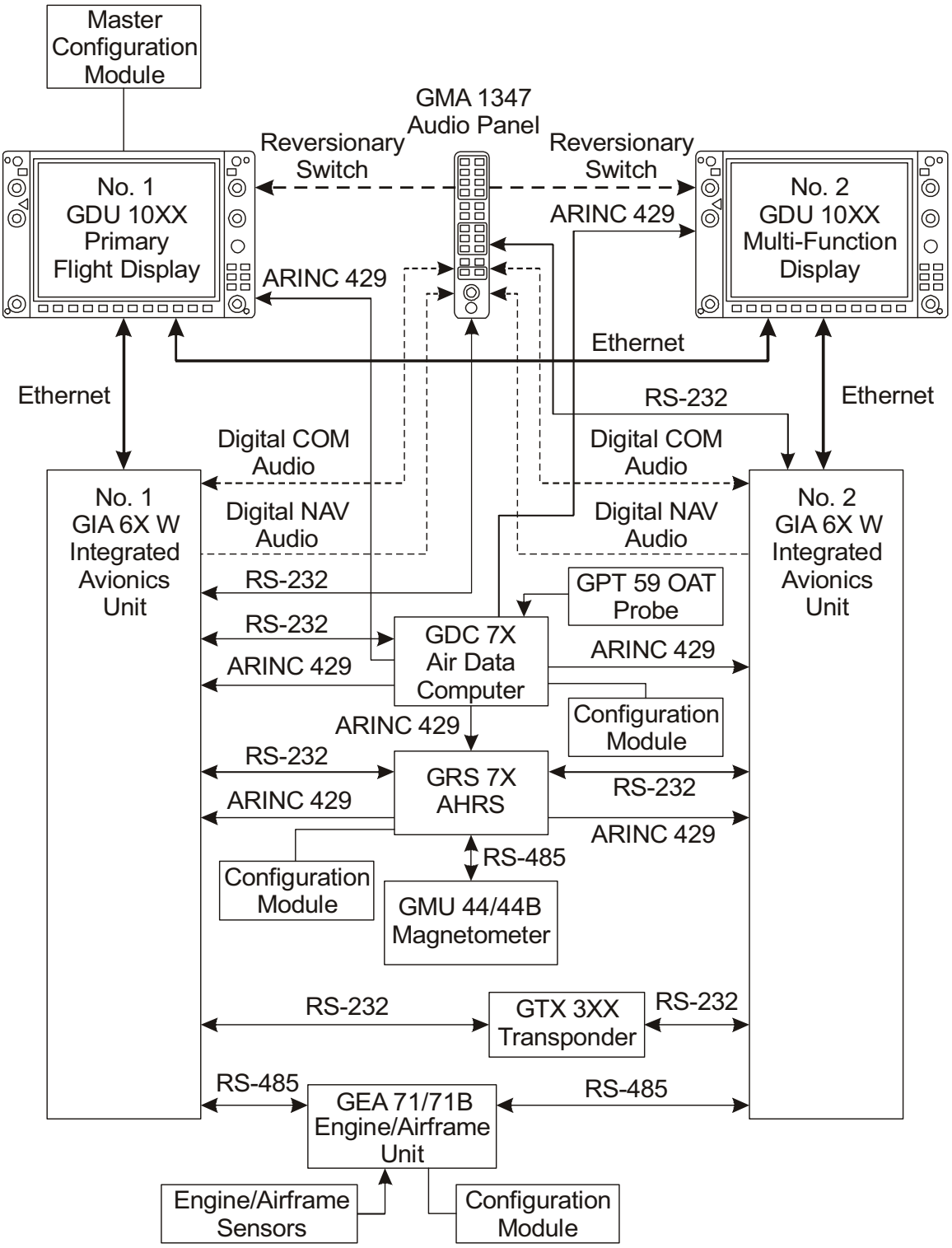

Figure 1 : Integrated Cockpit - System Schematic Diagram

2. Description

Figure 1 shows the schematic diagram for the ICS. The ICS has these main components:

A. Primary Flight Display (PFD)

Figure 3 shows the PFD.

The PFD is a 10.4 in liquid crystal display. Bezels on the left and right side of the PFD have the controls for the ICS. The lower edge of the PFD has “softkeys”. The function of the softkeys relates to the on-screen display and the display will show the function of the key.

The PFD shows the basic primary flight display plus a number of additional options that can selected manually. Some other indications will be generated automatically for example, alert captions.

The left side bezel has these controls:

- NAV Vol/Sq knob. This controls the NAV audio level. Press the knob to toggle the ident filter OFF/ON.

- NAV Frequency Transfer key. Press this key to make the standby NAV frequency the active frequency.

- NAV knob. This control has a large outer knob and a smaller inner knob. Rotate these knobs to select the NAV frequency. Rotate the large outer knob to select the MHz and the inner knob to select the KHz. Pressing the smaller inner knob will toggle the tuning cursor between the NAV1 and NAV2 frequency display.

- HDG knob. You can manually select the heading with this control. Pressing this knob will cause a heading window to momentarily appear to the left of the heading indicator. This window will show the airplane heading in a digital display and the heading bug will align with the compass lubber line.

- ALT SEL knob. Sets the selected altitude in the window over the altimeter tape display. The large outer knob sets the thousands indication and the inner knob sets the hundreds indication.

The right side bezel has these controls:

- COM VOL/SQ knob. Controls the COM audio level. Press the knob to toggle the COM automatic squelch ON/OFF.

- COM Frequency Transfer key. Press this key momentarily to make the standby COM frequency active. Press and hold this key to automatically make the emergency frequency (121.5 MHz) the standby frequency.

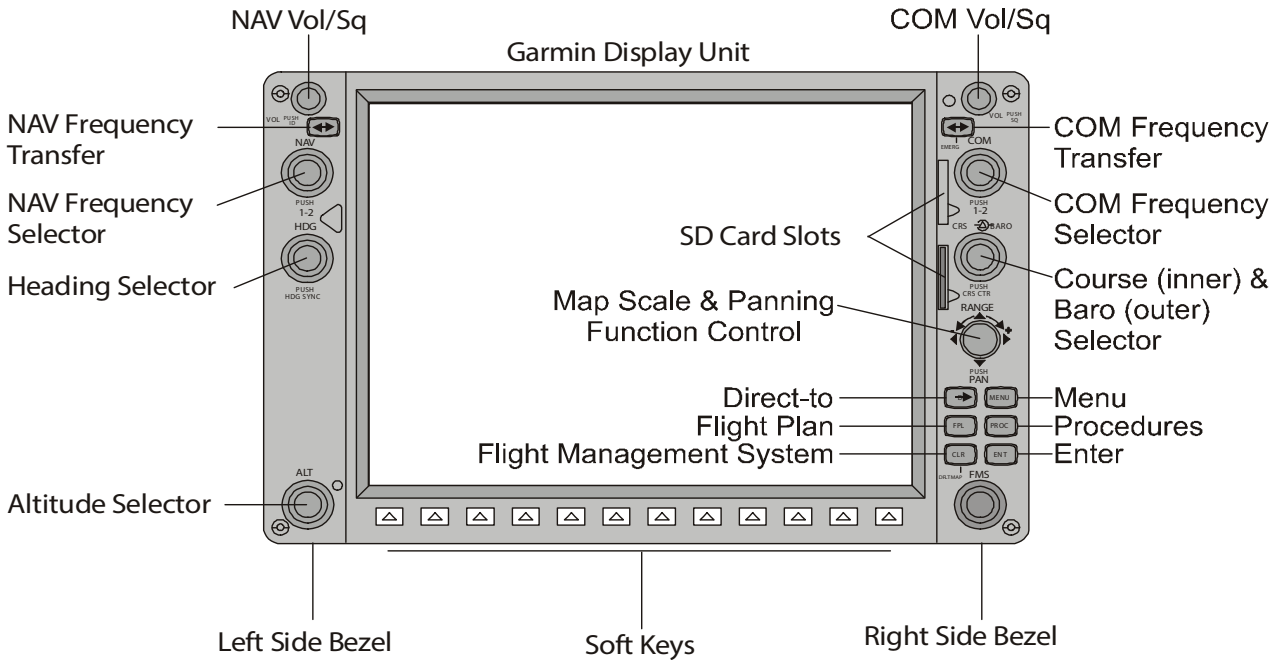

Figure 2 : Garmin G1000 Display Screens and Audio Integrating Unit

- COM knob. This control has a large outer knob and a smaller inner knob. Rotate these knobs to select the COM frequency. Rotate the large outer knob to select the MHz and the inner knob to select the KHz. Pressing the smaller inner knob will toggle the tuning cursor between the COM1 and COM2 frequency display.

- CRS/BARO knob. This control has a large outer knob and a small inner knob. The outer knob sets the barometric pressure. The inner knob sets the airplane course.

- RANGE/PAN JOYSTICK knob. Rotate the knob to increase/decrease the map scale. Use the knob as a joystick to pan the map display.

- DIRECT TO key. Press this key to activate the direct-to function. This will give the direct course to a waypoint selected from the active route or to a position indicated by the map cursor.

- MENU key. Press the key to display the menu. The menu displays the options associated with the currently displayed page.

- FPL key. Press this key to display the active flight plan page. You can create or edit an existing flight plan using the bezel controls and soft keys when this page is displayed.

- PROC key. Press this key to display the procedures page. If this page is used with a selected flight plan then the procedures page will display the data associated with the flight plan. If the page is not used with a flight plan then an airfield and its related procedures can be selected from a database.

- CLR key. Press this key to cancel an entry or delete information. Press and hold this key to immediately display the Default Navigation Map Page.

- ENT key. Press to accept a menu selection or data entry. Use this key to approve an operation or to complete a data entry.

- FMS knobs. Use these concentric knobs select the page to be displayed. The outer large knob selects a page group and the inner knob selects a specific page from within the selected page group. Press the inner knob to activates an on-screen cursor. When the cursor is activated the outer knob can be used to move the cursor on the page and the small inner knob can used to scroll the cursor through an item or menu selected by the outer knob.

- Secure Digital (SD) Cards. Secure digital cards can be inserted into the slots in the right side bezel. These cards can contain data such as updated GPS navigation charts or special-to-type airplane check-lists.

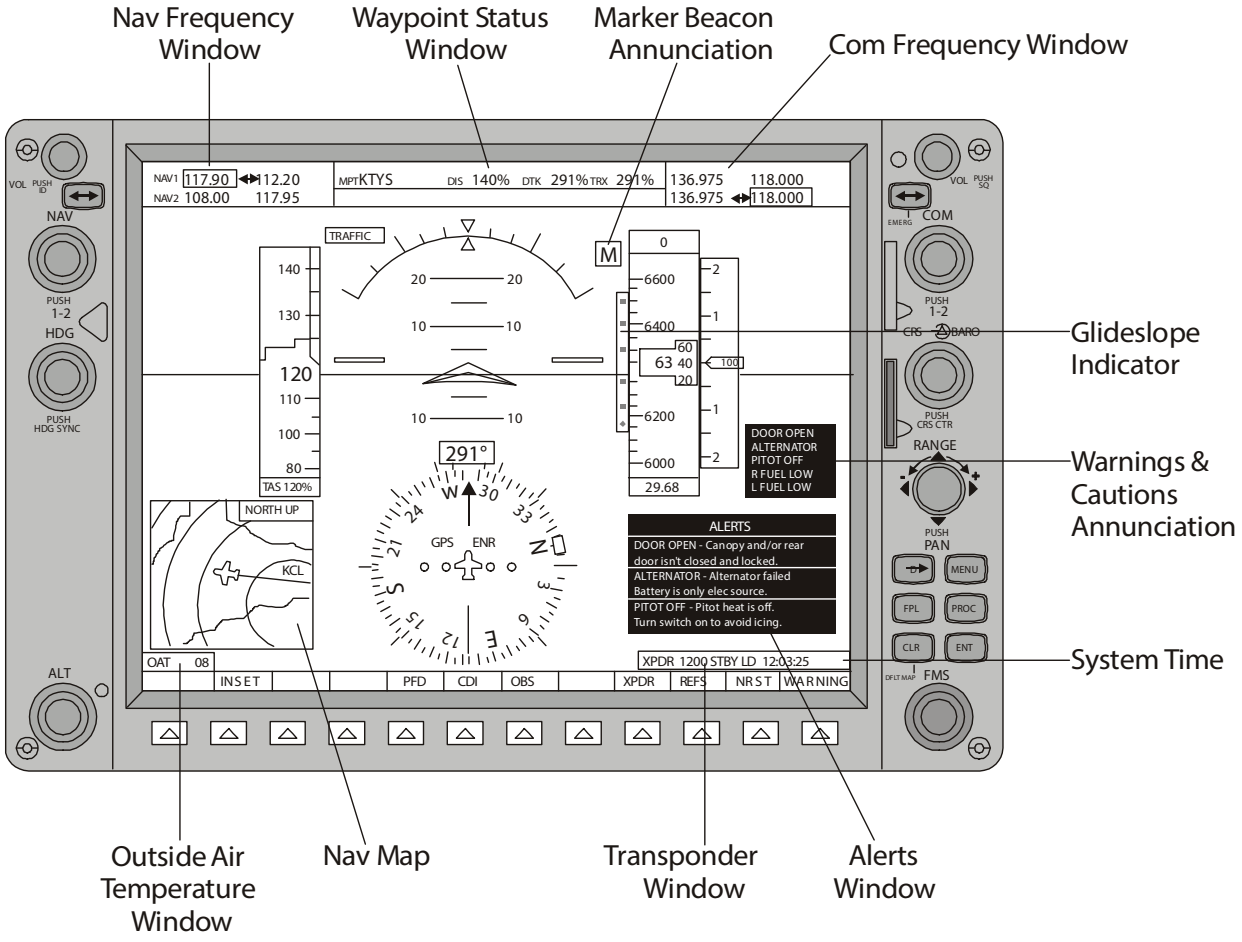

Figure 3 : Primary Flight Display

The basic flight instruments are:

- Airspeed Indicator (ASI). The airspeed indicator is on the left side of the display and indicates the airspeed on a rolling number gauge using a moving tape. The airspeed indicator also displays speed ranges for different airplane configurations, airspeed trends and 'V' speeds. If the airspeed indicator fails the display marks the airspeed display area with a red 'X' and yellow text spelling out 'AIRSPEED FAIL' (if MÄM 40-868 is NOT installed).

- TAS. True airspeed is digitally displayed in a small window below the airspeed indicator.

- Attitude Indicator (Artificial Horizon). The attitude indicator is located in the center of the PFD, at the top. The attitude indicator shows the pitch, roll and yaw situation of the airplane. If the attitude indicator fails the display marks the pitch attitude display area with a red 'X' and yellow text spelling out 'ATTITUDE FAIL' (if MÄM 40-868 is NOT installed).

- Altimeter. The altimeter is located at the top right of the PFD. The altimeter displays the airplane altitude in feet on a rolling number gauge using a moving tape. The altimeter also shows a altitude 'bug' at the selected altitude or the edge of the tape, whichever is closest to the current altitude. If the altitude indicator fails the display marks the tape display area with a red 'X' and yellow text spelling out 'ALTITUDE FAIL' (if MÄM 40-868 is NOT installed).

- Barometric Pressure Indicator. The barometric pressure indicator is located immediately below the altitude indicator. The indicator shows the barometric pressure that has been set in either inches of mercury (Hg) or hectopascal number (hPa)

- Vertical Speed Indicator (VSI). The vertical speed indicator is located to the right of the altitude indicator. The indicator displays the airplane vertical speed in feet/min. A numeric pointer moves vertically up/down a fixed tape. The vertical speed indication is also shown digitally on the pointer. A negative sign is shown on the pointer to indicate negative vertical speeds (airplane descending). If the VSI fails the display marks the tape display area with a red or yellow 'X' and yellow text spelling out 'VERT SPEED FAIL' (if MÄM 40-868 is NOT installed).

- Horizontal Situation Indicator (HSI). The HSI s located in the center of the PFD at the bottom. The HSI displays a rotating circular compass with heading markings. The HSI shows the following information:

- Heading information. The heading is shown digitally in a window at the top of the rotating compass.

- Turn Rate Indicator. A turn rate indicator is located between the digital heading window and the rotating compass.

- Course Deviation Indicator (CDI). The CDI is a line with an arrowhead that points to the airplane heading on the rotating compass. The line can slide left or right of the center marking to show the deviation of the actual course being flown to the required course. Course data can be supplied from the airplane VOR, LOC or GPS system. If the heading data is invalid the digital heading display window is marked with a red cross and yellow text spelling 'HDG'.

- Vertical Deviation (Glideslope) Indicator. The glideslope indicator is located to the left of the vertical speed indicator.

- Alerts Window. The alerts window is located on the lower right side of the PFD. This window opens when an alert is activated or when the WARNINGS softkey is operated.

- Warnings and Cautions Window. The warnings and cautions window is located above the alerts window. This window opens when a warning or caution is activated or if the WARNING softkey is operated.

- NAV MAP. The NAV MAP window is located in the lower left of the PFD. The window is activated by pressing the INSET softkey and when activated shows a pictorial view of the airplane on a moving map.

Small windows in the top left corner of the PFD show active and standby NAV frequencies. Small windows in the top right of the PFD show active and standby COM frequencies. A larger window in the top of the PFD flight planning data when activated.

A small window in the bottom left of the PFD shows the outside air temperature (OAT). A small windows on the bottom right of the PFD shows the transponder settings and operational state. Another small window in the right bottom corner of the PFD shows a digital clock.

A set of labels along the very bottom of the PFD identify the function of the softkeys for the current page being displayed on the PFD.

The PFD has a self-monitoring system. If the self-monitoring system detects a fault the PDF enters reversionary mode. In the reversionary mode the PDF is configured to display the flight instrument symbology and the basic engine parameter monitoring indications. The PFD reversionary mode can also be entered by pressing the DISPLAY BACKUP selector. The DISPLAY BACKUP selector is located on the bottom of the audio control panel.

B. Multi-Function Display (MFD)

The MFD is a 10.4 in liquid crystal display. Bezels on the left and right side of the MFD have the controls for the ICS. The lower edge of the MFD has 'softkeys'. The function of the soft keys relates to the on-screen display and if a key has a function related to the current display the display will show the function of the key.

The MFD displays engine and airplane pages on the left slide of the screen. The remainder of the screen is used to display navigational pages. The bezels on the left and right side of the MFD have the same controls and function as the bezels on the PFD. The left side bezel on the MFD has also the controls for the autopilot system. Refer to Chapter 22 for more information about the autopilot.

The engine instrumentation system window (EIS) is on the left side of the MFD and displays a full-time dedicated display of engine parameters. The information is presented in three displays:

- Engine Display. This is the default display and shows following critical engine and fuel indicators:

  - Engine load. The engine load is displayed as a percentage. An analog pointer moves to show the engine load. If the system fails the display shows a red or yellow cross at the load indicator to show the system has failed.

  - Engine RPM. An analog pointer moves to show the engine rpm. If the system fails the display shows a red or yellow cross at the RPM indicator to show the system has failed.

  - Fuel flow. A small window shows the engine fuel flow digitally. If the system fails a red or yellow cross is displayed in place of the digital indication for the failed system.

  - Oil temperature. A pointer above a horizontal range bar indicate the oil temperature. The range bar is color coded, green to show the normal operating range, yellow in the cautionary range and red in the warning range. The pointer moves from left to right to indicate the oil temperature. If the system fails a red or yellow cross is displayed above the range bar to show the system has failed.

  - Oil pressure. A pointer above a range bar indicates the oil pressure. The range bar is color coded, green to show the normal operating range, yellow in the cautionary range and red in the warning range. The pointer moves from left to right to indicate the oil pressure. If the system fails a red or yellow cross is displayed above the range bar to show the system has failed.

  - Coolant temperature. A pointer above a range bar indicates the coolant temperature. The range bar is color coded, green to show the normal operating range, yellow in the cautionary range and red in the warning range. The pointer moves from left to right to indicate the coolant temperature. If the system fails a red or yellow cross is displayed above the range bar to show the system has failed.

- Fuel temperature. Pointers above and below a range bar indicate the fuel temperature. The range bar is color coded, green to show the normal operating range, yellow in the cautionary range and red in the high warning range. The pointers move from left to right to indicate the fuel temperature. The pointer above the range bar indicates the temperature of the fuel in the left fuel tank and the pointer below the range bar indicates the temperature of the fuel in the right fuel tank. If the system fails a red or yellow cross is displayed in place of the indication for the failed system(s).

- Fuel quantity. Pointers above and below a range bar indicate the fuel quantities. The pointers move from left (low) to right (full) to indicate the fuel quantity. The pointer above the range bar indicates the quantity of fuel in the left fuel tank and the pointer below the range bar indicates the quantity of fuel in the right fuel tank. If the system fails a red or yellow cross is displayed in place of the indication for the failed system(s).

- System Display (if MÄM 40-868 is NOT installed). This display shows graphic and numeric readouts of following critical engine, electrical indicators and optional deice fluid quantity:

  - Engine load. This indication is in the same format as in the ENGINE page.

  - Engine RPM. This indication is in the same format as in the ENGINE page.

  - Volts. The essential bus voltage is displayed. A pointer above horizontal range bar shows the bus voltage. The horizontal range bar is color coded. The green central section of the bar indicates that the voltage is within limits. The red section at the left end of the range bar indicates too low a voltage. The red section at the right end of the range bar indicates too high a voltage. Above the range bar is a window displaying the essential bus voltage digitally.

  - Amps. The Generator load is displayed. A pointer above horizontal range bar shows the generator load. The range bar is color coded, green in the normal load range and then red at the high end of the range. The range bar is also marked numerically at the 0 and 80 Amp indications. The pointer moves from left to right to show the load on the generator. A small window above the range bar shows the generator load digitally.

  - Engine gearbox temperature. A pointer above a horizontal range bar shows the gearbox temperature. The range bar is color coded, green in the normal temperature range, yellow in the caution range and then red at the high end of the range. The pointer moves from left to right to show the temperature of the gearbox. A small window above the range bar shows the gearbox temperature digitally. If the system fails the display shows red crosses in place of the indications for the failed system(s).

  - Coolant temperature. Displays digital readouts of the coolant temperature.

  - Oil temperature. Displays digital readouts of the oil temperature.

  - Oil pressure. Displays digital readouts of the oil pressure.

- Pressing the FUEL softkey at the bottom of the MFD will change the display to the FUEL page in the EIS panel (if MÄM 40-868 is NOT installed). The display will now give the following indications:

  - Engine load and RPM. These indications are in the same format as in the ENGINE page.

  - Fuel Quantity. Displays digital readouts of the fuel tank quantity.

  - Fuel flow. Displays digital readouts of the fuel flow.

  - Fuel temperature. Displays digital readouts of the fuel temperature.

From this page you can use softkeys to enter data for the fuel system. Refer to the Garmin G1000 Cockpit Reference Guide for more data about entering data into the ICS.

- If MÄM 40-868 is installed, pressing the ENGINE softkey at the bottom of the MFD will change the display of the MFD to a full engine indication system page, as shown in Figure 4.

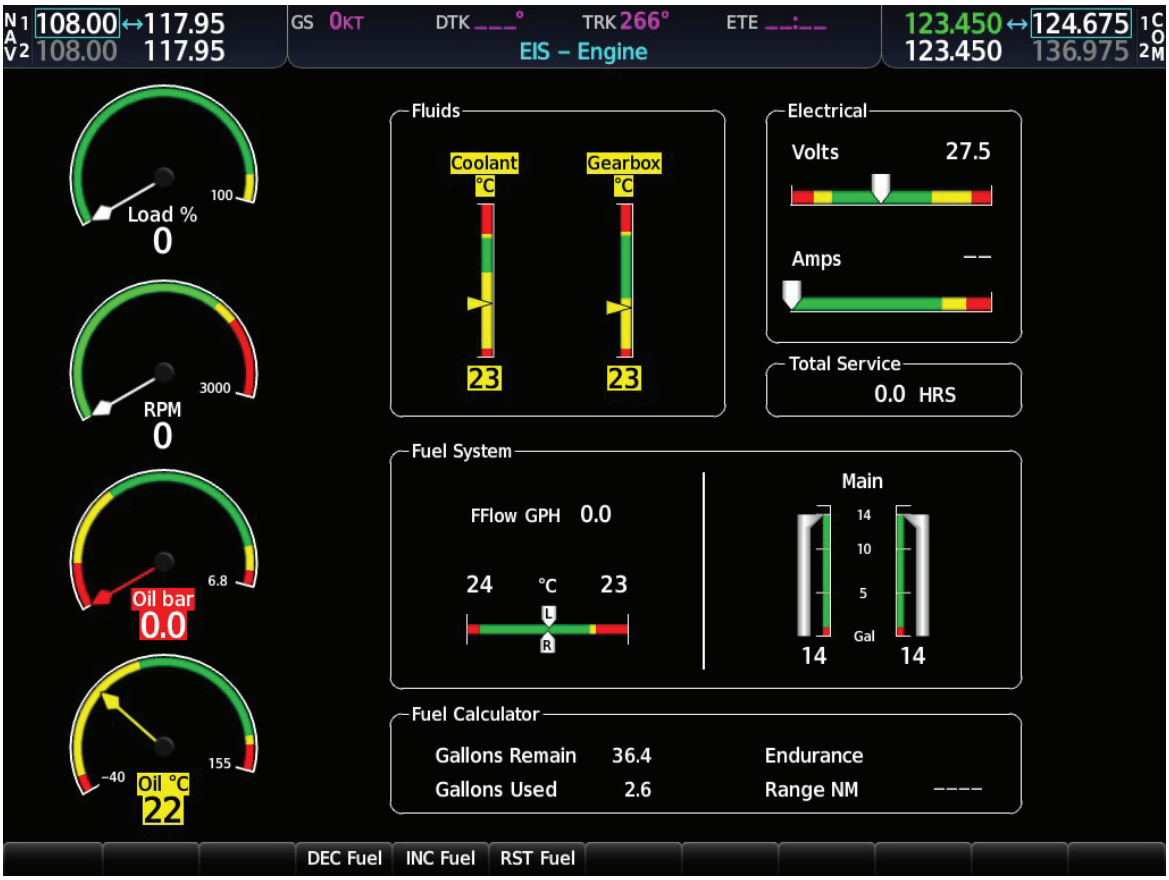

Figure 4 : MFD Full EIS Page

C. GMA 1347 Audio Control Panel

The GMA 1347 audio control panel is located in the airplane instrument panel between the two display screens. The audio control panel integrates the NAV/COM digital audio, intercom system and marker beacon controls. Manual display reversion is also controlled from the GMA 1347. The GMA 1347 communicates with both IAUs using RS-232 digital interface. For more data about the audio control panel refer to Section 23-50.

D. GIA 6X W Integrated Avionics Unit (IAU)

The ICS has two GIA 6X W IAUs. The two IAUs are identical and independent. They are both installed in the avionics rack in the rear fuselage, just aft of the rear baggage frame. The IAU processes all the data that is displayed on the cockpit display. Either IAU can supply data to either cockpit display. You cannot service the IAU.

E. Transponders

Refer to Fig. 5

(1) GTX 33 Transponder

The GTX 33 transponder is a solid state Mode-S transponder. The transponder provides modes A, C and S functions. The unit is operated directly through the PFD in the cockpit. The transponder is linked to both IAUs via RS-232 digital interface. The transponder is installed in the avionics rack in the rear fuselage, just aft of the rear baggage frame.

(2) GTX335R/345R Transponder

The GTX 335R and GTX 345R are solid state transponders that provide Mode A, C, S with ADS-B Out capability. The transponders are controlled from the PFD in the cockpit. The transponders communicate with the both IAUs through an RS-232 digital interface. Each is optionally available with a built-in WAAS GPS position source for ADS-B reference. The GTX 335R is an ADS-B “Out” only solution. The GTX335R/345R transponder is installed in the avionics rack in the rear fuselage, just aft of the rear baggage frame.

The GTX 345R adds ADS-B “in” and out capability — allowing for uplinked weather and traffic to be displayed on the GDUs as well as select portables and mobile devices via built-in wireless connectivity.

The GTX 335R/345R transponder also meets ADS-B requirements (transmitting on the 1090 MHz frequency). The G1000 must have software level 006-B2948-10 V1.00 or later and the GTX must have system software level V2.12 or later. Refer to the Garmin G1000 maintenance manual (190-00907-00) and the G1000 Pilot’s Guide (190-02452-00) for further information.

Figure 5 : (Top) GTX 335R / 345R Transponder - (Lower) GTX 33 Transponder

F. GRS 77/79 Attitude, Heading and Reference Unit (AHRS)

The GRS 77/79 provides airplane attitude and related flight data to the cockpit displays. The GRS 77/79 receives data from the air data computer, the GMU 44 magnetometer and GPS signals from the GIA 6X. The GRS communicates with both the GIA 6Xs and the cockpit displays via ARINC 429 digital interface. The GRS 77/79 is located next to the avionics rack in the rear fuselage, just aft of the rear baggage frame.

G. GDC 74A/72 Air Data Computer (ADC)

The ADC receives data from the Pitot/static system and an OAT sensor. The ADC uses this data to provide pressure altitude, airspeed, vertical speed and outside air temperature data to the G1000 system. The ADC communicates with the GIA 6Xs, GDU 10XX display screens and the GRS 77/79 using ARINC 429 digital interface. Software and configuration data is received through RS-232 digital interface with the GIA 6Xs. The ADC is located on the instrument panel shelf.

H. GEA 71/71B

Refer to Figure 6

The GEA 71 / 71B is a microprocessor based unit that receives and processes signals from airframe and engine sensors. The GEA 71 /71B communicates directly with both IAUs using RS 485 digital interface. The GEA 71 /71B is located on the instrument panel shelf.

The performance between the GEA 71and the GEA 71B is identical.

I. GMU 44 / GMU 44B Magnetometer

Refer to Figure 7

The magnetometer senses magnetic field information and provides horizontal and vertical magnetic field information to the GRS 77/79 AHRS for processing. The magnetometer receives power from the GRS 77/79 and communicates with the GRS 77/79 using a RS-485 digital interface.

The magnetometer is located in the right outer wing and can be accessed through a panel in the lower surface of the wing.

The performance between the GMU 44 and the GMU 44B is identical.

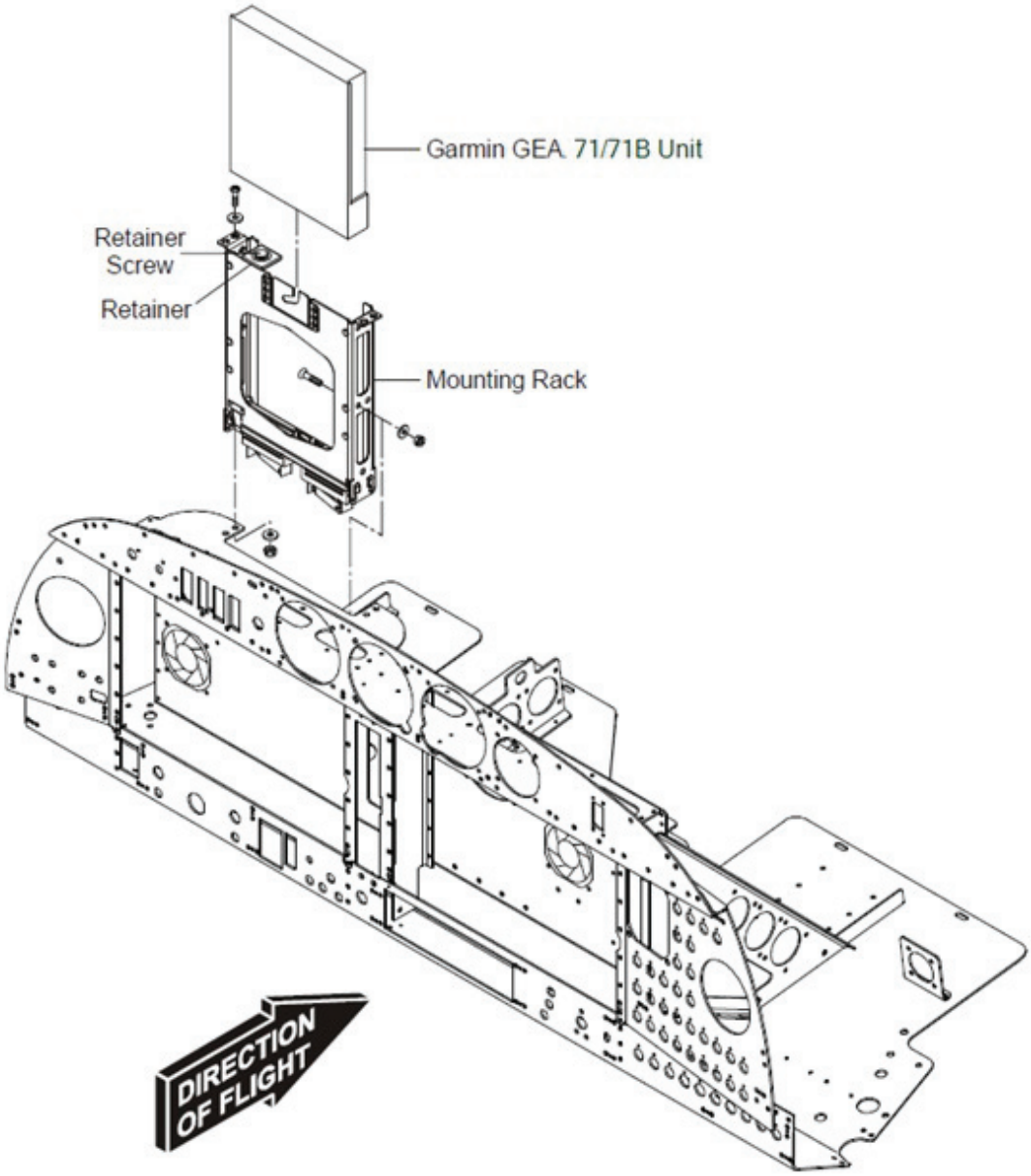

Figure 6 : GEA 71 / 71B Processor Installation

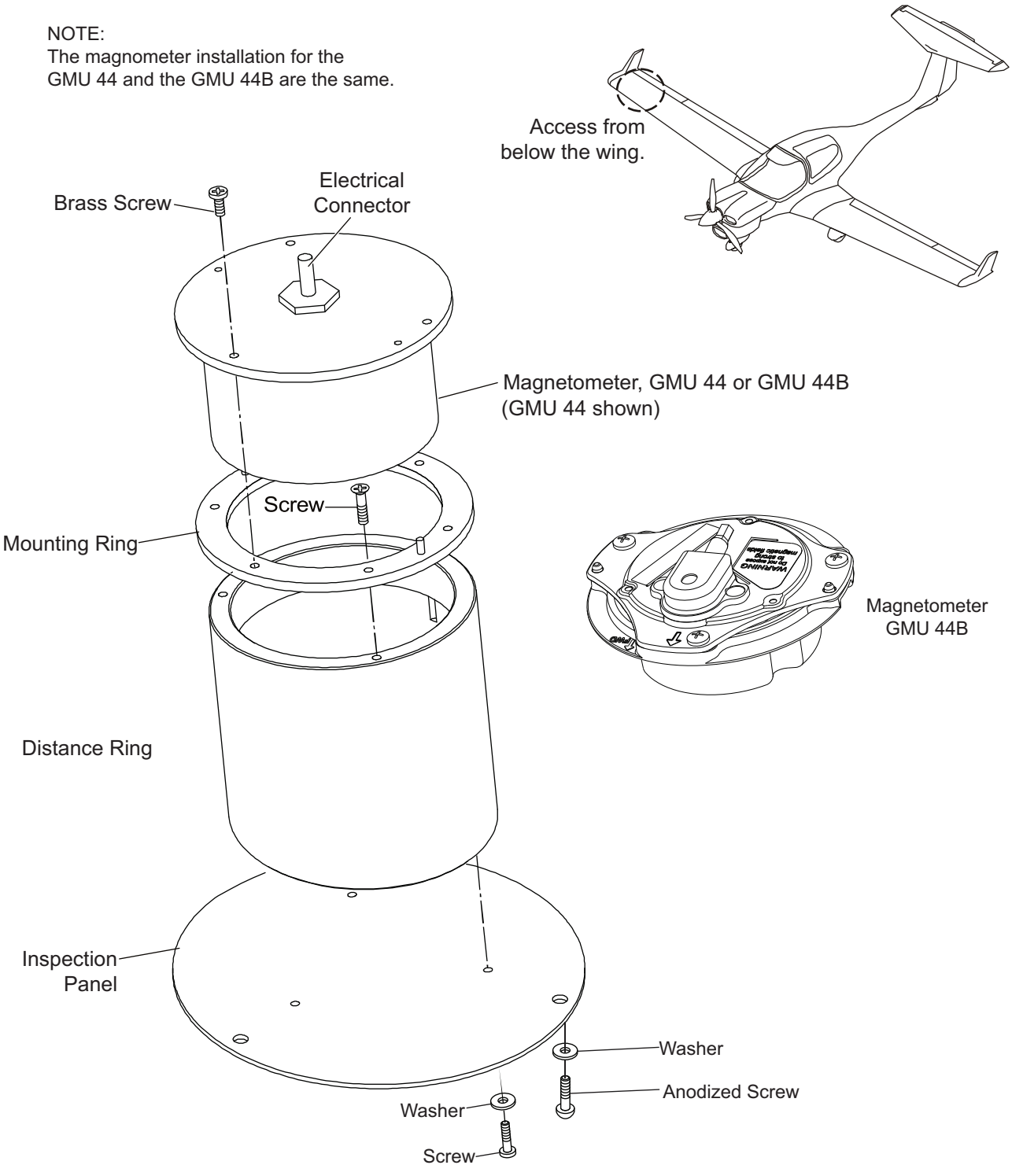

Figure 7 : GMU 44 / GMU 44B Magnetometer

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TROUBLE-SHOOTING

1. General

The Garmin ICS has a built-in test and trouble-shooting facility.

For more data about troubleshooting the ICS refer to the G1000 System Maintenance Manual.

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MAINTENANCE PRACTICES

1. General

These Maintenance Procedures tell you how to replace the main components of the ICS. They do not tell you how to maintain the components. For data about removing/installing the GMA 13XX audio control unit refer to Section 23-50. For more data about maintaining the equipment refer to the G1000 Line Maintenance Manual. The G1000 Line Maintenance Manual gives you particular information on:

- Unit related alerts and problems.
- Equipment removal and installation.
- Uploading software, configuring and testing.
- Final system checkout.
- Periodic maintenance.
- G1000 system software and configuration.
- GDU lighting setup.

Refer to the DAI service documentation for data about the approved software configurations (available for download at www.diamond-air.at).

The specific DA 40 NG values as to the equipment basic setting are given in the table below:

Item	Basic Setting
Main Lighting - Display.	Source ..... 28 VDC Response Time ..... 3 Minimum ..... 3.50 Edit Curve Vertex ..... none Photo Transition ..... 20% Edit Photo Vertex ..... none GMA Annunciator Gain ..... 1.00 GMA Annunciator Offset 0
Main Lighting - Key.	Source ..... 28 VDC Response Time ..... 1 Minimum ..... 1.75 GMA Key Gain ..... 2.00 GMA Key Offset 2
Audio Alert Configuration.	Volume ..... 45 Voice ..... male
Transponder Configuration.	VFR Code ..... Europe: 7000 USA: 1200 Aircraft Weight ..... < 15,500 lbs Max Airspeed ..... <= 150 kts Address Type ..... Europe: hex id USA: us tail Flight ID Type ..... Europe: PFD entry USA: same as tail
GMA Configuration – Headset Volume.	Music #1: ..... -20 Music #2 ..... -20 Unswitched in #1 ..... -20 Unswitched in #2 ..... -20 Unswitched in #3 ..... -20 Altitude Warning ..... -20
GMA Configuration – Speaker Volume.	Crew Audio 5
GMA Configuration – Master Squelch.	Threshold Value ..... -16

Item	Basic Setting
GMA Configuration – Marker Beacon.	HI SENSE THRESHOLD: ..... specific to airplane LO SENSE THRESHOLD: ..... specific to airplane
GMA Configuration – KEYPAD Annunciators.	Disable COM3: ..... set Disable TEL: ..... set Disable DME: ..... specific to airplane Disable ADF: ..... specific to airplane Disable AUX: ..... set Disable SPEAKER: ..... blank Disable PA: ..... set Disable PLAY: ..... blank Disable MUSIC: ..... set Disable REC: ..... set Disable CABIN: ..... set

NOTE: Unlisted items are preset. You must not change their values.

NOTE: Some items are specific to the airplane. Note down the settings prior to performing a software upload.

2. Remove/Install a GDU 10XX Display

A. Remove the GDU 10XX Display.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	
(2)	Set the PFD and MFD circuit-breakers open.	Right side of the instrument panel.
(3)	Remove the display unit: - Rotate the 4 locking studs that attach the display to the instrument panel 90° counterclockwise. - Move the instrument panel aft and disconnect the electrical cables. - Move the display unit clear of the instrument panel.	Refer to Figure 201. At the in-line connector.

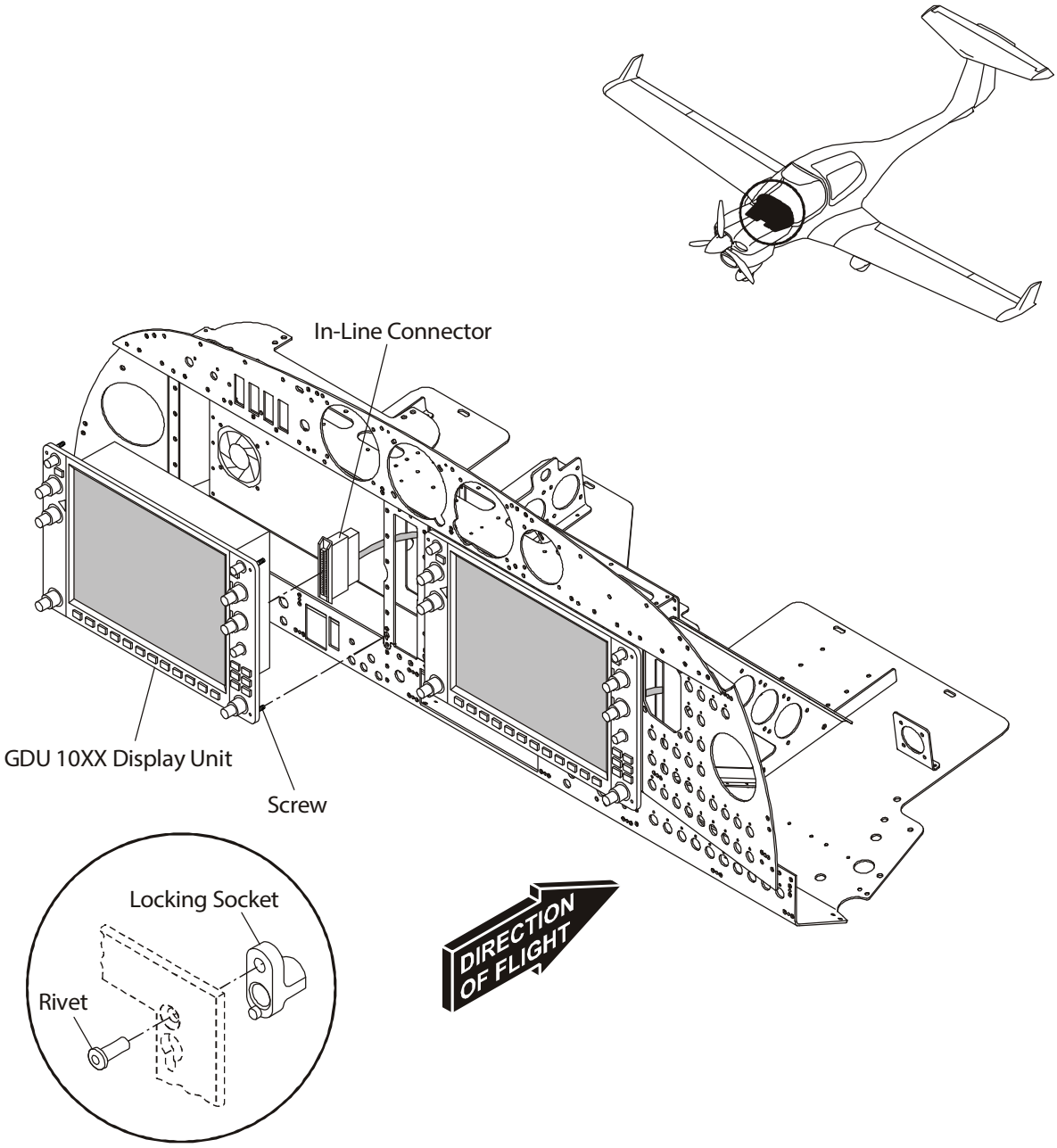

Figure 201 : GDU 10XX Display Unit Installation

B. Install the GDU 10XX Display.

	Detail Steps/Work Items	Key Items/References
(1)	If necessary, set the PFD and MFD circuit-breakers open.	Right side of the instrument panel.
(2)	Install the display unit: - Move the display unit into position at the instrument panel. - Connect the electrical cables to the display unit. - Move the display unit fully forward into position in the instrument panel. - Rotate the 4 locking studs that attach the display unit to the instrument panel 90° clockwise.	Refer to Figure 201. At the in-line connector. Make sure that you do not trap the electrical cables. The locking studs should be oriented with the alignment marks in the vertical position for installation. When locked, the alignment marks are in the horizontal position.
(3)	Reset the PFD and MFD circuit-breakers.	Right side of instrument panel.
(4)	Do a test for the correct operation of the integrated cockpit system (ICS): - Set the ELECTRIC MASTER key switch to ON. - Set the ELECTRIC MASTER key switch to OFF.	 The ICS must power-up and successfully complete its self-test procedure.

3. Remove/Install a GIA 6X W Integrated Avionics Unit (IAU)

A. Remove a GIA 6X W Integrated Avionics Unit (IAU).

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	
(2)	Remove the lower access panel from the rear baggage compartment.	Refer to Section 25-50.
(3)	Remove the avionics-enclosure box cover.	Refer to Figure 202. This is a High Intensity Radiated Field (HIRF) box which contains electronic components.
(4)	Remove the GIA IAU: - Identify the unit that you will remove. - Release the locking screw from the retainer. - Lift the retainer clear of the unit. - Lift the IAU clear of the mounting rack and the airplane.	Refer to Figure 202.

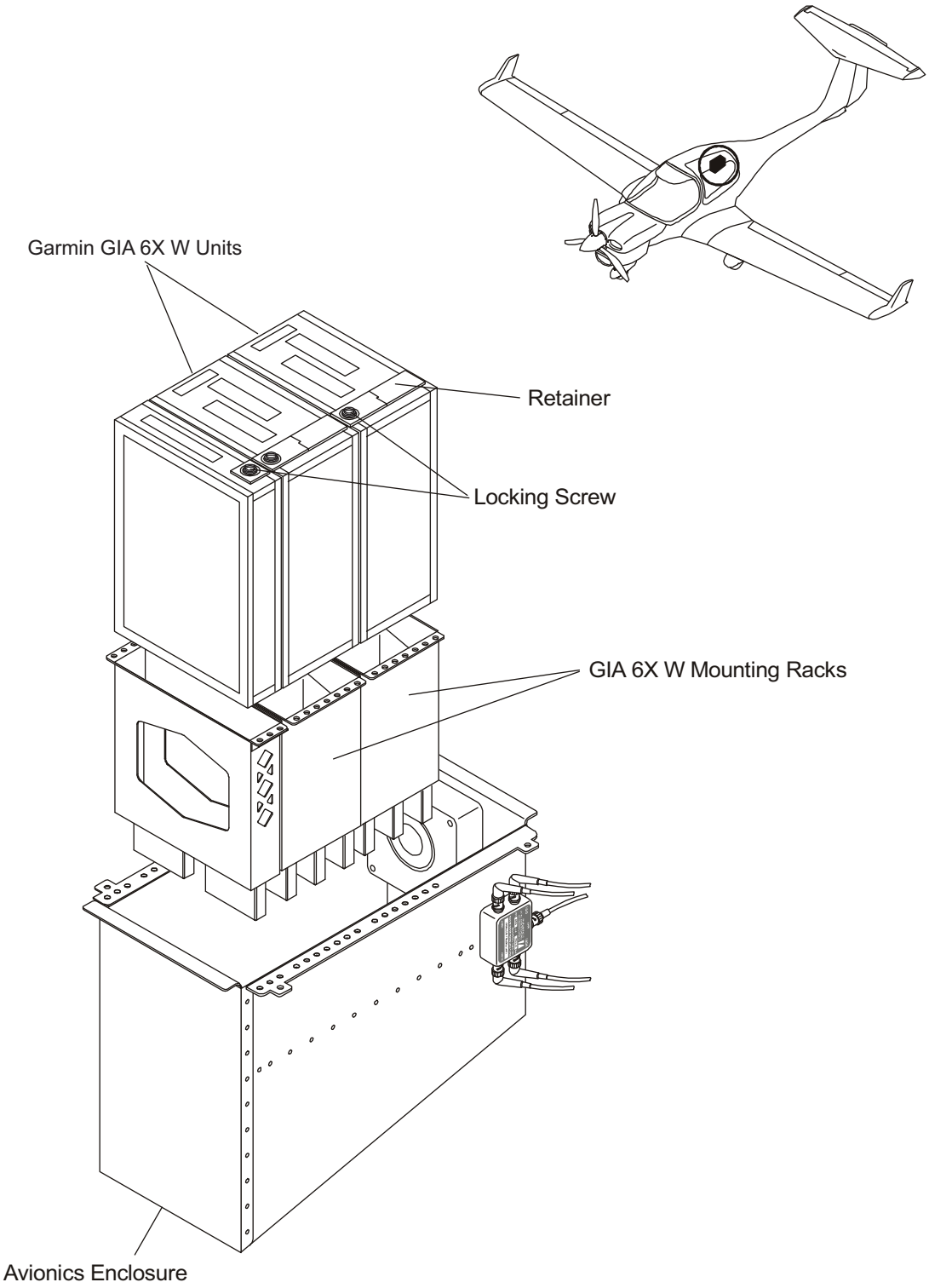

Figure 202 : GIA 6X W Integrated Avionics Unit (IAU) Installation

B. Install a GIA 6X W Integrated Avionics Unit (IAU).

	Detail Steps/Work Items	Key Items/References
(1)	Install the IAU: - Move the GIA IAU into position at the mounting and lower the unit into position in the rack. - Move the retainer into position and secure with the locking screw.	Refer to Figure 202. Make sure that the unit is seated correctly. Do not force the unit into position!
(2)	Install the avionics-enclosure box cover.	Refer to Figure 202.
(3)	Install the lower access panel in the rear baggage compartment	Refer to Section 25-50.
(4)	Do a test for the correct operation of the integrated cockpit system (ICS): - Set the ELECTRIC MASTER key switch to ON. - Set the ELECTRIC MASTER key switch to OFF.	The ICS must power-up and successfully complete its self-test procedure.

4. Remove/Install the GTX33/335R/345R Transponder

A. Remove the GTX33/335R/345R Transponder.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	
(2)	Remove the lower access panel from the rear baggage compartment for access to the avionics enclosure.	Refer to Section 25-50.
(3)	Remove the avionics-enclosure box cover.	Refer to Figure 203. This is a High Intensity Radiated Field (HIRF) box which contains electronic components.
(4)	Remove the Transponder: - Identify the unit that you will remove. - Release the locking screw from the retainer. - Lift the retainer clear of the unit. - Lift the Transponder clear of the mounting rack and the airplane.	Refer to Figure 203.

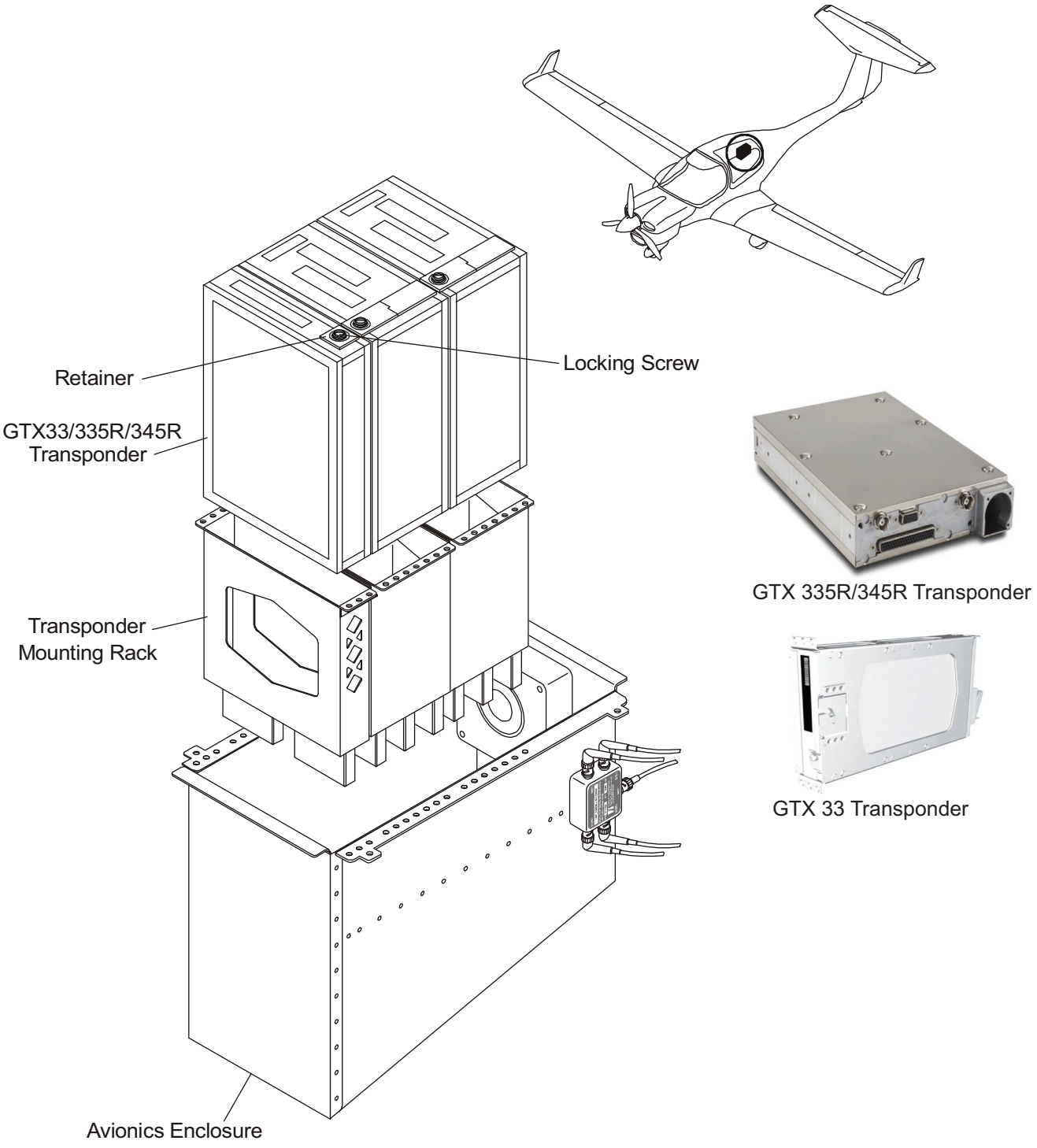

Figure 203 : GTX33 / 335R / 345R Transponder - Removal/Installation

B. Install the GTX33/335R/345R Transponder..

	Detail Steps/Work Items	Key Items/References
(1)	Install the GTX33/335R/345R Transponder: - Move the Transponder into position at the mounting and lower the unit into position in the rack. - Move the retainer into position and secure with the locking screw.	Refer to Figure 203. Make sure that the unit is seated correctly. Do not force the unit into position!
(2)	Install the avionics-enclosure box cover.	Refer to Figure 203.
(3)	Install the lower access panel in the rear baggage compartment	Refer to Section 25-50.
(4)	Do a test for the correct operation of the integrated cockpit system (ICS): - Set the ELECTRIC MASTER key switch to ON. - Set the ELECTRIC MASTER key switch to OFF.	The ICS must power-up and successfully complete its self-test procedure.

5. Remove/Install the GRS7X Attitude, Heading and Reference Unit (AHRS)

A. Remove the GRS7X Attitude, Heading and Reference Unit (AHRS)

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	
(2)	Remove the lower access panel from the rear baggage compartment.	Refer to Section 25-50.
(3)	Remove the GRS7X: - Disconnect the electrical cables. - Remove the four or two (if MÄM 40-868 is installed) screws that attach the GRS7X to the mounting. - Remove the GRS7X from the airplane.	Refer to Figure 204 or 205.

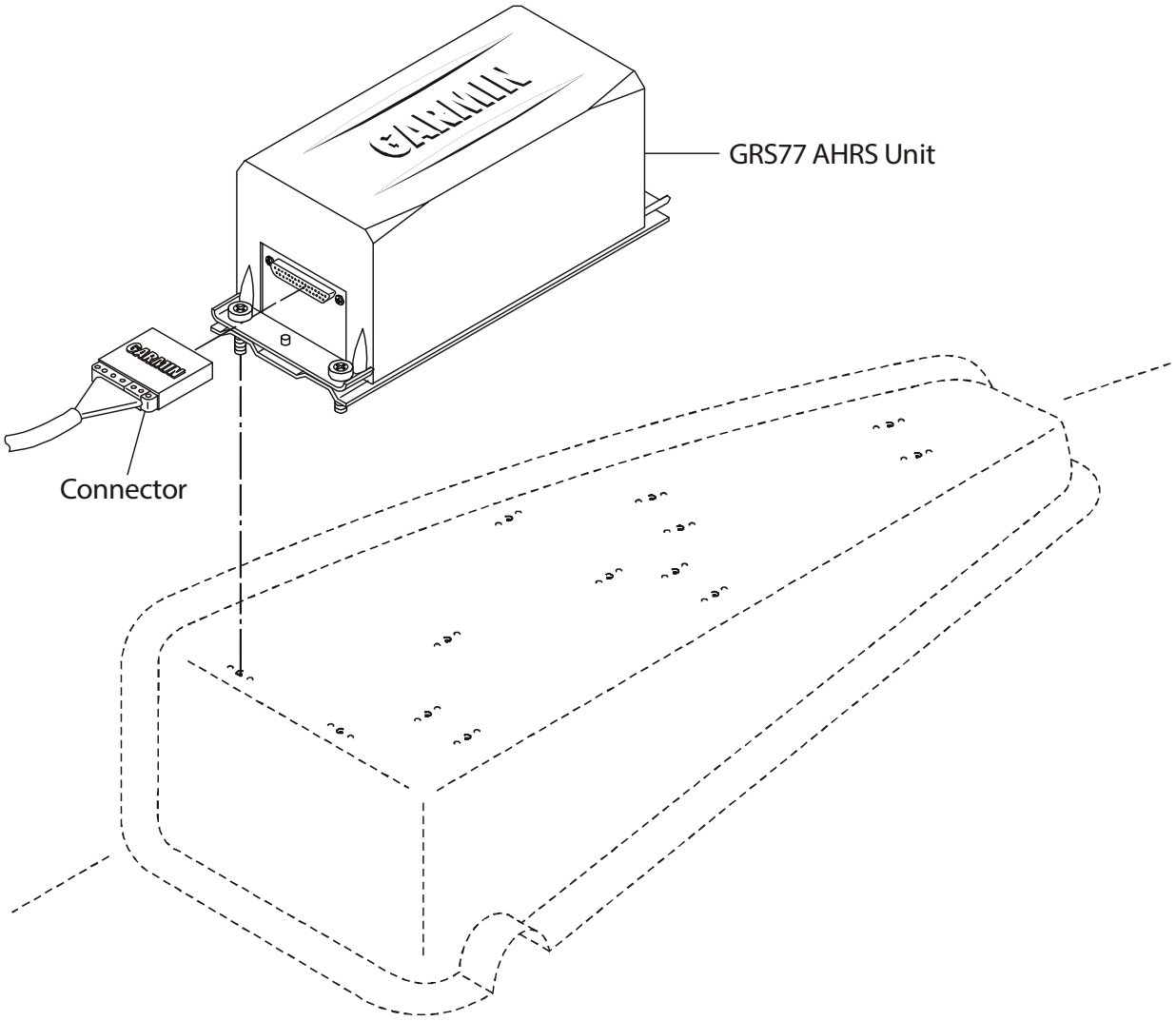

Figure 204 : GRS77 Attitude, Heading and Reference Unit (AHRS) Installation

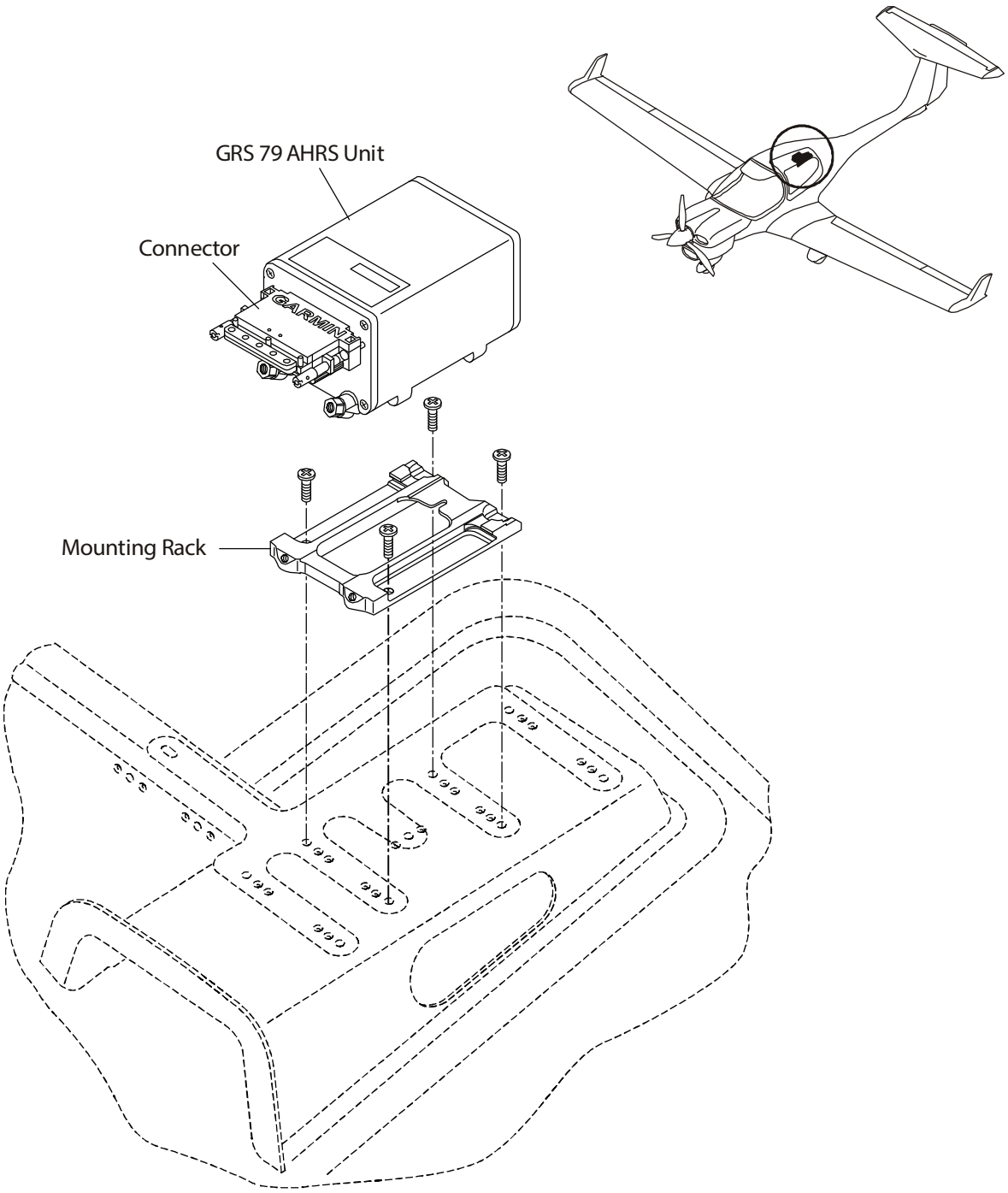

Figure 205 : GRS79 Attitude, Heading and Reference Unit (AHRS) Installation

B. Install the GRS7X Attitude, Heading and Reference Unit (AHRS)

	Detail Steps/Work Items	Key Items/References
(1)	Install the GRS7X unit: - Move the unit into position next to the avionics rack. - Tighten the four or two (if MÄM 40-868 is installed) screws that attach the unit to the mount. - Connect the electrical cables.	Refer to Figure 204 or 205. At the in-line connector.
(2)	Install the lower access panel in the rear baggage compartment	Refer to Section 25-50.
(3)	Do a test for the correct operation of the integrated cockpit system (ICS): - Set the ELECTRIC MASTER key switch to ON. - Set the ELECTRIC MASTER key switch to OFF.	The ICS must power-up and successfully complete its self-test procedure.

6. Remove/Install the GDC 7X Air Data Computer (ADC)

A. Remove the GDC 7X Air Data Computer (ADC)

	Detail Steps/Work Items	Key Items/References
(1)	Disconnect the airplane main battery.	Refer to Section 24-31.
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Remove the GDC 7X: - Locate the GDC 7X on the instrument panel shelf. - Disconnect the electrical cables. - Disconnect the Pitot/static tubes from the unit. - Remove the two screws that attach the GDC 7X to its mounting rack. - Remove the GDC 7X from the airplane.	Note the connections!

B. Install the GDC 7X Air Data Computer (ADC)

	Detail Steps/Work Items	Key Items/References
(1)	Install the GDC 7X: - Move the GDC 7X into position on the mounting rack. - Install the 2 screws that attach the GDC 7X to the mounting rack. - Install the Pitot/static tubes to the unit. - Connect the electrical cables	As noted in 6A. Para (3) At the in-line connector.
(2)	Install the instrument panel cover.	Refer to Section 25-10.
(3)	Connect the airplane main battery.	Refer to Section 24-31.
(4)	Do a test for the correct operation of the integrated cockpit system (ICS): - Set the ELECTRIC MASTER key switch to ON. - Set the ELECTRIC MASTER key switch to OFF.	The ICS must power-up and successfully complete its self-test procedure.
(5)	Do a Pitot/static leak test.	Refer to Section 34-10.

7. Remove/Install the GEA 71/71B Processor

A. Remove the GEA 71/71B Processor

	Detail Steps/Work Items	Key Items/References
(1)	Disconnect the airplane main battery.	Refer to Section 24-31.
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Remove the GEA 71/71B: - Locate the GEA 71/71B on the instrument panel shelf. - Release the screw that secures the retainer. - Move the retainer clear and lift the GEA 71/71B clear of the mounting.	Refer to Figure 206. If necessary, remove the standby altimeter. Refer to Section 34-10.

B. Install the GEA 71/71B Processor

	Detail Steps/Work Items	Key Items/References
(1)	Install the GEA 71/71B: - Move the GEA 71/71B into position at its mounting. - Lower the GEA 71/71B into its mounting. - Install the retainer and secure the retainer with the retaining screw.	 If removed, install the standby altimeter. Refer to Section 34-10.
(2)	Install the instrument panel cover.	Refer to Section 25-10.
(3)	Connect the airplane main battery.	Refer to Section 24-31.
(4)	Do a test for the correct operation of the integrated cockpit system (ICS): - Set the ELECTRIC MASTER key switch to ON. - Set the ELECTRIC MASTER key switch to OFF.	 The ICS must power-up and successfully complete its self-test procedure.

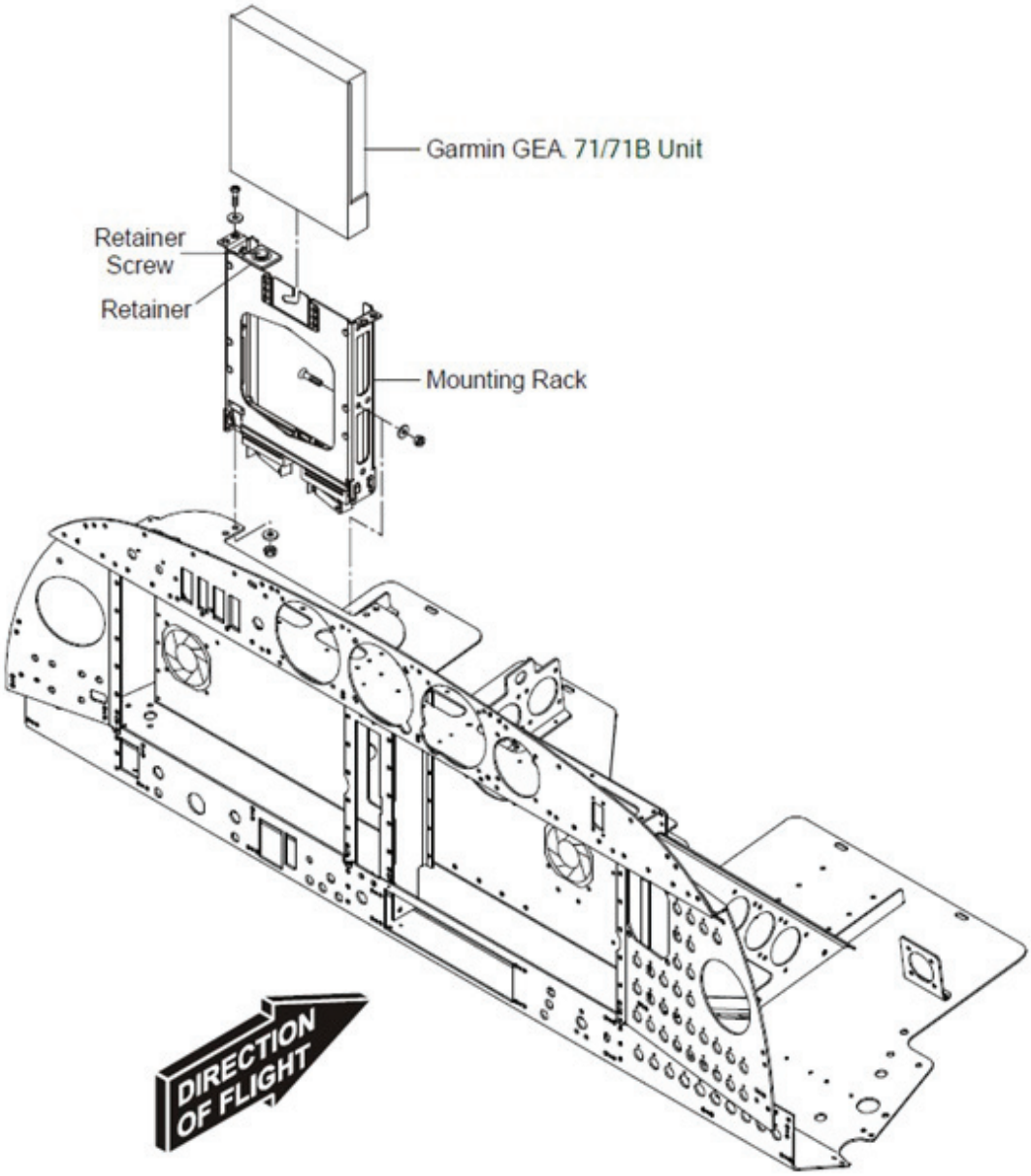

Figure 206 : GEA 71/71B Processor Installation

8. Remove/Install the GMU 44 / GMU 44B Magnetometer Assembly

A. Remove the GMU 44/44B Magnetometer Assembly.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	
(2)	Remove the magnetometer assembly: - Remove the three screws and washers that attach the access cover and magnetometer assembly to the lower surface of the right wing. - Lower the magnetometer assembly and access cover clear of the structure to disconnect the electrical connector. - Disconnect the electrical connector and move the magnetometer assembly and access cover clear of the airplane. - Remove the brass screws which attach the magnetometer to the mounting ring. - Remove the magnetometer from the complete assembly.	Refer to Figure 207. Support the assembly.

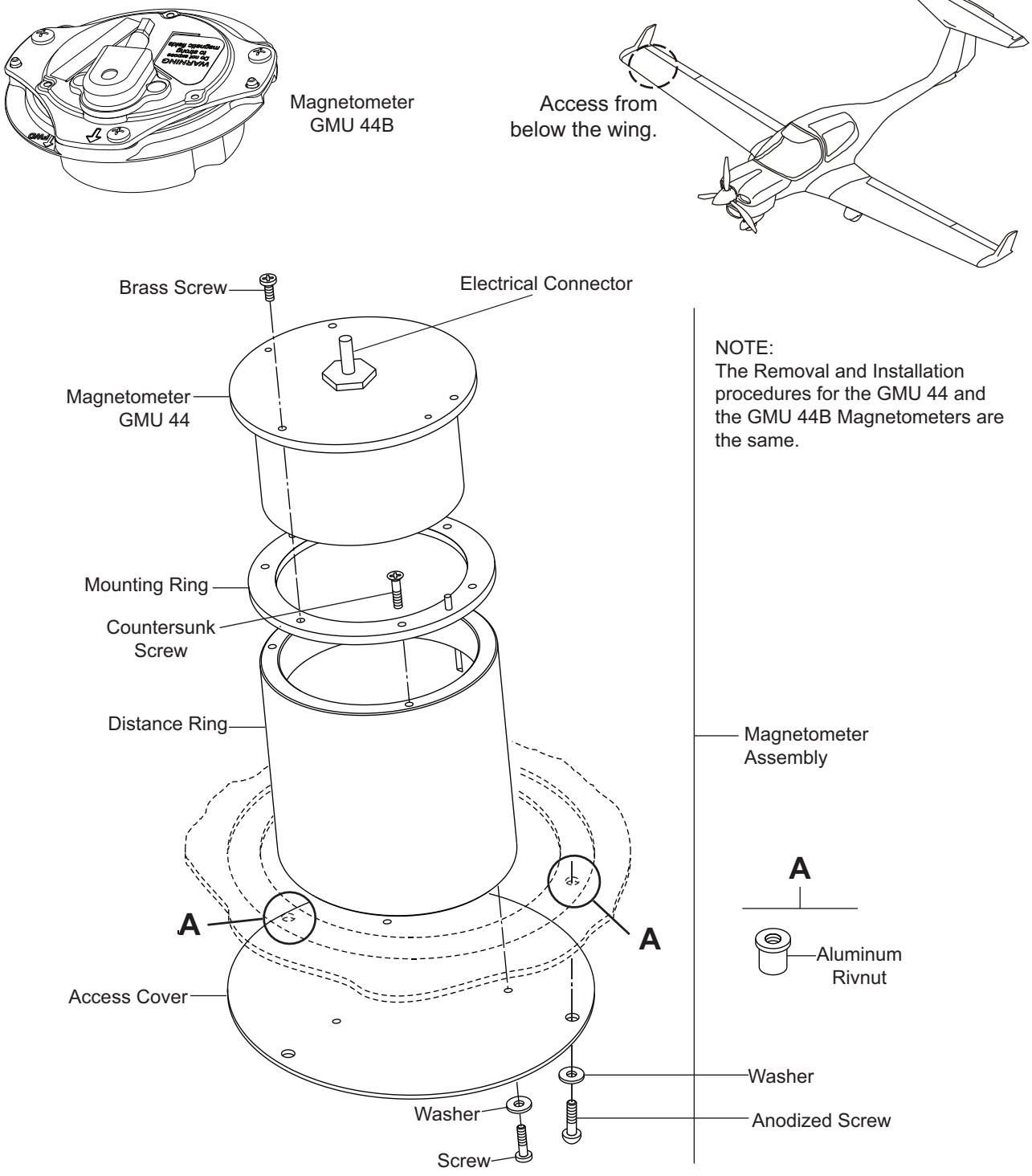

Figure 207 : Magnetometer Assembly - Removal/Installation

B. Install the GMU 44/44B Magnetometer Assembly.

	Detail Steps/Work Items	Key Items/References

(1)	Install the magnetometer assembly:
	- Install the magnetometer into the complete magnetometer assembly.
	  - Place the magnetometer inside the mounting ring of the complete assembly.
	  - Install the brass screws which attach the magnetometer to the mounting ring.
		Refer to Figure 207.
		
		If the Magnetometer is removed from the complete assembly, the anti-rotation properties of the mounting screws must be restored. This can be done by replacing the screws with new Garmin P/N 211-60037-08 screws. If the original screws must be re-used, coat the screw threads with Loctite 242 (blue) threadlocking compound,
		Garmin P/N 291- 00023-02, or equivalent.

(2)	Move the magnetometer assembly and access cover into position under the right wing to make the electrical connections: - Connect the magnetometer assembly connector to the airplane electrical cable at the in-line connector.	
	NOTE: The metal components in the Magnetometer connector might slightly affect the magnetic field sensed by the Magnetometer. Place the connector at least two inches from the body of the Magnetometer to minimize this effect. Attach the Magnetometer connector to its mate in the aircraft wiring. Secure the connector in place using good installation practices. This will make sure that any remaining magnetic effect can be compensated.	
(3)	Install the magnetometer assembly: - Move the magnetometer assembly and access cover fully into position in the lower surface of the right wing. - Install the three anodized screws that attach the magnetometer assembly and access cover to the wing.	Pay attention to the dedicated mounting direction marked by an arrow.

	Detail Steps/Work Items	Key Items/References
(4)	Do a test for the correct operation of the integrated cockpit system (ICS): - Set the ELECTRIC MASTER key switch to ON. - Set the ELECTRIC MASTER key switch to OFF.	The ICS must power-up and successfully complete its self-test procedure.
(5)	Do a magnetometer calibration.	Refer to the G1000 NXi Integrated Avionics System - Line Maintenance Manual. Doc. # 190-02631-00 latest revision.

9. ADS-B Out Test

A. Equipment.

Item	Quantity	Part Number
Mode S Transponder Ramp Tester	1	Aeroflex IFR-6000 or Aeroflex TIC TR-220

B. Procedure.

The ADS-B Out test procedure requires the use of a Mode S transponder ramp tester, such as an Aeroflex IFR-6000 or TIC TR-220. Specific instructions for operating the ramp tester are contained in the applicable operator's manual.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the airplane is in a location where a GPS signal can be received.	(e.g. outdoors with a clear view of the sky).
(2)	Power on the airplane avionics and make sure that the GTX is powered on.	
(3)	Place the GTX in the Ground Test Mode to simulate a temporary airborne state.	Refer to Section 8.1.1 of the GTX 3XX Part 23 AML STC Installation Manual P/N 190-00734-10.
(4)	Make sure that the GPS source being checked has acquired a position.	
(5)	Make sure that the ALT mode is selected. Press the XPDR Softkey to display the Mode selections.	

	Detail Steps/Work Items	Key Items/References
(6)	Using the transponder test set, make sure the following ADS-B Out parameters are being transmitted: - Aircraft emitter category is Light Airplane < 15,500 lbs (on the TR-220 this is indicated as “A1”). - Aircraft length is documented in the aircraft checkout log. - Aircraft width is documented in the aircraft checkout log. - 1090 ADS-B In capability matches the configuration setting documented in the aircraft checkout log. - UAT (978) ADS-B In capability matches the configuration setting documented in the aircraft checkout log.	
(7)	Disable the GPS source not being checked by covering the GPS antenna or removing power from that navigator.	
(8)	Verify that the GPS source not being checked is no longer receiving satellite data.	
(9)	Verify the GPS source being checked has acquired a position.	
(10)	Make sure that the ALT mode is selected. Press the XPDR Softkey to display the Mode selections.	
(11)	Using a transponder test set with ADS-B test capabilities, verify the ADS-B out parameters are being transmitted.	NACv .....≥1 SDA .....≥ 2 SIL .....≥ 3 NACp .....≥ 8 NIC.....≥ 7
(12)	Repeat steps (7) through (11) for the second GPS source.	
(13)	Test complete.	
(14)	Remove all test equipment and tools from the airplane.	

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TROUBLE-SHOOTING

1. General

The Garmin ICS has a built-in test and trouble-shooting facility.

For more data about troubleshooting the ICS refer to the G1000 System Maintenance Manual.

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MAINTENANCE PRACTICES

1. General

These Maintenance Procedures tell you how to replace the main components of the ICS. They do not tell you how to maintain the components. For data about removing/installing the GMA 13XX audio control unit refer to Section 23-50. For more data about maintaining the equipment refer to the G1000 Line Maintenance Manual. The G1000 Line Maintenance Manual gives you particular information on:

- Unit related alerts and problems.
- Equipment removal and installation.
- Uploading software, configuring and testing.
- Final system checkout.
- Periodic maintenance.
- G1000 system software and configuration.
- GDU lighting setup.

Refer to the DAI service documentation for data about the approved software configurations (available for download at www.diamond-air.at).

The specific DA 40 NG values as to the equipment basic setting are given in the table below:

Item	Basic Setting
Main Lighting - Display.	Source ..... 28 VDC Response Time ..... 3 Minimum ..... 3.50 Edit Curve Vertex ..... none Photo Transition ..... 20% Edit Photo Vertex ..... none GMA Annunciator Gain ..... 1.00 GMA Annunciator Offset 0
Main Lighting - Key.	Source ..... 28 VDC Response Time ..... 1 Minimum ..... 1.75 GMA Key Gain ..... 2.00 GMA Key Offset 2
Audio Alert Configuration.	Volume ..... 45 Voice ..... male
Transponder Configuration.	VFR Code ..... Europe: 7000 USA: 1200 Aircraft Weight ..... < 15,500 lbs Max Airspeed ..... <= 150 kts Address Type ..... Europe: hex id USA: us tail Flight ID Type ..... Europe: PFD entry USA: same as tail
GMA Configuration – Headset Volume.	Music #1: ..... -20 Music #2 ..... -20 Unswitched in #1 ..... -20 Unswitched in #2 ..... -20 Unswitched in #3 ..... -20 Altitude Warning ..... -20
GMA Configuration – Speaker Volume.	Crew Audio 5
GMA Configuration – Master Squelch.	Threshold Value ..... -16

Item	Basic Setting
GMA Configuration – Marker Beacon.	HI SENSE THRESHOLD: ..... specific to airplane LO SENSE THRESHOLD: ..... specific to airplane
GMA Configuration – KEYPAD Annunciators.	Disable COM3: ..... set Disable TEL: ..... set Disable DME: ..... specific to airplane Disable ADF: ..... specific to airplane Disable AUX: ..... set Disable SPEAKER: ..... blank Disable PA: ..... set Disable PLAY: ..... blank Disable MUSIC: ..... set Disable REC: ..... set Disable CABIN: ..... set

NOTE: Unlisted items are preset. You must not change their values.

NOTE: Some items are specific to the airplane. Note down the settings prior to performing a software upload.

2. Remove/Install a GDU 10XX Display

A. Remove the GDU 10XX Display.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	
(2)	Set the PFD and MFD circuit-breakers open.	Right side of the instrument panel.
(3)	Remove the display unit: - Rotate the 4 locking studs that attach the display to the instrument panel 90° counterclockwise. - Move the instrument panel aft and disconnect the electrical cables. - Move the display unit clear of the instrument panel.	Refer to Figure 201. At the in-line connector.

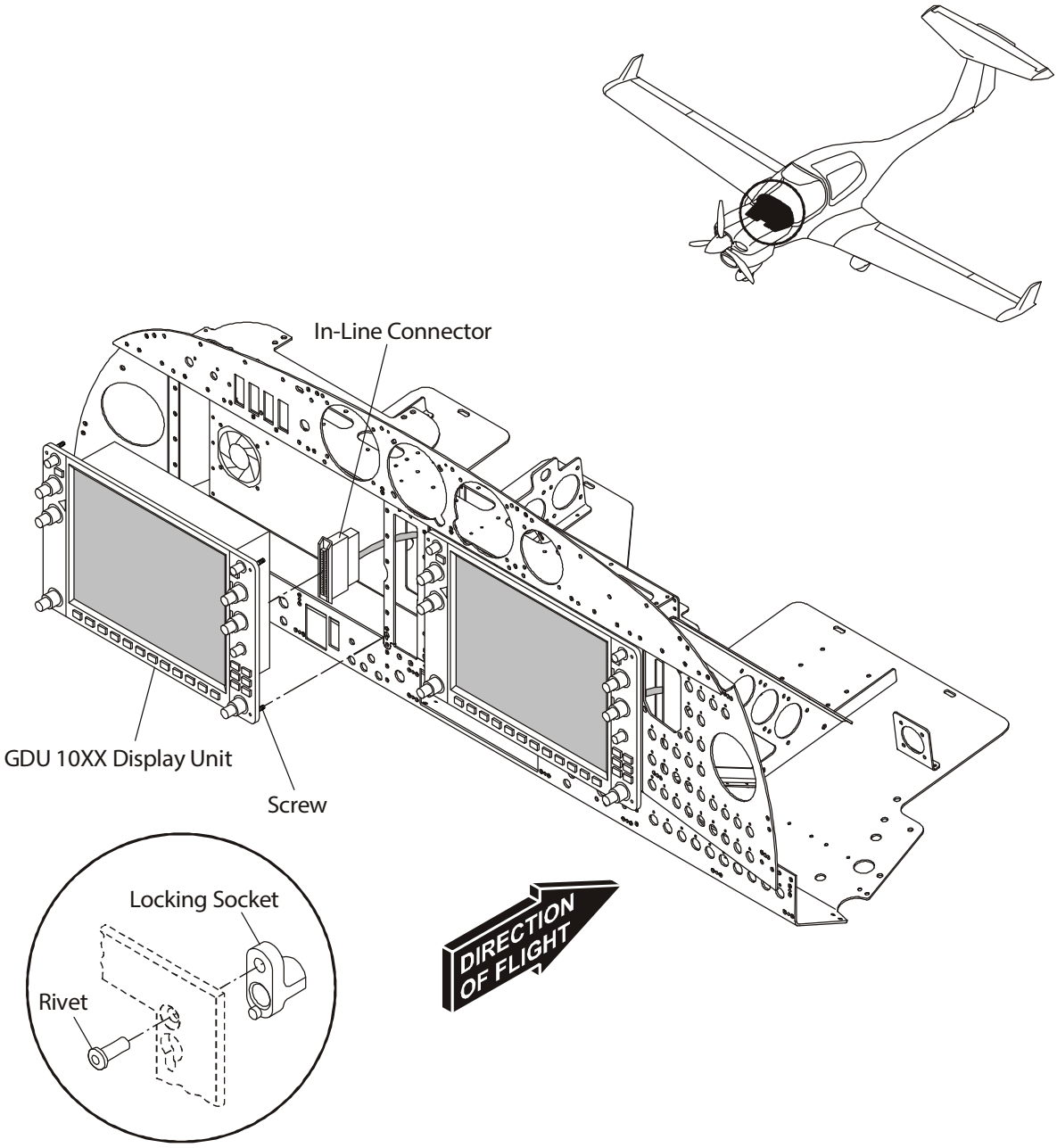

Figure 201 : GDU 10XX Display Unit Installation

B. Install the GDU 10XX Display.

	Detail Steps/Work Items	Key Items/References
(1)	If necessary, set the PFD and MFD circuit-breakers open.	Right side of the instrument panel.
(2)	Install the display unit: - Move the display unit into position at the instrument panel. - Connect the electrical cables to the display unit. - Move the display unit fully forward into position in the instrument panel. - Rotate the 4 locking studs that attach the display unit to the instrument panel 90° clockwise.	Refer to Figure 201. At the in-line connector. Make sure that you do not trap the electrical cables. The locking studs should be oriented with the alignment marks in the vertical position for installation. When locked, the alignment marks are in the horizontal position.
(3)	Reset the PFD and MFD circuit-breakers.	Right side of instrument panel.
(4)	Do a test for the correct operation of the integrated cockpit system (ICS): - Set the ELECTRIC MASTER key switch to ON. - Set the ELECTRIC MASTER key switch to OFF.	 The ICS must power-up and successfully complete its self-test procedure.

3. Remove/Install a GIA 6X W Integrated Avionics Unit (IAU)

A. Remove a GIA 6X W Integrated Avionics Unit (IAU).

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	
(2)	Remove the lower access panel from the rear baggage compartment.	Refer to Section 25-50.
(3)	Remove the avionics-enclosure box cover.	Refer to Figure 202. This is a High Intensity Radiated Field (HIRF) box which contains electronic components.
(4)	Remove the GIA IAU: - Identify the unit that you will remove. - Release the locking screw from the retainer. - Lift the retainer clear of the unit. - Lift the IAU clear of the mounting rack and the airplane.	Refer to Figure 202.

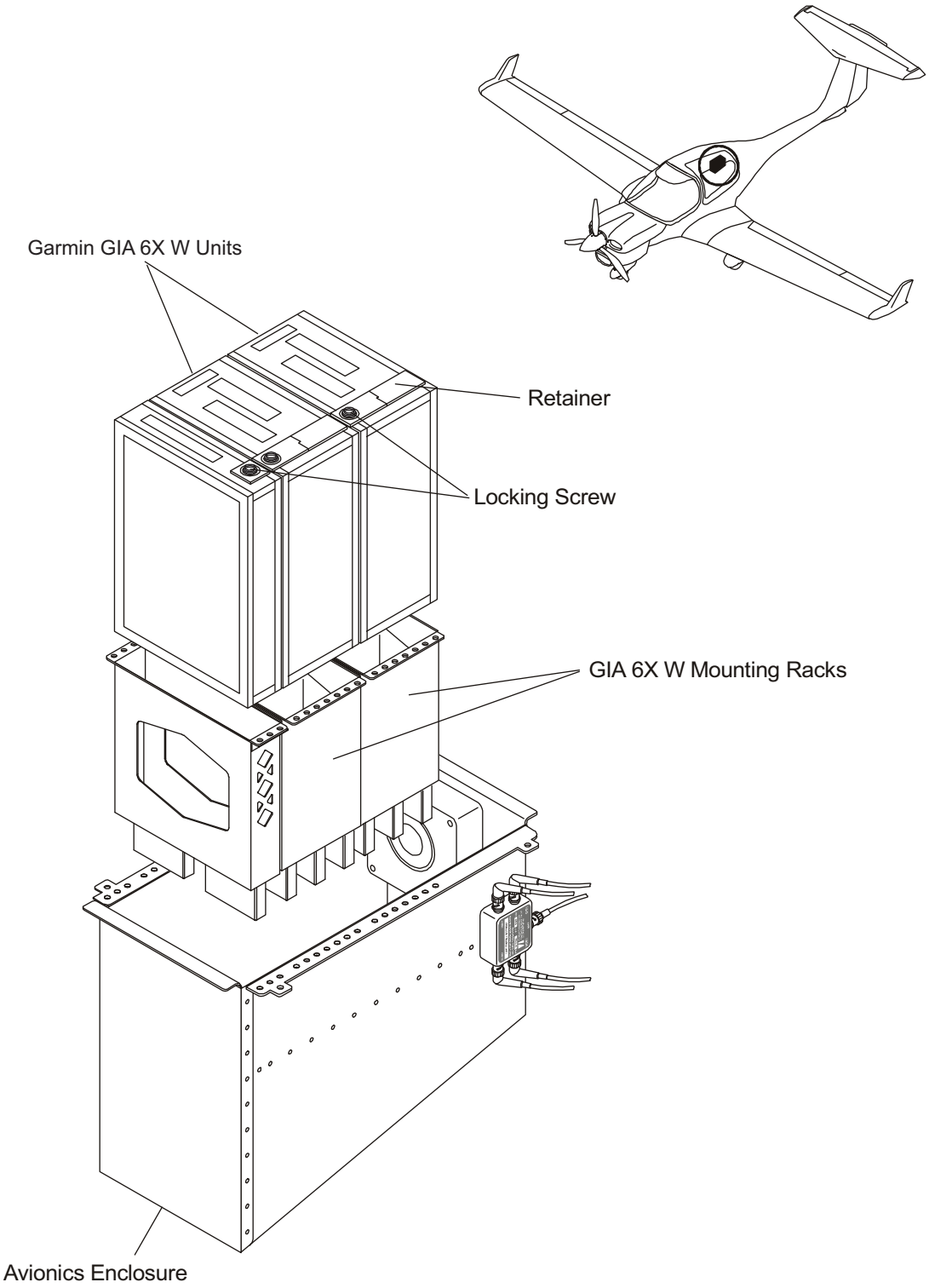

Figure 202 : GIA 6X W Integrated Avionics Unit (IAU) Installation

B. Install a GIA 6X W Integrated Avionics Unit (IAU).

	Detail Steps/Work Items	Key Items/References
(1)	Install the IAU: - Move the GIA IAU into position at the mounting and lower the unit into position in the rack. - Move the retainer into position and secure with the locking screw.	Refer to Figure 202. Make sure that the unit is seated correctly. Do not force the unit into position!
(2)	Install the avionics-enclosure box cover.	Refer to Figure 202.
(3)	Install the lower access panel in the rear baggage compartment	Refer to Section 25-50.
(4)	Do a test for the correct operation of the integrated cockpit system (ICS): - Set the ELECTRIC MASTER key switch to ON. - Set the ELECTRIC MASTER key switch to OFF.	The ICS must power-up and successfully complete its self-test procedure.

4. Remove/Install the GTX33/335R/345R Transponder

A. Remove the GTX33/335R/345R Transponder.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	
(2)	Remove the lower access panel from the rear baggage compartment for access to the avionics enclosure.	Refer to Section 25-50.
(3)	Remove the avionics-enclosure box cover.	Refer to Figure 203. This is a High Intensity Radiated Field (HIRF) box which contains electronic components.
(4)	Remove the Transponder: - Identify the unit that you will remove. - Release the locking screw from the retainer. - Lift the retainer clear of the unit. - Lift the Transponder clear of the mounting rack and the airplane.	Refer to Figure 203.

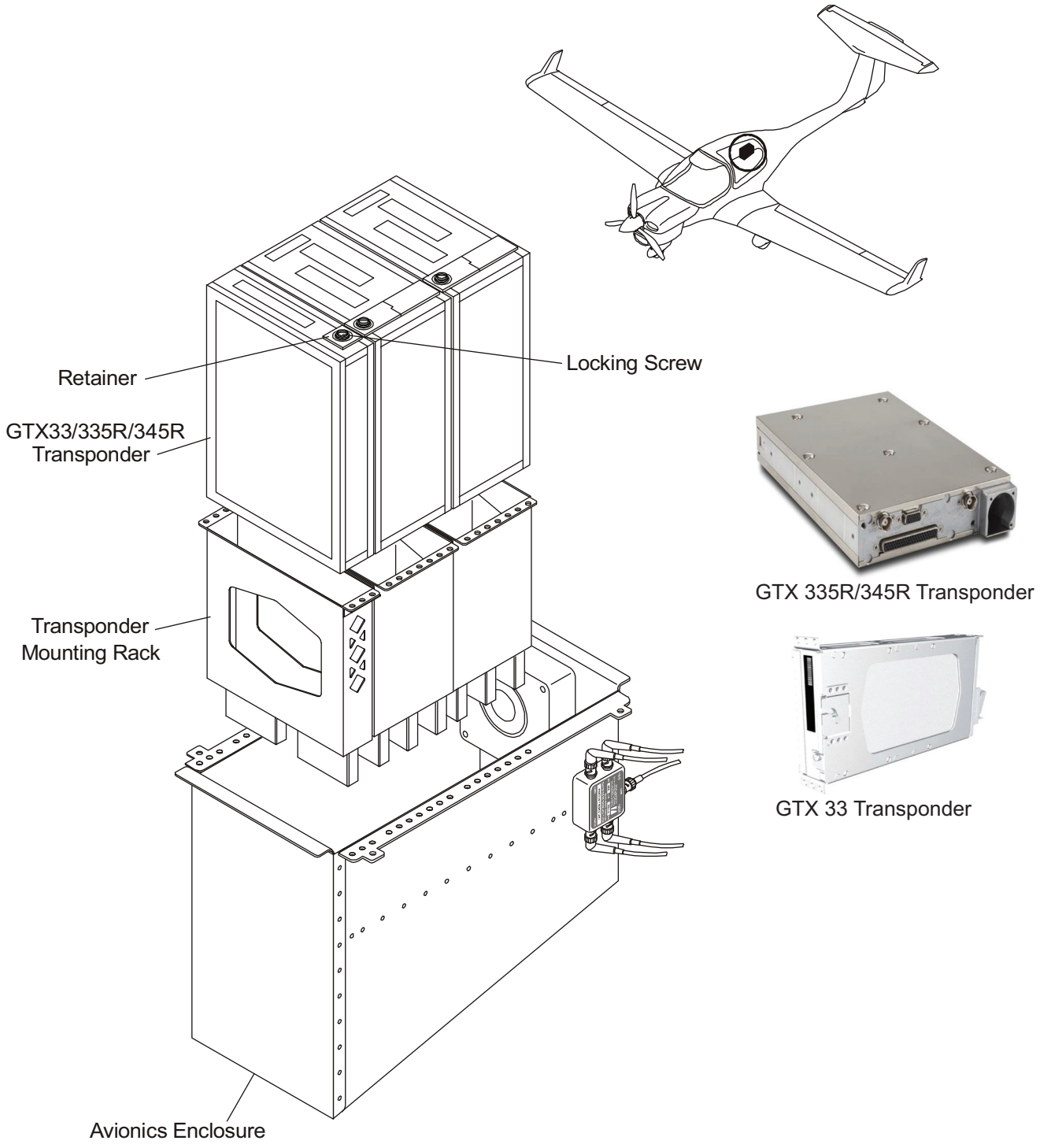

Figure 203 : GTX33 / 335R / 345R Transponder - Removal/Installation

B. Install the GTX33/335R/345R Transponder..

	Detail Steps/Work Items	Key Items/References
(1)	Install the GTX33/335R/345R Transponder: - Move the Transponder into position at the mounting and lower the unit into position in the rack. - Move the retainer into position and secure with the locking screw.	Refer to Figure 203. Make sure that the unit is seated correctly. Do not force the unit into position!
(2)	Install the avionics-enclosure box cover.	Refer to Figure 203.
(3)	Install the lower access panel in the rear baggage compartment	Refer to Section 25-50.
(4)	Do a test for the correct operation of the integrated cockpit system (ICS): - Set the ELECTRIC MASTER key switch to ON. - Set the ELECTRIC MASTER key switch to OFF.	The ICS must power-up and successfully complete its self-test procedure.

5. Remove/Install the GRS7X Attitude, Heading and Reference Unit (AHRS)

A. Remove the GRS7X Attitude, Heading and Reference Unit (AHRS)

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	
(2)	Remove the lower access panel from the rear baggage compartment.	Refer to Section 25-50.
(3)	Remove the GRS7X: - Disconnect the electrical cables. - Remove the four or two (if MÄM 40-868 is installed) screws that attach the GRS7X to the mounting. - Remove the GRS7X from the airplane.	Refer to Figure 204 or 205.

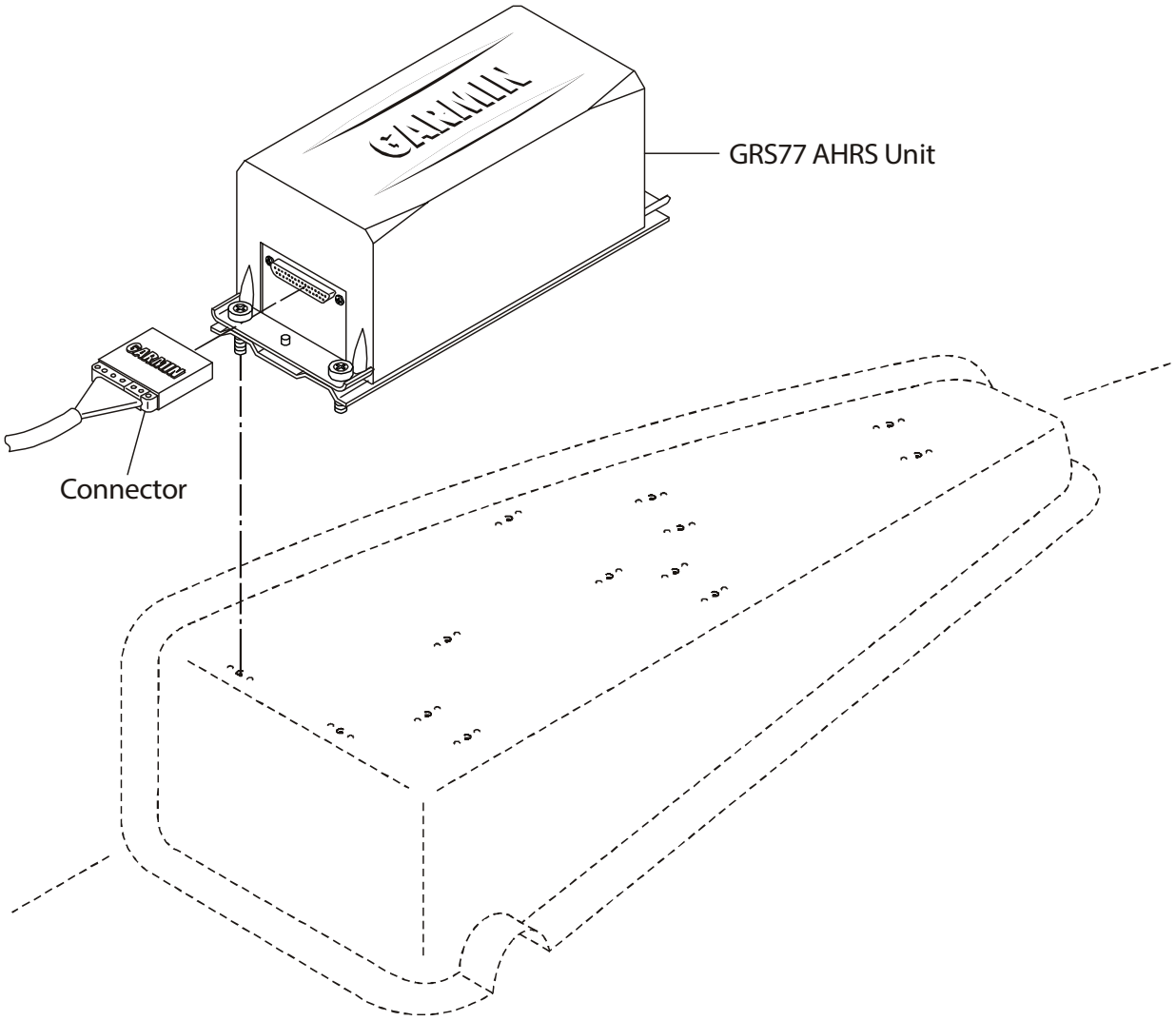

Figure 204 : GRS77 Attitude, Heading and Reference Unit (AHRS) Installation

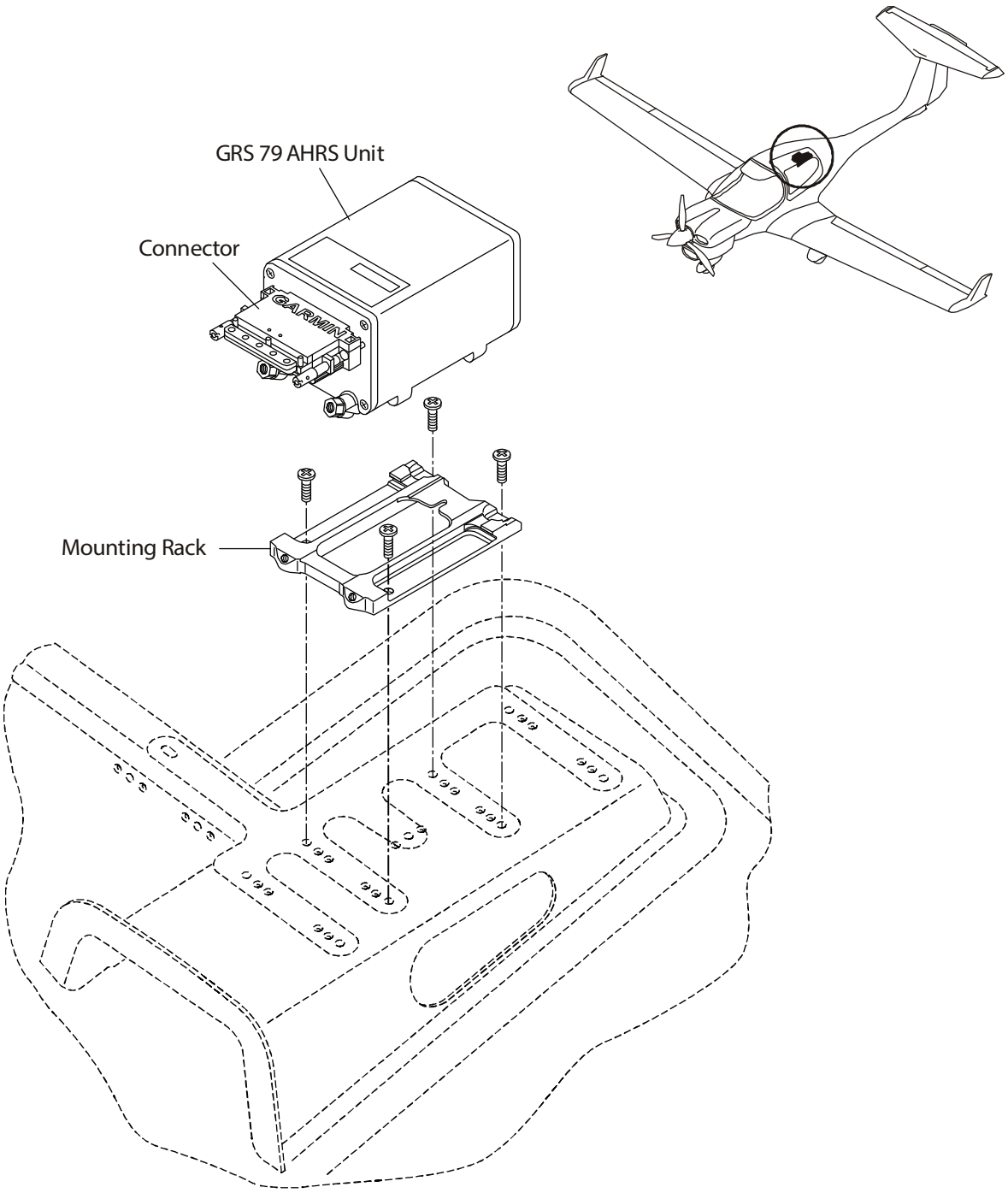

Figure 205 : GRS79 Attitude, Heading and Reference Unit (AHRS) Installation

B. Install the GRS7X Attitude, Heading and Reference Unit (AHRS)

	Detail Steps/Work Items	Key Items/References
(1)	Install the GRS7X unit: - Move the unit into position next to the avionics rack. - Tighten the four or two (if MÄM 40-868 is installed) screws that attach the unit to the mount. - Connect the electrical cables.	Refer to Figure 204 or 205. At the in-line connector.
(2)	Install the lower access panel in the rear baggage compartment	Refer to Section 25-50.
(3)	Do a test for the correct operation of the integrated cockpit system (ICS): - Set the ELECTRIC MASTER key switch to ON. - Set the ELECTRIC MASTER key switch to OFF.	The ICS must power-up and successfully complete its self-test procedure.

6. Remove/Install the GDC 7X Air Data Computer (ADC)

A. Remove the GDC 7X Air Data Computer (ADC)

	Detail Steps/Work Items	Key Items/References
(1)	Disconnect the airplane main battery.	Refer to Section 24-31.
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Remove the GDC 7X: - Locate the GDC 7X on the instrument panel shelf. - Disconnect the electrical cables. - Disconnect the Pitot/static tubes from the unit. - Remove the two screws that attach the GDC 7X to its mounting rack. - Remove the GDC 7X from the airplane.	Note the connections!

B. Install the GDC 7X Air Data Computer (ADC)

	Detail Steps/Work Items	Key Items/References
(1)	Install the GDC 7X: - Move the GDC 7X into position on the mounting rack. - Install the 2 screws that attach the GDC 7X to the mounting rack. - Install the Pitot/static tubes to the unit. - Connect the electrical cables	As noted in 6A. Para (3) At the in-line connector.
(2)	Install the instrument panel cover.	Refer to Section 25-10.
(3)	Connect the airplane main battery.	Refer to Section 24-31.
(4)	Do a test for the correct operation of the integrated cockpit system (ICS): - Set the ELECTRIC MASTER key switch to ON. - Set the ELECTRIC MASTER key switch to OFF.	The ICS must power-up and successfully complete its self-test procedure.
(5)	Do a Pitot/static leak test.	Refer to Section 34-10.

7. Remove/Install the GEA 71/71B Processor

A. Remove the GEA 71/71B Processor

	Detail Steps/Work Items	Key Items/References
(1)	Disconnect the airplane main battery.	Refer to Section 24-31.
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Remove the GEA 71/71B: - Locate the GEA 71/71B on the instrument panel shelf. - Release the screw that secures the retainer. - Move the retainer clear and lift the GEA 71/71B clear of the mounting.	Refer to Figure 206. If necessary, remove the standby altimeter. Refer to Section 34-10.

B. Install the GEA 71/71B Processor

	Detail Steps/Work Items	Key Items/References
(1)	Install the GEA 71/71B: - Move the GEA 71/71B into position at its mounting. - Lower the GEA 71/71B into its mounting. - Install the retainer and secure the retainer with the retaining screw.	 If removed, install the standby altimeter. Refer to Section 34-10.
(2)	Install the instrument panel cover.	Refer to Section 25-10.
(3)	Connect the airplane main battery.	Refer to Section 24-31.
(4)	Do a test for the correct operation of the integrated cockpit system (ICS): - Set the ELECTRIC MASTER key switch to ON. - Set the ELECTRIC MASTER key switch to OFF.	 The ICS must power-up and successfully complete its self-test procedure.

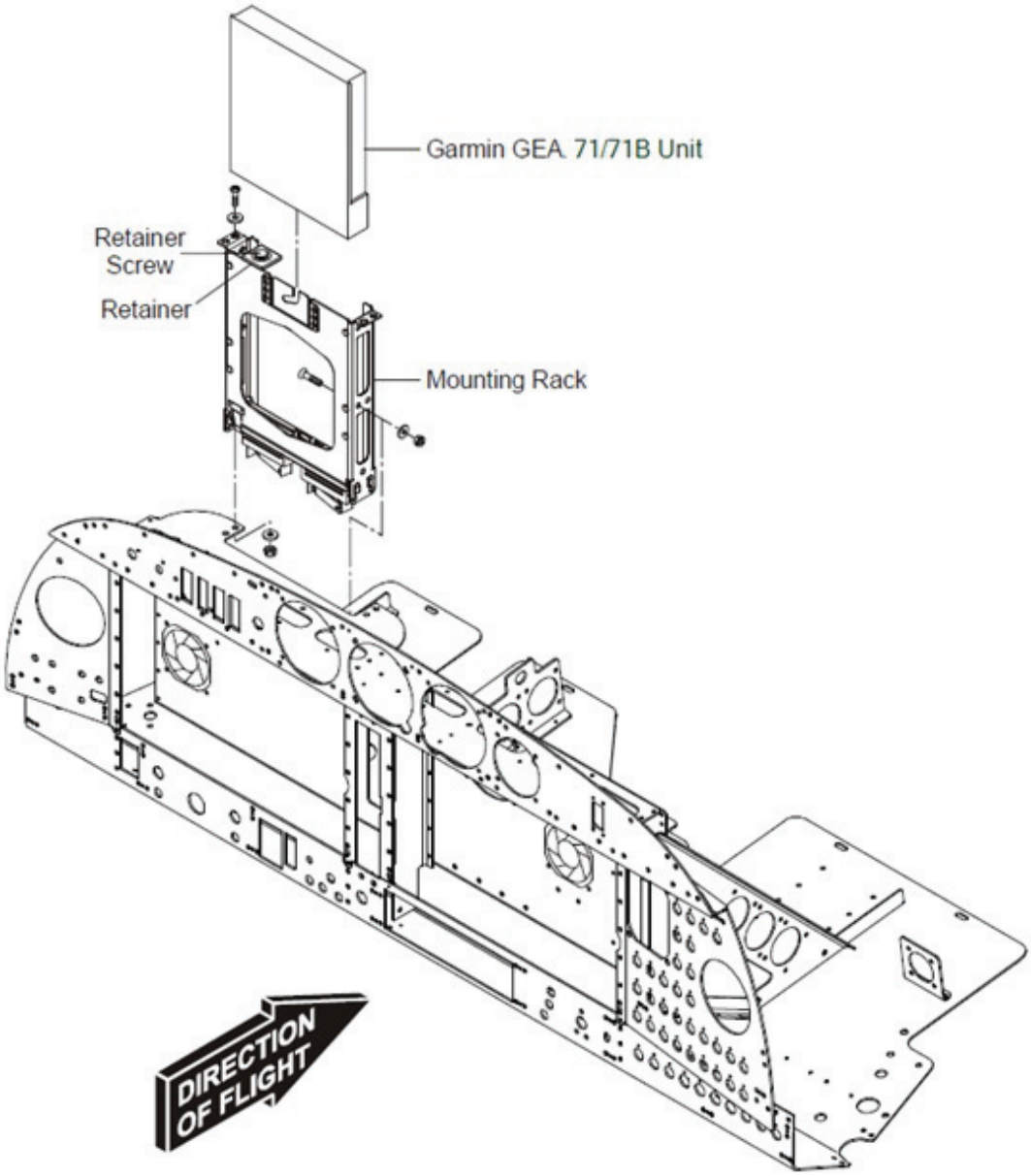

Figure 206 : GEA 71/71B Processor Installation

8. Remove/Install the GMU 44 / GMU 44B Magnetometer Assembly

A. Remove the GMU 44/44B Magnetometer Assembly.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	
(2)	Remove the magnetometer assembly: - Remove the three screws and washers that attach the access cover and magnetometer assembly to the lower surface of the right wing. - Lower the magnetometer assembly and access cover clear of the structure to disconnect the electrical connector. - Disconnect the electrical connector and move the magnetometer assembly and access cover clear of the airplane. - Remove the brass screws which attach the magnetometer to the mounting ring. - Remove the magnetometer from the complete assembly.	Refer to Figure 207. Support the assembly.

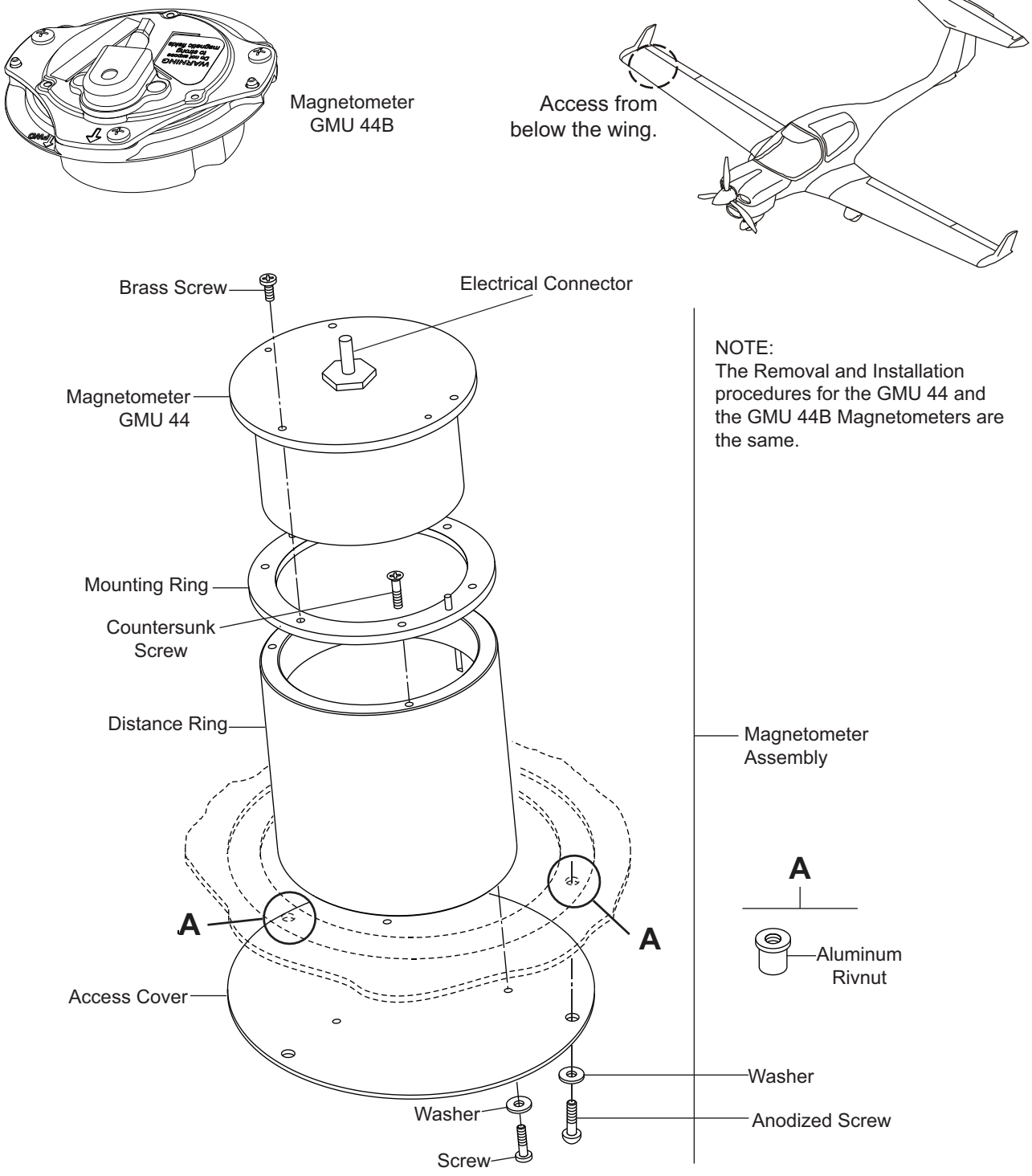

Figure 207 : Magnetometer Assembly - Removal/Installation

B. Install the GMU 44/44B Magnetometer Assembly.

	Detail Steps/Work Items	Key Items/References

(1)	Install the magnetometer assembly:
	- Install the magnetometer into the complete magnetometer assembly.
	  - Place the magnetometer inside the mounting ring of the complete assembly.
	  - Install the brass screws which attach the magnetometer to the mounting ring.
		Refer to Figure 207.
		
		If the Magnetometer is removed from the complete assembly, the anti-rotation properties of the mounting screws must be restored. This can be done by replacing the screws with new Garmin P/N 211-60037-08 screws. If the original screws must be re-used, coat the screw threads with Loctite 242 (blue) threadlocking compound,
		Garmin P/N 291- 00023-02, or equivalent.

(2)	Move the magnetometer assembly and access cover into position under the right wing to make the electrical connections: - Connect the magnetometer assembly connector to the airplane electrical cable at the in-line connector.	
	NOTE: The metal components in the Magnetometer connector might slightly affect the magnetic field sensed by the Magnetometer. Place the connector at least two inches from the body of the Magnetometer to minimize this effect. Attach the Magnetometer connector to its mate in the aircraft wiring. Secure the connector in place using good installation practices. This will make sure that any remaining magnetic effect can be compensated.	
(3)	Install the magnetometer assembly: - Move the magnetometer assembly and access cover fully into position in the lower surface of the right wing. - Install the three anodized screws that attach the magnetometer assembly and access cover to the wing.	Pay attention to the dedicated mounting direction marked by an arrow.

	Detail Steps/Work Items	Key Items/References
(4)	Do a test for the correct operation of the integrated cockpit system (ICS): - Set the ELECTRIC MASTER key switch to ON. - Set the ELECTRIC MASTER key switch to OFF.	The ICS must power-up and successfully complete its self-test procedure.
(5)	Do a magnetometer calibration.	Refer to the G1000 NXi Integrated Avionics System - Line Maintenance Manual. Doc. # 190-02631-00 latest revision.

9. ADS-B Out Test

A. Equipment.

Item	Quantity	Part Number
Mode S Transponder Ramp Tester	1	Aeroflex IFR-6000 or Aeroflex TIC TR-220

B. Procedure.

The ADS-B Out test procedure requires the use of a Mode S transponder ramp tester, such as an Aeroflex IFR-6000 or TIC TR-220. Specific instructions for operating the ramp tester are contained in the applicable operator's manual.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the airplane is in a location where a GPS signal can be received.	(e.g. outdoors with a clear view of the sky).
(2)	Power on the airplane avionics and make sure that the GTX is powered on.	
(3)	Place the GTX in the Ground Test Mode to simulate a temporary airborne state.	Refer to Section 8.1.1 of the GTX 3XX Part 23 AML STC Installation Manual P/N 190-00734-10.
(4)	Make sure that the GPS source being checked has acquired a position.	
(5)	Make sure that the ALT mode is selected. Press the XPDR Softkey to display the Mode selections.	

	Detail Steps/Work Items	Key Items/References
(6)	Using the transponder test set, make sure the following ADS-B Out parameters are being transmitted: - Aircraft emitter category is Light Airplane < 15,500 lbs (on the TR-220 this is indicated as “A1”). - Aircraft length is documented in the aircraft checkout log. - Aircraft width is documented in the aircraft checkout log. - 1090 ADS-B In capability matches the configuration setting documented in the aircraft checkout log. - UAT (978) ADS-B In capability matches the configuration setting documented in the aircraft checkout log.	
(7)	Disable the GPS source not being checked by covering the GPS antenna or removing power from that navigator.	
(8)	Verify that the GPS source not being checked is no longer receiving satellite data.	
(9)	Verify the GPS source being checked has acquired a position.	
(10)	Make sure that the ALT mode is selected. Press the XPDR Softkey to display the Mode selections.	
(11)	Using a transponder test set with ADS-B test capabilities, verify the ADS-B out parameters are being transmitted.	NACv .....≥1 SDA .....≥ 2 SIL .....≥ 3 NACp .....≥ 8 NIC.....≥ 7
(12)	Repeat steps (7) through (11) for the second GPS source.	
(13)	Test complete.	
(14)	Remove all test equipment and tools from the airplane.	

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CENTRAL WARNING SYSTEM
WITH CONVENTIONAL COCKPIT INSTALLED

1. General

The DA 40 NG with the conventional cockpit has warning, caution and status lights combined in one 'White Wire' annunciator panel. Figure 1 shows the annunciator panel.

2. Description

A. Warning Messages

A warning gives these indications:

- A continuous aural alert sounded in the airplane's intercom system.
- The red master WARNING light flashes.
- The red warning light for the related system flashes.
- The green acknowledge button lights.

Push the 'acknowledge' button to cancel the aural alert. The red master WARNING light will go off. The red warning light for the related system will change from flashing to a continuous light.

B. Caution Messages

A caution gives these indications:

- A short aural alert sounded in the airplane's intercom system.
- The amber master CAUTION light flashes.
- The amber caution light for the related system flashes.
- The green acknowledge button lights.

Push the 'acknowledge' button, to cancel the aural alert. The amber master CAUTION light will go off. The amber caution light for the related system will change from flashing to a continuous light.

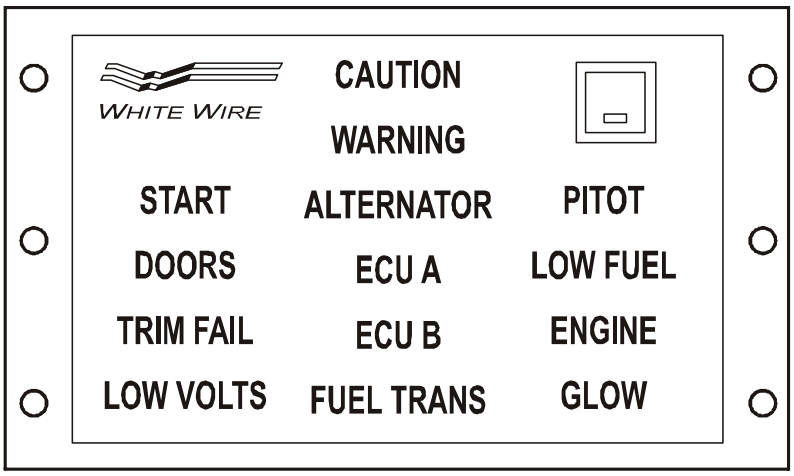

Figure 1 : Central Warning System: White Wire Annunciator Panel

C. Warning, Caution and Status Lights

START:

A red warning light shows that the starter solenoid is energized. The warning light receives an electrical current from the starter side of the starter solenoid. The starter warning message shows when the connection between the starter motor and the engine has not been broken. This occurs when the pinion of the starter motor remains engaged with the engine flywheel.

When the starter is operated, the starter warning light is ON continuously. In this case the master WARNING light and the aural alert do not operate.

DOORS:

A red warning light shows that the canopy or door is unlocked. Micro-switches connected parallel operate the doors warning message when either the door or canopy is unlocked.

LOW VOLTS:

An amber caution light shows low voltage. The low voltage caution message shows when the voltage falls below 25.0 Volts.

ENGINE:

An amber caution light shows when any indication on an engine instrument (MED or SED) changes from the green to the yellow range.

ALTERNATOR:

A red warning light shows alternator failure. The regulator of the alternator operates the ALTERNATOR warning message.

ECU A:

An amber caution light shows when the ECU A fails.

ECU B:

An amber caution light shows when the ECU B fails.

FUEL TRANS:

A white status light shows when the fuel transfer pump is ON.

PITOT:

An amber caution light shows that the Pitot heating system is OFF. The caution light receives an electrical current from the heater side of the Pitot heat relay. The Pitot heating caution message shows when the Pitot heating is not switched ON, or when there is a failure of the Pitot heating system.

LOW FUEL:

An amber caution light shows low fuel level is less than 3 US gal (+2/-1 US gal) in the left fuel tank. The fuel level switch in the left fuel tank operates the low fuel caution message.

TRIM FAIL: Not used.

GLOW:

A status message shows when the glow relay is energized. This is usually only before or during start.

3. Functional Check

The functional check is automatically started after switching the ELECTRIC MASTER key switch ON. All lights are flashed, and the aural alert is muted. By pressing the 'acknowledge' button, the lights are extinguished, and a short aural alert is sounded. This test verifies functionality of the microprocessor, the lights, and the aural signal.

You may do additional system tests by holding the 'acknowledge' button for 2 seconds. All lights will begin flashing, and the aural alert will sound continuously.

4. Wiring Diagrams

Refer to Chapter 92 for the wiring diagram for the central warning system.

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TROUBLE-SHOOTING

1. General

The table below lists the defects you could have with the central warning system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Warning/Caution/Status indication incorrect.	Sensor defective.	Replace the sensor.
	Annunciator panel defective.	Replace the annunciator panel.
	High resistance or open connection in the electrical wiring from the sensor.	Do resistance and continuity tests between the indicator and the sensor. Repair the defective connection or wire.

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MAINTENANCE PRACTICES

1. General

This Section tells you how to replace the main components of the central warning system. Refer to the equipment manufacturer's manuals for more data on the annunciator panel. Refer to the related Chapter for data on the warning sensors.

Refer to Chapter 92 for the Wiring Diagrams.

2. Remove/Install the Annunciator Panel

A. Remove the Annunciator Panel.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Disconnect the electrical connector from the annunciator panel.	
(3)	Remove the four cross-head screws which attach the annunciator panel to the instrument panel.	Refer to Figure 201. Hold the annunciator panel.
(4)	Move the annunciator panel out of the instrument panel and remove it from the airplane.	

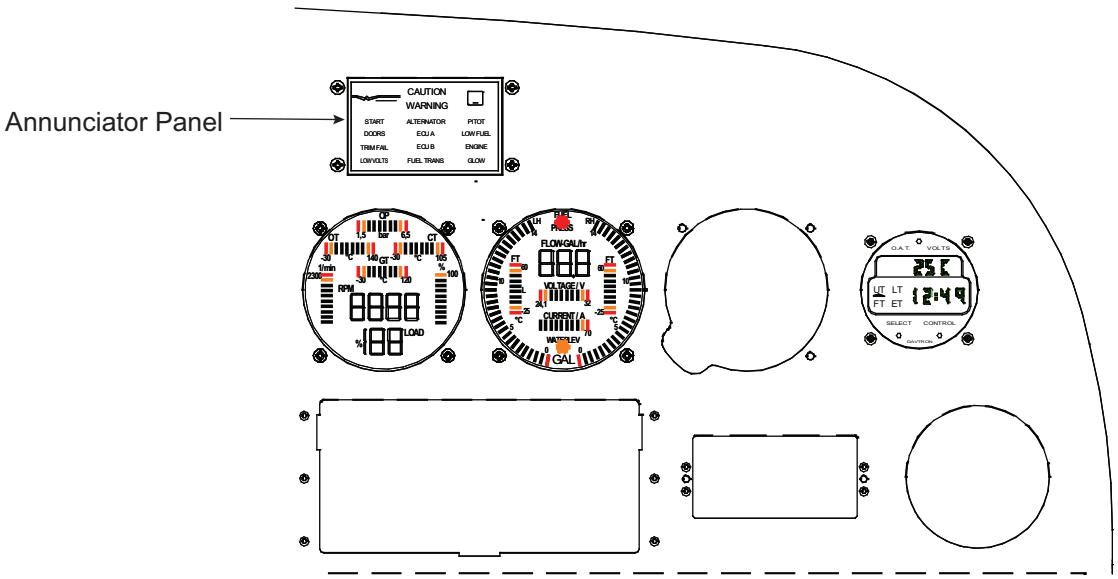

Figure 201: Annunciator Panel - Removal/Installation

B. Install the Annunciator Panel

	Detail Steps/Work Items	Key Items/References
(1)	Move the annunciator panel into its position in the instrument panel.	Refer to Figure 201.
(2)	Install the four cross-head screws which attach the annunciator panel to the instrument panel.	
(3)	Connect the electrical connector to the rear of the annunciator panel.	
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Do a test of the annunciator panel.	Refer to Paragraph 3.

3. Test the Annunciator Panel.

	Detail Steps/Work Items	Key Items/References
(1)	Close the front canopy and rear door.	
(2)	Put on a head-set.	To hear the aural alert.
(3)	Set the ELECTRIC MASTER key switch to ON.	All lights on the annunciator panel must be flashed. The aural alert must be muted.
(4)	Set the AVIONIC MASTER switch to ON.	
(5)	Switch the intercom ON.	To hear the aural alert.
(6)	Press the 'acknowledge' button.	The PITOT, ECU A and ECU B caution lights must be on. The ALTERNATOR WARNING light must be on if the engine is not running. The LOW VOLTS caution light can be on or off. All other lights on the annunciator panel must be extinguished, and a short aural alert must be sounded.
(7)	Set the AVIONIC MASTER switch to OFF.	
(8)	Set the ELECTRIC MASTER key switch to OFF.	

CHAPTER 32
LANDING GEAR

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LANDING GEAR

1. General

The DA 40 NG has a fixed tricycle landing gear and a castor nose wheel. This Section gives you the general description and operation of the landing gear. See Section 32-10 for Trouble-Shooting and Maintenance Practices for the main gear. See Section 32-20 for Trouble-Shooting and Maintenance Practices for the nose gear. See Section 32-40 for Trouble-Shooting and Maintenance Practices for the for the wheels and brakes.

NOTE: Equipment which is certified for installation in the DA 40 NG is listed in Chapter 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Chapter 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

2. Description and Operation

See the Figure 1 on the next page for a visual display of the Landing Gear.

Flat section steel leaf-springs make the main gear struts. Two mountings attach each main gear strut to the center section of the fuselage. The bottom of each strut has an axle, a brake torque plate and a mounting plate for the optional GFRP wheel fairing.

The nose gear is a tubular strut. A strong pivot attaches it to the forward fuselage. An elastomer spring pack or a hydraulic damper attaches the strut to the engine mount. A pivot at the bottom of the strut has a trailing fork for the wheel. It also holds the GFRP wheel fairing (if standard landing gear is installed).

Both nose and main gear have single wheels with low pressure tires. Each main gear strut has a disk brake. Toe-brake pedals on the rudder pedals operate the disk brakes. A parking brake valve allows the brakes to be set ON for parking.

The landing gear absorbs vertical loads (for example, landing loads). Each main gear strut is a leaf-spring which deflects upwards as the load increases. The elastomer pack (or the optional hydraulic damper) in the nose gear compresses as the load increases. In each case, the spring returns to the original position when the load is removed.

Push on both toe-brake pedals at the same time to apply both disk brakes. The airplane will stop in a straight line. Push on one toe-brake pedal to apply the disk brake on that side only. The airplane will steer to that side. Move the parking brake lever fully up. Then push on both toe-brake pedals a few times to apply the parking brake. Move the parking brake lever fully down to release the parking brake.

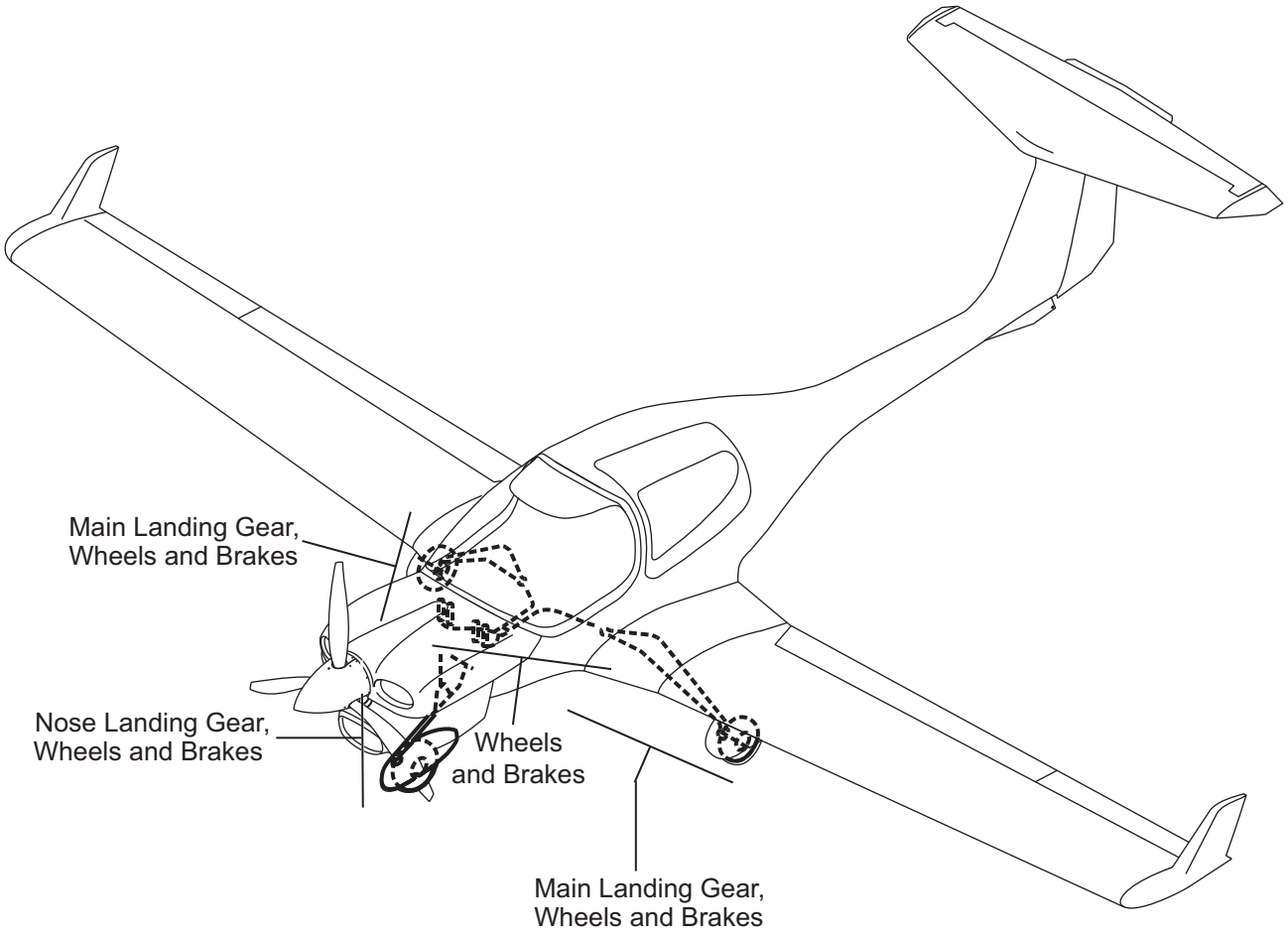

Figure 1 : Airplane Landing Gear

MAIN LANDING GEAR

1. General

This Section gives you the data for the main landing gear. It gives you the Trouble-Shooting and Maintenance Practices. Refer to Section 32-40 for data for the main wheels and the brakes.

2. Description and Operation

Figures 1 and 2 show the main gear strut mounting. Each main gear strut is a steel alloy leaf spring. Two strong mounts attach each spring to the center section of the fuselage. Small panels with flexible centers seal the gaps where each strut goes through the fuselage shell.

The inner mount is a large vertical bolt. The bolt goes through a metal block which attaches to the center closing rib of the fuselage center section. Spring washers separate the top face of the spring from the block. A convex and a concave washer separate the bottom face of the spring from a castle nut. The castle-nut pre-loads the spring washers.

The outer mount has two parts. The upper part locates on top of the main strut and the lower retaining bar locates below the main strut. Two bolts attach the assembly to the main landing gear ribs. The main landing gear ribs are bonded into the fuselage center section. Reinforced synthetic rubber inserts go between the leaf spring and the retaining bar to prevent chafing damage and allow angular movement of the leaf spring in the mount.

Figures 201, 202 and 203 show the main landing gear axle installation. Six bolts at the outer end of each strut attach these components:

- An axle, made from aluminum.
- A brake torque-plate.
- A shim (if MÄM 40-574 is installed).
- A mounting plate for the GFRP wheel fairing.

When the airplane is on the ground, the inner end of the leaf spring pulls down on the inner mounting. The outer end pushes up against the outer mounting. When the airplane is flying, the inner end of the leaf spring pushes up on the inner mounting. And the outer end pulls down against the retaining bar of the outer mounting.

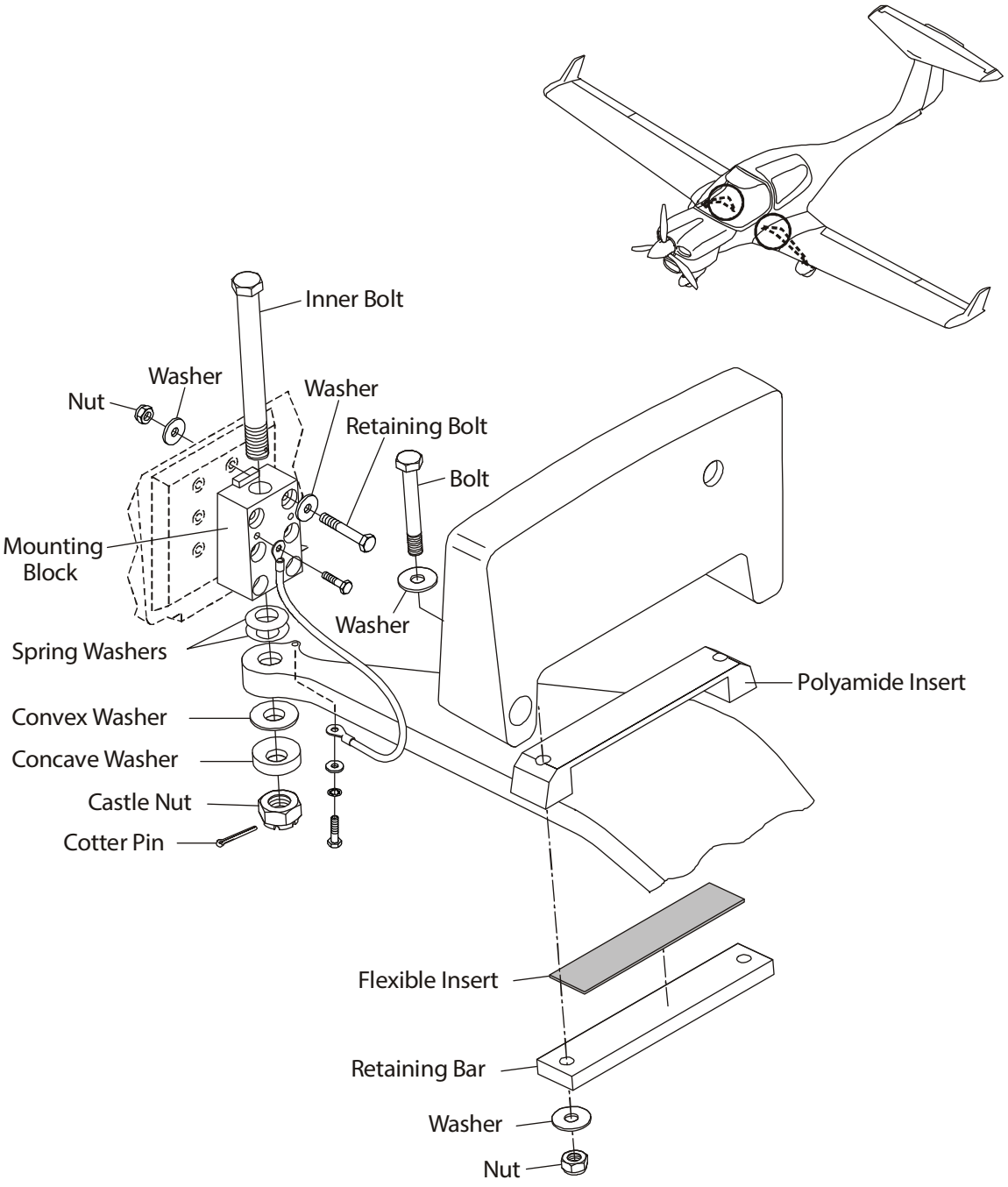

Figure 1 : Main Landing Gear Strut-Mounting

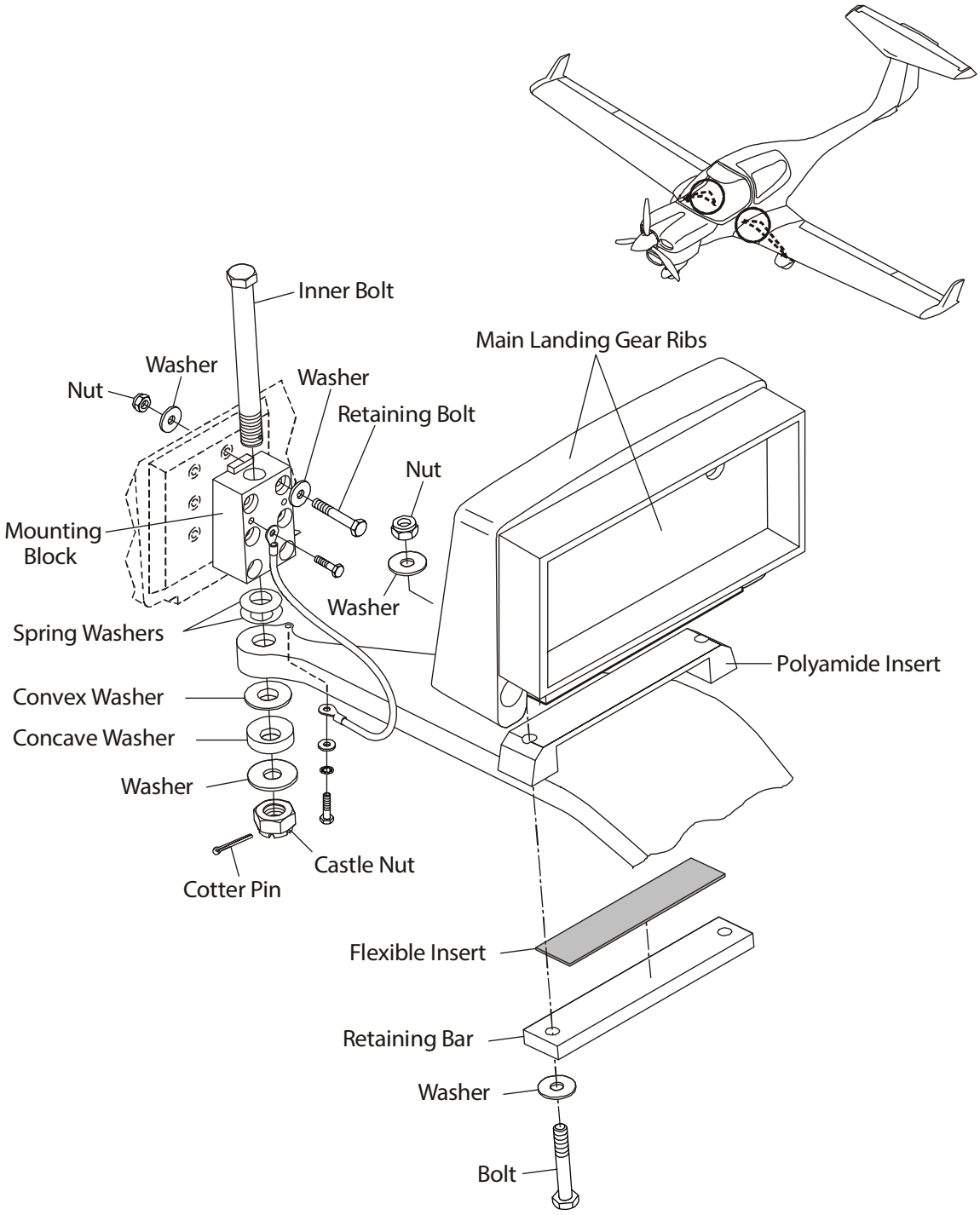

Figure 2 : Main Landing Gear Strut-Mounting
(if MÄM 40-574, OÄM 40-334, or OÄM 40-398 is installed)

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TROUBLE-SHOOTING

1. General

Use the table below to trouble-shoot the main landing gear.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

WARNING: **YOU MUST DO A HARD LANDING CHECK AFTER A HARD LANDING. HARD LANDINGS CAN CAUSE DAMAGE TO THE STRUCTURE AS WELL AS THE LANDING GEAR.**

Trouble	Possible Cause	Repair
Strut bent.	Hard landing.	Do a hard landing check. Refer to Section 05-50. Replace the strut.
Negative camber.	Strut bent, hard landing.	Do a hard landing check. Refer to Section 05-50. Replace the strut.
Too much tire wear.	Incorrect toe-in.	Adjust the toe-in. Refer to 'Test/Adjust the Main Landing Gear' procedure described later in this Section.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to remove, install and adjust the main landing gear. Refer to the manufacturer for further data.

2. Remove/Install a Main Landing Gear Strut

A. Equipment

Item	Quantity	Part Number
Airplane jacks.	3	Commercial
Nose trestle.	1	Commercial
Wing trestles.	2	Commercial

B. Remove a Main Landing Gear Strut.

	Detail Steps/Work Items	Key Items/References
(1)	Lift the airplane on jacks.	Refer to Section 07-10.
(2)	Remove the access panels for the main landing gear.	Refer to Section 52-40.
(3)	Remove the wheel fairing (if installed): - Remove the outer bolt. - Remove 4 screws from the inner side.	
(4)	Remove the back-plate from the brake caliper.	Refer to Section 32-40.
(5)	Remove the wheel.	Refer to Section 32-40.
(6)	Release the brake caliper.	
(7)	Remove the six bolts and bushings (if MÄM 40-574 is installed) which attach the axle. Remove the axle, torque-plate, 4 mm (0.16 in) shim (if MÄM 40-574 or OÄM 40-398 is installed) and mounting plate for the wheel fairing.	Refer to Figure 201. Refer to Figure 202 (if OÄM 40-334 is installed). Refer to Figure 203 (if MÄM 40-574 is installed). Only if you will install a different strut.

	Detail Steps/Work Items	Key Items/References
(8)	Disconnect the bonding cable from the strut.	
(9)	Remove the six bolts, washers and nuts which hold the mounting block to the web.	Refer to Figures 1 and 2 in the Description and Operation Pageblock 32-10-00.
(10)	Remove the nuts which hold the retaining bar to the outer mounting bracket.	Hold the strut!
(11)	Remove the strut.	Move the strut outboard.
(12)	If necessary remove the nut and bolt at the inner attachment mount.	Refer to Figures 1 and 2 in the Description and Operation Pageblock 32-10-00.

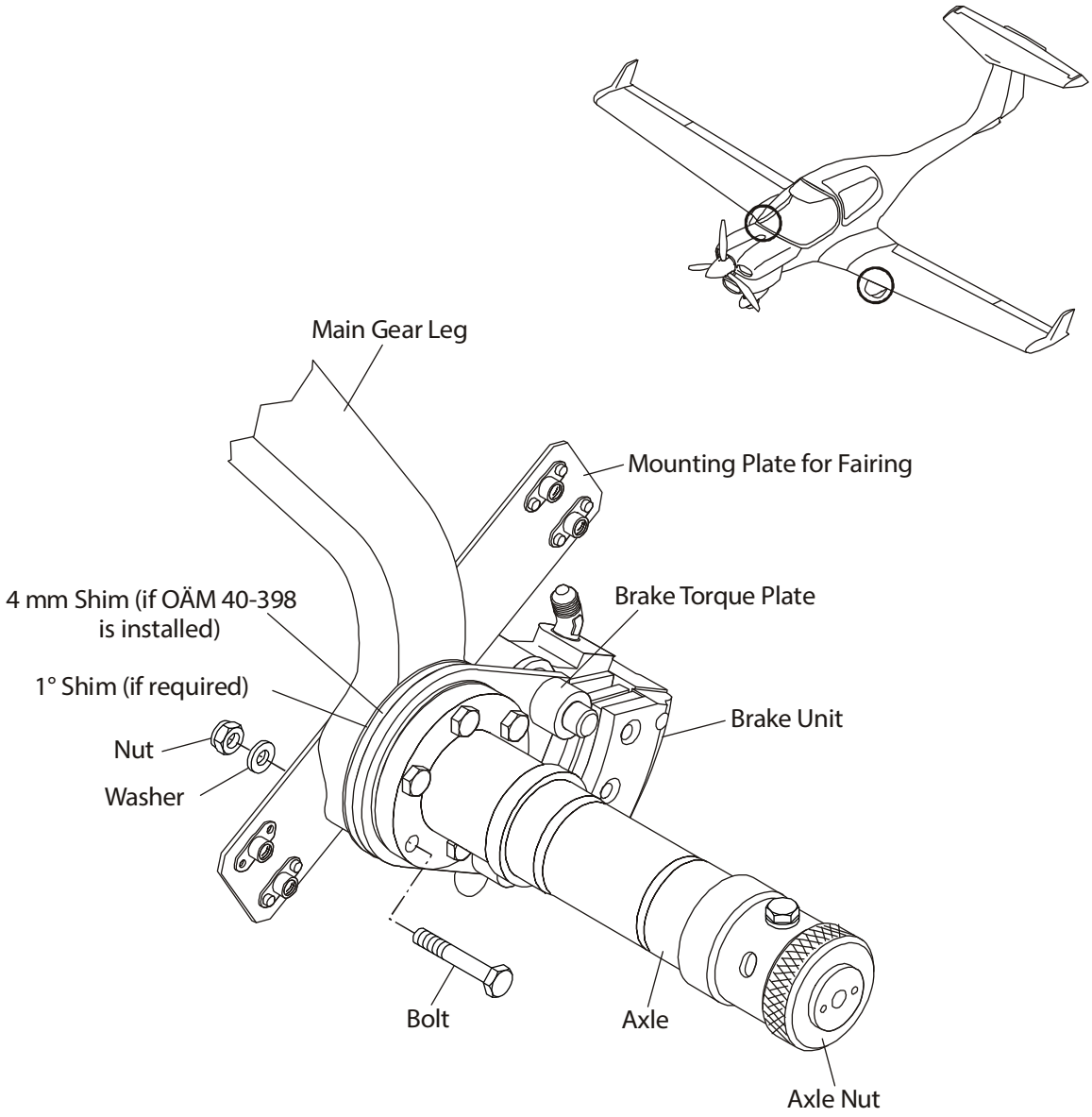


Figure 201 : Main Landing Gear Axle Installation

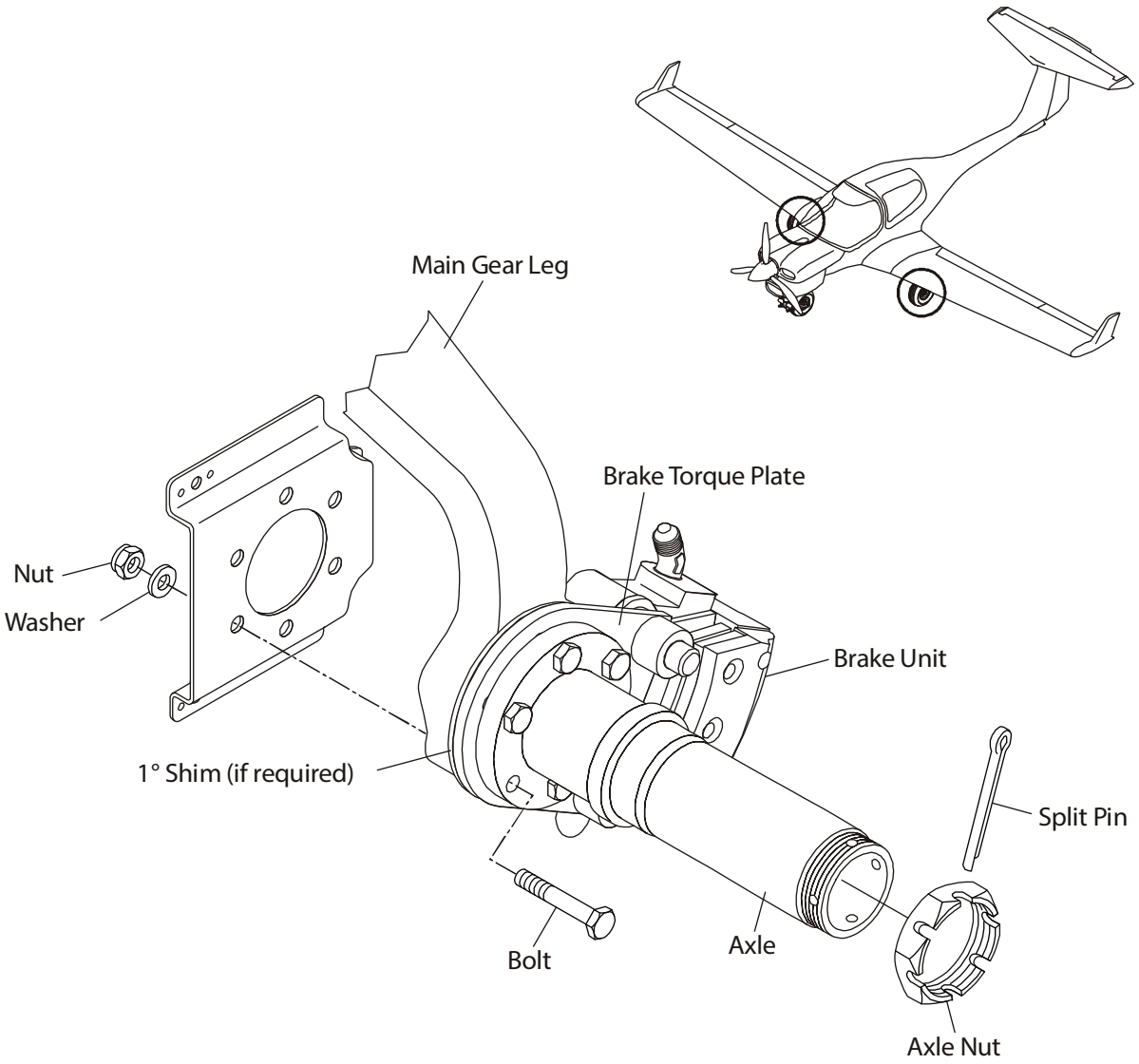


Figure 202 : Main Landing Gear Axle Installation (if OÄM 40-334 is installed)

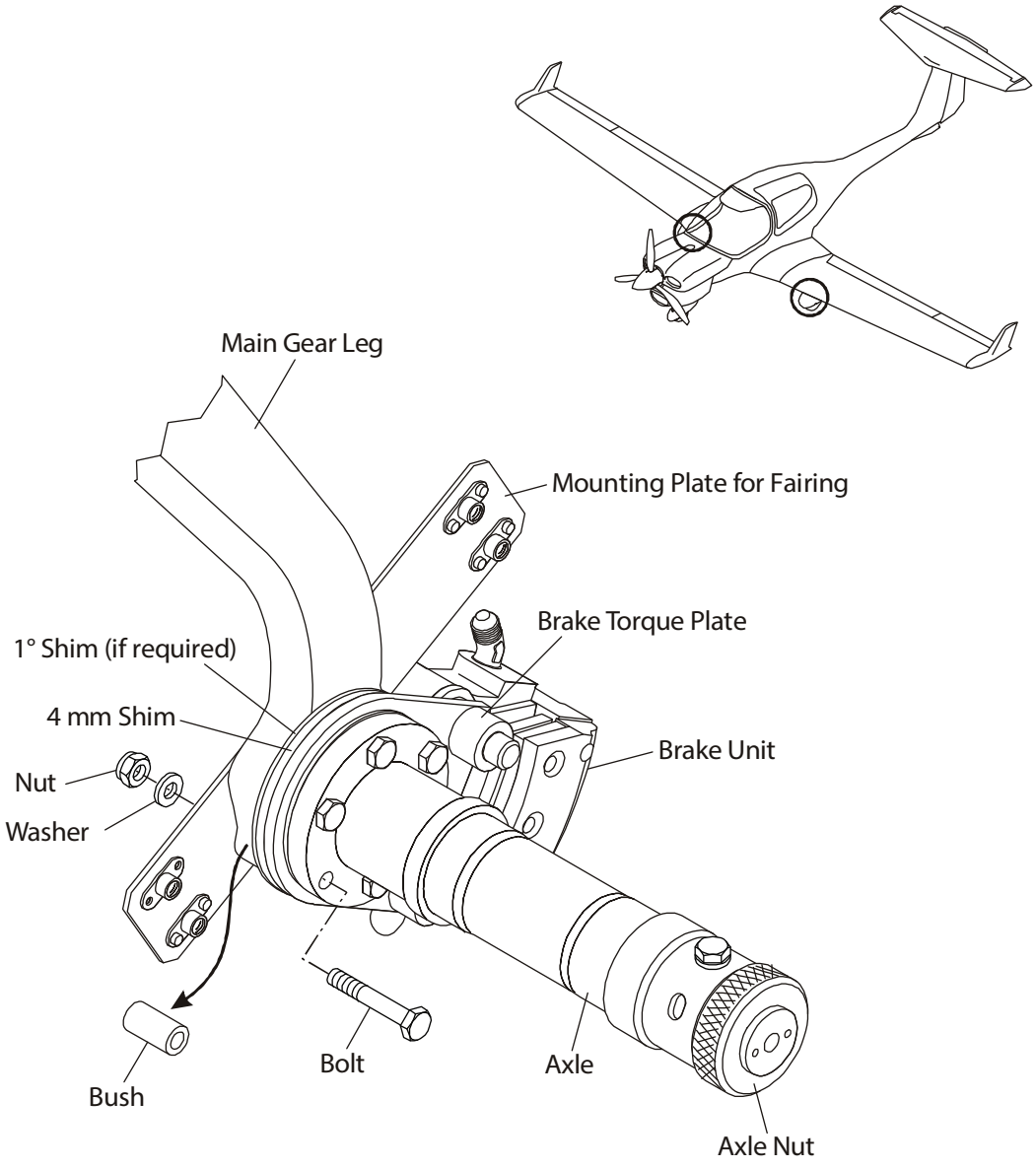


Figure 203 : Main landing Gear Axle Installation (if OÄM 40-574 is installed)

C. Install a Main Landing Gear Strut.

	Detail Steps/Work Items	Key Items/References
(1)	Examine the center section in the area of the main landing gear mountings. Look specially for damage to the GFRP structure.	Refer to Section 51-10 for GFRP inspection procedures.
(2)	If necessary install the nut and the bolt at the inner attachment mount.	Refer to Figures 1 and 2 in the Description and Operation Pageblock 32-10-00.
(3)	Put the strut in position.	Move it inboard through the center section access panel.
(4)	Put the inserts in position above and below the strut at the outer mounting.	Hold the strut!
(5)	Install the retaining bar.	Torque: 25 Nm (18.4 lbf.ft.). If MÄM 40-574, OÄM 40-334 or OÄM 40-398 is installed: Torque: 30 Nm (22.1 lbf.ft.). Make sure that the flexible insert is glued in position. Use Pattex Kraftkleber Classic.
(6)	If necessary install the mounting block to the web by use of the six bolts, washers and nuts.	Refer to Figures 1 and 2 in the Description and Operation Pageblock 32-10-00. Torque the six bolts to 15 Nm (11.1 lbf.ft.). Make sure that the spring washers are between the top of the strut and the mounting block (concave sides facing). Make sure that the convex and concave washers are between the nut and the strut.
(7)	Tighten the nut on the inner bolt and install a cotter pin.	To give a height of the spring washers of 4 mm (+0.5 mm / -0 mm) or 0.16 in (+0.02 in / -0 in).
(8)	Connect the bonding cable to the strut.	Install the nut and bolt near the inner mounting block.
(9)	Install the axle, brake torque-plate, 4 mm (0.16 in) shim (if MÄM 40-574 or OÄM 40-398 is installed) and the mounting plate for the wheel fairing. Install the six bolts and bushings (if MÄM 40-574 is installed) which attach the axle	Refer to Figures 201, 202 and 203. Torque: 6.5 Nm (4.8 lbf.ft.). If OÄM 40-334 is installed: Torque: 12 Nm (8.9 lbf.ft.)
(10)	Install the brake caliper.	Refer to Section 32-40.

	Detail Steps/Work Items	Key Items/References
(11)	Install the wheel.	Refer to Section 32-40.
(12)	Install the back-plate to the brake caliper.	Refer to Section 32-40.
(13)	Lower the airplane with jacks.	Refer to Section 07-10.
(14)	Do a test for correct adjustment of the landing gear.	See Paragraph 3.
(15)	Do a functional test of the wheel brake system.	
(16)	Install the wheel fairing (if wheel fairing was installed): - Install the outer bolt. - Install four screws on the inner side.	
(17)	Install the access panels for the main landing gear.	Refer to Section 52-40.

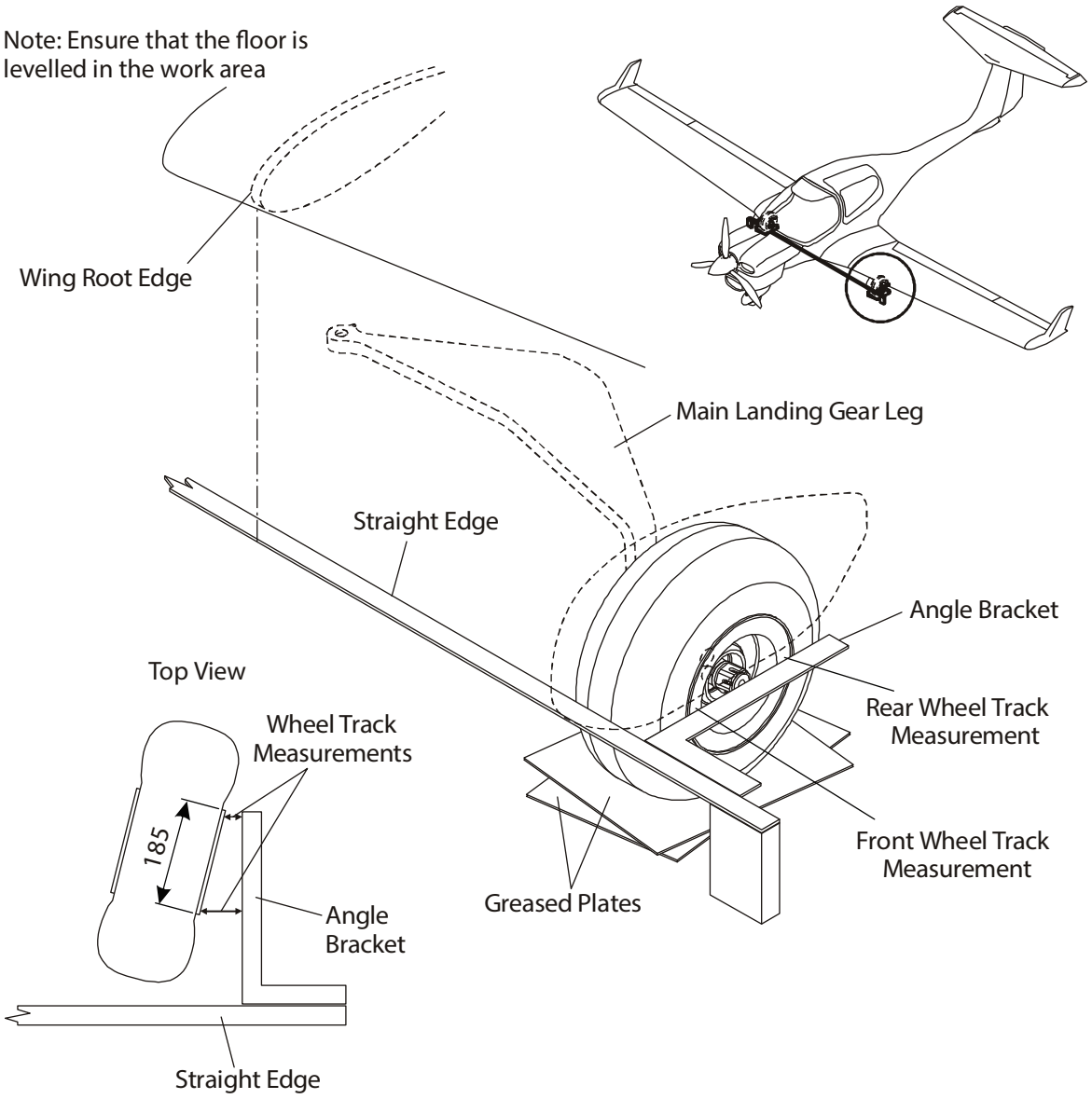
3. Test/Adjust the Main Landing Gear

Do this work at the following times:

- When required by the maintenance checklist (Chapter 05).
- After a hard landing.
- After any re-installation or repair to the main landing gear strut.

A. Equipment

Item	Quantity	Part Number
Slide sheets - 2 per side.	4	Commercial
E-protractor.	1	Commercial



Higher Wheel Track value - Lower Wheel Track value = Final Wheel Track value.
Look up in Table to convert to degrees.

Figure 204 : Measure Wheel Track and Camber

Figure 205 : DA 40 NG Wheel Track Table

DA 40 NG Wheel Track Table					
(Valid for DA 40 NG with 6” - Parker Rim P/N: 40-414A)					
mm	°	mm	°	mm	°
0,1	0,03	3,4	1,04	6,7	2,05
0,2	0,06	3,5	1,07	6,8	2,08
0,3	0,09	3,6	1,10	6,9	2,11
0,4	0,12	3,7	1,13	7	2,15
0,5	0,15	3,8	1,16	7,1	2,18
0,6	0,18	3,9	1,20	7,2	2,21
0,7	0,21	4	1,23	7,3	2,24
0,8	0,25	4,1	1,26	7,4	2,27
0,9	0,28	4,2	1,29	7,5	2,30
1	0,31	4,3	1,32	7,6	2,33
1,1	0,34	4,4	1,35	7,7	2,36
1,2	0,37	4,5	1,38	7,8	2,39
1,3	0,40	4,6	1,41	7,9	2,42
1,4	0,43	4,7	1,44	8	2,45
1,5	0,46	4,8	1,47	8,1	2,48
1,6	0,49	4,9	1,50	8,2	2,51
1,7	0,52	5	1,53	8,3	2,54
1,8	0,55	5,1	1,56	8,4	2,57
1,9	0,58	5,2	1,59	8,5	2,61
2	0,61	5,3	1,62	8,6	2,64
2,1	0,64	5,4	1,65	8,7	2,67
2,2	0,67	5,5	1,69	8,8	2,70
2,3	0,70	5,6	1,72	8,9	2,73
2,4	0,74	5,7	1,75	9	2,76
2,5	0,77	5,8	1,78	9,1	2,79
2,6	0,80	5,9	1,81	9,2	2,82
2,7	0,83	6	1,84	9,3	2,85
2,8	0,86	6,1	1,87	9,4	2,88
2,9	0,89	6,2	1,90	9,5	2,91
3	0,92	6,3	1,93	9,6	2,94
3,1	0,95	6,4	1,96	9,7	2,97
3,2	0,98	6,5	1,99	9,8	3,00
3,3	1,01	6,6	2,02	9,9	3,03

B. Procedure

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the airplane is at the empty weight.	See the Adjustment Report for the airplane
(2)	Remove the wheel fairings (if installed): - Remove the outer bolt. - Remove the four screws from the inner side.	For each wheel.
(3)	Move the airplane to put the main wheels on the slide sheets. Make sure there is no horizontal friction load on the landing gear.	Make sure the floor is level in the working area.
(4)	Measure the wheel track: - Measure from the front wing root edge LH and RH (between wing and fuselage) perpendicular to the ground. - Mark these points on the ground and draw a line or use a straight beam which aligns with both points. - Use a metal angle or similar and hold it onto the measured line from the previous step to the rim of the main gear wheel. - Measure the wheel track of the rim in the front and the rear. - Subtract the two measurements and write this wheel track measurement down. - Use the wheel track table to convert your wheel track measurement into degrees.	Refer to Figures 204 and 205.
(5)	Measure the camber using an E-protractor.	

	Detail Steps/Work Items	Key Items/References
	WARNING: USE ONLY THE SHIMS LISTED FOR THE PURPOSE IN THE ILLUSTRATED PARTS CATALOGUE. OTHER SHIMS COULD CAUSE LANDING GEAR FAILURE.	
(6)	If necessary, adjust the wheel track and/or camber.	Refer to Chapter 06-00 for limits. Maximum 2° shim per side (camber and toe). See the Illustrated Parts Catalogue for the correct shims. If MÄM 40-574, OÄM 40-334 or OÄM 40-398 is installed: Maximum 1° shim per side (camber and toe). Put shims between the strut and the axle. This changes the angle between the axle and the airplane longitudinal or vertical axis.
(7)	Measure the wheel track.	Across the airplane from the outermost point on one axle to the outermost point on the other axle.
(8)	Fill out the track and camber report.	Refer to Section 06-00.
(9)	Move the airplane off the slide sheets.	
(10)	Install the wheel fairings (if the wheel fairings were installed): - Install the outer bolt. - Install the four screws on the inner side.	

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NOSE LANDING GEAR

1. General

This Section gives you the data for the nose landing gear. It gives you the Trouble-Shooting and Maintenance Practices. Refer to Section 32-40 for the data for the nose wheel.

2. Description and Operation

Figures 1, 2 and 3 show the nose landing gear installation variants. The DA 40 NG has a fixed nose landing gear with a castor wheel. The nose landing gear strut is a welded tubular-steel component. The aft upper end has a transverse tube which holds the main attachment journal bearings. These journal bearings allow the strut to move only up and down.

Forward and below the attachment bearing is a welded bracket which holds the bottom of an elastomeric spring pack (elastomer pack) or an optional hydraulic damper. The upper end of the elastomer pack / hydraulic damper attaches to the engine mount.

The forward bottom end of the nose landing gear strut has a near vertical pivot for the nose-wheel fork. This lets the nose wheel castor. Stops limit the castor movement to ± 30°.

When the airplane is on the ground, the elastomer pack / hydraulic damper pushes up against the engine mount. The journal bearings pull down against the front fuselage. When the airplane is flying, the elastomer pack / hydraulic damper pulls down against the engine mount. And the journal bearing pushes up against the front fuselage.

The journal bearings in the fuselage keep the nose landing gear strut aligned fore and aft. A side load on the nose wheel causes it to castor. The stiffness (steering friction) of the nose-wheel fork pivot can be adjusted with the nose wheel fork mounting screw. This prevents nose wheel shimmy.

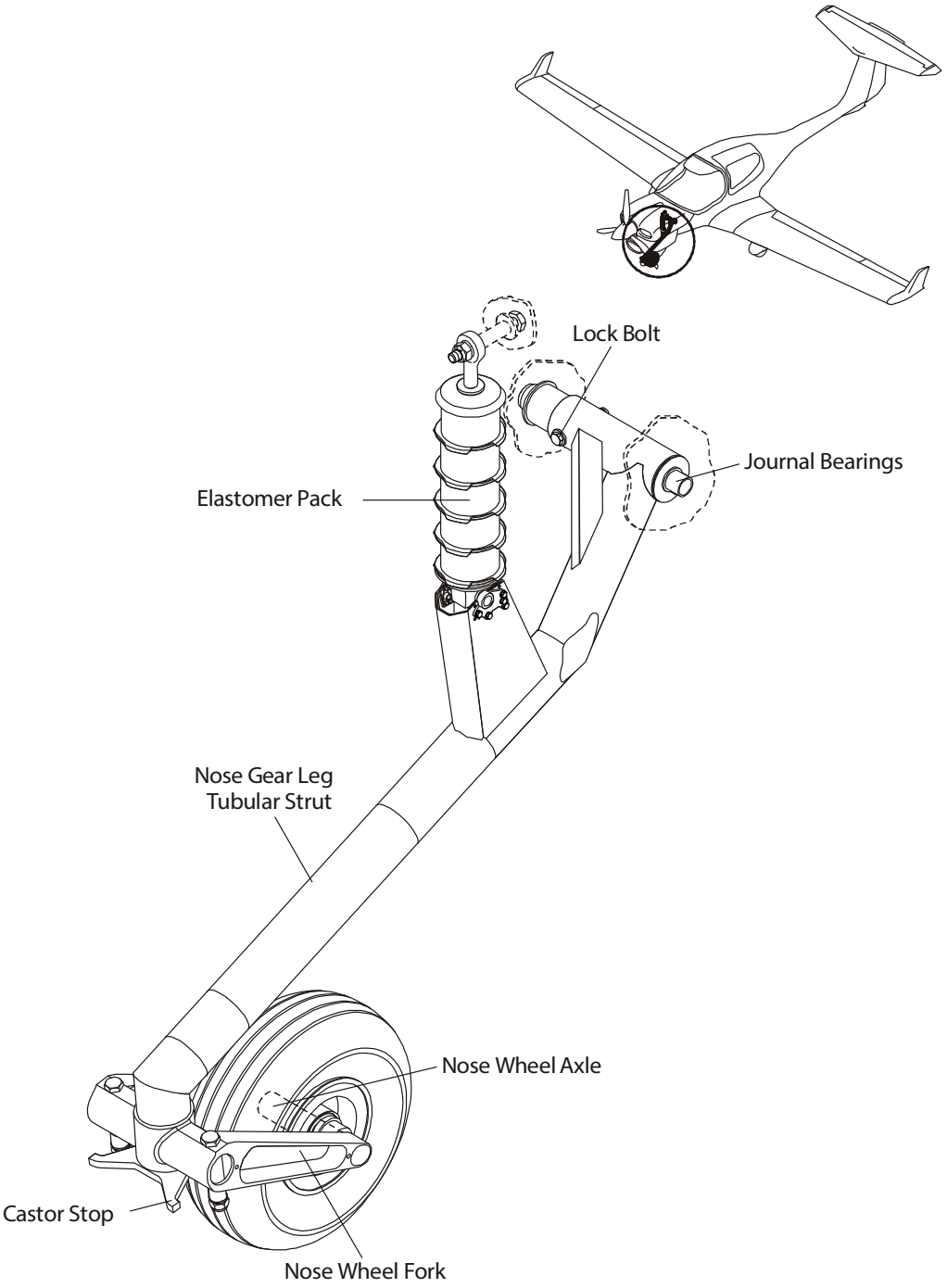

Figure 1 : Nose Landing Gear

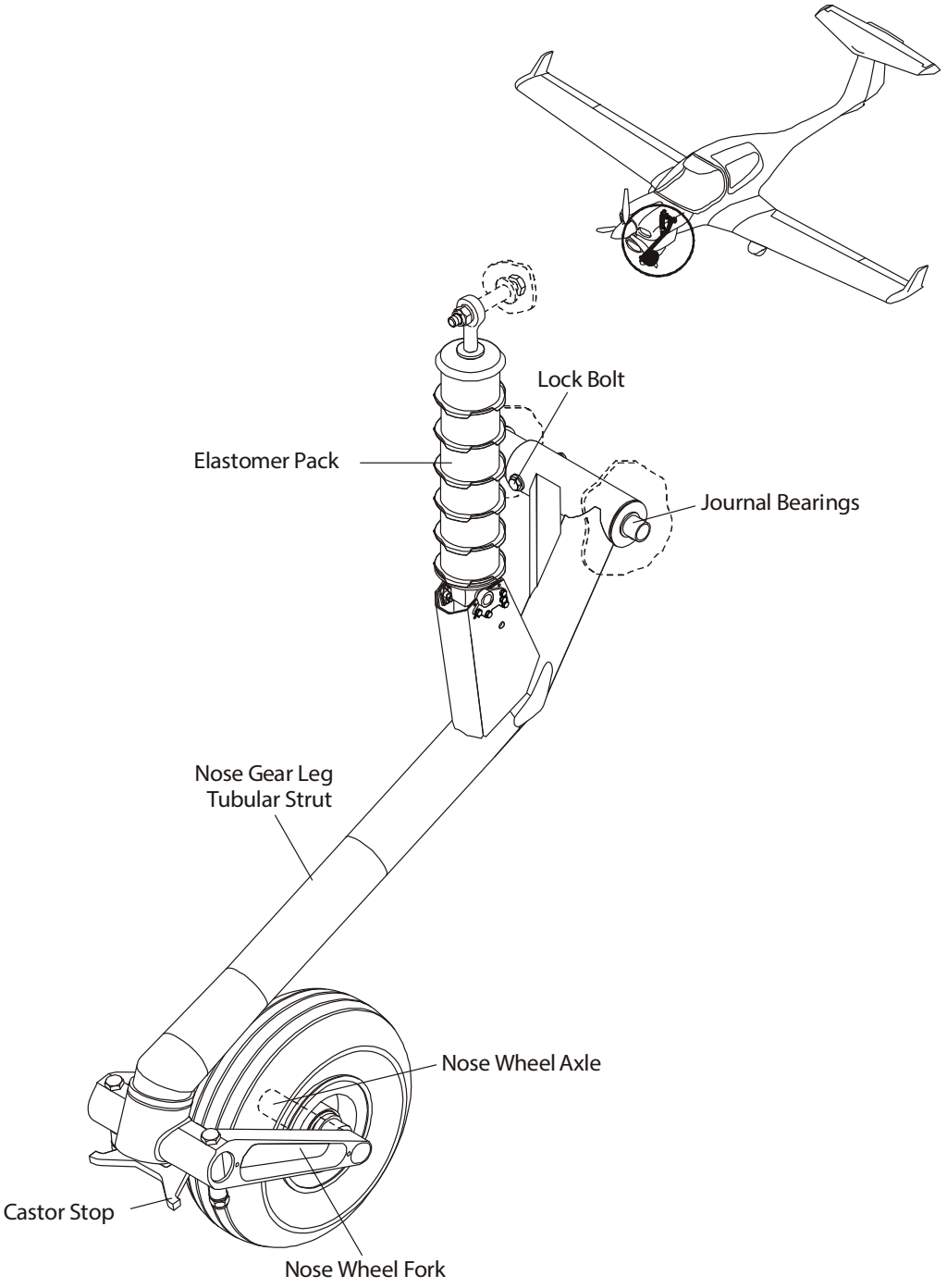

Figure 2 : Nose Landing Gear
(if MÄM 40-574, or OÄM 40-334 is installed)

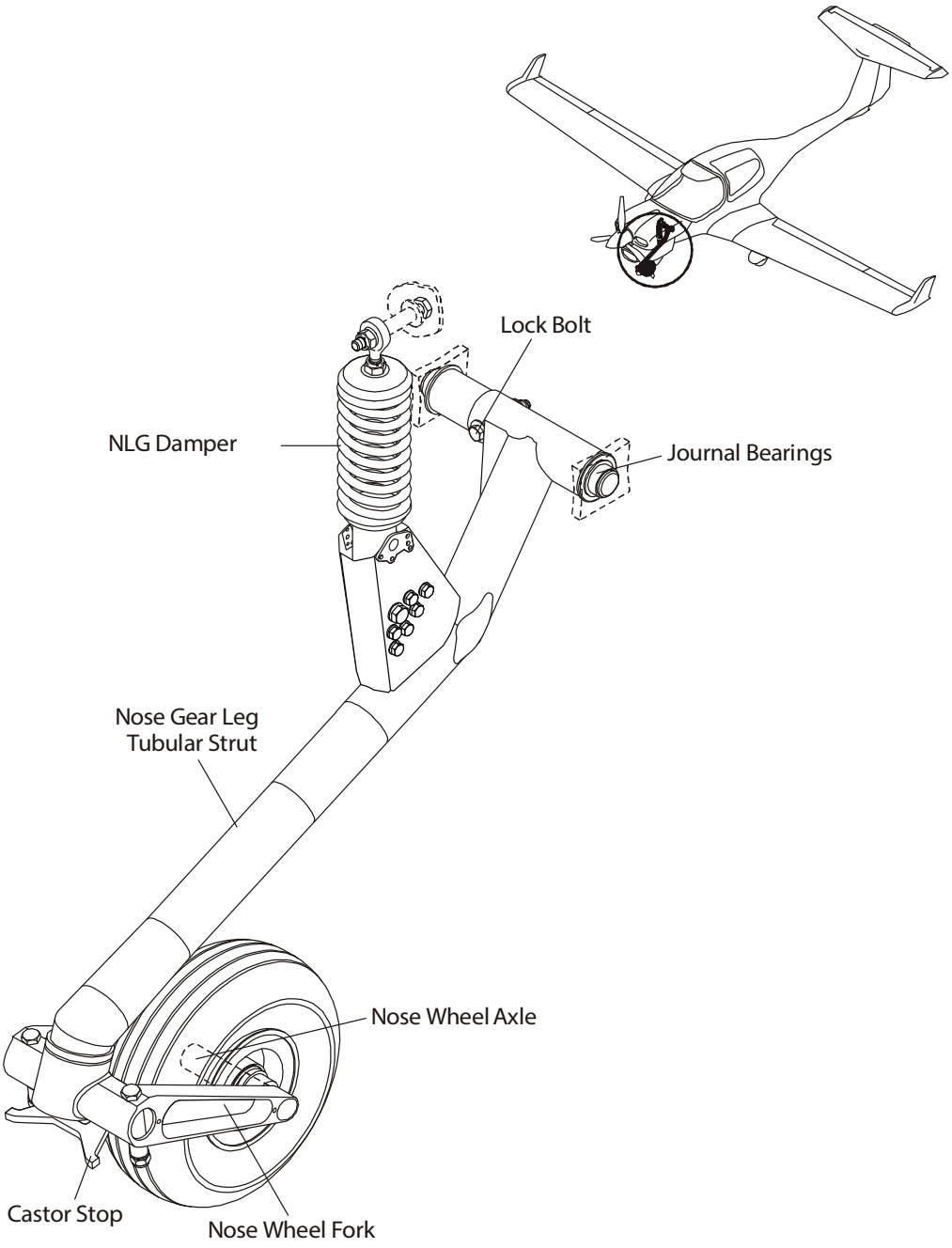

Figure 3 : Hydraulic Damper Journal Assembly (if OÄM 40-379 is installed)

TROUBLE-SHOOTING

1. General

Use the table below to trouble-shoot the nose landing gear.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

WARNING: YOU MUST DO A HARD LANDING CHECK AFTER A HARD LANDING. HARD LANDINGS CAN CAUSE DAMAGE TO THE STRUCTURE AS WELL AS THE LANDING GEAR.

Trouble	Possible Cause	Repair
Strut bent.	Hard landing.	Do a hard landing check. Refer to Section 05-50. Replace the strut.
Nose wheel shimmy.	Steering friction low.	Adjust the nose wheel steering friction.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to remove, install and adjust the nose landing gear and components of the nose landing gear. Refer to the manufacturer for further data.

2. Remove/Install the Nose Landing Gear Strut

A. Equipment

Item	Quantity	Part Number
Padded trestle.	1	Commercial
Weight and strap.	1	Commercial

B. Remove the Nose Landing Gear Strut.

	Detail Steps/Work Items	Key Items/References
(1)	Use weights to hold the rear fuselage down with the nose wheel clear of the ground.	Use a strap around the fuselage.
(2)	Put a padded trestle under the front fuselage just aft of the nose gear mounting.	
(3)	Remove the engine cowling.	Refer to Section 71-10.
(4)	Disconnect the elastomer pack / hydraulic damper from the engine mount. - Remove the bolt, locknut, the three washers and two bushings that hold the eye end of the elastomer pack and damper support to the support bracket and firewall. - Free the eye end of the elastomer pack / hydraulic damper from the engine mount.	Refer to Figure 201 and Description and Operation 71-20 Figure 1. Discard the locknut. Hold the nose gear strut.
(5)	Remove the lock bolt from the journal bearing.	Refer to Figures 1, 2 and 3 in the Description and Operation Pageblock 32-20-00.
(6)	Compress the journal bearing unit inwards.	
(7)	Release the journal bearing unit from the fuselage bearings.	
(8)	Remove the nose gear strut from the airplane in a downward direction.	

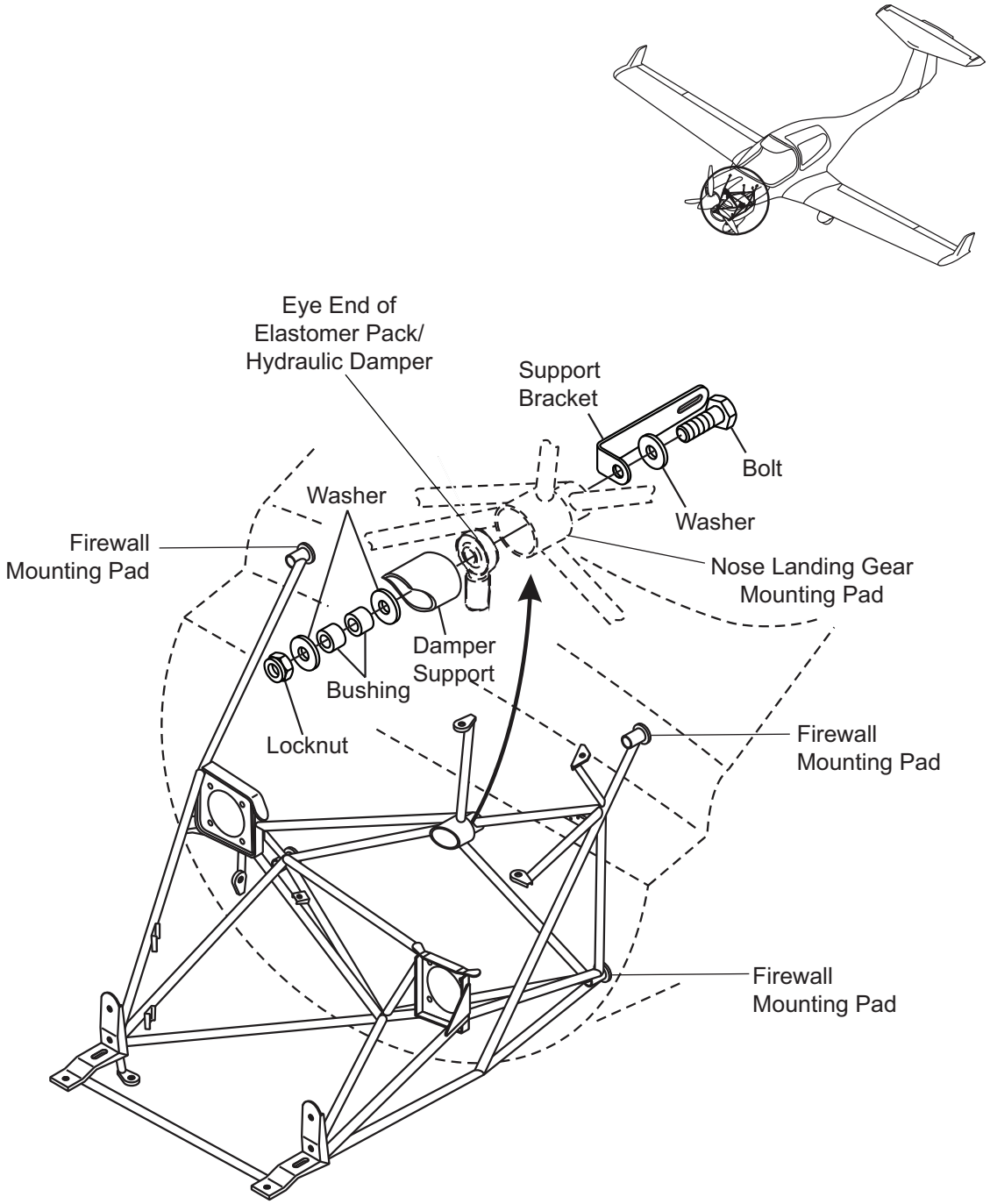

Figure 201 : Elastomer Pack / Hydraulic Damper at the Engine Mount

C. Install the Nose Landing Gear Strut.

	Detail Steps/Work Items	Key Items/References

(1)	Preparation:
	- Liberally apply corrosion protection to these items:
	  - The inside of the journal assembly.
	  - The shank of the lock bolt.
	  - The shank of the bolt which attaches the elastomer pack to the engine mount.
		Refer to Figures 1, 2 and 3 in the Description and Operation Pageblock 32-20-00.
		Use LPS

(2)	Put the nose gear strut in position in the airplane from below.	
(3)	Expand the journals of the unit to engage the bearings in the fuselage.	Refer to Figures 1, 2 and 3 in the Description and Operation Pageblock 32-20-00.
(4)	Install the lock bolt in the journal bearing unit.	
(5)	Connect the elastomer pack / hydraulic damper to the engine mount. - Install the bolt, the three washers, two bushings and locknut that hold the eye end of the elastomer pack and damper support to the support bracket and firewall. - Make sure that the connection is secure.	Refer to Figure 201 and Description and Operation 71-20 Figure 1. Make sure of the installation assembly. Use a new locknut. Put LPS 3 on the shanks of the bolt. Clean corrosion inhibitor from the threads.
(6)	Adjust the nose wheel steering friction.	Refer to Paragraph 6.
(7)	Remove the trestle from the front fuselage.	
(8)	Lower the nose wheel to the floor.	Remove the weights from the rear fuselage.
(9)	Install the engine cowling.	Refer to Section 71-10.

3. Remove/Install the Elastomer Pack / Hydraulic Damper

A. Equipment

Item	Quantity	Part Number
Padded trestle.	1	Commercial
Weight and strap.	1	Commercial

B. Remove the Elastomer Pack / Hydraulic Damper.

	Detail Steps/Work Items	Key Items/References
(1)	Use weights to hold the rear fuselage down with the nose wheel clear of the ground.	Use a strap around the fuselage.
(2)	Put a padded trestle under the front fuselage just aft of the nose gear mounting.	
(3)	Remove the engine cowling.	Refer to Section 71-10.
(4)	Disconnect the elastomer pack / hydraulic damper from the engine mount. - Remove the bolt, locknut, the three washers and two bushings that hold the eye end of the elastomer pack and damper support to the support bracket and firewall. - Free the eye end of the elastomer pack / hydraulic damper from the engine mount.	Refer to Figure 201 and Description and Operation 71-20 Figure 1. Discard the locknut. Hold the nose gear strut.
(5)	If OÄM 40-379 is NOT installed: - Remove the four bolts on each side attaching the left hand and right hand bearing plates. If OÄM 40-379 is installed: - Remove the lower bolt and bushing which attach the hydraulic damper to the nose landing gear leg.	Refer to Figure 202. Refer to Figure 203.
(6)	Remove the assembly from the airplane.	

C. Install the Elastomer Pack / Hydraulic Damper.

	Detail Steps/Work Items	Key Items/References
(1)	If OÄM 40-370 is NOT installed: - Install the bearing plates on the lower bearing.	Refer to Figure 202. Bearing plates must be installed on journals of trunnion.
	If OÄM 40-379 is installed: - Install the bushing, washers and the bolt which hold the hydraulic damper to the nose landing gear leg.	Refer to Figure 203. Put LPS 3 on the shank of the bolt. Clean corrosion inhibitor from the thread.
(2)	Install the four washers and bolts for the left hand and four washers and bolts for the right hand nut plates.	Put LPS 3 on the shanks of the bolts. Clean corrosion inhibitor from the threads.
(3)	Connect the elastomer pack / hydraulic damper to the engine mount. - Install the bolt, the three washers, two bushings and locknut that hold the eye end of the elastomer pack and damper support to the support bracket and firewall. - Make sure that the connection is secure.	Refer to Figure 201 and Description and Operation 71-20 Figure 1. Make sure of the installation assembly. Use a new locknut. Put LPS 3 on the shanks of the bolt. Clean corrosion inhibitor from the threads.
(4)	Remove the trestle from the front fuselage.	
(5)	Lower the nose wheel to the floor.	Remove the weights from the rear fuselage.
(6)	Install the engine cowling.	Refer to Section 71-10.

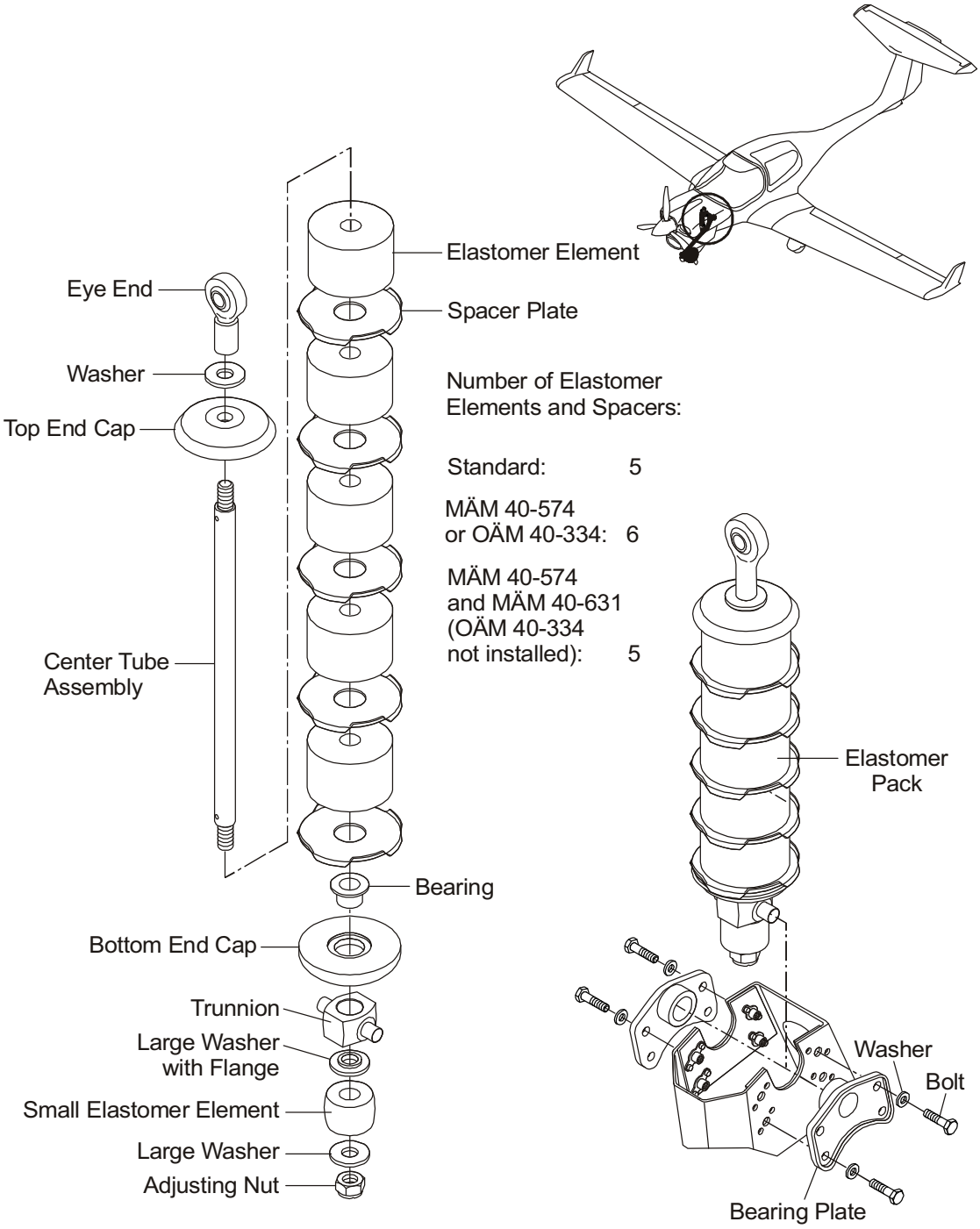

Figure 202 : Elastomer Pack and Journal Assembly

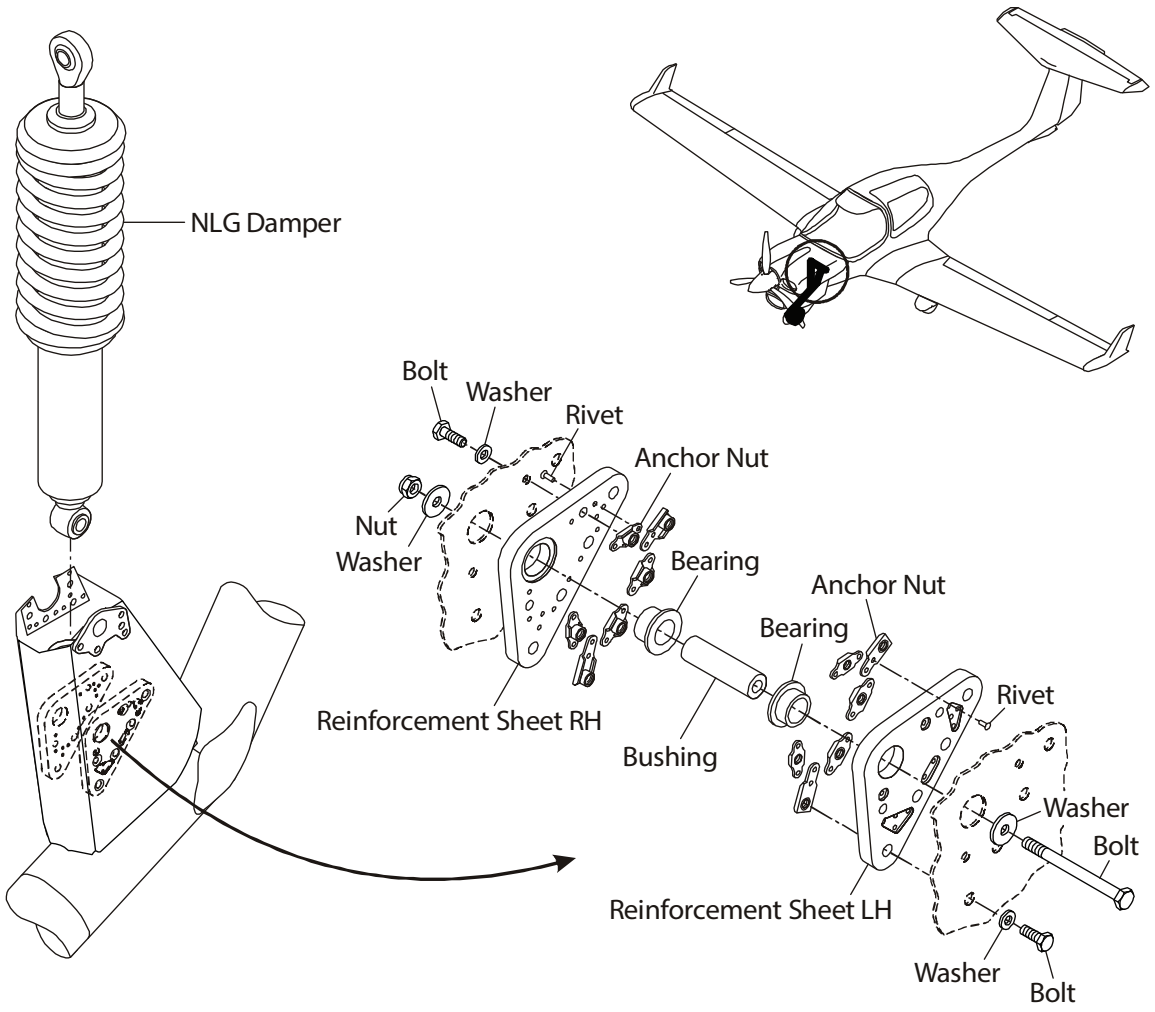

Figure 203 : Hydraulic Damper (if OÄM 40-379 is installed)

4. Replace the Elastomer Elements (if OÄM 40-379 is NOT installed)

CAUTION: YOU MUST ALWAYS REPLACE CRACKED OR WORN ELASTOMER ELEMENTS. IF YOU DO NOT REPLACE CRACKED OR WORN ELASTOMER ELEMENTS, THE AIRPLANE CAN BE LOWERED AND THE PROPELLER CAN HIT AN OBJECT.

A. Disassemble the Elastomer Pack.

Refer to Figure 202.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the elastomer pack from the airplane.	Refer to Paragraph 3.B.
WARNING: DO NOT STAND IN THE LINE OF THE ELASTOMER PACK WHEN YOU REMOVE THE NUT. THE ASSEMBLY CAN EXPAND WITH A LOT OF FORCE AND INJURY TO PERSONNEL COULD RESULT.		
(2)	Remove the adjusting nut from the elastomer pack.	
(3)	Remove all moving parts from the center tube assembly.	
(4)	Examine elastomer pack center tube: - If the center tube shows signs of deformation: Replace the center tube. - If the center tube shows signs of wear: Replace the center tube if a radial wear limit (depth measured) of 0.8 mm (0.03 in.) is exceeded	 Refer to Paragraph 5. Refer to Paragraph 5.
(5)	Check aluminum spacer plates for deformation and defects.	Replace defective plates.
(6)	Check elastomer elements for cracks and wear.	Replace all elastomer elements if a defective element is found.

B. Assemble the Elastomer Pack.

Refer to Figure 202.

	Detail Steps/Work Items	Key Items/References
(1)	Install the elastomer elements and remaining parts of the elastomer pack.	.
(2)	Adjust the length between the center of the eye end bearing and the center of the lower journal bearing (trunnion) with the adjusting nut.	Use Molykote DX paste when installing the adjustment nut. The distance between the center of the eye-end bearing and the center of the lower journal bearing must be 329 ± 1 mm (12.95 ± 0.04 in.) if five elastomer element are installed. The distance between the center of the eye-end bearing and the center of the lower journal bearing must be 349 ± 1 mm (13.74 ± 0.04 in.) if six elastomer elements are installed.
(3)	Install the elastomer pack in the airplane.	Refer to Paragraph 3.C.

5. Replace the Center Tube Assembly

CAUTION: YOU MUST REPLACE THE CENTER TUBE ASSEMBLY IF THE CENTER TUBE SHOWS SIGNS OF WEAR OR DEFORMATION. IF YOU DO NOT REPLACE THE DEFECTIVE CENTER TUBE, THE ELASTOMER PACK MAY COLLAPSE AND CAUSE DAMAGE TO THE AIRPLANE.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the elastomer pack from the airplane.	Refer to Paragraph 3.B.
	WARNING: DO NOT STAND IN THE LINE OF THE ELASTOMER PACK WHEN YOU REMOVE THE NUT. THE ASSEMBLY CAN EXPAND WITH A LOT OF FORCEAND INJURY TO PERSONNEL COULD RESULT.	
(2)	Remove the adjusting nut from the elastomer pack.	
(3)	Remove all moving parts from the center tube assembly.	
(4)	Remove the eye end bearing and top end cap from the defective center tube assembly. Check for damage and wear and reinstall parts on the new center tube assembly.	Install the eye end bearing on the threaded pin of center tube assembly with Loctite 638. Torque the eye end bearing to 35 Nm (310 lbf.in).
	CAUTION: DO NOT DAMAGE THE SURFACE OF THE CENTER TUBE.	
(5)	Install the elastomer elements and remaining parts of elastomer pack.	Refer to Figure 202.
(6)	Adjust the length between the center of the eye end bearing and the center of lower journal bearing (trunnion) with the adjusting nut.	Refer to Figure 202. Use Molykote DX paste when installing the adjustment nut. The distance between the center of the eye-end bearing and the center of the lower journal bearing must be 329 ± 1 mm (12.95 ± 0.04 in.) if five elastomer element are installed. The distance between the center of the eye-end bearing and the center of the lower journal bearing must be 349 ± 1 mm (13.74 ± 0.04 in.) if six elastomer elements are installed.
(7)	Install the elastomer pack in the airplane.	Refer to Paragraph 3.C.

6. Adjust the Nose Wheel Steering Friction

A. Equipment

Item	Quantity	Part Number
Padded trestle.	1	Commercial
Weight and strap.	1	Commercial
Spring Balance.	1	Commercial

B. Procedure.

	Detail Steps/Work Items	Key Items/References
(1)	Use weights to hold the rear fuselage down with the nose wheel clear of the ground.	Use a strap around the fuselage.
(2)	Put a padded trestle under the front fuselage just aft of the nose wheel mounting.	
(3)	Remove the nose wheel fairing (if installed).	
(4)	Adjust the nose wheel fork pivot nut.	The nose-wheel must just castor when a force of 30-50 N (6.75 - 11.25 lb) is applied along the direction of the nose wheel axle Refer to Figure 204.
(5)	Apply corrosion protection to the stud, hexagon nut, small washer, two disk springs, large washer, and stop plate.	Use CA 1000 corrosion inhibitive joining compound. Do not get CA 1000 on the tire or the fiberglass.
(6)	Install the nose-wheel fairing (if the nose wheel fairing was installed).	
(7)	Remove the trestle from the front fuselage.	
(8)	Lower the nose-wheel to the floor.	Remove the weights from the rear fuselage.

7. Nose Wheel Balancing

Always have the nose-wheel balanced before installation. .

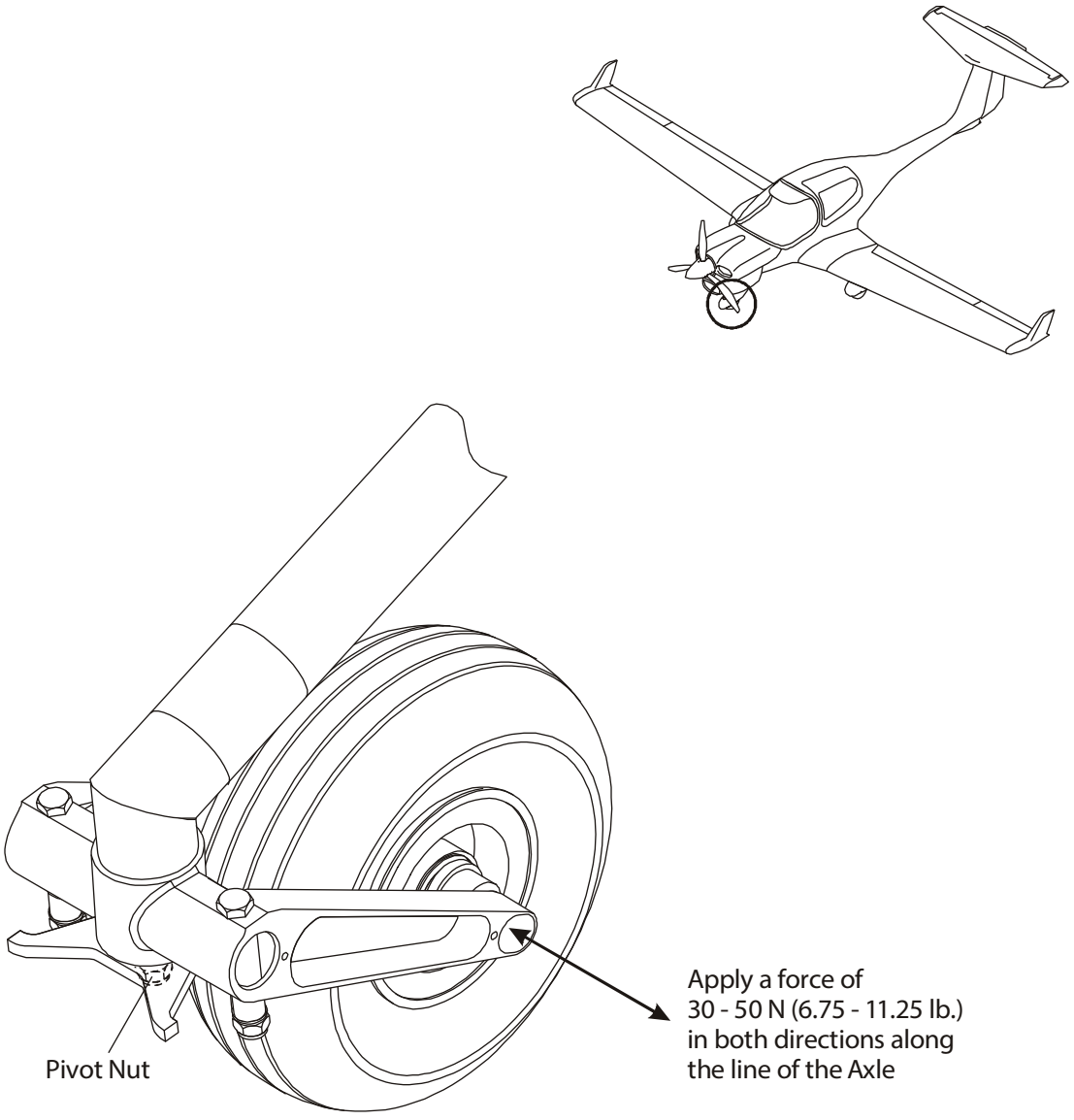

Figure 204 : Adjust the Nose Wheel Steering Friction

8. Remove/Install the NLG Fork Assembly

A. Equipment

Refer to Chapter 07-10-00 for the equipment required for jacking the aircraft.

B. Remove the NLG Fork Assembly.

	Detail Steps/Work Items	Key Items/References
(1)	Jack the aircraft.	Refer to Chapter 07-10-00.
(2)	Remove the fairing, if installed.	
(3)	Remove the hexagon nut, washers, disc spring and the NLG spacer.	Refer to Figure 205.
(4)	Remove the fork assembly from the pivot.	

C. Install the NLG Fork Assembly.

	Detail Steps/Work Items	Key Items/References
(1)	Clean the NLG strut and fork bushing of any dirt or residue.	
(2)	Install the fork assembly on the NLG strut axle as follows: - Install the fork assembly to the NLG strut - Install the NLG spacer, disc spring, washers and hexagon nut - Tighten the nut to achieve break out force required.	Refer to Figure 205. Ensure the disk springs are installed with the open side facing up. Refer to Paragraph 6.
(3)	Adjust the nose wheel steering friction.	Refer to Paragraph 6.
(4)	Install the fairing, if removed.	
(5)	Remove the aircraft from jacks.	Refer to Chapter 07-10-00.

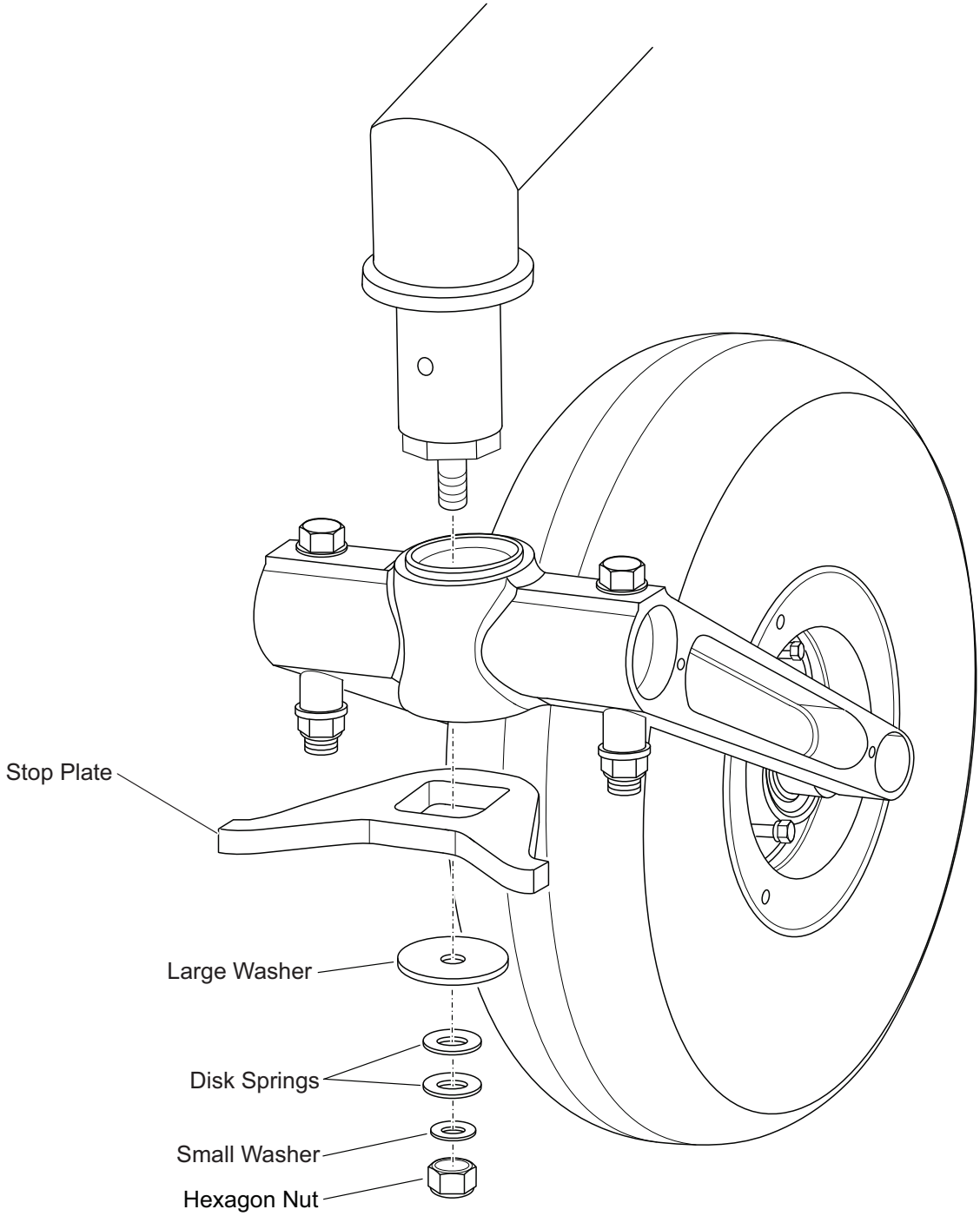

Figure 205 : NLG Fork Installation

WHEELS AND BRAKES

1. General

This Section gives you the data for the main and nose wheels. It also gives you the data for the brake system. And it gives you the Trouble-Shooting and Maintenance Practices.

2. Description and Operation

A. Main Wheel

Figures 1 shows the main and nose wheels. The main wheel hub has two magnesium (aluminum, if OÄM 40-334 is installed) halves. Three bolts (six bolts, if OÄM 40-334 is installed) hold the two halves together. The bolts also hold a brake disk to the inner half of the hub. A distance washer is installed between brake disc and inner half of the hub, if OÄM 40-334 is installed.

The wheel has a tire with an inner tube. Snap rings hold tapered roller bearings and grease seals in each half of the hub. You can remove the bearings for maintenance. The outer half of the hub has a hole for the valve stem.

B. Nose Wheel

The nose wheel has a similar construction to the main wheel with tapered bearings.

The nose wheel hub consists of two magnesium halves. Three bolts hold the two halves together

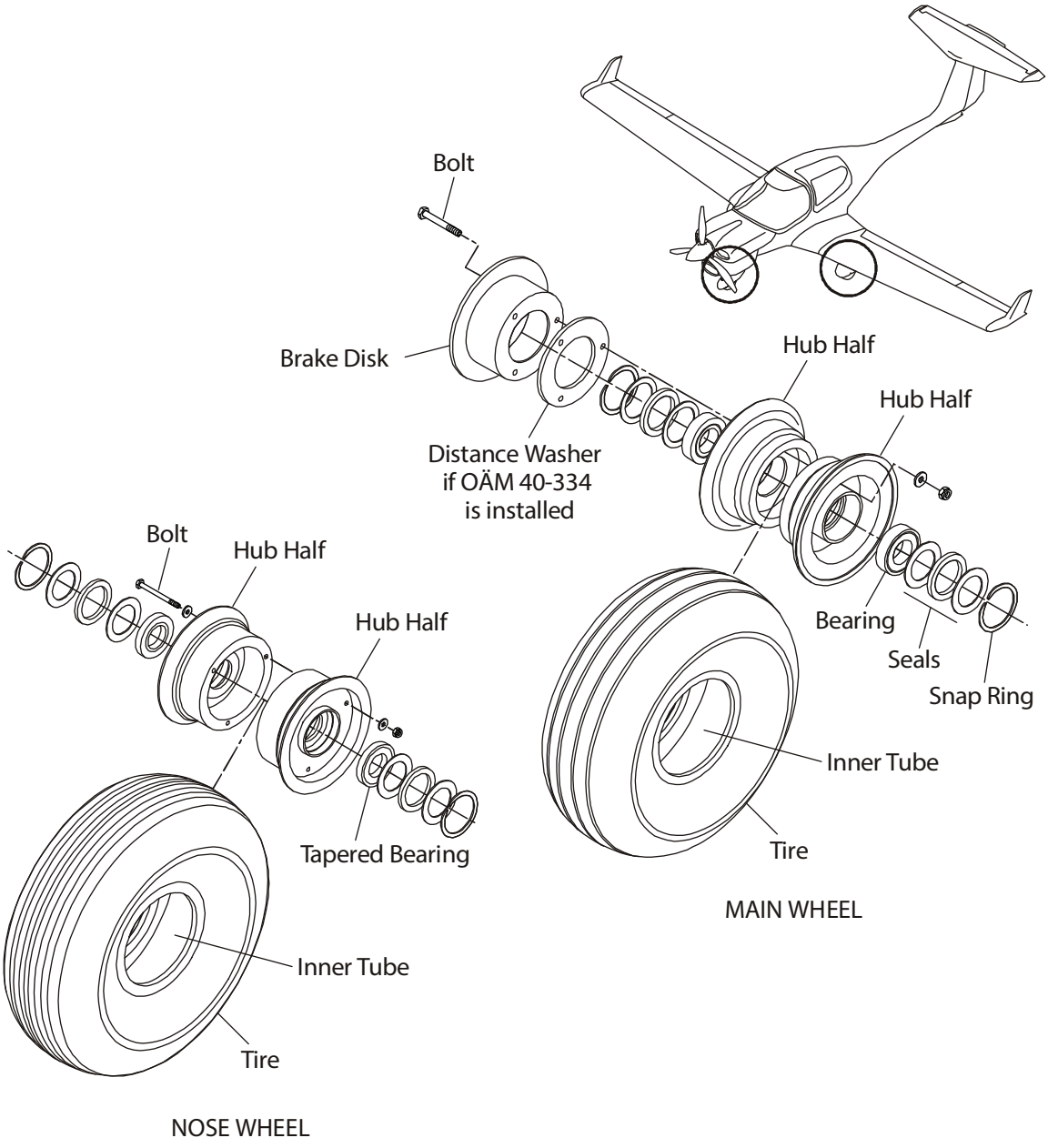

Figure 1 : Main and Nose Wheels

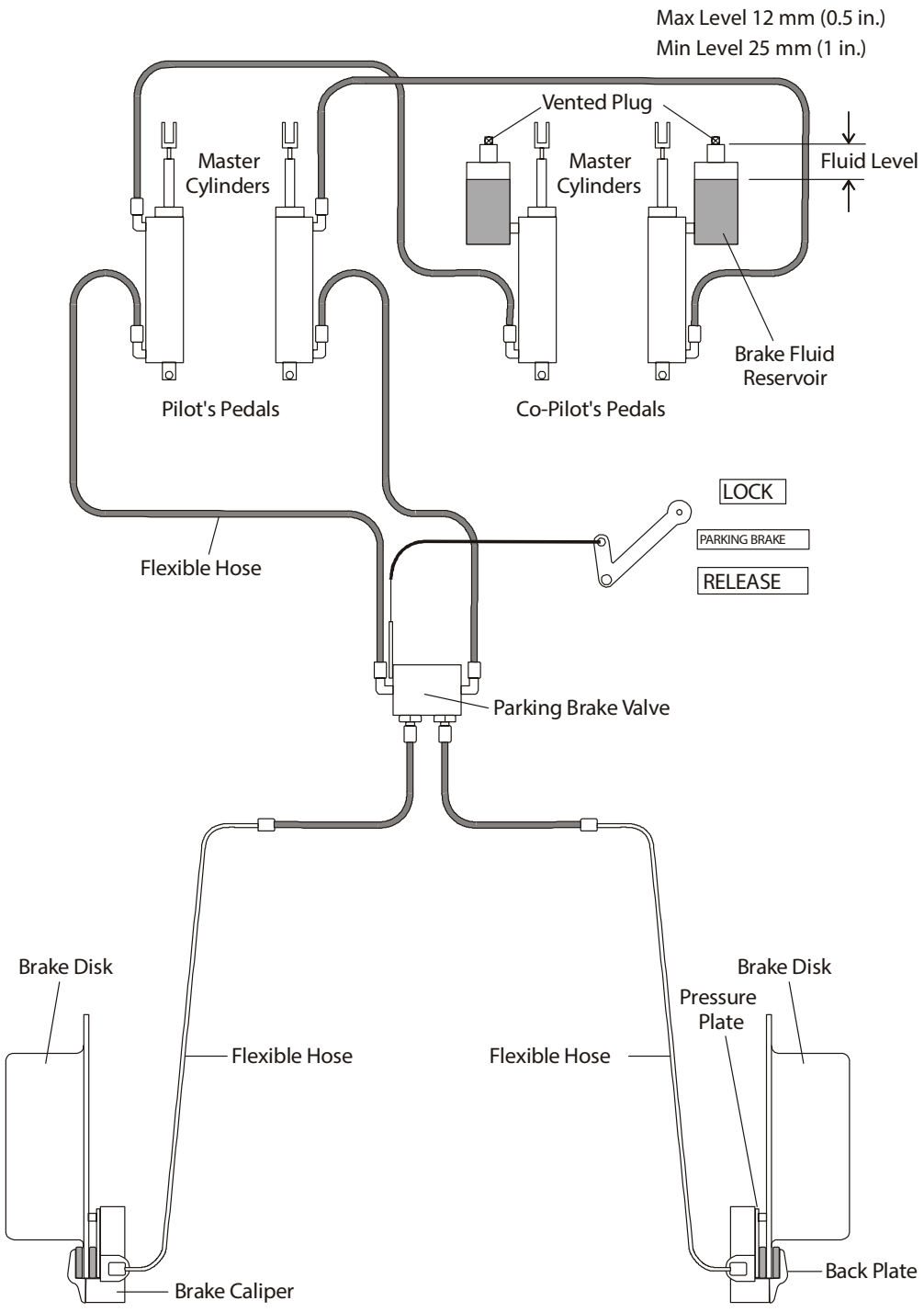

Figure 2 : Brake System Schematic

C. Brake System

Figure 2 shows the brake system schematic diagram. The DA 40 NG has two separate brake systems. The pilot's and co-pilot's left toe brake pedals operate the left system. They supply pressure to the left brake caliper. The right toe brake pedals operate the right brake system and supply pressure to the right caliper.

Figure 3 shows the brake master cylinder and reservoir installation. Each system has a brake fluid reservoir. The reservoir attaches to the master cylinder on the co-pilot's rudder pedal. The outlet from the master cylinder on the co-pilot's rudder pedal connects to the inlet of the master cylinder on the pilot's pedals. The outlet from the master cylinder on the pilot's rudder pedal connects to the parking brake valve. The parking brake valve connects to the brake caliper.

Figures 4 and 5 show the wheel brake assembly.

Figure 203 in the Maintenance Practices pageblock shows the parking brake valve installation. The parking brake valve is located on the bottom flange of the control bulkhead. It contains two valves which can seal the brake pressure into the calipers. This keeps the brakes ON. The pressure will reduce in time and the brakes will slowly release. A serviceable parking-brake valve will keep the brakes on for more than 1 day.

(1) Co-Pilot's Brake Operation

When you press on the co-pilot's right brake pedal these things happen:

- The connection to the reservoir is cut off by the initial movement.
- Further movement pushes fluid past the piston on the pilot's master cylinder.
- The fluid flows through the parking-brake valve to the right brake caliper.
- The fluid pushes the piston and the pressure plate against the brake disk.
- The reaction force on the caliper pulls the back-plate against the brake disk.
- The right brake is applied.

In the same way, when you press on the co-pilot's left brake pedal, the left brake is applied.

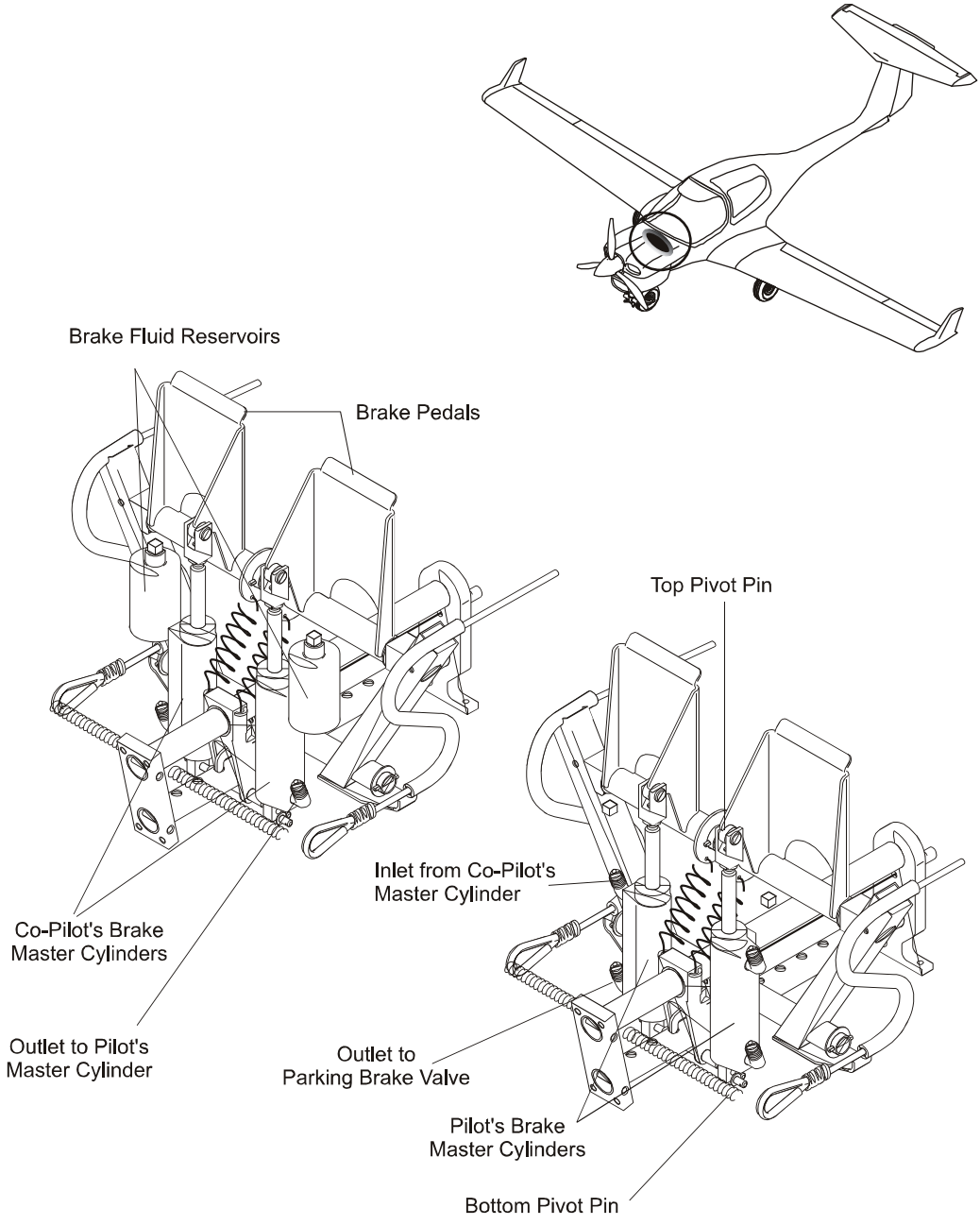

Figure 3 : Brake Master Cylinder and Reservoir Installation

(2) Pilot's Brake Operation

When you press on the pilot's right brake pedal, these things happen:

- The connection from the co-pilot's master cylinder is cut off by the initial movement. (Note: Any hydraulic pressure from the co-pilot's master cylinder pushes on the back of the piston in the pilot's master cylinder. This increases the brake pressure).
- The fluid flows through the parking brake valve to the right brake caliper.
- The fluid pushes the piston and the pressure plate against the brake disk.
- The reaction force on the caliper pulls the back plate against the brake disk.
- The right brake is applied.

In the same way, when you press on the pilot's left brake pedal, the left brake is applied.

NOTE: If one side of the system fails, one or both pilots can loose braking on that side. For example, a leak in the pipe between the co-pilot's and the pilot's right master cylinder will cause a right brake failure for the co-pilot. The pilot's right brake will operate correctly. If the leak is between the pilot's right master cylinder and the right brake caliper, both pilots will have right brake failure.

(3) Parking Brake Operation

To apply the parking brake:

- Press on both pedals.
- Move the parking brake lever to LOCK (fully up).
- Release your foot pressure on the pedals.
- If necessary, pump the brake pedals.

To release the parking brake, move the lever to RELEASE (fully up).

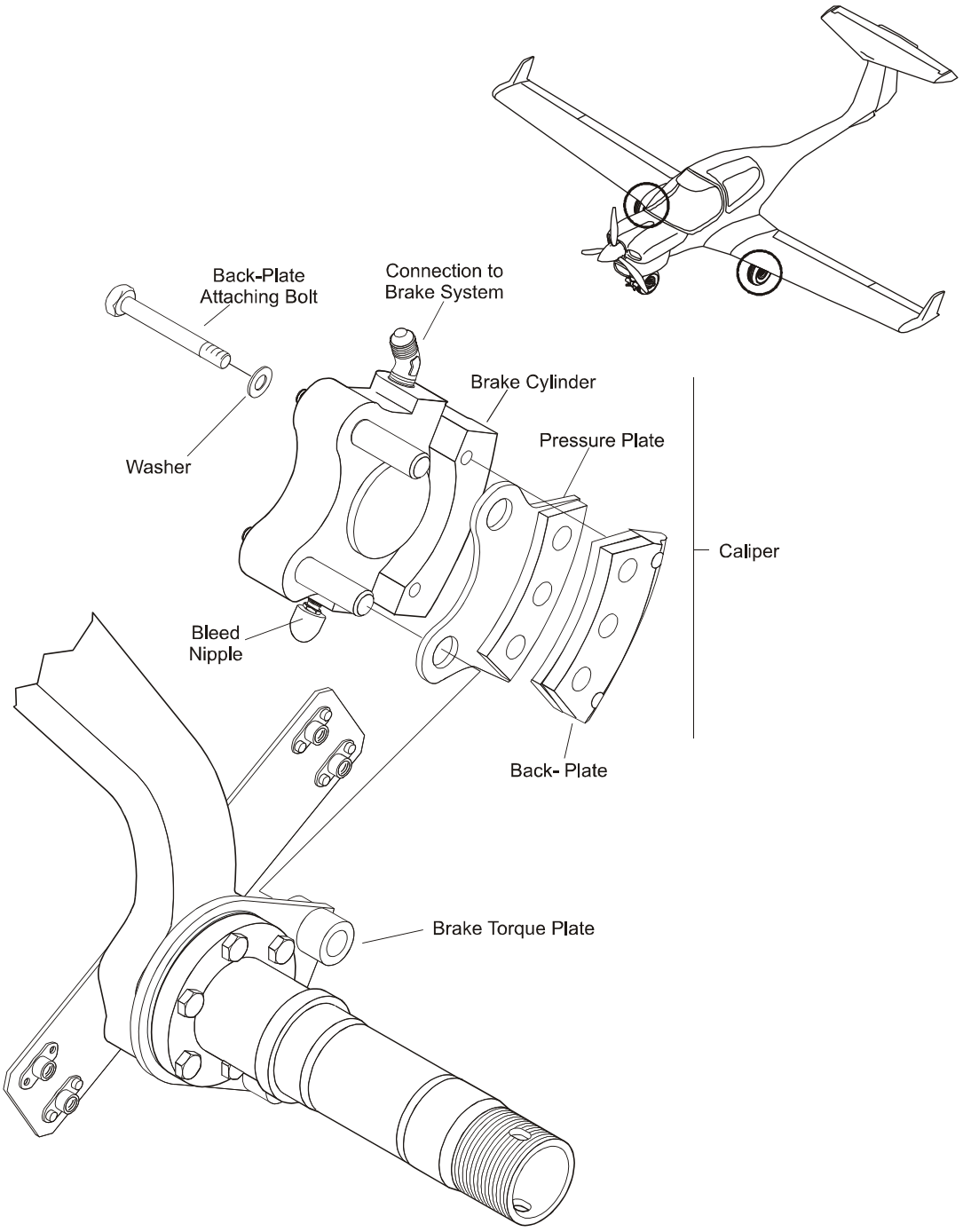

Figure 4 : Wheel Brake Assembly

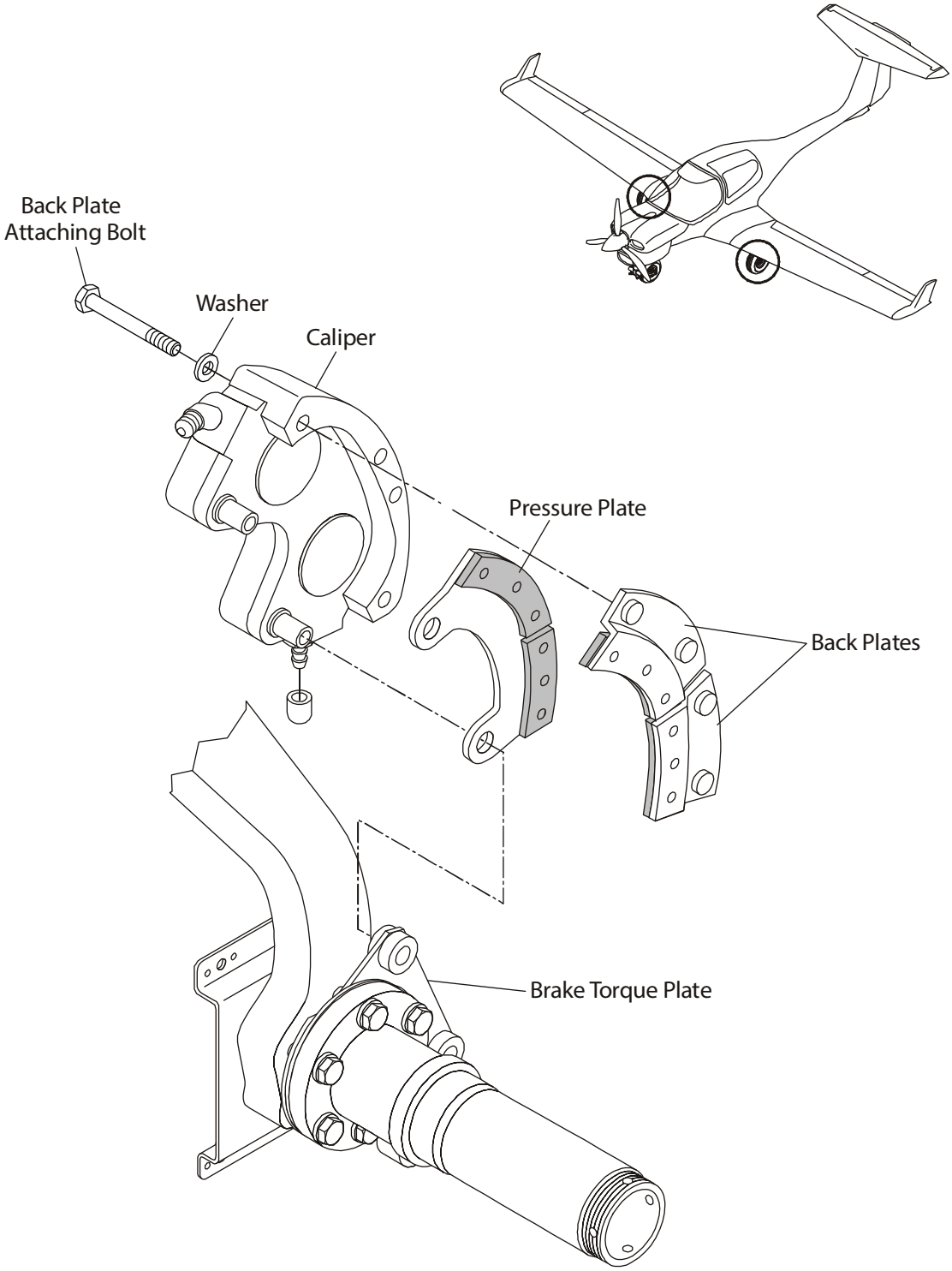

Figure 5 : Wheel Brake Assembly (if OÄM 40-334 is installed)

TROUBLE-SHOOTING

1. General

Use the table below to trouble-shoot the wheels and brake systems.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Too much tire wear.	Incorrect toe-in.	Adjust the toe-in. Refer to Section 32-10.
	Incorrect inflation pressure.	Correct inflation pressure.
Too much axial play in a wheel.	Main wheel incorrectly adjusted.	Adjust the main wheel.
	Defective wheel bearing.	Replace the wheel bearing.
Brake disk distorted.	Brakes applied too hard. Hard landing.	Replace the brake disk.
Brakes do not hold static engine run-up with the usual pedal force.	Brake fluid level low.	Fill the system with brake fluid.
	Air in the brake system.	Bleed the brake system.
	Defective master cylinder.	Replace the master cylinder and then bleed the brake system.
	Defective caliper.	Replace the caliper and then bleed the brake system.
	Worn brake linings.	Replace the brake linings and then bleed the brake system.
	Leaking connector.	Tighten (or replace) the connector and then bleed the brake system.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to remove/install components of the landing gear and brake system. They also give the conditioning procedure for the brake linings.
Refer to the manufacturer's data (Cleveland/Parker Hannifin Corporation) for other shop work.

2. Remove/Install a Main Wheel

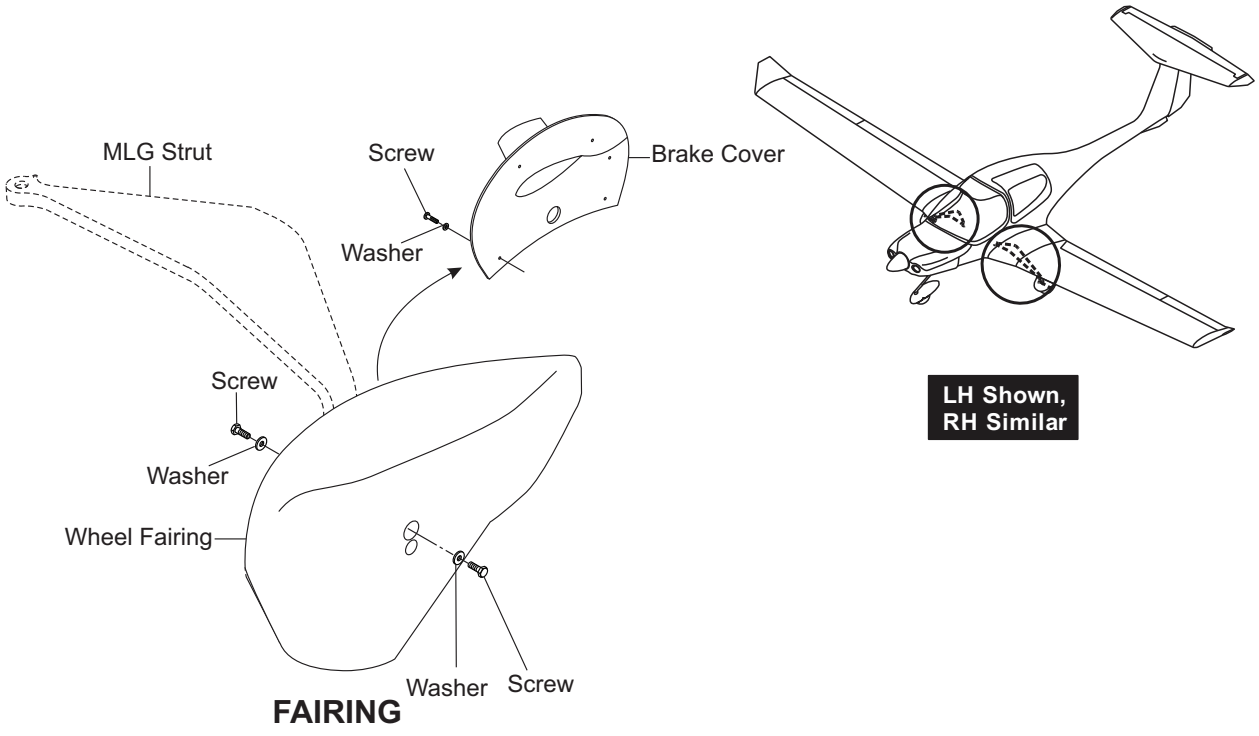
A. Equipment.

Item	Quantity	Part Number
Airplane jacks.	3	Commercial

B. Remove a Main Wheel.

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(1)	Lift the airplane on jacks.	Refer to Section 07-10.
(2)	Remove the wheel fairing (if installed): - Remove the outboard screw and washer - Remove the four screws and washers from the inner side.	
(3)	Remove the back cover from the brake caliper.	Cut the locking wire.
(4)	Remove the lock-bolt from the axle nut (if lock-bolt is installed).	
(5)	If OÄM 40-334 is installed: - Remove the dust cap from the wheel. - Remove the split pin.	
(6)	Remove the axle nut.	
(7)	Pull the wheel from the axle.	



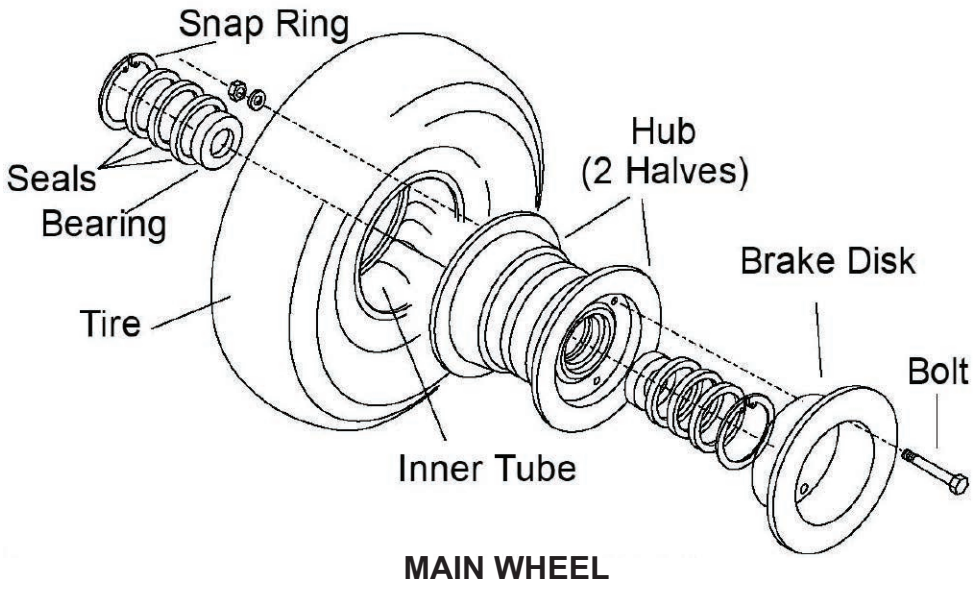


Figure 201 : Main Wheel - Removal/Installation

C. Install a Main Wheel.

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(1)	Apply a light coating of grease to the axle where the wheel bearings go.	Use grease MIL-G-3545.
(2)	Put the wheel in position on the axle	Make sure that the brake caliper is correctly engaged on the torque plate.
NOTE: Turn the wheel by hand while you tighten the axle nut. This will remove grease (which can separate the bearings) or burrs. Both can cause too much wheel bearing play later.		
(3)	Install the axle-nut.	Hand tight.
(4)	Loosen the axle nut until it is just loose.	
(5)	Tighten the axle nut.	Hand tight.
(6)	Loosen the axle nut until one of the two holes (if OÄM 40-334 is installed: four holes) in the axle aligns with the nut.	
(7)	Install the lock-bolt, washer and self-locking nut (castle nut, if OÄM 40-334 is installed).	Do not loosen the nut more than 30° (half of a flat).
(8)	If OÄM 40-334 is installed: Install the split pin.	Do not loosen the nut more than 30° (half of a flat).
(9)	Measure the end play in the hub assembly.	There should be 0.025 to 0.125 mm (0.001 to 0.005 in) of end play when correctly adjusted.
(10)	Lower the airplane with the jacks.	Refer to Section 07-10.
(11)	Install the back cover over the brake caliper.	Install new locking wire.
(12)	Install the wheel fairing (if one was removed): - Install the four screws and washers on the inner side. - Install the outboard screw and washer	

3. Disassemble/Assemble the Main Wheel

A. Disassemble the Main Wheel

Refer to Figure 202 throughout the procedure.

CAUTION: **DEFLATE THE TIRE COMPLETELY BEFORE YOU DISASSEMBLE THE WHEEL. IF YOU DO NOT DEFLATE THE TIRE COMPLETELY BEFORE YOU DISASSEMBLE THE WHEEL YOU MAY GET INJURED.**

	Detail Steps/Work Items	Key Items/References
1.	Remove the main wheel from the airplane.	Refer to Section 32-40-00 Para 2.B.
2.	Place the wheel on a clean flat surface for disassembly.	
3.	Remove the valve cap and deflate the tire completely.	
4.	Separate the tire beads from the wheel halves using a bead breaker or by applying pressure in even increments around the entire sidewall of the tire, as close to the tire beads as possible.	
5.	Remove the bolts, washers and self-locking nuts that hold the two halves of the hub together.	Discard the self-locking nuts.
6.	Remove the brake disk from the wheel.	
7.	Remove the two halves of the hub from the tire and remove the tire and inner tube.	Mark the wheel hub halves to note the relationship to each other for the assembly.
8.	Remove the bearings from each hub of the wheel: - Remove the snap ring. - Remove the grease seals from the hub. - Remove the bearings.	 Note the order of the installation of the seals for the assembly procedure. Use caution in handling the bearings to prevent damage or contamination.
9.	Examine the wheel hubs, brake disc and the bearings for wear or damage.	Refer to the Cleveland Wheels & Brakes Component Maintenance Manual, AWBCMM0001- (latest revision) /USA.
10.	Replace any cracked or excessively corroded parts.	

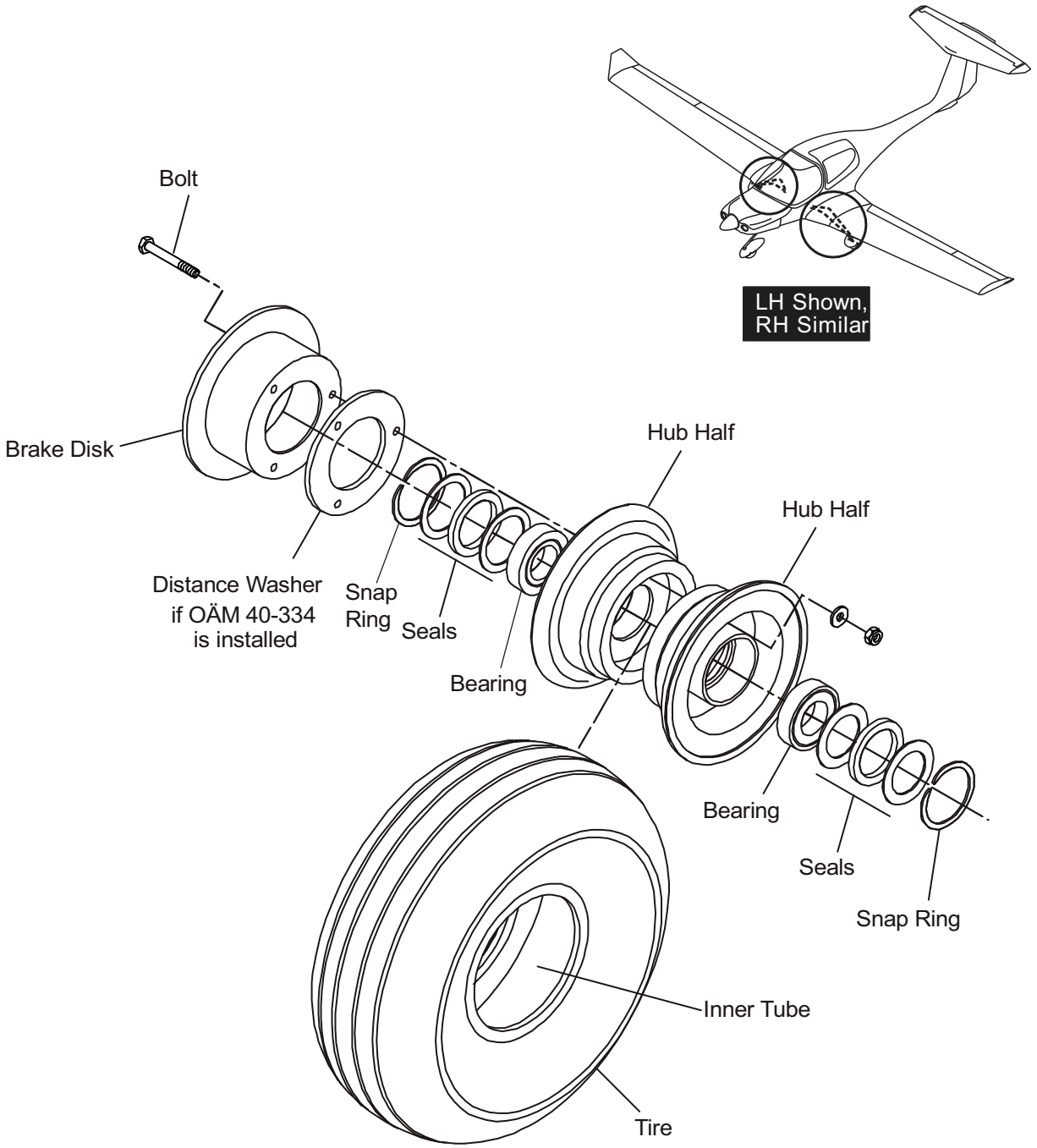


Figure 202 : Disassemble/Assemble the Main Wheel

B. Assemble the Main Wheel

Refer to Figure 202 throughout the procedure.

	Detail Steps/Work Items	Key Items/References
1.	Install the bearings into each half of the wheel hub: - Make sure that the hub is clean. - Grease and install the bearings. - Install the grease seals into the hub. - Install the snap ring.	 Use caution in handling the bearings to prevent damage or contamination. Refer to the Cleveland Wheels & Brakes Component Maintenance Manual, AWBCMM0001- (latest revision) /USA. In the correct order, noted during the removal.
2.	Apply talcum powder to the outside of the inner tube and move the inner tube into position in the tire.	Prior to mounting the tire, make sure that the tire bead is clean.
3.	Assemble the main wheel: - Move the main wheel hubs into position in the tire. - Move the brake disk into position at the inner hub. - Install the bolts, washers and new self-locking nuts that attach the brake disk and the two hub halves.	 Torque the bolts according to the Cleveland Wheels & Brakes Component Maintenance Manual, AWBCMM0001- (latest revision) /USA
4.	Inflate the tire.	Refer to Section 12-10-00 Para 9. “Tires”
5.	Paint a red slip mark on the tire and on the hub.	
6.	Install the main wheel on to the airplane.	Refer to Section 32-40-00 Para 2.C.

4. Remove/Install the Nose Wheel

A. Equipment.

Item	Quantity	Part Number
Padded trestle.	1	Commercial
Weight and strap.	1	Commercial

B. Remove the Nose Wheel.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the wheel fairing (if installed): - Remove six screws attaching the left half of the fairing to the right half. - Remove the two left and two right attaching screws. - Remove the fairing.	
(2)	Use weights to hold the rear fuselage down with the nose wheel clear of the ground.	Use a strap around the rear fuselage.
(3)	Put a padded trestle under the fuselage just aft of the nose gear mounting.	
(4)	Remove the axle bolt: - Remove the cotter pin from the axle nut. - Remove the axle nut and washer. - Remove the axle bolt and washer. If OÄM 40-334 is installed: - Remove the axle nut. - Remove the axle bolt, washer and flanged bushes.	Refer to Figure 4 in the D&O Pageblock and Figure 203. Refer to Figure5 in the D&O Pageblock and Figure 204. Support the nose wheel.
(5)	Remove the wheel from the fork.	
(6)	Remove the spacers from the axle.	Refer to Figure 203 or 204.
(7)	Remove the tubular axle from the wheel.	Refer to Figure 203 or 204.

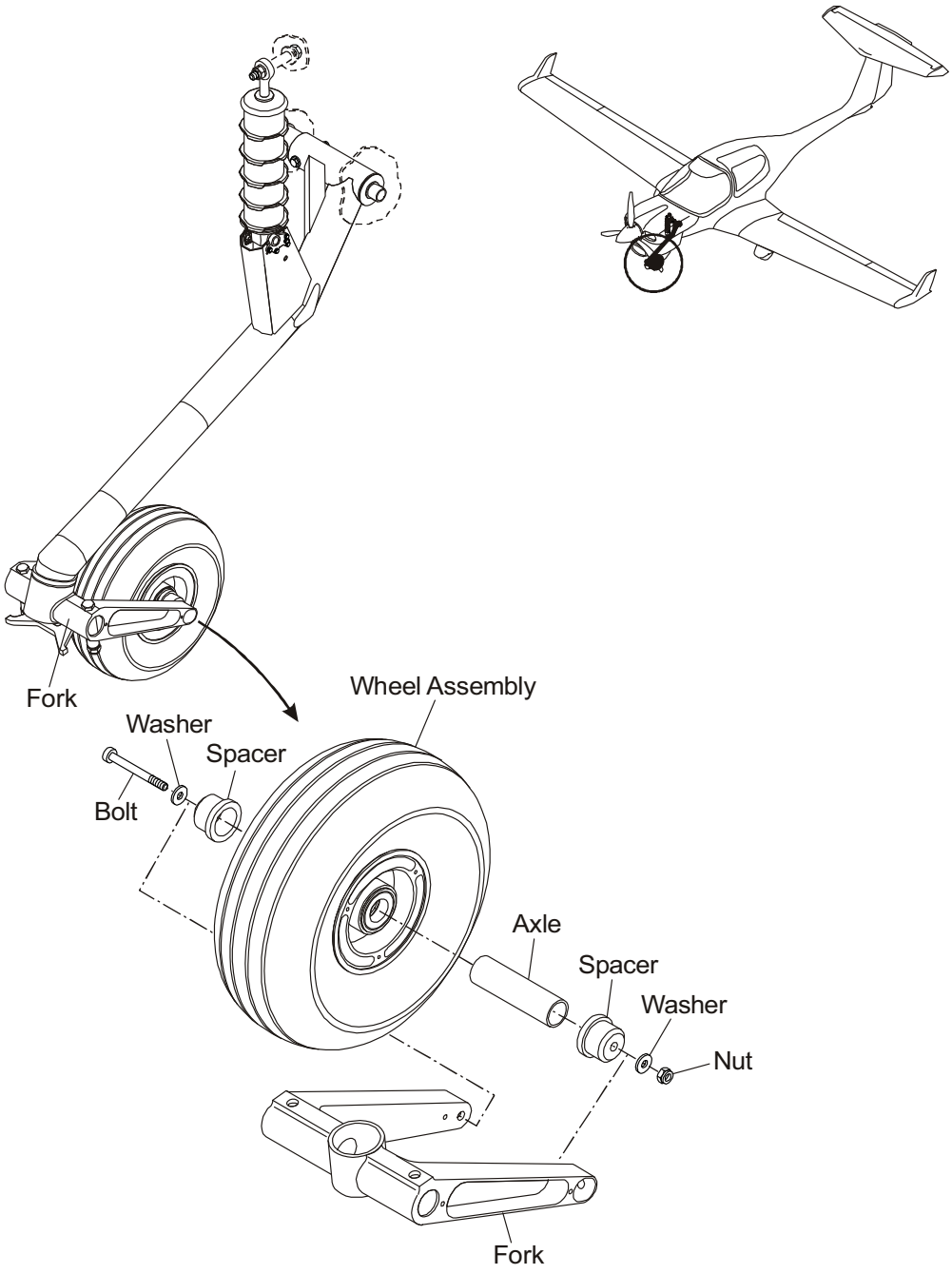


Figure 203 : Nose Wheel Assembly (if OÄM 40-334 is NOT installed)

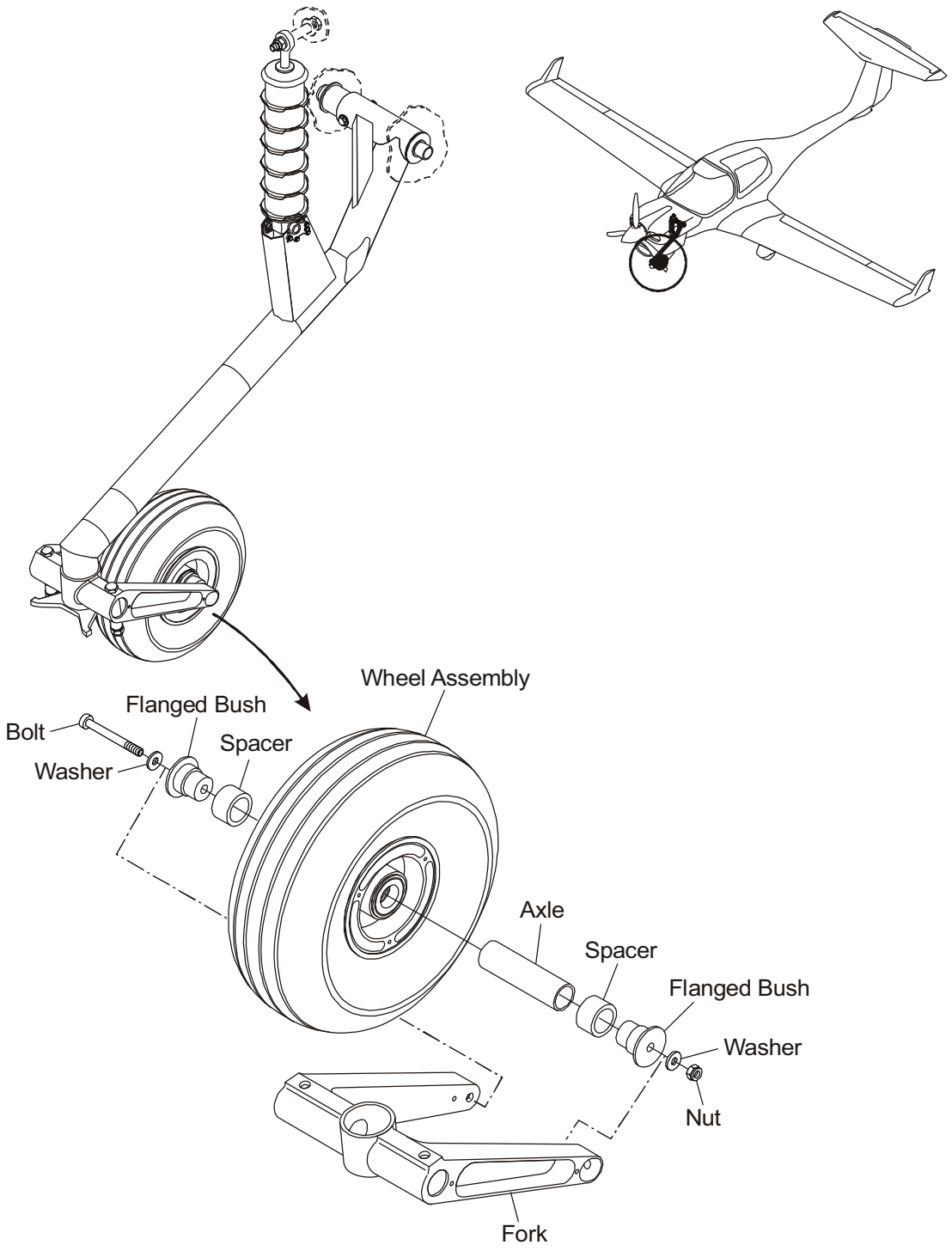


Figure 204 : Nose Wheel Assembly (if OÄM 40-334 is installed)

C. Install the Nose Wheel.

	Detail Steps/Work Items	Key Items/References
(1)	Install the axle bolt (if OÄM 40-334 is installed):	Refer to Figure 5 in the D&O Pageblock and Figure 204.
	- Make sure the tubular axle is clean and install the axle into the wheel.	
	- Install the spacers on the axle.	
	- Move the wheel into position in the fork.	
	- Install the flanges bushes and make sure they are installed correctly.	
	- Install the washer onto the axle bolt (if OÄM 40-334 is NOT installed).	Refer to Figure 4 in the D&O Pageblock and Figure 203.
	- Push the axle bolt into position through the axle.	Put Mastinox 6856K corrosion inhibitor or LPS-3 on the shank of the bolt. Clean corrosion inhibitor from the threads.
	- Install a washer onto the axle bolt.	
	- Install the axle nut hand tight only.	
	- Slowly rotate the wheel while tightening the axle nut, hand tight only.	
	- Turn the axle counter-clock-wise until the next cotter pin hole aligns with the axle nut and install the cotter pin (if OÄM 40-334 is NOT installed).	To settle the tapered wheel bearing. Check installation for smooth rotation without any axial free play.
(2)	Turn the nose wheel. Make sure that the valve cap does not touch the fork.	Clearance of 2 mm (0.08 in) minimum.
(3)	Remove the trestle from the front fuselage.	
(4)	Lower the nose wheel to the ground.	Remove the weights from the rear fuselage.
(5)	Install the wheel fairing (if the wheel fairing was installed):	
	- Put the two halves in position.	
	- Install the two LH and two RH mounting screws.	
	- Install the six screws which hold the fairing halves together.	

5. Disassemble/Assemble the Nose Wheel

A. Disassemble the Nose Wheel

Refer to Figure 205 throughout the procedure.

CAUTION: **DEFLATE THE TIRE COMPLETELY BEFORE YOU DISASSEMBLE THE WHEEL. IF YOU DO NOT DEFLATE THE TIRE COMPLETELY BEFORE YOU DISASSEMBLE THE WHEEL YOU MAY GET INJURED.**

	Detail Steps/Work Items	Key Items/References
1.	Remove the nose wheel from the airplane.	Refer to Section 32-40-00 Para 4.B.
2.	Place the wheel on a clean flat surface for disassembly.	
3.	Remove the valve cap and deflate the tire completely.	
4.	Separate the tire beads from the wheel halves using a bead breaker or by applying pressure in even increments around the entire sidewall of the tire, as close to the tire beads as possible.	
5.	Remove the bolts, washers and self-locking nuts that hold the two halves of the hub together.	Discard the self-locking nuts.
6.	Remove the two halves of the hub from the tire and remove the tire and inner tube.	Mark the wheel hub halves to note the relationship to each other for the assembly.
7.	Remove the bearings from each hub of the wheel: - Remove the snap ring. - Remove the grease seals from the hub. - Remove the bearings.	 Note the order of the installation of the seals for the assembly procedure. Use caution in handling the bearings to prevent damage or contamination.
8.	Examine the wheel hubs and the bearings for wear or damage.	Refer to the Cleveland Wheels & Brakes Component Maintenance Manual, AWBCMM0001- (latest revision) /USA.
9.	Replace any cracked or excessively corroded parts.	

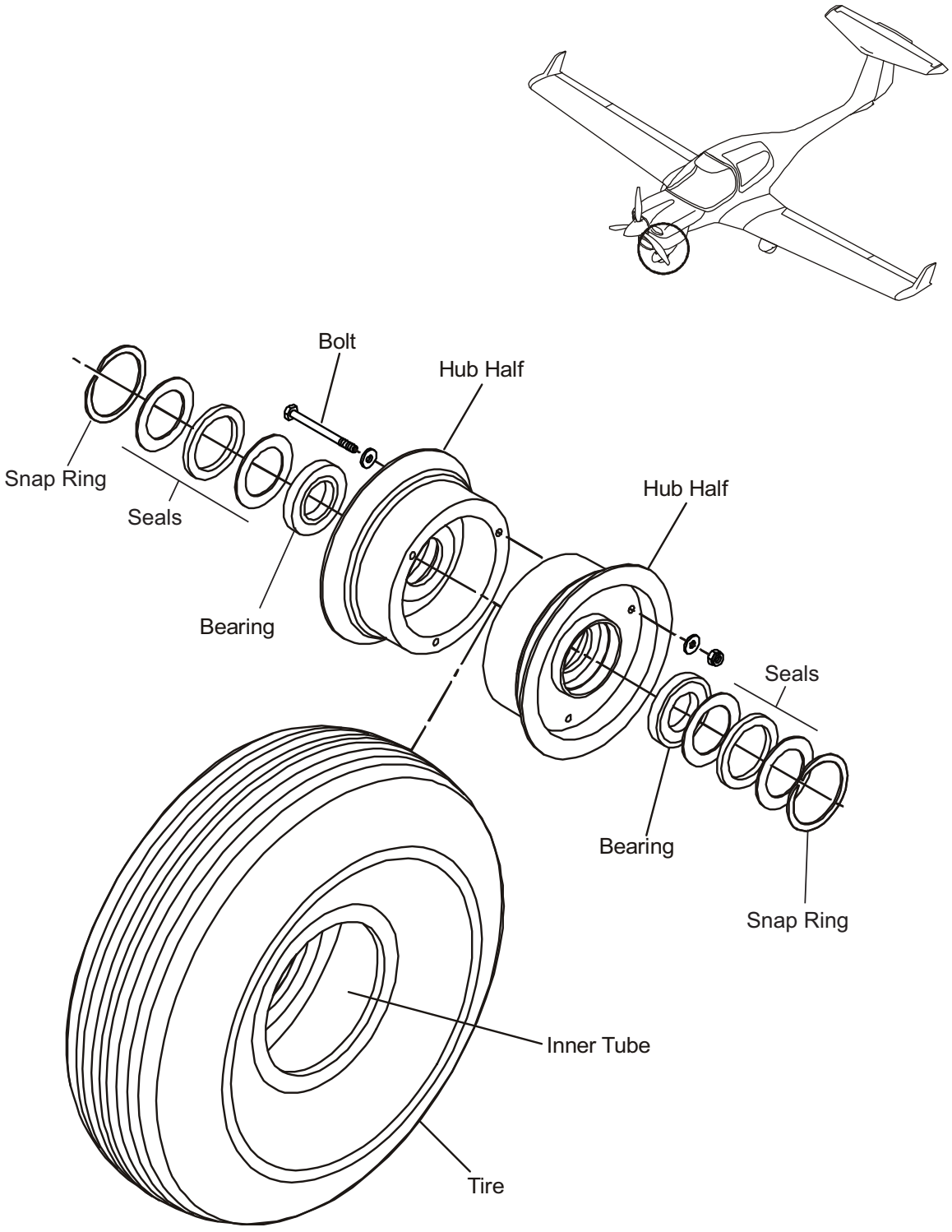


Figure 205 : Disassemble/Assemble the Nose Wheel

B. Assemble the Nose Wheel

Refer to Figure 205 throughout the procedure

	Detail Steps/Work Items	Key Items/References
1.	Install the bearings into each half of the wheel hub: - Make sure that the hub is clean. - Grease and install the bearings. - Install the grease seals into the hub. - Install the snap ring.	Use caution in handling the bearings to prevent damage or contamination. Refer to the Cleveland Wheels & Brakes Component Maintenance Manual, AWBCMM0001- (latest revision) /USA. In the correct order, noted during the removal.
2.	Apply talcum powder to the outside of the inner tube and move the inner tube into position in the tire.	Prior to mounting the tire, make sure that the tire bead is clean.
3.	Assemble the nose wheel: - Move the wheel hubs into position in the tire. - Install the bolts, washers and new self-locking nuts that attach the two hub halves.	Torque the bolts according to the Cleveland Wheels & Brakes Component Maintenance Manual, AWBCMM0001- (latest revision) /USA
4.	Inflate the tire.	Refer to Section 12-10-00 Para 9. “Tires”
5.	Paint a red slip mark on the tire and on the hub.	
6.	Install the nose wheel onto the airplane.	Refer to Section 32-40-00 Para 4.C.

6. Remove/Install a Brake Master Cylinder

The procedures given are for the brake master cylinder installed on the pilot's outboard side. The procedures are similar for the other three master cylinders.
The two master cylinders on the co-pilot's side have the brake fluid reservoirs attached to them.

A. Remove a Brake Master Cylinder.

Refer to Figure 206.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT GET BRAKE FLUID ON YOU. BRAKE FLUID CAN CAUSE DISEASE. CAUTION: CLEAN UP SPILT BRAKE FLUID IMMEDIATELY. BRAKE FLUID CAN DAMAGE PAINT AND OTHER MATERIAL.	
(1)	Disconnect the brake hoses from the brake master cylinder. - The top hose (inlet from the co-pilot's master cylinder). - The bottom hose (outlet to the parking brake valve).	Catch the brake fluid. Put caps on all connections.
(2)	Remove the top pivot pin at the rudder pedal: - Remove the cotter pin. - Remove the washer. - Remove the pivot pin.	Discard the cotter pin
(3)	Remove the master cylinder from bottom pivot pin at the latch frame assembly: - Remove the cotter pin. - Remove the washers. - Move the master cylinder sideways off the pivot pin.	Discard the cotter pin.
(4)	Lift the master cylinder from the rudder pedal assembly and remove it from the airplane.	

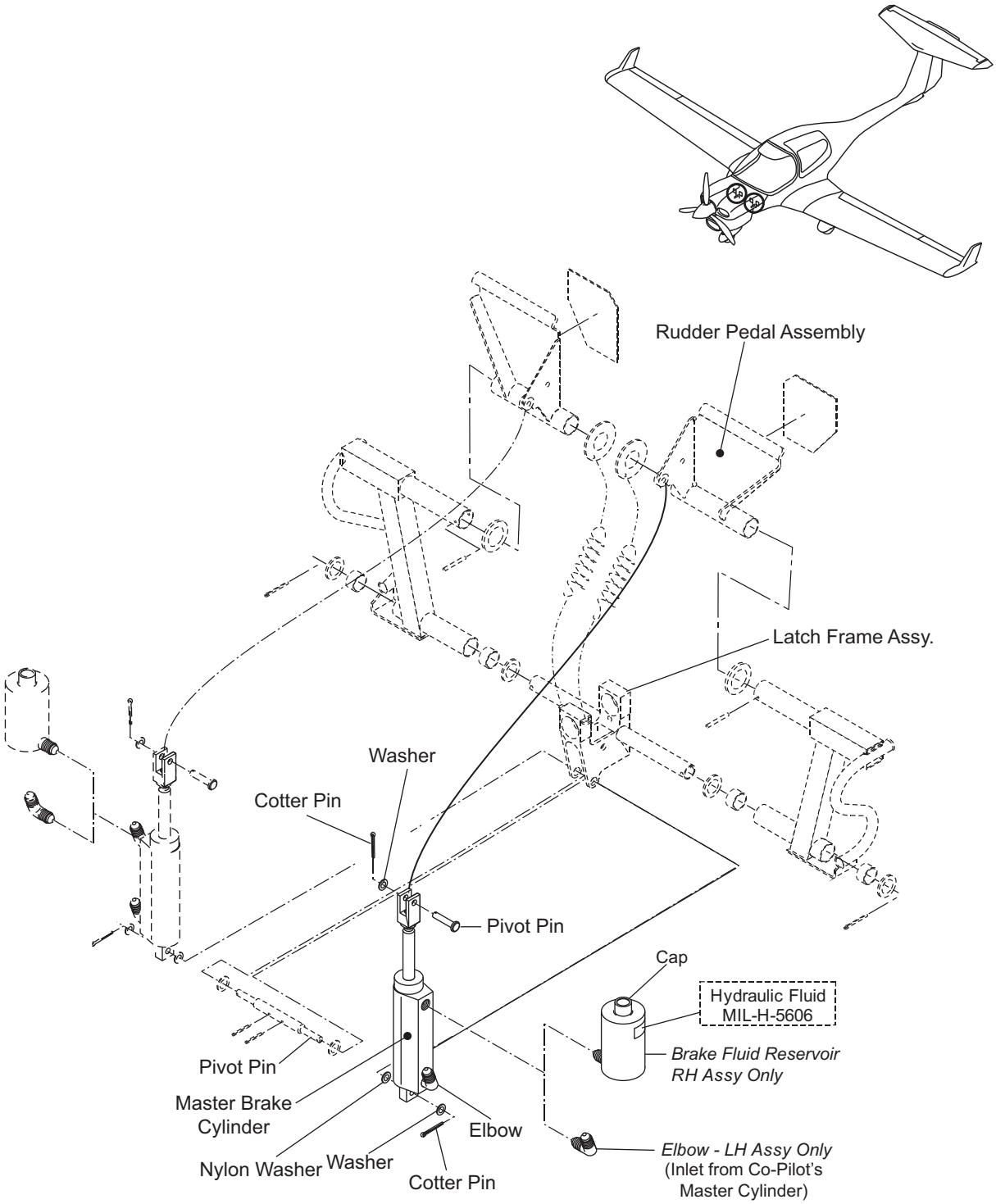


Figure 206 : Brake Master Cylinder - Removal/Installation

B. Install a Brake Master Cylinder.

Refer to Figure 206.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT GET BRAKE FLUID ON YOU. BRAKE FLUID CAN CAUSE DISEASE. CAUTION: CLEAN UP SPILT BRAKE FLUID IMMEDIATELY. BRAKE FLUID CAN DAMAGE PAINT AND OTHER MATERIAL.	
(1)	Put the master cylinder in position on the bottom pivot pin at the latch frame assembly.	
(2)	Attach the master cylinder to the bottom pivot pin: - Install the washers. - Install the cotter pin.	 Use a new cotter pin.
(3)	Install the top pivot pin at the rudder pedal: - Install the pivot pin. - Install the washer. - Install the cotter pin.	 Use a new cotter pin.
(4)	Connect the brake hoses to the master cylinder. - The top hose (inlet from the co-pilot's master cylinder) - The bottom hose (outlet to the parking brake valve).	Remove the caps for all the connections.
(5)	Bleed the brake system.	Refer to Paragraph 7.
(6)	Do a function test of the brake system.	

7. Remove/Install a Brake Cylinder

A. Remove a Brake Cylinder.

Refer to Figures 4 and 5 in the Description and Operation Pageblock 32-40-00.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the bolts which hold the back-plate. Remove the back-plate.	Four bolts (if OÄM 40-334 is installed) or Two bolts (otherwise).
	WARNING: DO NOT GET BRAKE FLUID ON YOU. BRAKE FLUID CAN CAUSE DISEASE. CAUTION: CLEAN UP SPILT BRAKE FLUID IMMEDIATELY. BRAKE FLUID CAN DAMAGE PAINT AND OTHER MATERIAL.	
(2)	Disconnect the brake pipe from the brake cylinder.	Catch the brake fluid in a container. Put caps on all connections.
(3)	Remove the pressure plate and the brake cylinder from the torque plate.	

B. Install a Brake Cylinder.

Refer to Figures 4 and 5 in the Description and Operation Pageblock 32-40-00.

	Detail Steps/Work Items	Key Items/References
(1)	Put the brake cylinder and pressure plate in position on the torque plate.	Use Loctite anti-seize compound 767, Loctite 8009 or equivalent on the locating pins.
(2)	Connect the brake pipe to the brake cylinder.	Remove the caps for all the connections.
(3)	Put the back-plate in position on the brake cylinder.	
(4)	Install the bolts which attach the back-plate.	Torque: according to Cleveland/Parker Maintenance Manual, latest revision or placard on brake cylinder. Four bolts (if OÄM 40-334 is installed) or two bolts (otherwise).
(5)	Lock the bolts with wire.	If bolts with drilled heads are used.
(6)	Bleed the brake system.	Refer to Paragraph 9.
(7)	Do a function test of the brake system.	

8. Remove/Install the Parking Brake Valve

A. Remove the Parking Brake Valve.

Refer to Figure 207.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the pilots' seats.	Refer to Section 25-10.
	WARNING: DO NOT GET BRAKE FLUID ON YOU. BRAKE FLUID CAN CAUSE DISEASE. CAUTION: CLEAN UP SPILT BRAKE FLUID IMMEDIATELY. BRAKE FLUID CAN DAMAGE PAINT AND OTHER MATERIAL.	
(2)	Disconnect the Bowden cable: - Loosen the screw in the swivel fitting. - Pull the bowden cable center-wire from the swivel fitting.	Refer to Figure 207, bottom right. At the bottom of the control bulkhead.
(3)	Disconnect the four brake hoses from the parking brake valve.	Catch the brake fluid! Put caps on all connections.
(4)	Remove the two locknuts, bolts, bonding wire and washers which attach the parking brake valve and support bracket.	Discard the locknuts,
(5)	Move the Bowden cable and support bracket clear of the parking brake valve.	
(6)	Remove the parking brake valve from the airplane.	

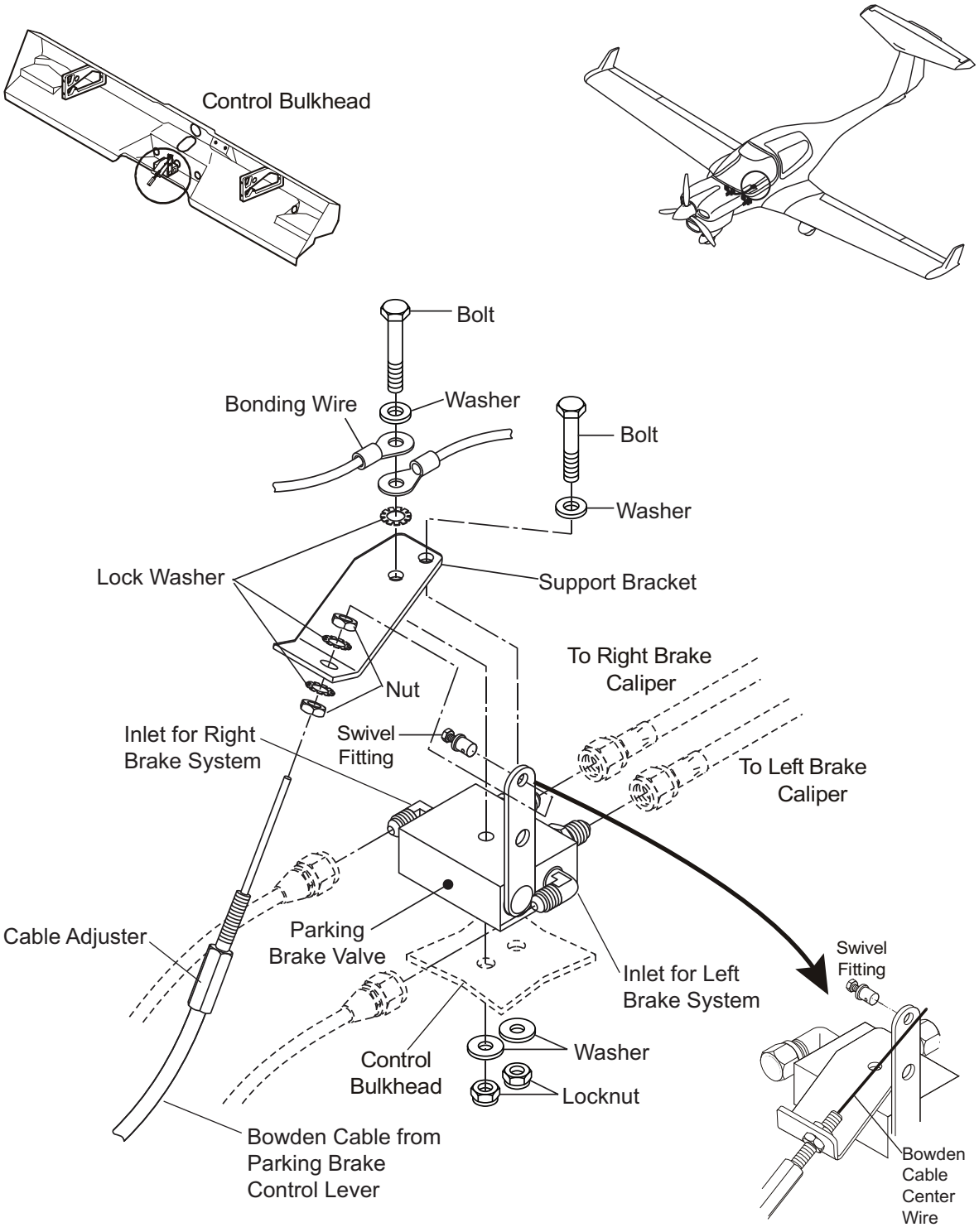


Figure 207 : Parking Brake Valve - Removal/Installation

B. Install the Parking Brake Valve.

Refer to Figure 207.

	Detail Steps/Work Items	Key Items/References
(1)	Put the parking brake valve in position.	At the bottom of the control bulkhead.
(2)	Install the two bolts, bonding wire, washers and locknuts which attach the parking brake valve to the support bracket.	Use new locknuts. Make sure that the bracket for the Bowden cable is in position.
(3)	Connect the four brake hoses to the parking brake valve.	Remove the caps for all the connections.
(4)	Put the center wire of the Bowden cable through the swivel fitting on the brake valve lever. Tighten the screw.	
(5)	Bleed the brake system.	Refer to Paragraph 9.
(6)	Do a function test of the parking brake system: - Set the parking brake to LOCK. - Pump the foot brake pedals. - The brakes must stay on. - Set the parking brake to RELEASE. - The brakes must release.	
(7)	Install the pilots' seats.	Refer to Section 25-10.

9. Bleed the Brake System

A. Equipment

Item	Quantity	Part Number
Pressure bleed equipment with MIL-PRF-5606H brake fluid.	1	Commercial
Transparent overflow pipe and container.	1	Commercial

B. Bleeding Procedure

This procedure bleeds the air from the braking system on one side of the airplane (left or right). If necessary, perform this procedure on both braking systems (left and right).

	Detail Steps/Work Items	Key Items/References
(1)	Clean the area of the brake fluid reservoir cap.	On the co-pilot's rudder pedal assembly. Refer to Figure 3 in the Description and Operation Pageblock 32-40-00.
(2)	Remove the cap.	
WARNING: DO NOT GET BRAKE FLUID ON YOU. BRAKE FLUID CAN CAUSE DISEASE. CAUTION: CLEAN UP SPILT BRAKE FLUID IMMEDIATELY. BRAKE FLUID CAN DAMAGE PAINT AND OTHER MATERIAL.		
(3)	Connect the transparent overflow pipe to the reservoir.	Put the free end of the pipe in a container.
(4)	Clean the area around the bleed nipple below the brake cylinder.	Refer to Figure 4 in the Description and Operation Pageblock 32-40-00.
(5)	Connect the pressure bleed equipment to the bleed nipple below the brake cylinder.	Use only MIL-PRF-5606H brake fluid.
(6)	Open the bleed nipple about 1/2 to 1 turn.	
(7)	Use the pressure bleed equipment to fill the brake system.	Monitor the fluid coming from the reservoir for air bubbles.
(8)	Operate the parking brake ON and OFF 10 to 20 times to remove air from the system.	Continue bleeding the system until the fluid has no bubbles.

	Detail Steps/Work Items	Key Items/References
(9)	Operate the pilot's brake pedals many times to remove air from the system.	Continue bleeding the system until the fluid has no bubbles.
(10)	Operate the co-pilot's brake pedals many times to remove air from the system.	Continue bleeding the system until the fluid has no bubbles.
(11	Remove the pressure bleed equipment. Close the bleed nipple and install the protective cap.	
(12)	Remove the overflow pipe and container.	
(13)	Measure the fluid level in the reservoir. If necessary, add or remove fluid.	The correct level is 12 mm (0.5 in.) below the top of the filler hole. When the level is 25 mm (1 in.) below the top of the filler hole you must add fluid to the correct level. Refer to Figure 2 in the Description and Operation Pageblock 32-40-00.
(14)	Install the reservoir cap.	
(15)	Do a function test of the brake system.	

10. Condition the Brake Linings

The brake linings are a non-asbestos organic material. You must condition new brake linings. Conditioning gives a thin layer of glaze at the friction surface. Usual brake usage keeps the layer of glaze for the life of the brake lining.

Light brake use can wear off the glaze. This reduces brake performance. If the glaze wears off, do the conditioning procedure.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT TAXI THE AIRPLANE UNLESS YOU HAVE BEEN TRAINED TO TAXI AND YOU ARE AUTHORIZED BY YOUR AIRWORTHINESS AUTHORITY. CAUTION: MAKE SURE THAT THE BRAKES OPERATE CORRECTLY WHILE YOU TAXI THE AIRPLANE, IF THE BRAKES FAIL, YOU MUST BE ABLE TO STOP THE AIRPLANE WITHOUT HITTING ANY PERSONS, EQUIPMENT OR OTHER OBSTACLES.	
(1)	Taxi the airplane for 1500 ft with 1700 RPM.	Use the brakes to keep the speed at 5 to 10 mph (8 to 16 km/h).
(2)	Let the brakes cool for 10 to 15 minutes.	
(3)	Apply the brakes. Do a high throttle run-up.	The brakes must hold with the usual pedal force.
(4)	If the brakes do not hold the static run-up, do steps 1 to 3 again as necessary.	

CHAPTER 33
LIGHTS

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LIGHTS

1. General

This Chapter tells you about the cockpit and the exterior lighting of the DA 40 NG. Section 33-10 tells you about the flight compartment lighting and Section 33-40 tells you about the exterior lighting.

NOTE: Equipment which is certified for installation in the DA 40 NG is listed in Chapter 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Chapter 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

2. Description

Figure 1 shows you the location of the lights. The DA 40 NG has these flight compartment lights:

- Reading lights.
- Instrument lights.
- Instrument panel flood light.

Some avionics equipment has internal lighting. Refer to the related Section and the equipment manufacturers handbooks for the equipment in your airplane. Combined ON/OFF and dimmer switches for the instrument panel flood lights and the internal instrument lights are located in the instrument panel, top left.

The DA 40 NG has these exterior lights in one light unit at each wing-tip:

- Left and right position lights. The front part of the light unit has a red (left) or green (right) lens. The light can be seen from the front and the side. If OÄM 40-341 or OÄM 40-369 is installed, the lenses are clear and the LEDs provide the coloration.
- Rear position lights. The aft part of each wing-tip light unit has a clear lens. The lights can be seen from the rear only.
- Strobe light. The middle part of each wing-tip light unit has a clear lens. The filament gives a high-intensity flash. The strobe light can be seen from all directions. If OÄM 40-369 is NOT installed, a separate power unit for each strobe light is mounted in the wing-tip.

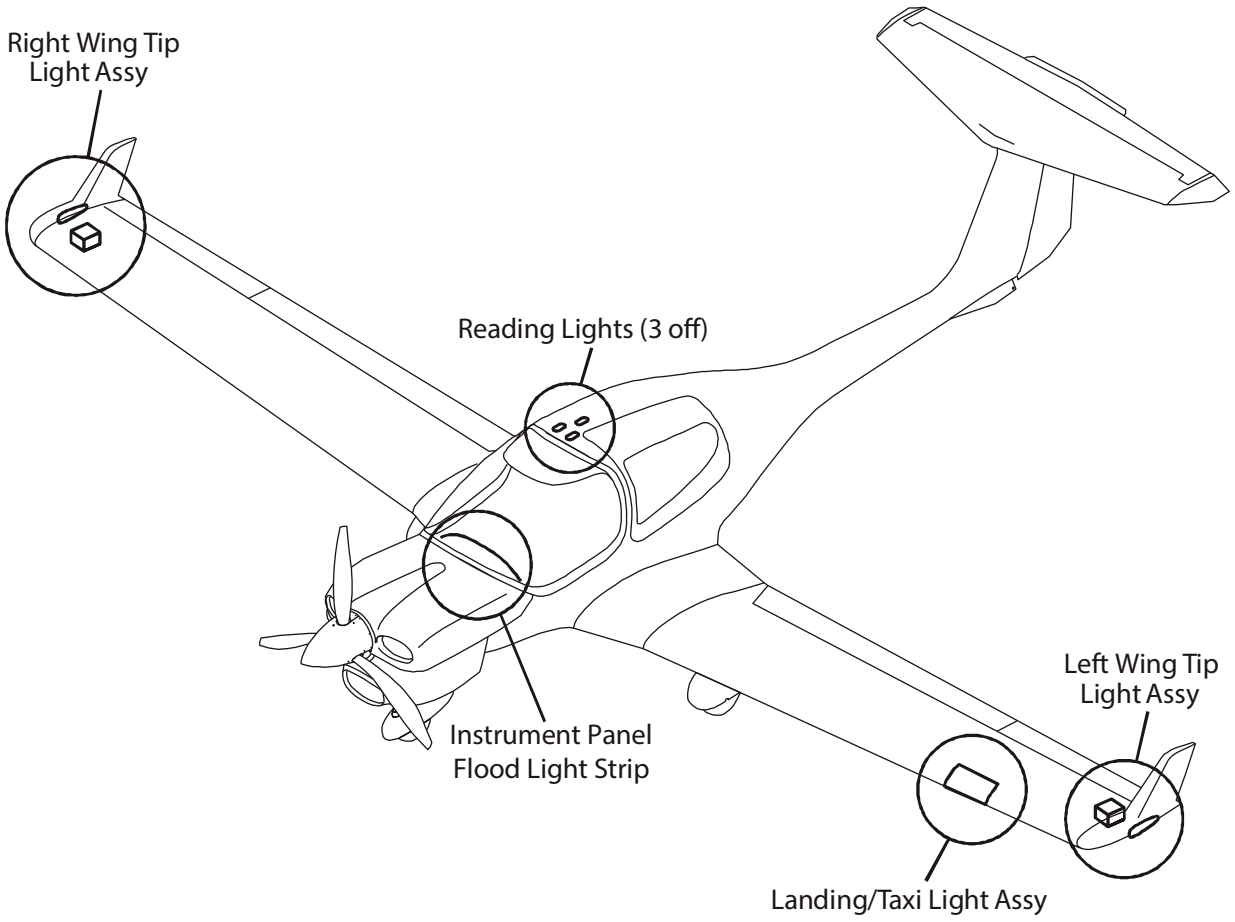

Figure 1 : Flight Compartment and Exterior Lights

The DA 40 NG has these exterior lights in one housing in the outer leading edge of the left wing:

- Landing light. It is located inboard in the housing. The landing light has a clear lens and a 35 Watt filament. If OÄM 40-258 is installed, a HID lamp with a ballast assembly is installed.

- Taxi light. It is located outboard in the housing. The taxi light has an optic lens and a 35 Watt filament. If OÄM 40-258 is installed, a HID lamp with a ballast assembly is installed.

The switches for all the exterior lights are located in the instrument panel, lower left.

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LIGHTS - FLIGHT COMPARTMENT

1. General

This Section tells you about the flight compartment lighting on the DA 40 NG. Refer to Chapter 92 for the wiring diagrams.

2. Description

The DA 40 NG has these flight compartment lighting systems:

- Reading lights.
- Instrument panel flood lighting.
- Instrument lights.

Some avionics equipment has internal lighting. Refer to the related section and the equipment manufacturers handbooks for the equipment in your airplane. Combined ON/OFF and dimmer switches for the instrument panel flood lights and the internal instrument lights are located in the instrument panel, top left.

A. Reading Lights

Reading lights are located in the roof of the cockpit. The two lights at the front are directed towards the pilots' seats and the light at the rear is directed towards the passenger seat. Each reading light assembly has an integral switch and a directional beam. The system is protected by a circuit-breaker located on the right side of the instrument panel.

B. Instrument Panel Flood Lighting

A 115 V AC foil type light strip makes the instrument flood light. The intensity of the light is controlled by a dimmer switch located on the left side of the instrument panel. Turn the dimmer switch fully counter-clockwise to turn the flood light off. Turn the dimmer switch clockwise to turn the flood light on and to set the level of lighting that you require. The light strip is held in place under the anti-glare panel with double sided tape. A solid state inverter supplies the 115 V AC current. The system is protected by a circuit-breaker located on the right side of the instrument panel.

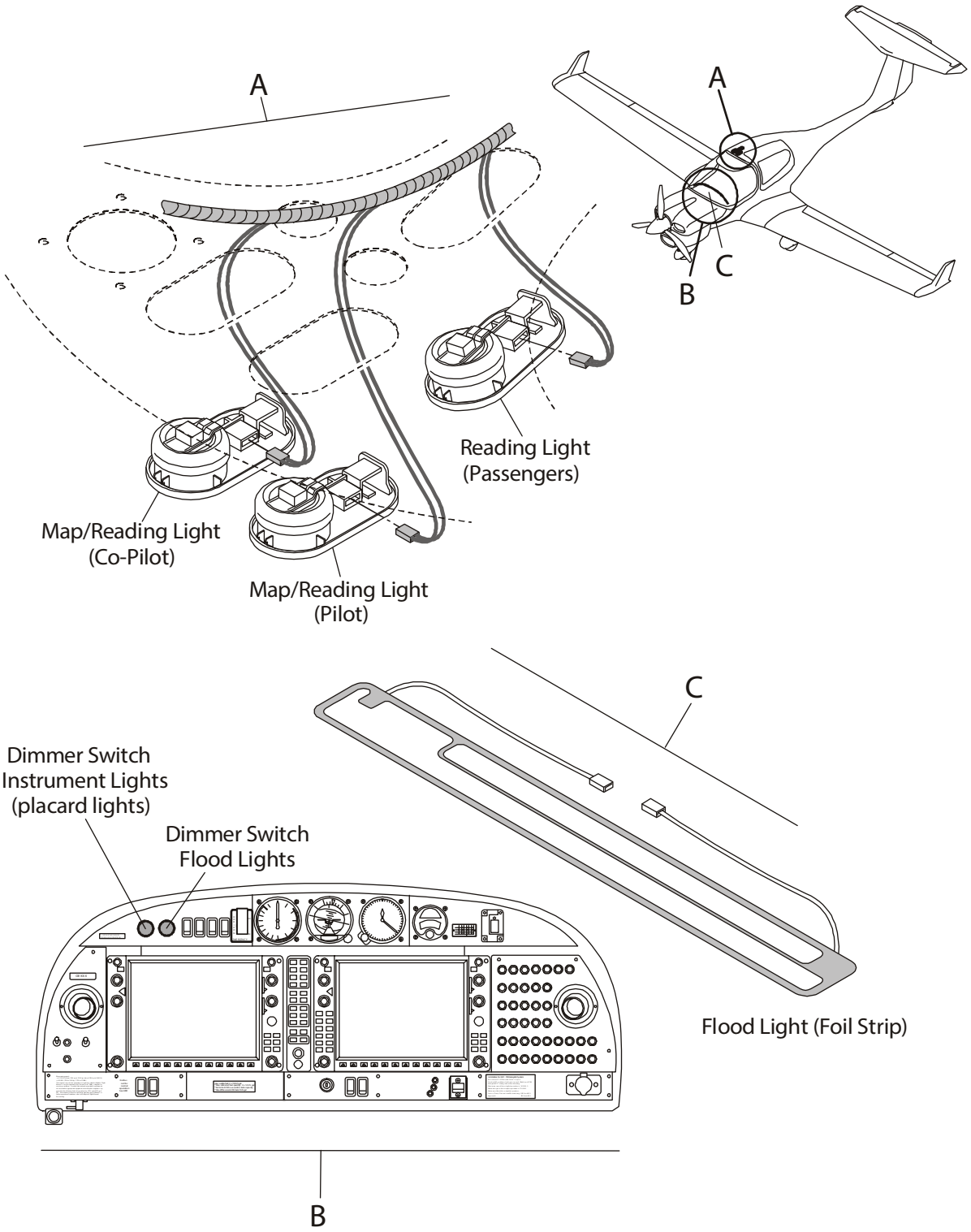

Figure 1 : Flight Compartment Lights
(if the G1000 System is installed)

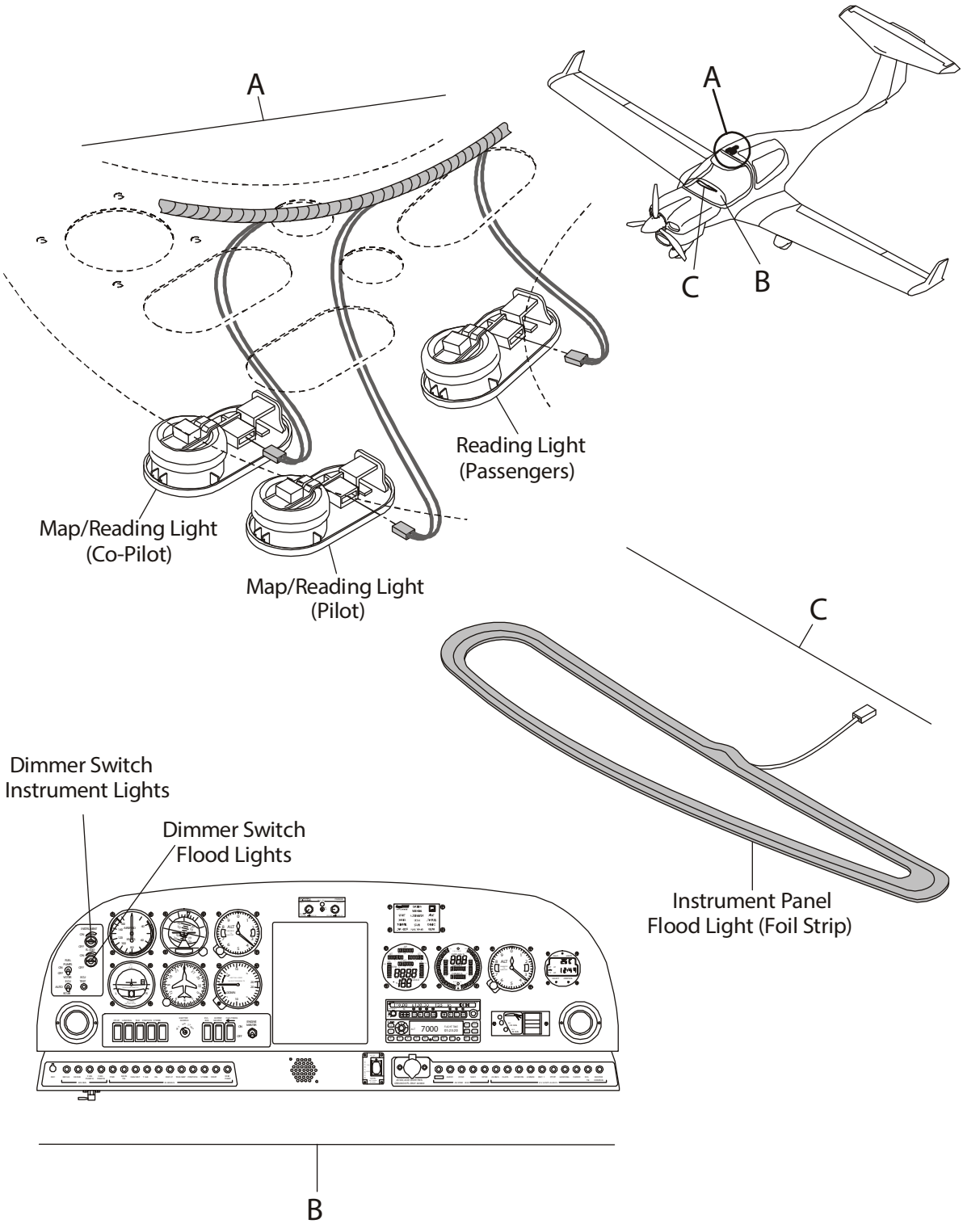

Figure 2 : Flight Compartment Lights
(if Conventional Cockpit (OÄM 40-321) Is Installed)

C. Instrument Lighting

The instrument lighting is controlled by a dimmer switch mounted on the left side of the instrument panel. Turn the dimmer switch fully counter-clockwise to turn the instrument lights off. Turn the dimmer switch clockwise to turn the instrument lights on and to set the level of lighting that you require. The system is protected by a circuit-breaker located on the right side of the instrument panel.

TROUBLE-SHOOTING

1. General

The table below lists the defects you could have in the flight compartment lighting system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
One of the reading lights does not operate.	Defective filament.	Replace the filament.
	Defective light unit.	Replace the light unit.
The instrument panel flood light does not operate correctly.	Circuit-breaker not set.	Set the circuit-breaker.
	Dimmer switch defective.	Replace the dimmer switch.
	Solid state inverter defective.	Replace the solid state inverter.
	Light strip defective.	Replace the light strip.
	Defective wiring.	Do a continuity check of the wiring. Repair/replace defective wiring. Refer to Chapter 92 for the wiring diagrams.
The instrument lights do not operate correctly.	Filament(s) defective.	Replace the filament(s).
	Circuit-breaker not set.	Set the circuit-breaker.
	Dimmer switch defective.	Replace the dimmer switch.
	Defective wiring.	Do a continuity check of the wiring. Repair/replace defective wiring. Refer to Chapter 92 for the wiring diagrams.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to remove/install the main components of the flight compartment lighting systems. Refer to the Chapter 92 for the wiring diagrams.

2. Remove/Install a Cabin Light Assembly

A. Remove a Reading Light Assembly.

	Detail Steps/Work Items	Key Items/References
(1)	Pull the circuit-breaker for the reading light.	Instrument panel, right side.
(2)	Remove the reading light assembly: - Release the spring clip which holds the light assembly in position. - Lower the light assembly from cockpit roof and disconnect the electrical cable. - Move the light assembly clear of the airplane.	Hold the reading light assembly. At the switch end of the assembly. At the in-line connector.

B. Install a Reading Light Assembly.

	Detail Steps/Work Items	Key Items/References
(1)	Move the reading light assembly into position in the cockpit.	Hold the reading light assembly.
(2)	Connect the electrical cable to the light assembly.	At the in-line connector.
(3)	Move the light assembly into position, lamp end first, then push the switch end up into position until the spring clip engages.	Make sure that the light assembly is correctly installed and that the spring clip is fully engaged.

C. Replace a Filament in a Reading Light Assembly.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the reading light assembly.	Refer to Paragraph 2.A.
(2)	Remove the filament holder from the rear of the light assembly.	
(3)	Replace the filament.	
(4)	Install the filament holder at the rear of the light assembly.	
(5)	Install the reading light assembly.	Refer to Paragraph 2.B.

3. Remove/Install a Dimmer Switch

A. Remove a Dimmer Switch.

	Detail Steps/Work Items	Key Items/References
(1)	Disconnect the battery.	Refer to Section 24-31.
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Remove the knob from the dimmer switch that you will remove.	
(4)	Disconnect the electrical wiring from the rear of the dimmer switch.	
(5)	Remove the nut and washer from the front of the dimmer switch.	
(6)	Move the dimmer switch forward and move it clear of the instrument panel.	

B. Install a Dimmer Switch.

	Detail Steps/Work Items	Key Items/References
(1)	Put the dimmer switch into position in the instrument panel.	
(2)	Install the washer and nut which attaches the dimmer switch to the instrument panel.	Make sure that the dimmer switch is orientated correctly.
(3)	Connect the electrical wiring to the rear of the dimmer switch.	Refer to Chapter 92 for the wiring diagrams.
(4)	Install the knob to the front of the dimmer switch.	
(5)	Install the instrument panel cover.	Refer to Section 25-10.
(6)	Connect the airplane battery.	Refer to Section 24-31.
(7)	Do an operational test of the dimmer switch: - Set the ELECTRIC MASTER key switch to ON. - Rotate the dimmer switch clockwise. - Rotate the dimmer switch fully clockwise. - Rotate the dimmer switch fully counter-clockwise to the OFF position. - Set the ELECTRIC MASTER key switch to OFF.	 The system light(s) must come on. The intensity of the light(s) must increase. The light(s) must go off.

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EXTERIOR LIGHTS

1. General

This Section tells you about the exterior lights on the DA 40 NG. Refer to Chapter 92 for the wiring diagrams.

2. Description

The DA 40 NG has three exterior lights in one light unit at each wing-tip. It also has landing and taxi lights in a housing in the leading edge of the left wing. Figures 1, 2 and 3 show a wing-tip light unit.

A. Position Lights (if OÄM 40-369 is NOT installed)

The DA 40 NG has left and right position lights. The front part of the light unit has a red (left) lens or green (right) lens. The light can be seen from the front or the side of the airplane.

The light unit also has rear position lights. The aft part of each light unit has a clear lens.
If OÄM 40-341 is installed, the lenses are clear and the LEDs provide the coloration The light can be seen from the rear of the airplane only.

A switch on the left instrument panel controls the position lights and the system is protected by a circuit-breaker.

B. Strobe Light (Anti Collision Light - ACL), if OÄM 40-369 is NOT installed

The middle part of each light unit has a clear lens for a strobe light. The filament gives a high intensity flash. This is followed immediately by a less-bright flash. The double flashes occur about 50 times per minute. The strobe lights can be seen from all round the airplane.

A separate power unit for each strobe light is mounted in the wing-tip. A switch on the left instrument panel controls both the strobe lights and the system is protected by a circuit-breaker.

The power unit generates an electrical impulse of about 600 volts. The pulse ionizes the gas in the strobe light filament which causes a bright flash. A second less powerful flash occurs immediately after the main pulse.

C. LED Position and Anti-Collision Light (if OÄM 40-369 is installed)

The DA 40 NG has left and right LED position and anti-collision light assemblies. The position and anti-collision lights are installed on a base plate covered by a clear lens. The LEDs provide the coloration. The forward position light is covered with red (left) or green (right) LEDs. The rear position light is designed with two white LEDs. The anti-collision light is designed with 24 white LEDs. If one of the LEDs fails, the unit must be replaced.

The position lights and the anti-collision lights are controlled by separate switches and are protected by individual circuit breakers.

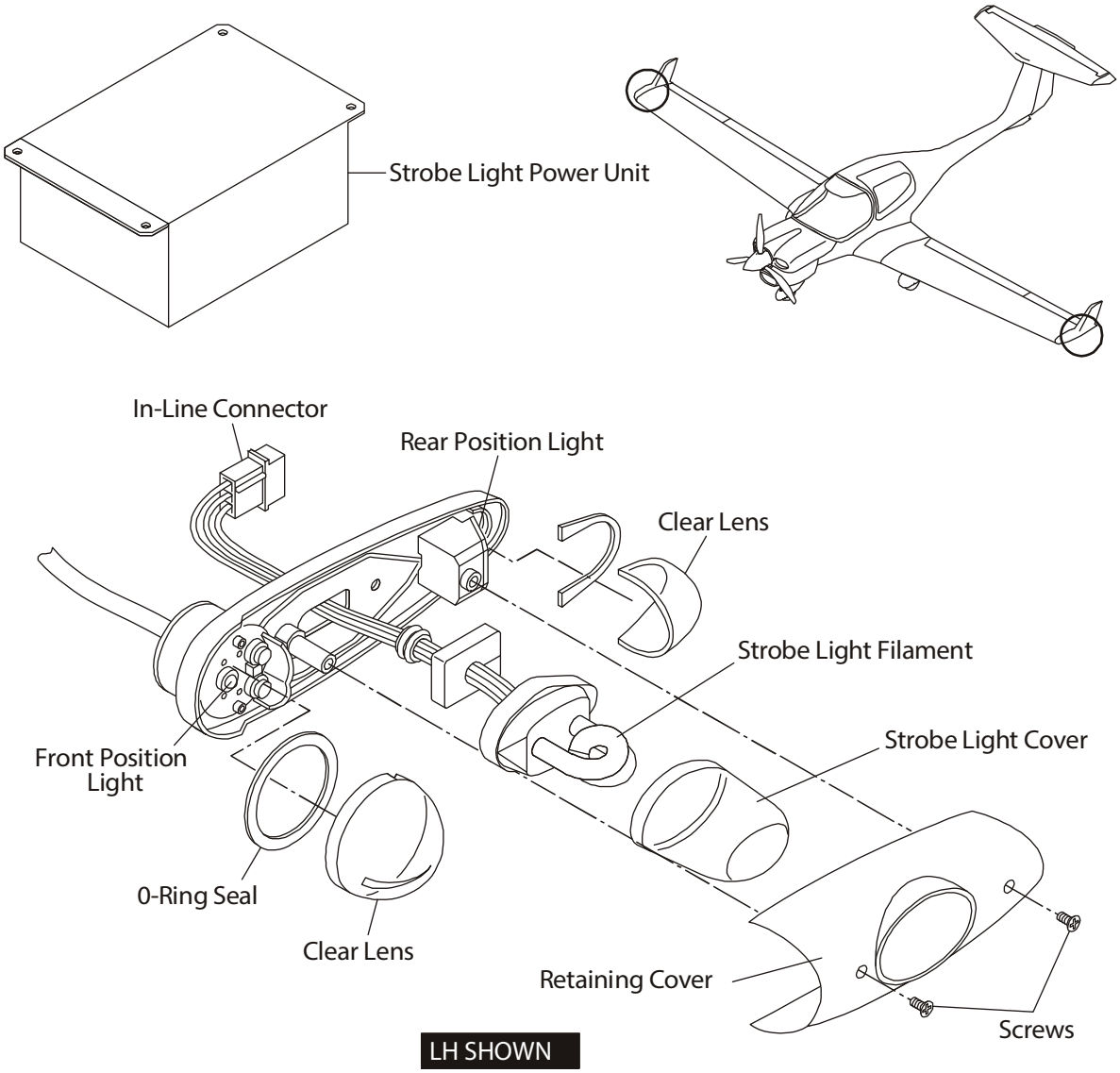

Figure 1 : Wing-Tip Light Unit and Strobe Power Unit

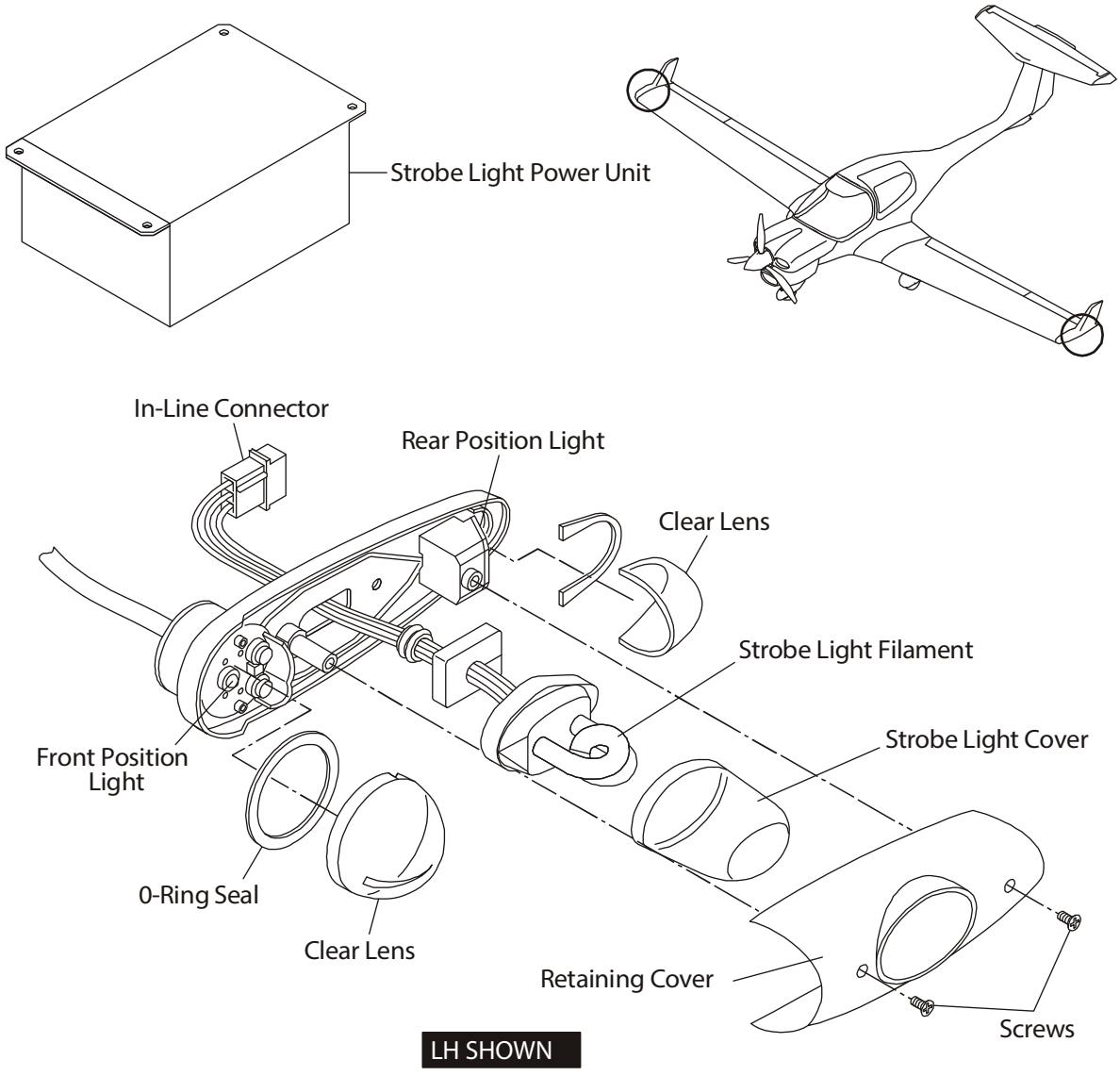

Figure 2 : Wing-Tip Light Unit and Strobe Power Unit (if OÄM 40-341 Is Installed)

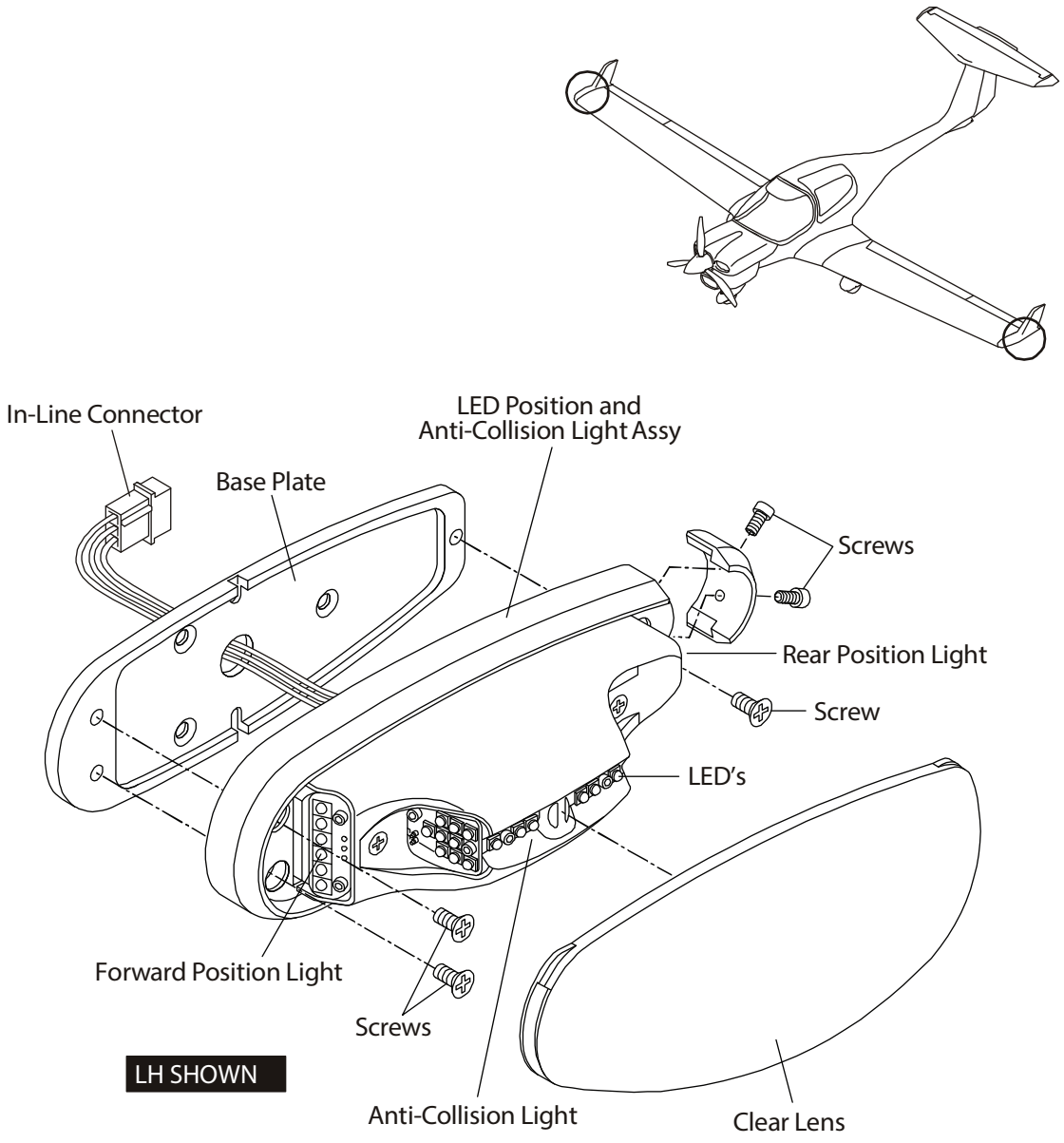

Figure 3 : Wing-Tip Light Unit (if OÄM 40-369 Is Installed)

D. Landing Light

The landing light is located in a housing in the leading edge of the left wing. The landing light has a clear lens and a 35 Watt filament or a HID lamp with a ballast assembly (if OÄM 40-258 is installed). It is located inboard in the housing. A switch on the left instrument panel controls the light and a circuit-breaker protects the system.

E. Taxi Light

The taxi light is located in a housing in the leading edge of the left wing. The landing light has an optic lens and a 35 Watt filament or a HID lamp with a ballast assembly (if OÄM 40-258 is installed). It is located outboard in the housing. A switch in the left instrument panel controls the light and a circuit-breaker protects the system.

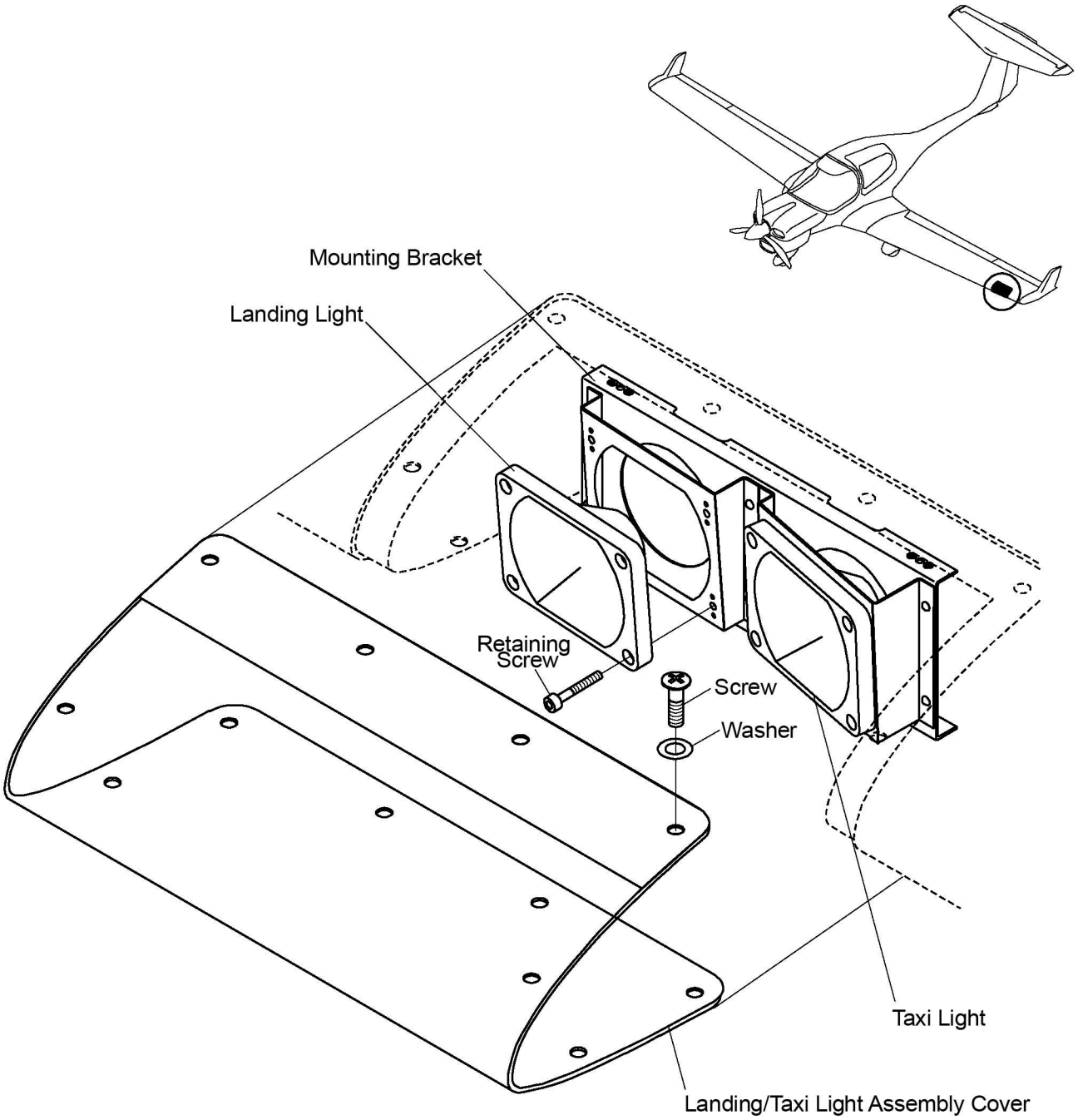

Figure 4 : Landing and Taxi Light Installation (Standard Equipment)

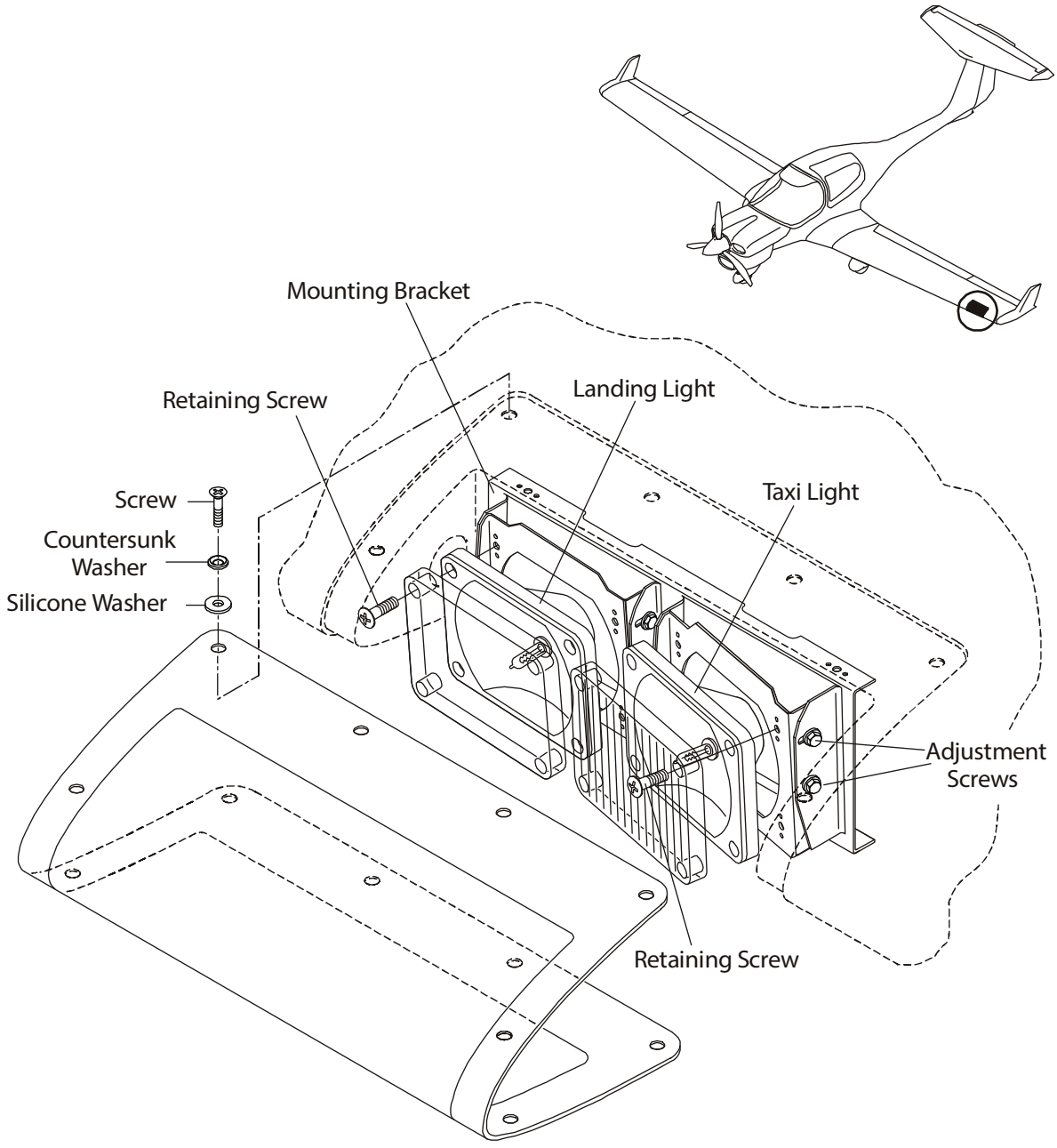

Figure 5 : Landing and Taxi Light Installation (if MÄM 40-635 Is Installed)

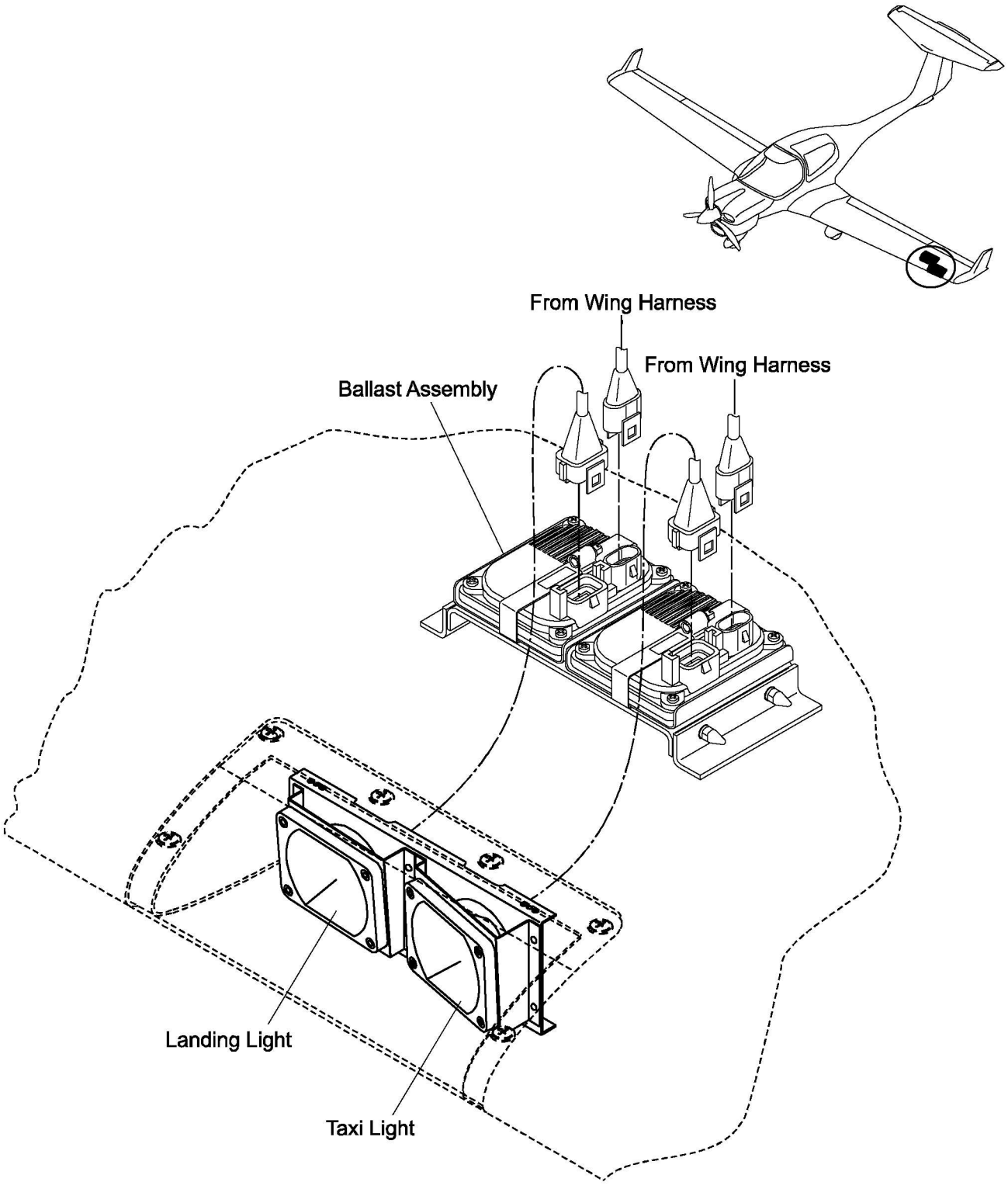

Figure 6 : Landing and Taxi Light Installation
(HID Lamps, if OÄM 40-258 Is Installed)

TROUBLE-SHOOTING

1. General

The table below lists the defects you could have with the exterior light system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

WARNING: **DO NOT OPERATE THE LANDING/TAXI LIGHTS WHEN PERSONS ARE CLOSE TO THE AIRPLANE AND DO NOT LOOK AT THE LIGHT WHEN IT OPERATES. STROBE, TAXI AND LANDING LIGHTS CAN CAUSE EYE DAMAGE.**

WARNING: **AFTER ELECTRICAL POWER IS SWITCHED OFF, MAKE SURE TO WAIT A MINIMUM OF FIVE MINUTES BEFORE THE LANDING/TAXI LIGHT COVER IS REMOVED OR WORK ON ANY PART OF THE LIGHTING SYSTEM IS PERFORMED. THE POWER SUPPLIES TO THESE COMPONENTS GENERATE HIGH VOLTAGE. HIGH VOLTAGE CAN CAUSE DEATH OR INJURY TO PERSONS.**

Trouble	Possible Cause	Repair
Both position lights do not operate.	Circuit breaker not set or defective.	Set/replace the circuit-breaker.
	Defective position light switch.	Replace the switch.
	Defective wiring.	Repair/replace the wiring. Refer to Chapter 92 for the wiring diagrams.
One position light does not operate.	Defective filament or LED.	Replace the filament or light assembly.
	Defective wiring.	Repair/replace the wiring. Refer to Chapter 92 for the wiring diagrams.
Both strobe lights do not operate.	Circuit-breaker not set or defective.	Set/replace the circuit-breaker.
	Defective switch.	Replace the switch.
	Defective wiring.	Repair/replace the wiring. Refer to Chapter 92 for the wiring diagrams.

Trouble	Possible Cause	Repair
One strobe light does not operate.	Defective power supply unit (if OÄM 40-369 is NOT installed).	Replace the power supply unit.
	Defective strobe unit or LED.	Replace the strobe unit or the light assembly.
	Defective wiring.	Repair/replace the wiring. Refer to Chapter 92 for the wiring diagrams.
Strobe and position light does not operate on one side.	Connector at the wing root disconnected.	Connect the connector.
Landing light or taxi light does not operate.	Defective light unit.	Replace the light unit.
	Circuit-breaker not set or defective.	Set/replace the circuit-breaker.
	Defective landing light or taxi light switch.	Replace the related switch.
	Loose connector at the light unit.	Connect the connector correctly.
	Defective wiring.	Repair/replace the wiring. Refer to Chapter 92 for the wiring diagrams.
	Loose connector at the light unit (standard installation) or ballast (HID version).	Connect the connector correctly.
	Ballast defective (HID version only).	Replace ballast.
	Loose connector between the ballast and HID lamp. (HID version only).	Repair / replace the wire harness between ballast and HID lamp.

MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to remove/install defective filaments and light units. They tell you how to adjust the landing light and the taxi light. They also tell you how to remove/install components in the system. Refer to Chapter 92 for the wiring diagrams.

WARNING: DO NOT OPERATE THE LANDING/TAXI LIGHTS WHEN PERSONS ARE CLOSE TO THE AIRPLANE AND DO NOT LOOK AT THE LIGHT WHEN IT OPERATES. STROBE, TAXI AND LANDING LIGHTS CAN CAUSE EYE DAMAGE.

WARNING: AFTER ELECTRICAL POWER IS SWITCHED OFF, MAKE SURE TO WAIT A MINIMUM OF FIVE MINUTES BEFORE THE LANDING/TAXI LIGHT COVER IS REMOVED OR WORK ON ANY PART OF THE LIGHTING SYSTEM IS PERFORMED. THE POWER SUPPLIES TO THESE COMPONENTS GENERATE HIGH VOLTAGE. HIGH VOLTAGE CAN CAUSE DEATH OR INJURY TO PERSONS.

2. Remove/Install/Check/Adjust the Taxi Light

A. Remove the Taxi Light.

	Detail Steps/Work Items	Key Items/References
(1)	Set the ELECTRIC MASTER key switch to OFF.	
(2)	Set the TAXI light switch to OFF.	
(3)	Set the TAXI/MAP circuit-breaker open.	
(4)	Remove the taxi/landing light cover from the wing: - Remove the 12 screws which attach the light cover to the wing. - Pull the light cover clear of the wing.	
(5)	Remove the screws which attach the taxi light to the wing.	The taxi light is the outboard assembly. Refer to Figure 4 in the Description and Operation Pageblock 33-40-00.

	Detail Steps/Work Items	Key Items/References
(6)	Hold the taxi light and carefully move it out from the wing: - Disconnect the electrical connector from the rear of the taxi light. - Remove the taxi light.	
	CAUTION: DO NOT TOUCH THE GLASS PART OF A HID LAMP. THIS WILL DAMAGE THE LAMP.	
(7)	If HID lamps are installed (if OÄM 40-258 is installed): Remove the HID lamp from the reflector assembly: - Remove the three screws securing the retaining ring to the mounting plate. Hold both the retaining ring and the HID lamp together to avoid dropping the HID lamp. - Slide the retaining ring out. - Remove the lamp from the reflector assembly.	Refer to Figure 201.

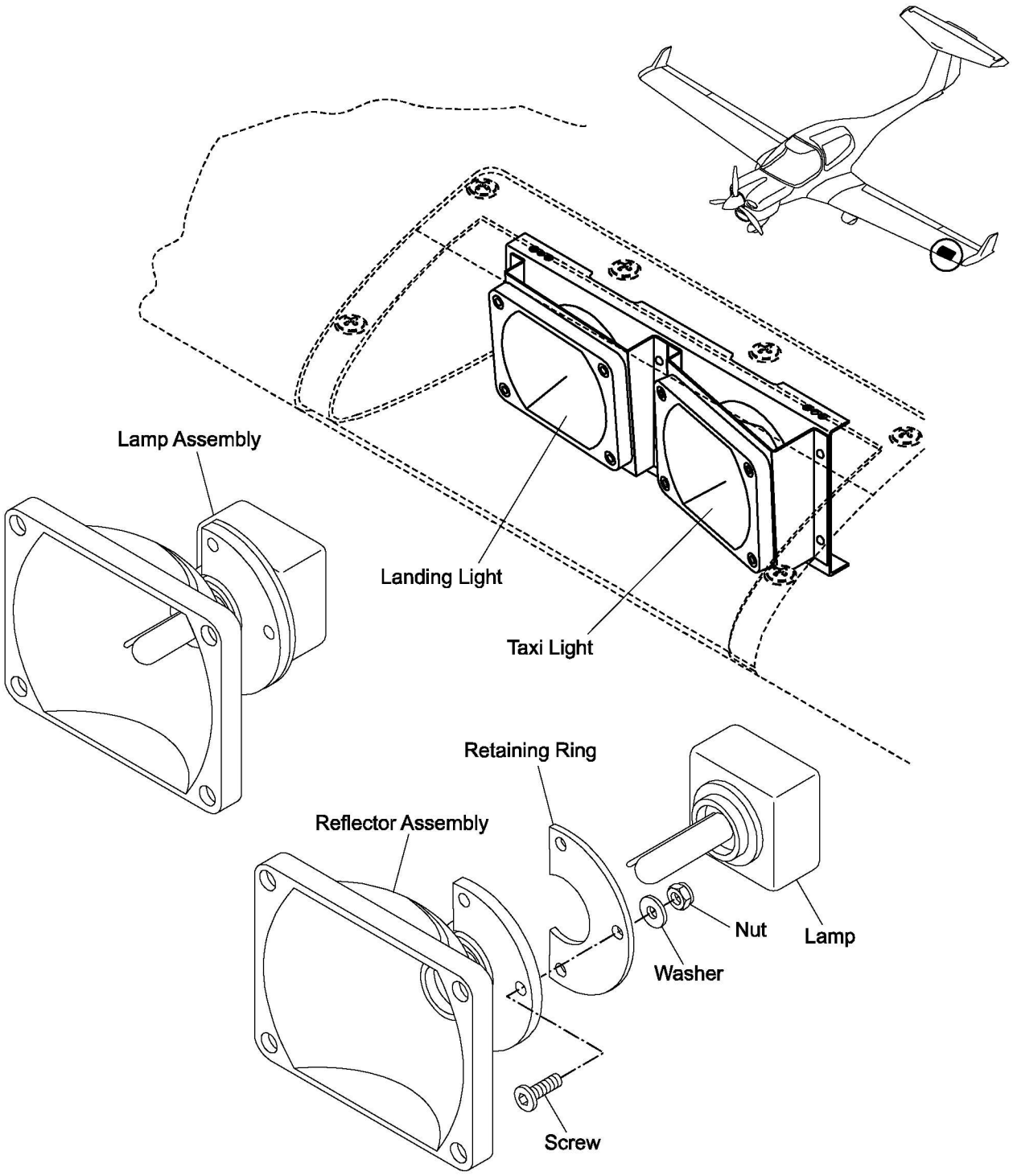

Figure 201 : Reflector and HID Lamp Assembly (if OÄM 40-258 is installed)

B. Install the Taxi Light.

	Detail Steps/Work Items	Key Items/References
	CAUTION: DO NOT TOUCH THE GLASS PART OF A HID LAMP. THIS WILL DAMAGE THE LAMP.	
(1)	If HID lamps are installed (if OÄM 40-258 is installed): Assemble the HID lamp assembly: - Insert the HID lamp into the mounting plate and the reflector carefully. - Slide the retaining ring into the slot on the HID lamp. - Align the retaining ring with the mounting plate. - Install the three assembly screws and washers and secure using Loctite 222 or 243 or equivalent.	Refer to Figure 201.
(2)	Hold the taxi light in position in the leading edge of the left wing. Connect the electrical connector to the rear of the taxi light.	
(3)	Install the screws which attach the taxi light assembly to the wing.	
(4)	Set the ELECTRIC MASTER key switch to ON.	
(5)	Set the TAXI/MAP circuit-breaker closed.	
(6)	Set the TAXI light switch to ON.	
(7)	Set the TAXI light switch to OFF.	
(8)	Set the ELECTRIC MASTER key switch to OFF.	
(9)	Install the taxi/landing light cover to the wing: - Put the light cover in position on the wing. - Install the 12 screws which attach the light cover to the wing.	

C. Check the Taxi Light Adjustment (if MÄM 40-635 is installed).

	Detail Steps/Work Items	Key Items/References
NOTE: The airplane must be on a level and flat surface prior to checking the taxi light adjustment. There must be a vertical surface in front of the airplane.		
(1)	Make sure that the airplane is in weighing configuration.	Refer to Section 08-10.
(2)	Check and adjust the tire pressure if necessary.	Refer to Section 12-10.
(3)	Position the airplane in front of a vertical surface with 3 m (118 in.) distance between the center of the nose landing gear and the vertical surface.	
(4)	Place wheel chocks in position.	
(5)	Turn on the taxi light. Check the taxi light adjustment.	The correct position of the center of the taxi light beam is 76 cm (30 in) above ground on the vertical surface.
(6)	If necessary adjust the taxi light.	Refer to Paragraph D.

D. Adjust the Taxi Light (if MÄM 40-635 is installed).

	Detail Steps/Work Items	Key Items/References
(1)	Set the ELECTRIC MASTER key switch to OFF.	
(2)	Set the TAXI light switch to OFF.	
(3)	Set the TAXI/MAP circuit-breaker open.	
(4)	Remove the taxi/landing light cover from the wing: - Remove the 12 screws which attach the light cover to the wing. - Pull the light cover clear of the wing.	
(5)	Loosen the three adjustment screws securing the taxi light bracket assembly.	Refer to Figure 4 in the Description and Operation Pageblock 33-40-00.
(6)	Adjust the taxi light position.	

	Detail Steps/Work Items	Key Items/References
(7)	Tighten the three adjustment screws.	
(8)	Check the taxi light adjustment.	Refer to Paragraph C.
(9)	Install the taxi/landing light cover to the wing: - Put the light cover in position on the wing. - Install the 12 screws which attach the light cover to the wing.	
(10)	Set the TAXI/MAP circuit-breaker close.	

3. Remove/Install the Landing Light

A. Remove the Landing Light.

	Detail Steps/Work Items	Key Items/References
(1)	Set the ELECTRIC MASTER key switch to OFF.	
(2)	Set the LANDING light switch to OFF.	
(3)	Set the LANDING circuit-breaker open.	
(4)	Remove the taxi/landing light cover from the wing: - Remove the 12 screws which attach the light cover to the wing. - Pull the light cover clear of the wing.	
(5)	Remove the screws which attach the landing light to the wing.	The landing light is the inboard assembly. Refer to Figure 4 in the Description and Operation Pageblock 33-40-00.
(6)	Hold the landing light and carefully move it out from the wing: - Disconnect the electrical connector from the rear of the landing light. - Remove the landing light.	
	CAUTION: DO NOT TOUCH THE GLASS PART OF A HID LAMP. THIS WILL DAMAGE THE LAMP.	
(7)	If HID lamps are installed (if OÄM 40-258 is installed): Remove the HID lamp from the reflector assembly: - Remove the three screws securing the retaining ring to the mounting plate. Hold both the retaining ring and the HID lamp together to avoid dropping the HID lamp. - Slide the retaining ring out. - Remove the lamp from the reflector assembly.	Refer to Figure 201.

B. Install the Landing Light.

	Detail Steps/Work Items	Key Items/References
	CAUTION: DO NOT TOUCH THE GLASS PART OF A HID LAMP. THIS WILL DAMAGE THE LAMP.	
(1)	If HID lamps are installed (if OÄM 40-258 is installed): Assemble the HID lamp assembly: - Insert the HID lamp into the mounting plate and the reflector carefully. - Slide the retaining ring into the slot on the HID lamp. - Align the retaining ring with the mounting plate. - Install the three assembly screws and washers and secure using Loctite 222 or 243 or equivalent.	Refer to Figure 201.
(2)	Hold the taxi light in position in the leading edge of the left wing. - Connect the electrical connector to the rear of the taxi light.	
(3)	Install the screws which attach the taxi light assembly to the wing.	
(4)	Set the ELECTRIC MASTER key switch to ON.	
(5)	Set the LANDING circuit-breaker closed.	
(6)	Set the LANDING light switch to ON.	
(7)	Set the LANDING light switch to OFF.	
(8)	Set the ELECTRIC MASTER key switch to OFF.	
(9)	Install the taxi/landing light cover to the wing: - Put the light cover in position on the wing. - Install the 12 screws which attach the light cover to the wing.	

4. Remove/Install the HID Ballast Assembly for the Landing and the Taxi Lights (if installed)

A. Remove the HID Ballast Assembly for the Landing and the Taxi Lights (if installed)

Refer to Figure 202.

	Detail Steps/Work Items	Key Items/References
(1)	Set the ELECTRIC MASTER key switch to OFF and set the LANDING/TAXI/MAP circuit breakers open.	
	WARNING: AFTER ELECTRICAL POWER IS SWITCHED OFF, MAKE SURE TO WAIT A MINIMUM OF FIVE MINUTES BEFORE THE LANDING/TAXI LIGHT COVER IS REMOVED OR WORK ON ANY PART OF THE LIGHTING SYSTEM IS PERFORMED. THE POWER SUPPLIES TO THESE COMPONENTS GENERATE HIGH VOLTAGE. HIGH VOLTAGE CAN CAUSE DEATH OR INJURY TO PERSONS.	
(2)	Remove the service cover next to the light assembly from the lower surface of the left wing.	
(3)	Unplug the cables connecting the ballast assembly to the wing harness.	
(4)	Unplug the high voltage cables connecting the ballast assembly to the landing and the taxi light assemblies.	
(5)	Remove the two screws fixing the ballast assembly to the inboard angle bracket.	
(6)	Carefully lift the ballast assembly and move it through the access panel off the airplane.	

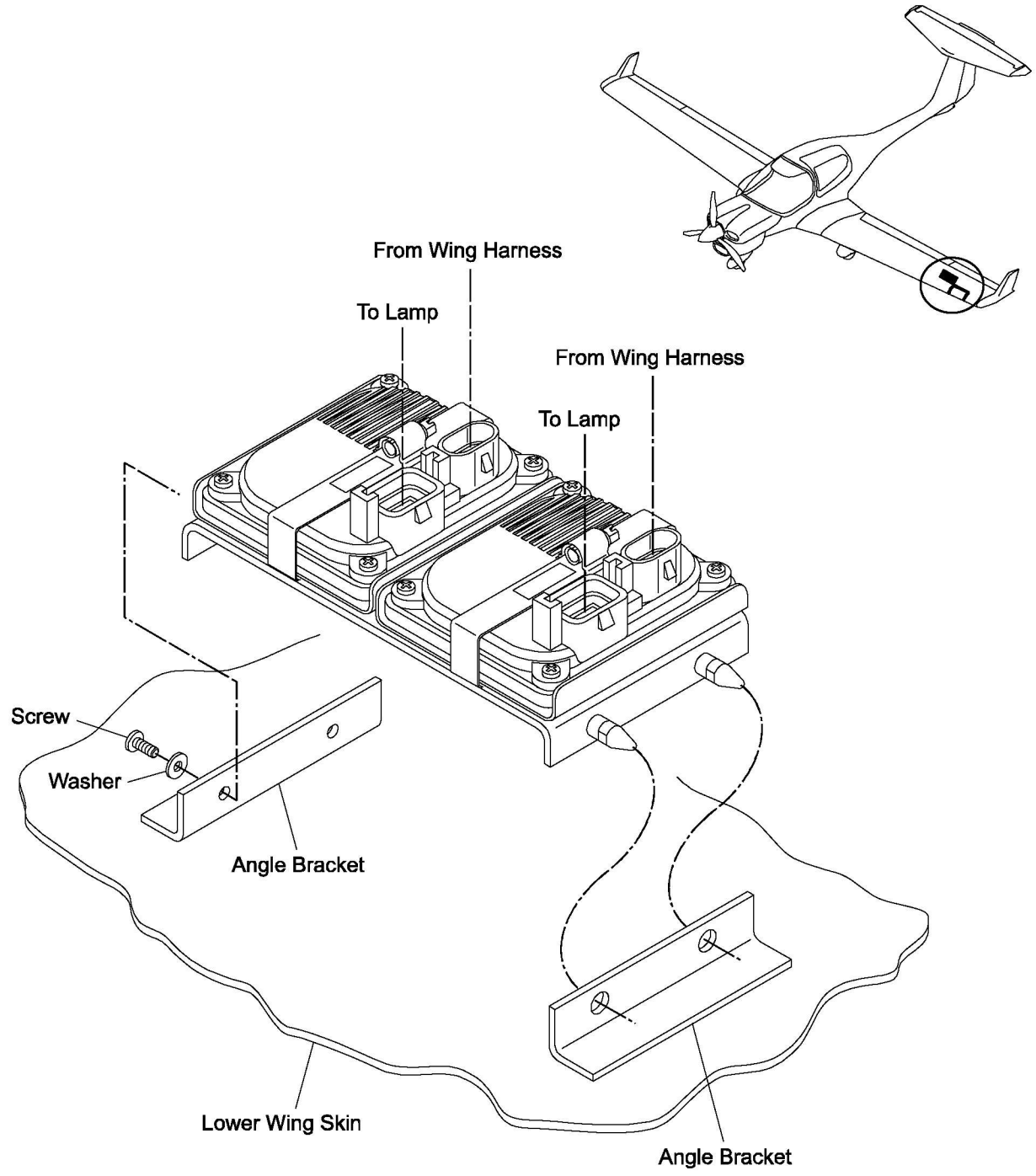

Figure 202 : Ballast Assembly (HID Lamps, if OÄM 40-258 is installed)

B. Install the HID Ballast Assembly for the Landing and the Taxi Lights (if installed)

Refer to Figure 202.

	Detail Steps/Work Items	Key Items/References
(1)	Set the ELECTRIC MASTER key switch to OFF and set the LANDING/TAXI/MAP circuit breakers open.	
(2)	Carefully move the ballast assembly through the service opening into the left wing. Lift the ballast assembly over the inboard angle bracket and slide the pins into the holes of the outboard angle bracket.	
(3)	Align the holes of the inboard angle bracket with the threaded holes of the ballast assembly.	
(4)	Mount the ballast assembly to the inboard angle bracket using Loctite 222 or 243 or equivalent to secure the screws.	
(5)	Plug the high voltage lines for the taxi and the landing lights into the related plugs of the ballast assembly.	
(6)	Plug the cables from the wing harness to the related plugs on the ballast assembly.	
(7)	Mount the access panel to the lower surface of the wing.	

	Detail Steps/Work Items	Key Items/References
	WARNING: **DO NOT OPERATE THE LANDING/TAXI LIGHTS WHEN PERSONS ARE CLOSE TO THE AIRPLANE AND DO NOT LOOK AT THE LIGHT WHEN IT OPERATES. STROBE, TAXI AND LANDING LIGHTS CAN CAUSE EYE DAMAGE.**	
(8)	Do an operational test of the taxi and landing lights: - Set the LANDING/TAXI/ MAP circuit breaker closed. - Set the ELECTRIC MASTER key switch to ON. - Set the TAXI and LANDING switches to ON. - Verify proper function of both the taxi and landing lights. - Set the TAXI and LANDING switches to OFF. - Set the ELECTRIC MASTER key switch to OFF.	

5. Replace a Filament in the Wing-Tip Light Unit (neither OÄM 40-341 nor OÄM 40-369 is installed)

A. Replace a Position Light Filament in the Wing-Tip.

	Detail Steps/Work Items	Key Items/References
(1)	Set the ELECTRIC MASTER key switch to OFF.	
	WARNING: AFTER YOU SET THE POWER TO OFF, MAKE SURE THAT YOU WAIT A MINIMUM OF FIVE MINUTES BEFORE YOU DO WORK ON THE STROBE LIGHTS. THE POWER SUPPLIES TO THE STROBE LIGHTS GENERATE HIGH VOLTAGE. HIGH VOLTAGE CAN CAUSE DEATH OR INJURY TO PERSONS.	
(2)	Remove the light unit cover from the wing-tip and the lamp glasses.	Refer to Figure 1 in the Description and Operation Pageblock 33-40-00.
(3)	Replace the position light filament.	
(4)	Install the lamp glass and the light unit cover	
(5)	Do an operational test of the position light.	

B. Replace a Strobe Light Filament in the Wing-Tip.

	Detail Steps/Work Items	Key Items/References
(1)	Set the ELECTRIC MASTER key switch to OFF.	
	WARNING: AFTER YOU SET THE POWER TO OFF, MAKE SURE THAT YOU WAIT A MINIMUM OF FIVE MINUTES BEFORE YOU DO WORK ON THE STROBE LIGHTS. THE POWER SUPPLIES TO THE STROBE LIGHTS GENERATE HIGH VOLTAGE. HIGH VOLTAGE CAN CAUSE DEATH OR INJURY TO PERSONS.	
(2)	Remove the light unit cover from the wing-tip and the lamp glasses.	Refer to Figure 1 in the Description and Operation Pageblock 33-40-00.
(3)	Replace the strobe light filament.	
(4)	Install the lamp glass and the light unit cover	
	WARNING: DO NOT OPERATE THE STROBE LIGHTS WHEN PERSONS ARE CLOSE TO THE AIRPLANE AND DO NOT LOOK AT THE LIGHT WHEN IT OPERATES. STROBE LIGHTS CAN CAUSE EYE DAMAGE	
(5)	Do an operational test of the strobe light.	

6. Remove/Install the Light Unit in the Wing-Tip

A. Remove the Light Unit in the Wing-Tip.

	Detail Steps/Work Items	Key Items/References
(1)	Set the ELECTRIC MASTER key switch to OFF. Set the STROBE and POSITION circuit-breakers open.	
	WARNING: AFTER YOU SET THE POWER TO OFF, MAKE SURE THAT YOU WAIT A MINIMUM OF FIVE MINUTES BEFORE YOU DO WORK ON THE STROBE LIGHTS. THE POWER SUPPLIES TO THE STROBE LIGHTS GENERATE HIGH VOLTAGE. HIGH VOLTAGE CAN CAUSE DEATH OR INJURY TO PERSONS.	
(2)	Remove the light unit cover from the wing-tip and the lamp glasses.	Refer to Figures 1, 2 and 3 in the Description and Operation Pageblock 33-40-00.
(3)	Remove the two light filaments (if neither OÄM 40-341 nor OÄM 40-369 is installed).	
(4)	Remove the light unit from the wing-tip: - Remove the screws which attach the light unit to the wing-tip. - Carefully move the light unit out from the wing-tip. - Disconnect the one or two connectors from the rear of the light unit. - Move the light unit clear from the airplane.	

B. Install the Light Unit in the Wing-Tip.

	Detail Steps/Work Items	Key Items/References
(1)	Put the light unit in position in the wing-tip and connect the one or two electrical connectors to the rear of the light unit.	
(2)	Install the screws that attach the light unit to the wing-tip.	
(3)	Install the filaments to the light unit (if neither OÄM 40-341 nor OÄM 40-369 is installed).	
	WARNING: DO NOT OPERATE THE STROBE LIGHTS WHEN PERSONS ARE CLOSE TO THE AIRPLANE AND DO NOT LOOK AT THE LIGHT WHEN IT OPERATES. STROBE LIGHTS CAN CAUSE EYE DAMAGE.	
(4)	Do an operational test of the position and strobe lights: - Set the ELECTRIC MASTER key switch to ON. - Set the POSITION and STROBE circuit-breakers closed. - Set the POSITION and STROBE switches to ON.	
(5)	Set the POSITION and STROBE switches to OFF.	
(6)	Set the ELECTRIC MASTER key switch to OFF.	
	WARNING: AFTER YOU SET THE POWER TO OFF, MAKE SURE THAT YOU WAIT A MINIMUM OF FIVE MINUTES BEFORE YOU DO WORK ON THE STROBE LIGHTS. THE POWER SUPPLIES TO THE STROBE LIGHTS GENERATE HIGH VOLTAGE. HIGH VOLTAGE CAN CAUSE DEATH OR INJURY TO PERSONS.	
(7)	Wait for a minimum of 5 minutes and install the lamp glasses and the light unit cover.	

7. Remove/Install a Strobe Power Unit in the Wing-Tip (if OÄM 40-369 is NOT installed)

A. Remove a Strobe Power Unit in the Wing-Tip.

	Detail Steps/Work Items	Key Items/References
(1)	Set the ELECTRIC MASTER key switch to OFF.	
(2)	Set the STROBE switch to OFF and set the STROBE circuit-breaker open.	
	WARNING: AFTER YOU SET THE POWER TO OFF, MAKE SURE THAT YOU WAIT A MINIMUM OF FIVE MINUTES BEFORE YOU DO WORK ON THE STROBE LIGHTS. THE POWER SUPPLIES TO THE STROBE LIGHTS GENERATE HIGH VOLTAGE. HIGH VOLTAGE CAN CAUSE DEATH OR INJURY TO PERSONS.	
(3)	Remove the wing-tip from the wing: - Remove the screws which attach the wing-tip to the wing. - Move the wing-tip just clear of the wing and disconnect the electrical connectors. - Move the wing-tip clear of the airplane.	
(4)	Remove the power unit from the inside of the wing-tip assembly.	Refer to Figures 1, 2 in the Description and Operation Pageblock 33-40-00.

B. Install a Strobe Power Unit in the Wing-Tip.

	Detail Steps/Work Items	Key Items/References
(1)	Install the power unit in the wing-tip.	Refer to Figures 1, 2 in the Description and Operation Pageblock 33-40-00.
(2)	Move the wing-tip close to the wing and connect the electrical connectors.	
(3)	Install the wing-tip onto the wing: - Put the wing-tip into position on the wing. - Install the screws which attach the wing-tip to the wing.	
	WARNING: DO NOT OPERATE THE STROBE LIGHTS WHEN PERSONS ARE CLOSE TO THE AIRPLANE AND DO NOT LOOK AT THE LIGHT WHEN IT OPERATES. STROBE LIGHTS CAN CAUSE EYE DAMAGE.	
(4)	Do an operational test of the position and strobe lights: - Set the ELECTRIC MASTER key switch to ON. - Set the LANDING, TAXI/MAP and STROBE circuit-breakers closed. - Set the POSITION and STROBE switches to ON.	
(5)	Set the POSITION and STROBE switches to OFF.	
(6)	Set the ELECTRIC MASTER key switch to OFF.	

CHAPTER 34
NAVIGATION

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NAVIGATION

1. General

This Chapter tells you about the navigation systems in the airplane. It only tells you about the installation in the airplane. Refer to the equipment manufacturers' manuals for more data about the equipment and refer to the Wiring Diagrams in Chapter 92 for more data about the electrical wiring for the navigation system.

Refer to Section 23-10 and 23-11 for more data about the NAV system which is part of the speech communication system.

The DA 40 NG can have these navigation systems. Refer to these Sections for data about the systems:

Section 34-10. Flight environment data (Pitot-static, OAT, Pressure Switch, flight instruments).

Section 34-20. Attitude and direction with the G1000 system installed (magnetic compass, artificial horizon).

Section 34-21. Attitude and direction with the conventional cockpit installed (magnetic compass, turn&bank indicator, attitude gyro, directional gyro).

Section 34-22. Magnetic compass with the conventional cockpit installed.

Section 34-25. Gyro instruments with the conventional cockpit installed.

Section 34-30. Landing and taxiing aids with the G1000 system installed (localizer, glideslope, marker beacon receiver).

Section 34-31. Landing and taxiing aids with the conventional cockpit installed (localizer, glideslope).

Section 34-40. Independent position determining with the G1000 system installed.

Section 34-41. Stormscope system with the G1000 system installed.

Section 34-50. Dependent positioning determining with the G1000 system installed (VOR/LOC/GS, ADF, DME, transponder, GPS).

Section 34-51. Dependent positioning determining with the conventional cockpit installed (VOR/LOC/GS, transponder).

Section 34-52. VOR/Localizer/Glideslope (VOR/LOC/GS) with the conventional cockpit installed.

Section 34-56. Transponder (XPDR) with the conventional cockpit installed.

NOTE: Equipment which is certified for installation in the DA 40 NG is listed in Chapter 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Chapter 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

2. Description

A. Flight Environment Data

The DA 40 NG has the usual flight environment data systems. It has a Pitot system. The Pitot system has a Pitot probe located under the left wing. The Pitot probe has an electric heater. The heater is controlled by a switch on the left side of the instrument panel, at the bottom. Flexible plastic hoses connect the Pitot probe to the airplane instruments. The static probe of the Pitot system is not used in this installation.

The airplane has a static system. The normal static vents are located on the rear fuselage. An alternate static vent is located in the cockpit, under the instrument panel, on the left side. The pilot opens the alternate static vent by turning a valve on the vent.

The Pitot system and the static system connect to these flight instruments and systems:

- Altimeter.
- Airspeed indicator.
- Pressure switch.

If G1000 is installed:

- Integrated cockpit system (ICS).I

If conventional cockpit is installed:

- Vertical speed indicator.
- Blind altitude encoder.

The DA 40 NG also has an electronic outside air temperature (OAT) indicator. The indicator is integral with the ICS if G1000 is installed. Refer to Section 31-40 for more data about the ICS. The probe for the OAT is located on the right side of the fuselage aft at the co-pilot's step.

B. Attitude and Direction

If G1000 is installed:

The DA 40 NG has a magnetic compass mounted in the instrument panel, on the right side, at the top. The airplane is also equipped with an attitude gyro (artificial horizon) mounted at the top of the instrument panel, centrally arranged.

If the conventional cockpit is installed:

The DA 40 NG can have the following systems:

- Magnetic compass.
- Turn & bank indicator.
- Attitude gyro (horizon).
- Directional gyro.

C. Landing and Taxiing Aids

If G1000 is installed:

The DA 40 NG has a localizer system which is part of the ICS. Refer to Section 31-40 for more data about the landing and taxiing aids which are part of the ICS.

If the conventional cockpit is installed:

The DA 40 NG can have the following system:

- A localizer system which is part of the VOR/LOC/GS system. Refer to Section 34-51 for more data about the VOR/LOC/GS system.

D. Independent Positioning Determining

If G1000 is installed:

The DA 40 NG can have the following system:

- Stormscope system, consisting of stormscope processor and stormscope antenna.

E. Dependent Positioning Determining

If G1000 is installed:

The DA 40 NG has these dependent position determining systems that are integral with the ICS:

- VOR/LOC.
- Global positioning system (GPS).
- Transponder.
- DME.
- ADF.
- Marker beacon receiver.
- Traffic advisory system, consisting of a processor, two antennas and a transponder coupler.

Refer to Section 31-40 for more data about the integrated cockpit system.

If the conventional cockpit is installed:

The DA 40 NG can have the following systems:

- VOR/LOC.
- Transponder.

FLIGHT ENVIRONMENT DATA

1. General

This Section tells you about the Pitot-static system and the OAT sensor.

It also tells you about the OAT indicating system if the conventional cockpit is installed. Refer to the manufacturer's manuals for more data about the equipment.

It does not tell you about the OAT indication which is integral with the ICS, if the G1000 system is installed. Refer to Section 31-40 for more data about the ICS.

Refer to Section 22-10 for information on the static pressure supplied to the autopilot system (if installed).

2. Description

Figure 1 shows the Pitot-static system schematic diagram.

Figure 2 shows the OAT indicator, if the conventional cockpit is installed.

Figure 3 shows the Pressure switch, used in place of a Weight-On-Wheels Switch

Figure 4 shows the equipment locations in the airplane.

A. Pitot-Static System

The Pitot-static system supplies Pitot pressure and static pressure to the air data instruments.

A Pitot probe mounted below the left wing senses Pitot pressure. The static ports on the rear fuselage sense the static pressure. The probe has a heater element to prevent icing. A switch on the instrument panel controls the Pitot heat. A circuit-breaker protects the system.

Flexible hoses connect the Pitot-static probe to the air data instruments. Pitot hoses are green and static hoses are red. Push-fit plastic connectors make the connections in the flexible hoses. T-pieces make junctions in the hoses.

Both Pitot and static hoses have a water trap at the lowest part of the hose-run. T-pieces divide the hose into two-runs. The top run goes directly to the instruments. The bottom run forms a sump before re-joining the top-run at a tee-piece.

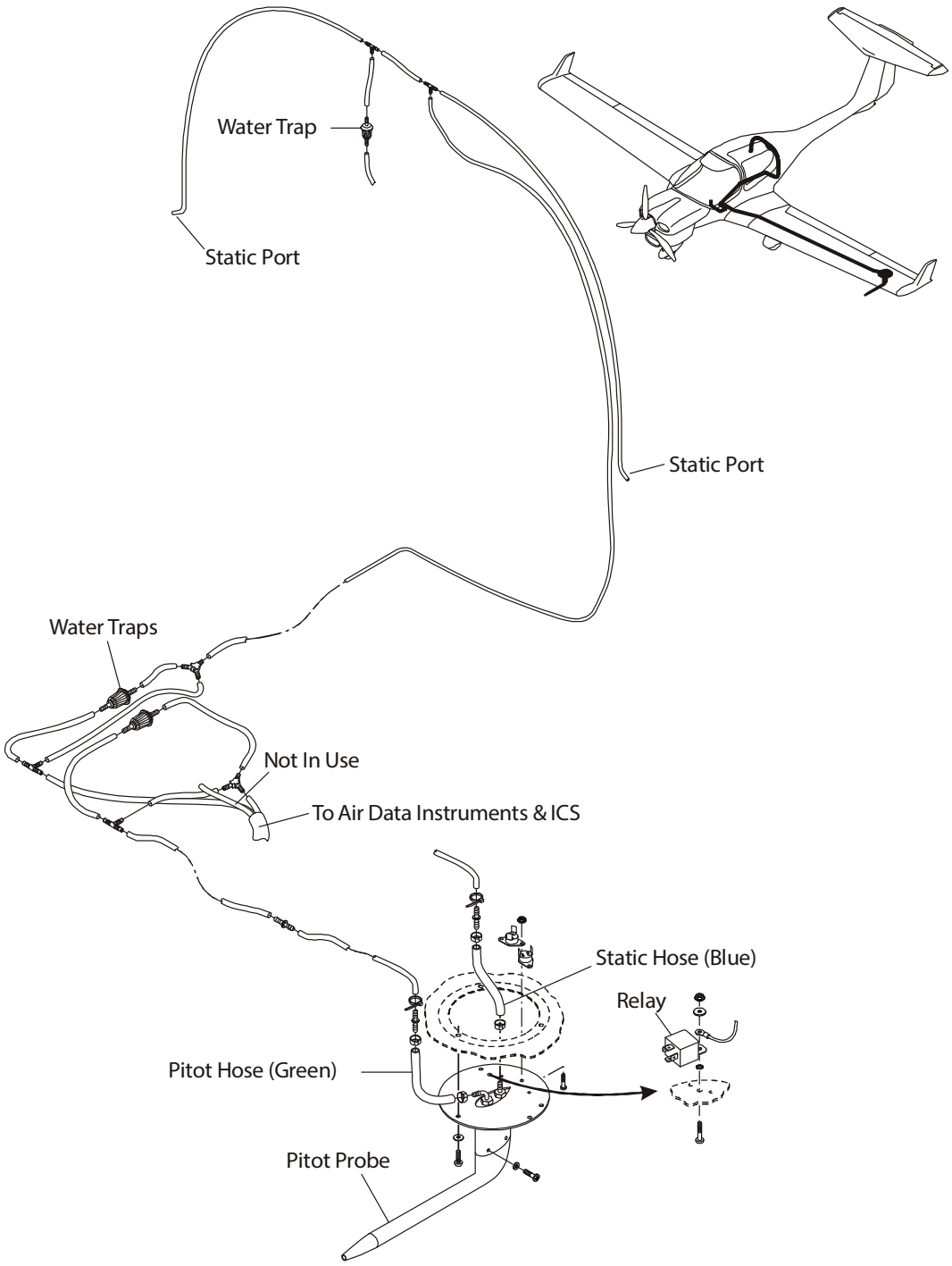

Figure 1 : Pitot-Static System

B. Davtron M803 Digital Chronometer with OAT Indication

Figure 2 shows the Davtron M803 digital chronometer with OAT indication. It is located in the instrument panel, see Chapter 31. Refer to Section 31-20 for the chronometer functions of the unit.

The OAT indicator is a digital instrument, and is included in the Davtron M803 digital chronometer. The indicator operates when the ELECTRIC MASTER key switch is set to ON. The probe for the OAT indicator is located on the right side of the fuselage aft of the co-pilot's step.

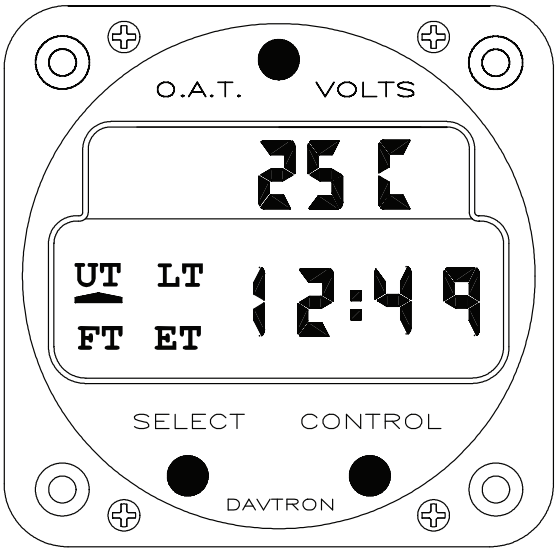

Figure 2 : Davtron M803 Digital Chronometer with OAT Indication

C. MPL 503 Pressure Switch

Figure 3 shows the MPL 503 Pressure Switch. It is located behind the instrument panel, under an I-Panel sheet metal.

The pressure switch is used as a substitute to the weight-on-wheels (WOW) switch. One of the requirements for the Austro engine to perform an ECU test is that the airplane must be on the ground. For the fixed gear DA 40 NG, an air (pressure switch) is used in place of the WOW switch to tell the computer if the aircraft is flying or not.

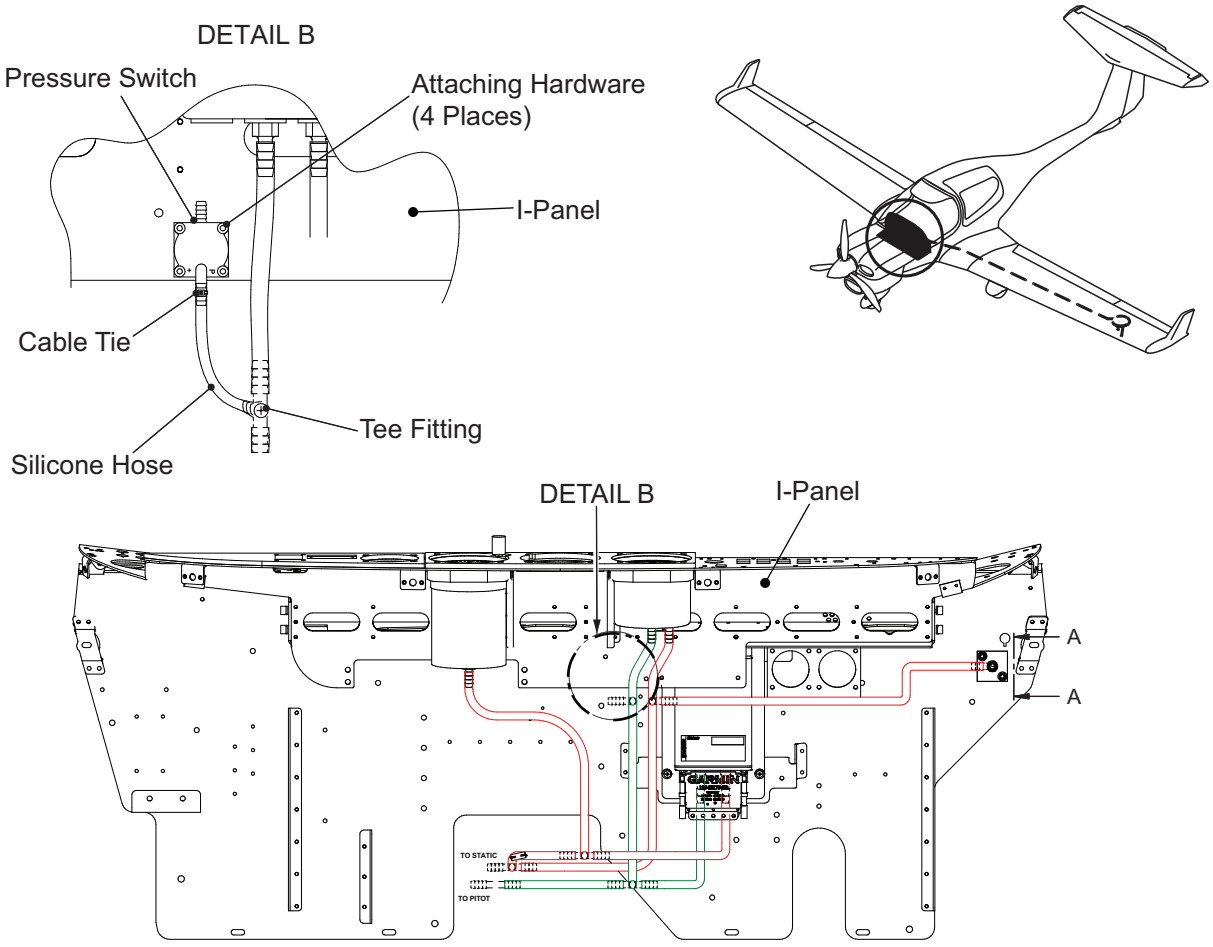

Figure 3 : MPL 503 Pressure Switch

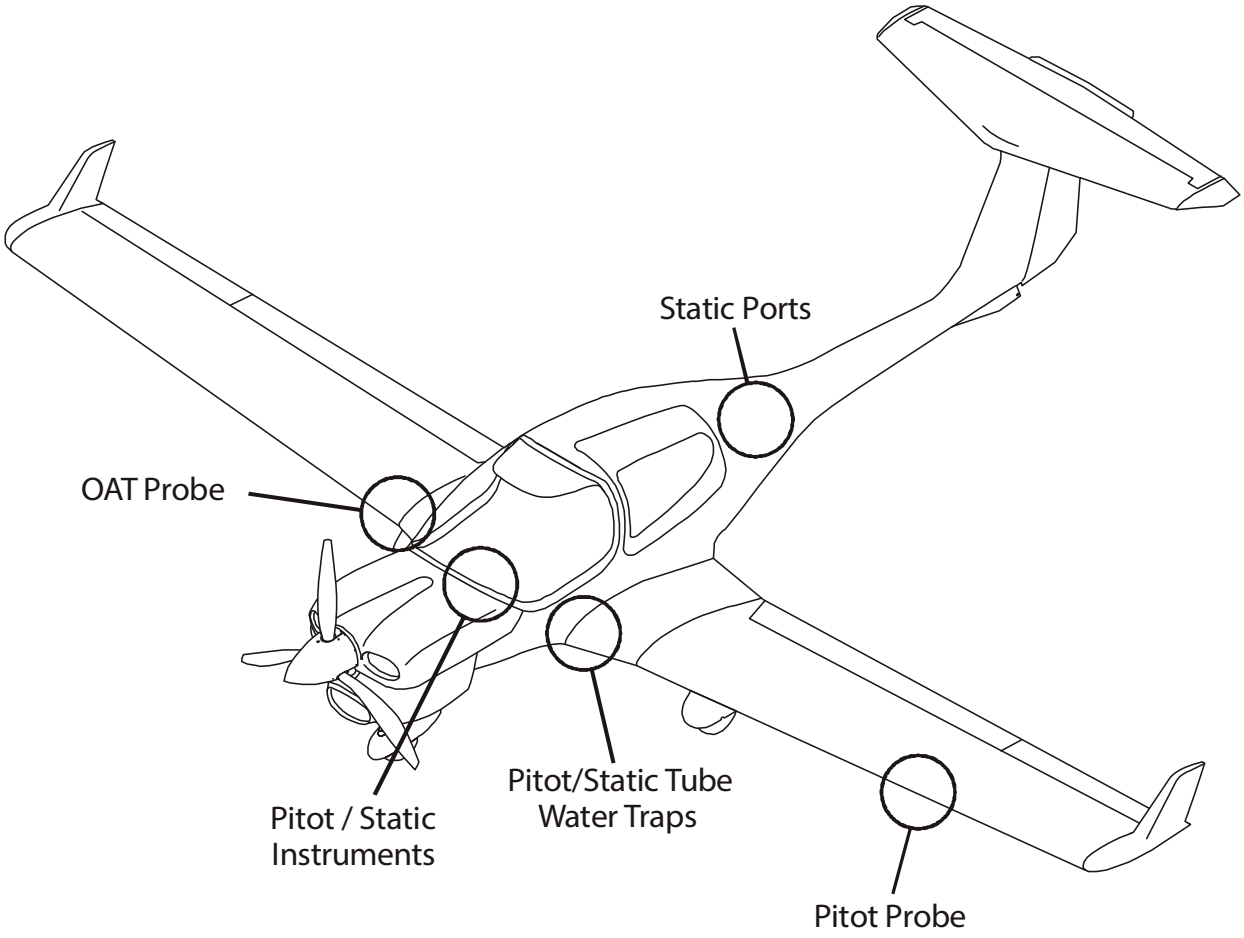

Figure 4 : Component Locations

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TROUBLE-SHOOTING

1. General

The table below lists the defects you could have with the flight environment data system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Altimeter lags or reads incorrectly. VSI reads incorrectly.	Faulty indicator.	Replace the indicator.
	Blocked or kinked static hose.	Clear the hose.
	Water in the system.	Drain the water.
Airspeed indicator reads low.	Faulty indicator.	Replace the indicator.
	Blocked or kinked static hose.	Clear the hose.
	Water in the system.	Drain the water.
Pitot heat does not operate.	Pitot heat circuit-breaker open.	Set the circuit-breaker. If the circuit-breaker opens again, do a test for a short-circuit in the Pitot heat wiring.
	Pitot heat circuit-breaker defective.	Replace the circuit-breaker.
	Pitot heat wiring open-circuit.	Do a continuity test of the wiring. Repair or replace defective wiring.
	Pitot probe defective.	Replace the Pitot probe.
OAT indication (on ICS, if G1000 is installed) incorrect.	OAT probe defective.	Replace the OAT probe.
	OAT circuit-breaker open or defective (if installed).	Set or replace the circuit-breaker (if installed).
The ECU test does not operate correctly.	The pressure switch requires adjustment.	Adjust the pressure switch so that the ECU test operates normally at a simulated airspeed of 35 ± 5 knots.
	The pressure switch is defective.	Replace the pressure switch.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to replace components of the environmental data system. It also tells you how to test the Pitot-static system. Refer to the equipment manufacturers' manuals for more data about the equipment.

2. Remove/Install a Pitot-Static Instrument

A. Remove a Pitot-Static Instrument.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the instrument panel cover.	Refer to Section 25-10.
(2)	Disconnect the Pitot-static hose(s) from the rear of the instrument.	
(3)	Remove the screws which attach the instrument to the panel.	Hold the instrument!
(4)	Remove the instrument from the panel.	

B. Install a Pitot-Static Instrument.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the port cover(s) from the new instrument and fit to the removed instrument.	
(2)	If necessary, transfer the Pitot-static fittings to the new instrument.	
(3)	Put the instrument in position in the panel.	
(4)	Install the screws which attach the instrument to the panel.	
(5)	Connect the Pitot-static hoses to the rear of the instrument.	
(6)	Do a low-range static leak check.	Refer to Paragraph 5.C.
(7)	For the ASI only: - Do a Pitot-static leak check.	Refer to Paragraph 5.
(8)	Install the instrument panel cover.	Refer to Section 25-10.

C. Remove/Install the Davtron M803 Digital Chronometer with OAT Indication.

Refer to Section 31-20.

3. Remove/Install the MPL 503 Pressure Switch

A. Remove the MPL 503 Pressure Switch.

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(1)	Open the EECU A and EECU B circuit breakers.	
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Locate the pressure switch.	The pressure switch is below the I-Panel, behind the instrument panel.
(4)	Disconnect the pressure port connection.	Cut the cable-tie.
(5)	Remove the screws, self-locking nuts and the two washers in the four places that hold the pressure switch in place below the I-Panel.	Hold the pressure switch.
(6)	Remove the pressure switch from below the I-Panel and disconnect the wiring to the pressure switch.	
(7)	Remove the pressure switch from the airplane.	

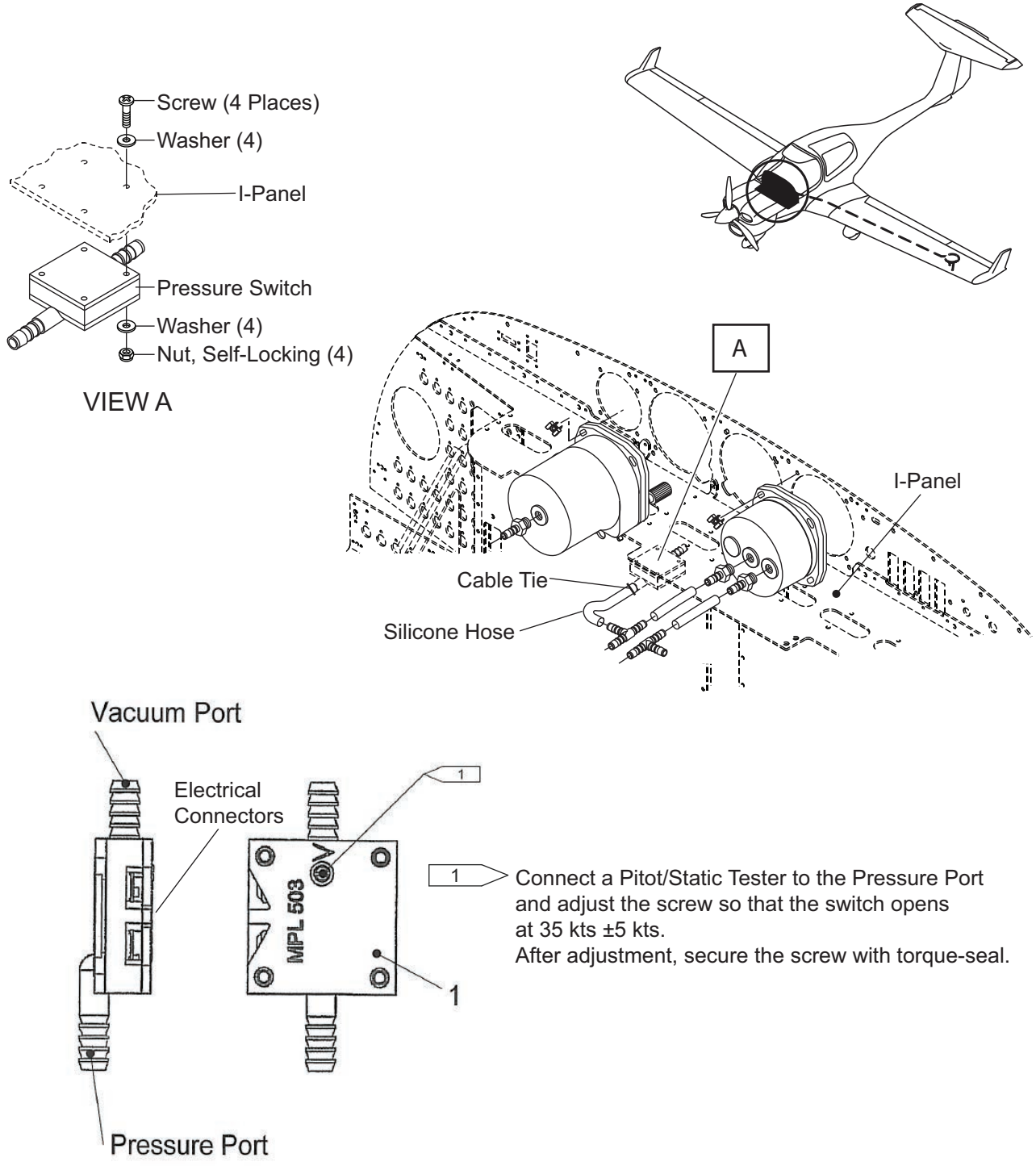

Figure 201 : MPL 503 Pressure Switch - Removal/Installation

B. Install the MPL 503 Pressure Switch.

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the airplane is in the same configuration as it was for the removal procedure	
(2)	Connect the wiring to the pressure switch.	Before installation of the switch under the I-Panel.
(3)	Put the pressure switch in position under the I-Panel and install the screws, self-locking nuts and the two washers in the four places that hold the pressure switch in place.	Install new self-locking nuts.
(4)	Connect the pressure port connection.	Secure the tube with a cable-tie.
(5)	Install the instrument panel cover.	Refer to Section 25-10.
(6)	Close the EECU A and EECU B circuit breakers.	
(7)	Do a low-range static leak test.	Refer to Paragraph 5.C.
(8)	Do a Pitot-static leak test.	Refer to Paragraph 5.
(9)	Perform a functional test of the MPL 503 pressure switch.	Refer to Para 3.C.

C. Functional Test of the MPL 503 Pressure Switch.

	Detail Steps/Work Items	Key Items/References
(1)	Connect a Pitot-static tester to the pitot probe.	
	WARNING: **DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. WHEN THE ENGINE RUNS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS.**	
(2)	Do an engine ground run.	Refer to the Airplane Flight Manual.
(3)	At the Pitot-static tester, simulate an airspeed of over 40 KIAS.	
(4)	With the voter in the AUTO position, press the ECT Test Button. - Make sure that The ECU Test does not start.	
(5)	At the Pitot-static tester, decrease the simulated airspeed to between 25-30 KIAS.	
(6)	With the voter in the AUTO position, press the ECT Test Button. - Make sure that the ECU Test operates normally.	
(7)	If the ECU Test fails to operate normally between 25-30 KIAS, adjust or replace the pressure switch.	Refer to Para 3.D. to Adjust the pressure switch. Refer to Para 3.A. and 3.B. to replace the pressure switch.
(8)	Do an engine shut-down after the ground run	Refer to the Airplane Flight Manual.
(9)	Remove the test equipment from the airplane.	

D. Adjust the MPL 503 Pressure Switch.

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(1)	Connect a Pitot-static tester to the pitot probe.	
(2)	Adjust the pressure switch	There is a hole through the I-Panel on top of the switch that will permit access to the adjustment screw.
(3)	Adjust the simulated airspeed past 35 kts.	
(4)	Adjust the screw so that the switch opens at a simulated airspeed of 35 kts ±5kts.	
(5)	After adjustment, secure the screw with torque-seal.	
(6)	Do a functional Test of the MPL 503 Pressure Switch	Refer to Para 3.C.

4. Remove/Install the Pitot-Static Probe

A. Remove the Pitot-Static Probe.

	Detail Steps/Work Items	Key Items/References
(1)	Open the PITOT circuit-breaker.	Lower left instrument panel.
(2)	Remove the Pitot access panel from the lower surface of the wing.	Refer to Section 52-40.
(3)	Move the probe down to give access to the connections.	
(4)	Disconnect the electrical connector.	
(5)	Disconnect the Pitot and static hose connections.	Identify the connections and put caps on the hoses.
(6)	Disconnect the bonding cable.	
(7)	Move the Pitot-static probe clear of the airplane.	

B. Install the Pitot-Static Probe.

	Detail Steps/Work Items	Key Items/References
(1)	Put the Pitot probe in position on the wing.	
(2)	Install the attaching screws and connect the bonding cable.	
(3)	Connect the Pitot and static hoses.	Remove the caps from the hoses. Make sure that you connect the hoses to the correct locations.
(4)	Connect the electrical connector.	
(5)	Install the Pitot access panel to the lower surface of the wing.	
(6)	Do a test of the Pitot heat system.	

	Detail Steps/Work Items	Key Items/References
(7)	Do a low-range static leak test.	Refer to Paragraph 5.C.
(8)	Do a Pitot-static leak test.	Refer to Paragraph 5.
(9)	Install a cap with a red pennant on the Pitot-static probe.	

5. Pitot and Static System Leak Tests

Always do a Pitot leak-test after you do maintenance on the Pitot system. And always do a low-range static leak-test after you do maintenance on the static system.

CAUTION: OBEY THE FOLLOWING PRECAUTIONS WHEN YOU DO A PITOT OR STATIC LEAK-TEST. IF YOU DO NOT OBEY THE PRECAUTIONS YOU CAN DAMAGE THE AIR DATA INSTRUMENTS.

A. Test Precautions.

- The pressure in the Pitot system must always be equal to (or greater than) the pressure in the static system.
- Reversal of the Pitot and static pipes can cause damage to the air data instruments.
- The applied pressure (and rate of change of pressure) must not be greater than the design limits of the equipment which you will test.
- After doing the test, you must always return the system to its usual operating conditions.

B. Equipment.

Item	Quantity	Part Number
Pitot-static probe adaptor.	1	PS 49742M-3-4 or equivalent.
Pitot-static leak tester.	1	Commercial.
Static port adaptor.	2	SKA 100-4.

C. Low Range Static Leak Test.

Follow the test equipment manufacturer's instructions for the use of the test-set. Obey the safety precautions for Pitot-static leak-testing at all times!

	Detail Steps/Work Items	Key Items/References
	CAUTION: IF INSTALLED, THE G1000 CONFIGURATION MODE CONTAINS CERTAIN PAGES AND SETTINGS THAT ARE CRITICAL TO AIRPLANE OPERATION AND SAFETY. THESE PAGES ARE PROTECTED AND CANNOT BE MODIFIED, UNLESS THE TECHNICIAN IS PROPERLY AUTHORIZED AND EQUIPPED. HOWEVER, MOST PROTECTED PAGES ARE VIEWABLE TO ALLOW SYSTEM AWARENESS FOR TROUBLE-SHOOTING.	
(1)	Remove the blanking cap from the Pitot static probe and connect the Pitot-static leak tester to the probe.	Use the test set adaptor
(2)	Make sure that the alternate static port is fully closed.	Under the instrument panel, left side.
(3)	Remove the aft baggage compartment.	Refer to Section 25-10.
(4)	Block the static line.	At the water trap on top of the fuselage.
(5)	If installed, prepare the G1000 system for the test: - Allow the unit to warm up for 15 minutes before performing the following tests. - Start the G1000 system in Normal Mode. - Remove power to the PFD. - Turn the PFD on in Configuration Mode by pressing and holding the ENT key on the PFD while applying power. - Release the ENT key after INITIALIZING SYSTEM appears on the upper left corner of the PFD. - Using the outer FMS knob on the PFD turn to the GRS page group, use the B ALT field for all CFR Part 43 Appendix E tests for G1000 altitude. - Place the MFD in Reversionary Mode by pressing the red DISPLAY BACKUP button on the GMA 13XX Audio Panel. Baro settings can then be read from the MFD for the CFR Part 43 Appendix E tests.	Only required for airplanes for which 14 CFR §91.411 and 14 CFR §91.411 Part 43 Appendix E is applicable.

	Detail Steps/Work Items	Key Items/References
(6)	Apply a partial vacuum to the static port until you get a pressure altitude of 1000 ft above the ambient pressure altitude.	Note the altitude.
(7)	Let the pressure stabilize.	
(8)	Stop the Pitot-static leak-tester.	
(9)	Monitor the system pressure.	The system pressure loss must not be more than 100 ft/min.
(10)	Compare the test equipment altimeter and the airplane altimeter.	The indication error must be less than shown in Table 1 below.
(11)	If installed, return both the MFD and PFD to Normal Mode.	Only required for airplanes for which 14 CFR §91.411 and 14 CFR §91.411 Part 43 Appendix E is applicable.
(12)	Disconnect the Pitot-static probe adaptor and install a blanking cap, with pennant, onto the airplane Pitot static probe.	
(13)	Remove the blockage of the static line.	At the water trap on top of the fuselage.
(14)	Install the aft baggage compartment.	Refer to Section 25-10.

Table 1 : Altimeter Indication Error

Altitude	Allowable Error
-1,000 ft*	±20 ft*
Sea Level	±20 ft
4,000 ft	±35 ft
8,000 ft	±60 ft
12,000 ft	±90 ft
16,000 ft	±110 ft
20,000 ft	±130 ft

* Only required for airplanes for which 14 CFR §91.411 and 14 CFR §91.411 Part 43, Appendix E is applicable.

D. Pitot Test.

Follow the test equipment manufacturer's instructions for the use of the test-set. Obey the safety precautions for Pitot-static leak-testing at all times!

	Detail Steps/Work Items	Key Items/References
(1)	Connect the Pitot-static leak-tester to the Pitot probe.	
(2)	Apply a pressure to the Pitot port equal to 150 kts.	
(3)	Let the pressure stabilize.	
(4)	Stop the Pitot-static leak-tester.	
(5)	Monitor the system pressure	The leak rate must not be more than 10 kts/min.
(6)	Compare the test-equipment ASI and the airplane ASI.	The indication error must be less than shown in Table 2 below.

Table 2 : ASI Indication Error

Airspeed	Allowable Error
160 kts	±4 kts
100 kts	±4 kts
40 kts	±1.7 kts

6. Clean the Pitot System and the Static System

CAUTION: OBEY THE FOLLOWING PRECAUTIONS WHEN YOU CLEAN THE PITOT STATIC SYSTEM. IF YOU DO NOT OBEY THE PRECAUTIONS YOU CAN DAMAGE THE AIR DATA INSTRUMENTS.

A. Precautions.

- Never apply pressurized air to the air data instruments. Always apply compressed air to the hoses from the inboard end to the outboard end.
- Do not apply excessive pressure (above 1 bar/14.5 PSI) to the Pitot and static hoses.
- Do not use compressed air without an oil separator.
- Reversal of the Pitot and static hoses can cause damage to the air data instruments.
- After cleaning the system, you must always return the system to usual operating conditions.

B. Equipment.

Item	Quantity	Part Number
Compressed air equipment with oil separator and pressure regulator.	1	Commercial

C. Cleaning Procedure.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Remove the pilot's seat.	Refer to Section 25-10.
(4)	Remove the aft baggage compartment.	
(5)	Disconnect the Pitot static hoses from the rear of the backup instruments.	
(6)	Disconnect the Pitot static hoses from the air data computer (ADC), if G1000 is installed or from all pneumatic instruments, if the conventional cockpit is installed.	

	Detail Steps/Work Items	Key Items/References
(7)	Disconnect the Pitot static hoses from the water traps.	Two under the pilot’s seat.
(8)	Blow compressed air through each of the Pitot static hoses from the inboard end to the outboard end.	Maximum pressure: 1 bar (14.5 PSI).
(9)	Check the water traps for dirt. Replace if necessary.	
(10)	Reconnect the Pitot static hoses to the water traps.	Two under the pilot’s seat.
(11)	Reconnect the Pitot static hoses to the Pitot probe	
(12)	Reconnect the Pitot static hoses to the air data computer (ADC), if G1000 is installed or to the pneumatic instruments, if the conventional cockpit is installed.	
(13)	Reconnect the Pitot static hoses to the rear of the backup instruments.	
(14)	Do a low-range static leak test.	Refer to Paragraph 5.C.
(15)	Do a Pitot static leak test.	Refer to Paragraph 5.
(16)	Install the pilot's seat.	Refer to Section 25-10.
(17)	Install the instrument panel cover.	Refer to Section 25-10.

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ATTITUDE AND DIRECTION

WITH G1000 SYSTEM INSTALLED

1. General

This Section tells you about the attitude and direction systems with the Garmin G1000 system installed. The main attitude and direction systems are integral with the Integrated Cockpit System (ICS). Refer to Section 31-40 for more data about the ICS.

The DA 40 NG has the usual magnetic compass. The magnetic compass is installed in the instrument panel at the top, on the right-hand side. There is also an artificial horizon installed in the instrument panel at the top, arranged centrally.

There can also be an optional standby attitude module (MD302) installed in the instrument panel at the top, arranged centrally.

2. Description and Operation

A. Magnetic Compass

The magnetic compass shows the heading of the airplane related to magnetic north. Fluid in the compass bowl gives damping. Each graduation of the compass is 5°.

A compass deviation card is located next to the compass on the instrument panel. You must do a test for the correct operation of the compass (compass swing).

- After replacing a major component.
- After replacing the compass.
- After a major modification to the airplane.
- After a lightning strike has been reported.
- If the airplane has been parked for more than 90 days.

B. Attitude Gyro (Artificial Horizon)

The artificial horizon is an electrically-powered gyroscopic instrument. It operates when the essential bus is powered and the HORIZON circuit-breaker is closed. It can also receive power from the emergency battery, see Section 24-32. A warning flag drops into view to indicate that the gyro motor is not receiving sufficient power to operate.

The artificial horizon incorporates a moving display that simulates the earth's horizon and provides the pilot with a real time visual indication of the airplane pitch and roll attitude relative to the indicator symbolic airplane. The instrument can function as a primary or standby indicator.

The attitude gyro incorporates pitch and roll displays that are mechanically linked to a spinning mass gyroscope. The horizon bar moves behind the symbolic airplane. Precession error is corrected by the internal erection system or by pulling the PULL TO CAGE knob.

The artificial horizon employs an efficient electrically driven internal vertical gyroscope assembly incorporating a special air erection mechanism. This mechanism simultaneously erects the pitch and roll axes of the gyroscope. Movement of the airplane generates a reaction of the display that simulates the visual reference seen by the pilot when looking outside at the earth's true horizon line.

C. Standby Attitude Module, MD302.

Refer to Figure 1.

The model MD302 series SAM® Standby Attitude Module is a self-contained situational awareness instrument that provides airplane attitude, altitude, airspeed, and slip indication.

The MD302 provides critical flight and situational data to the pilot and crew under any circumstances likely to encounter. The design is built around a solid-state electronic sensor array for high reliability. The main airplane power to the MD302 is from the 3 amp HORIZON circuit breaker on the ESS BUS. Emergency battery power installed in the instrument panel is provided to the MD 302 through the horizon emergency switch, just to the left of the unit.

The dual, high-resolution liquid crystal display uses smooth graphics, daylight-readable brightness and a configurable lighting response curve to ensure optimal visibility in all conditions. The left side of the display of the Standby Attitude Module MD302 represents the attitude indicator.

The background of the display consists of the representative white horizon line separating the ‘sky’ (blue) and ‘ground’ (brown).

The roll scale depicted as an arc of graduations representing bank angles of 0 (triangle), 10, 20, 30, 45 (small triangle) and 60. The roll scale can be configured during installation to be fixed to the sky/horizon or fixed to the top of the display.

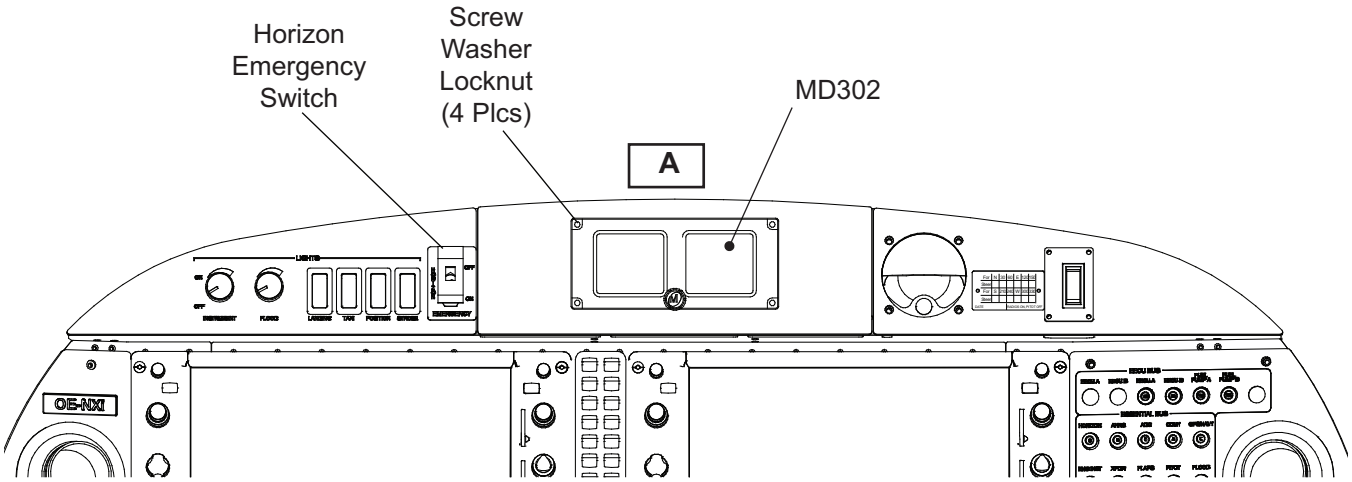
The roll pointer is the triangle just below the roll scale and represents the airplane in relation to its bank angle. It is configured, by definition, to operate conversely to the roll scale behavior. That is, a rotating scale produces a fixed roll pointer and a fixed roll scale produces a rotating roll pointer.

The pitch scale is depicted as a series of graduations representing pitch angles of every 5°, with every 10° graduation extended and numbered.

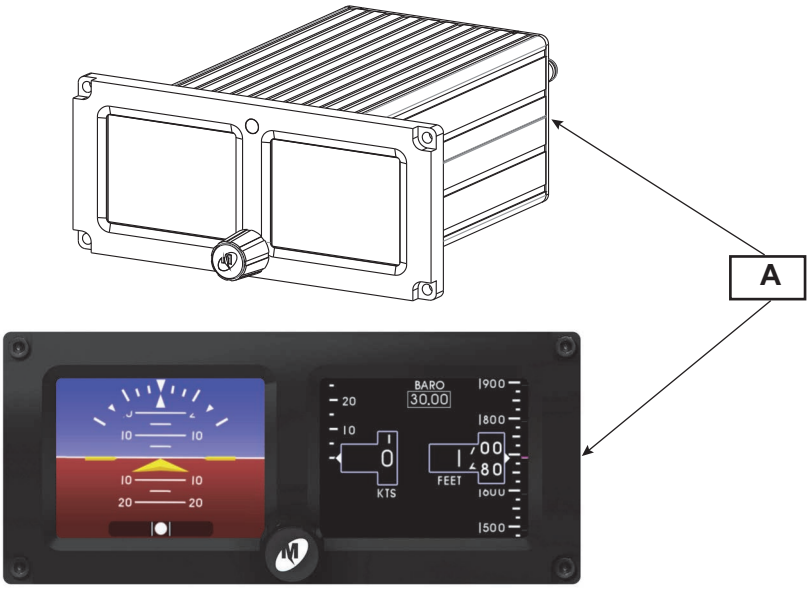
The symbolic airplane will always remain in the center of the display, with the background elements moving behind it to represent the airplane’s relative position.

Refer to the Mid-Continent ® Installation Manual and Operating Instructions for more information of the Model MD302 Standby Attitude Module.

For Trouble-Shooting of the MD302 Standby Attitude Module, refer to the Mid-Continent ® Installation Manual and Operating Instructions



Standby Attitude Module, MD302



Flight Mode

Figure 1 : Standby Attitude Module, MD302

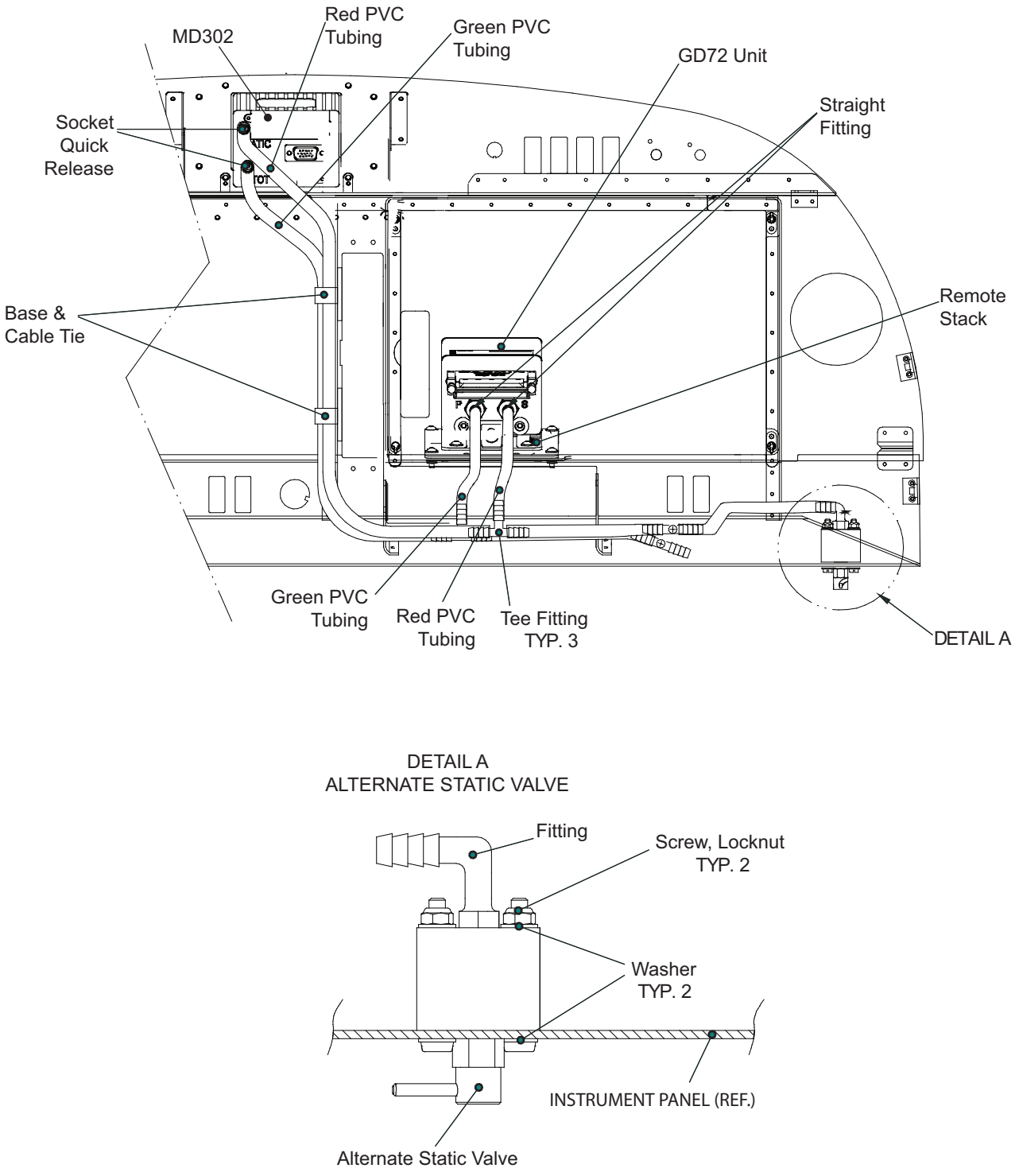


Figure 2 : Standby Attitude Module, MD302 - (Back of Instrument Panel)

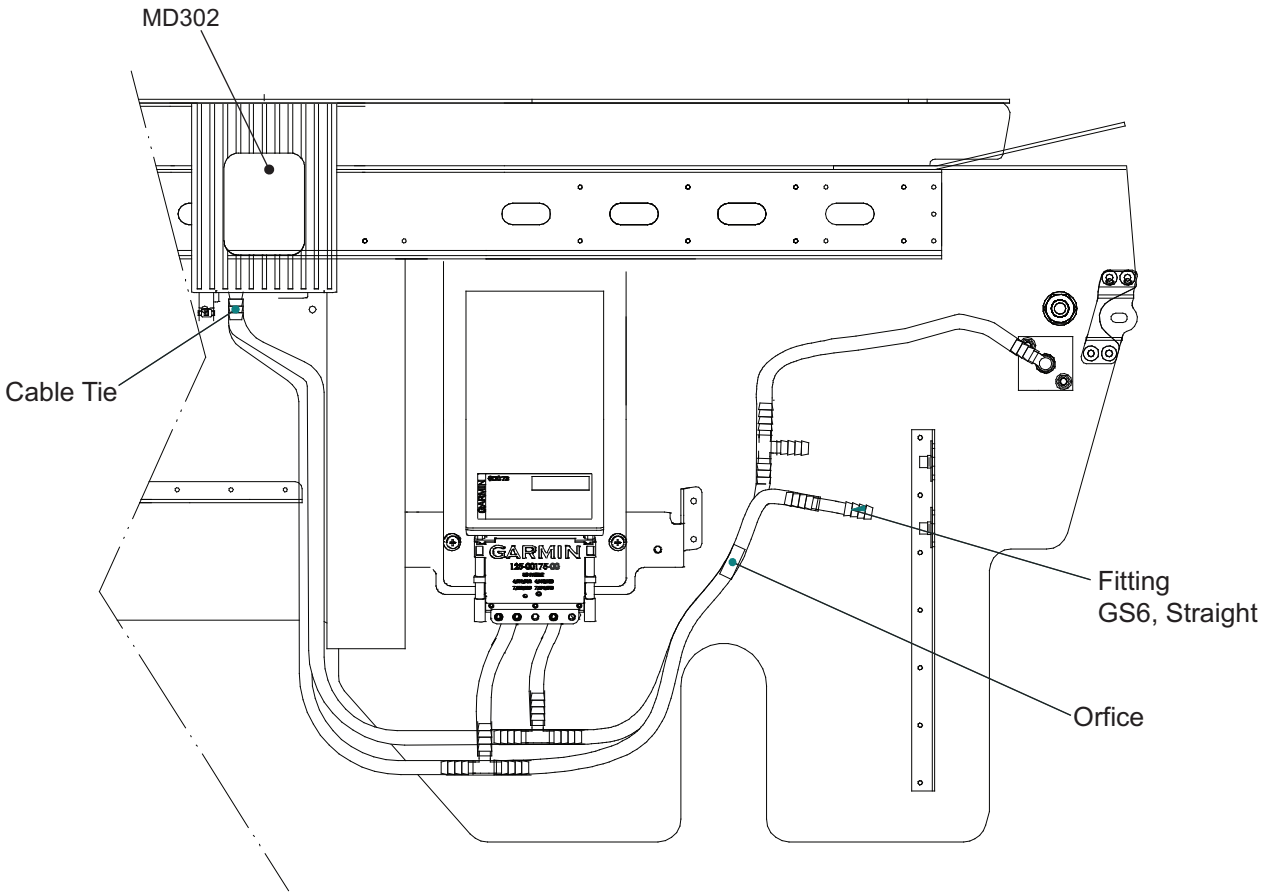


Figure 3 : Standby Attitude Module, MD302 - (Back of Instrument Panel)

TROUBLE-SHOOTING

1. General

The tables below lists the defects you could have with the magnetic compass and the attitude gyro.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

A. Magnetic Compass.

Trouble	Possible Cause	Repair
Magnetic compass damping fluid leaking.	Defective compass housing.	Replace the compass.
Compass deviation of more than 10°.	Residual magnetism of a metal component in the airplane.	Do a test for residual magnetism using a hand-held compass. If necessary, degauss the component.
	Defective compass.	Replace the compass.
	Compass out of calibration.	Do a compass swing.

B. Attitude Gyro (Artificial Horizon).

Trouble	Possible Cause	Repair
Warning flag in view.	HORIZON circuit-breaker open or defective.	Close or replace the circuit-breaker.
Indication of instrument not reliable.	Power supply wiring defective.	Do a test for the correct voltage at the instrument. Repair the power supply wiring/connector.
	Ground connection defective.	Do a test for correct ground connection. Repair the ground wiring/connector.
	Instrument defective.	Replace the instrument.
Instrument is sluggish.	Mechanism worn or dirty.	Replace the instrument.

C. Standby Attitude Module, MD302

For Trouble-Shooting of the MD302 Standby Attitude Module, refer to the Mid-Continent ® Installation Manual and Operating Instructions, Section 5.1.4.

MAINTENANCE PRACTICES

1. General

This Section tells you how to remove/install the magnetic compass as well as the attitude gyro (artificial horizon) and the standby attitude module. It also tells you how to test and adjust the magnetic compass (compass swing).

2. Remove/Install the Magnetic Compass

A. Remove the Magnetic Compass.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	Instrument panel, left side.
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Disconnect the electrical cables.	
(4)	Remove the four screws that attach the compass to the instrument panel.	Hold the compass!
(5)	Move the compass forward and clear of the instrument panel.	Remove and discard the compass deviation table in the compass card holder.

B. Install the Magnetic Compass.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	Instrument panel, left side.
(2)	Move the magnetic compass into position at the instrument panel.	Hold the compass in position.
(3)	Install the four screws that attach the compass to the instrument panel.	
(4)	Connect the electrical cables.	
(5)	Install the instrument panel cover.	Refer to Section 25-10.
(6)	Do a compass swing.	Refer to Paragraph 3.

3. Test/Adjust the Magnetic Compass (Compass Swing)

You must do a test for correct operation of the compass (compass swing):

- After replacing a major component.
- After replacing the compass.
- After a major modification to the airplane.
- After a lightning strike has been reported.
- If the airplane has been parked for more than 90 days.

CAUTION: USE ONLY NON-MAGNETIC TOOLS TO ADJUST THE COMPASS. METALLIC OBJECTS NEAR THE COMPASS CAN CAUSE ERRORS.

CAUTION: DO NOT WEAR OR CARRY METALLIC OBJECTS (WATCHES, BRACELETS ETC) WHEN YOU ADJUST THE COMPASS COMPENSATING MAGNETS OR OPERATE THE LAND COMPASS. METALLIC OBJECTS NEAR THE COMPASS CAN CAUSE ERRORS.

NOTE: If possible, use a compass swing area that has been tested for magnetic interference. In any case, you must use a level area that is away from metal structures, underground pipes, reinforced concrete, other airplane and ground servicing equipment.

Do the compass swing when the wind is less than 15 kts. A compass swing is not satisfactory with a wind of 15 kts or more.

A. Equipment.

Item	Quantity	Part Number
Calibrated land compass.	1	Commercial

B. Compass Swing.

	Detail Steps/Work Items	Key Items/References
(1)	Adjust the compensating magnets in the compass to a neutral position.	Refer to the compass manufacturer's instructions.
(2)	Start the engine and set all electrical loads to ON.	Refer to the Airplane Flight Manual.
(3)	Use a calibrated and reliable land compass to make sure of the airplane heading.	
(4)	Use the land compass to align the airplane to magnetic north.	Adjust the N-S compensator magnet so that the airplane compass indicates a heading of 0°.
(5)	Use the land compass to align the airplane to magnetic east.	Adjust the E-W compensator magnet so that the airplane compass indicates a heading of 90°.
(6)	Use the land compass to align the airplane to magnetic south.	Adjust the N-S compensator magnet to remove half of the error between the indicated heading and 180°.
(7)	Use the land compass to align the airplane to magnetic west.	Adjust the E-W compensator magnet to remove half of the error between the indicated heading and 270°.
(8)	Turn the airplane through 360°, record the deviation at each 30° radial. Prepare a deviation table that shows the corrections that must be applied to each of the 30° radials.	If large deviations occur when you operate electrical equipment/systems, the deviation table must also show the corrections to apply to each 30° radial when that particular equipment/system is operating.
(9)	Install the new deviation table in the compass card holder next to the compass.	

4. Remove/Install the Attitude Gyro (Artificial Horizon)

CAUTION: GYROS ARE DELICATE AND CAN NOT WITHSTAND THE SHOCK OF BEING DROPPED, JARRED OR STRUCK BY PIECES OF EQUIPMENT. DO NOT PLACE GYROS ON ANY HARD SURFACE. PAD WITH GENEROUS FOAM.

A. Precautions,

- To prevent damage to a gyro, the instrument should be transported to and from the airplane in its original shipping container. If this is impractical, the gyro should be hand carried carefully in an upright position.

- A gyro should never be removed while it is spinning or running down. The instrument normally operates at high RPM and may take 10 minutes or longer to run down. If it is removed while running and tilted more than 20 degrees, the gyro can develop a gimbal lock. The gimbal will tumble and start to spin. If gimbal lock occurs while the rotor is turning, the gimbal may spin fast enough to damage the gimbal bearings, requiring overhaul.

- A malfunctioning gyro should be handled with the same care given a new instrument. Most malfunctioning instruments can be repaired and returned to service. Using proper handling procedures during removal prevents additional damage and helps ensure possible reuse.

B. Remove the Attitude Gyro.

	Detail Steps/Work Items	Key Items/References
(1)	Pull open the HORIZON circuit-breaker.	Instrument panel, right side.
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Dis-connect the connector at the rear of the instrument.	
(4)	Remove the screws which attach the instrument to the instrument panel.	Hold the instrument!
(5)	Remove the attitude gyro from the instrument panel.	Handle the attitude gyro with care.

C. Install the Attitude Gyro.

	Detail Steps/Work Items	Key Items/References
(1)	Insert the attitude gyro into the instrument panel cutout.	Upper instrument panel, arranged centrally.
(2)	Install the screws which attach the instrument to the instrument panel.	
(3)	Connect the connector at the rear of the instrument.	
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Close the HORIZON circuit-breaker.	Instrument panel, right side.

5. Remove/Install the Standby Attitude Module, MD302

A. Remove the Standby Attitude Module, MD302

Refer to Figures 1, 2 and 3 in the Description and Operation Pageblock 34-20-00.

	Detail Steps/Work Items	Key Items/References
(1)	Open the HORIZON circuit breaker on the ESS BUS.	
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Disconnect the electrical connector at the back of the standby attitude module.	
(4)	Disconnect the red PVC tubing at the quick release socket at the rear of the standby attitude module.	This is the static connection to the standby attitude module. Put air tight caps on the connections. (On both the standby attitude module and the tubing to the standby attitude module.)
(5)	Disconnect the green PVC tubing at the quick release socket at the rear of the standby attitude module.	This is the pitot connection to the standby attitude module. Put air tight caps on the connections. (On both the standby attitude module and the tubing to the standby attitude module.)
(6)	At the front of the instrument panel remove the four screws, washers and locknuts which attach the standby attitude module to the instrument panel.	Hold the standby attitude module.
(7)	Move the standby attitude module out of the instrument panel and remove it from the airplane.	

B. Install the Standby Attitude Module, MD302

Refer to Figures 1, 2 and 3 in the Description and Operation Pageblock 34-20-00.

	Detail Steps/Work Items	Key Items/References
(1)	Move the standby attitude module into its position in the instrument panel.	
(2)	Install the four screws, washers and locknuts which attach the standby attitude module to the instrument panel.	Apply LOCTITE 222 onto the screw threads.
(3)	Remove the air tight caps from the tubing connections and the standby attitude module.	
(4)	Connect the green PVC tubing at the quick release socket to the rear of the standby attitude module.	This is the pitot connection to the standby attitude module.
(5)	Connect the red PVC tubing at the quick release socket to the rear of the standby attitude module.	This is the static connection to the standby attitude module.
(6)	Connect the electrical connector to the rear of the standby attitude module.	
(7)	Install the instrument panel cover.	Refer to Section 25-10.
(8)	Close the HORIZON circuit-breaker on the ESS BUS.	
(9)	Do a Pitot and Static System Leak Test.	Refer to Para 4 in the Maintenance Practices Pageblock 34-10-00.
(10)	Do an Operational Check of the Standby Attitude Module, MD302.	Refer to the Section 3 of the Mid-Continent ® Installation Manual and Operating Instructions.

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ATTITUDE AND DIRECTION

WITH CONVENTIONAL COCKPIT INSTALLED

1. General

This Section tells you about the equipment which shows attitude and flight direction.

Refer to these Sections for data about the systems:

Section 34-22. Magnetic compass.

Section 34-25. Gyro instruments (turn & bank indicator, attitude gyro (artificial horizon), directional gyro).

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MAGNETIC COMPASS

WITH CONVENTIONAL COCKPIT INSTALLED

1. General

This Section tells you about the magnetic compass which is used to show airplane flight direction. Refer to the manufacturer's manuals for more data about the magnetic compass.

2. Description and Operation

The magnetic compass shows the heading of the airplane related to magnetic north. Fluid in the compass bowl gives damping. Each graduation of the compass is 5°.

A compass deviation card attaches to the compass. Compensating magnets for compass adjustment are located behind the deviation card holder. The compass lighting comes on when the instrument light potentiometer is switched on.

You must do a test for correct operation of the compass (compass swing):

- After replacing a major component.
- After replacing the compass.
- After modification to the airplane.
- After a lightning strike has been reported.
- If the airplane has been parked for more than 90 days

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TROUBLE-SHOOTING

1. General

The table below lists the defects you could have with the magnetic compass.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Magnetic compass damping fluid leaking.	Defective compass housing.	Replace the compass.
Compass deviation of more than 10°.	Residual magnetism of a metal component in the airplane.	Do a test for residual magnetism using a hand-held compass. If necessary, degauss the component.
	Defective compass.	Replace the compass.
	Compass out of calibration.	Do a compass swing. Refer to the Maintenance Practices in this Section.

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MAINTENANCE PRACTICES

1. General

This Section tells you how to remove/install the magnetic compass . It also tells you how to test and adjust the magnetic compass (compass swing).

2. Remove/Install the Magnetic Compass

A. Remove the Magnetic Compass.

	Detail Steps/Work Items	Key Items/References
(1)	Disconnect the electrical plug for the compass light.	
(2)	Remove the screws which attach the compass to the glare shield.	Hold the compass!
(3)	Remove the compass from the airplane.	

B. Install the Magnetic Compass.

	Detail Steps/Work Items	Key Items/References
(1)	Put the compass in position on the glare shield.	
(2)	Install the screws which attach the compass to the glare shield.	
(3)	Connect the electrical plug for the compass light.	
(4)	Do a compass swing.	Refer to Paragraph 3.

3. Test/Adjust the Magnetic Compass (Compass Swing)

You must do a test for correct operation of the compass (compass swing):

- After replacing a major component.
- After replacing the compass.
- After a major modification to the airplane.
- After a lightning strike has been reported.
- If the airplane has been parked for more than 90 days.

CAUTION: USE ONLY NON-MAGNETIC TOOLS TO ADJUST THE COMPASS. METALLIC OBJECTS NEAR THE COMPASS CAN CAUSE ERRORS.

CAUTION: DO NOT WEAR OR CARRY METALLIC OBJECTS (WATCHES, BRACELETS ETC) WHEN YOU ADJUST THE COMPASS COMPENSATING MAGNETS OR OPERATE THE LAND COMPASS. METALLIC OBJECTS NEAR THE COMPASS CAN CAUSE ERRORS.

NOTE: If possible, use a compass swing area that has been tested for magnetic interference. In any case, you must use a level area that is away from metal structures, underground pipes, reinforced concrete, other airplane and ground servicing equipment.

Do the compass swing when the wind is less than 15 kts. A compass swing is not satisfactory with a wind of 15 kts or more.

NOTE:

A. Equipment.

Item	Quantity	Part Number
Calibrated land compass.	1	Commercial

B. Compass Swing.

	Detail Steps/Work Items	Key Items/References
(1)	Adjust the compensating magnets in the compass to a neutral position.	
(2)	Start the engine and set all electrical loads to ON.	Refer to the Airplane Flight Manual.
(3)	Use a calibrated and reliable land compass to make sure of the airplane heading.	
(4)	Use the land compass to align the airplane to magnetic north.	Adjust the N-S compensator magnet so that the airplane compass indicates a heading of 0°.
(5)	Use the land compass to align the airplane to magnetic east.	Adjust the E-W compensator magnet so that the airplane compass indicates a heading of 90°.
(6)	Use the land compass to align the airplane to magnetic south.	Adjust the N-S compensator magnet to remove half of the error between the indicated heading and 180°.
(7)	Use the land compass to align the airplane to magnetic west.	Adjust the E-W compensator magnet to remove half of the error between the indicated heading and 270°.
(8)	Turn the airplane through 360°, record the deviation at each 30° radial. Prepare a deviation table that shows the corrections that must be applied to each of the 30° radials.	If large deviations occur when you operate electrical equipment/systems, the deviation table must also show the corrections to apply to each 30° radial when that particular equipment/system is operating.
(9)	Install the new deviation table in the compass card holder next to the compass.	

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GYRO INSTRUMENTS

WITH CONVENTIONAL COCKPIT INSTALLED

1. General

This Section tells you about the instruments which show attitude and flight direction and which have integrated gyros. These are:

- Turn coordinator.
- Attitude gyro (horizon).
- Directional gyro.

2. Description and Operation

A. Turn Coordinator

Figure 1 shows the turn coordinator Mid Continent 1394T100-(R). It is located in the left-hand section of the instrument panel, see Chapter 31.

The turn coordinator is an electrically-powered gyroscopic instrument. It operates when the main bus is powered and the T&B circuit-breaker is closed. A warning flag shows when there is no power to the unit. The warning flag goes out of view when the turn coordinator has the correct power.

The turn and bank coordinator shows the rate of rotation of the airplane about the vertical axis. The turn coordinator has markings for rate 2 turns.

The turn coordinator has a slip indicator. A ball in a curved tube filled with fluid shows when the airplane is slipping or skidding. When the ball is in the center, the turn is correctly coordinated.

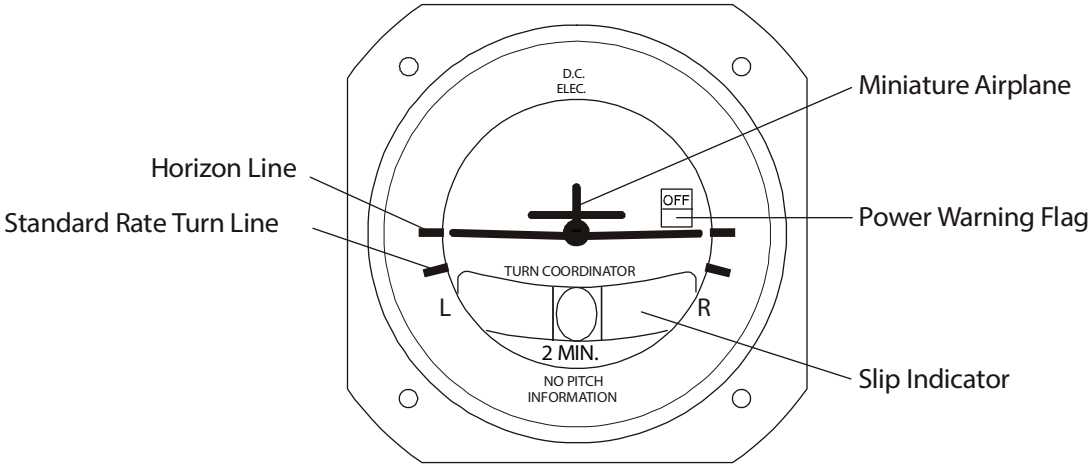

Figure 1: Mid Continent 1394T100-(R.) Turn Coordinator

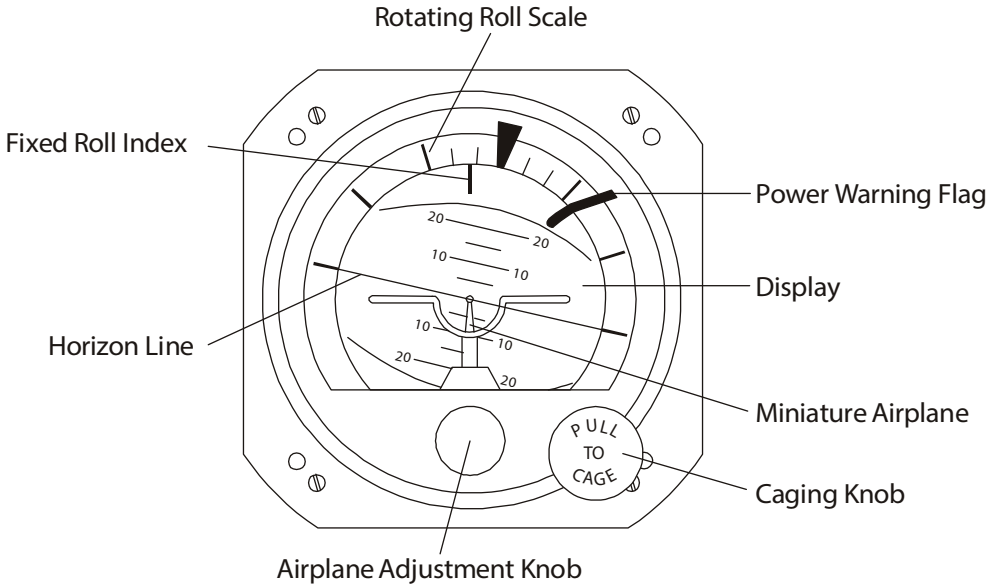

Figure 2 : L-3 Communications AIM 1100 Attitude Gyro

B. Attitude Gyro (Artificial Horizon)

Figure 2 shows the L-3 Communications AIM 1100 attitude gyro.

The attitude gyro is located in the left-hand section of the instrument panel, see Chapter 31.

The attitude gyro is an electrically-powered gyroscopic instrument. It operates when the essential bus is powered and the HORIZON circuit-breaker is closed. A warning flag shows when there is no power to the unit. The warning flag goes out of view when the attitude gyro has the correct power.

The indicator shows pitch and roll data. The display shows a blue area for the sky and a brown area for the ground. A miniature airplane represents the airplane's nose and wings. Horizontal markings above and below the horizon show pitch up and down. Each graduation is 5°.

The roll display has markings around the circumference of the instrument. The markings are at 10, 20, 30, 60 and 90 degrees of roll.

The attitude gyro has these controls:

- PULL TO CAGE knob (manual erection). When pulled, rotated and released in the detent position, it locks roll and pitch gimbals in caged position.

CAUTION: THE INDICATOR MAY BE DAMAGED IF THE 'PULL TO CAGE' KNOB IS RELEASED WITH A 'SNAP'. RELEASE 'PULL TO CAGE' KNOB AVOIDING A 'SNAP' RELEASE.

- Airplane adjustment knob. Only the AIM 1100-28L(0F) DIA has this knob, see Figure 2. Turning the knob moves the miniature airplane up and down a minimum of ± 4° relative to the middle position.

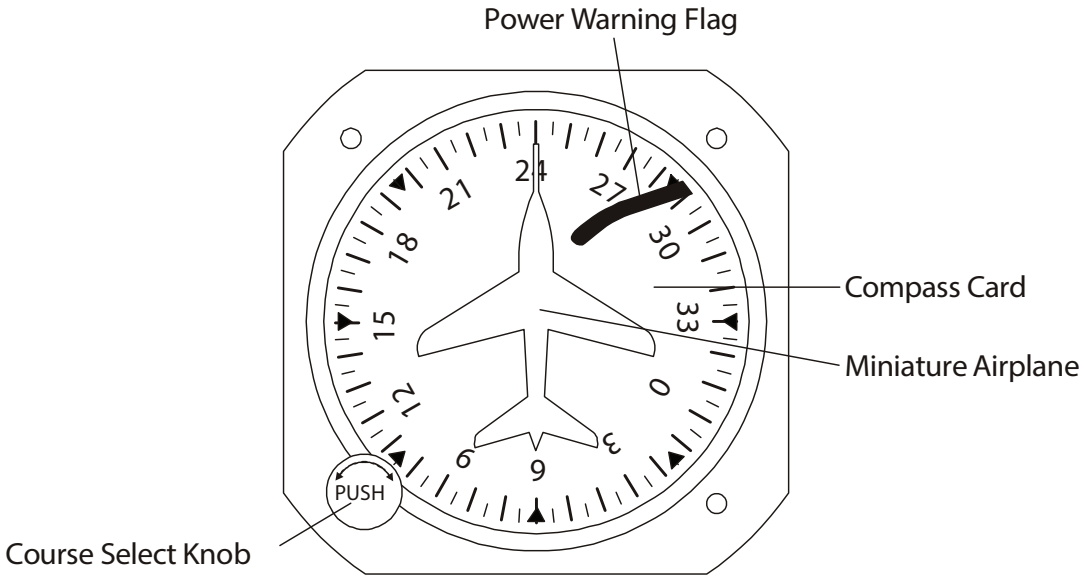

Figure 3 : L-3 Communications AIM2051BLD Directional Gyro

C. Directional Gyro

Figure 3 shows the L-3 Communications AIM2051BLD directional gyro. It is located in the left-hand section of the instrument panel, see Chapter 31.

The directional gyro (DG) is an electrically-powered gyroscopic instrument. It operates when the main bus is powered and the DG circuit-breaker is closed. A warning flag shows when there is no power to the unit. The warning flag goes out of view when the DG has the correct power.

The directional gyro shows the direction of the airplane related to a preset heading. You set the heading by pushing and turning the knob on the face of the directional gyro. The display has a 360° compass card with 5° graduations.

TROUBLE-SHOOTING

1. General

The table below lists the defects you could have with the integrated electrical gyro-instruments.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Warning flag in view.	Related circuit-breaker (T&B or HORIZON or DG) open or defective.	Set or replace the circuit-breaker.
Indication of instrument not reliable.	Power supply wiring defective.	Do a test for the correct voltage at the instrument. Repair the power supply wiring/connector.
	Ground connection defective.	Do a test for correct ground connection. Repair the ground wiring/connector.
	Instrument defective.	Replace the instrument.
Instrument is sluggish.	Mechanism worn or dirty.	Replace the instrument.

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MAINTENANCE PRACTICES

1. General

This Section tells you how to remove/install the gyro instruments.

CAUTION: BE SPECIALLY CAREFUL WHEN YOU WORK ON OR MOVE GYROSCOPIC INSTRUMENTS. MAKE SURE THAT THE GYRO STOPS TURNING BEFORE YOU START TO REMOVE THE INSTRUMENT. USE ONLY THE CORRECT SHOCK-PROOF CONTAINER FOR SHIPPING.
MARK THE CONTAINER 'VERY FRAGILE' 'HANDLE LIKE EGGS'.

2. Remove/Install a Gyro Instrument

A. Remove a Gyro Instrument.

	Detail Steps/Work Items	Key Items/References
(1)	Open the related circuit-breaker.	T&B for the turn & bank indicator. HORIZON for the attitude gyro. DG for the directional gyro.
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Dis-connect the connector at the rear of the instrument.	
(4)	Remove the screws which attach the instrument to the instrument panel.	Hold the instrument!
(5)	Remove the instrument from the instrument panel and from the airplane.	

B. Install a Gyro Instrument.

	Detail Steps/Work Items	Key Items/References
(1)	Put the instrument in position in the instrument panel.	
(2)	Install the screws which attach the instrument to the instrument panel.	
(3)	Connect the connector at the rear of the instrument.	
(4)	Install the instrument panel cover.	Refer to Section 25-10.
(5)	Set the related circuit-breaker.	T&B for the turn & bank indicator. HORIZON for the attitude gyro. DG for the directional gyro.

3. Test/Adjust the Magnetic Compass (Compass Swing)

You must do a test for correct operation of the compass (compass swing):

- After replacing a major component.
- After replacing the compass.
- After a major modification to the airplane.
- After a lightning strike has been reported.

CAUTION: USE ONLY NON-MAGNETIC TOOLS TO ADJUST THE COMPASS. METALLIC OBJECTS NEAR THE COMPASS CAN CAUSE ERRORS.

CAUTION: DO NOT WEAR OR CARRY METALLIC OBJECTS (WATCHES, BRACELETS ETC) WHEN YOU ADJUST THE COMPASS COMPENSATING MAGNETS OR OPERATE THE LAND COMPASS. METALLIC OBJECTS NEAR THE COMPASS CAN CAUSE ERRORS.

NOTE: If possible, use a compass swing area that has been tested for magnetic interference. In any case, you must use a level area that is away from metal structures, underground pipes, reinforced concrete, other airplane and ground servicing equipment.

Do the compass swing when the wind is less than 15 kts. A compass swing is not satisfactory with a wind of 15 kts or more.

A. Equipment.

Item	Quantity	Part Number
Calibrated land compass.	1	Commercial

B. Compass Swing.

	Detail Steps/Work Items	Key Items/References
(1)	Adjust the compensating magnets in the compass to a neutral position.	
(2)	Start the engine and set all electrical loads to ON.	Refer to the Airplane Flight Manual.
(3)	Use a calibrated and reliable land compass to make sure of the airplane heading.	
(4)	Use the land compass to align the airplane to magnetic north.	Adjust the N-S compensator magnet so that the airplane compass indicates a heading of 0°.
(5)	Use the land compass to align the airplane to magnetic east.	Adjust the E-W compensator magnet so that the airplane compass indicates a heading of 90°.
(6)	Use the land compass to align the airplane to magnetic south.	Adjust the N-S compensator magnet to remove half of the error between the indicated heading and 180°.
(7)	Use the land compass to align the airplane to magnetic west.	Adjust the E-W compensator magnet to remove half of the error between the indicated heading and 270°.
(8)	Turn the airplane through 360°, record the deviation at each 30° radial. Prepare a deviation table that shows the corrections that must be applied to each of the 30° radials.	If large deviations occur when you operate electrical equipment/systems, the deviation table must also show the corrections to apply to each 30° radial when that particular equipment/system is operating.
(9)	Install the new deviation table in the compass card holder next to the compass.	

LANDING AND TAXIING AIDS

WITH G1000 SYSTEM INSTALLED

1. General

This Section tells you about the landing and taxiing aids of the DA 40 NG.

Refer to the equipment manufacturer's manuals for more data about other options of landing and taxiing aids.

2. Description

The DA 40 NG has the following landing and taxiing aids:

- A localizer system which is part of the G1000 integrated avionics system.
  Refer to Section 31-40 for more data about the G1000 integrated avionics system.

- A glideslope system which is part of the G1000 integrated avionics system.
  Refer to Section 31-40 for more data about the G1000 integrated avionics system.

- A marker beacon receiver which is part of the G1000 integrated avionics system.
  Refer to Section 31-40 for more data about the G1000 integrated avionics system.

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LANDING AND TAXIING AIDS

WITH CONVENTIONAL COCKPIT INSTALLED

1. General

This Section tells you about the landing and taxiing aids that can be installed in the DA 40 NG.

Refer to the equipment manufacturer's manuals for more data about other options of landing and taxiing aids.

2. Description

The DA 40 NG has the following landing and taxiing aids:

- A localizer system which is part of the VOR/LOC/GS system. Refer to Section 34-52 for more data about the VOR/LOC/GS system.

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LANDING AND TAXIING AIDS

WITH G1000 SYSTEM INSTALLED

1. General

This Section tells you about the independent position determining system that can be installed in the DA 40 NG:

- Section 34-41. Stormscope system.
- Section 34-42. Traffic Advisory System (TAS).

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STORMSCOPE SYSTEM

WITH G1000 SYSTEM INSTALLED

1. General

This Section tells you about the stormscope system that can be installed in the DA 40 NG. Refer to the manufacturer's manual for more data about the equipment.

The stormscope system consists of the following items:

- Stormscope processor.
- Stormscope antenna.

2. Description and Operation

The WX-500 is a passive sensor that listens for electromagnetic signals with a receiving antenna. The antenna detects intra-cloud, inter-cloud, or cloud-to-ground electrical discharges within a 200 nm radius of the airplane and sends the resulting 'discharge signals' to the processor. The processor digitizes, analyzes, and converts the discharge signals into range and bearing data. This information is stored in the storm buffer.

A. Stormscope Processor

The stormscope processor is tray mounted and is located under the passengers' seat.

The AVIONICS BUS power to the stormscope system. The ELECTRIC MASTER key switch and the AVIONIC MASTER switch must be set to ON to supply power through the WX-500 circuit breaker to the stormscope system.

The processor houses the lightning data acquisition circuitry as well as the circuitry necessary to process heading information and communicate with the G1000 system. All WX-500 functions are controlled through the MFD of the G1000 system.

B. Stormscope Antenna

The NY-163 stormscope antenna is located on the horizontal stabilizer. The antenna is a combined cross-loop and sense antenna. The antenna is sealed against environmental extremes and is non-repairable.

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TROUBLE-SHOOTING

1. General

The table below lists the defects you could have with the stormscope system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Stormscope does not operate.	Circuit breaker not set.	Set the circuit breaker.
	Faulty cables/connectors.	Do a test for continuity on each cable. Do a test for short circuit to ground and between cables. Replace defective cables.

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MAINTENANCE PRACTICES

1. General

This Section tells you how to remove/install the components of the stormscope system. It also tells you how to test the stormscope system.

2. Remove/Install the Stormscope Processor

A. Remove the Stormscope Processor.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the passengers seat.	Refer to Section 25-10.
(2)	Open the WX-500 circuit breaker.	
(3)	Loosen the screw that attaches the processor to its mounting tray.	
(4)	Remove the stormscope processor from the mounting tray and from the airplane.	

B. Install the Stormscope Processor.

	Detail Steps/Work Items	Key Items/References
(1)	Put the stormscope processor in position in the mounting tray.	
(2)	Tighten the screw that attaches the processor to its mounting tray.	
(3)	Install the passengers seat.	Refer to Section 25-10.
(4)	Close the WX-500 circuit breaker.	
(5)	Do a test of the stormscope system.	Refer to Paragraph 4.

3. Remove/Install the Stormscope Antenna

A. Remove the Stormscope Antenna.

	Detail Steps/Work Items	Key Items/References
(1)	Open the WX-500 circuit breaker.	
(2)	Disconnect the connector of the stormscope antenna.	
(3)	Remove the screws which attach the stormscope antenna to the mounting bracket.	Hold the antenna!
(4)	Remove the stormscope antenna from the horizontal stabilizer.	

B. Install the Stormscope Antenna.

	Detail Steps/Work Items	Key Items/References
(1)	Put the stormscope antenna in position on the horizontal stabilizer.	The arrow must point into flight direction.
(2)	Install the screws which attach the stormscope antenna to the mounting bracket.	
(3)	Connect the connector of the stormscope antenna.	
(4)	Close the WX-500 circuit breaker.	
(5)	Do a test of the stormscope system.	Refer to Paragraph 4.

4. Test of the Stormscope System

Perform the installation checkout as outlined in Goodrich Stormscope WX-500 Installation Manual P/N 009-11500-001 Chapter 3 'Installation Checkout'.

TRAFFIC ADVISORY SYSTEM (TAS)

1. General

This Section tells you about the traffic advisory system that can be installed in the DA 40 NG. Refer to the manufacturer´s manual for more data about the equipment.

The TAS consists of the following items:

- Processor.
- Transponder coupler.
- Top antenna.
- Bottom antenna

2. Description and Operation

The Ryan/Avidyne Traffic Advisory Systems (collectively know as TASs) are actively interrogating on-board air traffic detection systems used to identify potential collision threats. The TAS computes relative altitude and range of threats from nearby transponder-equipped airplanes. Airplanes with non-Mode C transponders can provide range information. The TAS does not detect airplanes without an operating transponder.

A. Processor.

The TAS processor is tray mounted and is located behind the first ring frame.

The avionics bus supplies power to the traffic advisory system. The ELECTRIC MASTER key switch and the AVIONIC MASTER switch must be set to ON to supply power through the TAS circuit breaker to the traffic advisory system.

The TAS processor communicates to the Garmin G1000 system which indicates nearby traffic on the MFD. All functions of the TAS are controlled through the MFD.

B. Transponder Coupler.

The transponder coupler is mounted on the remote avionic box of the Garmin G1000 system. The transponder coupler supplies the processor with a signal indicating the on-board transponder is transmitting a reply.

C. Antennas

The TAS has two directional antennas. The top antenna is located on top of the fuselage behind the cabin in front of the COM antenna, and the bottom antenna is located on the fuselage bottom center between the main bulkheads.

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TROUBLE-SHOOTING

1. General

The table below lists the defects you could have with the traffic advisory system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
TAS does not operate.	Circuit-breaker not set.	Set the circuit-breaker.
	Faulty cables/connectors.	Do a test for continuity on each cable. Do a test for short circuit to ground and between cables. Replace defective cables.
The TAS bearing shows opposite to the traffic forward and aft, and it shows correctly left and right.	The antenna coaxes for the top antenna are backwards.	Check the antenna connections.
The TAS bearing shows opposite to the traffic left and right, and it shows correctly forward and aft.	The antenna coaxes for the bottom antenna are backwards.	Check the antenna connections.

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MAINTENANCE PRACTICES

1. General

This Section tells you how to remove/install the components of the traffic advisory system (TAS).

2. Remove/Install the TAS Processor

A. Remove the TAS Processor.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	Instrument panel, center.
(2)	Remove the aft baggage compartment.	Refer to Section 25-50.
(3)	Open the TAS circuit breaker.	Instrument panel, right side.
(4)	Disconnect the connectors and antenna cables from the TAS processor.	
(5)	Loosen the diagonal retaining screws that attaches the processor to its mounting tray.	
(6)	Slide the TAS processor out of its mounting tray and clear of the airplane.	Along the rails.

B. Install the TAS Processor.

	Detail Steps/Work Items	Key Items/References
(1)	Slide the TAS processor into its mounting tray.	Along the rails.
(2)	Tighten the diagonal retaining screws that attached the processor to its mounting tray.	
CAUTION: A WRONG CONNECTION OF THE ANTENNA CABLES WILL LEAD TO A WRONG INDICATION.		
(3)	Connect the connectors and antenna cables to the TAS processor.	
(4)	Close the TAS circuit breaker.	
(5)	Install the aft baggage compartment.	
(6)	Do a test of the traffic advisory system.	Refer to the TAS Installation Manual, latest revision.

3. Remove/Install the Transponder Coupler

A. Remove the Transponder Coupler.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	Instrument panel, center.
(2)	Remove the aft baggage compartment.	Refer to Section 25-50.
(3)	Open the TAS circuit breaker.	Instrument panel, right side.
(4)	Disconnect the antenna cables from the transponder coupler.	
(5)	Remove the screws and nuts that attach the transponder coupler to the remote avionics box.	Hold the transponder coupler!
(6)	Remove the transponder coupler from the remote avionics box and clear of the airplane.	Fit dust caps to all connections.

B. Install the Transponder Coupler.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the dust-cover(s) from all connections.	If necessary, install the dust covers from the new transponder coupler onto the transponder coupler that you removed.
(2)	Move the transponder coupler into position on the remote avionics box.	Hold the transponder coupler!
(3)	Install the screws and nuts that attach the transponder coupler to the remote avionics box.	
(4)	Connect the antenna cables to the transponder coupler.	
(5)	Close the TAS circuit breaker.	
(6)	Install the aft baggage compartment.	Refer to Section 25-50.
(7)	Do a test of the traffic advisory system.	Refer to the TAS Installation Manual, latest revision.

4. Remove/Install a TAS Antenna

A. Remove a TAS Antenna.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	Instrument panel, center.
(2)	Open the TAS circuit breaker.	Instrument panel, right side.
(3)	Remove the aft baggage compartment if you will replace the top mounted antenna. Remove the center console between the two main bulkheads if you will replace the bottom mounted antenna.	Refer to Section 25-50. Refer to Section 25-10.
(4)	Disconnect the co-axial cables from the antenna that you will replace.	At the antenna.
(5)	Remove the antenna: - Remove the four screws that attach the antenna to the structure. - If necessary, use a knife to carefully remove the sealant that seals the antenna to the airplane outer surface. - Move the antenna clear of the airplane	Hold the antenna. Take care not to damage the airplane surface!

B. Install a TAS Antenna.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the contact surfaces of the antenna and the ground plane where the antenna will be installed are clean and free of grease.	
(2)	Move the antenna into position.	
(3)	Install the four screws that attach the antenna to the airplane.	
(4)	Seal the outer edge of the antenna where it contacts the airplane surface with sealant.	Refer to the AMM for an approved sealant.
(5)	Remove the excess sealant that has been forced out of the joint between the antenna and the airplanes surface.	
CAUTION: A WRONG CONNECTION OF THE ANTENNA CABLES WILL LEAD TO A WRONG INDICATION.		
(6)	Connect the co-axial cables to the antenna.	At the antenna.
(7)	Install the aft baggage compartment or center console panel that you removed in Paragraph A.	Refer to Section 25-10 or 25-50.
(8)	Reset the TAS circuit-breaker.	Instrument panel, right side.
(9)	Do a test of the traffic advisory system.	Refer to the TAS Installation Manual, latest revision.

DEPENDENT POSITION DETERMINING

WITH G1000 SYSTEM INSTALLED

1. General

The DA 40 NG has an integrated cockpit system (ICS). The ICS has all the usual dependent position determining systems. Refer to Section 31-40 for more data about the dependent positioning determining systems that are integral with the ICS.

This Section tells you how to replace the antennas for the dependent position determining systems.

2. Description

The DA 40 NG has these dependent position determining systems and antennas:

- Transponder.
- DME.
- GPS (x2).
- ADF.
- Marker.
- VOR.

Flexible co-axial cables connect the antennas to their related equipment. You can replace the co-axial cables. The VOR antenna is integral with the horizontal stabilizer and you can not replace the VOR antenna. The other antennas are all attached to the surface of the airplane and can be replaced.

Refer to Section 31-40 for more data about the dependent position determining systems and their related displays.

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TROUBLE-SHOOTING

1. General

The table below lists the defects you could have with the dependent positioning determining system antennas. Refer to Section 31-40 for trouble-shooting data for the dependent positioning determining systems.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
ATC reports no transponder reply. Transponder reply symbol operates.	Low output power.	Examine and repair/replace defective antenna connections. Replace the antenna.
ATC reports no transponder reply. Transponder reply symbol not operating.	Poor received signal.	Examine and repair/replace defective antenna connections. Replace the antenna.
DME/GPS/ADF/MARKER systems give poor performance.	Poor received signal.	Examine and repair/replace related defective antenna connections. Replace the related antenna.

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MAINTENANCE PRACTICES

1. General

The Maintenance Procedures in this Section tell you how to replace the antennas of the dependent position determining systems. Refer to Section 31-40 for more data about the dependent position determining systems. Refer to Paragraph 3 for more information on the used types of co-axial cables. Further particulars on the antenna sealant are given in Paragraph 4.

2. Replace a Dependent Position Determining System Antenna

A. Replace the Transponder or DME Antenna.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	Instrument panel, center.
(2)	Pull open the XPDR/DME circuit-breaker.	Instrument panel, right side.
(3)	Remove the pilot's seat if you will replace the transponder antenna. Remove only the co-pilot's seat if you will replace the DME antenna.	Refer to Section 25-10.
(4)	Disconnect the co-axial cable from the antenna that you will replace.	At the antenna.
(5)	Remove the antenna: - Remove the two nuts and washers that attach the antenna to the structure. - If necessary, use a knife to carefully remove the sealant that seals the antenna to the airplane outer surface. - Move the antenna clear of the airplane.	 Hold the antenna. Take care not to damage the airplane surface!

	Detail Steps/Work Items	Key Items/References
(6)	Install the antenna: - Make sure that the contact surfaces of the antenna and the airplane surface where the antenna will be installed are clean and free of grease. - Move the antenna into position under the fuselage. - Seal the outer edge of the antenna where it contacts the airplane surface with sealant. - Install the two washers and nuts that attach the antenna to the airplane structure. - Remove the excess sealant that has been forced out of the joint between the antenna and the airplane surface.	Use sealant. Refer to Paragraph 4.
(7)	Connect the co-axial cable to the antenna.	At the antenna.
(8)	Install the seat(s) that you removed.	Refer to Section 25-10.
(9)	Close the XPDR/DME circuit-breaker.	Instrument panel, right side
(10)	Do a test of the transponder.	Only if you replaced the transponder antenna.
(11)	Do an operational test of the DME on the next flight.	Only if you replaced the DME antenna.

B. Replace a GPS Antenna.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	Instrument panel, center.
(2)	Pull open the GPS/NAV1 and/or GPS/NAV2 circuit-breaker.	Instrument panel, right side.
(3)	Remove the reading/map light(s) as necessary to gain access to the antenna that you will replace.	Refer to Section 33-10.
(4)	Disconnect the co-axial cable from the antenna that you will replace.	At the antenna.
(5)	Remove the antenna: - Remove the four screws, nuts and washers that attach the antenna to the airplane. - Remove the ground-plate. - If necessary, use a knife to carefully remove the sealant that seals the antenna to the airplane outer surface. - Move the antenna clear of the airplane.	 Hold the antenna. Take care not to damage the airplane surface! From the outside.
(6)	Install the antenna: - Make sure that the contact surfaces of the antenna and the airplane surface where the antenna will be installed are clean and free of grease. - Move the antenna into position on the top of the fuselage. - Seal the outer edge of the antenna where it contacts the airplane surface with sealant. - Install the ground-plate. - Install the four screws, washers and nuts that attach the antenna to the airplane.	 Use sealant. Refer to Paragraph 4.

	Detail Steps/Work Items	Key Items/References
(7)	Connect the co-axial cable to the antenna.	At the antenna.
(8)	Install the reading/map light(s) that you removed at step 3.	
(9)	Close the GPS/NAV1 and/or GPS/NAV2 circuit-breaker.	Instrument panel, right side.
(10)	Do a test of the GPS system(s).	Refer to Section 31-40.

C. Replace a Marker or ADF Antenna.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the ELECTRIC MASTER key switch is set to OFF.	Instrument panel, center.
(2)	Remove the rear passengers' seats.	Refer to Section 25-10.
(3)	Disconnect the co-axial cable from the antenna that you will replace.	At the antenna.
(4)	Remove the antenna: - Remove the three screws, nuts and washers that attach the antenna to the airplane. - Remove the ground-plate. - If necessary, use a knife to carefully remove the sealant that seals the antenna to the airplane outer surface. - Move the antenna clear of the airplane.	 Hold the antenna. Take care not to damage the airplane surface! From the outside.
(5)	Install the antenna: - Make sure that the contact surfaces of the antenna and the airplane surface where the antenna will be installed are clean and free of grease. - Move the antenna into position on the bottom of the fuselage. - Seal the outer edge of the antenna where it contacts the airplane surface with sealant. - Install the ground-plate. - Install the 3three screws, washers and nuts that attach the antenna to the airplane.	 Use sealant. Refer to Paragraph 4.
(6)	Connect the co-axial cable to the antenna.	At the antenna.
(7)	Install the rear passengers' seats.	Refer to Section 25-10.
(8)	Do a post-installation operational test of the ADF system.	Only if you replaced the ADF antenna. Refer to Paragraph 5.
(9)	Do an operational test of the marker system on the next flight.	Only if you replaced the marker antenna.

3. Used Types of Flexible Co-Axial Cables

	Antenna/Receiver	Co-Axial Cable
(1)	Transponder	RG 142
(2)	DME	RG 142
(3)	GPS	RG 400
(4)	ADF	RG 142
(5)	Marker	RG 400

4. Sealant Specification

Use an adhesive bonding compound on the basis of modified polymers or polyurethane to seal the antennas to the airplane outer surface. Make sure the sealant is free of silicone and it is temperature resistant from -40 °C (-40 °F) to +60 °C (+140 °F).

5. Post-Installation Check of the ADF System

A. After installing the equipment, check the indicator reading is correct and determine whether or not quadrantal error correction is necessary. If so, correction should be first carried out on the ground, then in the air. It is also necessary to establish whether any equipment in the airplane electrical system is generating interference.

B. Operational Check

	Detail Steps/Work Items	Key Items/References
(1)	Locate the airplane on the correction platform and using the bearing compass point the nose of the airplane to a radio beacon in boundary range.	
(2)	Switch on the ADF, adjust to the correct frequency and observe the indication in the ADF operating mode.	The indicator should read 0 relative bearing.
(3)	Turn the airplane about its vertical axis to a larger heading.	The indicator should move to the left.
(4)	Turn the airplane about its vertical axis to a smaller heading.	The indicator should move to the right.

NOTE: If the reading is incorrect or should the indicator move in the wrong direction, check the wiring of the equipment for agreement with the wiring diagram and correct if necessary.

NOTE: If the airplane is accurately aligned with the NBD beacon, but a relative bearing reading of 0° is not indicated, this is an indication that the antenna has been wrongly installed. Recheck the antenna for agreement with the centerline of the airplane and correct if necessary.

Refer to the manufacturer's manual for detailed information on the quadrantal error correction.

NOTE: It is recommended to proceed in accordance with FAA AC 43-13-1A and FAA AC 43.13-2A requirements.

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DEPENDENT POSITION DETERMINING

WITH CONVENTIONAL COCKPIT INSTALLED

1. General

This Section tells you about the equipment which shows dependent position determining.

Refer to these Sections for data about the systems:

Section 34-52.VHF omnidirectional range (VOR), localizer (LOC), and glideslope (GS).

Section 34-56.Transponder (XPDR).

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VOR/LOCALIZER/GLIDESLOPE (VOR/LOC/GS)

WITH CONVENTIONAL COCKPIT INSTALLED

1. General

This Section tells you about the VOR/LOC/GS (VHF omnidirectional range/localizer/glideslope) system that can be installed in the DA 40 NG. Refer to the manufacturer's manuals for more data about the equipment.

The VOR/LOC/GS system consists of the following items:

- NAV receiver. The NAV receiver is part of the NAV/COM system. Refer to Section 23-11 for more data about the NAV/COM system.
- Display:
  - VOR and LOC information is displayed by the NAV/COM receiver. Refer to Section 23-11 for more data about the NAV/COM receiver.
- NAV (VOR/LOC/GS) antenna. Refer to Section 23-11 for more data about the NAV antenna.

2. Description and Operation

The VHF omnidirectional range (VOR) gives bearing information, ground station identification, and reception of FSS reports in the VHF band.

Localizer (LOC) circuits are automatically energized when an ILS frequency is selected on the NAV. Station identification and ATIS information can be received.

Glideslope (GS) circuits are automatically energized when an ILS frequency is selected on the NAV.

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TROUBLE-SHOOTING

1. General

The table below lists the defects you could have with the VOR/LOC/GS system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
NAV flag on both NAV receiver display and VOR/LOC instrument.	Faulty NAV receiver.	Repair or replace the NAV receiver.
	Transmitting station is off the air.	Tune to a new station.
	Poor co-ax connections.	Examine co-ax connections for condition and security.
	Faulty NAV antenna.	Replace the horizontal stabilizer.
	Faulty NAV antenna coupler.	Replace the NAV antenna coupler.
LOC indication not accurate on NAV receiver display. VOR/LOC instrument correct.	Faulty NAV receiver.	Repair or replace the NAV receiver.
LOC indication not accurate on VOR/LOC instrument. NAV receiver display correct.	LOC centering adjustment needed.	Adjust LOC centering. Refer to manufacturer's documentation.
	Faulty VOR/LOC instrument.	Repair or replace the VOR/LOC instrument.
VOR indication not accurate on NAV receiver display. VOR/LOC instrument correct.	Faulty NAV receiver.	Repair or replace the NAV receiver.
VOR indication not accurate on VOR/LOC instrument. NAV receiver display correct.	VOR centering adjustment needed.	Adjust VOR centering. Refer to manufacturer's documentation.
	Faulty VOR/LOC instrument.	Repair or replace the VOR/LOC instrument.

Trouble	Possible Cause	Repair
GS indication not accurate on GS instrument.	GS centering adjustment needed.	Adjust GS centering. Refer to manufacturer's documentation.
	Faulty NAV/GS receiver.	Repair or replace the NAV/GS receiver.
	Faulty GS instrument.	Repair or replace the GS instrument.
	Poor co-ax connections.	Examine co-ax connections for condition and security.
	Faulty NAV antenna.	Replace the horizontal stabilizer.
	Faulty NAV antenna coupler.	Replace the NAV antenna coupler.

MAINTENANCE PRACTICES

1. General

Refer to Section 23-11 for Maintenance Practices for the NAV/COM receivers and antennas.

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TRANSPONDER (XPDR)

WITH CONVENTIONAL COCKPIT INSTALLED

1. General

This Section tells you about the transponder system which can be installed in the DA 40 NG. Refer to the manufacturer's manuals for more data about the equipment. Refer to Chapter 92 for the wiring diagrams.

The transponder system consists of the following items:

- Transponder. The following transponder can be installed in the DA 40 NG:
  - Garmin GTX 328.
- Blind altitude encoder. The following blind altitude encoder can be installed in the DA 40 NG:
  - Sandia SAE5-35.

A. Garmin GTX 328 Mode S Transponder

Figure 1 shows the Garmin GTX 328 Mode S transponder. It is located in the instrument panel on the bottom side, see Chapter 31.

The essential avionics bus supplies power to the transponder. The ELECTRIC MASTER key switch and the AVIONIC MASTER switch must be set to ON to supply power through the XPDR circuit-breaker to the transponder.

The transponder has a display which shows the following:

- FUNC window. The FUNC button changes the FUNC window shown on the right side of the display. Displayed data includes pressure altitude, flight time, count up timer, count down timer, and may include contrast, and display brightness, depending on configuration.

- Code window. The transponder code, set by the code selection keys, is shown in the center of the display.

- Reply indicator. The reply indicator blinks to indicate that the GTX 328 is functioning properly and replying to interrogations.

- Mode annunciation. The mode annunciation indicates which mode is selected.

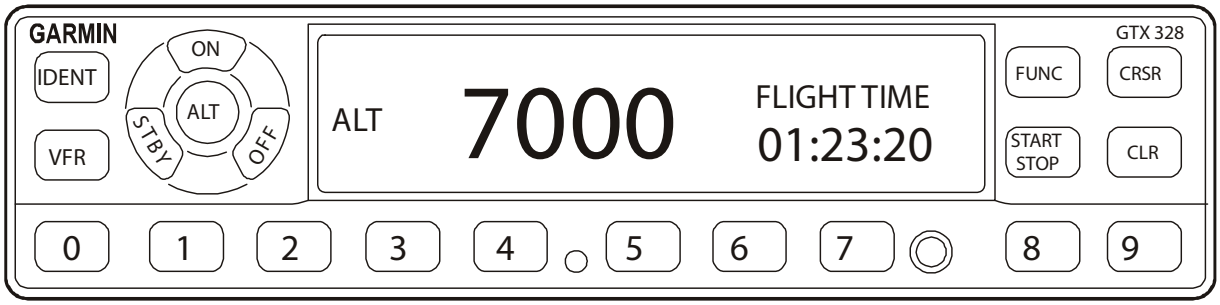

Figure 1 : Garmin GTX Mode S Transponder

The transponder has these controls:

- Mode selection keys. The mode selection keys consist of:
  - STBY. Sets the transponder to the standby mode. The transponder receives signals but does not reply.
  - ON. If the transponder receives an interrogation, it transmits the code set by the code selection keys.
  - ALT. If the transponder receives an interrogation, it transmits the code set by the code selection keys and altitude data from the blind encoder.
  - OFF. Turns the unit off when depressed for approximately 2 seconds.
- IDENT key. Pressing the IDENT key activates the Special Position Identification (SPI) pulse for 18 seconds, identifying your transponder return from others on the air traffic controller's screen. The word 'IDENT' will appear in the upper left corner of the display while the IDENT mode is active.
- Code selection keys. Use these keys (0-7) to enter the transponder code.
- VFR button. Sets the transponder code to the pre-programmed VFR code selected in Configuration mode. Pressing the VFR button again will restore the previous identification code.
- FUNC button. Changes the page shown on the right side of the display. Displayed data includes pressure altitude, flight time, count up timer, count down timer, and may include contrast, and display brightness, depending on configuration.
- START/STOP button. Starts and stops the altitude monitor, count up, count down, and flight timers.
- CRSR button. Initiates entry of the starting time for the count down timer and cancels transponder code entry.
- CLR button. Resets the count up and count down timers and cancels the previous keypress during code selection.
- 8 button. Reduces contrast and display brightness when the respective pages are displayed. Also enters the number eight into the count down timer.
- 9 button. Increases contrast and display brightness when the respective pages are displayed. Also enters the number nine into the count down timer.

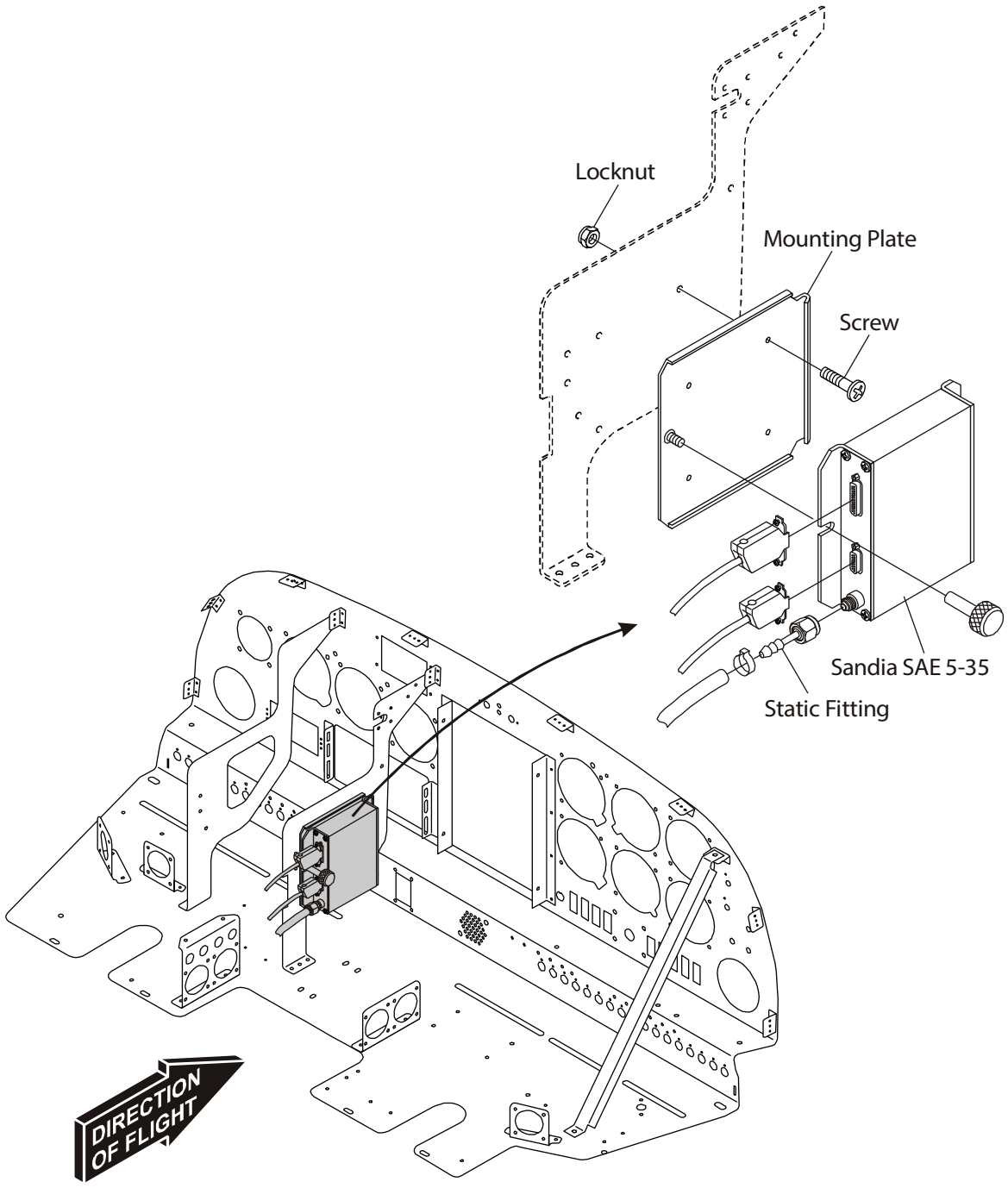

Figure 2 : Sandia Aerospace Altitude Data System SAE5-35 Installation

TROUBLE-SHOOTING

1. General

The table below lists the defects you could have with the transponder system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Transponder does not operate. Reply indicator does not come on when TST selected.	Faulty transponder.	Replace the transponder.
	No power.	Repair faulty wiring, circuit-breaker etc.
	Poor ground connection.	Do a test of the ground connection.
ATC reports no reply. Transponder reply indicator flashes.	Low output power.	Examine the antenna connections.
		Replace the transponder.
ATC reports no reply. Transponder reply indicator does not flash.	Airplane out of radar range.	Do a test at higher altitude.
	Poor received signal.	Examine the antenna connections.
	Faulty transponder.	Replace the transponder.
ATC reports Mode A does not operate. Mode C operates correctly.	Faulty transponder.	Replace the transponder.
Encoded altitude is wrong at one or more altitudes but is correct at most other altitudes.	Data code-bit missing.	Do a Mode C fault analysis.
	Faulty encoder.	Replace the encoder.
	Faulty Mode C part of the transponder.	Replace the transponder.
	Wiring open-circuit between encoder and transponder.	Repair/replace the wiring. Refer to the wiring diagrams in Chapter 92.

Trouble	Possible Cause	Repair
Encoded altitude output is too high or too low over a steady range of altitudes. The airplane altimeter reads correctly.	Faulty encoder. Encoder requires calibration.	Replace the encoder. Calibrate the encoder. Refer to the manufacturers manuals.
Altitude read-out is -800 ft.	Encoder not warmed-up.	Let the encoder warm-up (Refer to the blind encoder fault analysis in this Section).

MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to remove/install the transponder and the blind altitude encoder. They also tell you how to adjust/test the transponder and do fault analysis on the blind encoder.

2. Remove/Install the Transponder

A. Remove the Transponder.

Refer to Figure 1 in the Description and Operation Pageblock 34-56-00.

	Detail Steps/Work Items	Key Items/References
(1)	Open the transponder circuit-breaker.	
(2)	Put a 3/32 Allen wrench into the access hole for the locking screw. Engage the screw.	
(3)	Turn the screw counter-clockwise until the unit disengages from the mounting rack.	
CAUTION: DO NOT PULL ON THE KNOBS. DO NOT PRY THE FACE-PLATE. IF YOU PULL ON THE KNOBS, OR PRY THE FACE-PLATE, YOU CAN DAMAGE THE UNIT. CAUTION: DO NOT TOUCH THE CONNECTOR CARD AT THE REAR OF THE UNIT. THE ELECTROSTATIC CHARGE ON YOUR BODY CAN DAMAGE THE UNIT.		
(4)	Pull gently on the sides of the unit to remove it from the mounting rack.	
(5)	Install the protective covers on the rear connectors of the transponder.	

B. Install the Transponder.

Refer to Figure 1 in the Description and Operation Pageblock 34-56-00.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the protective covers from the connectors on the replacement unit.	
(2)	Slide the unit into the rack. Engage the locking screw so that the latch front-lobe touches the rack.	
(3)	Turn the locking screw clockwise so that the rear lobe engages the mounting rack.	
CAUTION: DO NOT OVER-TIGHTEN THE LOCKING SCREW. YOU CAN DAMAGE THE LOCKING MECHANISM.		
(4)	Continue to turn the screw until the unit is fully installed in the mounting rack.	
(5)	Close the transponder circuit-breaker.	
(6)	Do an operational test.	Refer to Paragraph 4.

3. Remove/Install the Blind Altitude Encoder

A. Remove the Blind Altitude Encoder.

Refer to Figure 2 in the Description and Operation Pageblock 34-56-00.

	Detail Steps/Work Items	Key Items/References
(1)	Open the XPDR circuit-breaker.	
(2)	Remove the instrument panel cover.	Refer to Section 25-10.
(3)	Disconnect the static hose from the encoder.	Put a cap on the static hose!
(4)	Disconnect the electrical connector(s).	
(5)	Release the knurled mounting screw for the encoder.	
(6)	Remove the encoder.	Remove the SAE5-35 from the mounting rack.
(7)	Install a cover over the static port.	

B. Install the Blind Altitude Encoder.

Refer to Figure 2 in the Description and Operation Pageblock 34-56-00.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the cover from the static port on the encoder.	
(2)	If you install a new encoder, install the static fitting from the old encoder on the new encoder.	
(3)	Put the encoder in position on the mounting. Install the knurled mounting screw.	Slide the SAE5-35 in the mounting rack.
(4)	Connect the electrical connector(s).	
(5)	Connect the static hose to the encoder	
(6)	Close the XPDR circuit-breaker.	
(7)	Do a low-range static leak check.	Refer to Section 34-10.
(8)	Do the adjustment/test procedure.	Refer to Paragraph 5.
(9)	Install the instrument panel cover.	Refer to Section 25-10.

4. Test the Transponder

Use a transponder test set to make sure that the system operates correctly.

	Detail Steps/Work Items	Key Items/References or Limit Values
(1)	Connect the test equipment.	Refer to the equipment manufacturers' manuals.
(2)	Measure TX power.	125 W to 500 W.
(3)	Measure MTL Mode A.	-69 dBm to -77 dBm.
(4)	Measure MTL Mode C.	-69 dBm to -77 dBm.
(5)	Determine MTL A & C difference.	Max. 1 dB.
(6)	Measure SLS P2 P1.	Less than 1 % reply.
(7)	Measure SLS P2 -9 dB < P1.	More than 90 % reply.
(8)	Measure 'ident' time.	15 sec to 30 sec.
(9)	Measure interrogation Mode A retard/advance P3.	Less than 10 % at max. 1.0 µs.
(10)	Measure interrogation Mode C retard/advance P3.	Less than 10 % at max. 1.0 µs.
(11)	Measure framing: - Retard/advance (F2 light just on). - Difference between F2 retard and advance. - Calculate center of F2.	 0.45 ± 0.07 µs. Max. ± 0.1 µs. from 0.
(12)	Check if 'reply' indicator and dimer are OK.	
(13)	Check if Mode A coding is OK.	
(14)	Measure transmitter frequency deviation (from 1090 MHz).	± 1.5 MHz.
(15)	If necessary, do a test of the blind altitude encoder.	Refer to Paragraph 5.

	Detail Steps/Work Items	Key Items/References or Limit Values
(16)	Dis-connect the test equipment.	
(17)	Do an operation flight test: - Do a test of each control function. - Contact ATC, ask for a transponder check.	 Refer to this Section. Note warm-up period of blind encoding altimeter (see Paragraph 5).

5. Adjust/Test the SAE5-35 Blind Altitude Encoder

This adjustment ensures that the altitude code generated from the SAE5-35 is within 125 feet of the altitude displayed to the pilot.

	Detail Steps/Work Items	Key Items/References or Limit Values
(1)	Connect the test equipment.	Refer to the equipment manufacturers' manuals.
(2)	Set the airplane altimeter to 1013.25 hPa (29.92 inHg).	
(3)	Monitor the altitude code. Decrease the pressure until the output code just changes to 20,000 ft.	
(4)	Make sure that the altimeter reading is within ± 125 ft of the encoder reading. If not, press the increase button (behind slot A) or decrease button (behind slot B) until the encoder reading is within 30 ft of the altimeter reading.	Lightly tap the panel next to the altimeter to prevent errors due to friction.
(5)	Increase the pressure until the output code just changes to 0 ft.	
(6)	Make sure that the altimeter reading is within ± 125 ft of the encoder reading. If not, press the increase button (behind slot A) or decrease button (behind slot B) until the encoder reading is within 30 ft of the altimeter reading.	Lightly tap the panel next to the altimeter to prevent errors due to friction.
(7)	Do steps 2 to 5 again until both 20,000 ft and 0 ft values are within the ± 125 ft tolerance.	
(8)	Operate the system through the range -1000 ft to 20,000 ft. Make sure that the altimeter and the encoder are within the ± 125 ft tolerance.	Lightly tap the panel next to the altimeter to prevent errors due to friction.
(9)	Disconnect the test equipment and remove it from the airplane.	

CHAPTER 51
STANDARD PRACTICES AND STRUCTURES

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STANDARD PRACTICES AND STRUCTURES

1. General

The DA 40 NG is a single-engine, low-wing monoplane of composite construction. It has a 'T' tail and a fixed tricycle landing gear with a nose wheel that can caster.

The DA 40 NG fuselage has a semi-monocoque structure. Two glass fiber reinforced plastic (GFRP) half-shells make the fuselage skin. The fuselage shells have many layers of glass cloth. Rigid foam inserts give stiffness to the fuselage shells where necessary. All of the main structural components are GFRP rigid moldings. Many layers of glass cloth bond together to make each molding. Some components have layers of carbon fiber cloth to give more strength and stiffness.

The DA 40 NG has a cantilever wing. The wing has top and bottom shells. It has front and rear spars and a root rib made in three parts. Each shell has a carbon fiber reinforced plastic (CFRP) outer skin, a rigid foam core and a GFRP inner skin.

The vertical stabilizer is part of the fuselage. The aft part of the left and right fuselage shells make the left and right shells of the vertical stabilizer.

Each wing has two I-section spars. The front spar on one side is the same as the rear spar on the opposite side. Many layers of uni-directional carbon fiber make the spar caps. The number of layers in the spar caps decreases from root to tip. Each spar has a shear web. The shear web has GFRP skins and a rigid foam core. Glass cloth fillets attach the spar caps to the shear web.

A rear web closes the trailing edge of the wing. An end rib closes the outboard end of the wing. A removable GFRP winglet attaches to the wing shells and outer rib with screws.

The flaps and ailerons have top and bottom shells. Each shell has mixture of CFRP and GFRP cloth. The shells have rigid foam cores and bond together.

The horizontal stabilizer has top and bottom shells. Each shell has GFRP skins. The horizontal stabilizer has a front spar and a rear spar. Three pairs of ribs give strength to the center area. The elevator has top and bottom shells. Each shell has GFRP skins with a rigid foam core.

The rudder has left and right shells. Each shell has GFRP skins with a rigid foam core. The shells bond together at a flange.

The canopy is a CFRP molding with inner and outer frames which bond together. The canopy has a large one-piece acrylic glass window. The passenger door is a CFRP molding with inner and outer frames. The frames bond together. The door has an acrylic glass window.

A polyurethane paint finish protects the outside skin of the airplane from ultraviolet rays and humidity.

2. Types of Structures

The DA 40 NG is constructed from two main types of composite structure.

A. Glass Fiber Reinforced Plastic (GFRP)

GFRP is very thin glass fibers bonded together by resin. The glass fibers give most of the strength and the resin maintains the shape. The resin also bonds to other structural components such as other GFRP parts, metal attachment brackets or metal bushings.

The glass fibers are woven to make glass cloth. The orientation and weave of the glass in the cloth affects the structural strength of the cloth. A component can have many layers of cloth bonded together with resin. This is called lamination.

GFRP has very good properties. It is strong and flexible. It is very resistant to chemical attack and very little maintenance is necessary.

B. Carbon Fiber Reinforced Plastic (CFRP)

CFRP is very thin carbon fibers bonded together by resin. The carbon gives most of the strength and the resin maintains the shape. The resin also bonds to other structural components such as other CFRP parts, metal attachment brackets or metal bushings.

CFRP is very similar to GFRP. The main advantage of CFRP is that it is stronger and more rigid and lighter than GFRP.

3. Laminated Components

A laminated component has two or more layers of glass/carbon cloth. The direction of the fibers in the cloth is important for the properties for each layer. Extra layers are bonded to areas to give more strength.

4. Sandwich Structure

Many of the components in the DA 40 NG have a sandwich of two skins and a core. GFRP or CFRP make the skins and rigid plastic foam makes the core.

The skins must bond to the core of a sandwich structure completely. If the skins do not bond to the core the component can fail.

5. Bonded Components

A number of components can bond together to make a larger component. Special thick resin bonds these components together and fills the gap in a joint.

6. Repair Limitations

Repairs which are categorized as 'Class 1' in accordance with Section 51-10, Paragraph 2, may only be carried out in accordance with a repair scheme which has been approved by the manufacturer. Such repairs are not described in this Airplane Maintenance Manual.

INVESTIGATION

1. General

This Section tells you how to assess the class of the damage. It also tells you how to inspect glass fiber reinforced plastic (GFRP) and carbon fiber reinforced plastic (CFRP) composite structures. Damage assessment and repairs must be carried out by approved persons.

Refer to Section 51-00 for the types of structure used in the DA 40 NG and for repair limitations. Refer to Section 51-20 for general repair procedures.

2. Damage Classification

Damage is divided into the classes described below. In doubtful cases (i.e., if you are not sure about the classification of a damage), you must contact the airplane manufacturer.

A. Class 1

- Major structural damage that requires the partial replacing of a structural component, or
- Damage to a large area, or
- Damage to a highly stressed component or part.

This type of damage restricts or voids airworthiness.

B. Class 2

Holes and cracks passing through both skins of a sandwich construction component. The core damage must be able to be covered by a 75 mm (3 in) diameter circle.

C. Class 3

Small holes or cracks in the outer skin where there is no internal damage to the component, the sandwich material, or the inner skin.

D. Class 4

Minor scratches, abrasions or similar damage which is not a crack or a puncture in the skin.

3. Types of Damage

There are two basic types of hidden failure in composite structures:

- Disbonding.
- Delamination.

Disbonding is the failure of a bond between two components. For example between the fuselage skin and a fuselage frame. Or between a composite component and a metal component. Or between a composite skin and a sandwich core material.

Delamination is the failure of the bond between layers of glass/carbon cloth in a component.

There are also two main types of cracks:

- Micro cracks which occur in the surface of the resin.
- Major cracks with broken fibers. Major cracks do not occur with normal flight loads or normal landing loads. You must repair major cracks.

4. Inspection Techniques

A. Examine Visually

Use this method to find all types of damage to composites. Use a bright light to examine visually the inside of a component. GFRP must be green or brown. If the GFRP has white areas, then it may be damaged. Look specially at areas where components bond to the GFRP.

CFRP must be black or black/brown. If the CFRP has white areas, then it may be damaged. Look specially at areas where components bond to the CFRP.

Look carefully at the outer surface of a component. If the paint has cracks or bubbles, then the composite may be damaged. Refer to Paragraph 5 in this Section.

Also look for dents. Look specially in areas where stones can hit the airplane below the fuselage and the wings. Look specially in the areas of the walkways.

B. Light Test

Use the light test to find delamination. Use this test on components which do not have rigid foam inside.

CAUTION: DO NOT LET THE COMPOSITE GET HOT. HEAT CAN CAUSE DAMAGE TO THE COMPOSITE.

Point a very bright light at the surface and look at the other side of the surface. Damage shows as a dark area. You can point the light from the inside of a component or from the outside of a component.

NOTE: You can use the light test on thick GFRP but it is difficult to use on CFRP.

C. Coin Tap Test

Use the coin tap test to find delamination and disbonding. Tap a coin on the laminate surface in the area you will test. The sound of the coin tapping on the surface of the laminate will change as you move the coin over damaged laminate.

Look specially at the area around the damage for secondary damage, which can remain undetected.

5. Further Inspection

If you find paint damage when you examine a composite structure then do this further inspection.

Find a way to see the inside of a structure or a component. If necessary, remove panels (or other components), or you can use remote viewing equipment. For example, remove the wing tip assembly to see inside the wing. If you can see damage inside the component or structure you must do a repair.

Remove the paint coat in the area that you think is damaged. Remove the paint coat carefully, you must not damage the cloth under the paint coat.

Look carefully at the surface. If you find cracks in the composite you must repair the structure.

If you do not find cracks in the composite then do this test. Push the middle of the area to be tested with your thumb. If you can feel the skin hitting the core of a sandwich (or other layer/component), then the skin is disbonded and you must repair the structure.

In some cases you must cut inspection holes in the structure to do the test correctly. If you must cut inspection holes you must seek advice from Diamond Aircraft Industries.

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REPAIR PROCESSES

1. General

This Section tells you how to repair composite structures. Repairs must be carried out by approved persons. Refer to Section 51-00 for data about the types of structures. Refer to Section 51-10 for data about the classification of damage and inspection techniques. Refer to Section 51-30 for data about approved repair materials.

2. Center of Gravity Limits

When you repair an airplane, it is likely that you change the weight of the airplane and the center of gravity. The further the distance of a repair from the center of gravity, the greater the effect will be on the center of gravity. You must always weigh the airplane after a large repair and calculate the center of gravity. Refer to Section 08-10 for data about weighing the airplane.

3. Control Surface Ballancing

When you repair a control surface it becomes heavier. Make an estimate of the new weight of the control surface before you do a repair. If the control surface will be too heavy then do not repair it. You must install a new item.

When you repair a control surface and/or apply a new paint coat you must weigh and balance the control surface. Refer to Section 06-00 for data about weights and balance. Section 51-60 tells you how to balance a control surface.

WARNING: YOU MUST WEIGH AND BALANCE A CONTROL SURFACE AFTER REPAIR OR PAINTING. FAILURE TO BALANCE A CONTROL SURFACE MAY CAUSE THE AIRPLANE TO FAIL IN FLIGHT.

4. Drain/Vent Holes

You must keep all drain and vent holes in the structure of the DA 40 NG open. If you close a drain or vent hole doing a repair you must make a new hole in the same position.

5. Holding the Component

You must hold a component in the correct position when you do a repair. If you do not hold a component correctly it may move when you do the repair and cause further damage. It can also change the airplane alignment.

Hold the component in a special device (jig/fixture) before you cut the repair area. If necessary, lift the airplane on jacks and level the airplane. Refer to Section 07-10 for data about jacking and Section 08-20 for data about leveling the airplane.

6. Safety Precautions

WARNING: DO NOT GET RESIN ON YOUR SKIN. RESIN CAN CAUSE SKIN DISEASE.

Most resins can cause skin disease. When you use resin/hardener use a protective barrier cream on your hands and exposed skin. You must always wear plastic gloves.

WARNING: DO NOT GET RESINS, HARDENERS OR SOLVENTS IN YOUR MOUTH OR IN YOUR EYES. THESE CHEMICALS CAN CAUSE DISEASE.

The resins, hardeners and solvents used for composite repairs are poisonous. You must not take food into the work area. Use a mask to protect your face and use eye-protection.

When you grind composites you make small particles of composite dust. These particles can irritate the skin and eyes. If you breathe these composite particles, they can cause lung disease.

When you grind composite you must always use a protective cream on your hands and on all exposed skin. Wear overalls which seal at the wrists, neck and ankles. You must always wear gloves and if necessary, change them often. Use a suitable mask to protect you face and lungs. Always wear safety goggles to protect your eyes.

WARNING: DO NOT GET COMPOSITE DUST PARTICLES IN YOUR EYES, OR IN YOUR MOUTH, OR ON YOUR SKIN. THESE PARTICLES CAN CAUSE DISEASE.

If your skin comes into contact with composite dust, then wash it off with flowing water. Do not rub your skin while it has dust on it.

7. Workshop Conditions

Keep the workshop clean and free from dust. Remove grinding dust as it occurs. The working area must not be affected by air draughts.

The temperature of the workshop should be maintained between 18 °C (65 °F) and 27 °C (77 °F) and must not fall below 15 °C (59 °F). The relative humidity during mixing, applying or curing or resins must not be allowed to rise above 80 %.

Maintain the workshop temperature as near to 25 °C (77 °F) as possible during curing.

MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you about composite repair processes and how to repair Class 2, 3 and 4 damage to the composite structure. Refer to Section 51-10 for data about damage classification. Class 1 damage may only be repaired in accordance with a repair scheme approved by the manufacturer. All repairs must be carried out by approved persons.

You must only use the materials approved by the manufacturer when repairing the airplane. Refer to Section 51-30 for data about approved materials.

Inspect the damaged area. Look specially at the adjacent structure. Damage can go a long way under the surface. Use the techniques given in Section 51-10.

You must take care to do the repair correctly. The outer shell of a composite structure is stressed. Failure of the structure can cause an accident.

2. Resin

You must use the correct quantity of mixed resin for the repair. Weigh all the cut cloth patches that you will use for the repair. The ratio for glass cloth to mixed resin is 100 : 70. For example, 100 grams of dry glass cloth require 70 grams of mixed resin. The ratio for carbon cloth to mixed resin is 100 : 100. For example, 100 grams of dry carbon cloth require 100 grams of mixed resin.

Measure the quantities of resin and hardener accurately (± 2% by weight). Mix the resin and hardener thoroughly before laminating, or adding fillers or other additives.

Always use clean containers for mixing resin and only mix as much resin as you can use within its pot life.

When using a large quantity of resin put it into a shallow container. This will increase the ratio of surface area to volume which will reduce the risk of an exothermic reaction and can improve pot life.

For parts made from self extinguishing resin use the same resin system for repair (refer to Section 51-30).

3. Glass and Carbon Cloth

CAUTION: EPOXY RESIN CURES IN AN EXOTHERMAL REACTION. DEPENDING ON RESIN/ HARDENER COMBINATION, AND POT LIFE OF THE COMBINATION, AND WORKING TEMPERATURE THE MIXTURE CAN REACH HIGH TEMPERATURES. DO NOT USE HOT RESIN. HOT RESIN CAN INFLAME. PUT IT TO A SAFE LOCATION UNTIL HARDENED.

You must always use the correct cloth for the repair. Refer to the lay-up drawing of the repair area for data about the type of cloths you must use. The lay-up drawing will tell you:

- The correct type of cloth.
- The fiber direction.
- The dimensions of the layer.

Make sure that the fibers in each layer of cloth point in the direction given in the lay-up drawing. This gives the correct strength to the laminate. Only use sharp shears or scissors to cut the cloth to size. Make sure that the fibers in the cut cloth point in the correct relative direction. Make sure that the fiber strands are not broken or damaged. The cloth must be free of any damage or contamination.

4. Core Material

You must always use the correct sandwich core for the repair. Refer to the lay-up drawing of the repair area for data about the type of core you must use.

Make sure that the core material is not damaged or contaminated.

Use a sharp knife to cut the core to the exact size for the repair. The edges of the cut must be clean so that the core will bond correctly. You can profile the core by cutting or sanding.

5. Laminating

A prescribed stack of resin impregnated cloth makes a laminate. A laminate which is used to repair an airplane becomes an integral part of the airplane structure once the laminate is hardened and fully cured.

You can make the laminate in place directly on the repair or you can make the laminate on a work table and then apply the wet laminate to the repair. When you make the laminate on a table:

- It is easier to do.
- It is easier to control and correct the laminating process.
- You can make sure that the cloth layers in the stack are correct before you apply the resin.
- You can make the repair neater.
- You do not have to work upside down.

A. Laminating in Place.

	Detail Steps/Work Items	Key Items/References
(1)	Prepare the damaged area for laminating. Make sure that the repair is clean and free from contamination.	Refer to the relevant repair procedure in this Section.
(2)	Prepare the layers of cloth that you will use.	Refer to the lay-up drawing.
(3)	Protect the area of the structure around the repair from contamination by the repair materials.	Use plastic/polythene sheet material held in place by self adhesive tape.
	WARNING: DO NOT GET RESIN ON YOUR SKIN. RESIN CAN CAUSE SKIN DISEASE. **WARNING: DO NOT GET RESINS, HARDENERS OR SOLVENTS IN YOUR MOUTH OR IN YOUR EYES. THESE CHEMICALS CAN CAUSE DISEASE.**	
(4)	Apply a thin coat of resin to the repair.	
(5)	Apply the first layer of cloth to the repair and trim to the correct size.	Make sure that the fibers in the cloth point in the correct direction.
(6)	Use a roller, squeegee and a stipple brush to remove all trapped air. Make sure that the cloth is completely impregnated with resin. If necessary, add more resin.	
(7)	When the excess resin has been brought to the surface with the rolling and stippling process, apply the next layer of cloth. Trim the cloth to the correct size.	Make sure that the fibers in the cloth point in the correct direction.
(8)	Do steps 6 and 7 as necessary until all the layers of cloth are in place.	
(9)	Use the roller and squeegee to remove the excess resin.	
(10)	Put a layer of peel ply over the laminate.	
(11)	If necessary, apply a vacuum bag to the laminate.	Refer to the lay-up drawing and/or repair drawing.

B. Laminating on a Table.

	Detail Steps/Work Items	Key Items/References
(1)	Prepare the damaged area for laminating. Make sure that the repair is clean and free from contamination.	Refer to the relevant repair procedure in this Section.
(2)	Protect the area of the structure around the repair from contamination by the repair materials.	Use plastic/polythene sheet material held in place by self adhesive tape.
(3)	Put a layer of clean transparent plastic / polyethylene sheet over the repair and hold it in place with self adhesive tape.	Colored sheet should be preferred.
(4)	Use an indelible felt marker to: - Trace onto the plastic sheet the extreme outline of the repair. - Trace onto the plastic sheet the contour lines of each layer of cloth in the structure.	The outer layer of the structure must be tapered to avoid stress risers and to give a good finish.
(5)	Remove the transparent sheet from the structure and place it upside down on a work table.	
	NOTE: The cloth layers are laid in reverse order when you laminate on a table. You must take care to put the cut cloth layers in the correct order and that the fibers in each cloth layer point in the correct direction.	
(6)	Cut the layers of cloth to fit the contour lines that you traced onto the transparent sheet.	
	WARNING: DO NOT GET RESIN ON YOUR SKIN. RESIN CAN CAUSE SKIN DISEASE. **WARNING: DO NOT GET RESINS, HARDENERS OR SOLVENTS IN YOUR MOUTH OR IN YOUR EYES. THESE CHEMICALS CAN CAUSE DISEASE.**	
(7)	Apply a thin coat of resin to the transparent sheet.	
(8)	Apply the first inner layer of cloth to the transparent sheet and trim to the correct size.	Make sure that the fibers in the cloth point in the correct direction.

	Detail Steps/Work Items	Key Items/References
(9)	Use a roller, squeegee and a stipple brush to remove all trapped air. Make sure that the cloth is completely impregnated with resin. If necessary, add more resin.	
(10)	When the excess resin has been brought to the surface with the rolling and stippling process, apply the next layer of cloth. Trim the cloth to the correct size.	Make sure that the fibers in the cloth point in the correct direction.
(11)	Do steps 9 and 10 as necessary until all the layers of cloth are in place.	
(12)	Apply a thin coat of resin to the area of the repair on the structure where you will attach the laminate patch.	
(13)	Put the laminate patch carefully into position on the structure using the transparent sheet.	Make sure that the fibers in the cloths point in the correct direction.
(14)	Carefully remove the transparent sheet from the laminate patch.	
(15)	Use a roller to make sure that the laminate patch is firmly in position and that any excess resin is removed from the repair laminate.	
(16)	Put a layer of peel ply over the laminate.	
(17)	If necessary, apply a vacuum bag to the laminate.	Refer to the lay-up drawing and/or repair drawing.

Table 1 : Bonding Paste Mixing Table

Material	Weight in Grams								
Mixed Resin	500	100	150	200	250	300	350	400	450
Cotton Flocks	6	11.5	17	23	29	34.5	40	46	52
Aerosil	1.4	2.8	4.2	5.5	6.9	8.3	9.7	11.1	12.5

6. Bonding Paste (Thickened Resin)

CAUTION: TO BOND PARTS MADE OR REPAIRED WITH SELF EXTINGUISHING RESIN, YOU MUST USE SELF EXTINGUISHING RESIN TO MIX THE BONDING PASTE (REFER TO SECTION 51-30).

Use bonding paste to bond GFRP/CFRP components together and in the repair of sandwich cores. Resin and thickening fillers make bonding paste. Table 1 gives you the proportions by weight of resin to thickening fillers. You can change the proportions of Aerosil and Microballoons relative to each other but you must keep the total weight of the Aerosil/Microballoon mix constant.

7. Curing

You must cure a composite structure to make it strong. If you do not cure a composite structure correctly it may fail. Curing is a two part process, pre-curing and post-curing. The following procedure gives a typical curing process.

	Detail Steps/Work Items	Key Items/References
(1)	Maintain the temperature of the repair at 20 °C to 25 °C (68 °F to 77 °F) for at least 24 hours to pre-cure the repair.	If you do not have an oven or a warming room you can make a temporary enclosure around the repair to trap the heat from a flame proof air heater.
CAUTION: DO NOT ALLOW A TOO HIGH TEMPERATURE DURING THE CURE. A TOO HIGH TEMPERATURE CAN DAMAGE THE COMPOSITE STRUCTURE.		
(2)	After 24 hours raise the temperature of the repair to at least 65 °C (149 °F) for a minimum of 6 hours to complete the first stage of the post-cure.	Monitor the temperature every 15 minutes for the first hour and then hourly.
(3)	After a minimum of 6 hours raise the temperature of the repair to at least 80 °C (176 °F). Maintain this temperature for a minimum of 14 hours to complete the final post-cure.	The final stage post-cure time can be divided into sections but you must make sure that the repair has a minimum total of 14 hours at post-cure temperature.

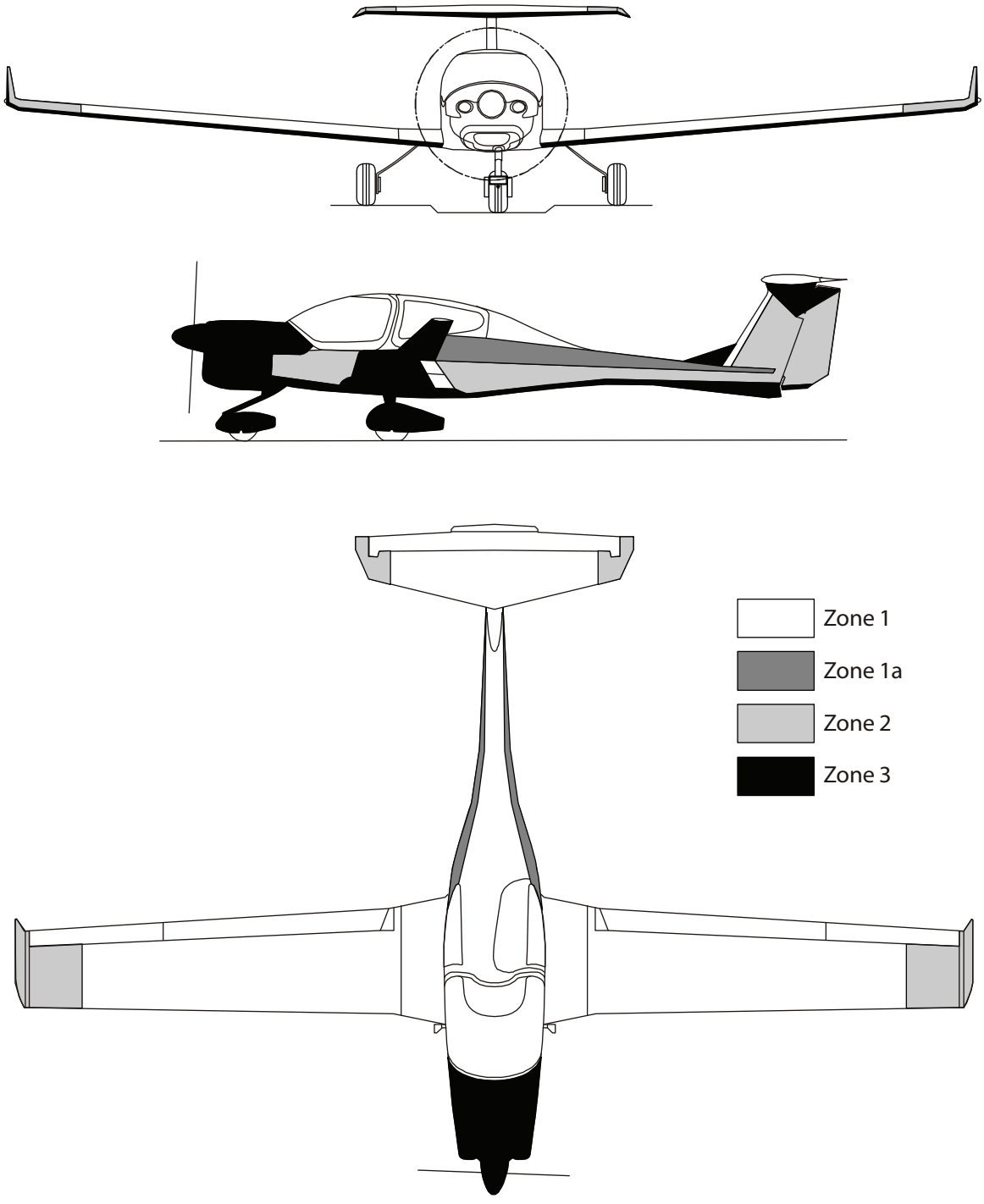


Figure 201 : Paint Color Scheme

8. Exterior Paint Finish

A. Paint Color Scheme.

CAUTION: YOU MUST PAINT THE AIRPLANE TO THE PAINT COLOR SCHEME. IF YOU DO NOT PAINT THE AIRPLANE TO THE PAINT COLOR SCHEME, YOU MAY CAUSE DAMAGE TO THE AIRPLANE STRUCTURE.

Since full strength of the fiber composite structure has only been shown up to a temperature of 54° C (129° F), the outer surface of the airplane must be painted white in accordance with Chapter 04 of this manual.

Exceptions are registration markings, warning markings, trim or striping, which are subject to the following restrictions (refer to Figure 201):

- Zone 1. No registration markings, warning markings, trim or striping, may be applied here, except for the placards in accordance with Section 11-20.

- Zone 1a. This zone has the same restrictions as Zone 1, except that registration marks may be applied here which comply with the restrictions of Zone 2.

- Zone 2. Registration markings, warning markings, trim or striping, may be applied here. They may be any shape and color, provided that the average absorption coefficient of each area measuring 200 mm by 200 mm (8 in by 8 in) does not exceed 0.5. Examples which meet this criterion are:

    - Registration markings, warning markings, trim or striping, of any shape, provided that colors with a solar absorptivity not exceeding 0.5 (e.g. light yellow or light green) are used.

    - Registration markings, warning markings, trim or striping, of any color, provided that no area measuring 200 mm by 200 mm (8 in by 8 in) is covered by more than 50%. One consequence is that the width of decoration stripes must not exceed 100 mm (4 in).

- Zone 3. Registration markings, warning markings, trim or striping, of any shape and color may be applied here without restrictions.

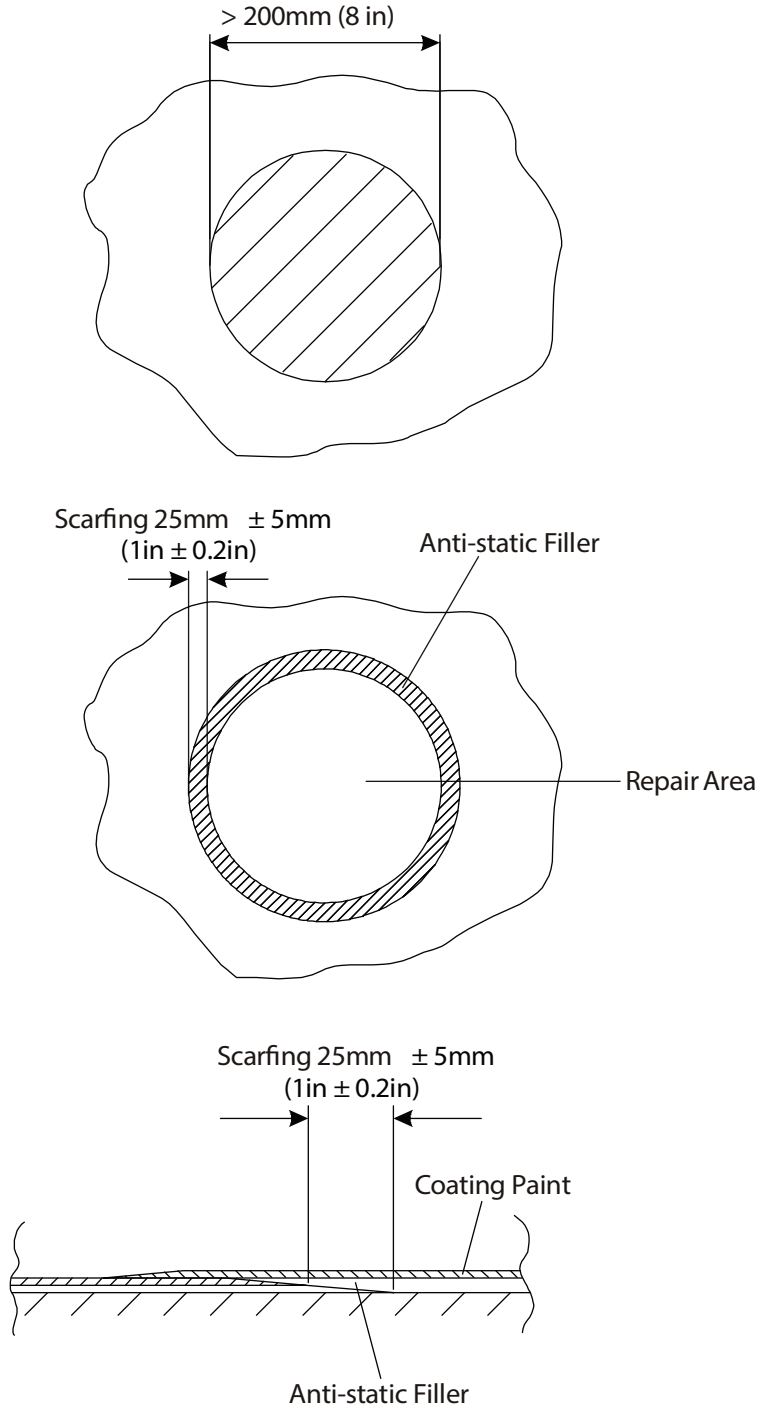


Figure 202 : Scarfing the Paint Coat

B. Painting a Large Repair Area.

Refer to Figure 202. This procedure must be followed when the diameter of the area which must be painted is larger than 200 mm (8 in).

	Detail Steps/Work Items	Key Items/References
(1)	Carefully scarf the edges of the existing paint finish.	Do not sand through the existing anti-static filler. Minimum scarf length: 25 mm (1 in). To ensure that the anti-static filler of the existing paint is electrically connected to the anti-static filler of the new paint.
WARNING: **DO NOT GET ACETONE, FILLER, OR PAINT ON YOUR SKIN. ACETONE, FILLER, AND PAINT CAN CAUSE SKIN DISEASE.** **WARNING:** **DO NOT BREATHE ACETONE, FILLER, OR PAINT FUMES. ACETONE, FILLER, AND PAINT FUMES CAN CAUSE DISEASE.** CAUTION: THERE MUST BE NO GREASE OR DUST ON THE REPAIR AREA. GREASE AND DUST PREVENT A GOOD BOND.		
(2)	Make sure that the area to be repaired is clean and free from any contaminants.	If necessary, use acetone and re-sand the area.
(3)	Apply HS filler to the repair area.	Obey the filler manufacturer's instructions.
(4)	Allow the HS filler to cure.	Two hours at 45 °C (113 °F).
(5)	Lightly sand the HS filler with 320 grit sanding paper.	
(6)	Make sure that the area to be repaired is clean and free from any contaminants.	If necessary, use acetone and re-sand the area.
(7)	Apply two layers of anti-static spray filler to the repair area.	Obey the filler manufacturer's instructions.
(8)	Allow the anti-static filler to dry.	At 20 °C to 25 °C (68 °F to 77 °F), 60 to 75 % relative humidity.
(9)	Carefully sand the anti-static filler with 320 grit sanding paper.	Remove as little anti-static filler as possible. Do not sand through the edges.
(10)	Make sure that the area to be repaired is clean and free from any contaminants.	If necessary, use acetone and re-sand the area.

	Detail Steps/Work Items	Key Items/References
(11)	Apply the coating paint.	Obey the paint manufacturer's instructions.
(12)	Allow the coating paint to dry.	90 minutes at 45 °C (113 °F), then two days at 20 °C (68 °F).

C. Painting a Small Repair Area.

This procedure must be followed when the diameter of the area which must be painted is 200 mm (8 in) or less.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT GET ACETONE, FILLER, OR PAINT ON YOUR SKIN. ACETONE, FILLER, AND PAINT CAN CAUSE SKIN DISEASE. **WARNING: DO NOT BREATHE ACETONE, FILLER, OR PAINT FUMES. ACETONE, FILLER, AND PAINT FUMES CAN CAUSE DISEASE.** CAUTION: THERE MUST BE NO GREASE OR DUST ON THE REPAIR AREA. GREASE AND DUST PREVENT A GOOD BOND.	
(1)	Make sure that the area to be repaired is clean and free from any contaminants.	If necessary, use acetone and re-sand the area.
(2)	Apply 2 layers of HS filler to the repair area.	Obey the filler manufacturer's instructions.
(3)	Allow the HS filler to cure.	Two hours at 45 °C (113 °F).
(4)	Lightly sand the HS filler with 320 grit sanding paper.	
(5)	Make sure that the area to be repaired is clean and free from any contaminants.	If necessary, use acetone and re-sand the area.
(6)	Apply the coating paint.	Obey the paint manufacturer's instructions.
(7)	Allow the coating paint to dry.	90 minutes at 45 °C (113 °F), then two days at 20 °C (68 °F).

D. Coated Safety Walk Repair (if OÄM 40-317 is installed).

(1) Equipment.

Item	Quantity	Part Number
Safety walk substrate sprinkler.	1	DAI-9011-20-03_LV.
Plastic spattle.	1	Commercial.

(2) Material.

Item	Quantity	Part Number
Safety walk cover LH.	1	D41-1120-20-01_LV.
Safety walk cover RH.	1	D41-1120-20-02_LV.
Fill-in 2 K 400 ml RAL 7038.	3	22101980.
Safety walk substrate.	0.5 kg	DAI-9011-20-03.

(3) Repair Procedure.

	Detail Steps/Work Items	Key Items/References
	WARNING: WHEN HANDLING CHEMICALS ALWAYS OBSERVE HEALTH AND SAFETY REGULATIONS GIVEN BY THE MANUFACTURER OF THE CHEMICALS.	
(1)	Clean the entire area between fuselage and rootribs (LH and RH sides). Use water to remove dirt from the surface. If necessary, add a mild cleaning agent.	Refer to Section 12-30.
(2)	Use a commercial solvent to remove grease from the surface. The surface must be totally clean from grease or dirt.	
(3)	Place the safety walk covers (note LH and RH sides) on the center wing and mark the positions with a pencil on the middle wing surface.	Refer to Figure 203.
(4)	Make sure that the safety walk cover orientation is parallel to flight direction.	
(5)	Remove the protective layer from the safety walk cover.	
(6)	Place the safety walk cover corresponding to the marks on center wing (don't use soap water) and remove the transfer foil smoothly.	
(7)	Remove air bubbles from the edges of the cutouts with a plastic spattle.	
(8)	Prepare the surface at the cutouts of the safety walk cover: - Carefully roughen the paint with sandpaper (grit 320), for the ends of strips use red Scotch-Brite.	
(9)	Clean the surface at the safety walk cutouts with a vacuum cleaner and silicon remover	
(10)	Cover the airplane's surface around the safety walk cover.	

	Detail Steps/Work Items	Key Items/References
(11)	Prepare lacquer P/N 22101980 in acc. with the technical information sheet. Shake 2 minutes before and after operating the red button. Press red button with the ball of your hand until stop is reached.	
(12)	Spray a thick film at the cutouts of the safety walk cover.	
(13)	Use safety walk substrate sprinkler to apply safety walk substrate evenly over cutouts.	
(14)	Apply a second layer of lacquer: - Make sure the whole substrate is evenly covered with a sufficient amount of paint.	
(15)	Carefully pull off the safety walk cover starting from one edge. Remove the cover in direction of the strips within 15 minutes.	
(16)	Let the system dry for 12 hours in a dry and weather protected area at temperatures from 20 to 30°C (68 to 86 °F).	
(17)	Remove the cover from the airplane surface.	

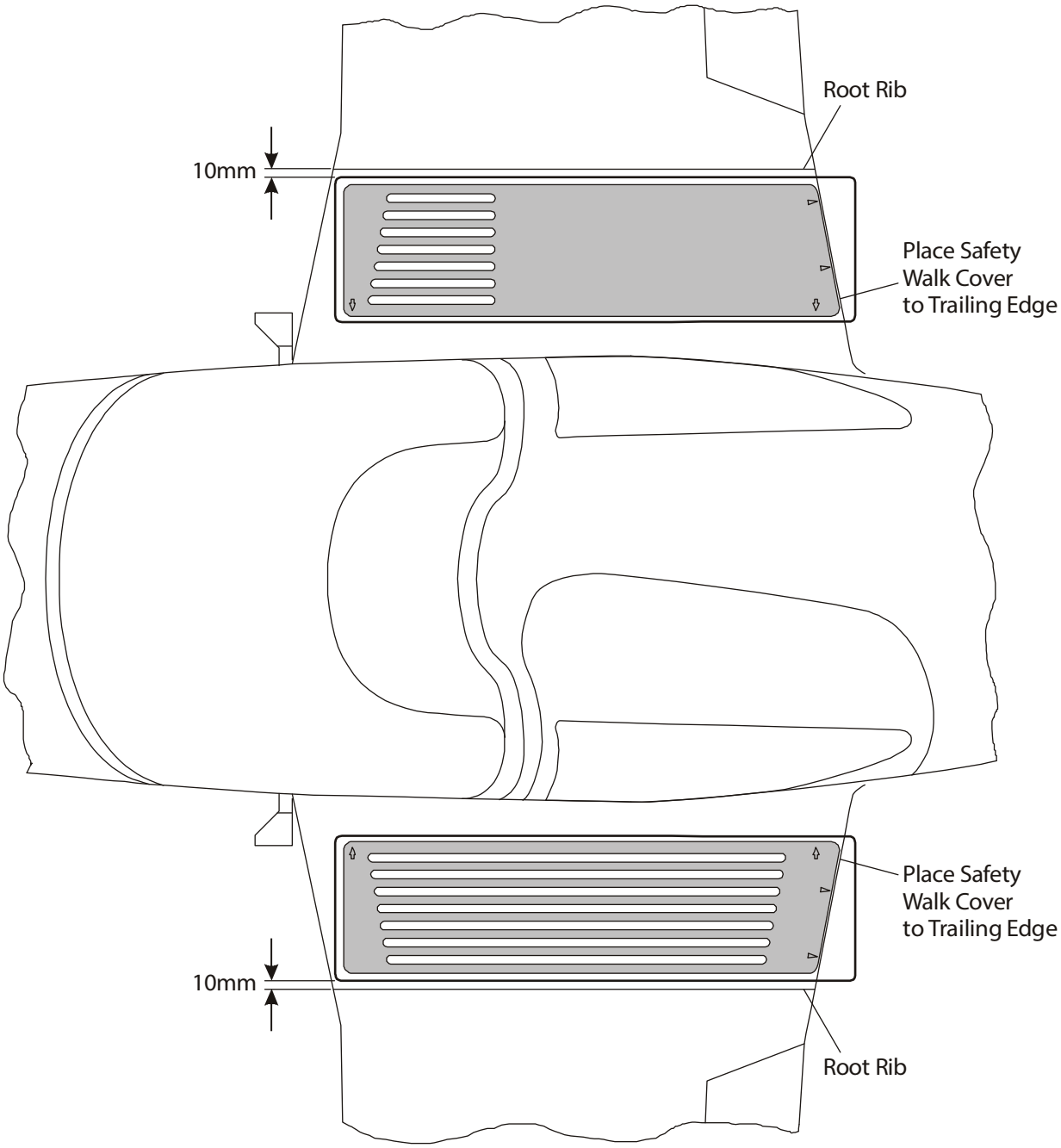


Figure 203 : Safety Walk Cover Positioning

9. Repairs

A. Class 4 Repairs.

The repair of minor scratches, abrasions or similar damage which is not a crack or a puncture in the skin.

	Detail Steps/Work Items	Key Items/References
WARNING: DO NOT GET ACETONE, FILLER, OR PAINT ON YOUR SKIN. ACETONE, FILLER, AND PAINT CAN CAUSE SKIN DISEASE. **WARNING: DO NOT BREATHE ACETONE, FILLER, OR PAINT FUMES. ACETONE, FILLER, AND PAINT FUMES CAN CAUSE DISEASE.**		
(1)	Sand the repair area with 150 grit sanding paper.	
(2)	Make sure that the area to be repaired is clean and free from any contaminants.	If necessary, use acetone.
(3)	Apply putty to the repair area to fill any damage.	Obey the putty manufacturer's instructions. Fill to the original contour of the structure.
(4)	Allow the putty to cure.	5 to 20 minutes.
(5)	Lightly sand the putty with 150 grit sanding paper.	
(6)	Apply filler(s) and paint coat.	Refer to Paragraph 8.

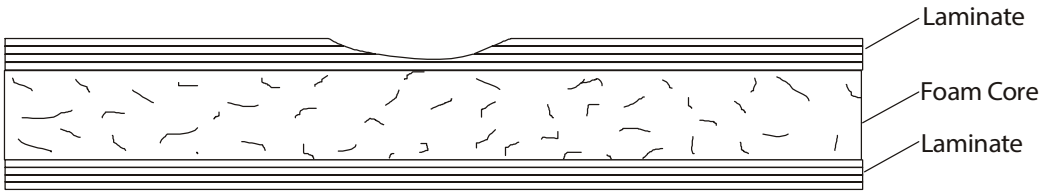
Table 2 : Material Specifications

WLB No. (German Aviation Standard)	Manufacturer and Type	Material	Weave	Weight per unit area [g/m^2]	Thickness [mm]	Scarf [mm]
8.4548.60	Interglas 92110	glass	2/2 twill	163	0.17	7
8.4551.60	Interglas 92125	glass	2/2 twill	280	0.30	12
8.4554.60	Interglas 92140	glass	2/2 twill	390	0.43	18
8.4520.6	Interglas 92145	glass	uni-directional	220	0.23	19
8.4525.60	Interglas 92146	glass	uni-directional	425	0.43	35
8.3520.80	Interglas 98141 Cramer CCC 452	carbon	2/2 twill	200	0.30	18
	Cramer CCC 459 Al	carbon with aluminum	2/2 twill	220	0.32	20
	SGL Sigratex KDU 1034	carbon	uni-directional tape	380	0.40	80

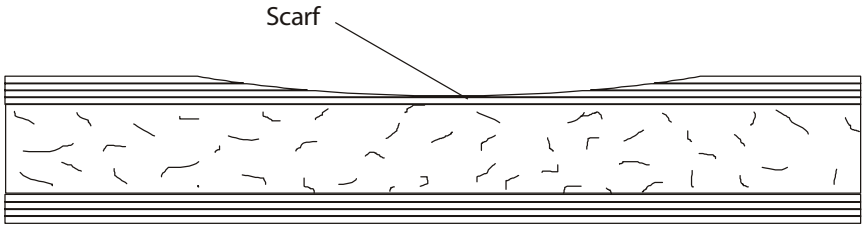
B. Class 3 Repairs.

Small holes or cracks in the outer skin where there is no internal damage to the component, the sandwich material, or the inner skin.

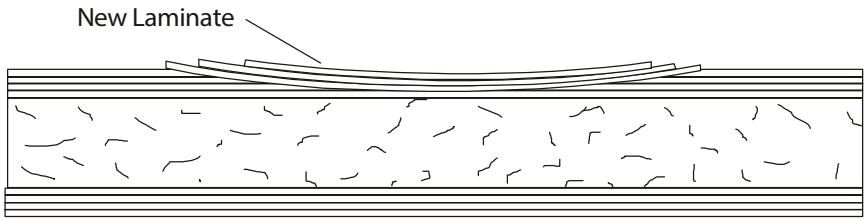
	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the area around the damage is clean.	
(2)	Carefully examine the area around the damage. Look specially for disbonding between the inner laminate layers and any core material.	Do a coin tap test to find the extent of any disbonding or delamination.
(3)	Remove damaged/loose laminate until the edges of the laminates bond together and to any core material.	Refer to Figure 204. Use a sharp knife or grinding disk.
(4)	Scarf the edges of the repair area with a grinding disk or block.	Refer to Table 2 for data about the scarf size.
(5)	Count the layers of fabric that you will need to replace.	Refer to the lay-up drawing for the related structure for data about the cloth type and orientation.
	WARNING: DO NOT GET ACETONE ON YOUR SKIN. ACETONE CAN CAUSE SKIN DISEASE. **WARNING: DO NOT BREATHE ACETONE FUMES. ACETONE FUMES CAN CAUSE DISEASE.**	
	CAUTION: THERE MUST BE NO GREASE OR DUST ON THE REPAIR AREA. GREASE AND DUST PREVENT A GOOD BOND.	
(6)	Clean the area of the repair.	If you use acetone to remove any grease or dirt then you must re-sand the repair area.
	WARNING: DO NOT GET RESIN ON YOUR SKIN. RESIN CAN CAUSE SKIN DISEASE. **WARNING: DO NOT GET RESINS, HARDENERS OR SOLVENTS IN YOUR MOUTH OR IN YOUR EYES. THESE CHEMICALS CAN CAUSE DISEASE.**	
(7)	Repair the laminate.	Use one of the two methods given in Paragraph 5.



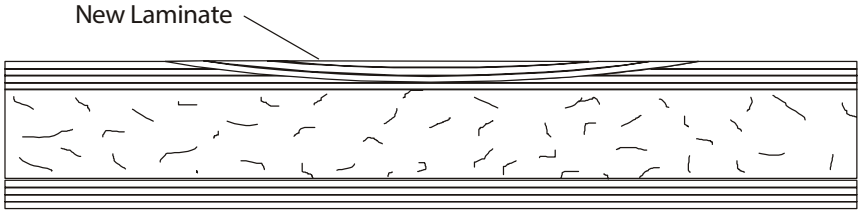
Remove Damaged /Loose Laminate



Scarf the Edges of the Repair Area



Repair the Laminate



Contour the Laminate

Figure 204 : Typical Class 3 Repair

	Detail Steps/Work Items	Key Items/References
(8)	Pre-cure the repair.	Refer to Paragraph 7.
(9)	Post-cure the repair.	Refer to Paragraph 7.
(10)	When the repair is fully post cured, remove the peel ply and sand smooth the surface of the repair.	
(11)	Contour the repair so that the final surface level of the repair is slightly lower than the original surrounding area.	Use 150 grit sanding paper. To allow for the paint coat.
(12)	Apply filler(s) and paint coat.	Refer to Paragraph 8.

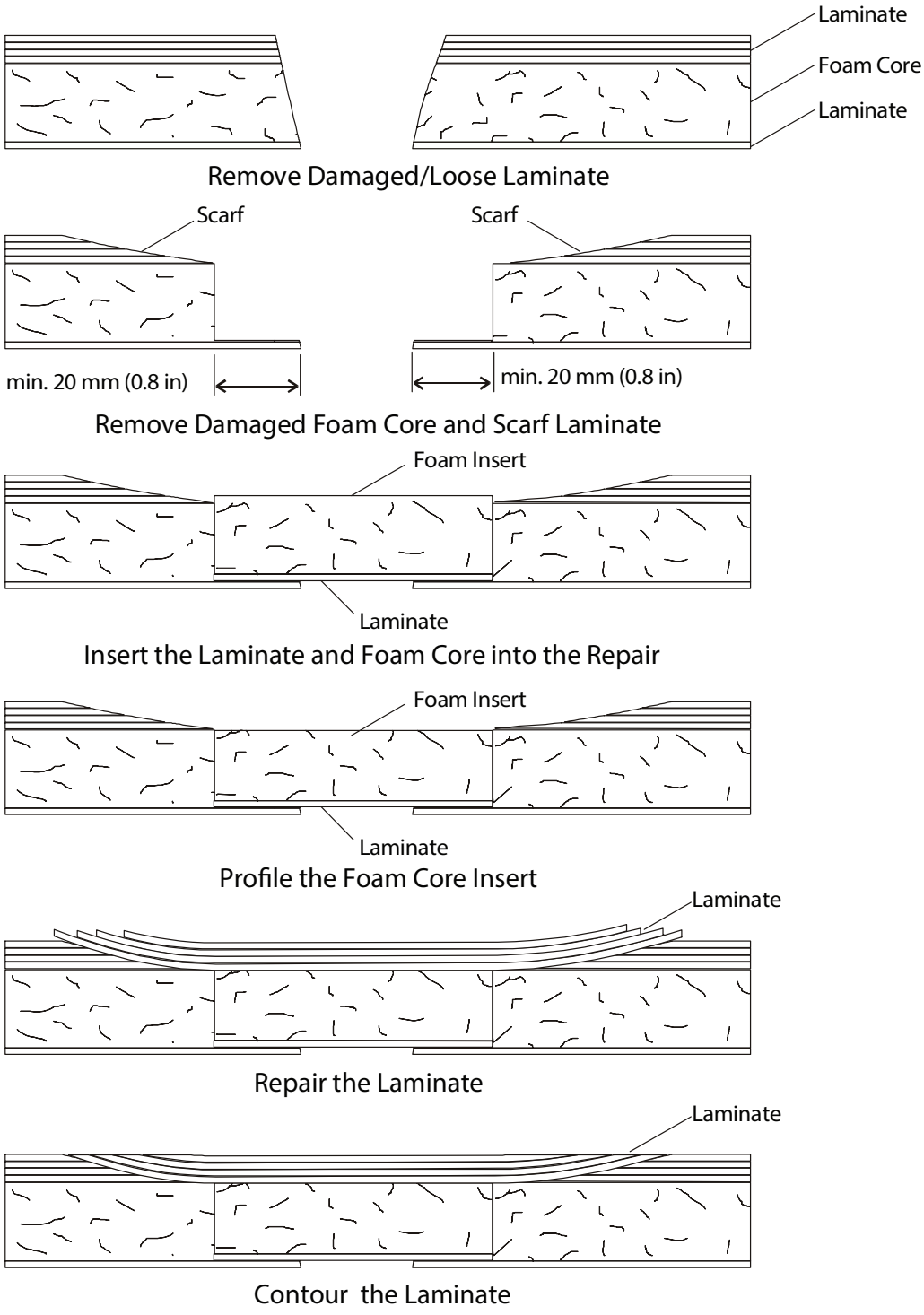


Figure 205 : Typical Class 2 Repair

C. Class 2 Repairs.

Holes and cracks passing through both skins of a sandwich construction component. The core damage must be able to be covered by a 75 mm (3 in) diameter circle.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the area around the damage is clean.	
(2)	Carefully examine the area around the damage. Look specially for disbonding between the inner laminate layers and any core material.	Do a coin tap test to find the extent of any disbonding or delamination.
(3)	Remove exterior laminate which is damaged or has become disbonded from the foam core. The edge of the laminate must bond to the foam core	Refer to Figure 205.
(4)	Remove the damaged foam core.	Remove sufficient foam core to give a minimum of a 20 mm (0.8 in) edge around the outside of the damaged area. Refer to Figure 204.
(5)	Scarf the edges of the external laminate repair area with a grinding disk or block.	Refer to Table 2 for data about the scarf size.
WARNING: **DO NOT GET ACETONE ON YOUR SKIN. ACETONE CAN CAUSE SKIN DISEASE.** **WARNING:** **DO NOT BREATHE ACETONE FUMES. ACETONE FUMES CAN CAUSE DISEASE.** CAUTION: THERE MUST BE NO GREASE OR DUST ON THE REPAIR AREA. GREASE AND DUST PREVENT A GOOD BOND.		
(6)	Clean the area of the repair.	Use acetone only if any grease or dirt comes to the surface of the repair.
(7)	Cut and shape a piece of foam core to replace the damaged foam core that you removed in step 4.	Use a sharp knife to cut the foam.
(8)	Prepare the layers of cloth that you will need to laminate on the inner surface of the foam core.	Refer to the lay-up drawing for the related structure for data about the cloth type and orientation.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT GET RESIN ON YOUR SKIN. RESIN CAN CAUSE SKIN DISEASE. **WARNING: DO NOT GET RESINS, HARDENERS OR SOLVENTS IN YOUR MOUTH OR IN YOUR EYES. THESE CHEMICALS CAN CAUSE DISEASE.**	
(9)	Prepare the foam core for inserting in the repair: - Apply a thin coat of resin to the foam core. - Apply a coat of thickened resin to the foam core. - Laminate the inner layers of cloth onto the inner surface of the foam core. Make sure that the fibers in the cloth point in the correct direction.	Refer to Paragraph 6. Use one of the two methods given in Paragraph 5.
(10)	Apply a thin coat of resin to the area to be repaired.	
(11)	Put the foam core and inner laminate into position in the repair.	
(12)	Pre-cure the repair.	Refer to Paragraph 7.
(13)	Use a sanding disk or block to contour the foam core to the correct shape.	Refer to Figure 205.
(14)	Clean the repair.	
(15)	Apply a coat of thickened resin to the foam core of the repair.	
(16)	Apply a thin coat of resin to the scarfed edges of the outer laminate of the repair.	
(17)	Repair the outer laminate.	Use one of the two methods given in Paragraph 5.
(18)	Pre-cure the repair.	Refer to Paragraph 7.
(19)	Post-cure the repair.	Refer to Paragraph 7.

	Detail Steps/Work Items	Key Items/References
(20)	When the repair is fully post cured, remove any peel ply and sand smooth the surface of the repair.	
(21)	Contour the repair so that the final surface level of the repair is slightly lower than the original surrounding area.	Use 150 grit sanding paper. To allow for the paint coat.
(22)	Apply filler(s) and paint coat.	Refer to Paragraph 8.

MATERIALS

1. General

You must only use approved materials from approved sources to repair the DA 40 NG airplane.

NOTE: If the approved material for the repair work is not available please contact Diamond Aircraft Industries for information about alternative materials.

2. Approved Materials

A. Resin System.

Resin : L 285

Hardener : H 286 (Alternatively H285 or H287)

Mixture : 100 parts resin and 40 ± 2 parts hardener (by weight)

CAUTION: THE RESIN SYSTEM L940/ H286 IS A SELF EXTINGUISHING SYSTEM AND IS APPROVED FOR COWLING PARTS ONLY.

Resin : L 940 (self extinguishing)

Hardener : H 286

Mixture : 100 parts resin and 21 ± 2 parts hardener (by weight)

Supplier : Hexion Speciality Chemicals Stuttgart GmbH
Am Ostkai 21/22
D-70327 Stuttgart, Germany
Phone: +49-711-323081
Fax: +49-711-3280041

B. Fire Resistant Resin System.

(1) Resin System.

Resin : Biresin® CR132 FR

Hardener : CH132-2 or CH132-5

Mixture : 100 parts resin and 20 parts hardener (by weight)

Supplier : Sika Deutschland GmbH
Subsidiary Bad Urach
Stuttgarter Strasse 139
D - 72574 Bad Urach
Germany
Phone : +49 (0) 7125 940 492
Fax : +49 (0) 7125 940 401

(2) Pigment.

Pigment : Universal Colour Paste deep black (RAL 9005)

Part number : 1321300

Mixture : 100 parts resin/hardener mix and 5 parts pigment (maximum, by weight)

Supplier : R&G Faserverbundwerkstoffe GmbH
Headquarters: Im Meißel 7
Logistics center: Bonholzstr. 17
71111 Waldenbuch
Germany
Phone: : +49 (0) 7157 530460
Fax:: +49 (0) 7157 530470

C. Glass Fiber Cloth.

WLB No. (German Aviation Standard)	Weave	Weight per Unit Area [g/m²]	Interglas Type	Porcher Type
8.4548.60	2/2 twill	163	92110	917
8.4551.60	2/2 twill	280	92125	3063
8.4554.60	2/2 twill	390	92140	1989
8.4520.6	UD	220	92145	
8.4525.60	UD	425	92146	

All cloth types consist of alkali free E-glass with I 550 or PT 55 finish and comply with LN 9169 (German aviation standard).

Supplier for Interglas fabric : Rudolf Usner GmbH
Am Ausferngenufer 4
A-5400 Hallein, Austria
Phone : +43-6245-81516
Fax : +43-6245-81516-40

Supplier for Porcher fabric : Porcher Industrietextilien GmbH
Holzgraben 13/15
D-52062 Aachen, Germany
Phone : +49-241-48225
Fax : +49-241-48229

D. Carbon Fiber Cloth.

WLB No. (German Aviation Standard)	Weave	Mass per Unit Area [g/m²]	Interglas Type	CramerType	SGLType
8.3520.80	2/2 twill	200	98141	CCC 452	
	2/2 twill with aluminum fibers	220		CCC 459Al	
	UD tape	380			Sigratex KDU 1034

The cloth complies with LN 9169 (German aviation standard).

Supplier for Interglas fabric : Rudolf Usner GmbH (see Page3 for Supplier info)

Supplier for Cramer fabric : CCC C. Cramer & Co
Postfach 2163
D-48616 Heek-Nienborg, Germany
Phone : +49-2568-9315-34
Fax : +49-2568-9315-93

Supplier for SGL tape : SGL Technik GmbH
Wernen von Siemens-Str. 8
D-86405 Meitingen, Germany
Phone: +49-8271-832152
Fax: +49-8271-831427

E. Peel Ply.

Type : PA 20-63, compliant with LN 98690

Supplier : Strübel Vertriebs GbR
Herrlingerstr. 36/1
D-89081 Ulm, Germany
Phone: +49-731-388577-1, -2
Fax: +49-731-9387353Sandwich Core Material.

F. Sandwich Core Material.

Type : PVC rigid foam Divinycell H 60

Thickness : 3 mm, 6 mm, 8 mm

Supplier : Conti Tech Kautschuk- und KunststoffvertriebsgesmbH
Industriestr. 31
A-2353 Guntramsdorf, Austria
Phone: +43-2236-49101-0
Fax: +43-2236-49101-49

Type : Airex C70.55, Airex C71.55

Manufacturer : Alcan

Supplier : Polychem HandelsgesmbH
Markt Allhau Nr. 463
A-7411 Markt Allhau, Austria
Phone: +43-3356-20444
Fax: +43-3356-20445
E-Mail: chemie@polychem.at

G. Fillers for Resin.

(1) Cotton Flakes FB1/035.

Supplier : Rudolf Usner GmbH (see Page 3 for Supplier info)

(2) Silcell 300.

Supplier : Joh. Klinglhuber & Söhne Handelsgesellschaft mbH
Wallgasse 21
A-1060 Vienna, Austria
Phone: +43-1-5974712-0
mFax: +43-1-5974712-16

(3) Aerosil 380

Supplier : Polychem HandelsgesmbH
Markt Allhau Nr. 463
A-7411 Markt Allhau, Austria
Phone: +43-3356-20444
Fax: +43-3356-20445
E-Mail: chemie@polychem.at

H. Exterior Paint.

(1) Putty

(a) Putty : Sikkens Polysoft

Manufacturer : Akzo Nobel

Supplier : Akzo Nobel Coatings GesmbH
Baudißg. 10
A-1110 Vienna, Austria
Phone: +43-1-7674488
Fax: +43-1-7674488-33

OR

(b) Putty : ICI P551-1052

Manufacturer : ICI Paints, Berkshire, Great Britain

Supplier : ICI Autocolor der PPG (Austria) Handels GmbH
Rautenweg 15
A-1220 Vienna, Austria
Phone: +43-1-2562704-53
Fax: +43-1-2562700-47

(2) HS Filler

Filler : HS Filler ICI P565-889

Manufacturer : ICI Paints, Berkshire, Great Britain

Supplier : ICI Autocolor (see Page 6 for Supplier info)

(3) Anti Static Filler

Antistatic filler : Durodur spray filler 2923-011P

Manufacturer : Morton International GmbH, Strullendorf, Germany

Supplier : Lorenz Industrielacke
Wiener Str. 22
A-3002 Purkersdorf, Austria
Phone: +43-2231-633499
Fax : +43-2231-61503

(4) Coating Paint

(a) Durodur

Coating paint : Durodur 3067-R916g; color: RAL 9016 (white) or DB 147 (white)

Manufacturer : Morton International GmbH, Strullendorf, Germany

Supplier : Lorenz Industrielacke (see above)

OR

(b) ICI

Coating paint : ICI Turbo Plus P488-1111; color RAL 9016 (white) or DB 147 (white)

Manufacturer : ICI Paints, Berkshire, Great Britain

Supplier : ICI Autocolor
Bachstr. 75
A-5020 Salzburg, Austria
Phone: +43-662-643681
Fax: +43-662-643686

I. Interior Paint.

(1) Putty

(a) Putty : Sikkens Polysoft

Manufacturer : Akzo Nobel

Supplier : Akzo Nobel Coatings GesmbH (see Page 6 for Supplier info)

OR

(b) Putty : ICI P551-1052

Manufacturer : ICI Paints, Berkshire, Great Britain

Supplier : ICI Autocolor (see Page 6 for Supplier info)

(2) Coating Paint

Glare shield : Nuvovern DS 10/1 + Nuvovern ACR

Instr. panel cover : Nuvovern DS 10/1 + Nuvovern ACR

Other interior parts : Nuvovern DS 10/1

Manufacturer : Mäder Lacke AG, Killwangen, Switzerland

Supplier : Walter Mäder GmbH
Wiener Str. 99
A-2514 Traiskirchen, Austria
Phone: +43-2252-53038
Fax: +43-2252-52297

J. Fire Retardant Paint.

(1) Courtaulds

Fire retardant paint	: Courtaulds Aerospace N 56582/T508 (white)
Finishing varnish	: Courtaulds Aerospace 4232-0303
Hardener	: Courtaulds Aerospace N 39/1327 (4:1)
Supplier	: PRO-DeSoto Deutschland GmbH Aerospace Coatings Lauenburger Landstr. 11 D-21039 Börnsen, Germany Phone: +49-40-742193-10 Fax: +49-40-742139-69

(2) Hensel

Fire retardant paint	: Hensotherm 2 KS (white)
Coating paint	: Hensotop 84 f
Supplier	: Rudolf Hensel GmbH Lack- und Farbenfabrik Süderstraße 235 D-20537 Hamburg, Germany Phone: +49-40-214093 Fax: +49-40-214783

K. Acrylic Glass Cement

Acrylic glass cement	: Polymerization cement Acrifix 192
Manufacturer	: Röhm, Darmstadt, Germany
Supplier	: Röhm Austria GmbH

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FASTENERS

1. General

This Section tells you about the fasteners used to attach panels and cowlings.

2. Description

The DA 40 NG has two main types of fastener. It has quick release cam-lock fasteners for panels which you remove often, for example, engine cowling, and screws for all the other access panels.

Figure 1 shows the quick-release cam-lock fastener. The fastener has three parts, a receptacle with a cam track, a grommet and a stud. Rivets attach the receptacle to the airplane structure. A spring ring attaches the stud assembly to the access panel and a compression spring holds the stud in the stud assembly.

The T-shaped end of the stud locates in a slot in the receptacle. When you turn the stud clockwise through 90° it engages the cam track in the receptacle and pulls the access panel into position. When the stud is turned fully 90° clockwise the T-shaped end of the stud engages a small detent in the cam track. The compression spring in the stud assembly holds the stud in position in the detent.

There are different length studs. Short studs for thin panels and longer studs for thicker panels. Not all airplanes have the same length studs in the same position. This is because composite components can vary in thickness.

If you replace a fastener, make sure that the new fastener has the correct length stud.

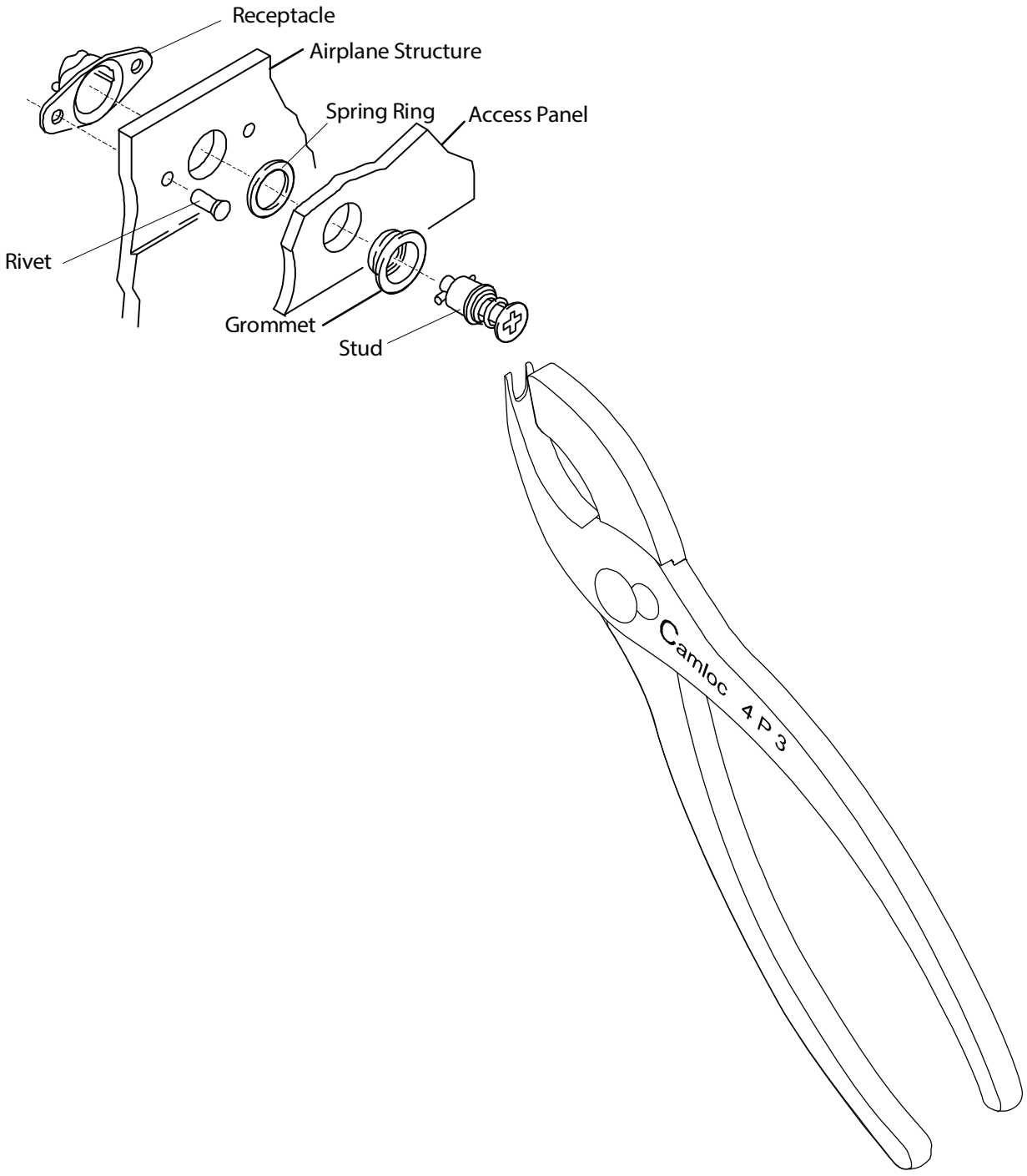

Figure 1 : Quick Release Fastener

MAINTENANCE PRACTICES

1. General

This Section tells you how to replace a quick release fastener stud in an access panel.

2. Replace a Quick Release Fastener Stud

A. Equipment.

Item	Quantity	Part Number
Stud pliers.	1	Camloc 4 P 3.

B. Procedure.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the damaged stud assembly: - Turn the stud 90° counter-clockwise to release it from the receptacle. - Place the U-jaw of the Camloc pliers under the rim of the stud assembly. - Compress the stud assembly and remove it from the grommet.	If fitted. Refer to Figure 1 in the Description and Operation Pageblock 51-40-00. Turn the stud assembly approximately 30° off axis.
(2)	Install the new stud assembly: - Select the correct length stud assembly. - Put the stud assembly into the U-jaw of the Camloc pliers. - Compress the stud assembly with the Camloc pliers and install into the grommet. - Engage the stud in the receptacle and turn 90° clockwise to lock the stud.	 Turn the stud assembly approximately 30° off axis.

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CONTROL SURFACE BALANCING

1. General

This Section tells you how to weigh and measure the residual moment of the control surfaces.

WARNING: YOU MUST WEIGH AND BALANCE A CONTROL SURFACE AFTER ANY WORK WHICH COULD AFFECT ITS WEIGHT OR ITS BALANCE. OUT OF BALANCE CONTROL SURFACES CAN FLUTTER AND CAUSE STRUCTURAL FAILURE.

Correct control surface balance is critical to flight safety. You must remove a control surface to weigh and balance it after:

- Any repair to the control surface.
- Painting the control surface.
- Any report of control vibration or flutter in flight.

You can use any convenient method to weigh a control surface. If you use anything to connect the control surface to the weighing device, (for example, a sling) you must weigh it separately. Then subtract its weight from the total value. For example, you use a rope sling to lift an aileron with a spring balance:

- Weight of the aileron and the rope sling = 3.8 kg (8.3 lb)
- Weight of the rope sling = 0.7 kg (1.5 lb)
- Weight of the aileron = 3.8 kg (8.3 lb) - 0.7 kg (1.5 lb) = 3.1 kg (6.8 lb)

When you balance a control surface, the pivot angle of the control must be as shown in the Weights and Residual Moments Report.

We recommend that for balancing the flaps, aileron, elevator and elevator trim tab, you put a suitable size rod through the hinge bearings. Support the rod at two points to keep it horizontal.

To balance the rudder it must be supported at the top pivot pin and the bottom mounting bracket. The center line of the rudder must be horizontal.

	Rudder	Elevator	Trim Tab	Aileron		Wing Flap	
				LH	RH	LH	RH
weight incl. BW — nominal	3.5 to 4.4 kg (7.72 to 9.7 lb)	5.7 to 6.9 kg (12.57 to 15.21 lb)	0.28 to 0.39 kg (0.617 to 0.860 lb)	2.6 to 3.15 kg (5.73 to 6.94 lb)		4.0 to 4.8 kg (8.82 to 10.58 lb)	
weight incl. BW — actual							
balancing weight [kg] or [lb]		Center: LH: RH:					
P							
r							
residual moment — nominal	35.6 to 45.8 kg.cm (30.9 to 39.75 in.lb)	-5.0 to 0.0 kg.cm (-4.34 to 0.00 in.lb)	1.0 to 1.5 kg.cm (0.868 to 1.302 in.lb)	-5.1 to -2.0 kg.cm (-4.43 to -1.74 in.lb)		23.4 to 31.1 kg.cm (20.31 to 26.99 in.lb)	
residual moment — actual							
M = P * r P ...[kg] or [lb] r ...[cm] or [in]	center line horizontal	center line horizontal	center line horizontal	upper surface horizontal		upper surface horizontal	

Calculation. M = P * r Where M is the residual moment, r (cm or inches) is the distance between the hinge line and the point where the force P (kg or lb) acts.

Notes. Positive moments are tail heavy, negative moments are nose heavy.
Rudder - weight and residual moment include lower hinge and trim plate.
Elevator - weight and residual moment include trim tab, horn, and trim tab control rods.
Aileron - weight and residual moment include horn, trim plate and hinges.
Wing flaps - Weight and residual moment include horn and hinges

Figure 1 : Weights and Residual Moments Report

	Rudder	Elevator	Trim Tab	Aileron		Wing Flap	
				LH	RH	LH	RH
weight incl. BW nominal	3.5 to 4.4 kg (7.72 to 9.7 lb)	5.7 to 6.9 kg (12.57 to 15.21 lb)	0.28 to 0.39 kg (0.617 to 0.860 lb)	2.6 to 3.15 kg (5.73 to 6.94 lb)		4.0 to 5.2 kg (8.82 to 11.46 lb)	
weight incl. BW actual							
balancing weight [kg] or [lb]		Center: LH: RH:					
P							
r							
residual moment nominal	35.6 to 45.8 kg.cm (30.9 to 39.75 in.lb)	-5.0 to 0.0 kg.cm (-4.34 to 0.00 in.lb)	1.0 to 1.5 kg.cm (0.868 to 1.302 in.lb)	-5.1 to -2.0 kg.cm (-4.43 to -1.74 in.lb)		23.4 to 30.5 kg.cm (20.31 to 26.47 in.lb)	
residual moment actual							
M = P * r	center line horizontal	center line horizontal	center line horizontal	upper surface horizontal		upper surface horizontal	
P ...[kg] or [lb]							
r ...[cm] or [in]							

Calculation. M = P * r Where M is the residual moment, r (cm or inches) is the distance between the hinge line and the point where the force P (kg or lb) acts.

Notes. Positive moments are tail heavy, negative moments are nose heavy.
Rudder - weight and residual moment include lower hinge and trim plate.
Elevator - weight and residual moment include trim tab, horn, and trim tab control rods.
Aileron - weight and residual moment include horn, trim plate and hinges.
Wing flaps - Weight and residual moment include horn and hinges

Figure 2 : Weights and Residual Moments Report (if OÄM 30-360 is carried out)

Refer to Figure 1 or 2 for the weight and residual moment for the DA 40 NG.
Use any suitable method to support the rudder horizontally at the pivot axis.
The rudder must be able to rotate freely around the pivot axis.
Remove the stop bolts from the lower mounting bracket before weighing and balancing.
The residual moment is tail heavy.

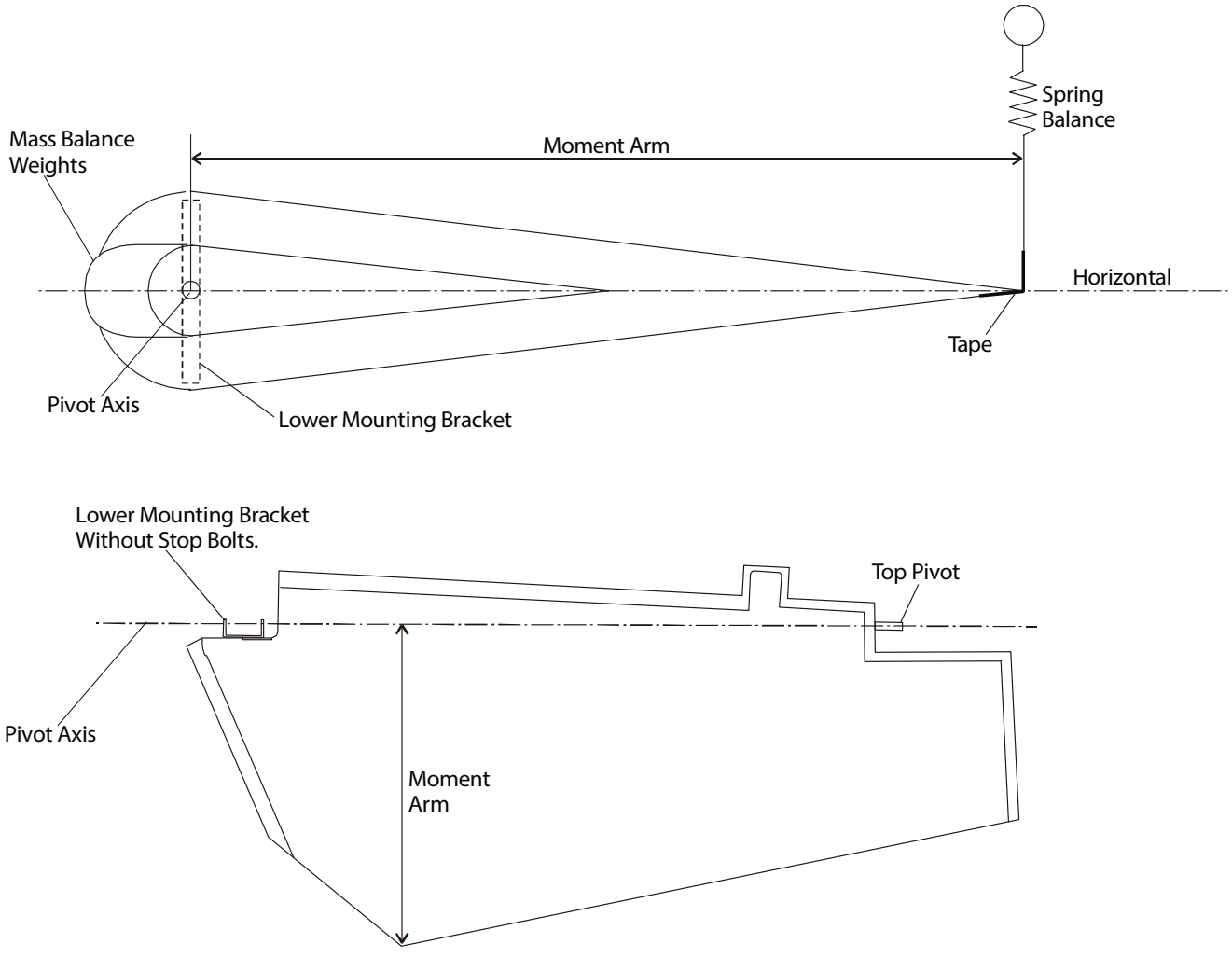

Figure 3 : Rudder Static Balance

Refer to Figure 1 or 2 for the weight and residual moment for the DA 40 NG.
Use any suitable method to support the elevator horizontally at the pivot axis.
The elevator must be able to rotate freely around the pivot axis.
The balance includes the trim tab, trim tab control rod and horn.

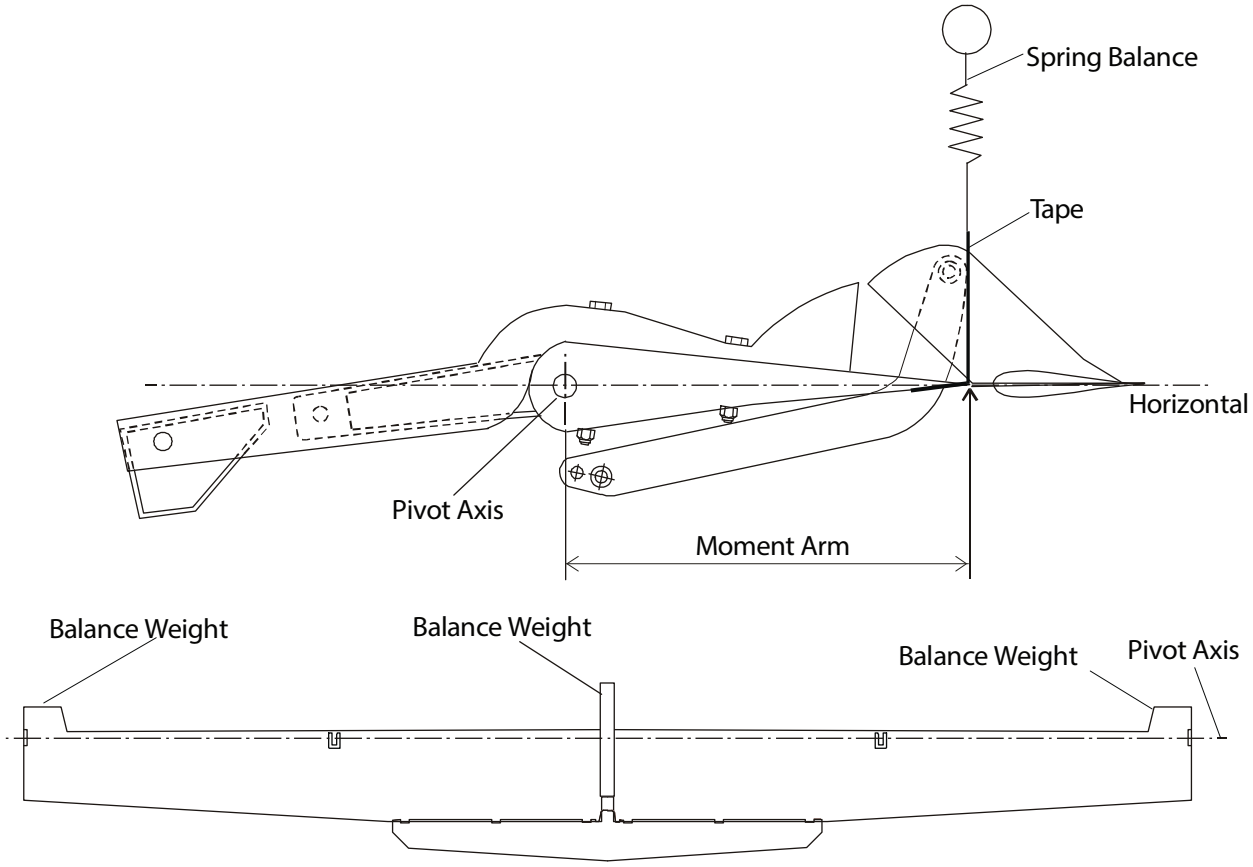

Figure 4 : Elevator Static Balance

Refer to Figure 1 or 2 for the weight and residual moment for the DA 40 NG.
Use any suitable method to support the trim tab horizontally at the pivot axis.
The trim tab must be able to rotate freely around the pivot axis.
The residual moment is tail heavy.

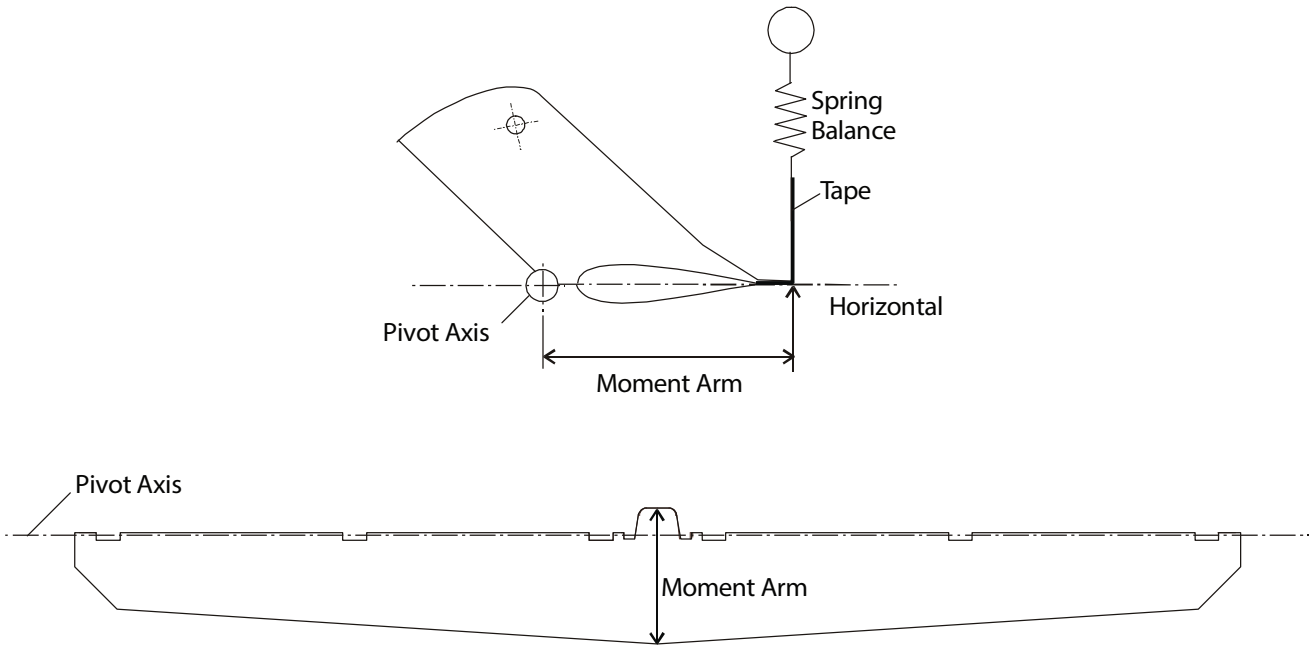

Figure 5 : Trim Tab Static Balance

Refer to Figure 1 or 2 for the weight and residual moment for the DA 40 NG.
Use any suitable method to support the aileron horizontally at the pivot axis.
The aileron must be able to rotate freely around the pivot axis.
The balance includes the horn, trim plate and hinges.

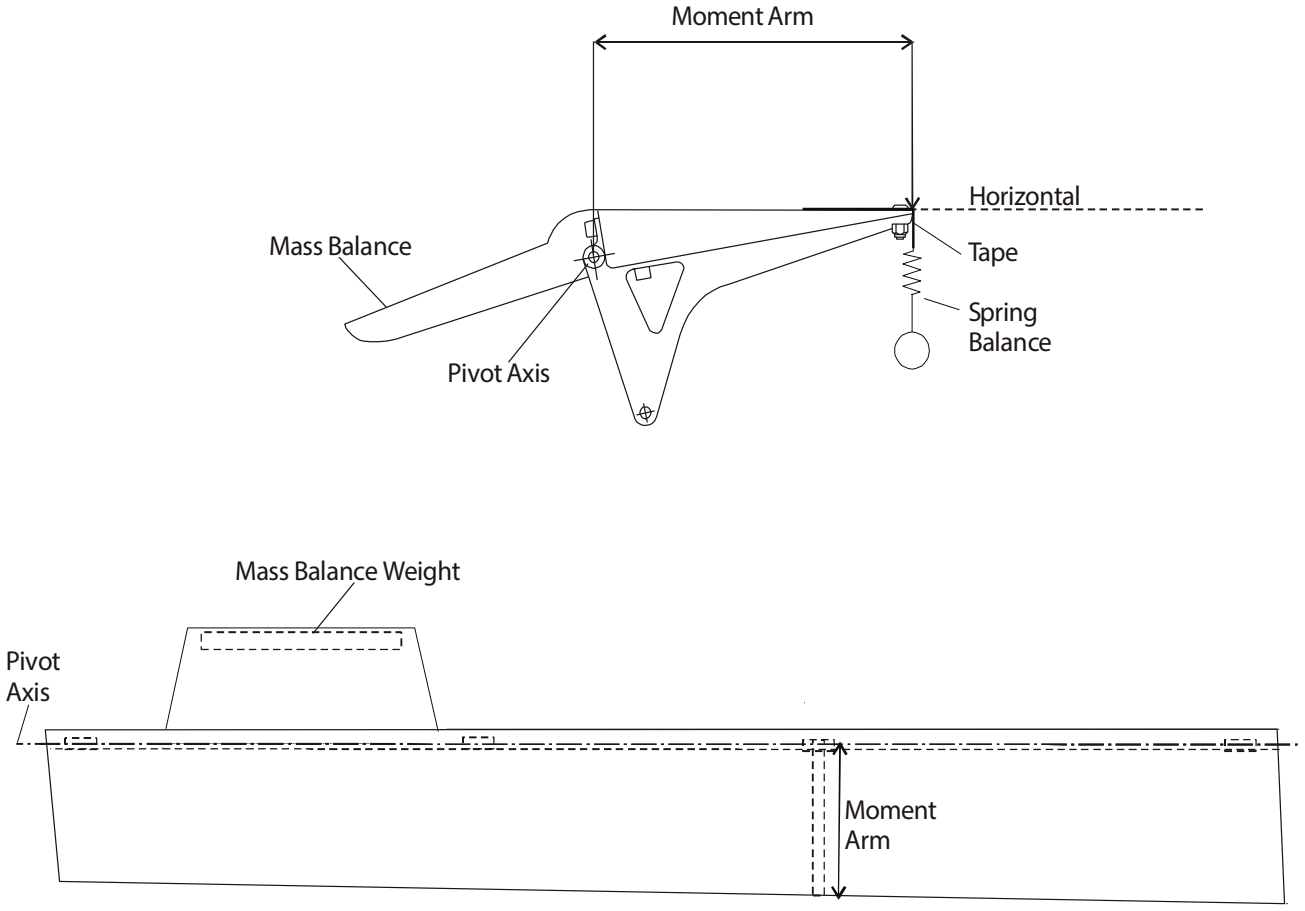

Figure 6 : Aileron Static Balance

Refer to Figure 1 or 2 for the weight and residual moment for the DA 40 NG.
Use any suitable method to support the wing flap horizontally at the pivot axis.
The wing flap must be able to rotate freely around the pivot axis.
The balance includes the horn and hinges.
The residual moment is tail heavy.

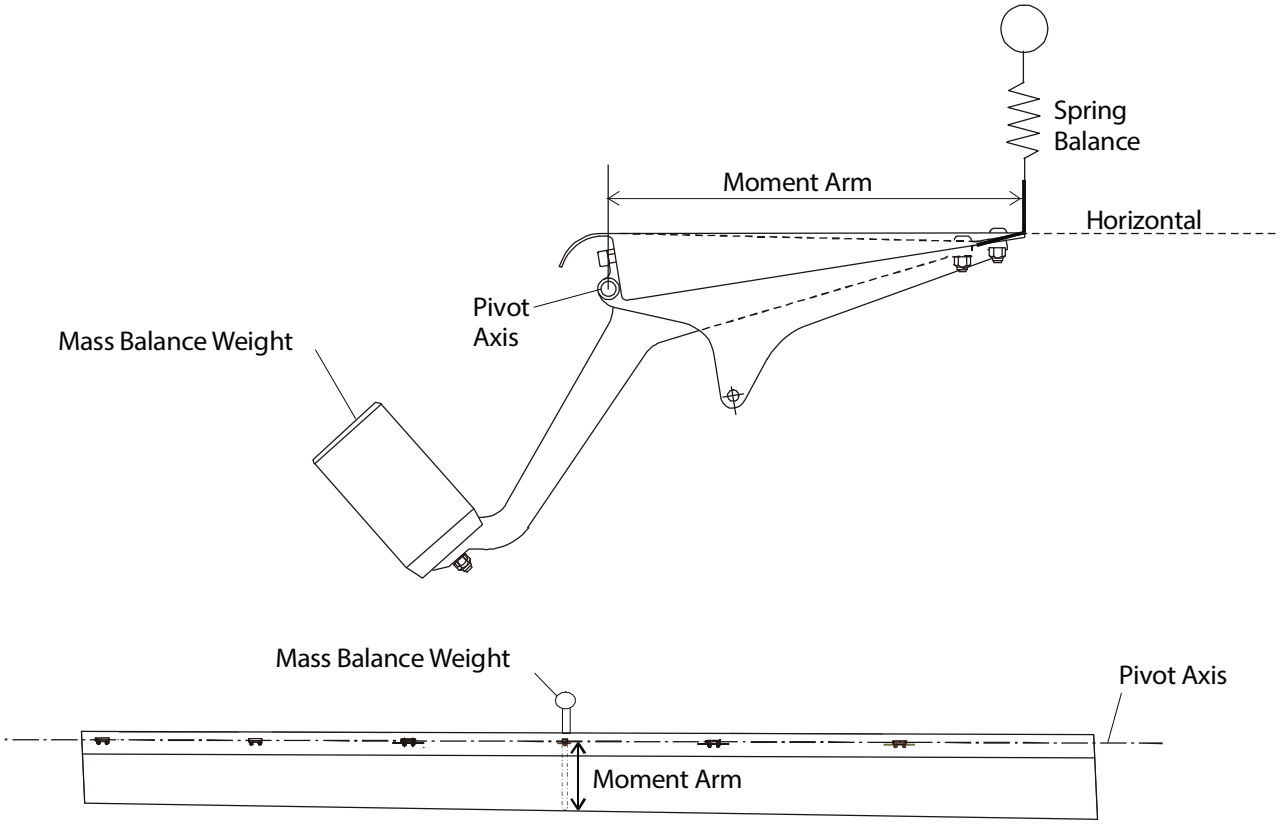

Figure 7 : Wing Flap Static Balance

ELECTRICAL BONDING

1. General

The bonding system gives the airplane good lightning protection. A special bonding system is necessary for the composite structure of the DA 40 NG. Without this special system, the composite structure would not sufficiently conduct electricity.

Refer to Section 23-60 for details about the static discharge wicks.

2. Description

Figure 1 (Sheets 1-3) shows simplified bonding system schematics for the airplane.

The lightning conductor system is the main part of the bonding system. High capacity aluminum alloy tubes and strips make the lightning conductor system.

The lightning conductor system has a longitudinal branch and a lateral branch. The longitudinal branch runs from the engine block via engine truss, firewall, cabin, aft fuselage and empennage to the elevator. The horizontal branch connects the left wing tip with the right wing tip. It is connected with the longitudinal branch at the cabin floor under the forward seats.

Metal braiding and strips connect all conductive components (for example: wing skin, fuel tanks, control systems, landing gear, engine, etc.) and antenna ground plates to the lightning conductor system.

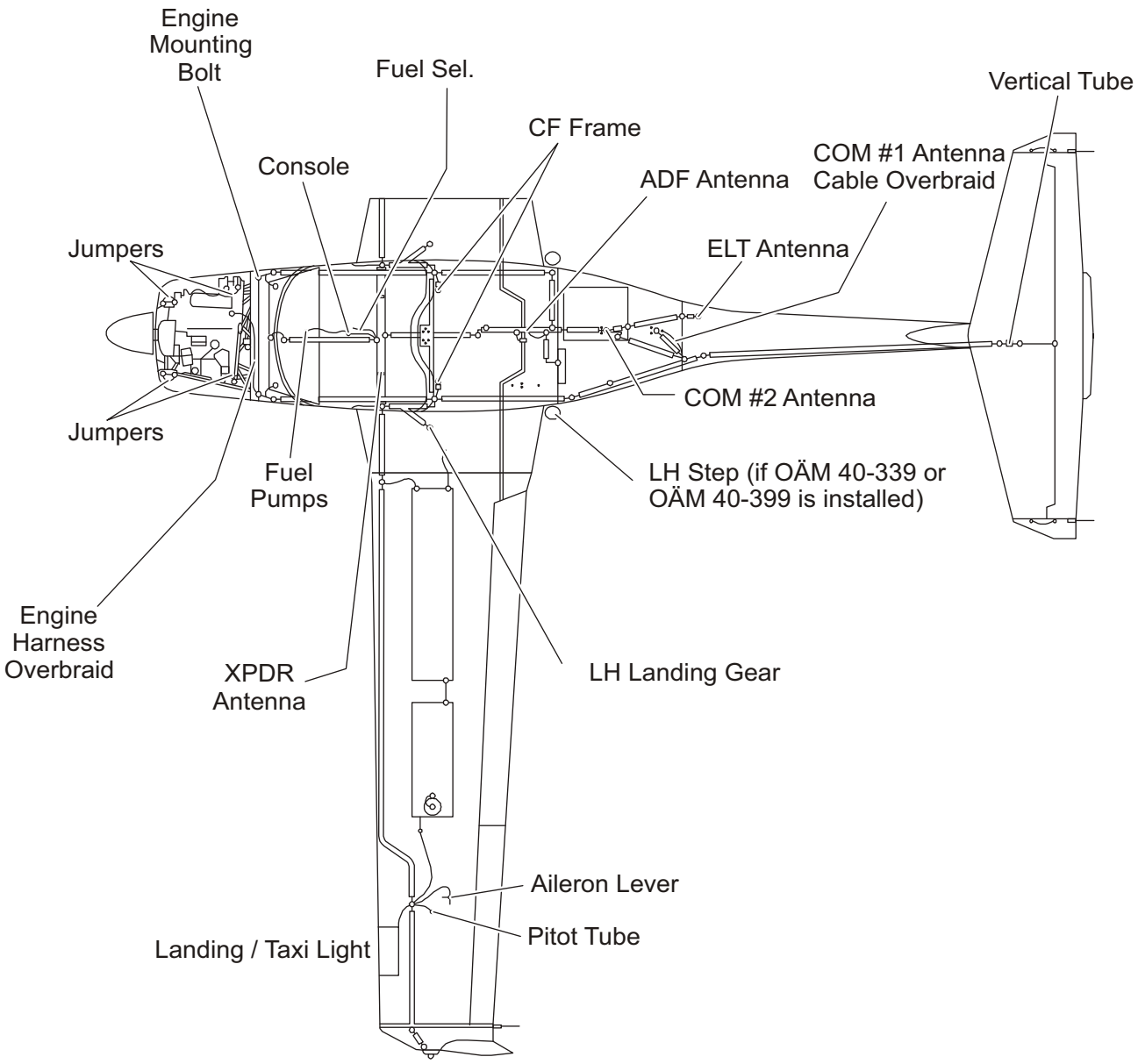

Figure 1 : Airplane Lightning Protection and Bonding System Schematic (Sheet 1)

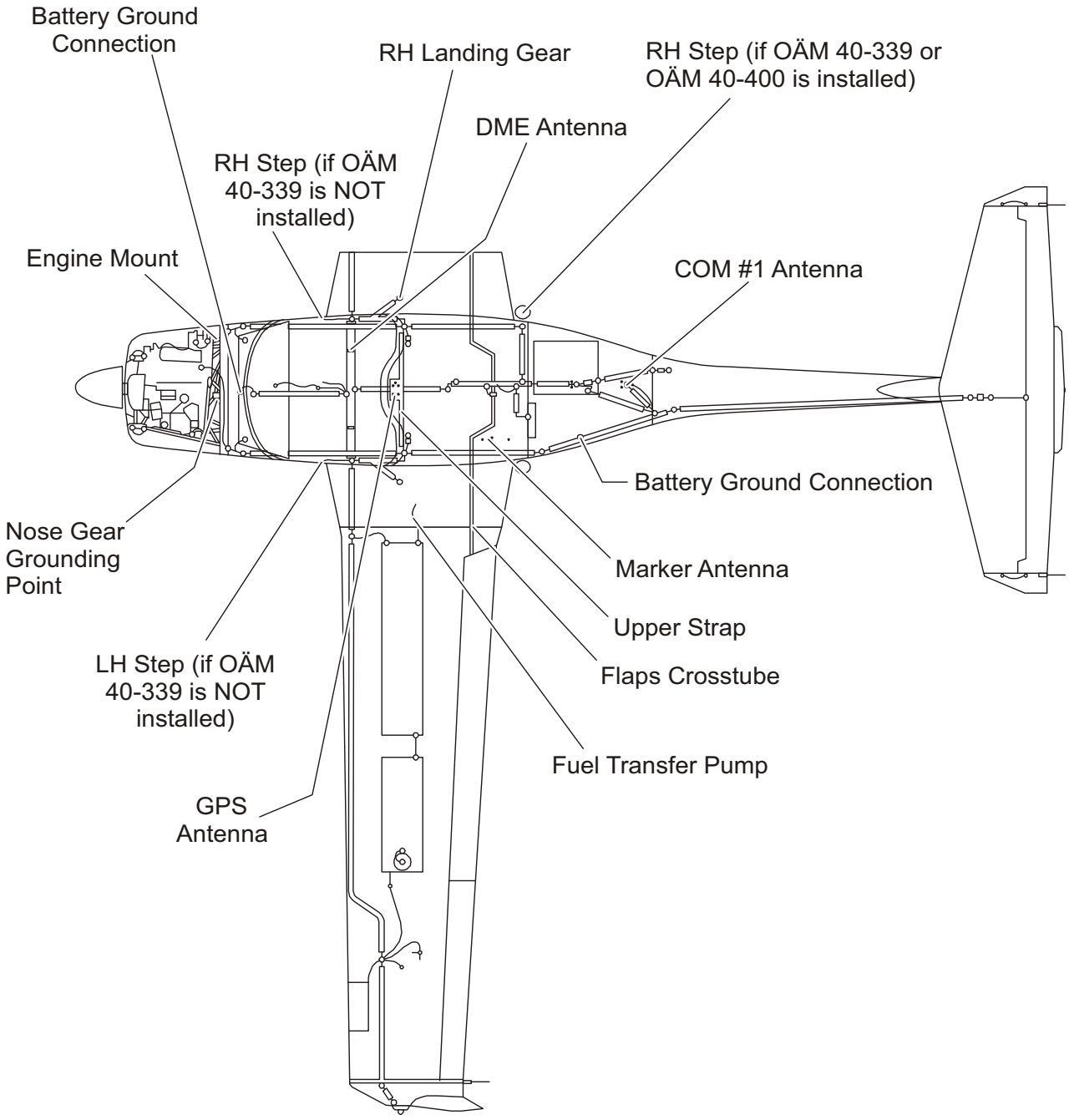

Figure 1 : Airplane Lightning Protection and Bonding System Schematic (Sheet 2)

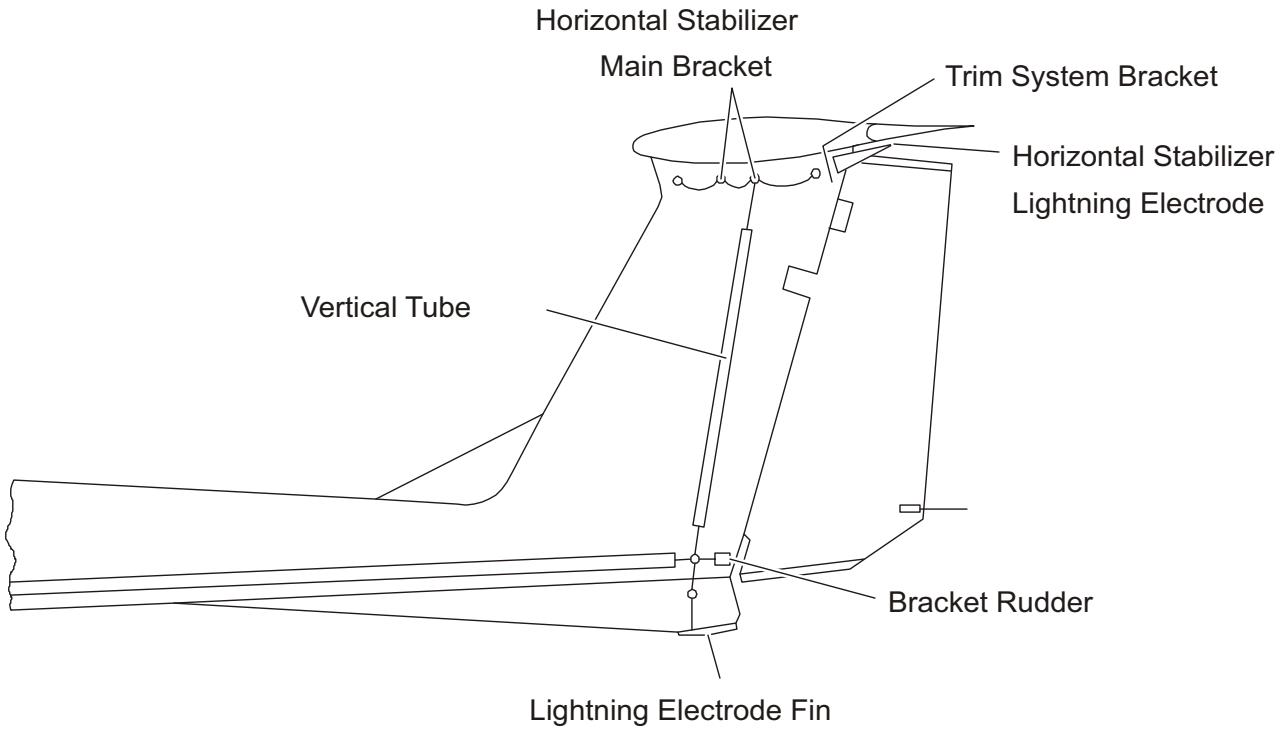

Figure 1 : Airplane Lightning Protection and Bonding System Schematic (Sheet 3)

The following design features also give lightning protection:

- The aluminum tubes of the lightning conductor system are also used as conduits for electric wires.
- Carbon fiber material is used for the lower wing skin and parts of the fuselage skin, canopy frame and rear door frame. Carbon fiber material is conductive.
- Carbon fiber material with interwoven aluminum fibers is used for the upper wing skin and the engine cowling. Carbon fiber material with interwoven aluminum fibers is conductive.
- The forward wing spar separates the lightning conductor system from the fuel tanks.
- A lightning conductor strip is integrated in the horizontal stabilizer.
- The tail skid has an aluminum bar on the lower edge.
- The propeller is non-conductive (except for the erosion sheath), therefore currents cannot flow in structural parts of the propeller.

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MAINTENANCE PRACTICES

1. General

This Section tells you how to do a test of the electrical bonding system.

2. Test the Electrical Bonding System

The resistance measurements on the DA 40 NG are divided into three categories:

- Very low resistance measurements for conduits in the direct lightning path and electrical power grounds.
- Low resistance measurements for bondings of controls.
- High resistance measurements for the static discharge wicks.

Do the low resistance bonding measurements with a milliohmmeter and Kelvin probes. The test current should be approximately 2 amps.

Do the high resistance measurements with a high voltage megaohmmeter (500 V). Measure the static discharge wicks and the precautions against static charge of the airplane.

All measurements are referenced to the negative pole connection of the battery, except where noted. The airplane must be in a serviceable condition during the tests, except that the engine cowlings must be removed.

A. Very Low Resistance Measurement.

Item	Attachment Point	Maximum Allowable [mΩ]	Measured [mΩ]	Passed
ENGINE COMPARTMENT				
Firewall		4.0		
Engine	propeller bearing, front	5.0		
Heating cooler	case	6.0		
Oil cooler	case	6.0		
Water cooler	case	6.0		
Inter cooler	case	6.0		
Front landing gear	tube	10.0		
Engine breather	tube	6.0		
Engine to firewall	engine block - firewall	3.0		

Item	Attachment Point	Maximum Allowable [mΩ]	Measured [mΩ]	Passed
2nd alternator (if installed)	case	10.0		
FUSELAGE COMPONENTS				
External power connector	outer large pin	3.0		
Instrument panel	above co-pilot's left knee	3.0		
Remote avionic box (if installed)	case	4.0		
Relay box	sheet metal	4.0		
FUEL SYSTEM				
Fuel gascolator	case	15.0		
Fuel pumps	bracket	15.0		
Fuel transfer pump	case	15.0		
Fuel drain protector	sheet metal	15.0		
EXTERNAL CONDUCTIVE PARTS				
LH step	grounding point	5.0		
RH step	grounding point	5.0		
OAT sensor		5.0		
Main LDG gear LH	lower bend, inner side	10.0		
Main LDG gear RH	lower bend, inner side	10.0		
Flap asymmetrical tube LH	bond. strap connection	10.0		
Flap asymmetrical tube RH	bond. strap connection	10.0		
LH RACC outlet scoop (if installed)	tube	10.0		
RH RACC outlet scoop (if installed)	tube	10.0		
RACC inlet cap (if installed)	tube	15.0		
ANTENNAS				
Top COM antenna	mounting screw	6.0		

Item	Attachment Point	Maximum Allowable [mΩ]	Measured [mΩ]	Passed
Bottom COM antenna (if installed)	mounting screw	6.0		
GPS antennas(s)	mounting screw	6.0		
Top TAS antenna (if installed)	mounting screw	6.0		
Bottom TAS antenna (if installed)	mounting screw	8.0		
STABILIZER				
Vert. lightning prot. tube	upper end	7.0		
Hor. stab LH lightning strap	tip	15.0		
Hor. stab RH lightning strap	tip	15.0		
Grind spur	aluminum strap	15.0		
Rudder hinge	rudder side	10.0		
Vert. stabilizer fairing	FWD LH side screw	12.0		
Vert. stabilizer fairing	FWD RH side screw	12.0		
Horizontal stabilizer	front bracket	10.0		
Horizontal stabilizer	rear bracket	10.0		
Towing device (if installed)	aft mounting screws	20.0		
LH WING				
Fuel tank drain	drain	5.0		
Tank refill	ring	5.0		
Tank vent	plate	10.0		
Pitot tube base	tube base	6.0		
Landing/taxi light	bracket (screws)	10.0		
Tip light assembly	base plate	8.0		
Aileron pushrod attachment	bracket, aileron	50.0		
Flap pushrod attachment	bracket, flap	50.0		
Rear view mirror (if installed)	mounting screw	10.0		

Item	Attachment Point	Maximum Allowable [mΩ]	Measured [mΩ]	Passed
RH WING				
Fuel tank drain	drain	5.0		
Tank refill	ring	5.0		
Tank vent	plate	10.0		
Pitot tube base	tube base	6.0		
Landing/taxi light	bracket (screws)	10.0		
Tip light assembly	base plate	8.0		
Aileron pushrod attachment	bracket, aileron	50.0		
Flap pushrod attachment	bracket, flap	50.0		
Rear view mirror (if installed)	mounting screw	10.0		

B. Low Resistance Measurement.

Item	Attachment Point	Maximum Allowable [mΩ]	Measured [mΩ]	Passed
Pilot stick	tube	50.0		
Co-pilot stick	tube	50.0		
Trim wheel assembly	frame	10.0		
Levers	frame	50.0		
Pilot pedal assembly		150.0		
Co-pilot pedal assembly		150.0		
Canopy hinge LH	tube tip	100.0		
Canopy hinge RH	tube tip	100.0		
RACC system (if installed)	bracket	100.0		

C. High Resistance Measurement.

Use a wet sponge to obtain a constant electrical connection to the static dischargers.

Item	Attachment Point	Maximum Allowable [mΩ]	Measured [mΩ] (500 V)	Passed
STATIC WICKS				
LH wing		200.0		
RH wing		200.0		
Rudder		200.0		
Horizontal stabilizer LH		200.0		
Horizontal stabilizer RH		200.0		
TIRES				
Nose		100.0		
LH		100.0		
RH		100.0		

CHAPTER 52
DOORS

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DOORS

1. General

The DA 40 NG has two types of doors. Section 52-10 tells you about the canopy and the passenger access door. Section 52-40 tells you about the maintenance access panels.

2. Description

The canopy is a CFRP molding with inner and outer frames. The frames bond together. The canopy has a large one-piece acrylic glass window. The window has an emergency window on the left side. Some airplanes also have an emergency window on the right side. You can open the emergency windows in flight. Refer to Chapter 56 for data about the window.

The canopy attaches to a tubular steel frame at the front. The frame attaches to two hinges on the rear face of the firewall. The canopy moves up and forward to open.

A handle on the left of the canopy operates two locking bolts. The indoor and outdoor handles are red. The locking bolts are at the bottom rear corners of the canopy.

The passenger door is a CFRP molding with inner and outer frames. The frames bond together. The door has a acrylic glass window.

Two hinges attach the door to the top of the fuselage near the center-line. A gas strut attaches to the rear of the door and the fuselage. The gas strut holds the door open.

A handle on the left of the door operates two locking bolts. The locking bolts are at the bottom front and rear corners of the door.

The DA 40 NG has a small number of access panels. Panels which must be used often (for example the oil filler panel) have quick-release fasteners. Other panels have the usual screws.

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CANOPY AND PASSENGER DOOR

1. General

This Section tells you about the structure, operation and maintenance of the canopy and the passenger door. Refer to Chapter 56 for data about the windows in the canopy and door.

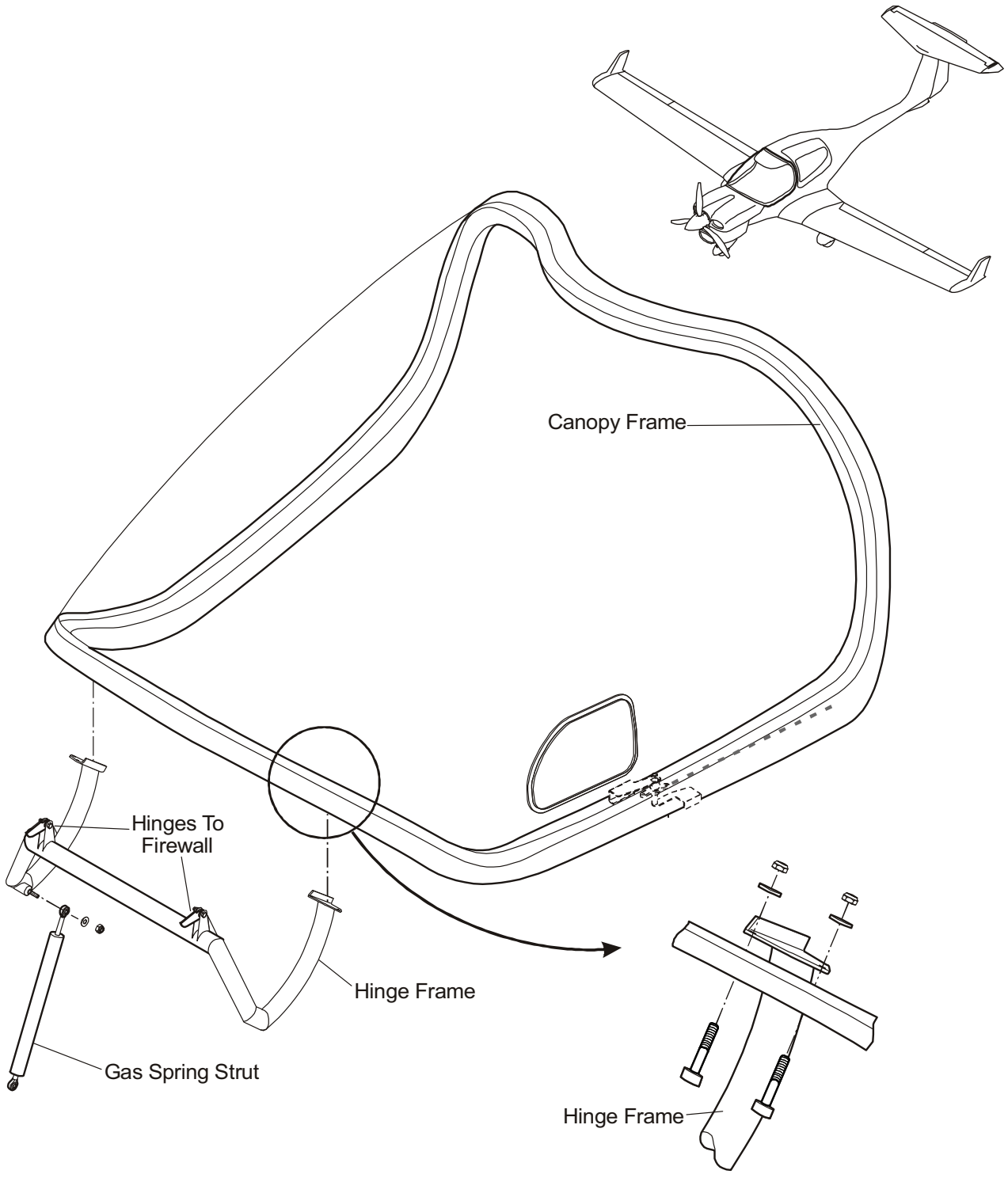

Figure 1 : Canopy Installation

2. Canopy Description and Operation

Figure 1 shows the canopy installation.

A. Canopy Description

The canopy is a CFRP molding with inner and outer frames. The frames bond together with thickened resin. Each part of the frame has layers of carbon cloth and one layer of glass cloth. Areas of high stress have extra layers of carbon cloth. Mounting bushes for the handle and locking bolts bond to the inside of the frame with thickened resin.

The canopy has a large one-piece acrylic glass window. A special flexible adhesive bonds the window to the canopy frame. A flexible filler seals the small gap between the edge of the window and the frame.

The window has a an emergency window on the left side. Some airplanes also have an emergency window on the right side. You can open the emergency windows in flight. Refer to Chapter 56 for data about the window.

B. Canopy Hinge Frame

The canopy attaches to a tubular steel frame at the front (the hinge frame). The frame attaches to two hinges on the rear face of the firewall. A gas spring strut attaches to the hinge frame and the bottom of the firewall. The canopy moves up and forward to open. The gas spring strut holds the canopy open. A door unlocked warning light (DOOR OPEN or DOORS) on the G1000 or the annunciator panel operates when the canopy is unlocked.

C. Canopy Attachment

The canopy has two attachment plates on the front edge of the canopy hinge frame. Two bolts attach each plate to the canopy frame. You can remove the canopy by removing these four bolts.

D. Canopy Locking Mechanism

(1) MÄM 40-139 Not Implemented

Figure 2 shows the canopy locking mechanism.

A handle on the left of the canopy operates two locking bolts. The handle has a spring assisted over-center lock which holds the handle in the closed position. The locking bolts are at the bottom rear corners of the canopy.

The handle has two parts. The inner handle has a double lever. The outer handle is red and attaches to the inner handle with two roll pins. A connecting rod attaches to the rear of the double lever. The other end of the connecting rod attaches to the inside of the left locking bolt.

A teleflex cable attaches to the front of the double lever. The teleflex cable goes inside the front of the canopy frame to the right locking bolt. If you pull the canopy handle away from the canopy frame, these things happen:

The double lever turns to pull the connecting rod and the teleflex cable.

The connecting rod pulls the left locking bolt forward. The forward movement of the locking bolt operates the door unlocked warning micro-switch in the left side fuselage shell.

The teleflex cable pulls the right locking bolt forward. The forward movement of the locking bolt operates the door unlocked warning micro-switch in the right side fuselage shell.

The canopy can be pushed up and forward to open.

With the canopy fully closed, push the canopy handle towards the canopy frame. This engages the locking bolts in the fuselage holes. The spring assisted over-center lock holds the handle in the closed position. The left locking bolt operates the micro-switch for the door unlocked warning light (DOOR OPEN or DOORS). When the handle is flush with the canopy frame, the canopy is locked. Push up on the rear of the canopy frame to make sure that it is locked.

(2) MÄM 40-139 Implemented

Figure 3 shows the canopy locking mechanism when the design change MÄM 40-139 is implemented.

A handle on the left of the canopy operates two locking bolts. The handle has a spring assisted over-center lock which holds the handle in the closed position. The locking bolts are at the bottom rear corners of the canopy.

The handle has two parts. The inner handle is red and has a double lever. The outer handle is red and attaches to the inner handle with a roll pin. A connecting rod attaches to the rear of the double lever. The other end of the connecting rod attaches to the inside of the left locking bolt.

A teleflex cable attaches to the front of the double lever. The teleflex cable goes inside the front of the canopy frame to the right locking bolt. It can be removed for servicing. If you pull the canopy handle away from the canopy frame, these things happen:

The double lever turns to pull the connecting rod and the teleflex cable.

The connecting rod pulls the left locking bolt forward. The forward movement of the locking bolt operates the door unlocked warning micro-switch in the left side fuselage shell.

The teleflex cable pulls the right locking bolt forward. The forward movement of the locking bolt operates the door unlocked warning micro-switch in the right side fuselage shell.

The canopy can be pushed up and forward to open.

With the canopy fully closed, push the canopy handle towards the canopy frame. This engages the locking bolts in the fuselage holes. The spring assisted over-center lock holds the handle in the closed position. The left locking bolt operates the micro-switch for the door unlocked warning light (DOOR OPEN or DOORS). When the handle is flush with the canopy frame, the canopy is locked. Push up on the rear of the canopy frame to make sure that it is locked.

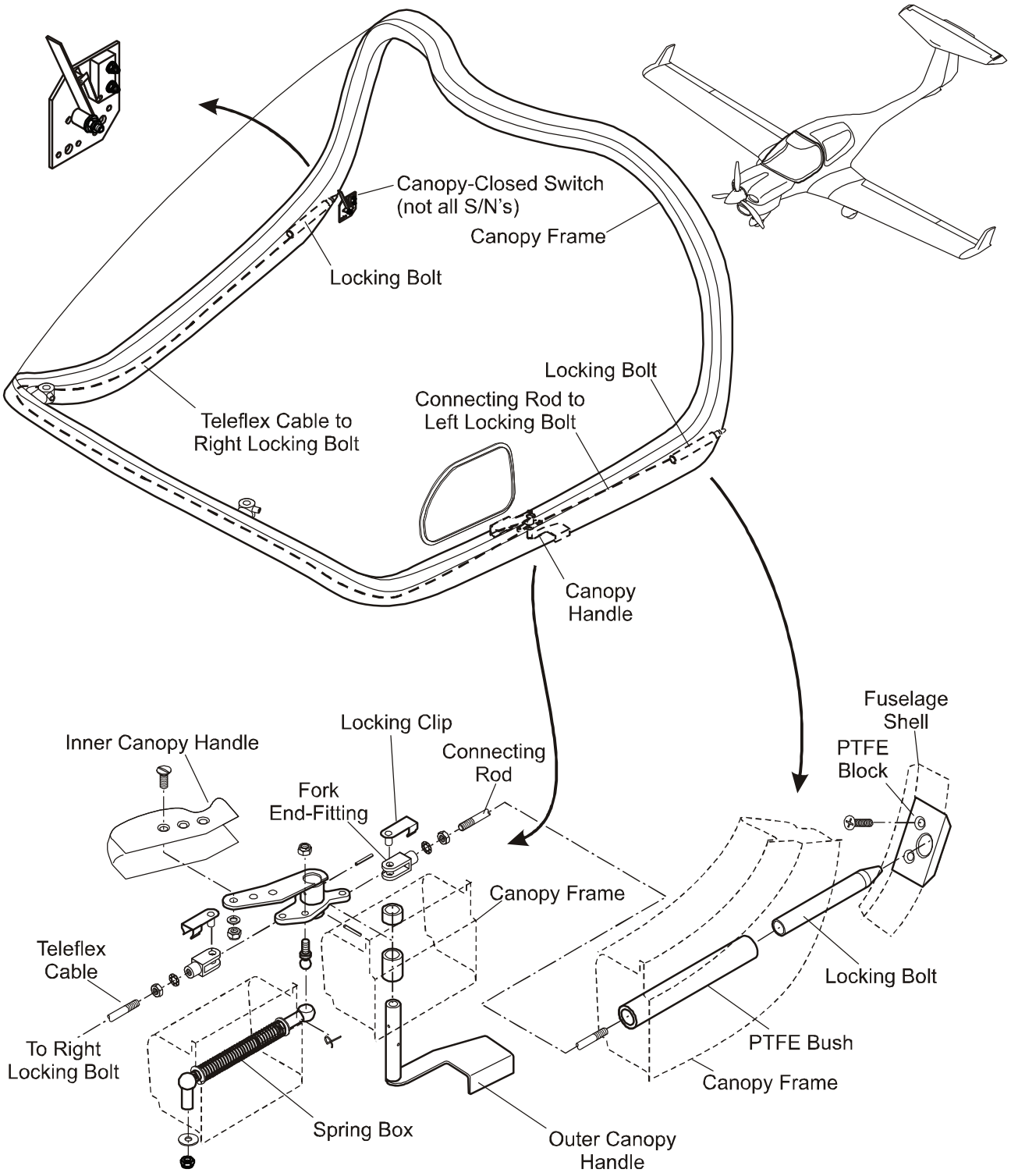

Figure 2 : Canopy Locking Mechanism (MÄM 40-139 not implemented)

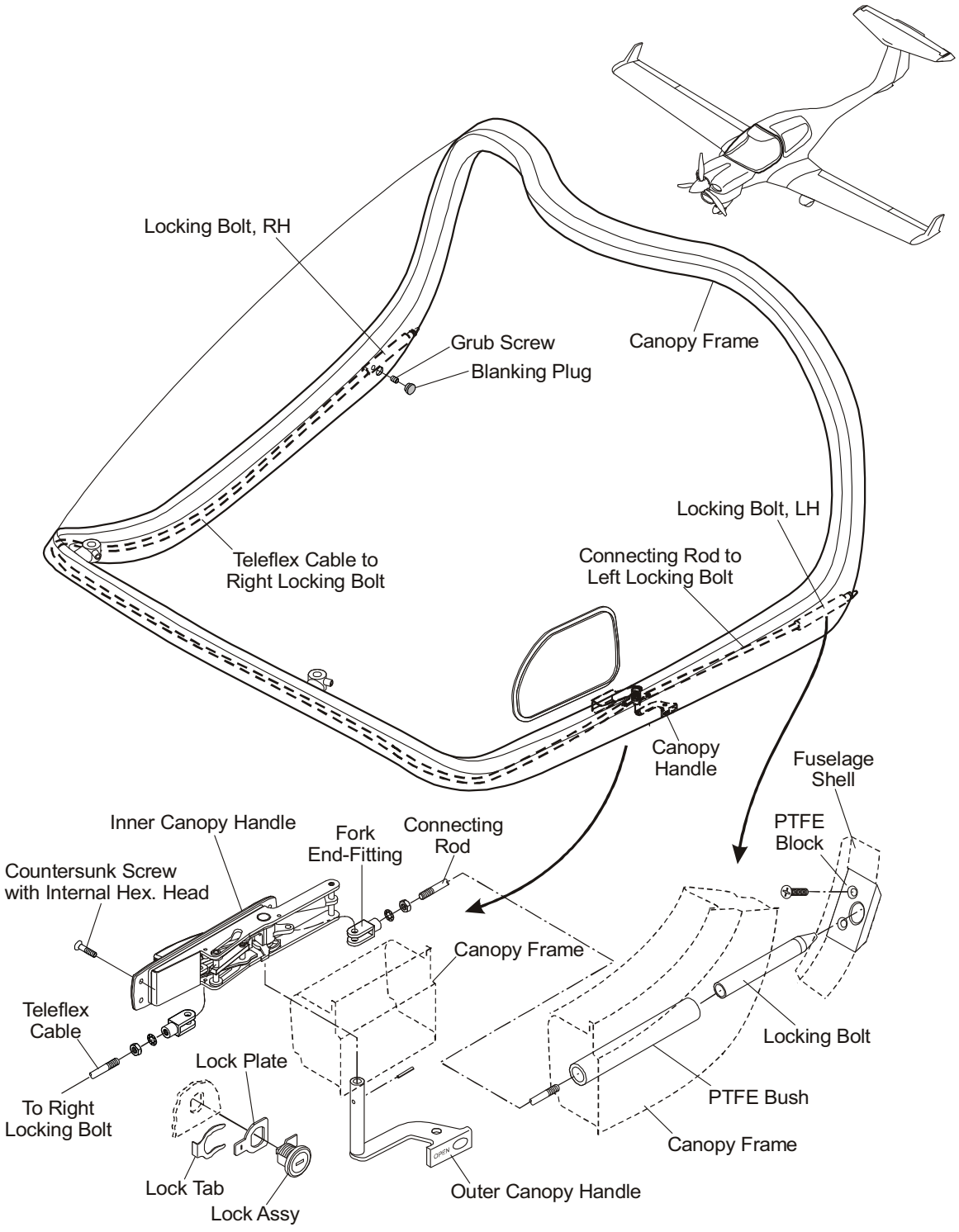

Figure 3 : Canopy Locking Mechanism (MÄM 40-139 implemented)

3. Passenger Door - Description and Operation

A. MÄM 40-139 Not Implemented

Figure 4 shows the passenger door installation and locking mechanism.

The passenger door is a CFRP molding with inner and outer frames. The frames bond together with thickened resin. Each part of the frame has layers of carbon cloth and one layer of glass cloth. Areas of high stress have extra layers of carbon cloth. Mounting bushes for the handle and locking bolts bond to the inside of the frame with thickened resin.

The door has a acrylic glass window. A special flexible adhesive bonds the window to the door frame. A flexible filler seals the small gap between the edge of the window and the frame.

Two hinges attach the door to the top of the fuselage near the center-line. The hinges bolt to the door frame. The front hinge can be removed from inside of the cabin in an emergency. With the front hinge removed, the passenger door can be forced open from the top. A gas strut attaches to a bracket at the rear of the door and to the fuselage. The gas strut holds the door open. A door unlocked warning light (DOOR OPEN or DOORS) on the G1000 or on the annunciator panel operates when the door is unlocked.

A handle on the left of the door operates two locking bolts. The locking bolts are at the bottom front and rear corners of the door.

The handle has two parts. The inner handle is black and has a double lever. The outer handle is red and attaches to the inner handle with two roll pins. A long connecting rod attaches to the rear of the double lever. The other end of the long connecting rod attaches to the inside of the rear locking bolt. A safety lock is fitted to prevent accidental movement of the handle.

You must lift the safety handle before you can operate the handle from inside the passenger compartment. To operate the red handle from the outside you must push the button next to the red handle to lift the inner safety lock.

A short connecting rod attaches to the front of the double lever. The short connecting rod goes to the front locking bolt. If you pull the canopy handle away from the canopy frame, these things happen:

- The double lever turns to pull the both of the connecting rods.
- The long connecting rod pulls the rear locking bolt forward.
- The short connecting bolt pulls the front locking bolt aft. The aft movement of the locking bolt operates a micro switch for the door unlocked warning light (DOOR OPEN or DOORS) located on the G1000 or on the annunciator panel.

The door can be pushed up and out to open. With the door fully closed, push the door handle towards the door frame. This engages the locking bolts in the fuselage holes. The forward locking bolt operates the door unlocked micro switch. When the handle is flush with the door frame, the door is locked. Push outwards on the bottom of the door frame to make sure that it is locked.

B. MÄM 40-139 Implemented

Figure 5 shows the passenger door installation and locking mechanism when the design change MÄM 40-139 is implemented.

The passenger door is a CFRP molding with inner and outer frames. The frames bond together with thickened resin. Each part of the frame has layers of carbon cloth and one layer of glass cloth. Areas of high stress have extra layers of carbon cloth. Mounting bushes for the locking bolts bond to the inside of the frame with thickened resin.

The door has an acrylic glass window. A special flexible adhesive bonds the window to the door frame. A flexible filler seals the small gap between the edge of the window and the frame.

Two hinges attach the door to the top of the fuselage near the center-line. The hinges bolt to the door frame. The front hinge can be removed from inside of the cabin in an emergency. With the front hinge removed, the passenger door can be forced open from the top. A gas strut attaches to a bracket at the rear of the door and to the fuselage. The gas strut holds the door open. A door unlocked warning light (DOOR OPEN or DOORS) on the G1000 or on the annunciator panel operates when the door is unlocked.

A handle on the left of the door operates two locking bolts. The locking bolts are at the bottom front and rear corners of the door.

The handle has two parts. The inner handle is red and has a double lever. The outer handle is red and attaches to the inner handle with two roll pins. A long connecting rod attaches to the rear of the double lever. The other end of the long connecting rod attaches to the inside of the rear locking bolt. A safety lock is fitted to prevent accidental movement of the handle.

You must lift the safety handle before you can operate the red handle from inside the passenger compartment. To operate the red handle from the outside you must push the button next to the red handle to lift the inner safety lock.

A short connecting rod attaches to the front of the double lever. The short connecting rod goes to the front locking bolt. If you pull the canopy handle away from the canopy frame, these things happen:

- The double lever turns to pull the both of the connecting rods.
- The long connecting rod pulls the rear locking bolt forward.
- The short connecting bolt pulls the front locking bolt aft. The aft movement of the locking bolt operates a micro switch for the door unlocked warning light (DOOR OPEN or DOORS) located on the G1000 or on the annunciator panel.

The door can be pushed up and out to open.

With the door fully closed, push the door handle towards the door frame. This engages the locking bolts in the fuselage holes. The forward locking bolt operates the door unlocked micro switch. When the handle is flush with the door frame, the door is locked. Push outwards on the bottom of the door frame to make sure that it is locked.

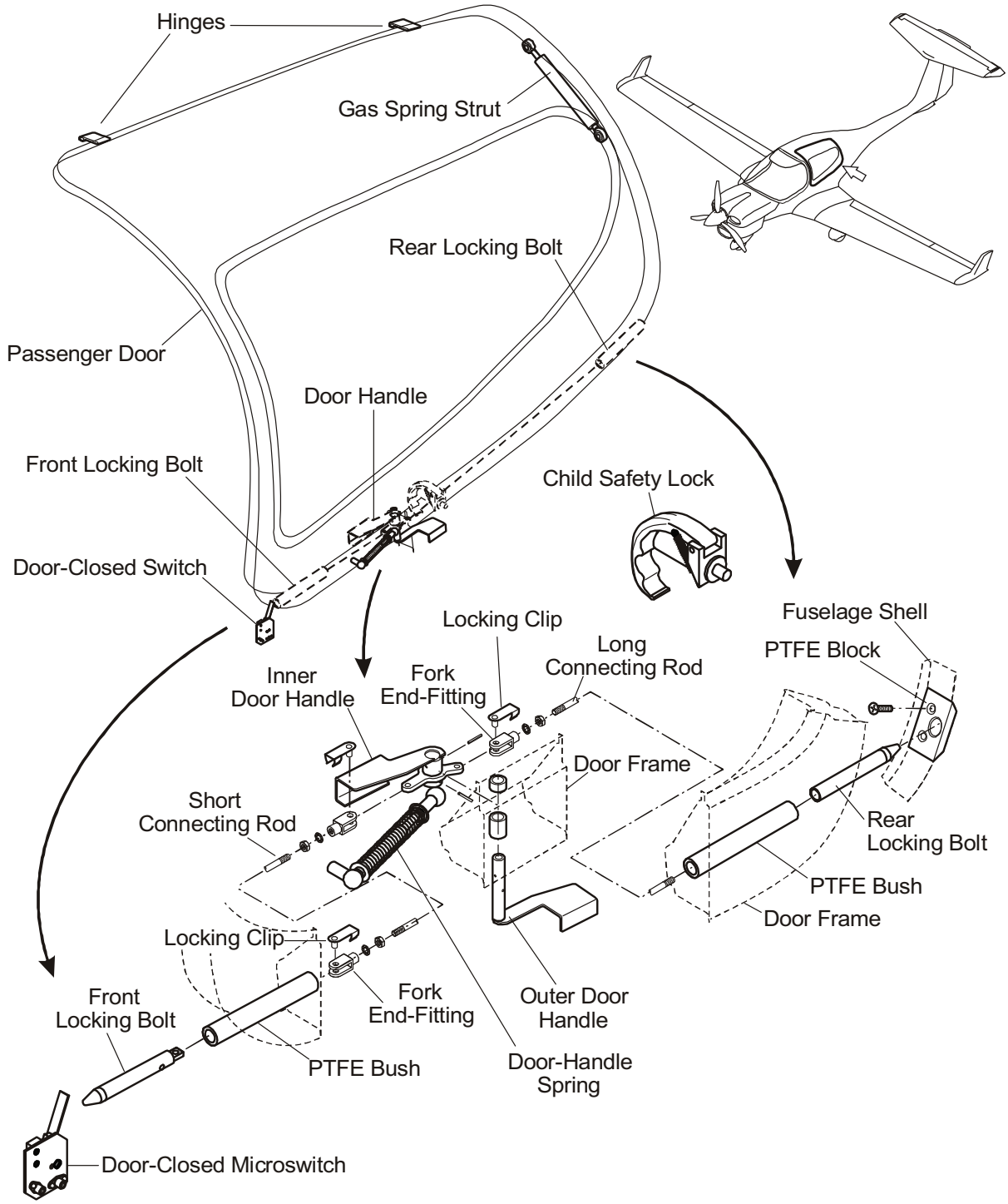

Figure 4 : Passenger Door (MÄM 40-139 not implemented)

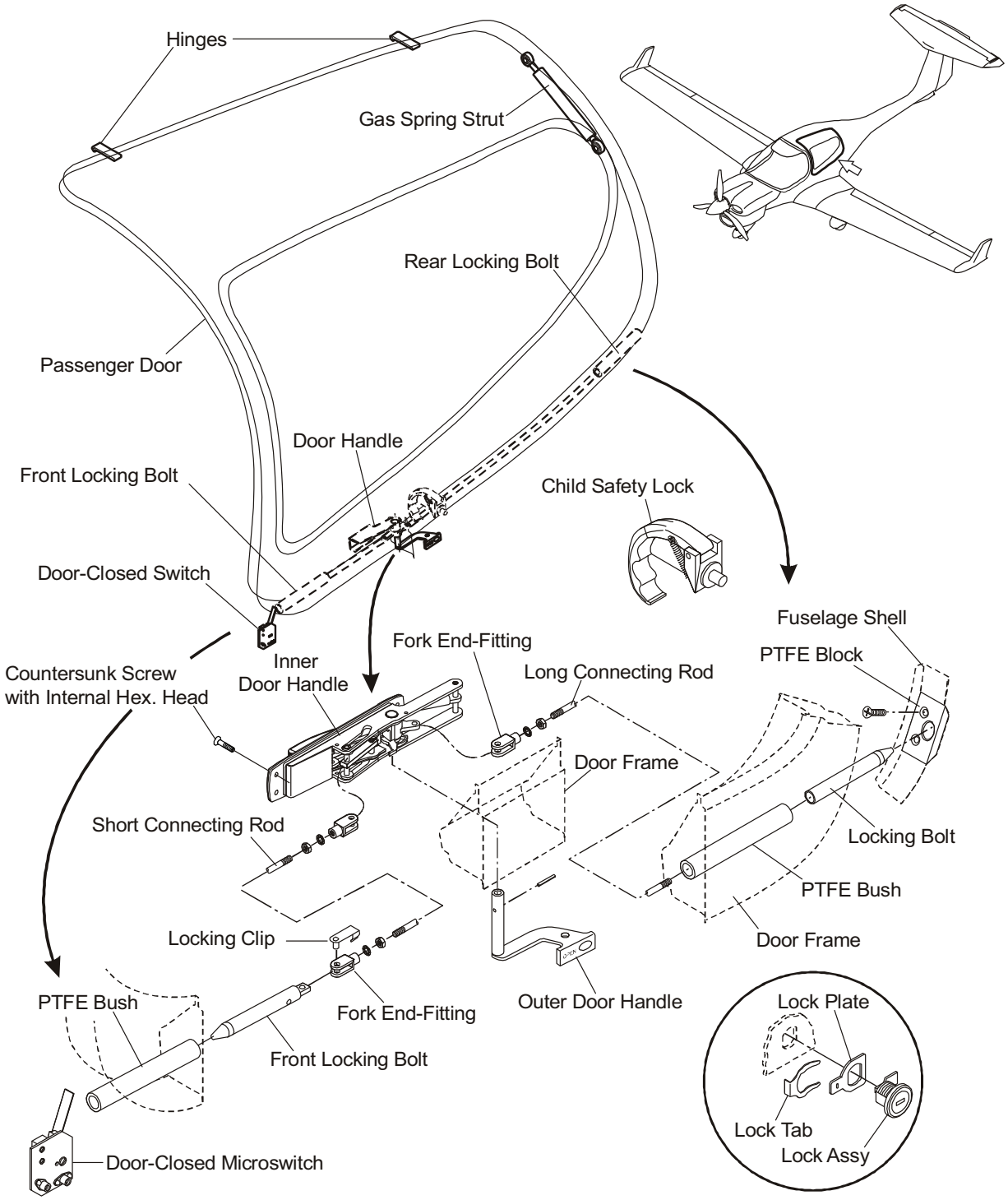

Figure 5 : Passenger Door (MÄM 40-139 implemented)

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TROUBLE-SHOOTING

1. General

The table below lists the defects you could have with the canopy and passenger door.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Canopy/door is difficult to move.	Canopy/door frame damaged.	Replace the canopy/door.
	Canopy/door hinges damaged.	Replace the damaged parts.
	Gas spring strut defective.	Replace the gas spring strut.
Canopy/door handle is difficult to move.	Locking bolts damaged.	Replace the damaged bolt.
	Handle bushes damaged.	Replace the canopy/door.
Canopy handle is difficult to move.	Teleflex cable defective.	Replace the teleflex cable.
Incorrect operation of door unlocked warning on the annunciator panel.	Canopy/door micro-switch incorrectly adjusted.	Adjust canopy/door micro switch.
	Canopy/door micro-switch defective.	Replace defective micro switch.
	Defective wiring.	Do a continuity test of the wiring. Refer to Chapter 92 for the wiring diagrams.
Red button operating the safety hook mechanism is stuck in pushed position.	Poor lubrication.	Lubricate. Refer to Section 12-20.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to install and remove the canopy and passenger door. They also tell you how to test and adjust the locking mechanism. The standard remove/install procedure is valid for the standard canopy.

2. Remove/Install the Canopy

A. Remove the Canopy.

	Detail Steps/Work Items	Key Items/References
(1)	Open the canopy: - Pull the canopy handle away from the canopy frame. - Lift the canopy open.	Refer to Figure 2 in the Description and Operation Pageblock 52-10-00.
(2)	Remove the four nuts, washers and bolts which attach the canopy to the hinge frame bracket.	Refer to Figure 1 in the Description and Operation Pageblock 52-10-00. Hold the canopy.
(3)	Disconnect the plug for the flood light.	
(4)	Lift the canopy clear of the airplane.	Two persons needed.

B. Install the Canopy.

	Detail Steps/Work Items	Key Items/References
(1)	Lift the canopy into position on the airplane.	Two persons needed.
(2)	Engage the tapered ends of the hinge frame in the tubular brackets on the canopy frame.	Refer to Figure 1 in the Description and Operation Pageblock 52-10-00.
(3)	Install the four bolts, washers and nuts which attach the canopy to the hinge frame bracket.	
(4)	Connect the plug for the flood light.	
(5)	Close the canopy.	
(6)	Operate the canopy lock: - Hold the canopy closed. - Push the canopy handle towards the canopy frame. - Push up on the rear of the canopy frame.	When the canopy is locked, the canopy handle must be flush with the canopy frame. To make sure that the canopy is locked.
(7)	Do a test for correct operation of the door unlocked warning light (DOOR OPEN or DOORS).	Refer to Paragraph 9.

3. Remove/Install the Canopy Door Handle (if MÄM 40-139 is installed)

A. Remove the Canopy Door Handle.

Refer to Figure 3 in the Description and Operation Pageblock 52-10-00.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the canopy.	Refer to Paragraph 2.
(2)	Put the canopy on a stable surface and secure it against movement.	Protect the canopy surface.
(3)	Remove the outside door handle: - Open the inside door handle for access to the spring pin. - Push the spring pin through the inside door handle. - Pull the outside door handle out.	Use a punch 4 mm (0.16 in).
(4)	Remove the four screws from the inside door handle.	
(5)	Pull out the handle and disconnect the front fork head from the slide axle. Remove the circlip and move the axle out.	
(6)	Disconnect the rear fork head from the inside lever.	
(7)	Remove the inside door handle from the canopy shell.	
(8)	Remove the spring pin from the canopy door handle.	

B. Install the Canopy Door Handle.

Refer to Figure 3 in the Description and Operation Pageblock 52-10-00.

	Detail Steps/Work Items	Key Items/References
(1)	Install the inside door handle to the canopy door shell: - Pre fit the door handle. - Connect the rear fork head to the inside lever.	
(2)	Connect the front fork head. Install the slide axle and secure the axle with circlip.	
(3)	Install the inside handle. Install the four screws.	
(4)	Install the outside door handle: - Push the outside door handle into the door shell to the inside door handle.	
(5)	Install the spring pin through the inside door handle.	Use a punch 4 mm (0.16 in).
(6)	Install the canopy.	Refer to Paragraph 2.

4. Remove/Install the Gas Spring Strut for the Canopy

A. Remove the Gas Spring Strut for the Canopy.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the canopy.	Refer to Paragraph 2.
(2)	Remove the nut and washer that attach the strut to the hinge frame.	Refer to Figure 1 in the Description and Operation Pageblock 52-10-00.
WARNING: MAKE SURE THAT THE STRUT IS FULLY EXTENDED BEFORE YOU DISCONNECT IT FROM THE HINGE FRAME.		
(3)	Pull the top of the strut away from the hinge frame.	Catch the bush and second washer.
(4)	Remove these items that attach the bottom of the strut: - Nut, washer and bolt. - Bush. - Two polyamide spacers.	
(5)	Remove the strut from the airplane.	

B. Install the Gas Spring Strut for the Canopy.

	Detail Steps/Work Items	Key Items/References
(1)	Put the strut in position in the airplane.	Refer to Figure 1 in the Description and Operation Pageblock 52-10-00. The cylinder goes to the top.
(2)	Install the bolt, washer and self-locking nut at the bottom attachment to the firewall.	Torque: 6.4 Nm (4.7 lbf.ft.). Use a new self-locking nut.
(3)	Put the washer and bush in position on the hinge frame.	
(4)	Move the top eye-end of the strut over the bush on the hinge frame.	
(5)	Install the washer and self-locking nut to the hinge frame.	Torque: 6.4 Nm (4.7 lbf.ft.). Use a new self-locking nut.
(6)	Install the canopy.	Refer to Paragraph 2.

5. Remove/Install the Passenger Door

A. Remove the Passenger Door.

Refer to Figure 4 in the Description and Operation Pageblock 52-10-00 if MÄM 40-139 **is not** implemented.

Refer to Figure 5 in the Description and Operation Pageblock 52-10-00 if MÄM 40-139 **is** implemented.

Refer to Figure 201 if both MÄM 40-139 and MÄM 40-619 are implemented..

	Detail Steps/Work Items	Key Items/References
(1)	Open the passenger door: - Push and hold the safety button next to the door handle. - Pull the door handle away from the door frame. - Lift the door open.	
(2)	Remove the gas strut: - Remove the locking clips from the gas strut top and bottom ball-end fittings. - Pull the gas strut off the ball end fittings on the fuselage and clear of the airplane.	Hold the door!
(3)	Remove the passenger reading light assembly from the top of the cockpit.	For access to the front door hinge. Refer to Section 33-10.
(4)	Remove the bolts and washers which attach the front and rear door hinges to the fuselage.	Hold the door!
(5)	Lift the door clear of the airplane.	

B. Install the Passenger Door.

Refer to Figure 4 in the Description and Operation Pageblock 52-10-00 if MÄM 40-139 **is not** implemented.

Refer to Figure 5 in the Description and Operation Pageblock 52-10-00 if MÄM 40-139 **is** implemented.

Refer to Figure 201 if both MÄM 40-139 and MÄM 40-619 are implemented.

	Detail Steps/Work Items	Key Items/References
(1)	Put the door in position in the fuselage.	
(2)	Install the bolts and washers which attach the front and rear door hinges to the fuselage.	
(3)	Install the passenger reading light assembly.	Refer to Section 33-10.
(4)	Install the gas strut: - Push the gas strut ball end fittings onto the fuselage gas strut mounts. - Install the locking clips which lock the ball end fittings in place.	
(5)	Close the door.	
(6)	Operate the door lock: - Hold the door closed. - Press the safety button next to the door handle and push the door handle towards the door frame. - Push outwards on the bottom of the door frame.	When the door is locked, the door handle must be flush with the door frame.
(7)	Do a test for correct operation of the door unlocked warning light (DOOR OPEN or DOORS).	Refer to Paragraph 9.

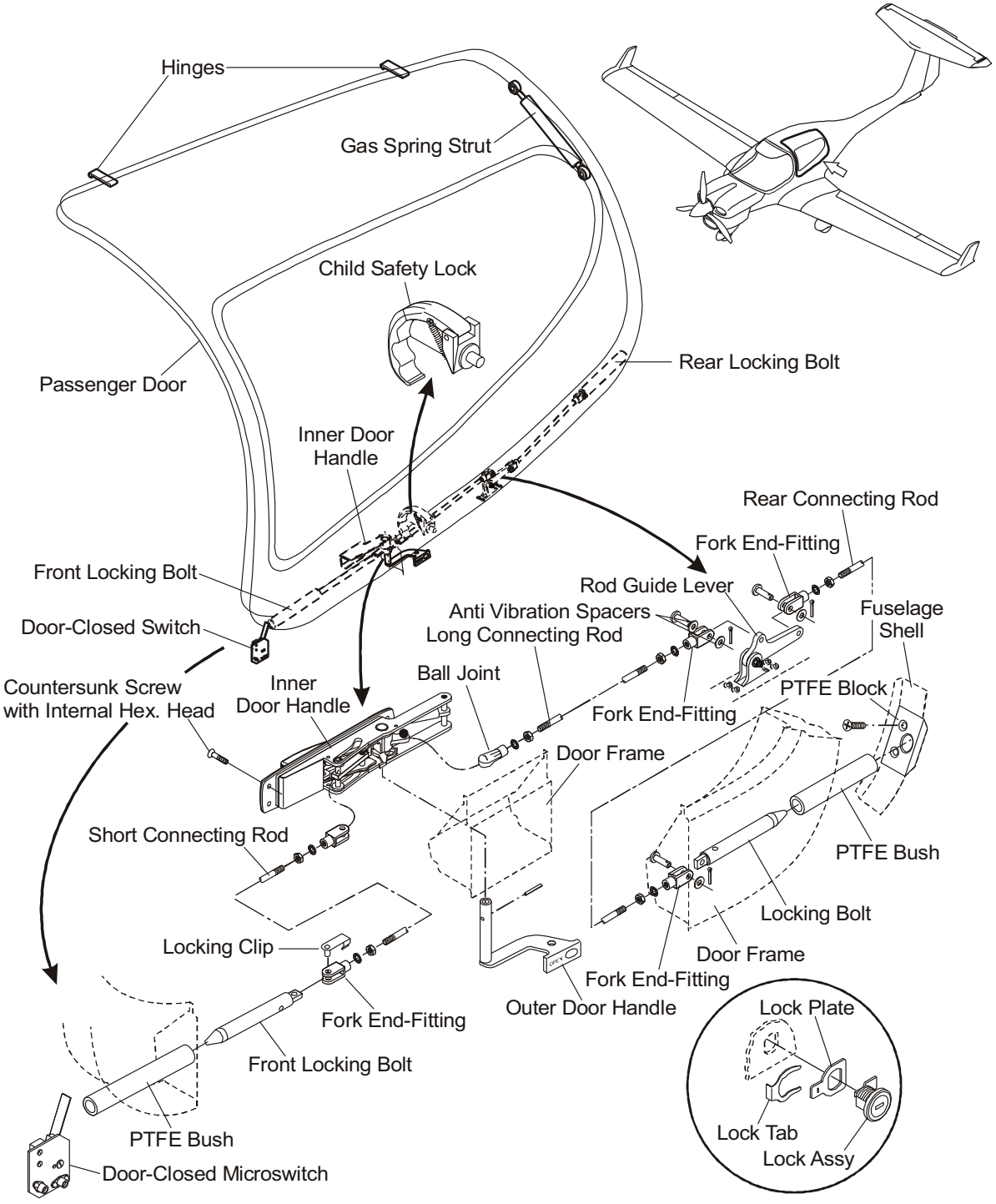

Figure 201 : Passenger Door (MÄM 40-139 and MÄM 40-619 are implemented)

6. Remove/Install the Passenger Door Handle (if MÄM 40-139 is installed)

A. Remove the Passenger Door Handle.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the passenger door.	Refer to Paragraph 5.
(2)	Fix the passenger door on a flat surface.	Protect the door surface finish.
(3)	Remove the outer door handle: - Open the inner door handle in order to gain access to the spring pin. - Push the spring pin through the inner door handle. - Remove the outer door handle.	Refer to Figure 5 in the Description and Operation Pageblock 52-10-00. Use a punch 4 mm (0.16 in).
(4)	If MÄM 40-619 is installed: Remove the rod guide base from the door shell: - Remove the four screws. - Move the guide base free of the door shell.	
(5)	If MÄM 40-619 is installed: Disconnect the thread rod from the rod guide lever: - Remove the cotter pin and the bolt.	
(6)	Remove the inner door handle from the passenger door shell: - Remove the four screws from the inner door handle.	
(7)	Lift the inner door handle and disconnect the front fork head from the slide axle.	
(8)	Remove the circlip and move the axle free of the door shell.	
(9)	Disconnect the rear fork head from the lever.	
(10)	Move the door handle free of the door shell.	
(11)	Remove the spring pin from the door handle.	

B. Install the Passenger Door Handle.

	Detail Steps/Work Items	Key Items/References
(1)	Install the inner door handle of the passenger door: - Move the door handle into place. - Connect the rear fork head to the inner door handle lever.	Refer to Figure 5 in the Description and Operation Pageblock 52-10-00.
(2)	Connect the front fork head and install the slide axle and secure the axle with a circlip.	
(3)	If MÄM 40-619 is installed: Connect the rear thread rod to the rod guide lever.	
(4)	If MÄM 40-619 is installed: Install the rod guide base to the door shell: - Install the four screws.	
(5)	Install the inner handle: - Install the four screws.	
(6)	Install the outer door handle of the passenger door: - Align the outer door handle with the hole of the inner door handle. - Push the door handle into the inner door handle.	
(7)	Install the spring pin through the inner door handle.	Use a punch 4 mm (0.16 in).

7. Remove/Install the Passenger Door Locking-Mechanism (if MÄM 40-619 is installed)

A. Remove the Passenger Door Locking-Mechanism.

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the door handle.	
(2)	Remove the four bolts from the rod guide base.	
(3)	Remove the lever bolt from the guide base.	
(4)	Remove the guide base.	
(5)	Pull the long connecting rod and the guide lever with the locking bolt to the door handle cut out.	

B. Install the Passenger Door Locking-Mechanism.

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(1)	Install the long connecting rod and the guide lever into the door handle cutout.	
(2)	Install the rear locking bolt into the PTFE bush.	
(3)	Connect the guide lever to the guide base.	
(4)	Connect the ball cup fitting from the thread rod 2 to the door handle.	
(5)	Connect the front fork head to the slide axle.	
(6)	Pre-fit the inner door handle.	

	Detail Steps/Work Items	Key Items/References
(7)	Install the guide base.	
(8)	Adjust the rear locking bolt: - Check that the short lever arm from the guide lever position is more than 90° in the closed position. If necessary adjust long connecting rod. - Check the rear locking bolt over length in closed position 44 mm ± 1mm (1.73 in. ± 0.04 in.) If necessary adjust the locking bolt thread rod. For adjustment remove the guide base and lever. - Check the locking mechanism for release. Push with 15 kg on the rear locking bolt in the closed position. The closing mechanism has to stay locked up to a force of 15 kg. - Check the front locking bolt over length in closed position 40 mm ± 1mm (1.57 in. ± 0.04 in.). - Install the four guide base bolts. - Install the inner door handle.	

8. Remove/Install the Gas Spring Strut for the Door

A. Remove the Gas Spring Strut for the Door.

	Detail Steps/Work Items	Key Items/References
(1)	Open the passenger door: - Push and hold the button next to the door handle. - Pull the door handle away from the door frame. - Lift the door open.	Refer to Figure 4 or Figure 5 in the Description and Operation Pageblock 52-10-00.
(2)	Remove the gas strut: - Remove the locking clips from the gas strut top and bottom ball-end fittings. - Pull the gas strut off the ball end fittings on the fuselage and clear of the airplane.	Hold the Door!

B. Install the Gas Spring Strut for the Door.

	Detail Steps/Work Items	Key Items/References
(1)	Open the passenger door: - Pull the door handle away from the door frame. - Lift the door open.	Refer to Figure 4 or Figure 5 in the Description and Operation Pageblock 52-10-00. Hold the Door!
(2)	Install the gas strut: - Push the gas strut ball end fittings onto the fuselage gas strut mounts. - Install the locking clips which lock the ball end fittings in place.	Hold the Door!
(3)	Close the door.	

9. Test the Door Unlocked Warning-Light

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that both the front canopy and the passenger door are fully closed.	Operating handles flush against the canopy/ door frame.
(2)	Test the operation of the door unlocked warning light (DOOR OPEN or DOORS) on the PFD of G1000 or annunciator panel:	Monitor the door unlocked warning light (DOOR OPEN or DOORS) on the PFD of G1000 or annunciator panel.
	- Set the ELECTRIC MASTER key switch to ON.	The warning light must be off.
	- Move the passenger door operating handle towards the open position.	The warning light must come on when the operating handle has moved away from the door frame.
	- Move the door operating handle to the fully closed position.	The warning light must go off.
	- Move the canopy operating handle towards the open position.	The warning light must come on when the operating handle has moved away from the door frame.
	- Move the canopy operating handle to the fully closed position.	The warning light must go off.
	- Set the ELECTRIC MASTER key switch to OFF.	

10. Examine the Carbon Hinges on the Passenger Door

	Detail Steps/Work Items	Key Items/References
(1)	Open the passenger door to carry out the carbon hinge inspection.	
(2)	Examine the carbon hinges for cracks and delamination on the side faces: - Hold the passenger door frame with one hand to the left and one hand to the right of the hinge. - Apply torsional test force to the hinge by alternately pulling with one hand and pushing with the other hand. - If cracks become visible on the side faces of the hinges when test force is applied, the hinge is structurally damaged due to delamination. Replace the carbon hinges.	Refer to Figure 202. Apply test force of approx. 8 kg (18 lb) with each hand. Refer to Paragraph 12.
(3)	Cracks at the outer face of the hinges where they meet the door frame may be visible. If cracks in this area are visible, perform the following checks: - Hold the passenger door frame with one hand to the left and one hand to the right of the hinge. - Apply torsional test force to the hinge by alternately pulling with one hand and pushing with the other hand, check the cracks on the outer face of the hinge. - Push the passenger door open against the mechanical stop of the damper with care, do not use undue force. Check the cracks on the outer face of the hinge. If cracks expand extensively when applying test force, the hinges are structurally damaged. Replace the carbon hinge. If the cracks do not expand extensively when applying test force, they are limited to the painting and do not affect the serviceability of the door.	Refer to Figure 203. Apply test force of approx. 8 kg (18 lb) with each hand. Refer to Paragraph 12.

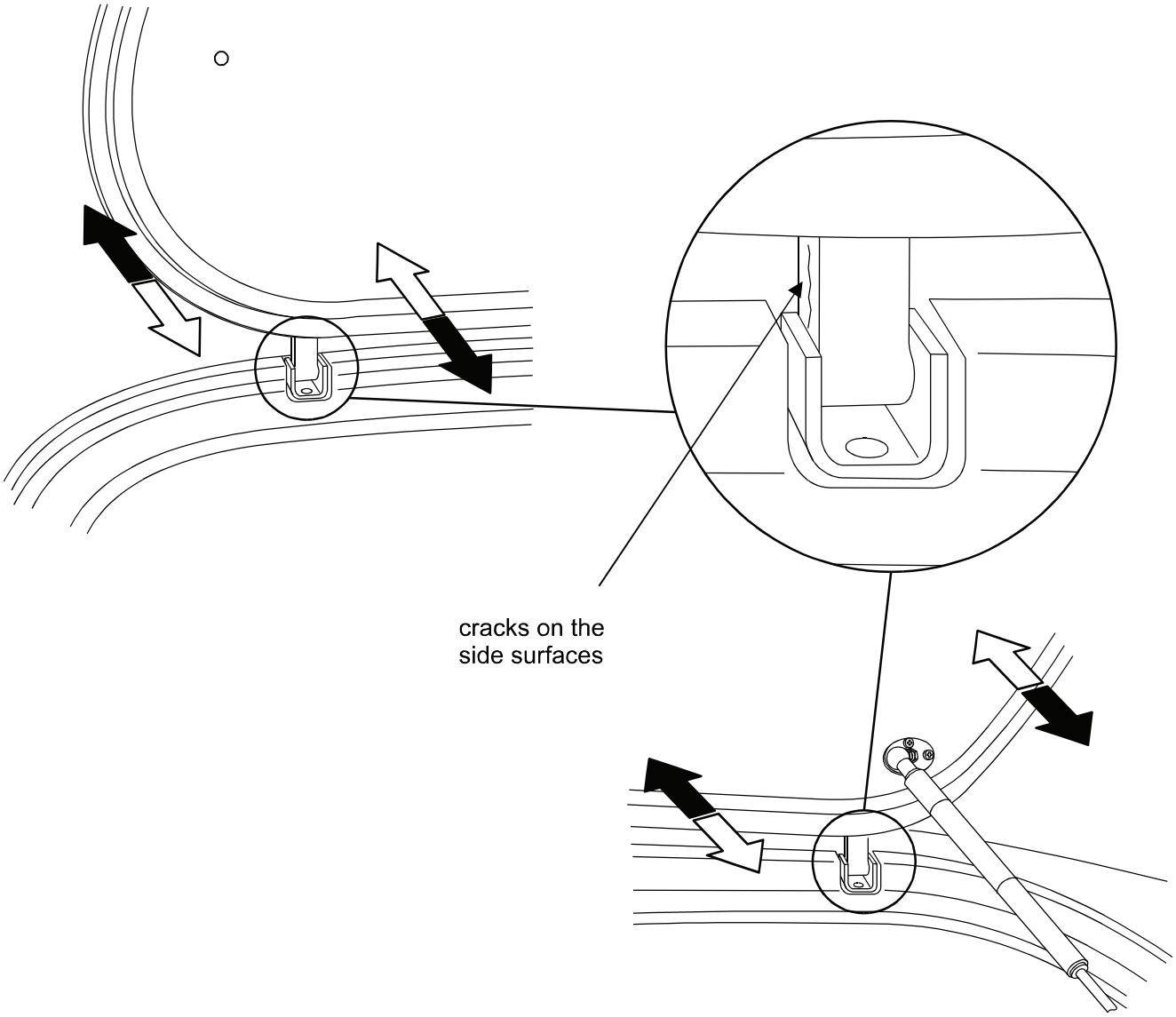

Figure 202 : Passenger Door - Torsional Hinge Test

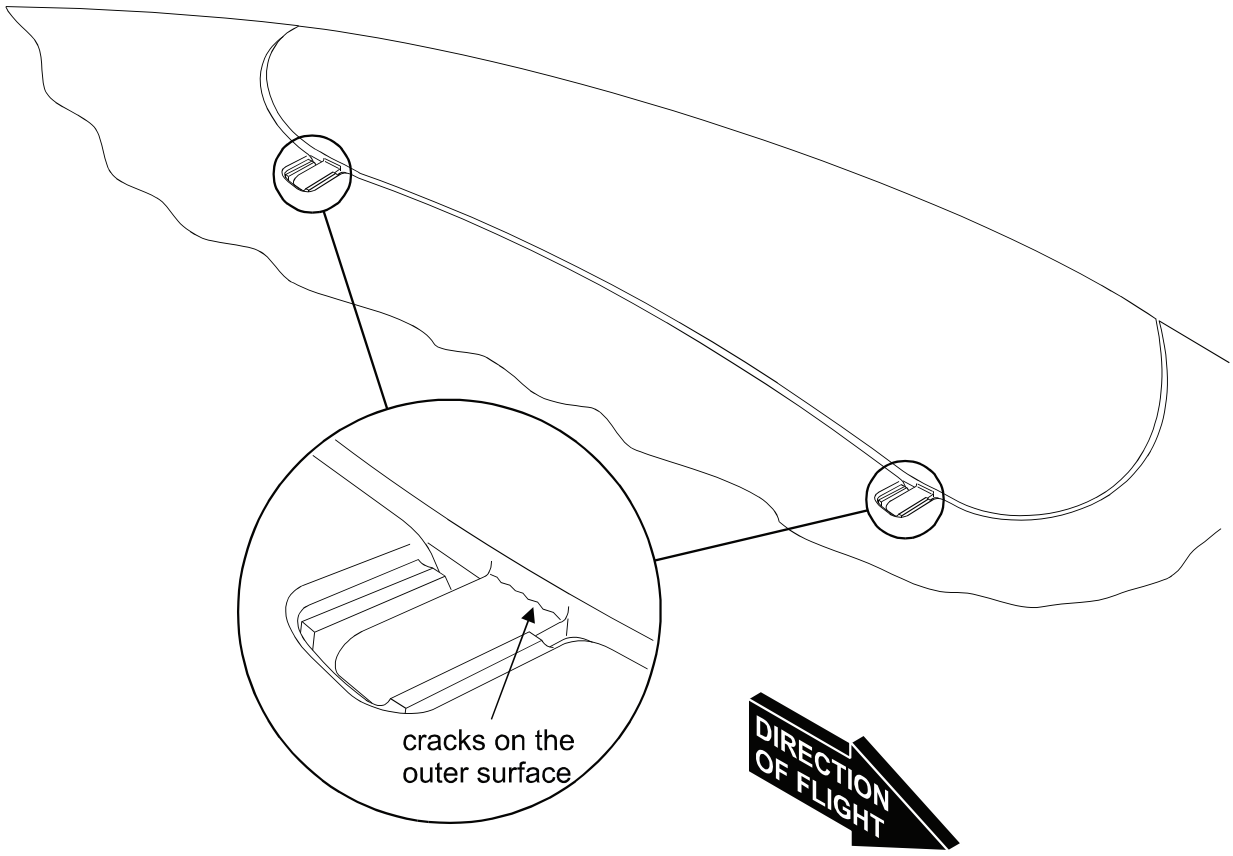

Figure 203 : Passenger Door - Outer Face Hinge Test

11. Inspection of the Door Locking and Safety Hook Mechanisms

	Detail Steps/Work Items	Key Items/References
(1)	Make sure the door lock mechanism works correctly: - The pins must engage in the guarding plates of the door frame correctly.	
(2)	Make sure the safety hook mechanism works correctly: - Lubricate the red button of the safety hook mechanism from outside, where it enters the door frame. - Operate the button several times. Repeat lubrication procedure until button moves smoothly. - Make sure the safety hook engages correctly into the retaining block on the fuselage when the door is closed but unlatched.	Refer to Section 12-20.

12. Replace a Passenger Door Carbon Hinge

	Detail Steps/Work Items	Key Items/References
(1)	Remove the passenger door.	Refer to Paragraph 5.
(2)	Clean the surface around the hinge on the fuselage and passenger door.	
(3)	Cover the surface around the hinge with masking tape.	Use enough masking tape to prevent the bonding paste touching the paint.
(4)	Remove the peel ply from the carbon hinge.	
(5)	Install and center the new carbon hinge on the fuselage side.	Use shims to keep the bearing centered.
(6)	Remove the carbon hinge from the passenger door.	Make sure not to damage to door structure.
(7)	Cover the surface around the hole for the carbon hinge with masking tape.	Use enough masking tape to prevent the bonding paste touching the paint.

	Detail Steps/Work Items	Key Items/References
(8)	Put the passenger door into position for a trial fit. Close the door lock.	Use shims to make sure there are equal gaps and contour fit. Mark the shims and the positions for later use.
(9)	Remove the passenger door.	
(10)	Prepare the bonding surfaces.	Refer to Section 51-20.
(11)	Coat the bonding surface with mixed resin.	Refer to Section 51-20.
(12)	Fill the hole for the carbon hinge with bonding paste completely.	Refer to Section 51-20.
(13)	Put the passenger door into position. Close the door lock.	Make sure there are equal gaps and contour fit.
(14)	Remove excessive bonding paste.	
(15)	Pre-cure the carbon hinges.	Refer to Section 51-20.
(16)	Remove the passenger door.	
(17)	Remove the masking tape from the fuselage and passenger door.	
(18)	Post-cure the carbon hinge.	Refer to Section 51-20.
(19)	Grind the surface smooth.	
(20)	Paint the surface.	Refer to Section 51-20.
(21)	Install the passenger door.	Refer to Paragraph 5.

13. Remove/Install the Door Handle Compression-Gas-Spring (if MÄM 40-139 is installed)

A. Remove the Door Handle Compression-Gas-Spring.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the canopy or passenger door handle	Refer to Paragraph 3 or Paragraph 6.
(2)	If installed, remove the circlip from the gas spring tie bolt.	Protect the door surface finish.
(3)	Pull the rear end of the door handle frame approximately 4 mm (0.16 in) apart and pull out the gas spring tie bolt. If MÄM 40-859 is installed, pull the tie bolt out axially. Caution: The spring is loaded!	Door handle must be in the open position.
(4)	Unscrew the piston of the gas spring from the door handle.	

B. Install the Door Handle Compression-Gas-Spring.

	Detail Steps/Work Items	Key Items/References
(1)	Screw the piston of the gas spring into the door handle.	Use Loctite 243.
(2)	Adjust the length of the compression gas spring. Make sure that the polyamide bushing defines the mechanical stop of the red aluminum door handle.	The mechanical stop of the red aluminum door handle must not be defined by the internal stop of the compression gas spring.
(3)	Compress the gas spring and insert the tie bolt. Pull the rear end of the door handle frame approximately 4 mm (0.16 in) apart and push the gas spring tie bolt in. If MÄM 40-859 is installed, push the tie bolt in axially.	
(4)	If MÄM 40-859 is installed, install the circlip on the gas spring tie bolt.	
(5)	Install the canopy or passenger door handle.	Refer to Paragraph 3 or Paragraph 6.

14. Test the Door Handle Compression-Gas-Spring (if MÄM 40-139 is installed)

	Detail Steps/Work Items	Key Items/References
(1)	Open the canopy or passenger door.	The test is the same for both the canopy door handle and the passenger door handle.
(2)	Move the door handle into the open position. Slowly move the door handle to the closed position and check, if the door handle snaps into the closed position by itself at least 10 mm (measured at the outermost point of the lever) before reaching the end position.	
(3)	If the distance is less then 10 mm when the door handle snaps into the closed position, replace the compression gas spring.	Refer to Paragraph 13.

15. Replace the Canopy Bowden Cable

Refer to Figures 204 and 205.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the canopy.	Refer to Paragraph 2.A.
(2)	Put the canopy on a stable surface and secure it against movement.	Protect the canopy surface.
(3)	Remove the canopy door handle.	Refer to Paragraph 3.A. (if MÄM 40-139 is installed)
(4)	Remove the bowden cable:	
	- At position **A** (left side of the canopy), remove the fork end, the washer and nut that attach the bowden cable to the canopy door inside-assembly.	Refer to Figure 205.
	- On the right side of the canopy, remove the blind plug and threaded pin that holds the bowden cable in position in the locking bolt.	
	- Remove (unscrew) the locking bolt from the bowden cable.	
	- Attach a thin, strong cord to one end of the bowden cable to assist in the installation of the cable.	Make sure that the cord is longer than the bowden cable.
	- From the other end, carefully pull the bowden cable to remove it from the bowden cable sheath.	The cord will pull through the sheath with the bowden cable.
	- Remove the cord from the cable and remove the bowden cable from the airplane.	The cord remains in place in the bowden cable sheath.

	Detail Steps/Work Items	Key Items/References
(5)	Install the bowden cable:	This procedure will require a second person.
	- Attach the cord that is in the bowden cable sheath to one end of the bowden cable.	
	- One person will feed the bowden cable through the sheath while the second person will carefully pull the cord to assist the bowden cable installation in the sheath.	Once the bowden cable is completely through the sheath, remove and discard the cord.
	- At position **A** (left side of the canopy), install the fork end, the washer and nut that attach the bowden cable to the canopy door inside-assembly.	Refer to Figure 205. Install to the threaded mid-point to give room for locking pin adjustment.
	- On the right side of the canopy, install and secure the locking bolt to the bowden cable.	Apply Rota Bond 2000 onto the bowden cable.
	- Install the threaded pin that holds the bowden cable in position in the locking bolt.	This will be adjusted once the canopy door handle is installed.
(6)	Install the canopy door handle.	Refer to Paragraph 3.B. (if MÄM 40-139 is installed)
	- Check the locking bolt pin extrusion. Adjust as necessary.	Refer to Figure 205.
	- Once the locking pin extrusion is set correctly, tighten the threaded pin and install the blind plug.	Refer to Figure 205.
(7)	Install the canopy.	Refer to Paragraph 2.B.

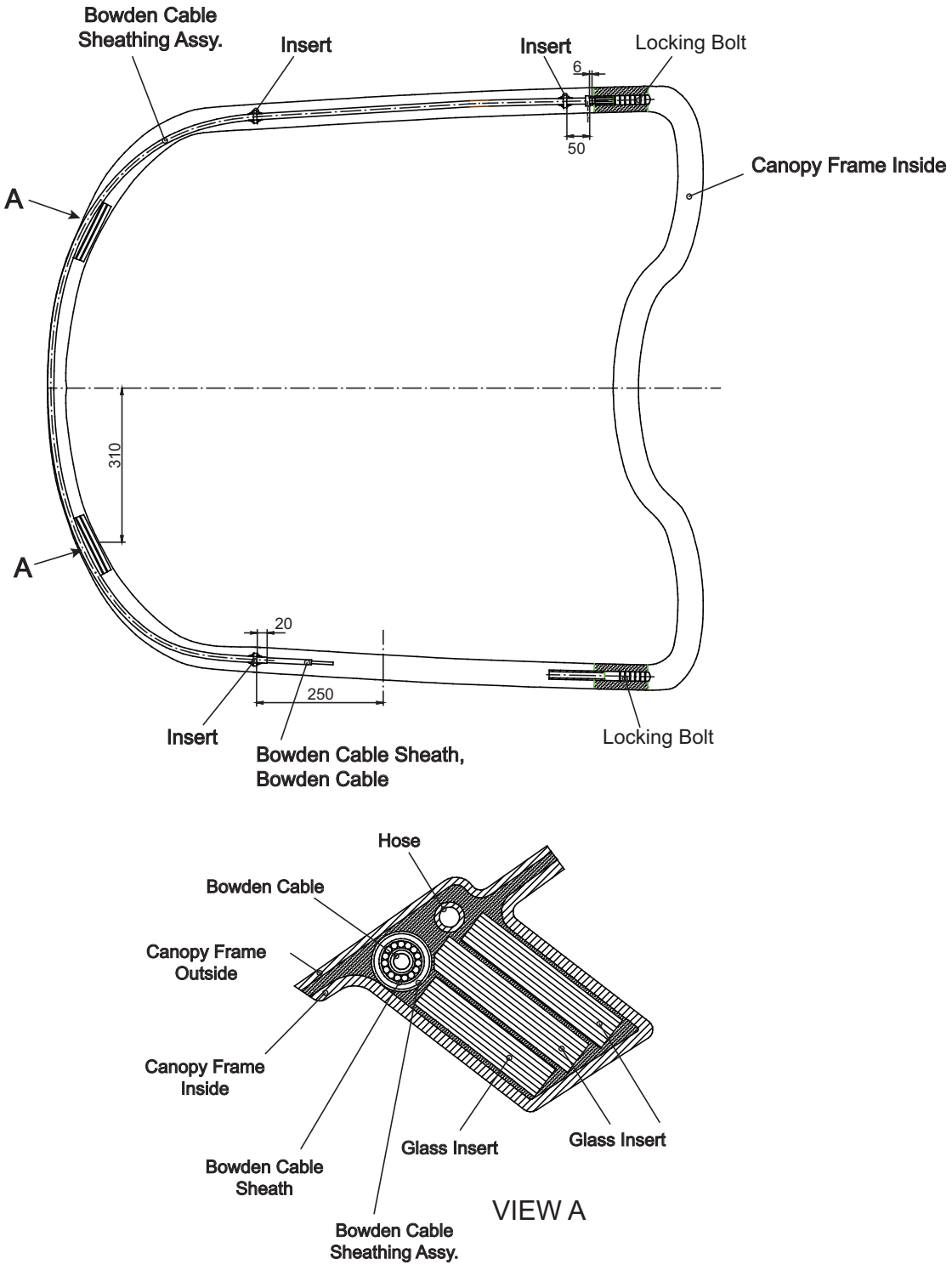

Figure 204 : Bowden Cable - Removal/Installation

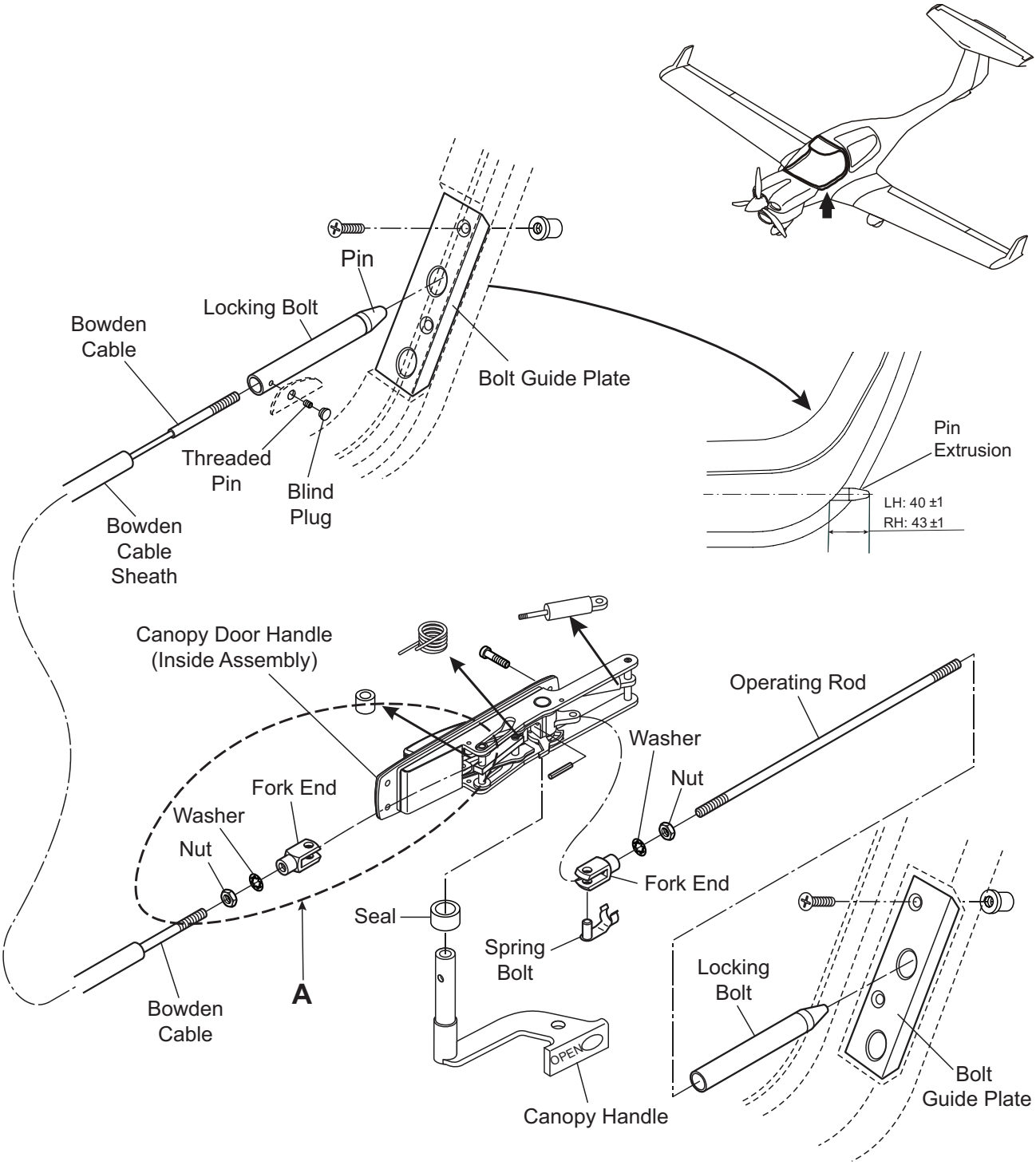

Figure 205 : Bowden Cable - Removal/Installation

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ACCESS PANELS

1. General

The DA 40 NG has a small number of access panels. Panels which must be used often (for example the oil filler panel), have quick-release fasteners. Other panels have the usual screws.
Refer to Section 71-10 for data about the engine cowlings.

2. Description

Figure 1 shows the location of the access panels on the airplane.

Most panels are GFRP moldings. Screws hold the panels in position. There are no special procedures for removing or installing access panels.

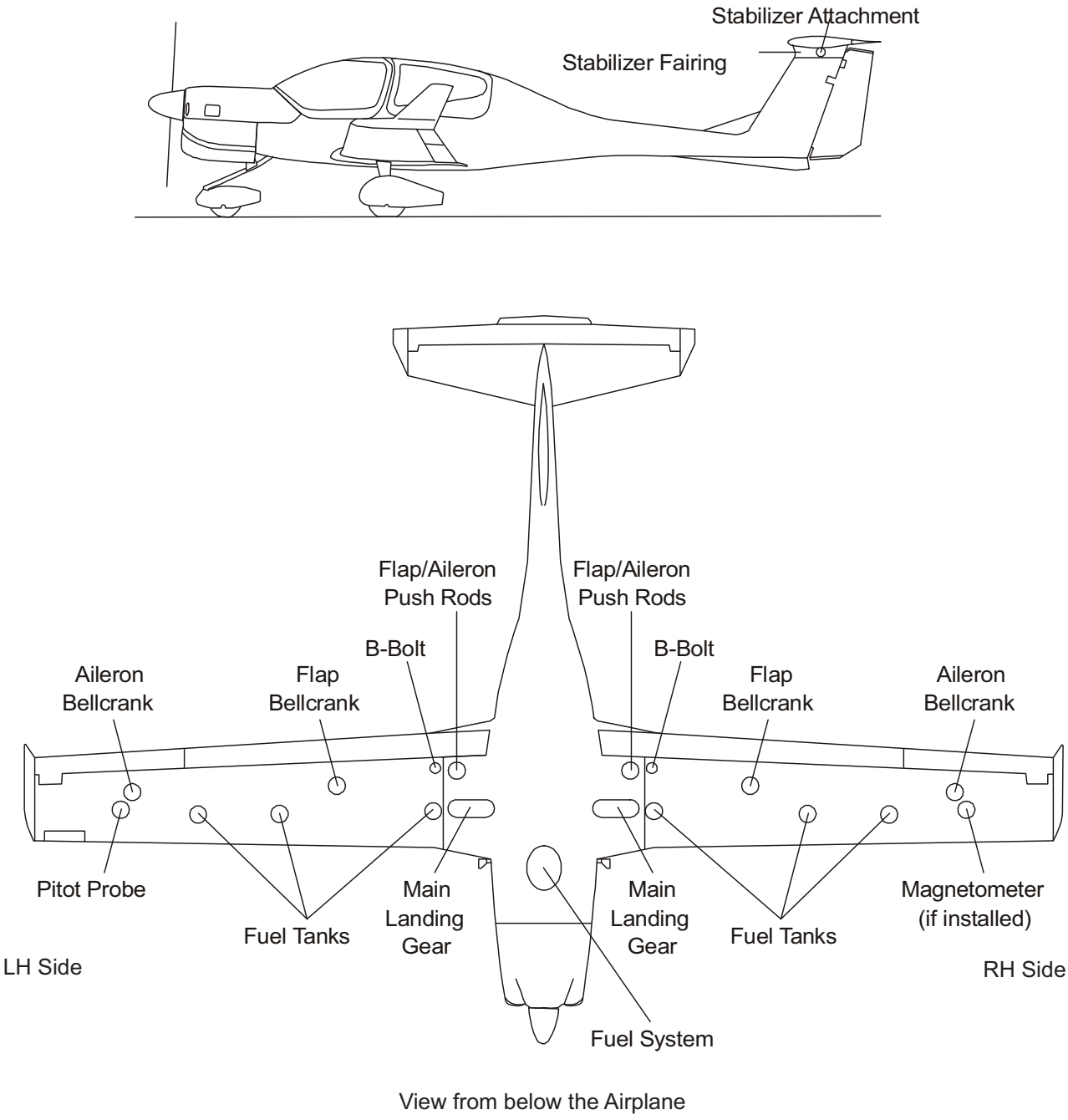

Figure 1 : Access Panel Locations

CHAPTER 53
FUSELAGE

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FUSELAGE

1. General

The DA 40 NG fuselage has a semi-monocoque structure. Two GFRP half-shells make the fuselage skin. GFRP frames and webs give the fuselage strength and stiffness. The vertical stabilizer is an integral part of the fuselage.

The fuselage shells have many layers of glass cloth. Some areas have more layers of glass cloth than other areas. This gives more strength and stiffness where it is needed. Rigid foam inserts give stiffness where necessary.

The frames and webs also have many layers of glass cloth. Some areas have layers of carbon fiber cloth or tape to give extra strength. Some components also have rigid inserts of GFRP for attaching brackets or other components.

There is a foot step on each side of the cockpit for pilot entrance and optional footsteps to the rear of the left wing and right wing for rear seat passenger entrance.

Section 53-10 gives the data for the fuselage structure.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to remove and install the foot steps. There is a foot step on each side of the cockpit for pilot entrance and optional foot steps to the rear of the left wing and right wing for rear seat passenger entrance.

The procedures are shown for the left side foot steps. The procedures for the foot steps on the right side are similar.

2. Remove/Install the Foot Steps

A. Remove the Foot Steps.

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the pilot's or co-pilot's seat for access to the forward foot step hardware.	Refer to Section 25-10-00, Maintenance Practices - Remove a Pilot's Seat
(2)	Remove a forward foot step: - Hold the locknuts inside the cockpit and remove the three bolts and washers from outside, at the foot step. - Remove the three bolts, locknuts and the six washers. - Remove the foot step from the airplane.	This may require a second person if the locknuts inside the cockpit cannot be accessed from the foot step outside. Hold the foot step. Discard the locknuts.
(3)	If installed, remove the rear foot step: - The rear foot step attaches to anchor nuts installed in mounting plate assemblies. - At the foot step, remove the two bolts and washers from the bottom of the mount. - Remove the three bolts and washers from the side of the mount. - Remove the foot step from the airplane.	This foot step is optional. The mounting plate assemblies are fixed. Hold the foot step.

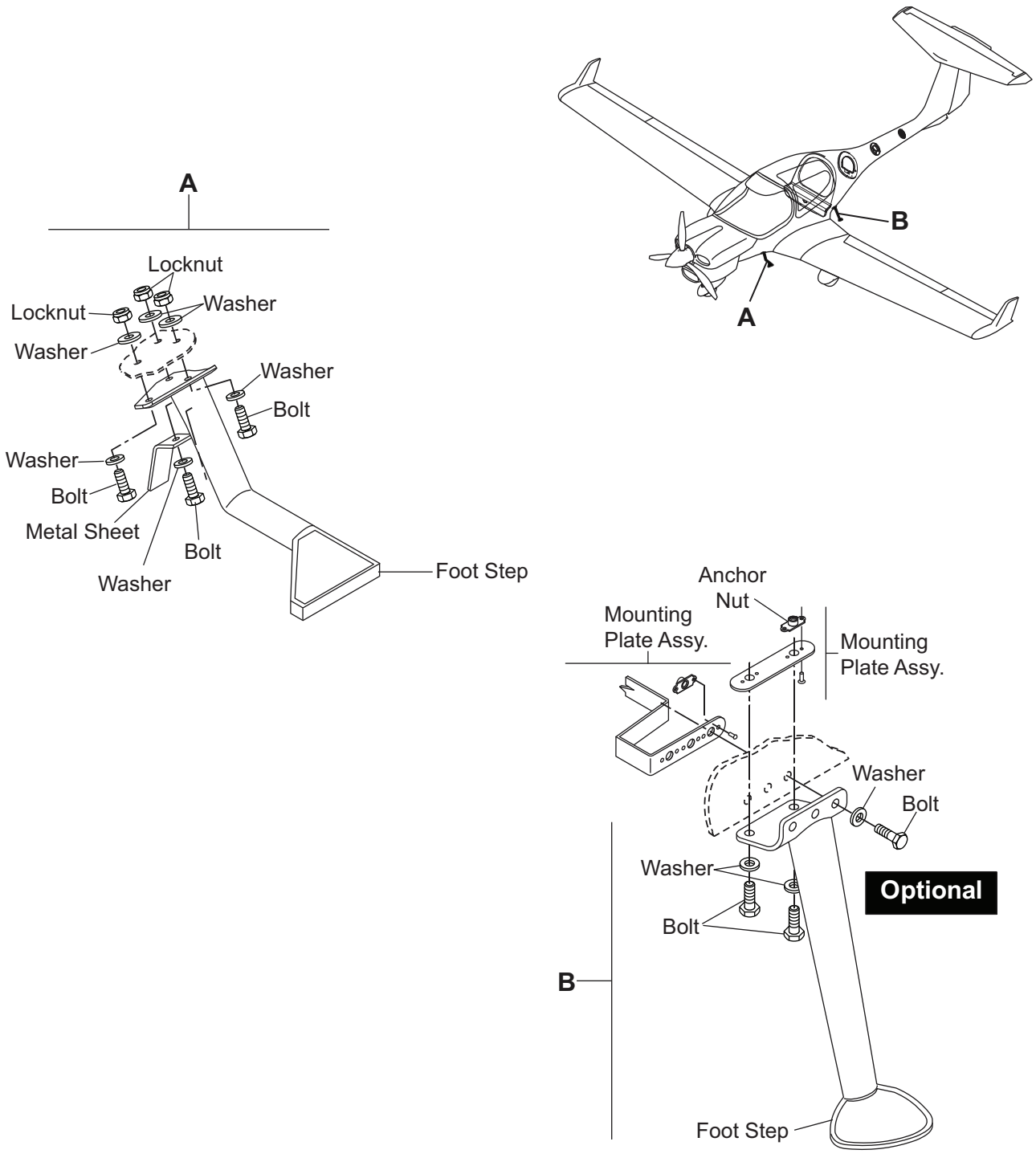

Figure 201 : Foot Steps - Removal/Installation

A. Install the Foot Steps.

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(1)	Install a forward foot step: - Put the foot step in place on the front side of the airplane. - Install the three bolts and washers into the mount. - Inside the cockpit install the three washers and new locknuts onto the bolts. - Tighten the bolts from the outside.	 Hold the foot step. Make sure that the one bolt goes through the metal sheet. This may require a second person if the locknuts inside the cockpit cannot be accessed from the foot step outside.
(2)	Install the pilot's or co-pilot's seat.	Refer to Section 25-10-00, Maintenance Practices - Install a Pilot's Seat
(3)	If removed, install the rear foot step: - Clean the terostat from the foot step mounting location. - Put the foot step in place on the side of the airplane below the rear passenger door. - Install the three bolts and washers on the side of the mount. - Install the two bolts and washers on the bottom side of the mount. - Seal the outside of the mount with terostat.	This foot step is optional. Be careful not to damage the airplane skin. Hold the foot step. The bolts attach to anchor nuts fixed on a mounting plate assembly. The bolts attach to anchor nuts fixed on a mounting plate assembly. Use Terostat-MS 9380 white/grey/black/ Limited temperature resistance: 120°C for 1 hr.

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FUSELAGE STRUCTURE

1. General

This Section gives you the data about the fuselage structure. It also includes the vertical stabilizer. See Chapter 51-00 for data about repair to the structure.

All of the main structural components are GFRP rigid moldings. Many layers of glass cloth bond together to make each molding. Some components have layers of carbon fiber cloth. This gives more strength and stiffness.

Most components have rigid GFRP inserts. The inserts give strength and stiffness for attaching other components such as brackets for controls.

Bonding paste (thickened resin) bonds components to other components. Most of the components in the fuselage also bond to the fuselage shell.

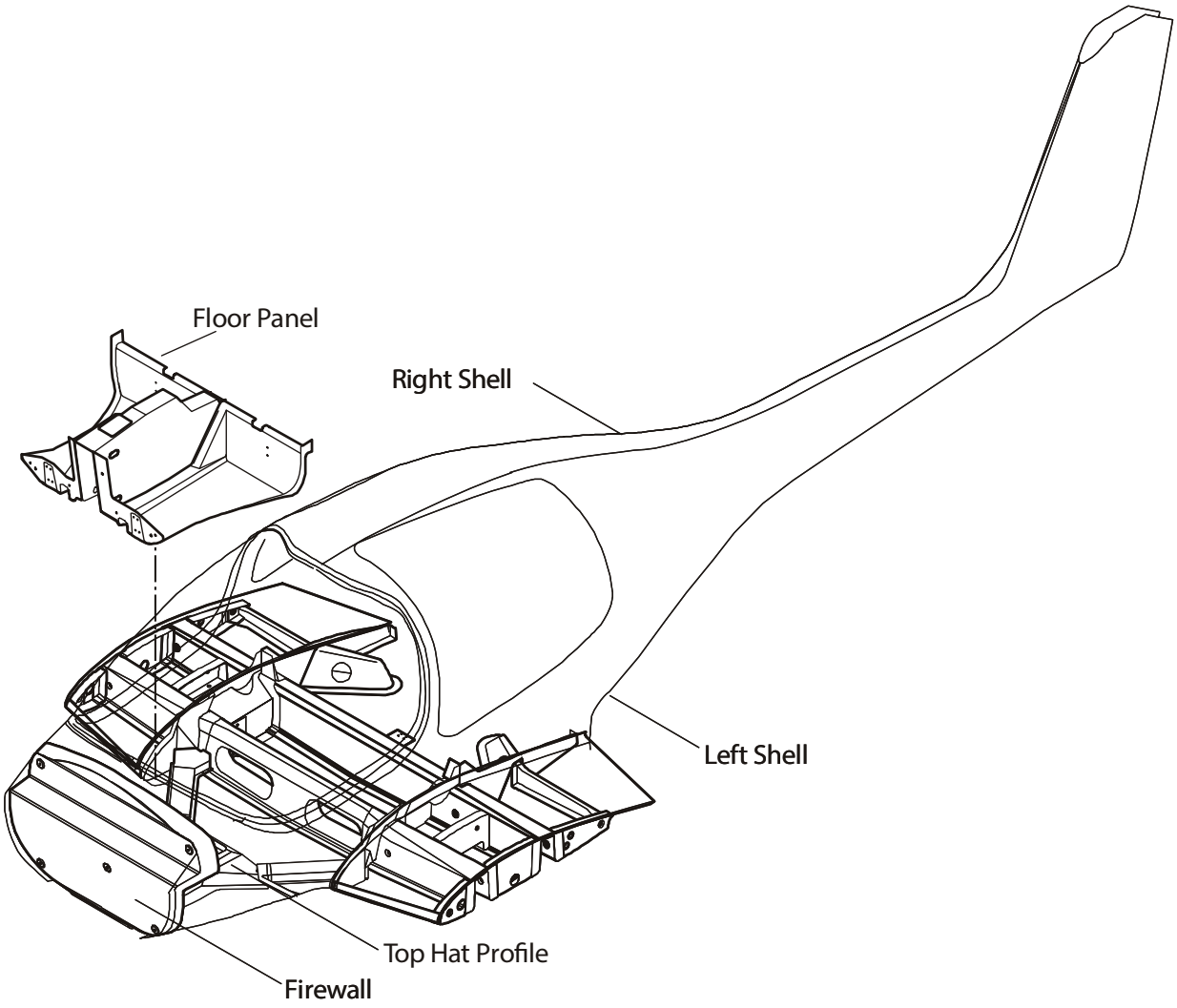

Figure 1 : Fuselage Shells and Front Fuselage Structure

2. Description

Figures 1 to 4 show the fuselage structure.

A. Fuselage Shells.

Two GFRP shells make the outer skin of the fuselage. The shells transmit structural loads. The shells bond to each other at the top and bottom of the fuselage. Each shell has many layers of glass cloth. Some areas have of the shell have more layers to give more strength and stiffness. Some areas have rigid foam inserts to give more stiffness.

Thickened resin bonds all other structural components to the fuselage shells. Many small components bond to the fuselage shells, these include:

- Air inlet and outlet ducts.

- Conduits for electrical wires, antenna cables and fuel pipes.

B. Firewall.

The firewall closes the front of the fuselage. It also holds the attachments for the engine mount. It has holes for the different systems that attach to the engine.

The firewall is a rigid GFRP molding. A special adhesive bonds a fire-resistant ceramic blanket to the front face of the firewall. The adhesive also bonds a stainless-steel sheet to the front of the blanket. Components which go through the firewall also hold the stainless-steel sheet and blanket to the GFRP molding.

C. Top Hat Profile.

The top hat profile bonds to the inner bottom skin of the fuselage, behind the firewall. It gives strength and stiffness to the front fuselage. It has the mounting for the nose landing gear and channels for fuel pipes.

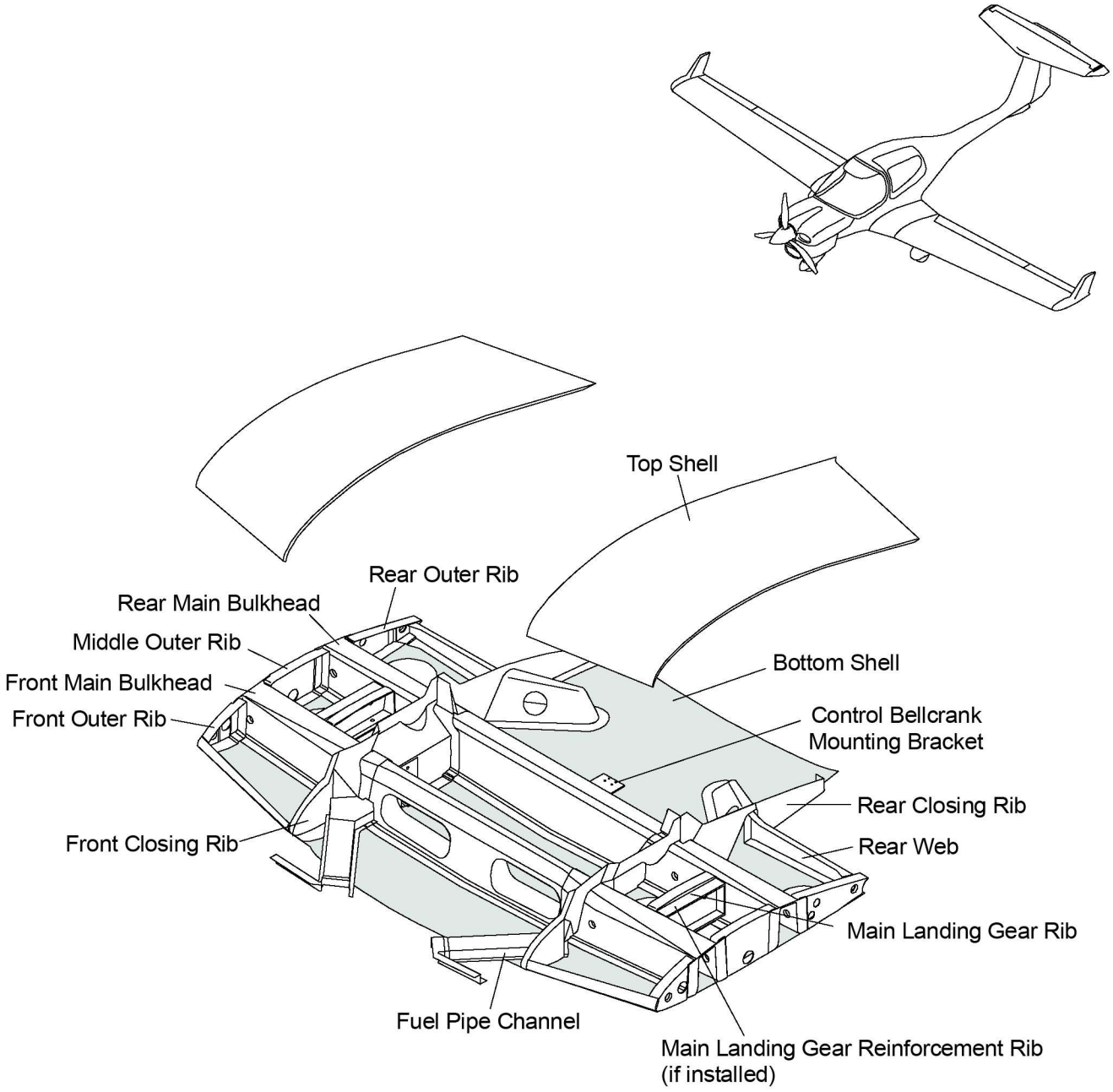

Figure 2 : Fuselage - Cross Section

D. Floor Panel.

The floor is a rigid GFRP molding. It bonds to the inner bottom skin of the fuselage shell and the firewall. It goes over the top of the top hat profile. The center part of the floor panel makes the center console.

The rear part of the floor makes the front support for the pilots' seats. It also holds the front of the control stick support brackets. The rudder pedal assembly for each pilot attaches to the floor panel.

E. Center Section.

Figure 2 shows the center section. The center section has the mountings for the wings and the main landing gear. It has a front main bulkhead and it has a rear main bulkhead.

The front main bulkhead is a rigid GFRP box-section molding. It has layers of carbon cloth on the top and bottom faces. The carbon gives cloth gives strength and stiffness to the bulkhead.

The rear main bulkhead has a similar structure. The control bellcrank mounting-bracket is bonded to the rear face of the rear main bulkhead, in the center.

Front, middle and rear outer ribs bond to the outboard ends of the main bulkheads. The ribs are rigid GFRP moldings which make the outer face of the wing stub.

Main landing gear ribs bond to the main bulkheads inboard of the middle outer rib. The main landing gear rib has the outer mounting for the main gear strut.

Front and rear closing ribs bond to the main bulkheads. They are inboard of the main landing gear ribs. The ribs are rigid GFRP moldings. The middle part of the front closing rib has the inner mounting for the main landing gear. The rear channels of the top hat profile bond to the front closing ribs and the front main bulkhead. The rear channels also carry fuel pipes.

A rigid GFRP bottom shell bonds to the lower surface of the center section and makes the bottom surface of the wing stubs and fuselage. Rigid GFRP top shells bond to the top-outer surface of the center section and makes the top surface of the wing stubs.

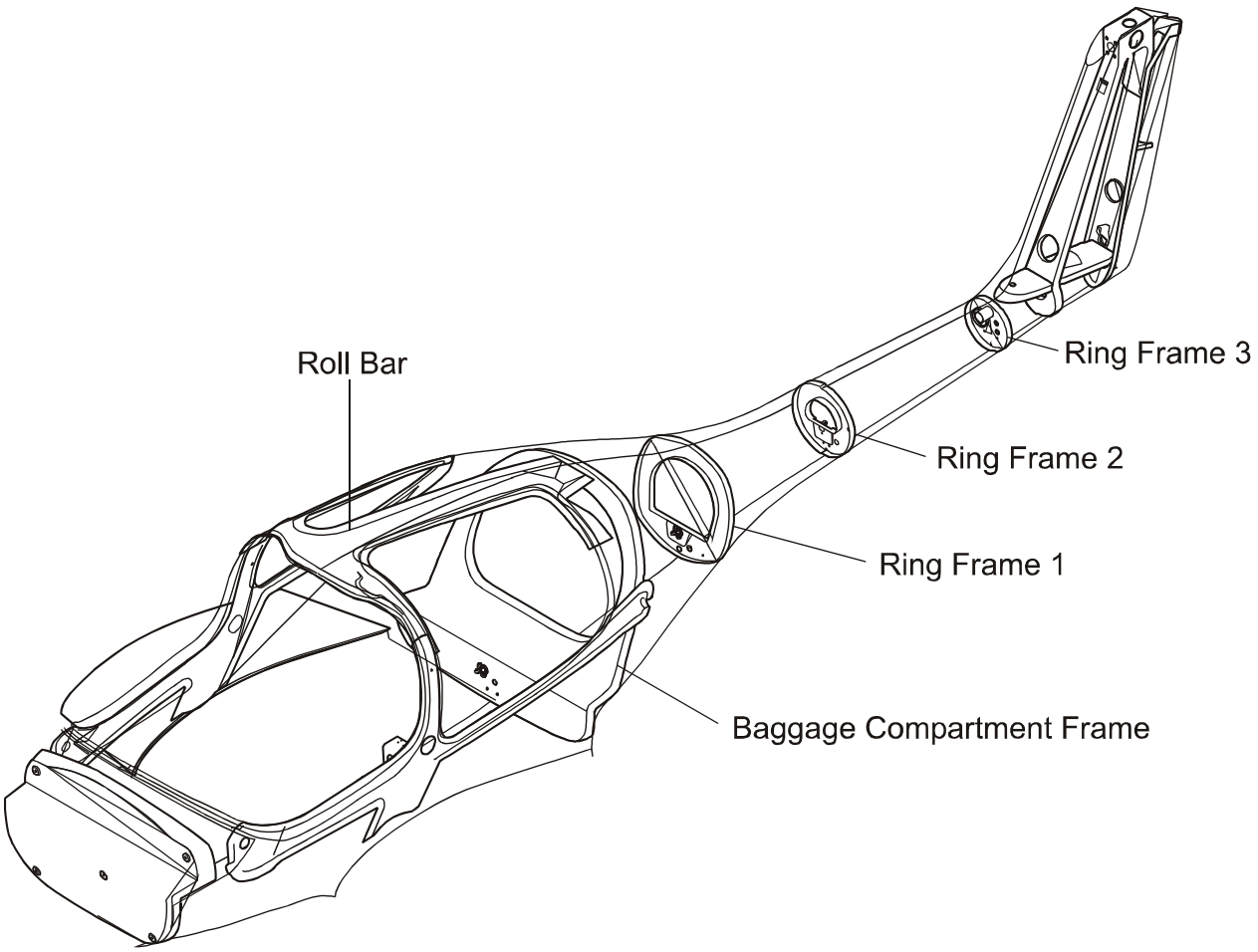

Figure 3 : Fuselage Structure - Rear Fuselage

F. Roll Bar.

The roll bar is a rigid GFRP molding. Carbon tape gives strength and stiffness to the molding. The roll bar bonds to the inner face of the fuselage shell and around the canopy, window and passenger door cut-outs.

G. Baggage Compartment Frame.

The baggage compartment frame is a rigid GFRP molding. It closes the rear of the cockpit and makes a support for the passenger seat (rear seat pan). The frame bonds to the inner fuselage shells and the center section lower shell.

The lower part of the frame has holes for the rudder cables and trim control. It also has a control rod guide for the elevator control rod.

H. Ring Frame 1.

The ring frame 1 is a rigid GFRP molding. It bonds to the fuselage shells just aft of the baggage compartment frame. It has holes for the rudder control cables and trim control. It also has a control rod guide for the elevator control rod.

I. Ring Frame 2.

The ring frame 2 is a rigid GFRP molding. It bonds to the fuselage shells aft of ring frame 1. It has holes for the rudder control cables and trim control. It also has a control rod guide for the elevator control.

J. Ring Frame 3.

The ring frame 3 is a rigid GFRP molding. It bonds to the fuselage shells just forward of the vertical stabilizer. It has holes for the rudder control cables and trim control.

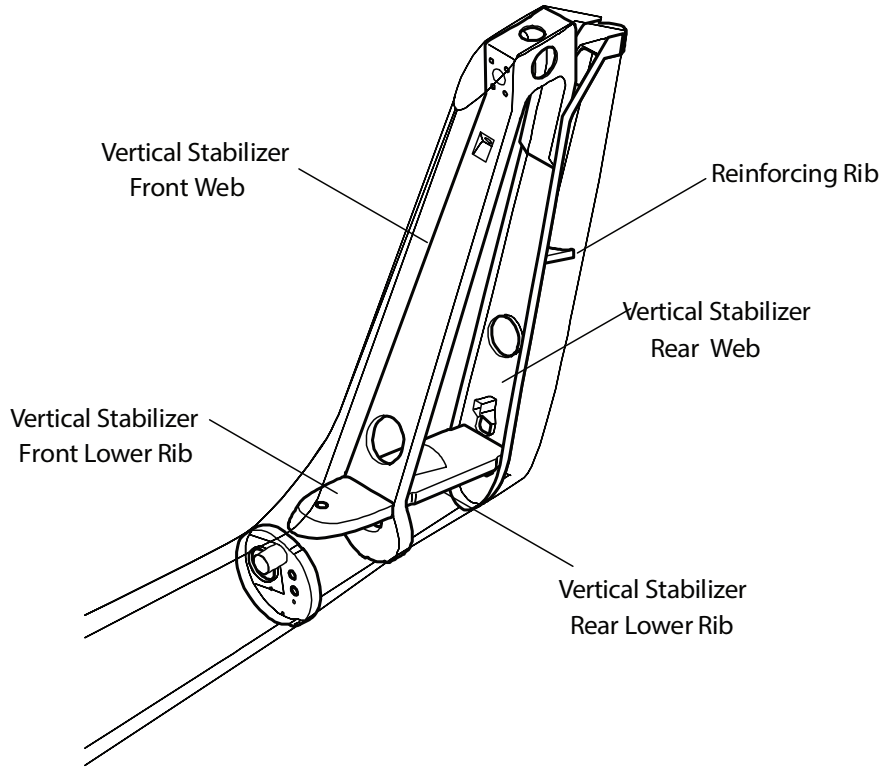

Figure 4 : Fuselage Structure - Vertical Stabilizer

K. Vertical Stabilizer Front Lower Rib.

The vertical stabilizer front lower rib is a rigid GFRP molding. It bonds to the fuselage shell at the bottom of the vertical stabilizer. It also bonds to the vertical stabilizer front web. It has a hole for the flexible control cable for the elevator trim-tab.

L. Vertical Stabilizer Rear Lower Rib.

The vertical stabilizer rear lower rib is a rigid GFRP molding. It bonds to the fuselage shell at the bottom of the vertical stabilizer. It also bonds to the vertical stabilizer front and rear webs. It has a large slot for the elevator control push-rod.

M. Vertical Stabilizer Front Web.

The vertical stabilizer front web is a rigid GFRP molding. It bonds to the fuselage shell. It also bonds to the vertical stabilizer lower ribs and to the top of the rear web.

The top of the front web is a rigid channel section. GFRP inserts give strength to the area where the horizontal stabilizer mounts attach.

N. Vertical Stabilizer Rear Web.

The vertical stabilizer rear web is a rigid GFRP molding. It bonds to the fuselage shell and it bonds to the vertical stabilizer front web. The top of the rear web has the top mounting for the rudder. It also has a reinforcing rib bonded to the rear face.

The vertical stabilizer rear web closes the rear of the vertical stabilizer.

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MAINTENANCE PRACTICES

1. General

This Section gives repair data for the fuselage. Use it to give the data about the fuselage structure. Refer to Chapter 51 for standard repair procedures.

2. Repair Data for the Fuselage Shells

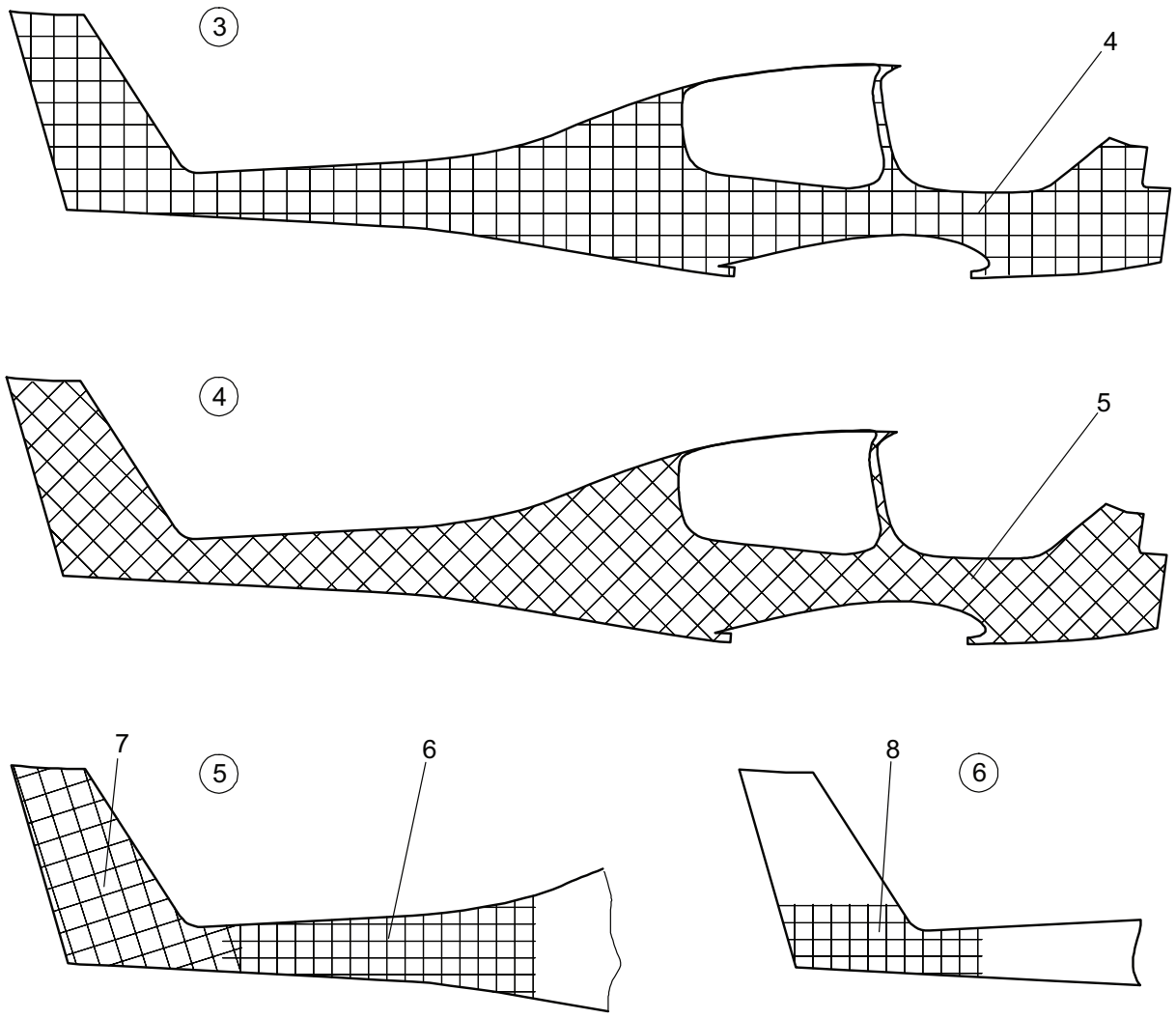
Figures 201 to 207 show the layers of glass fiber or carbon fiber cloth in the fuselage shells. Use this data when you need to repair the fuselage. Contact Diamond Aircraft customer support department if more detailed information (such as further lay up plans) is needed.

The Figures show the main layers of cloth. The cross-hatching on the figure shows the orientation of the fibers. The orientation is also given in the related table. When you repair the fuselage, you must use the same type of cloth with the same fiber orientation.

In many areas, uni-directional carbon fiber tape is used. In these cases, the length of the tape is given.

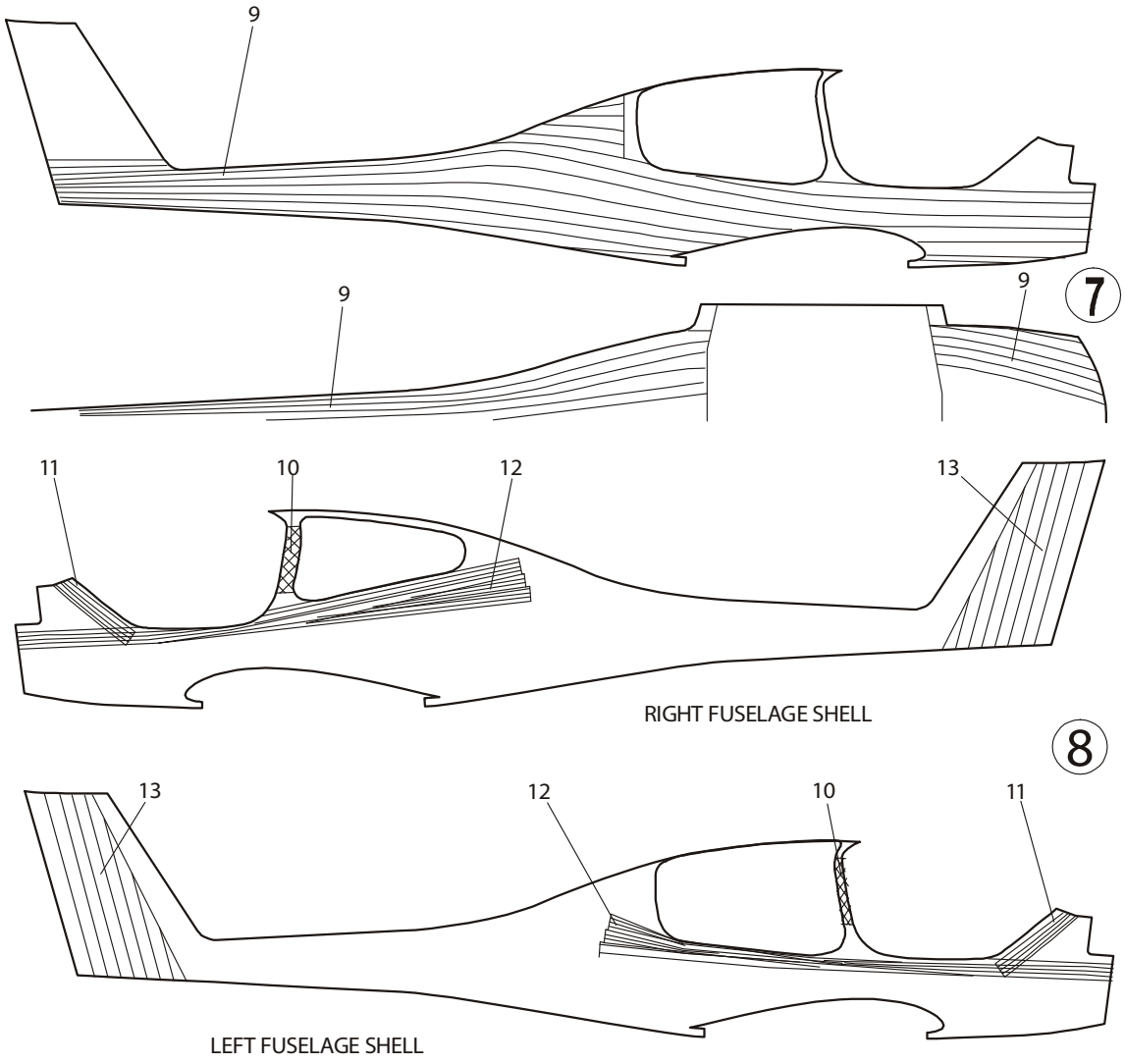
The numbers in circles beside each drawing give the order in which the layers are applied (‘Stages’). The first stage is a layer of filler and is not shown. Stage 1 is the outer face of the shell.

Where dimensions of layers are given in millimeters (mm), divide by 25.4 to obtain the dimension in inches (in).



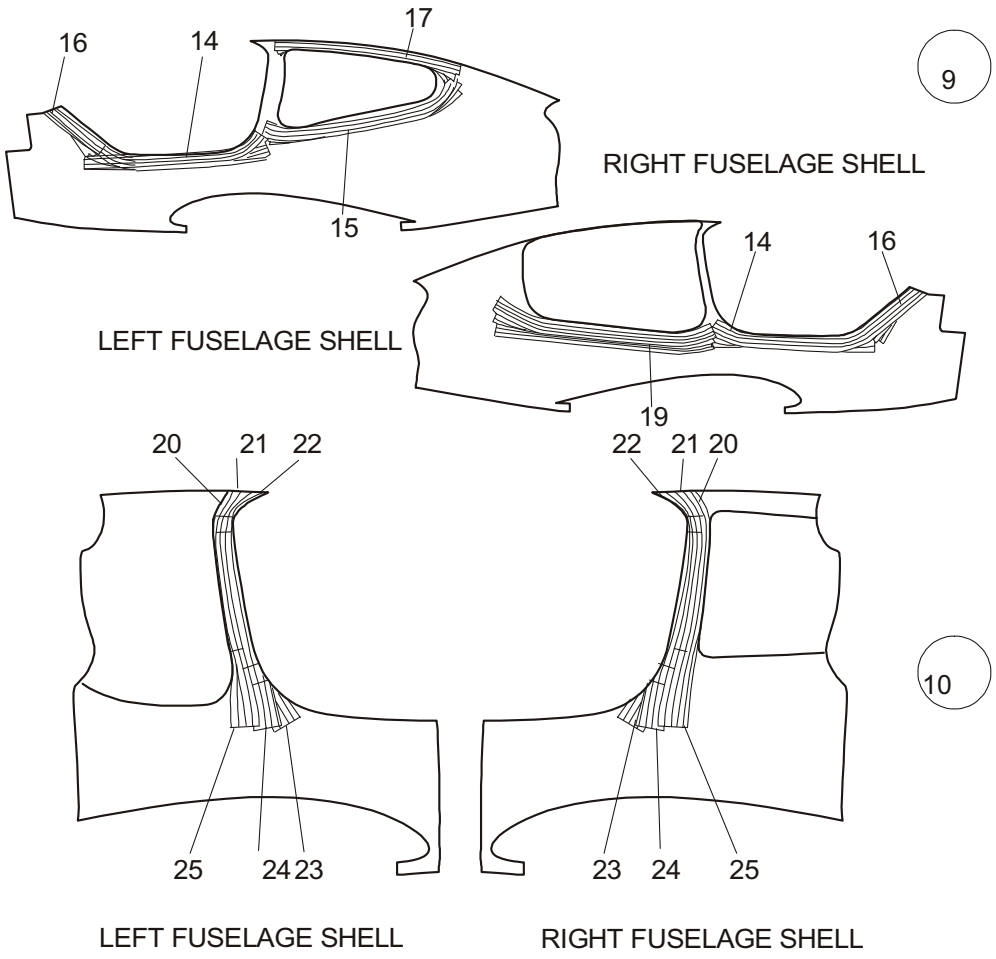
Item No.	Layers	Reference No.	Type	Remarks
4	1	8.4548.60 Glass	92110 twill 2/2	0º/90º Overall
5	2	8.4551.60 Glass	92125 twill 2/2	±45º
6	1	8.4551.60 Glass	92125 twill 2/2	0°/90º
7	2	8.4551.60 Glass	92125 twill 2/2	15º/105º
8	2	8.4551.60 Glass	92125 twill 2/2	0°/90º

Figure 201 : Layers of Cloth in the Fuselage Shells - Stages 3 - 6



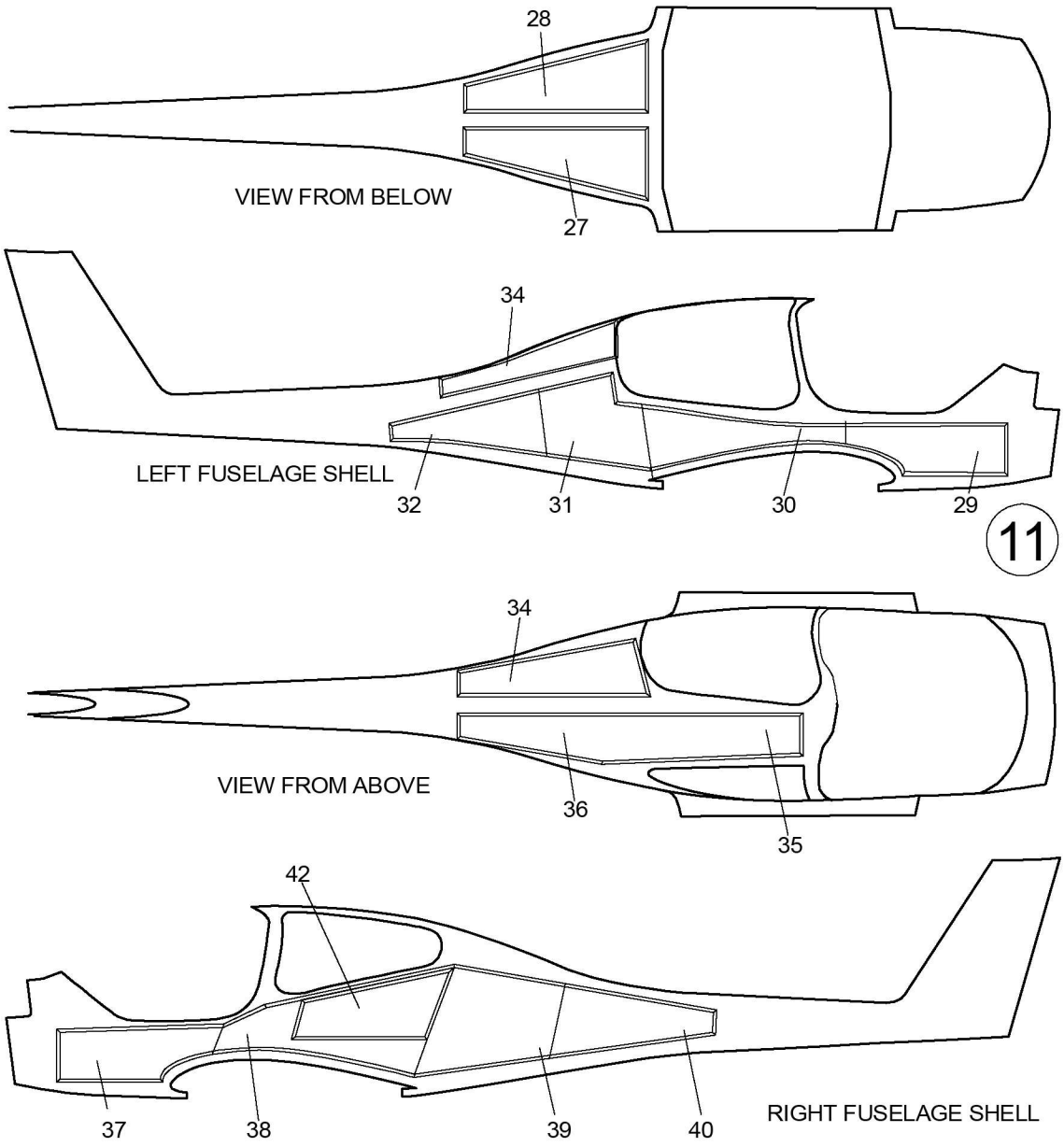
Item No.	Layers	Reference No.	Type	Remarks
9	2	8.4525.60 Glass	92146 uni-directional	0°/90°
10	2	8.4551.60 Glass	92125 twill 2/2	±45°, 250 mm * 600 mm
11	3	KDU 1034 Carbon	100 mm uni-directional	750 mm
12	3	KDU 1034 Carbon	100 mm uni-directional	3250 mm
13	2	8.4525.60 Glass	92146 uni-directional	17°/107°

Figure 202 : Layers of Cloth in the Fuselage Shells - Stages 7 & 8



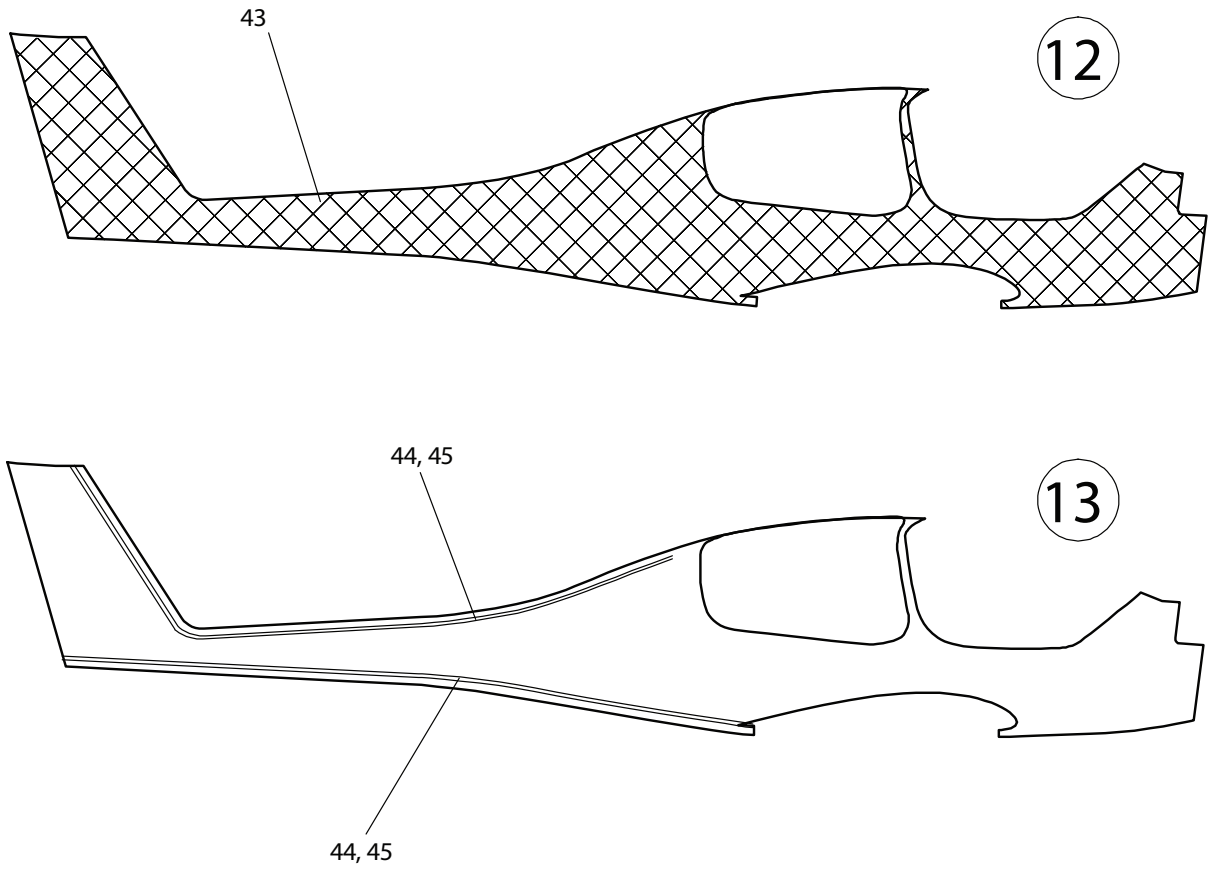
Item No.	Layers	Reference No.	Type	Remarks
14	3	KDU 1034 Carbon	100 mm uni-directional	1000 mm
15	3	KDU 1034 Carbon	100 mm uni-directional	1400 mm
16	3	KDU 1034 Carbon	100 mm uni-directional	850 mm
17	3	KDU 1034 Carbon	100 mm uni-directional	1200 mm
19	3	KDU 1034 Carbon	100 mm uni-directional	1200 mm
20-22	1 each	KDU 1034 Carbon	100 mm uni-directional	600 mm, 700 mm, 800 mm
23-25	1 each	KDU 1034 Carbon	100 mm uni-directional	600 mm, 700 mm, 800 mm

Figure 203 : Layers of Cloth in the Fuselage Shells - Stages 9 & 10



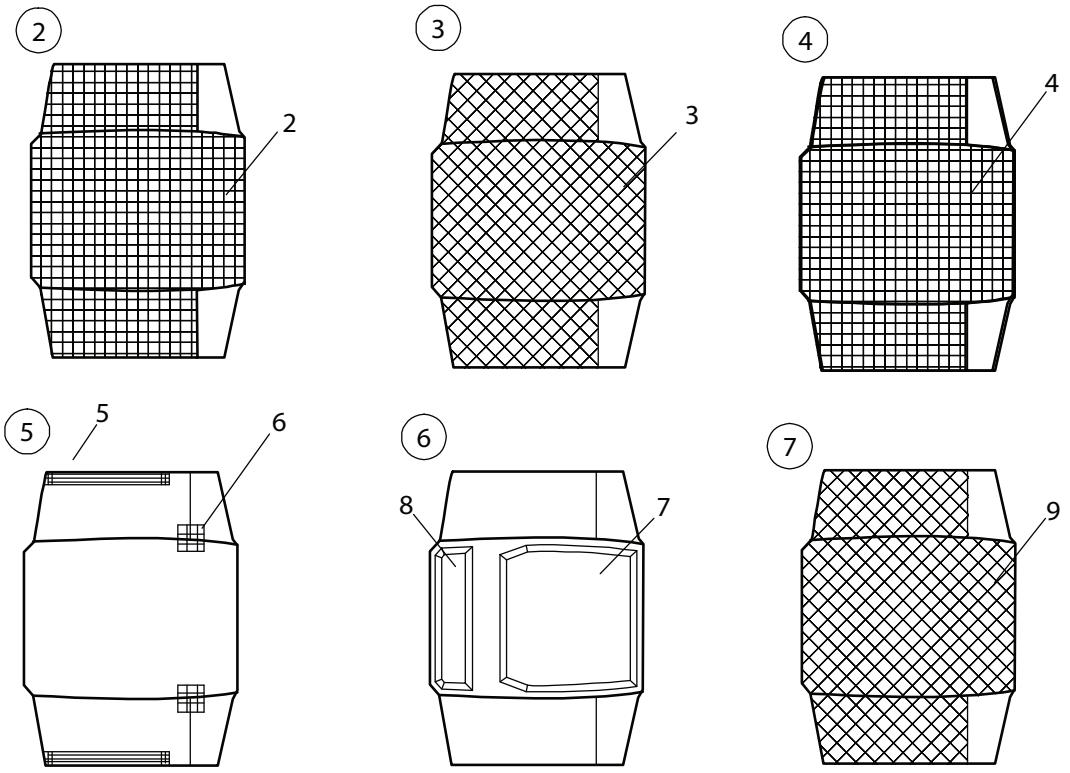
Item No.	Reference No.	Type	Remarks
27-32	H 60	8 mm rigid foam	
34-36	H 60	3 mm rigid foam	
37-42	H 60	8 mm rigid foam	

Figure 204 : Layers of Cloth in the Fuselage Shells - Stage 11



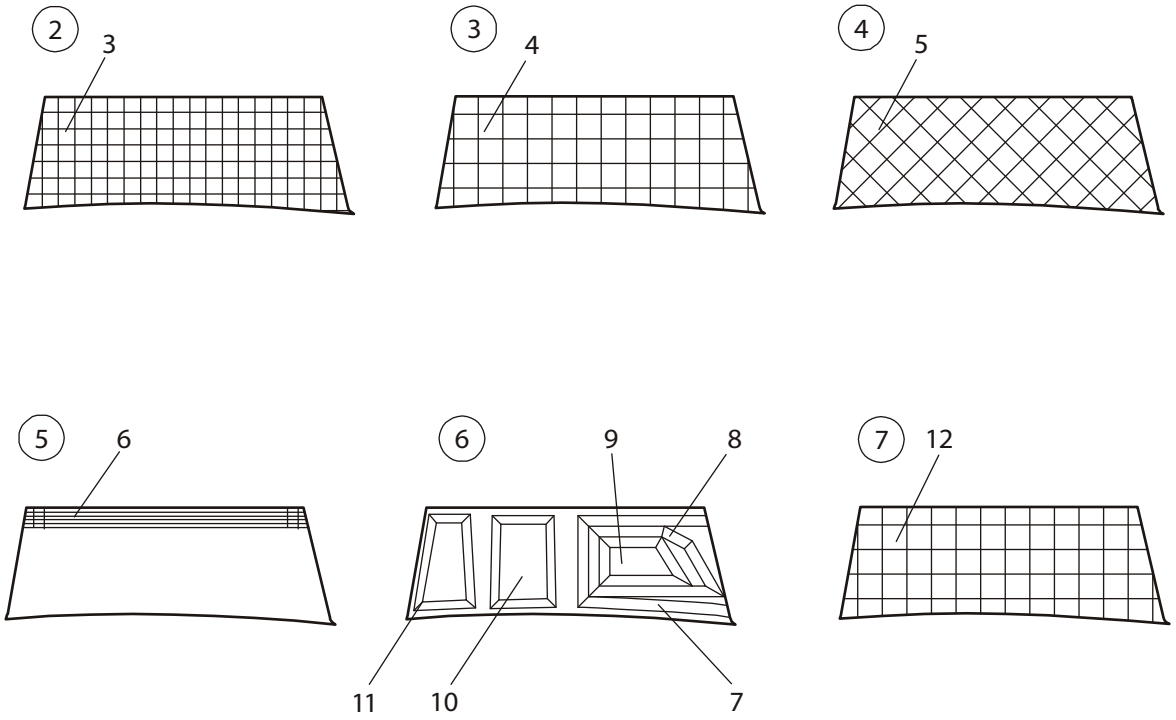
Item No.	Layers	Reference No.	Type	Remarks
43	2	8.4551.60 Glass	92125 twill 2/2	±45°
44	2	8.4554.60 Glass	92140 twill 2/2	±45°
45	1	8.4554.60 Glass	92140 twill 2/2	0°/90°

Figure 205 : Layers of Cloth in the Fuselage Shells - Stages 12 & 13



Item No.	Layers	Reference No.	Type	Remarks
2	1	8.4548.60 Glass	92110 twill 2/2	0°/90°
3	1	8.4551.60 Glass	92125 twill 2/2	±45°
4	2	8.4551.60 Glass	92125 twill 2/2	0°/90°
5	3	8.4525.60 Glass	92146 uni-directional	0°, 900 mm
6	2	8.4551.60 Glass	92125 twill 2/2	200 mm * 200 mm
7 & 8		H 60	8 mm rigid foam	
9	3	8.4548.60 Glass	92125 twill 2/2	±45°

Figure 206 : Layers of Cloth in the Center Section - Bottom Shell



Item No.	Layers	Reference No.	Type	Remarks
3	1	8.4548.60 Glass	92110 twill 2/2	0°/90°
4	2	8.4551.60 Glass	92125 twill 2/2	0°/90°
5	2	8.4551.60 Glass	92125 twill 2/2	±45°
6	3	8.4525.60 Glass	92146 uni-directional	0°
7 - 11		H 60	8 mm rigid foam	
12	2	8.4551.60 Glass	92125 twill 2/2	0°/90°

Figure 207 : Layers of Cloth in the Center Section - Top Shells

CHAPTER 55
STABILIZERS

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STABILIZERS

1. General

The DA 40 NG has the usual stabilizers. The vertical stabilizer is part of the fuselage. The aft part of the left and right fuselage shells make the left and right shells of the vertical stabilizer.
See Section 53-10 for data on the fuselage structure.

The horizontal stabilizer has top and bottom shells. Each shell has GFRP skins. The horizontal stabilizer has a front spar and a rear spar. Both spars have mounting brackets. Three pairs of ribs give strength to the center area. Two trailing edge webs hold the hinges for the elevator.

The elevator has top and bottom shells. Each shell has GFRP skins with a rigid foam core. The bottom shell also makes the leading edge spar. The hinges attach to the bottom shell. A large horn with the mass balance weight attaches to the bottom shell at the center. The trailing edge carries a trim tab.

The lower fin is a GFRP molding. Bolts attach the lower fin to the bottom of the fuselage.

The rudder has left and right shells. Each shell has GFRP skins with a rigid foam core. The shells bond together at a flange. The hinges attach to the top face of the rudder and a flat face near the bottom of the leading edge. The horn near the top makes the rudder mass balance.

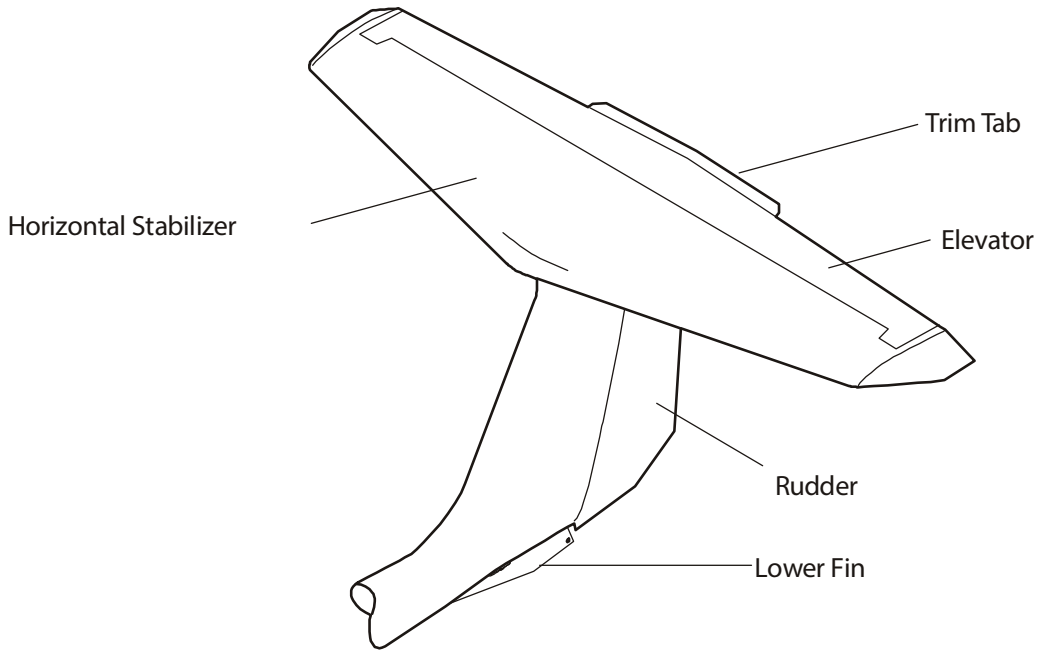

Figure 1 : Stabilizers

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HORIZONTAL STABILIZER

1. General

The DA 40 NG has the usual horizontal stabilizer. The horizontal stabilizer attaches to the top of the vertical stabilizer. The elevator attaches to the trailing edge of the horizontal stabilizer.
See Section 55-20 for data about the elevator structure.

2. Description

Figure 1 shows the horizontal stabilizer structure.

The horizontal stabilizer has top and bottom shells. Each shell has GFRP skins. The top shell has no cut-outs. The bottom shell has a large cut-out at the rear for the elevator horn and mass balance. It also has two smaller holes forward and aft of the front spar.

The horizontal stabilizer has two spars. The spars have GFRP skins with rigid GFRP inserts at the main mounting points. They also have top and bottom caps. The ends of the front spar turn back to join the aft spar at mid span. The rear spar goes almost to the tip of the horizontal stabilizer. The spars bond to the top and bottom shells with resin.

Each spar has four holes for a mounting bracket. You can get access to the attachment bolts from below. The mounting brackets go down through the cut-outs in the bottom shell. Four more holes in the bottom part of each mounting bracket attach to the vertical stabilizer front web.

Three pairs of ribs give strength to the center area on each side of the access holes. All are rigid GFRP moldings. They bond to the other components with resin. The rear 'box' ribs make a box round the large cut-out in the bottom skin. A short rear rib at mid-span gives strength to the area between the rear spar and the trailing edge web.

The rear box rib has sides with bends and a top face which joins the sides. It closes the sides of the large cut-out in the bottom shell. The aft part has three holes on each side for the anchor bracket for the trim-tab mechanism.

Two trailing edge webs close the trailing edges of the top and bottom shells. The outboard end of each web is a 'J' shape which goes round the outboard balance weight of the elevator. It extends aft at the outer side to close the elevator cut-out. The webs also holds the hinges for the elevator. The webs bond to the top and bottom shells and the rear and rear 'box' ribs with resin.

A rigid GFRP fairing goes around the joint between the horizontal stabilizer and the vertical stabilizer. Four screws attach the fairing to the vertical stabilizer.

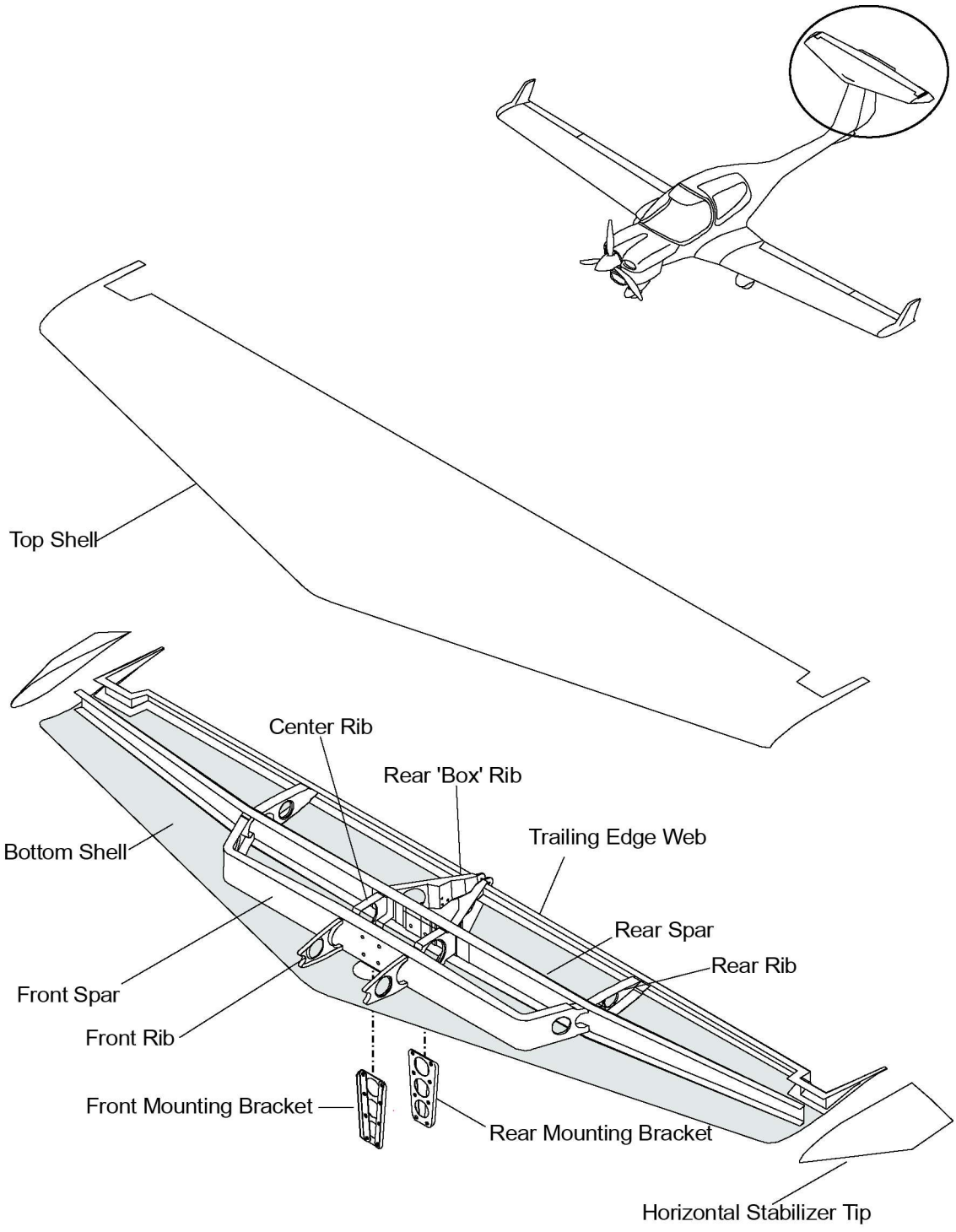


Figure 1 : Horizontal Stabilizer Structure

MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to remove and install the horizontal stabilizer.

2. Remove/Install the Horizontal Stabilizer

NOTE: Two persons are required to remove/install the horizontal stabilizer.

A. Remove the Horizontal Stabilizer.

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the horizontal stabilizer fairing. - Remove the four screws.	
(2)	Release the two ball-end fittings from the trim-tab operating links.	Under the elevator.
(3)	Release the trim-tab mechanism from its mounting bracket.	Refer to Section 27-31.
(4)	Move the trim-tab mechanism forward through the hole in the vertical stabilizer web, clear of the mounting bracket.	
(5)	Remove the bolt which connects the elevator vertical push rod to the elevator horn.	
(6)	Remove the eight bolts, washers and nuts which attach the horizontal stabilizer and the lightning protection strips to the front and rear mounting brackets	Hold the horizontal stabilizer.
(7)	Disconnect the VOR antenna.	
(8)	Lift the horizontal stabilizer clear of the airplane.	

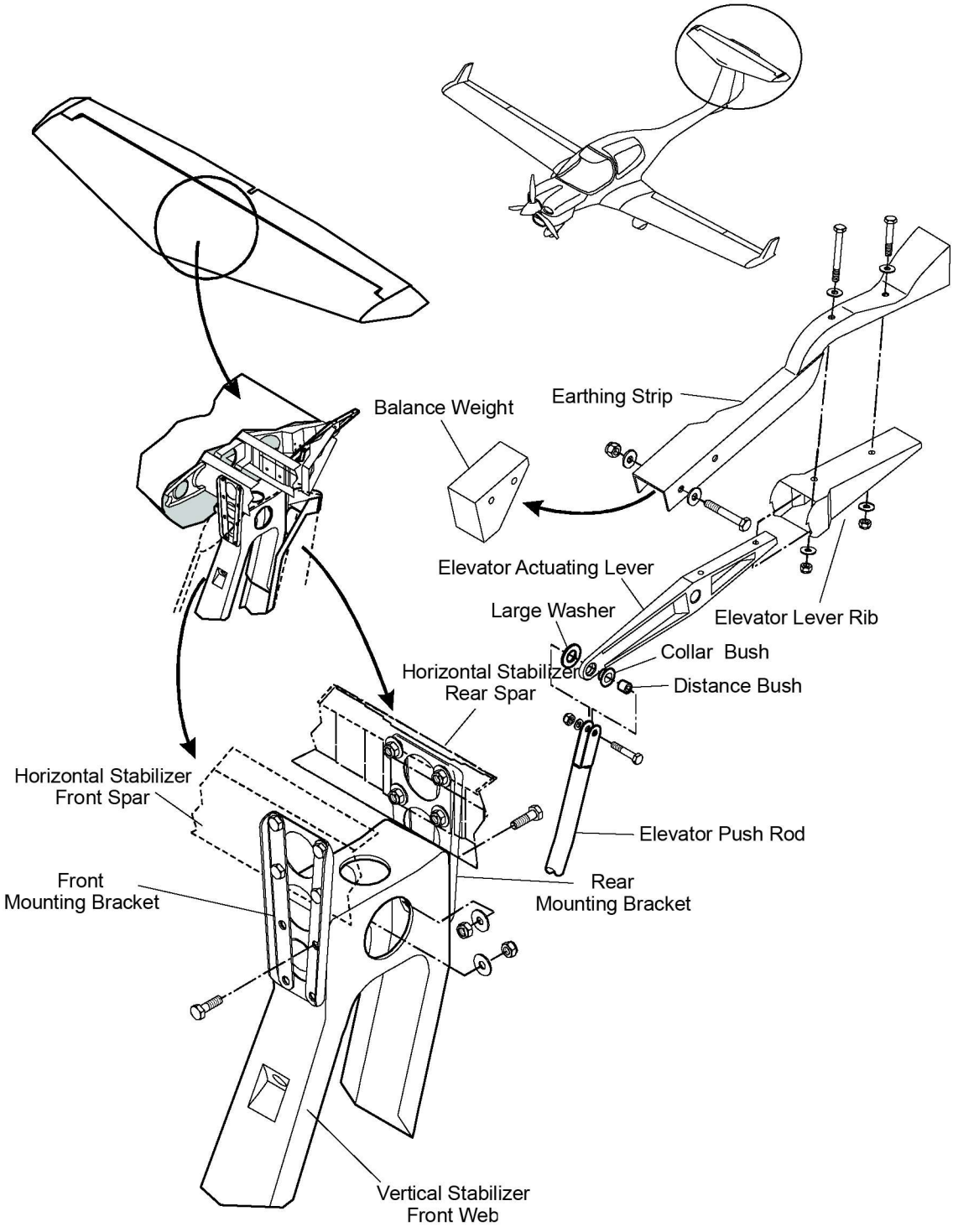


Figure 201 : Horizontal Stabilizer - Removal/Installation

NOTES:

A Seal LP strap contact surfaces using NYCOTE® 7-11 Blue.

B Wet install using PRC CA 1000 (If MÄM 40-1035 is installed)

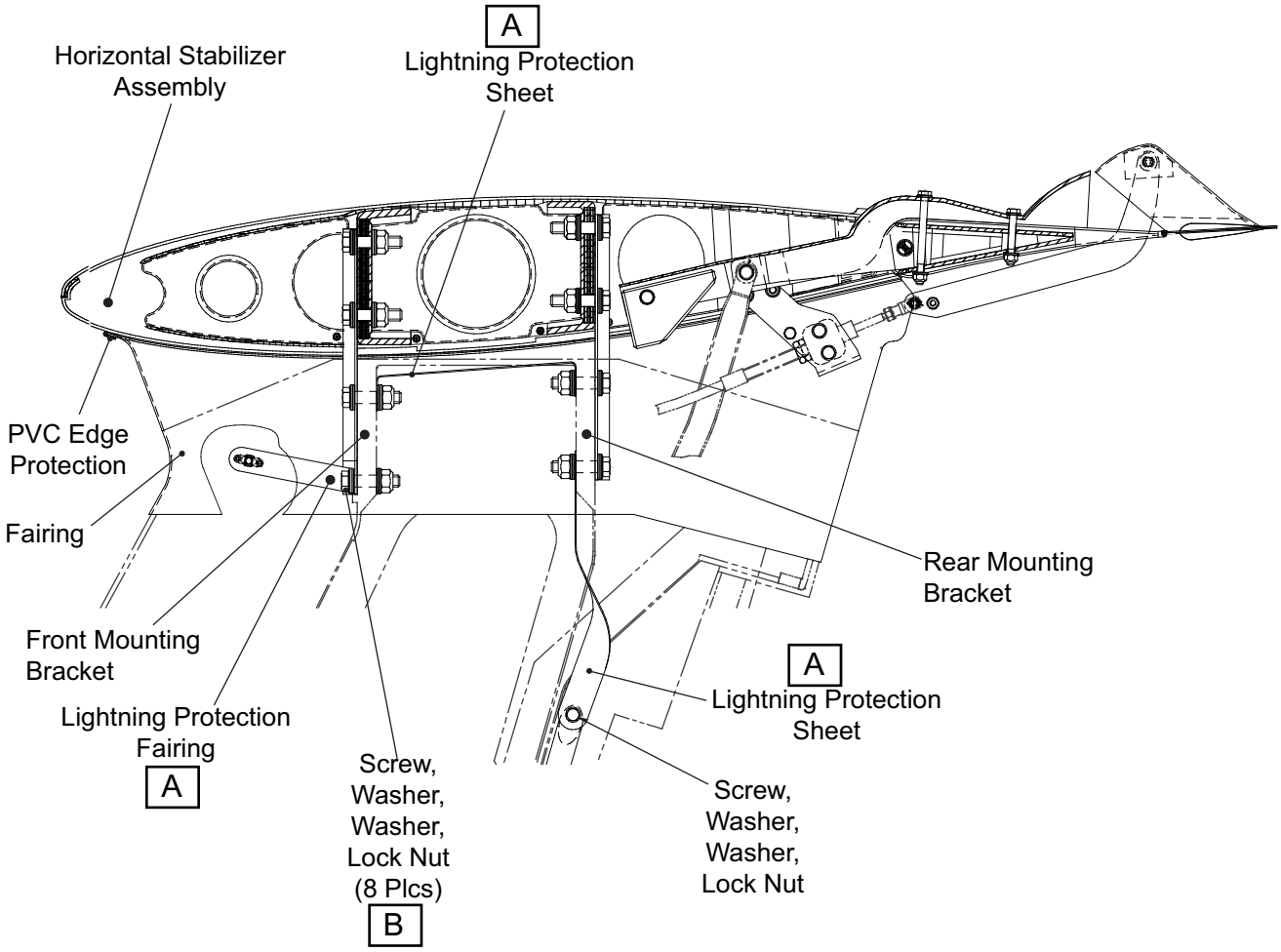


Figure 202 : Horizontal Stabilizer - Removal/Installation

B. Install the Horizontal Stabilizer.

Refer to Figures 201 and 202.

	Detail Steps/Work Items	Key Items/References
(1)	Examine the horizontal stabilizer attachments. Look specially for: - Corrosion or wear of the bolts. - Distortion of the mounting brackets. - Cracks in the mounting brackets. - Damage to the mounting holes.	
(2)	Put the horizontal stabilizer in position on the vertical stabilizer.	Hold the horizontal stabilizer.
(3)	Connect the VOR antenna.	
(4)	Install the eight bolts, washers and nuts which attach the horizontal stabilizer and lightning protection strips to the front and rear mounting brackets.	Use new self-locking nuts. Torque the bolts to 45 Nm (33.2 lbf.ft.) Apply corrosion protection during hardware installation (material is PPG CA1000) for aircraft with MÄM 40-1035 installed.
(5)	Seal the contact surfaces of the lightning protection strap using Nycote 7-11 Blue or an equivalent alternative.	
(6)	Install the bolt which connects the elevator vertical push rod to the elevator horn.	Torque: 1.7 Nm (1.2 lbf.ft.). Use a new self-locking nut.
(7)	Move the trim-tab mechanism aft through the hole in the vertical stabilizer web, through the mounting bracket for the trim mechanism.	
(8)	Attach the trim-tab mechanism to its mounting bracket: - Install the two bolts.	Use a new self-locking nut.
(9)	Connect the two ball-end fittings to the trim-tab operating links.	Under the elevator.

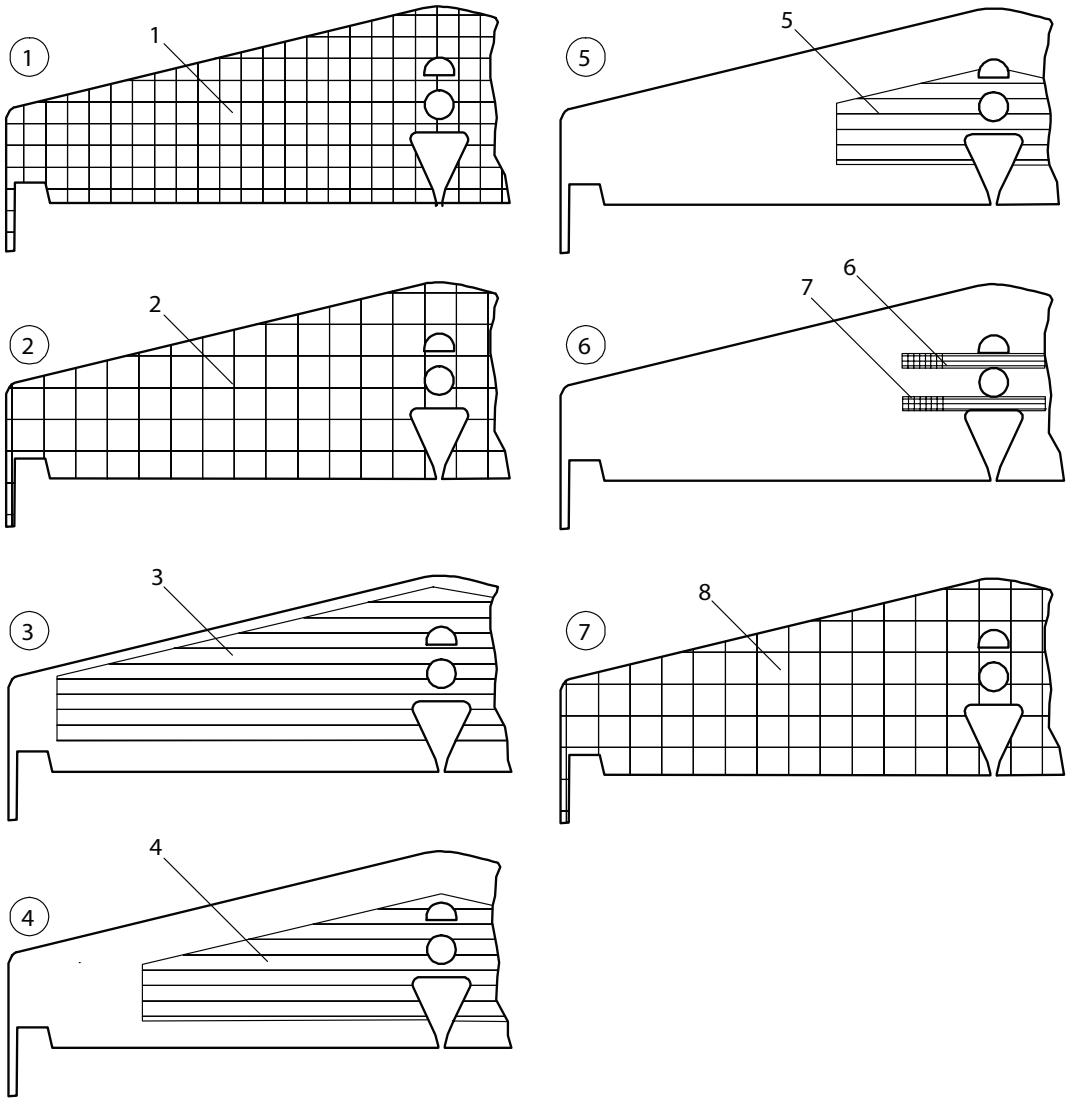
	Detail Steps/Work Items	Key Items/References
(10)	Do a test for correct, full and free movement of the elevator control. If necessary, adjust the elevator control.	Refer to Section 27-30.
(11)	Do a test for correct, full and free movement of the trim control. If necessary, adjust the trim control.	Refer to Section 27-31.
(12)	Verify the electrical bonding for the horizontal stabilizer front and rear brackets.	Refer to Section 51-80.
(13)	Install the horizontal stabilizer fairing: - Install the four screws.	

3. Repair Data for the Horizontal Stabilizer Shells

Figures 203 and 204 show the layers of glass fiber cloth in the horizontal stabilizer shells. Use this data when you need to repair the horizontal stabilizer.

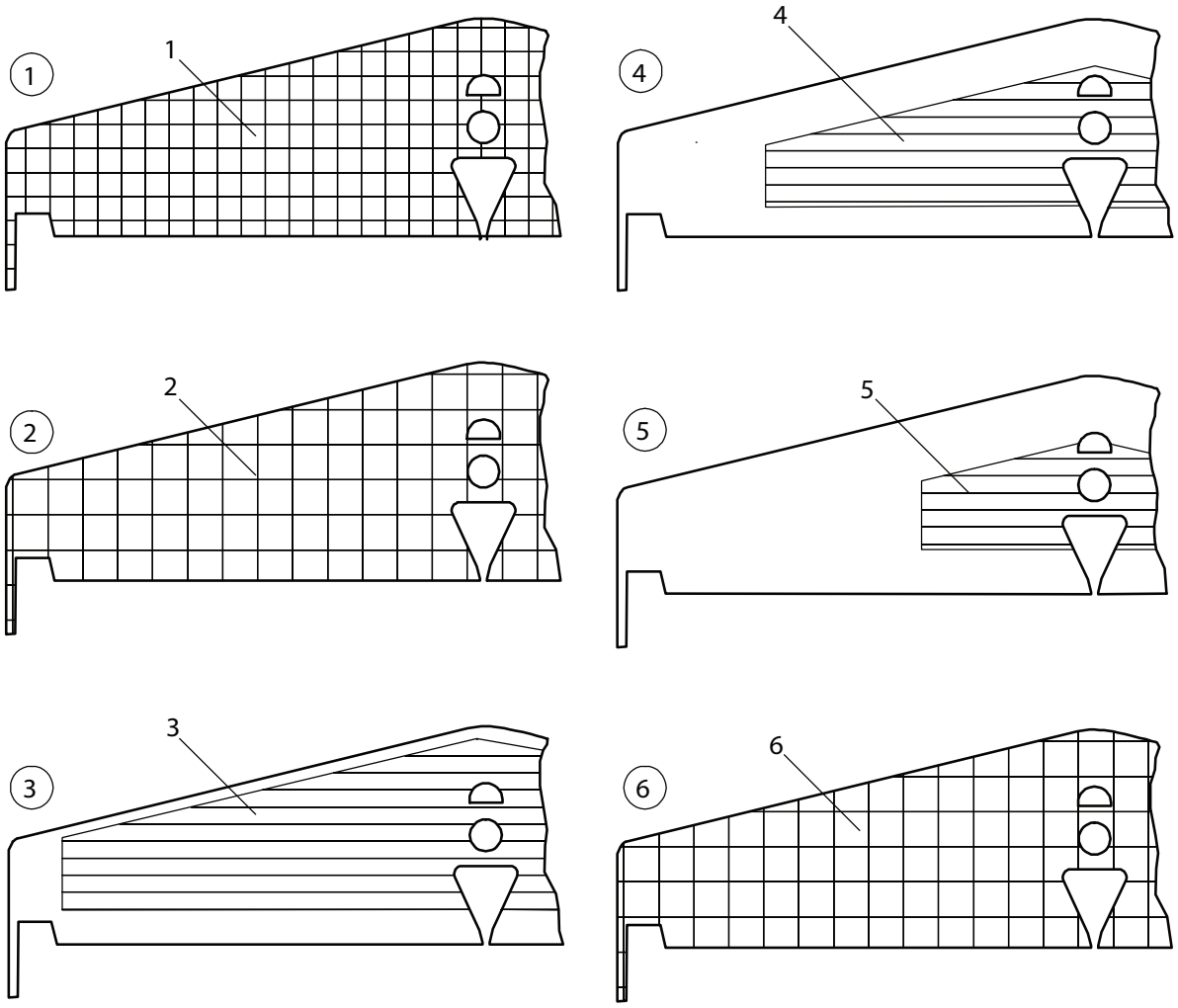
The Figures show the main layers of cloth. The cross-hatching on the Figure shows the orientation of the fibers. The orientation is also given in the related table. When you repair the horizontal stabilizer, you must use the same type of cloth with the same fiber orientation.

The numbers in circles beside each drawing give the order in which the layers are applied ('Stages'). The first stage (0 for the horizontal stabilizer) is a layer of filler and is not shown. Stage 1 is the outer face of the shell.



Item No.	Layers	Reference No.	Type	Remarks
1	1	8.4548.60 Glass	92110 twill 2/2	0/90°
2	1	8.4551.60 Glass	92125 twill 2/2	0/90°
3, 4, 5	1 each	8.4525.60 Glass	92146 uni-directional	0/180°
6, 7	8 each	8.4525.60 Glass	92146 uni-directional	0/180°, 50 mm x 500 mm stepped 20 mm
8	2	8.4551.60 Glass	92125 twill 2/2	0/90°

Figure 203 : Layers of Cloth in the Horizontal Stabilizer Bottom Shell



Item No.	Layers	Reference No.	Type	Remarks
1	1	8.4548.60 Glass	92110 twill 2/2	0/90°
2	2	8.4551.60 Glass	92125 twill 2/2	0/90°
3, 4, 5	1 each	8.4525.60 Glass	92146 uni-directional	0/180°
6	2	8.4551.60 Glass	92125 twill 2/2	0/90°

Figure 204 : Layers of Cloth in the Horizontal Stabilizer Top Shell

ELEVATOR

1. General

The DA 40 NG has the usual elevator. The elevator attaches to the rear web of the horizontal stabilizer. See Section 27-30 for data about the elevator controls.

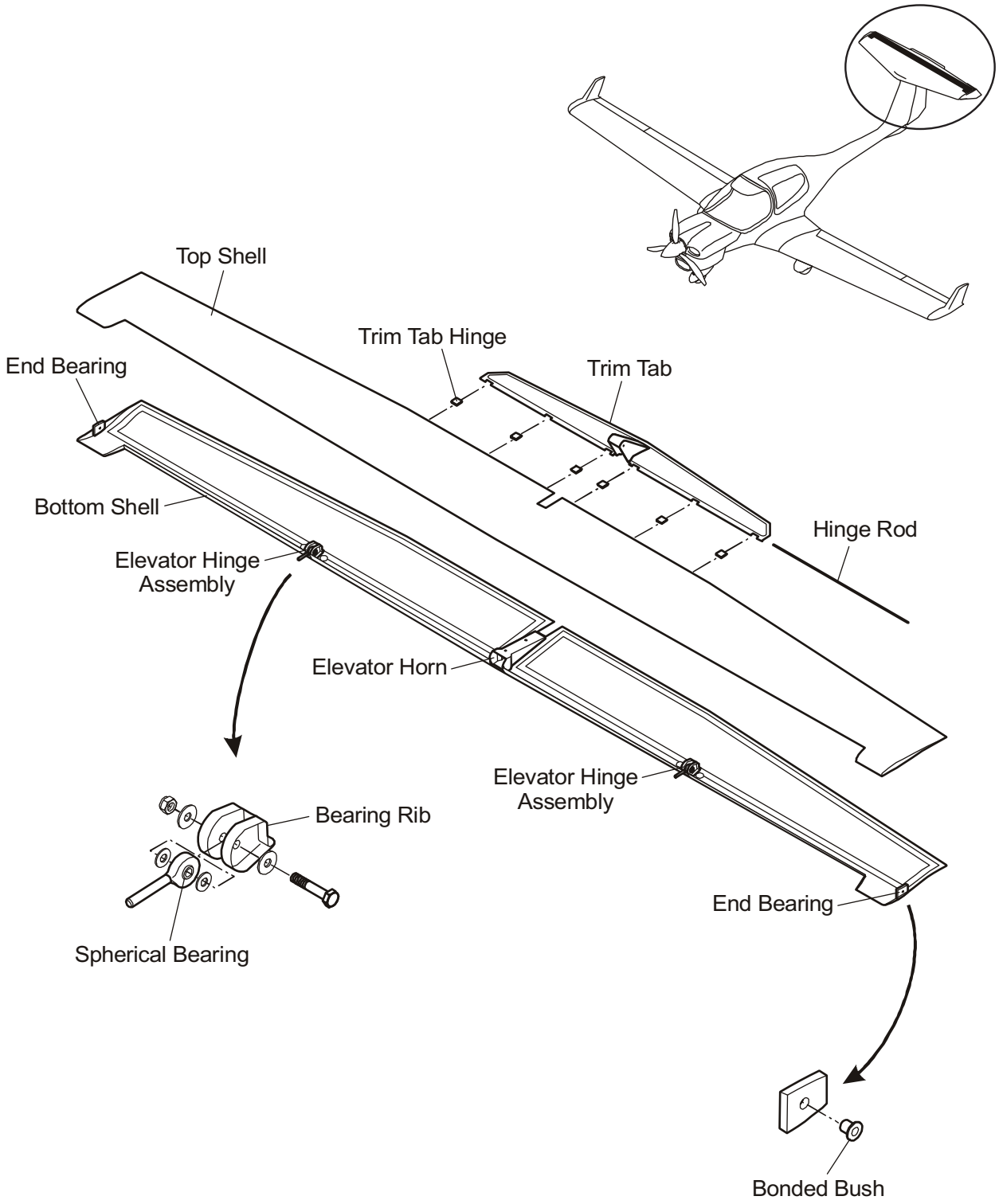


Figure 1 : Elevator Structure

2. Description

Figure 1 shows the elevator structure. Figure 2 shows the installation of the elevator on the horizontal stabilizer. Figure 201 shows the trim tab installation.

The elevator has top and bottom shells. Each shell has GFRP skins with a rigid foam core. The leading edge of each shell has a curve. The shells bond together where the curves overlap. The shells also bond together at the ends and at the trailing edge.

The elevator has a horn rib in the middle. It is a strong box with an open front. The elevator horn goes into the horn rib. Two bolts attach the horn to the elevator.

The horn has a hole with a bush for the elevator push rod. The front of the horn has elevator mass balance weight. More mass balance weight is attached at the front of the elevator tips.

Five bearings hold the elevator. The elevator horn has a plain bearing. A bolt and spacer attach the elevator horn to the trailing edge webs of the horizontal stabilizer.

A small bearing rib at mid-span on each side holds an elevator hinge assembly. The hinge assembly has an eye-end with a plain shank. The eye-end has a spherical bearing. The shank engages in a bush in the trailing edge web.

The outer end of the elevator on each side has an end bearing. A reinforcing block holds a bonded bush. The bush aligns with a bonded bush in the horizontal stabilizer trailing edge web. A pivot pin goes through both bushes to make the outer bearing. A roll pin locks the pivot pin in the bonded bush.

A GFRP trim tab attaches to the trailing edge of the elevator. The trim tab has six GFRP hinges. The front half of each hinge bonds to the trailing edge of the elevator. The rear half of each hinge bonds to the leading edge of the trim tab. Two hinge rods go through the hinges. Lock wires hold the hinge rods in place.

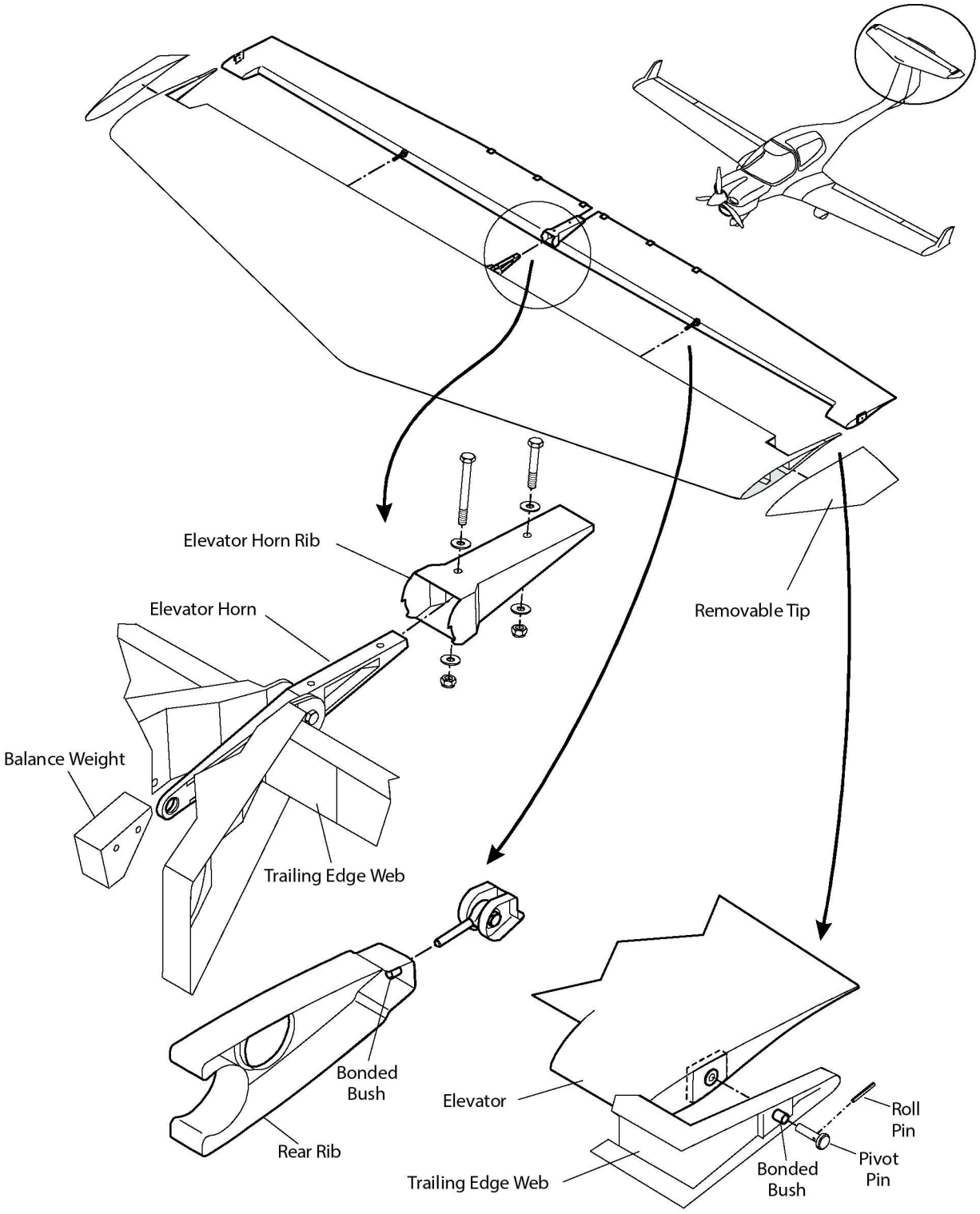


Figure 2 : Elevator Installation on the Horizontal Stabilizer

MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to remove and install the elevator and trim tab. Refer to Sections 27-30 and 27-31 for data on the elevator and trim tab control setting.

2. Remove/Install the Elevator

A. Remove the Elevator.

Refer to Figure 2 in the Description and Operation Pageblock 55-20-00.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the horizontal stabilizer fairing. - Remove the four screws.	
(2)	Release the two ball-end fittings from the trim-tab operating links.	Under the elevator.
(3)	Remove the horizontal stabilizer tips.	
(4)	Remove the two bolts, nuts and washers which attach the elevator horn rib to the elevator.	
(5)	Remove the pivot pins from the end bearings: - Remove the roll pin. - Pull the pivot pin out of the end bearing.	Hold the elevator.
(6)	Pull the elevator aft to release the elevator horn and hinge assemblies.	
(7)	Put the elevator in a stand or on a padded surface.	

B. Install the Elevator.

Refer to Figure 2 in the Description and Operation Pageblock 55-20-00.

	Detail Steps/Work Items	Key Items/References
(1)	Put the elevator in position aft of the horizontal stabilizer: - Align the elevator with the horn. - Move the elevator forward over the horn. - Align the shanks of the hinge assemblies at mid-span with the bushes in the trailing edge web of the horizontal stabilizer. - Push the elevator forward to engage the shanks in the bushes. - Align the end bearings with the bushes in the trailing edge spar of the horizontal stabilizer.	
(2)	Install the pivot pins in the end bearings and lock the pivot pins in position with a roll pin.	
(3)	Install the bolts, washers and nuts which attach the elevator to the elevator horn.	Torque: 6.4 Nm (4.7 lbf.ft.). Use new lock nuts.
(4)	Install the two ball-end fittings for the trim-tab operating links.	Under the elevator.
(5)	Install the horizontal stabilizer tips.	
(6)	Install the horizontal stabilizer fairing: - Install the four screws.	
(7)	Do a test for correct range of movement of the elevator control.	Refer to Section 27-30.
(8)	Do a test for correct range of movement of the elevator trim control.	Refer to Section 27-31.

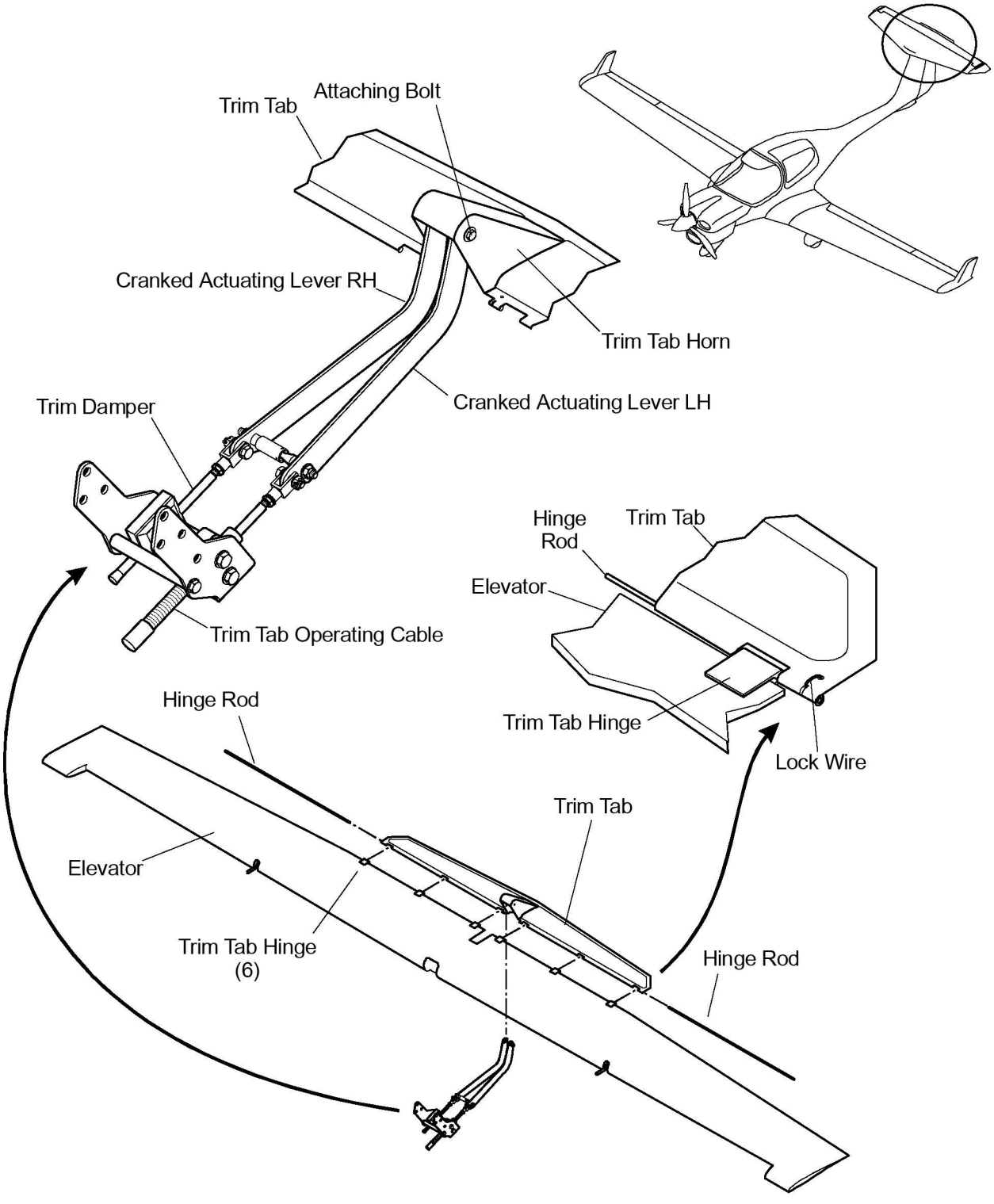


Figure 201 : Trim Tab Installation

3. Remove/Install the Elevator Trim Tab

A. Remove the Elevator Trim Tab.

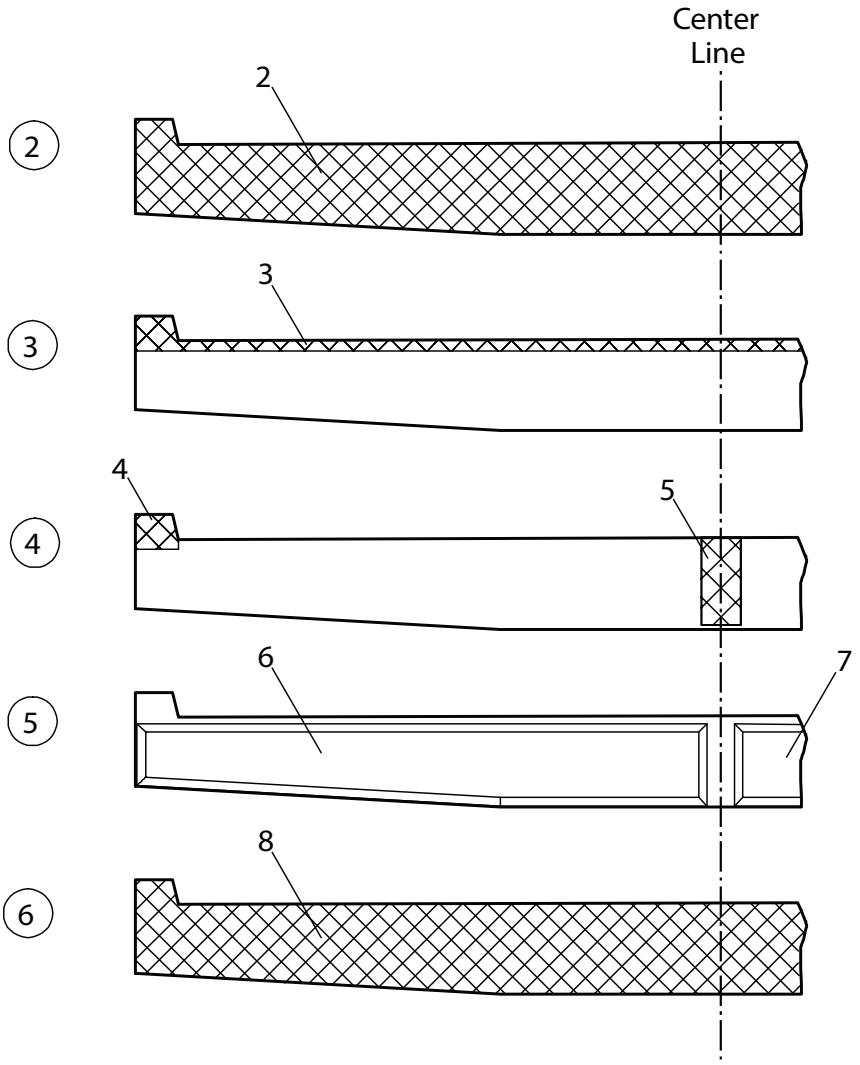
Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the bolt which attaches the cranked actuating levers to the trim tab.	
CAUTION: DO NOT USE FORCE TO REMOVE THE LOCK WIRE FROM THE TRIM TAB HINGE. YOU CAN DAMAGE THE GFRP HINGE.		
(2)	Remove the lock wire at the outer hinge on each side of the trim tab.	
(3)	Move the hinge rods out of the hinges.	Hold the trim tab.
(4)	Remove the trim tab from the elevator.	

B. Install the Elevator Trim Tab.

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(1)	Put the trim tab in position on the elevator.	
CAUTION: DO NOT USE FORCE TO REMOVE THE LOCK WIRE FROM THE TRIM TAB HINGE. YOU CAN DAMAGE THE GFRP HINGE.		
(2)	Align the hinges.	
(3)	Install the hinge rods in each side.	
(4)	Lock the hinge rods in position with wire.	Use new lock wire.
(5)	Align the cranked actuating levers with the trim tab.	
(6)	Install the bolt which attaches the cranked actuating levers to the trim tab.	
(7)	Do a test for correct range of movement of the elevator trim control.	Refer to Section 27-31.



Item No.	Layers	Reference No.	Type	Remarks
2	2	8.4548.60 Glass	twill 2/2	±45°
3	2	8.4548.60 Glass	twill 2/2	±45°
4	2	8.4548.60 Glass	twill 2/2	±45°, 125 mm x 135 mm
5	3	8.4554.60 Glass	twill 2/2	±45°, 90 mm x 220 mm
6	1	H 60	3 mm Rigid foam	
8	1	8.4548.60 Glass	twill 2/2	±45°

Figure 202 : Layers of Cloth in the Horizontal Stabilizer Bottom Shell

4. Repair Data for the Elevator Shells

Figure 202 shows the layers of glass fiber cloth in the elevator shells. Use this data when you need to repair the elevator.

The Figures show the main layers of cloth. The cross-hatching on the Figure shows the orientation of the fibers. The orientation is also given in the related table. When you repair the elevator, you must use the same type of cloth with the same fiber orientation.

The numbers in circles beside each drawing give the order in which the layers are applied (‘Stages’). The first stage is a layer of filler and is not shown. Stage 1 is the outer face of the shell.

LOWER FIN

1. General

The DA 40 NG has a removable lower fin. The lower fin is a GFRP molding. Screws attach the lower fin to the bottom of the rear fuselage.

2. Description

The lower fin is a GFRP molding. It has a left shell and a right shell. The shells bond together with resin.

The lower fin has a hole at the rear for a tie down rope. It also has a flat area at the bottom for a tail skid.

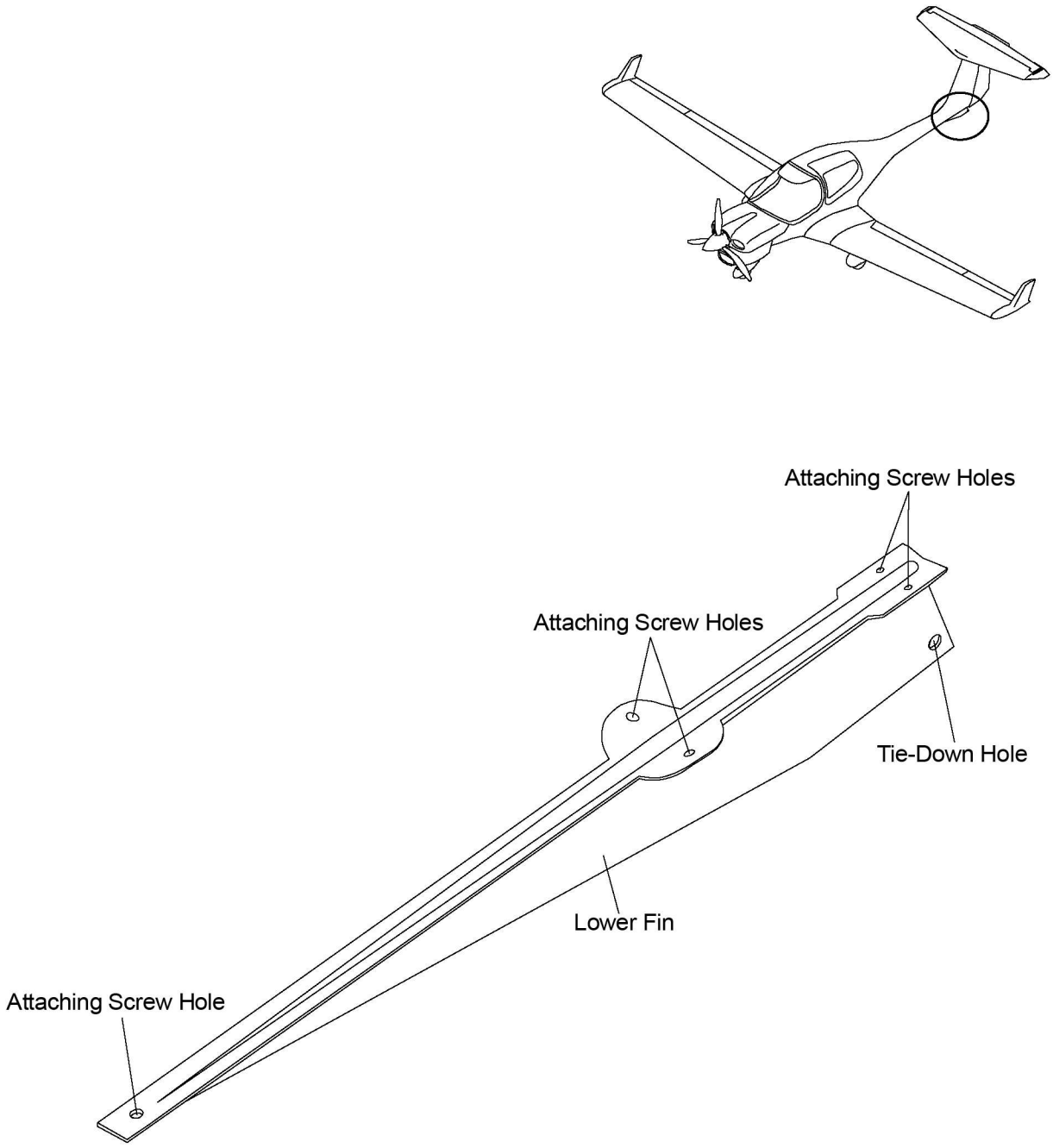


Figure 1 : Lower Fin

MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to remove and install the lower fin.

2. Remove/Install the Lower Fin

A. Remove the Lower Fin.

Refer to Figure 1 in the Description and Operation Pageblock 55-30-00.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the sealing tape from the joint between the lower fin and the fuselage.	
(2)	Remove the five screws which attach the lower fin to the rear fuselage and cut sealant.	Hold the lower fin.
(3)	Remove the lower fin from the airplane.	

B. Install the Lower Fin.

Refer to Figure 1 in the Description and Operation Pageblock 55-30-00.

	Detail Steps/Work Items	Key Items/References
(1)	Clean the area of the fuselage where the lower fin attaches.	
(2)	Put the lower fin in position below the fuselage.	Hold the lower fin.
(3)	Install the five screws with washers which attach the lower fin. Seal with a Polyurethane-based sealant such as 3M 5200 Marine Sealant.	
(4)	Apply sealing tape to the joint between the lower fin and the fuselage.	

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RUDDER

1. General

The DA 40 NG has the usual rudder. The rudder attaches to the rear web of the vertical stabilizer. See Section 27-20 for data about the rudder controls.

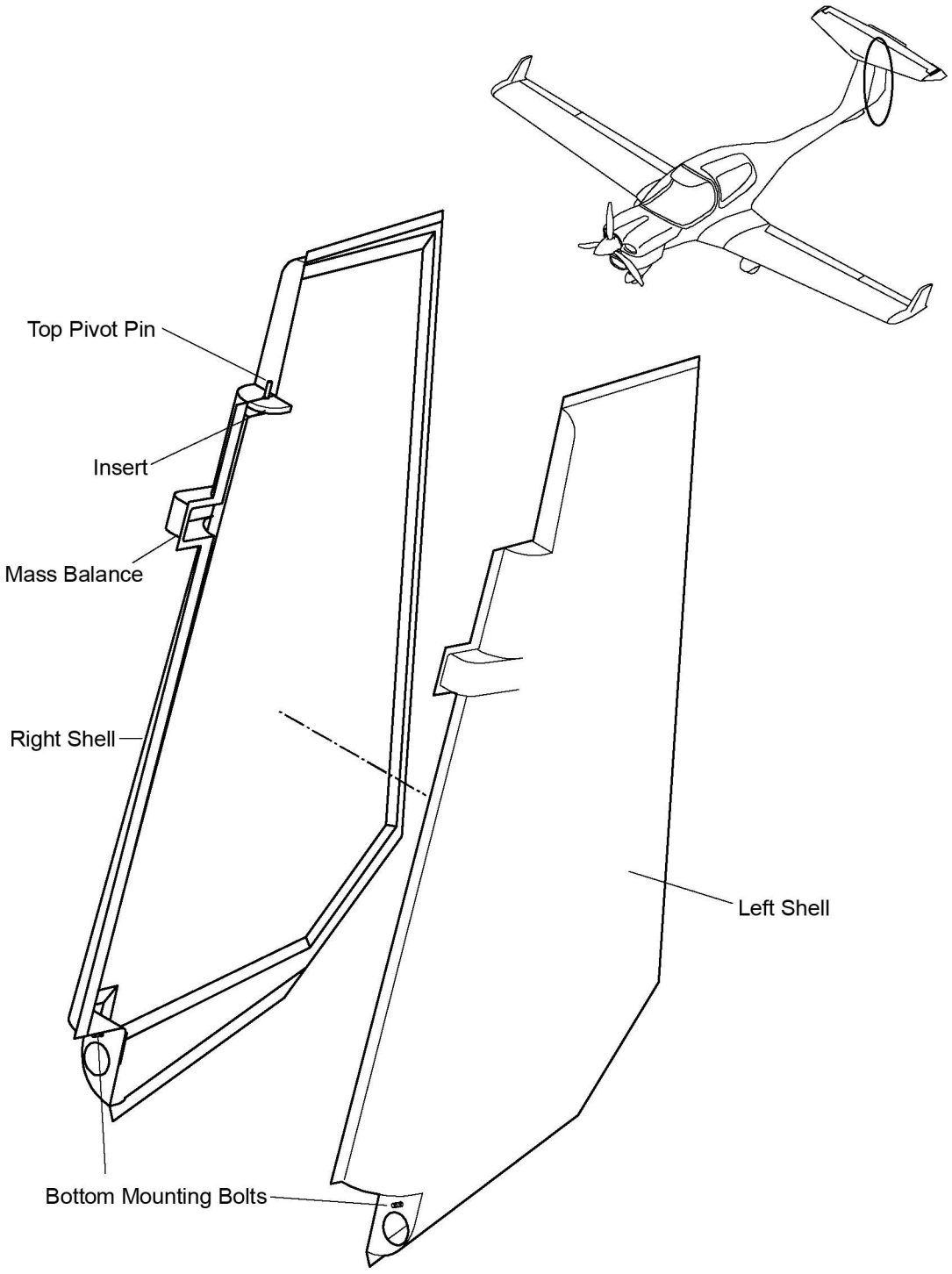


Figure 1 : Rudder Assembly

2. Description

Figure 1 shows the rudder structure. Figure 2 shows the installation of the rudder on the vertical stabilizer.

The rudder has left and right shells. Each shell has GFRP skins with a rigid foam core. The leading edge of each shell has a curve and a flange. The shells bond together at the flanges. The shells also bond together at the top, bottom and at the trailing edge.

The rudder has a flat face at the bottom of the leading edge. The flat face has two bonded bolts. The bolts attach the rudder to the rudder lower mounting bracket. Refer to Section 27-20 for data about the rudder lower mounting bracket.

The rudder has a mass balance weight bonded into the leading edge near the top. You cannot adjust the mass balance.

Two bearings hold the rudder. A pivot pin bonds into the leading edge near the top. It engages with a bearing installed in a bearing sleeve attached to the rear web of the vertical stabilizer. On the pivot pin a bushing and if necessary for adjustment a washer is bonded with Loctite 680. This bushing is installed to adjust the clearance between rudder and bearing.

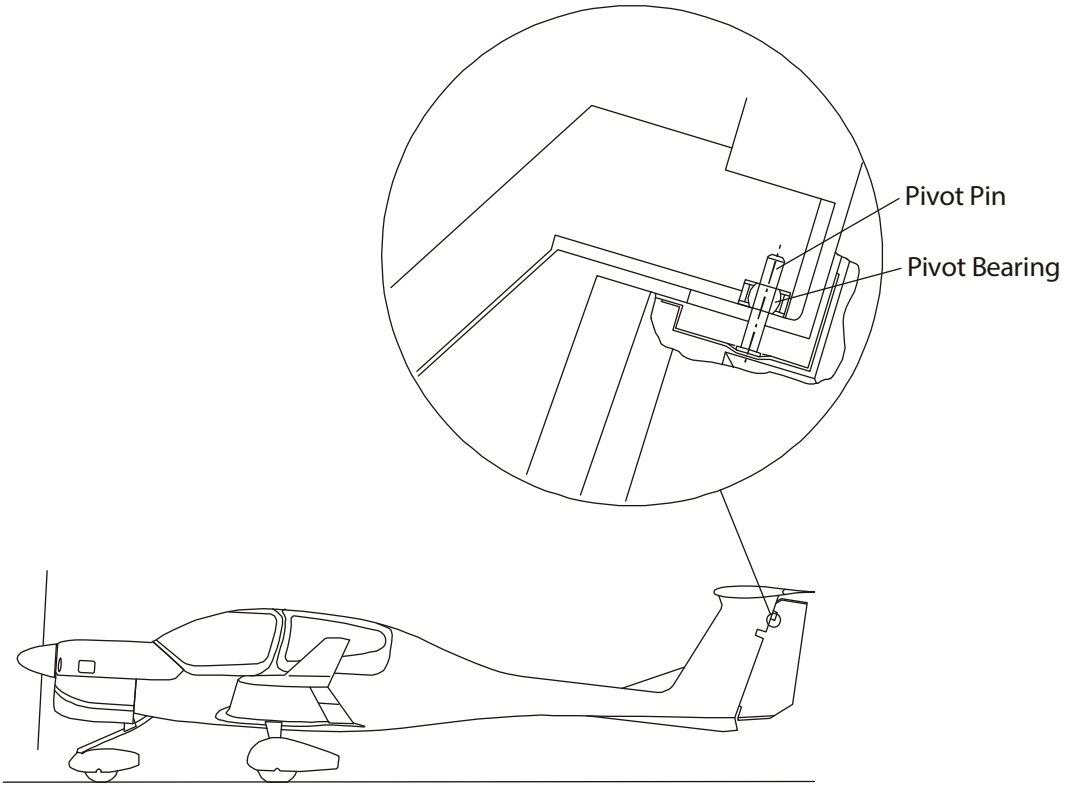


Figure 2 : Clearance Bushing between the Rudder and Rudder Bearing

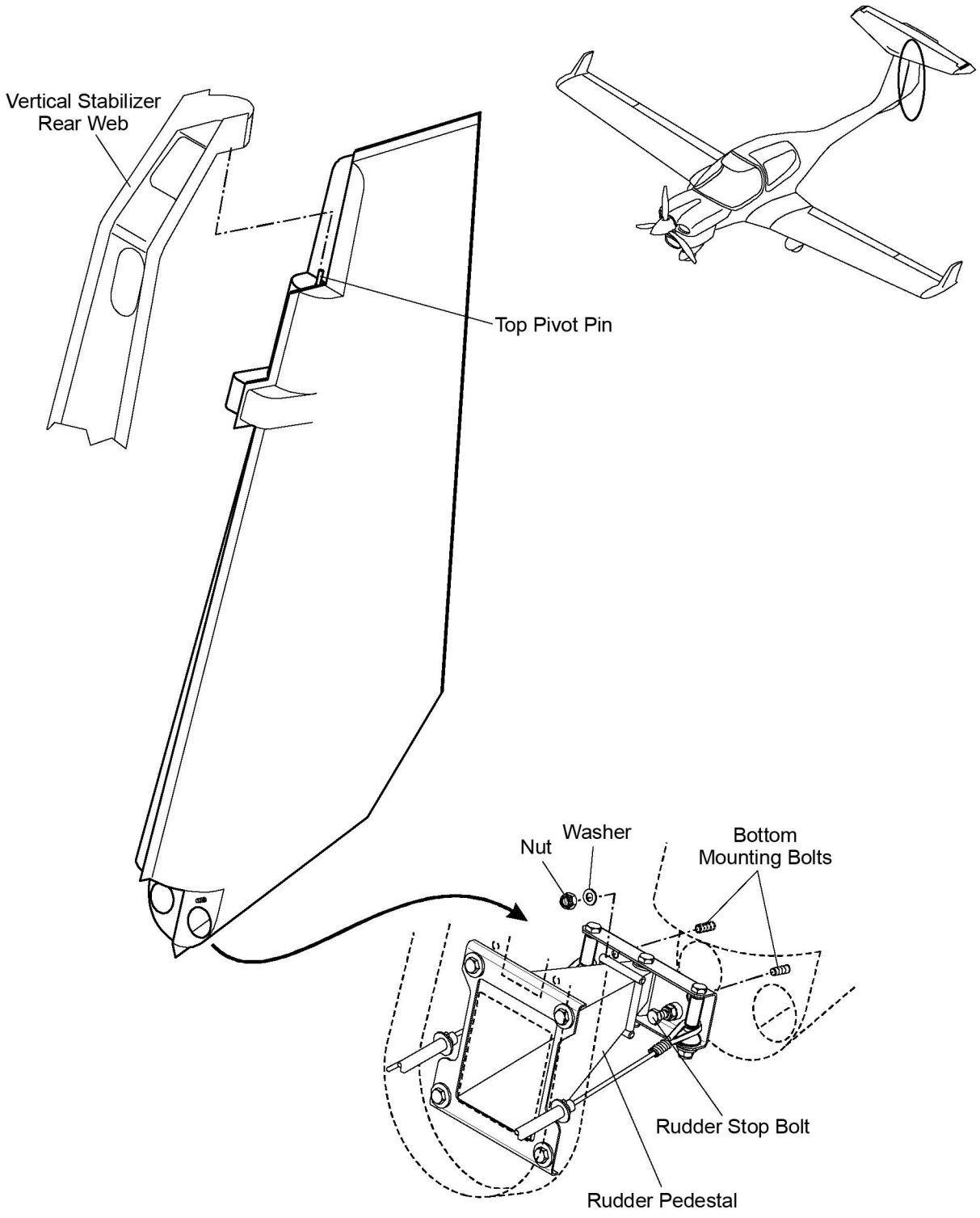


Figure 3 : Rudder Installation

MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to remove and install the rudder.
Refer to Section 27-20 for data on the rudder control setting.

2. Remove/Install the Rudder and Upper Bearing

A. Remove the Rudder.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the two nuts and washers which attach the rudder to the rudder lower mounting bracket.	Refer to Figure 3 in the Description and Operation Pageblock 55-40-00. Hold the rudder.
(2)	Pull the bottom of the rudder aft to disengage the bottom bolts.	
(3)	Lower the rudder to disengage the top pivot.	
(4)	Put the rudder in a stand or on a padded surface.	

B. Remove the Upper Bearing.

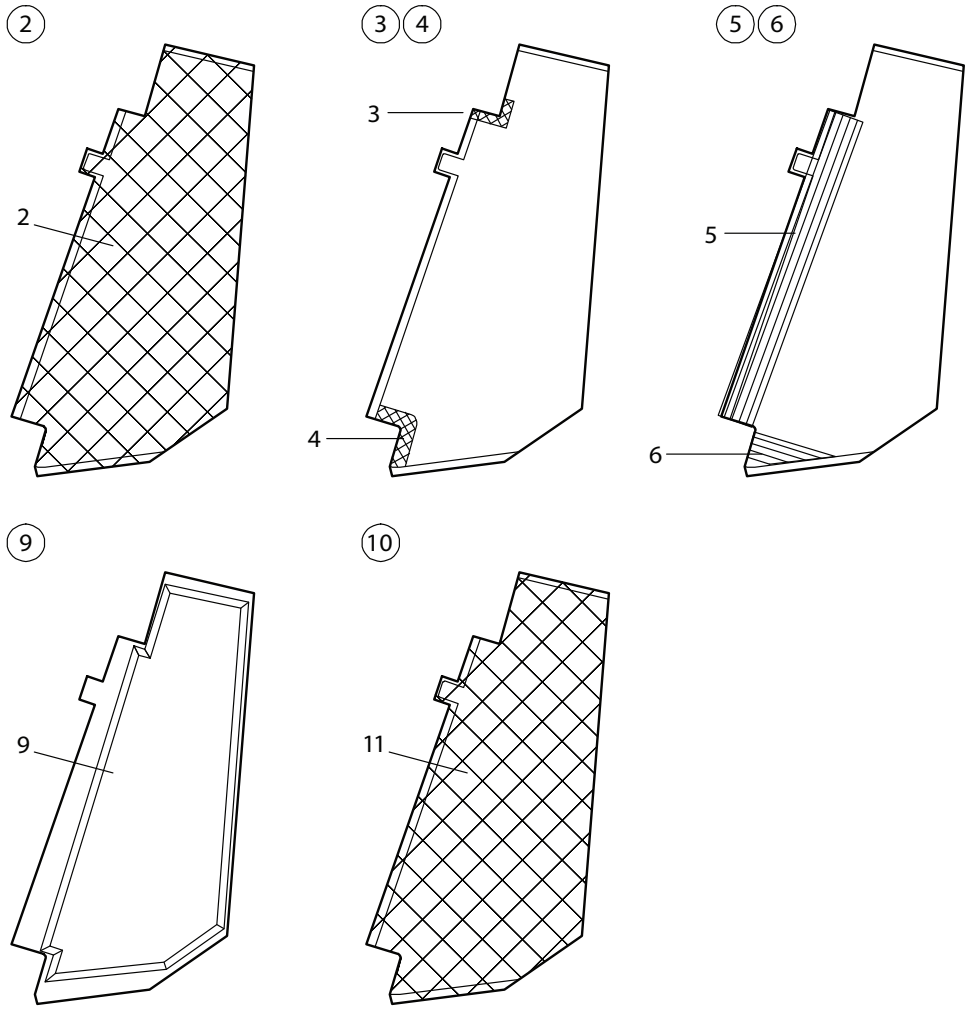
	Detail Steps/Work Items	Key Items/References
(1)	Remove the circlip and spacer of the bearing sleeve from the top side.	Refer to Figure 2 in the Description and Operation Pageblock 55-40-00.
(2)	Remove the bearing in an upward direction by pushing from the bottom side.	

C. Install the Upper Bearing.

	Detail Steps/Work Items	Key Items/References
(1)	Press the bearing into the bearing sleeve from the top side.	Refer to Figure 2 in the Description and Operation Pageblock 55-40-00.
(2)	Install the spacer and circlip into the bearing sleeve from the top side.	

D. Install the Rudder.

	Detail Steps/Work Items	Key Items/References
(1)	Put the rudder in position aft of the vertical stabilizer rear web.	Refer to Figure 3 in the Description and Operation Pageblock 55-40-00.
(2)	Make sure that the bearing is installed and bonded into the top face of the rear web.	
(3)	Align the top pivot pin with the bearing in the top face of the rear web. Lift the rudder to engage the top pivot pin.	
(4)	Move the bottom of the rudder forward to engage the bottom mounting bolts in the holes in the rudder lower mounting bracket.	
(5)	Install the washers and nuts on the bottom mounting bolts.	Torque: 6.4 Nm (4.7 lbf.ft.).
(6)	Do a test for correct range of movement of the rudder control.	Refer to Section 27-20.



Item No.	Layers	Reference No.	Type	Remarks
2	2	8.4548.60 Glass	twill 2/2	±45°
3	6	8.4548.60 Glass	twill 2/2	±45°, 120 mm x 120 mm
4	4	8.4548.60 Glass	twill 2/2	±45°, 200 mm x 150 mm
5	1	8.4525.60 Glass	uni-directional	0°/180°, 100 mm x 920 mm
6	1	8.4525.60 Glass	uni-directional	±45°, 265 mm x 100 mm
9	1	H 60	3 mm rigid foam	
11	1	8.4548.60 Glass	twill 2/2	±45°

Figure 201 : Layers of Cloth in the Rudder Shells

3. Repair Data for the Rudder Shells

Figure 201 shows the layers of glass fiber cloth in the rudder shells. Use this data when you need to repair the rudder.

The drawings in the Figure show the main layers of cloth. The cross-hatching on the Figure shows the orientation of the fibers. The orientation is also given in the related table. When you repair the rudder, you must use the same type of cloth with the same fiber orientation.

The numbers in circles beside each drawing give the order in which the layers are applied (‘Stages’). The first stage is a layer of filler and is not shown. Stage 1 is the outer face of the shell.

After repair, weigh and make sure mass and moments are within limits.

CHAPTER 56
WINDOWS

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TABLE OF CONTENTS

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WINDOWS

1. General

The DA 40 NG has three windows. All of the windows are molded acrylic glass (plexiglass). The one-piece canopy window covers the pilots' cockpit. It is also the windscreen. The passenger door has a window. The right side of the fuselage has a window for the passenger compartment.

A high-performance elastic adhesive bonds each window to the structure.

Section 56-10 gives the data for all of the windows. Refer to Section 52-10 for data about the canopy and door structure.

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FLIGHT COMPARTMENT WINDOWS

1. General

This Section tells you about the windows in the canopy, passenger door and fuselage.
Refer to Section 52-10 for data about the canopy and door structure.

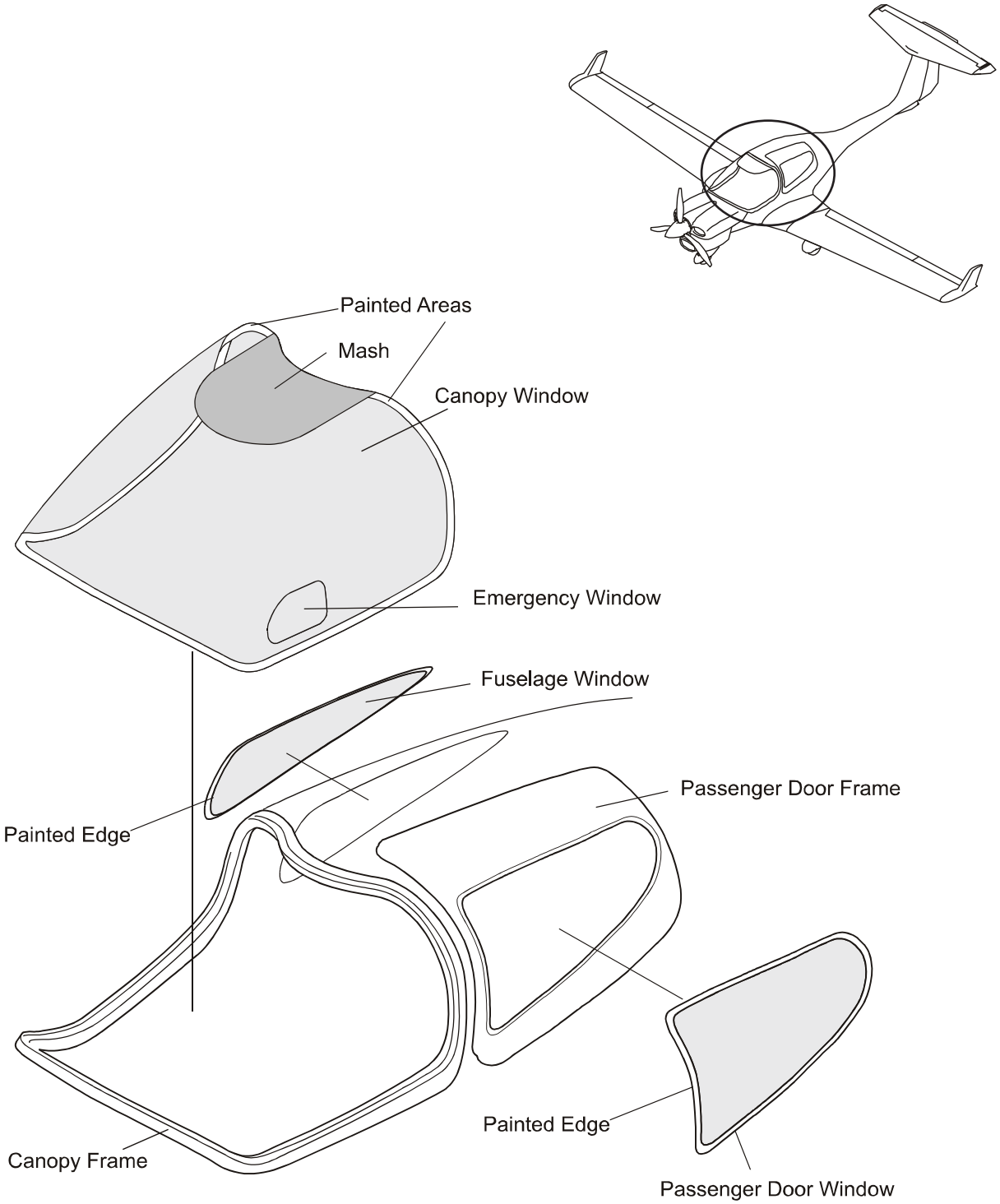

Figure 1 : Windows

2. Description and Operation

Figure 1 shows the windows.

A. General.

The DA 40 NG has 3 windows. Each window is polycast molded acrylic glass (plexiglass). This material gives good optical characteristics. It is also strong. It can be accurately formed into 3-dimensional shapes. A high-performance elastic adhesive bonds each window to the structure. A flexible white sealant fills the small gap between the edge of the window and the structure.

Each window has a band of white paint over the area where it bonds to the structure. The canopy window also has a screened area above the pilots' heads. This is a sun-shade. New windows are painted by the manufacturer.

B. Front Canopy and Emergency Windows.

The one-piece canopy window covers the pilots' cockpit. It is also the windscreen. It has a small emergency window (direct-vision panel) on the left side. Some airplanes also have an emergency window on the right side. The emergency windows have a hinge. You can open the emergency windows in flight.

C. 'Pop out' Windows (OÄM 40-086).

The emergency windows can be furnished with optional small 'pop out' windows for ventilation (OÄM 40-086).

D. Rear Windows.

The passenger door has a window for the left side of the passenger compartment. The right side of the fuselage also has a window for the passenger compartment.

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MAINTENANCE PRACTICES

1. General

This Section tells you how to replace or repair damaged windows.
See Section 12-30 for data on cleaning windows.

2. Replace a Window

You must cut the window from the frame to replace it.

A. Equipment.

Item	Quantity	Part Number
High-speed rotary grinder.	1	Commercial
Adhesive.	A/R	Terostat MS 9380.
White sealant.	A/R	06586.

B. Procedure.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the canopy or door. Put the canopy or door on a firm working surface.	Only if you will replace the canopy or door window. Refer to Section 52-10.
(2)	Put protective covers over the inside of the cockpit.	Only if you will replace the right fuselage window.
(3)	Cut the damaged window from the frame.	Use the high-speed rotary grinder.
(4)	Grind the frame to remove the remaining window material and adhesive.	
(5)	Put the window in position in the frame. Align the two holes in the window (center front and back) with the holes in the canopy frame.	
(6)	Carefully remove the protective coating from the new window, only where it will bond to the frame.	
(7)	Grind the bonding surface of the window.	Use 120 grade abrasive paper.
(8)	Make sure that the viewing area of the window is protected.	Use masking tape with paper.

	Detail Steps/Work Items	Key Items/References
(9)	Apply adhesive to the frame.	Use Terostat MS 9380.
(10)	Put the window in position in the frame. Hold the window with 3 mm pins through the two holes in the canopy.	
(11)	Remove the unwanted adhesive.	
(12)	Allow the adhesive to cure for 24 hours.	
(13)	Remove the two pins.	
(14)	Apply a bead of white sealant to the gap between the edge of the window and the frame.	Use 06586.
(15)	Allow the sealant to cure.	Follow the manufacturer’s instructions.
(16)	Remove the protective covering from the window.	
(17)	Install the canopy or door.	Only if you have replaced the canopy or door window. Refer to Section 52-10.

3. Window Repairs

A. Damage Limits.

Maximum crack length: 150 mm (6 in).

Do not repair cracks which are more than 150 mm (6 in) from the edge of the window.

B. Equipment.

Item	Quantity	Part Number
Small high-speed rotary grinder.	1	Commercial
Filler: Acrifix 192 or Tensol cement No. 70.	A/R	Commercial
Masking tape.	A/R	Commercial
Plastic adhesive tape.	A/R	Commercial
Cold ultra-violet light source (only for Acrifix 192).	A/R	Commercial

NOTE: Fillers become smaller when they cure. Apply enough filler to be above the level of the window surface. Cut the filler back when it has cured.

If you repair a vertical crack, keep the filler in place with plastic adhesive tape. Apply a second coat of filler after the first coat has cured.

C. Temporary Repairs to Windows.

Stop-drill the ends of short cracks. Use a 2.5 mm (3/32 in) drill. Refer to Figure 201.

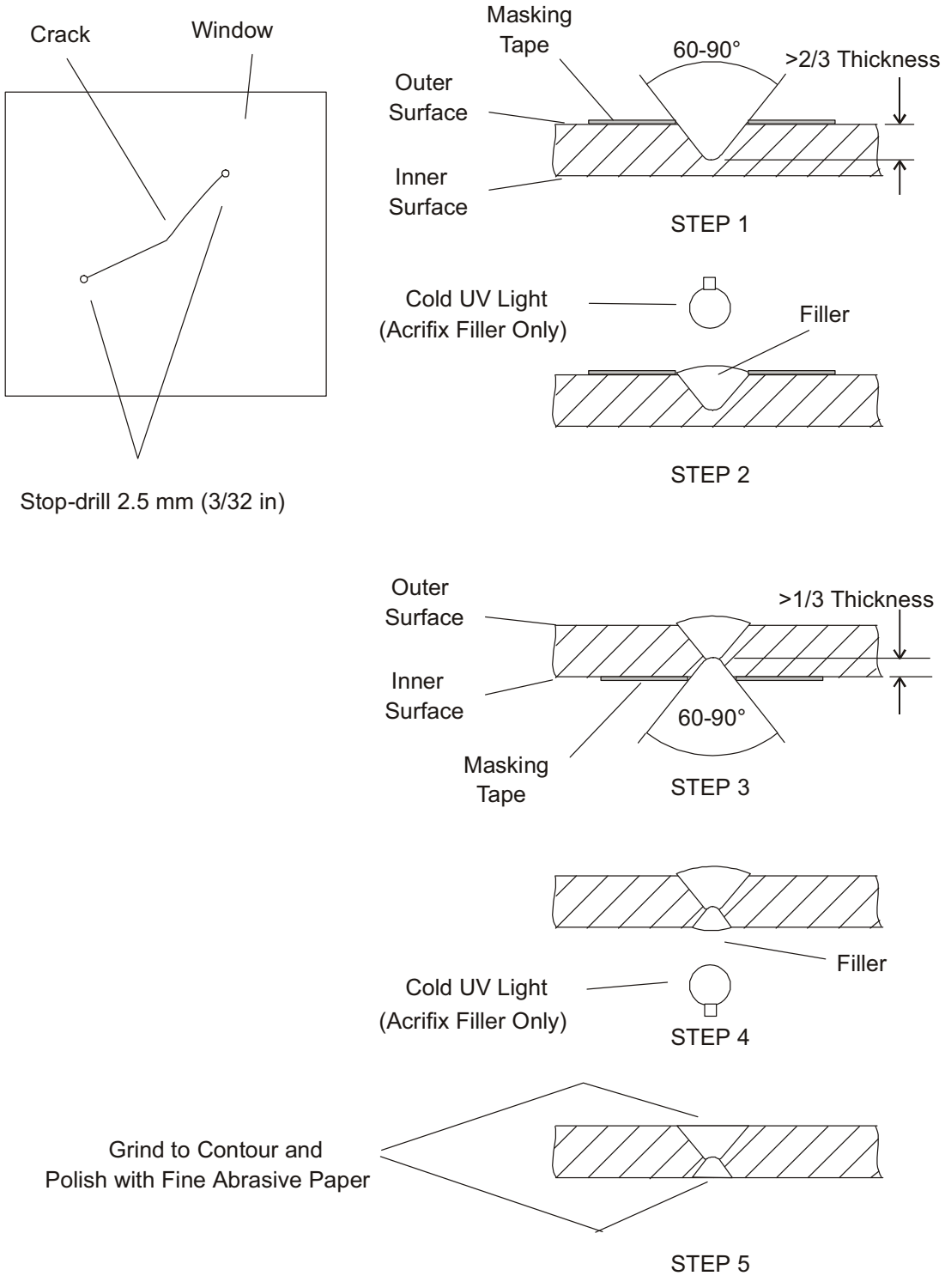

Figure 201 : Window Repairs

D. Permanent Repairs to Windows.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the canopy or door. Put the canopy or door on a firm working surface with the crack horizontal.	Only if you will repair the canopy or door window. Refer to Section 52-10.
(2)	Put protective covers over the inside of the cockpit.	Only if you will repair the right fuselage window.
(3)	Mask the area around the crack on both inner and outer surfaces.	
(4)	Cut a groove along the crack in the outer surface of the window.	Refer to Figure 201, step 1.
(5)	Countersink temporary stop-drill holes.	
(6)	Seal the stop-drill holes on the inner surface.	Use plastic adhesive tape.
(7)	Apply filler to the groove and the stop-drill holes.	Refer to Figure 201, step 2. Use Acrifix 192 or Tensol cement No. 70.
(8)	Let the filler cure.	
(9)	If possible, turn the window so that the inner surface is up. Remove any plastic adhesive tape.	
(10)	Cut a groove along the crack in the inner surface of the window.	Refer to Figure 201, step 3.
NOTE: This groove is less deep than the outer surface groove. It must cut into the outer layer of filler. This prevents holes in the filler.		
(11)	Countersink the filler in the stop-drill holes on the inner surface to 1 mm (0.04 in).	
(12)	Apply filler to the groove and the stop-drill holes.	Refer to Figure 201, step 4.
(13)	Let the filler cure.	Refer to the manufacturer's data.

	Detail Steps/Work Items	Key Items/References
(14)	Remove the masking materials.	
(15)	Grind the filler to the profile of the surface.	Grind both sides. Refer to Figure 201, step 5.
(16)	Polish the repair area with fine abrasive paper.	

CHAPTER 57
WINGS

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WINGS

1. General

The DA 40 NG has cantilever wings. The wings are set low on the fuselage. Each wing has a flap attached to the inboard trailing edge. An aileron attaches to the outboard trailing edge.

The wings have a monocoque structure. Each wing has top and bottom shells. The shells have CFRP outer skins, a rigid foam core and GFRP inner skins. Each wing has two I-section spars. Uni-directional carbon fiber cloth makes the spar caps. Each wing also has GFRP ribs and webs.

The flaps and ailerons have a mixture of CFRP and GFRP cloth in the shells. The shells have rigid foam cores.

This Chapter gives the repair data about the layers of cloth used in the structure of the wings flaps and ailerons. Refer to Chapter 51 for general composite repair data. Refer to Chapter 27 for data about the control systems which operate the flaps and ailerons.

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WING STRUCTURE

1. General

This Section gives you the data about the structure of the wings. Refer to Section 57-50 for data about the structure of the flaps. Refer to Section 57-60 for data about the structure of the ailerons.

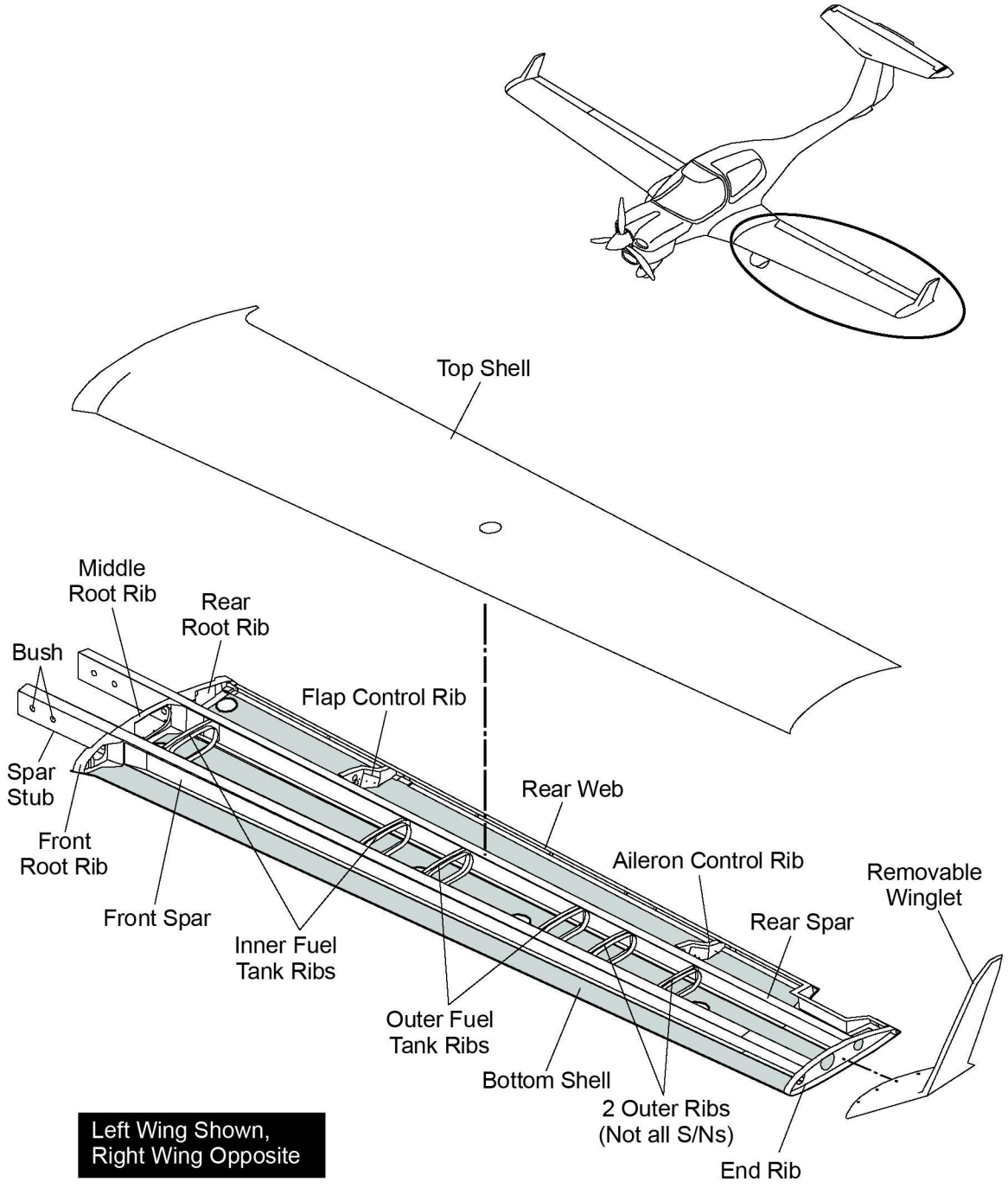


Figure 1 : Wing Structure

2. Description

Figure 1 shows the wing structure. The wing has top and bottom shells. It has front and rear spars and a root rib made in three parts. Four ribs hold the fuel tanks between the spars. Flap and aileron control ribs hold the bellcranks for the control systems.

A rear web closes the trailing edge of the wing. An end rib closes the outboard end of the wing. A removable GFRP tip attaches to the wing shells and outer rib with screws.

Bonding paste (thickened resin) bonds the wing components to each other. The following section gives more data about the main parts:

A. Wing Shells

Each wing has top and bottom shells. Each shell has a CFRP outer skin, a rigid foam core and a GFRP inner skin. The fibers in the layers of cloth which cover the whole wing run at ± 45° to the lateral axis of the wing. The outer layer is carbon fiber. The inner layer is glass fiber.

Some areas have more layers of cloth to give more strength. For example, the area around each access hole has extra layers of carbon fiber cloth.

The bottom shell of each wing has seven access holes. These give access to the flap and aileron bellcranks and fuel tanks. The top shell has a hole for the fuel cap of the outer fuel tank.

B. Spars

Each wing has two I-section spars. The front spar on one side is the same as the rear spar on the opposite side.

Many layers of uni-directional carbon fiber make the spar caps. The number of layers in the spar caps decreases from root to tip.

Each spar has a shear web. The shear web has GFRP skins and a rigid foam core. Glass cloth fillets attach the spar caps to the shear web.

The inboard end of each spar (the ‘stub’) goes past the root rib. The spar stub is a box-section with many layers of glass cloth wrapped round the spar caps. Two large bushes bond into the spar stub. The wing main bolts engage these bushes and attach the wing to the fuselage center section. The bushes and bolts transmit the wing bending loads into the center section. Figure 3 shows the main bolt installation.

C. Root Rib

Each wing has a three-piece root rib. Each piece is a GFRP molding with many layers of glass fiber cloth. The front root rib bonds to the top and bottom shells and the front face of the front spar. It has a housing for the A-bolt. The A-bolt transmits lift loads into the center section.

The middle part of the root rib bonds to the top and bottom shells, the aft face of the front spar and the front face of the rear spar. It has a large oval access panel for removing the fuel tanks.

The rear root rib bonds to the top and bottom shells, the aft face of the rear spar and the rear web. It has a housing for the B-bolt. The B-bolt transmits lift loads into the center section. It also has guide rollers for the flap and aileron push rods.

D. Fuel Tank Ribs

Four ribs hold the fuel tanks in each wing. Each rib is a GFRP molding with a large oval hole. The hole has a flat inner flange to hold the tank. The ribs bond to the top and bottom shells, the aft face of the front spar and the front face of the rear spar.

E. Flap and Aileron Control Ribs

Each wing has two flap and one aileron control rib. The ribs are GFRP moldings. Each rib has a bend with a solid insert. The insert gives extra strength where the control bellcrank attaches. The ribs bond to the top and bottom shells, the aft face of the rear spar and the rear web.

F. Rear Web

Each wing has a rear web. The web closes the trailing edge of the wing. The web bonds to the top and bottom shells. It also bonds to the rear faces of the rear root rib, the flap control ribs and the aileron control rib. The rear web has extra layers where the flap and aileron hinges attach. Rivets hold anchor-nut plates to the forward face of the rear web where the hinges attach.

G. Wing End Rib

Each wing has an end rib. The end rib is a GFRP molding. The end rib has eight anchor-nuts which attach the wing tip. It also has a threaded strong-point for a tie-down ring.

H. Wing Tip

The wing tip is a GFRP molding with top and bottom shells. The wing tip holds the external lights.

MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to remove and install the wings. They also tell you how to remove and install the wing tips and other small components.

2. Remove/Install the Wings

A. Equipment.

Item	Quantity	Part Number
Padded wing trestles.	4	Commercial
Main bolt removal tool.	1	--
Wing stand (not essential).	1 per wing	Commercial

B. Remove the Wings.

Use this procedure to remove the left wing or the right wing. Where a part of the procedure applies to only one wing it will tell you so.

	Detail Steps/Work Items	Key Items/References
WARNING:	**MAKE SURE THAT THE AREA AROUND THE FLAPS IS CLEAR OF PERSONS AND EQUIPMENT BEFORE YOU LOWER THE FLAPS. IF NOT, THE FLAPS CAN INJURE PERSONS OR BE DAMAGED BY EQUIPMENT.**	
(1)	Lower the flaps.	
(2)	Disconnect the battery.	Refer to Section 24-31.
(3)	Defuel the airplane.	Refer to Section 12-10.
(4)	Remove these items for access: - The left/right pilots' seats. - Main landing gear access panel. - Center section rear access panel. - Inboard fuel tank access panel.	As necessary. Refer to Section 25-10.
(5)	Put trestles under both wing tips.	Under the end rib.

	Detail Steps/Work Items	Key Items/References
(6)	Disconnect the flap push-rod: - Remove the nut, washer and bolt.	At the wing root. Through the center section rear panel.
(7)	Disconnect the aileron push-rod: - Remove the nut, washer and bolt.	At the wing root. Through the center section rear panel.
(8)	Disconnect the electrical connector in the wing harness.	Left wing: connector P2400, under the pilot's seat. Right wing: connector P2401, under the co-pilot's seat.
(9)	Disconnect these items under the left pilot's seat: - The Pitot hose. - The stall warning hose.	For left wing only. The hose is 8 mm (5/16 in) diameter (green color). The hose is 10 mm (3/8 in) diameter (transparent).
	WARNING: DO NOT GET FUEL ON YOU. FUEL CAN CAUSE DISEASE. **WARNING: DO NOT ALLOW FIRE NEAR FUEL. FUEL BURNS AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.**	
(10)	Disconnect the fuel hose(s) in the stub wing.	Put a container to catch a small quantity of fuel. Remove spilt fuel.
(11)	Remove the locking tube from the inboard and outboard main bolts: - Remove the nut, washer and bolt. - Move the tube over the long end piece. - Remove the short end piece. - Remove the tube and the long end piece.	Refer to Figure 201.
	WARNING: THREE PERSONS ARE NEEDED TO LIFT THE WING. OTHERWISE YOU CAN CAUSE INJURY. CAUTION: DO NOT LIFT ON THE FLAP. YOU CAN DAMAGE THE FLAP.	
	NOTE: For the rest of this procedure, one person must lift the wing tip. One person must lift the leading edge at the root rib. One person must lift the trailing edge at the root rib.	

	Detail Steps/Work Items	Key Items/References

(12)	Remove the main bolts:
	- Take the weight off the wing.
	- For each bolt:
	  - Install the main bolt removal tool.
	  - Extract the bolt.
		If necessary, move the wing tip a small amount up and down to help release the main bolts.

(13)	Lift the wing away from the center section.	Make sure that the electrical cables do not catch on the center section conduit.
(14)	Put the wing on trestles or a wing stand.	
NOTE: If you use trestles, put one trestle under the spar stubs. Put the second trestle under the wing end rib.		

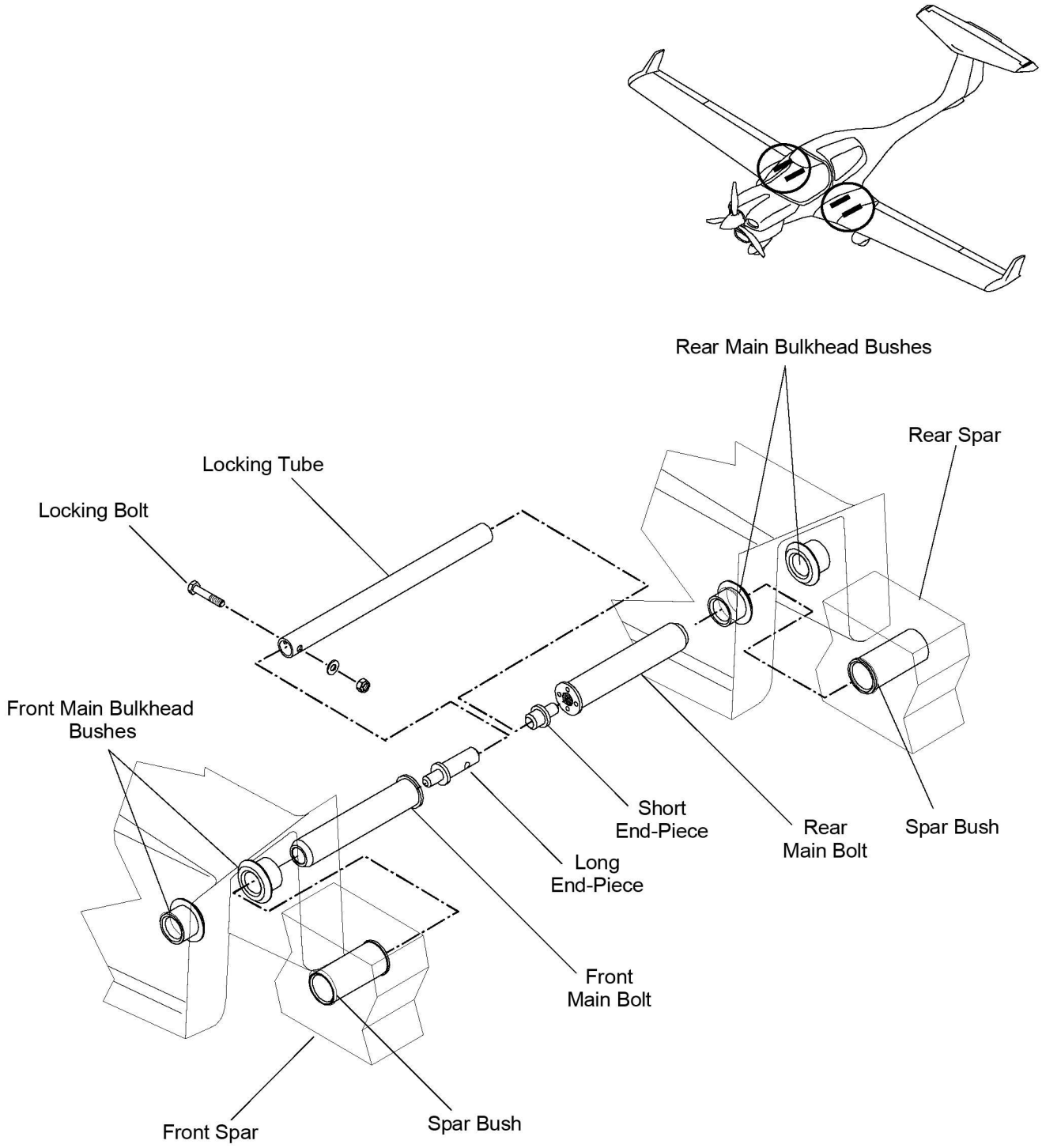


Figure 201 : Wing Main Bolt Installation

C. Pre-Installation Check.

Do this check before you install the wings.

Refer to Figures 201 and 202.

	Detail Steps/Work Items	Key Items/References
(1)	Examine the inner faces of the front and rear main bulkheads. Look specially for: - Damage to the main bolt bushes. - Damage to the structure round the bushes. - Looseness between the bushes and the main bulkhead. - Damage to the top and bottom shells of the center section (where the spar stubs can touch the shells during wing removal). - Delamination between the main bulkheads and the shells.	Refer to the manufacturer if you find damage in any of these areas. Clean the bushes.
(2)	Examine the front, middle and rear end ribs in the center section. Look specially for: - Damage to the A and B-bolt bushes. - Looseness between the A and B-bolt bushes and the end ribs. - Delamination between the end ribs, the main bulkheads and the shells.	Refer to the manufacturer if you find damage in any of these areas. Clean the bushes.
(3)	Examine the wing spar stubs. Look specially for: - Damage to the main bolt bushes. - Damage to the spar stub around the bushes. - Looseness between the bushes and the spar stub. - Delamination between the spars and the shells.	Refer to the manufacturer if you find damage in any of these areas. Clean the bushes.

	Detail Steps/Work Items	Key Items/References
(4)	Examine the wing root ribs. Look specially for:	Refer to the manufacturer if you find damage in any of these areas.
	- Damage to the A and B-bolts and bushes.	Clean the bushes.
	- Damage to the front and rear root ribs around the bushes.	
	- Looseness between the bushes and the root ribs.	
	- Delamination between the root ribs, the spars and the shells	
(5)	Examine the main bolt assemblies. Look specially for:	Clean the main bolt assembly.
	- Corrosion of the end-pieces or tube.	Remove corrosion. Repair the surface finish. Refer to Section 51-20.
	- Corrosion of the main bolts.	No corrosion permitted.
	- Scratches on the bearing surfaces.	Maximum depth 0.1 mm (0.004 in).
	- Deformation.	No deformation permitted.
	- Damage to the threads for the removal tool.	Replace the bolt if you cannot attach the removal tool correctly.
(6)	Measure the radial play of each main bolt in the related main bulkhead bushes.	Maximum radial play 0.2 mm (0.008 in).
(7)	Measure the radial play of each main bolt in the related spar stub bush.	Maximum radial play 0.2 mm (0.008 in).

	Detail Steps/Work Items	Key Items/References
(8)	Lubricate these items: - Main bolts. - Front and rear main bulkhead bushes. - Spar bushes. - A and B-bolt bushes in the end ribs. - A and B-bolts in the wing root ribs.	Refer to Section 12-20.
(9)	Examine the flap torsion tube and transfer lever in the center section. Look specially for damage to the transfer pins.	
(10)	Examine the flap. Look specially for damage to the inner end rib.	

D. Install the Wings.

Use this procedure to install the left wing or the right wing. Where a part of the procedure applies to only one wing it will tell you so.

	Detail Steps/Work Items	Key Items/References
(1)	Do the pre-installation check.	Refer to Paragraph C.
	WARNING: THREE PERSONS ARE NEEDED TO LIFT THE WING. OTHERWISE YOU CAN CAUSE INJURY. CAUTION: DO NOT LIFT ON THE FLAP. YOU CAN DAMAGE THE FLAP. CAUTION: DO NOT LET THE SPAR STUBS TOUCH THE CENTER SECTION SHELLS. YOU CAN DAMAGE THE SHELLS.	
	NOTE: Until you install the main bolts, one person must lift the wing tip. One person must lift the leading edge at the root rib. One person must lift the trailing edge at the root rib.	
(2)	Lift the wing into position: - Move the spar stubs part way into the front and rear main bulkheads. - Put the electrical cable, Pitot, static and stall warning tubes through the conduit in the leading edge of the center section. - Align the flap inner rib with the transfer pins on the transfer lever. - Move the wing fully into the center section to engage the A and B-bolts and the flap transfer pins.	 Hold the wing in position. Hold the wing in position. Hold the wing in position.
(3)	Install the main bolts: - Hold the weight of the wing. - Install each bolt.	If necessary, move the wing tip a small amount up and down to help install the main bolts.
(4)	Install the locking tubes on the inboard and outboard main bolts: - Install the long end piece in one main bolt. - Move the tube over the long end piece. - Install the short end piece in the other main bolt. - Move the tube over the short end piece. - Install the bolt, washer and self-locking nut through the tube and the long end piece.	Refer to Figure 201. Torque: hand tight.

	Detail Steps/Work Items	Key Items/References
(5)	Connect these items under the left pilot's seat: - The Pitot hose. - The stall warning hose.	For left wing only. The hose is 8 mm (5/16 in) diameter. (Green color). The hose is 10 mm (3/8 in) diameter. (Transparent).
(6)	Connect the electrical connector in the wing harness.	Left wing: connector P2400, under the pilot's seat. Right wing: connector P2401, under the co-pilot's seat.
(7)	Connect the fuel hose(s) in the stub-wing.	
(8)	Connect the flap push-rod: - Install the bolt, washer and self-locking nut.	Through the center section rear panel. Torque: 6.4 Nm (4.7 lbf.ft.).
(9)	Connect the aileron push-rod: - Install the bolt, washer and self-locking nut.	Through the center section rear panel. Torque: 6.4 Nm (4.7 lbf.ft.).
(10)	If you must also install the other wing, do steps 1 to 9 again for that wing.	
(11)	Connect the battery.	Refer to Section 24-31.
(12)	Do a test for correct operation and range of movement of the flap system. If necessary, adjust the flap system.	Refer to Section 27-50.
(13)	Do an inspection of the flap controls which you have connected or adjusted. - If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(14)	Do a test for correct operation and range of movement of the aileron system. If necessary, adjust the aileron system.	Refer to Section 27-10.

	Detail Steps/Work Items	Key Items/References
(15)	Do an inspection of the aileron controls which you have connected or adjusted. - If necessary for your Airworthiness Authority, do a second inspection of the controls.	
(16)	Do a functional check of these lights: - Navigation lights. - Strobe lights (ACLs). - Taxi light. - Landing light.	Refer to Section 33-40. Left wing only. Left wing only
(17)	Do a functional check of the Pitot heating system.	Left wing only. Refer to Section 34-10.
(18)	Do a Pitot and static system leak test.	Left wing only. Refer to Section 34-10.
(19)	Refuel the airplane to the unusable fuel level.	Refer to Section 12-10.
(20)	Install these items after access: - The left/right pilots' seats. - Main landing gear access panel. - Center section rear access panel. - Inboard fuel tank access panel.	As necessary. Refer to Section 25-10.
(21)	Do an air test.	Refer to the Airplane Flight Manual.

3. Remove/Install the A or B-Bolts

A. Remove the A or B-Bolts.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the wing.	Refer to Paragraph 2.
(2)	Remove the A or B-bolt: - Hold the flats on the flange of the bolt with a wrench. - Remove the self-locking nut from the A or B-bolt. - Remove the A or B-bolt.	Refer to Figure 202. Access for the A-bolt through the hole in the front root rib. Access for the B-bolt through the access panel in the bottom shell.

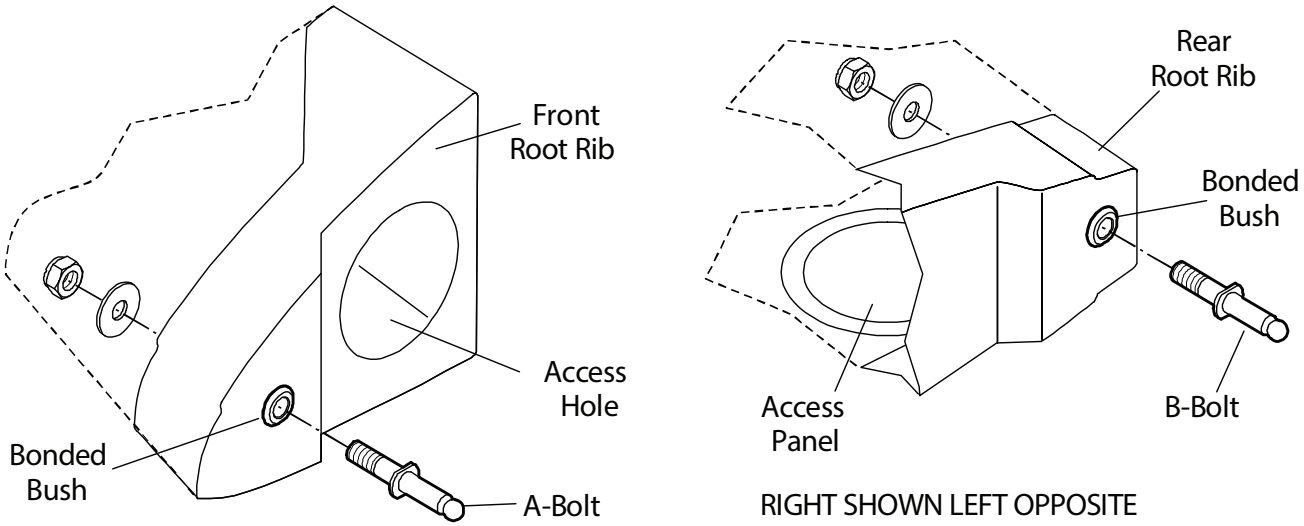


Figure 202 : A and B-Bolt Installation

B. Install the A or B-Bolts.

	Detail Steps/Work Items	Key Items/References
(1)	Examine the A or B-bolt. Look specially for: - Corrosion. - Scratches on the bearing surfaces. - Deformation. - Damage to the threads.	 No corrosion permitted. Maximum depth 0.1 mm (0.004 in). No deformation permitted. No damage permitted.
(2)	Examine the A or B-bolt bush. Look specially for: - Looseness between the A or B-bolt bush and the root rib. - Damage to the root rib where the bush attaches. - Damage to the bush.	
(3)	Install the A or B-bolt: - Install the bolt in the bush. - Hold the flats on the flange of the bolt with a wrench. - Install the washer and self-locking nut.	Refer to Figure 202. Access for the A-bolt through the hole in the front root rib. Access for the B-bolt through the access panel in the bottom shell. Torque: 32 Nm (23.6 lbf.ft.).
(4)	Install the wing.	Refer to Paragraph 2.

4. Remove/Install Control Surface Hinge-Brackets

A. Remove Control Surface Hinge-Brackets.

Refer to Figure 203.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the control surface.	Refer to Sections 57-50 and 57-60.
(2)	For brackets at the control horn hinge: - Remove the control bell-crank access panel under the wing. - Remove the attaching nuts and large washers. - Remove the bolts and small washers. - Remove the bracket.	The flap brackets have 3 bolts. The aileron brackets have 2 bolts. From inside of the wing.
(3)	For brackets not at the control horn hinge: - Remove the bolts and small washers. - Remove the bracket.	All brackets have 2 bolts.

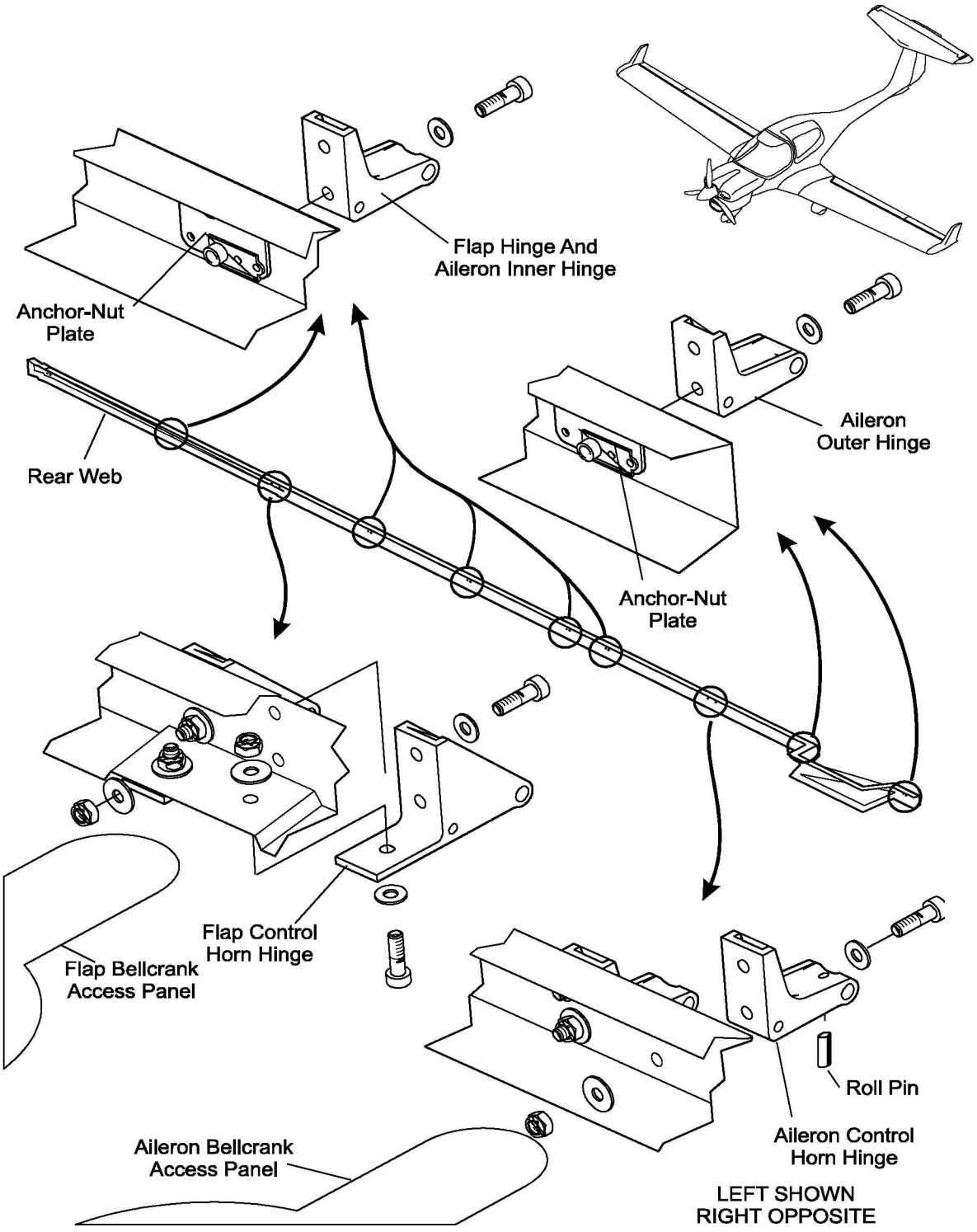


Figure 203 : Control Surface Hinge-Bracket - Installation

B. Install Control Surface Hinge-Brackets.

Refer to Figure 203.

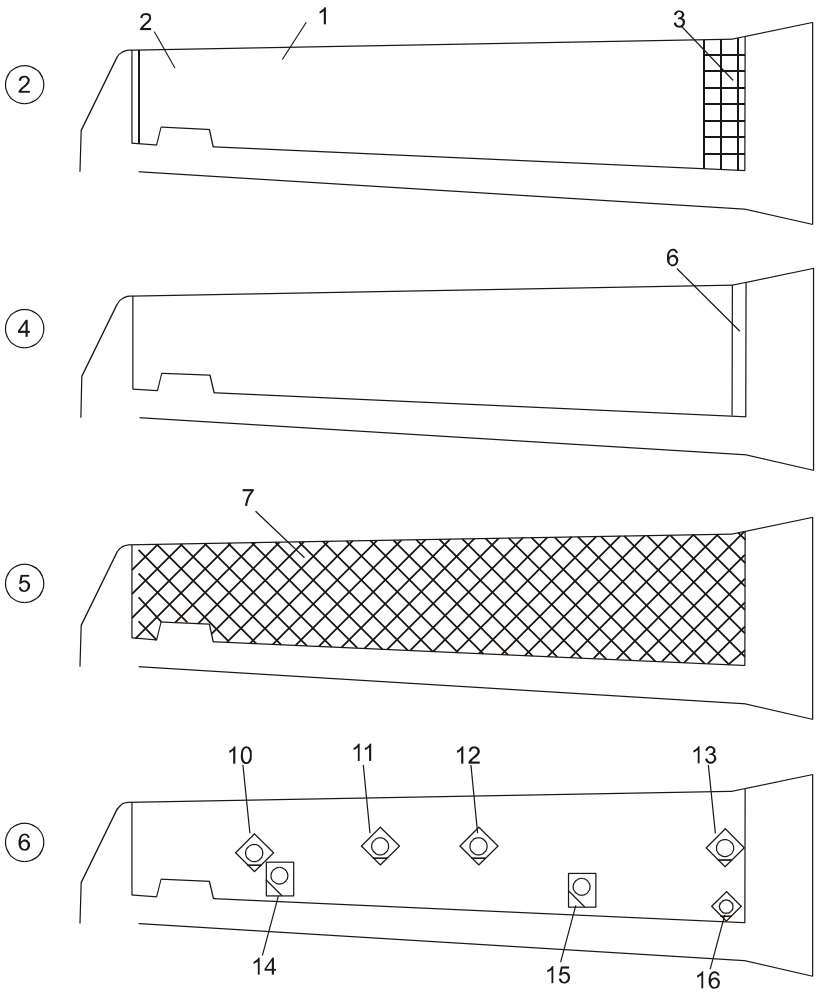
	Detail Steps/Work Items	Key Items/References
(1)	For brackets at the control horn hinge: - Put the bracket in position on the rear web. - Install the bolts with small washers. - Install the large washers and self-locking nuts. - Install the control bellcrank access panel under the wing.	The flap brackets have 3 bolts. The aileron brackets have 2 bolts. From inside of the wing. Torque: 3.6 Nm (2.7 lbf.ft.).
(2)	For brackets not at the control horn hinge: - Put the bracket in position on the rear web. - Install the bolts and small washers.	All brackets have 2 bolts. Torque: 3.6 Nm (2.7 lbf.ft.).
(3)	Install the control surface.	

5. Repair Data for the Wing Shells

Figures 204 through 207 show the layers of glass fiber cloth in the wing shells. Use this data when you need to repair the wing.

The Figures show the main layers of cloth. The cross-hatching on the figure shows the orientation of the fibers. The orientation is also given in the related table. When you repair the wing, you must use the same type of cloth with the same fiber orientation.

The numbers in circles beside each drawing give the order in which the layers are applied (‘Stages’). The first stage is a layer of filler and is not shown. Stage 1 is the outer face of the shell.

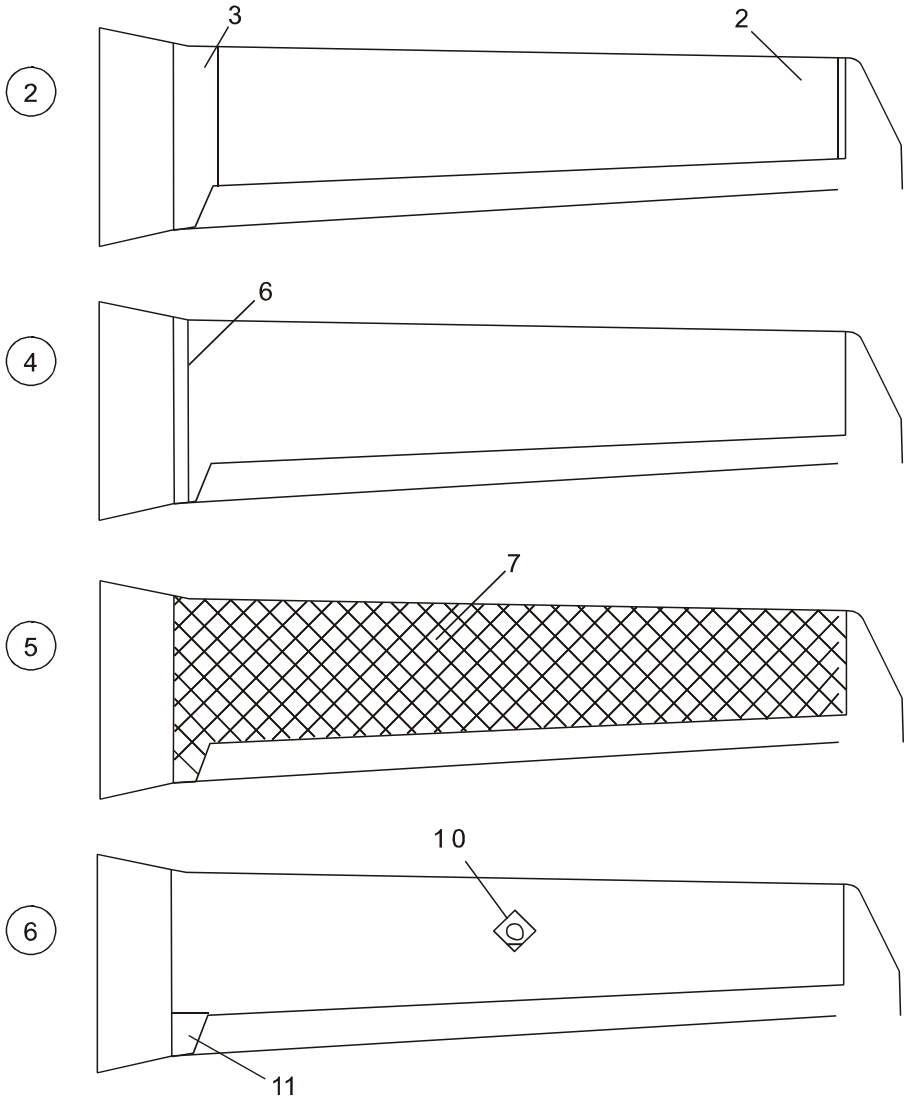


Item No.	Layers	Reference No.	Type	Remarks
1	1	8.4503.60	Interglas 02037	0 °/90°
2, 3	1	CCC 459 Al	carbon/aluminum	0°/90° - lightning protection
6	2	8.3520.80	carbon cloth	0°/90°, 100 mm wide
7	1	8.3520.80	carbon cloth	±45°
10 - 13	3 each	8.3520.80	carbon cloth	±45°, 200 mm x 200 mm
14, 15	3 each	8.3520.80	carbon cloth	±45°, 200 mm x 250 mm
16	3 each	8.3520.80	carbon cloth	±45°, 160 mm x 160 mm

Figure 204 : Layers of Cloth in the Wing Bottom Shell - Stages 2 - 6

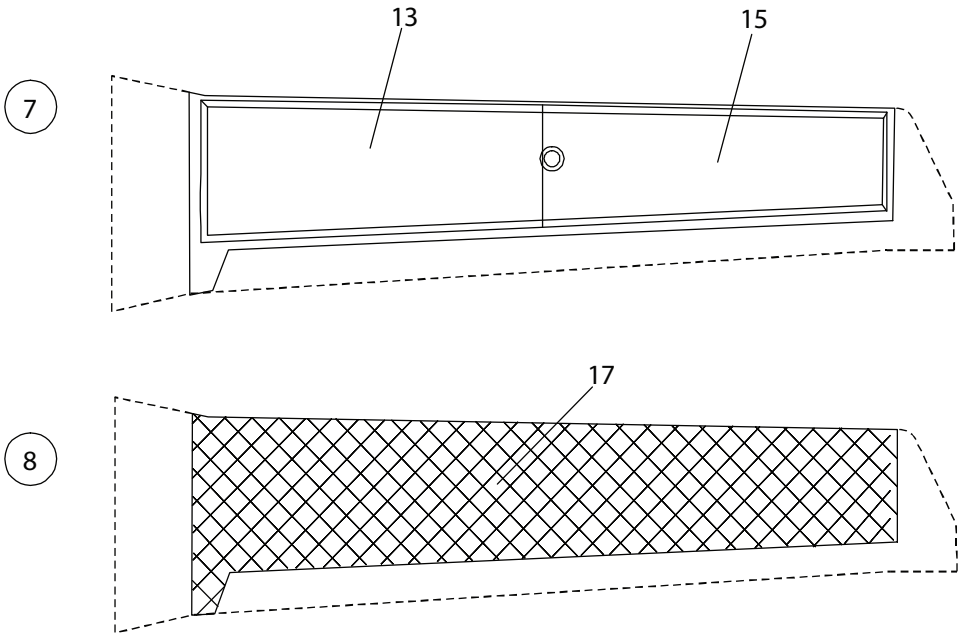
Item No.	Layers	Reference No.	Type	Remarks
18, 20	1 each	H 60	6 mm rigid foam	
22	2	8.4551.60 glass	twill 2/2	±45°, 90 mm wide
23	1	8.4551.60 glass	twill 2/2	±45°

Figure 205 : Layers of Cloth in the Wing Bottom Shell - Stages 7 - 9



Item No.	Layers	Reference No.	Type	Remarks
2, 3	1	CCC 459 Al	carbon/aluminum	0°/90° - lightning protection
6	2	8.3520.80	carbon cloth	0°/90°, 100 mm wide
7	2	8.3520.80	carbon cloth	±45° 200 mm x 200 mm
10	3	8.3520.80	carbon cloth	±45° 220 mm x 220 mm
11	3	8.3520.80	carbon cloth	±45° 250 mm x 300 mm

Figure 206 : Layers of Cloth in the Wing Top Shell - Stages 2 - 6



Item No.	Layers	Reference No.	Type	Remarks
13, 15	1 each	H 60	6 mm rigid foam	
17	1	8.4551.60 glass	twill 2/2	±45°

Figure 207 : Layers of Cloth in the Wing Top Shell - Stages 7 and 8

FLAPS

1. General

This Section tells you about the flap structure. Refer to Section 27-50 for data about the flap control system.

2. Description

Figure 1 shows the flap structure. Each flap has these components:

A. Bottom Shell

The bottom shell has inner and outer GFRP skins. It also has one layer of carbon fiber cloth in the outer skin. The skins bond to a rigid plastic foam core. The leading edge of the shell bends up to form a web. It then curves forward to form a shroud which seals the gap between flap and wing when the flap is down.

The outboard end of the bottom shell also bends up to close the end of the flap. The leading edge, the ends, and the area where the horn attaches have more carbon fiber cloth to give more strength and stiffness.

B. Top Shell

The top shell has inner and outer GFRP skins. It also has one layer of carbon cloth in the outer skin. The skins bond to a rigid plastic foam core. The top shell bonds to the bottom shell and the inner end rib.

C. Inner End Rib

The inner end rib is a CFRP molding. The rib has two holes with flanged bushes. The bushes engage with the transfer pins on the transfer levers of the flap control system. The end rib bonds to the top and bottom shells.

D. Flap Horn

The flap horn is an aluminum alloy component. Three bolts attach the horn to the bottom surface of the flap. A small hole in the leading edge of the flap gives access to the front attaching nuts and washers. The horn also makes one of the flap hinges. Two flanged bushes in the front of the horn make the hinge.

E. Flap Hinges

Each flap has five hinges (as well as the flap horn). Two bolts attach each hinge to the leading edge of the flap. A small hole in the middle of the hinge gives access to the attaching nuts and washers. Each hinge has a flanged bush at the inboard end. A plastic plug seals the outboard end.

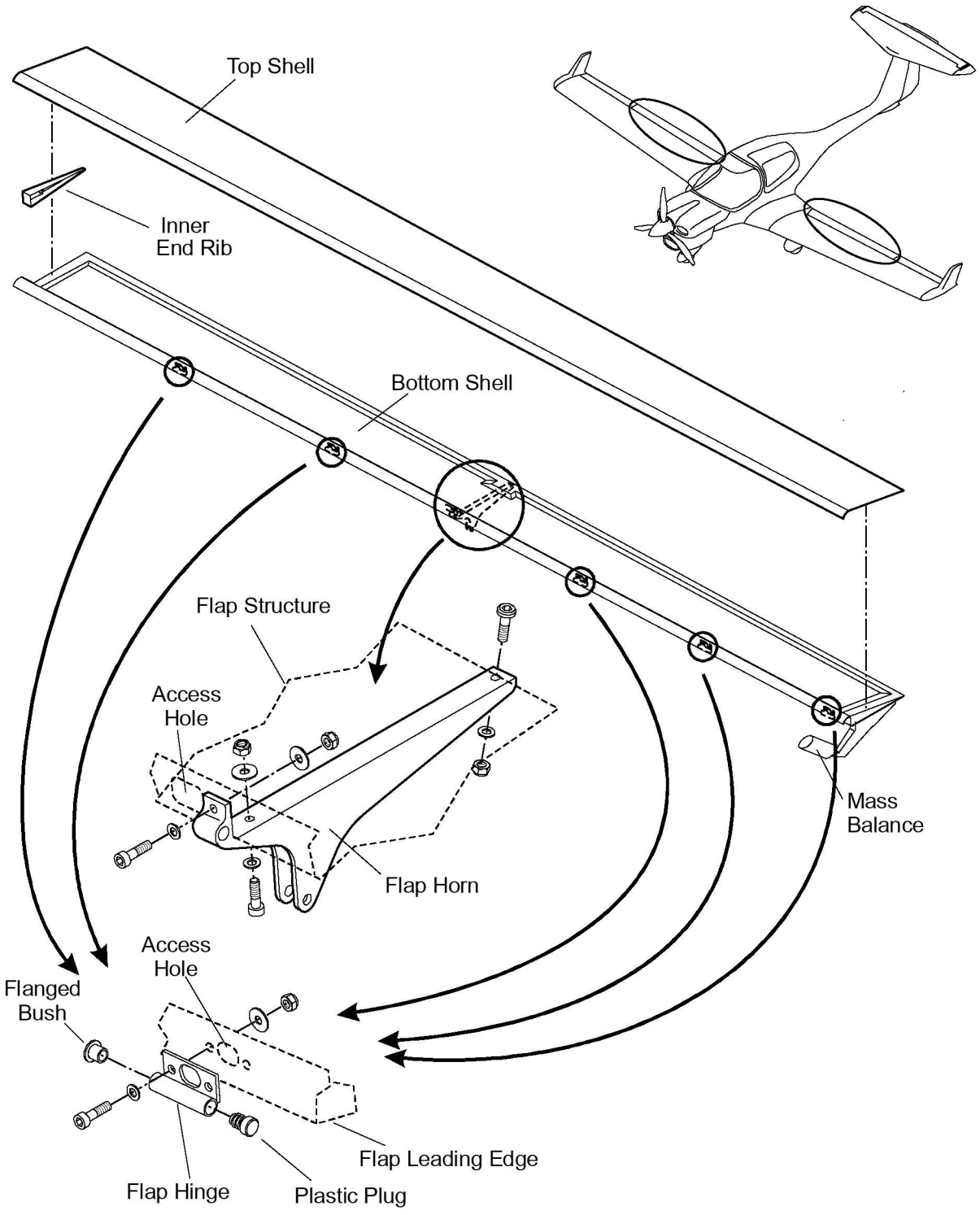


Figure 1 : Flap Structure and Assembly

MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to remove and install the flaps.
Refer to Section 27-50 for the flap setting procedure.

2. Remove/Install a Flap

A. Remove a Flap.

Refer to Figure 1 in the Description and Operation Pageblock 57-50-00.

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE AREA AROUND THE FLAPS IS CLEAR OF PERSONS AND EQUIPMENT BEFORE YOU LOWER THE FLAPS. IF NOT, THE FLAPS CAN INJURE PERSONS OR BE DAMAGED BY EQUIPMENT.	
(1)	Lower the flaps: - Set the ELECTRIC MASTER key switch to ON. - Set the flap selector to LDG. - When the flaps stop moving. - Set the ELECTRIC MASTER key switch to OFF.	
(2)	Open the circuit-breaker for the flap control.	Instrument panel. Right side.
(3)	Disconnect the flap push rod from the flap horn: - Remove the nut and washer from the bolt which attaches the push rod to the horn. - Remove the attachment bolt and washer from the horn.	Hold the flap.
(4)	Remove the six hinge pins from the flap hinges and the flap horn: - Remove the roll pins which locate the flap hinge pins. - Move the hinge pins inboard, and clear of the hinges.	Support the flap assembly!
(5)	Carefully move the flap aft, and clear of the airplane.	

B. Install a Flap.

Refer to Figure 1 in the Description and Operation Pageblock 57-50-00.

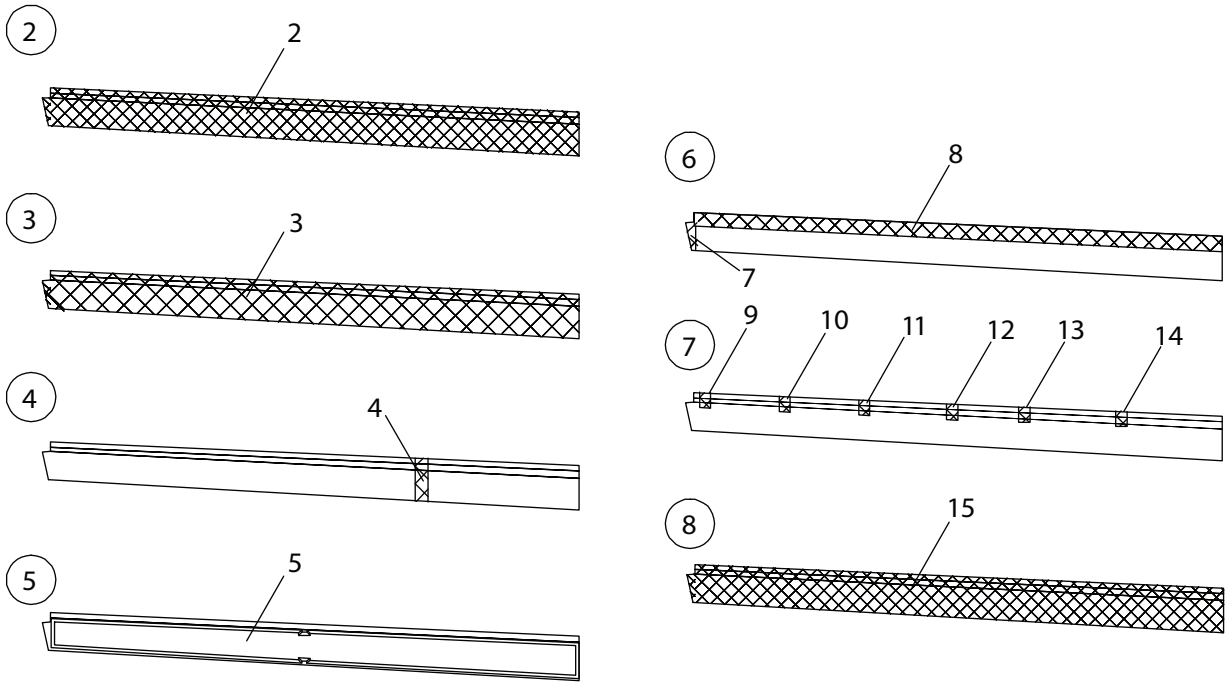
	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the hinge pins are clean and not damaged.	
(2)	Put the flap into position on the airplane.	
(3)	Install the six hinge pins in the hinges and flap horn: - Push the hinge pins into position from the inboard side. - Align the holes in the hinges with the holes in the hinge pins and install the roll pins.	Make sure that there is a gap of 0.5 - 2.5 mm (0.002 - 0.010 in) between the faces of the hinge at the horn and a gap of 1 - 3 mm (0.004 - 0.012 in) between the faces at the other hinges
(4)	Install the bolt which attaches the flap push rod to the flap horn: - Install a washer on the bolt. - Push the bolt through the horn and the push rod. - Install the washer and the nut on the bolt.	
(5)	Do a test for correct adjustment of the flaps.	Refer to Section 27-50.
(6)	If necessary for your Airworthiness Authority, do a second inspection of the flap controls.	

3. Repair Data for the Flap Shells

Figures 201 and 202 show the layers of glass/carbon fiber cloth in the flap shells. Use this data when you need to repair the flap.

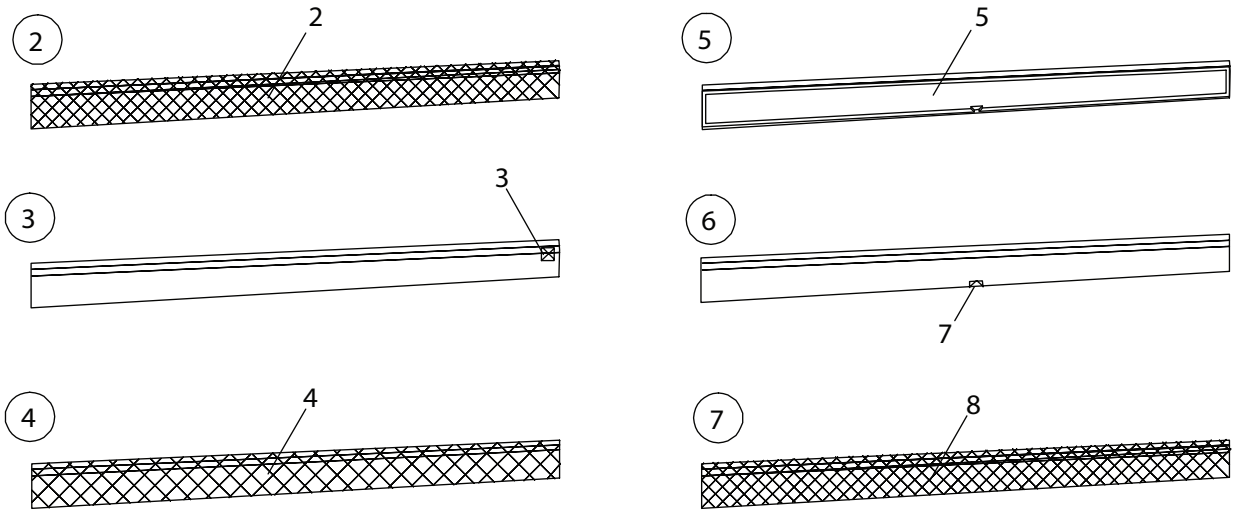
The Figures show the main layers of cloth. The cross-hatching on the figure shows the orientation of the fibers. The orientation is also given in the related table. When you repair the flap, you must use the same type of cloth with the same fiber orientation.

The numbers in circles beside each drawing give the order in which the layers are applied (‘Stages’). The first stage is a layer of filler and is not shown. Stage 1 is the outer face of the shell.



Item No.	Layers	Reference No.	Type	Remarks
2	1	8.4548.60 glass	twill 2/2	±45°
3	1	8.3520.8 carbon		±45°
4	1	8.3520.8 carbon		±45°, 80 mm x 270 mm
5	1	H 60	3 mm rigid foam	
7	1	8.3520.8 carbon		±45°, 70 mm x 230 mm
8	1	8.3520.8 carbon		±45°, 90 mm wide
9 - 14	1 each	8.3520.8 carbon		±45°, 30 mm x 70 mm
15	1	8.4548.60 glass	twill 2/2	±45°

Figure 201 : Layers of Cloth in the Flap Bottom Shell



Item No.	Layers	Reference No.	Type	Remarks
2	1	8.4548.60 glass	twill 2/2	±45°
3	2	8.3520.8 carbon		±45°, 80 mm x 80 mm
4	1	8.3520.8 carbon		±45°
5	1	H 60	3 mm rigid foam	
7	1	8.3520.8 carbon		±45°
8	1	8.4548.60 glass	twill 2/2	±45°

Figure 202 : Layers of Cloth in the Flap Top Shell

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AILERONS

1. General

This Section tells you about the aileron structure.
Refer to Section 27-10 for data about the aileron control system

2. Description

Figure 1 shows the aileron structure. Each aileron has these components:

A. Bottom Shell

The bottom shell has inner and outer GFRP skins. A layer of carbon fiber cloth covers a large part of the inboard area of the outer skin. The skins bond to a rigid plastic foam core. The leading edge of the shell bends up to form a web. It then curves forward to form a shroud which seals the gap between aileron and wing when the aileron moves down.

The ends of the bottom shell also bend up to close the ends of the aileron. The leading edge, the ends and the area where the horn attaches have more carbon fiber cloth to give more strength and stiffness.

B. Top Shell

The top shell has inner and outer GFRP skins. A layer of carbon fiber cloth covers a large part of the inboard area of the outer skin. The skins bond to a rigid plastic foam core. The top shell bonds to the bottom shell.

C. Aileron Horn

The aileron horn is an aluminum alloy component. Three bolts attach the horn to the bottom surface of the aileron. A small hole in the leading edge of the aileron gives access to the front attaching nuts and washers. The horn also makes one of the aileron hinges

D. Aileron Hinges

Each aileron has three hinges (as well as the aileron horn). Two bolts attach each hinge to the leading edge of the aileron. A small hole in the middle of the hinge gives access to the attaching nuts and washers. Each hinge has a flanged bush at the inboard end. A plastic plug seals the outboard end.

E. Aileron Mass Balance

Each aileron has a paddle on the outboard end. To balance the mass of the aileron behind the hinge line, the leading edge of the paddle is made from heavy metal.

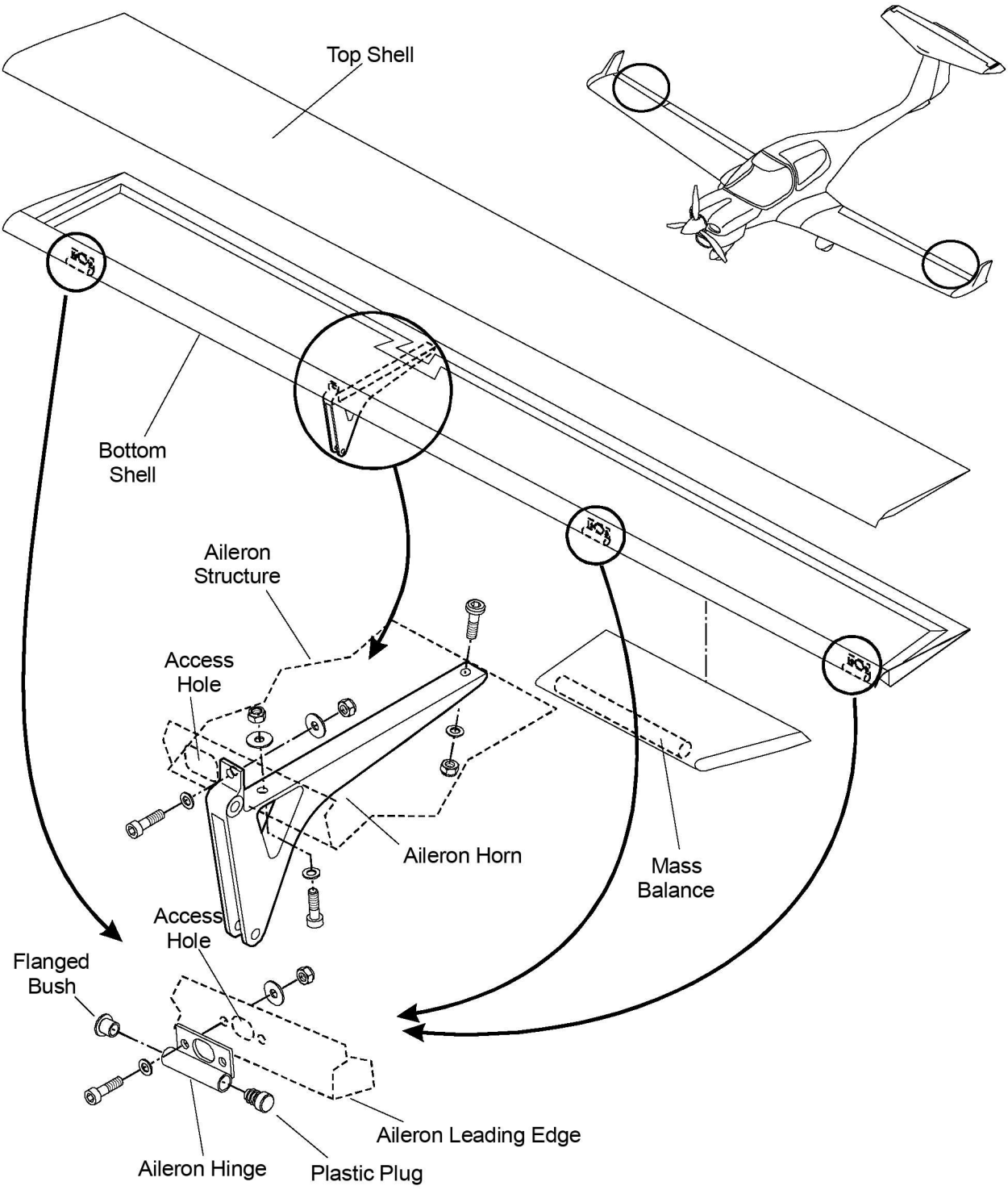


Figure 1 : Aileron Structure and Assembly

MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to remove and install the ailerons.
Refer to Section 27-10 for the aileron control setting procedure.

2. Remove/Install an Aileron

A. Remove an Aileron.

Refer to Figure 1 in the Description and Operation Pageblock 57-60-00.

	Detail Steps/Work Items	Key Items/References
(1)	Disconnect the aileron push rod from the aileron horn: - Remove the nut and washer from the bolt which attaches the push rod to the horn. - Remove the attachment bolt and washer from the horn.	Hold the aileron.
(2)	Remove the four hinge pins from the aileron hinges and the aileron horn: - Remove the roll pins which locate the aileron hinge pins. - Move the hinge pins inboard, and clear of the hinges.	Support the aileron assembly!
(3)	Carefully move the aileron aft, and clear of the airplane.	

B. Install an Aileron.

Refer to Figure 1 in the Description and Operation Pageblock 57-60-00.

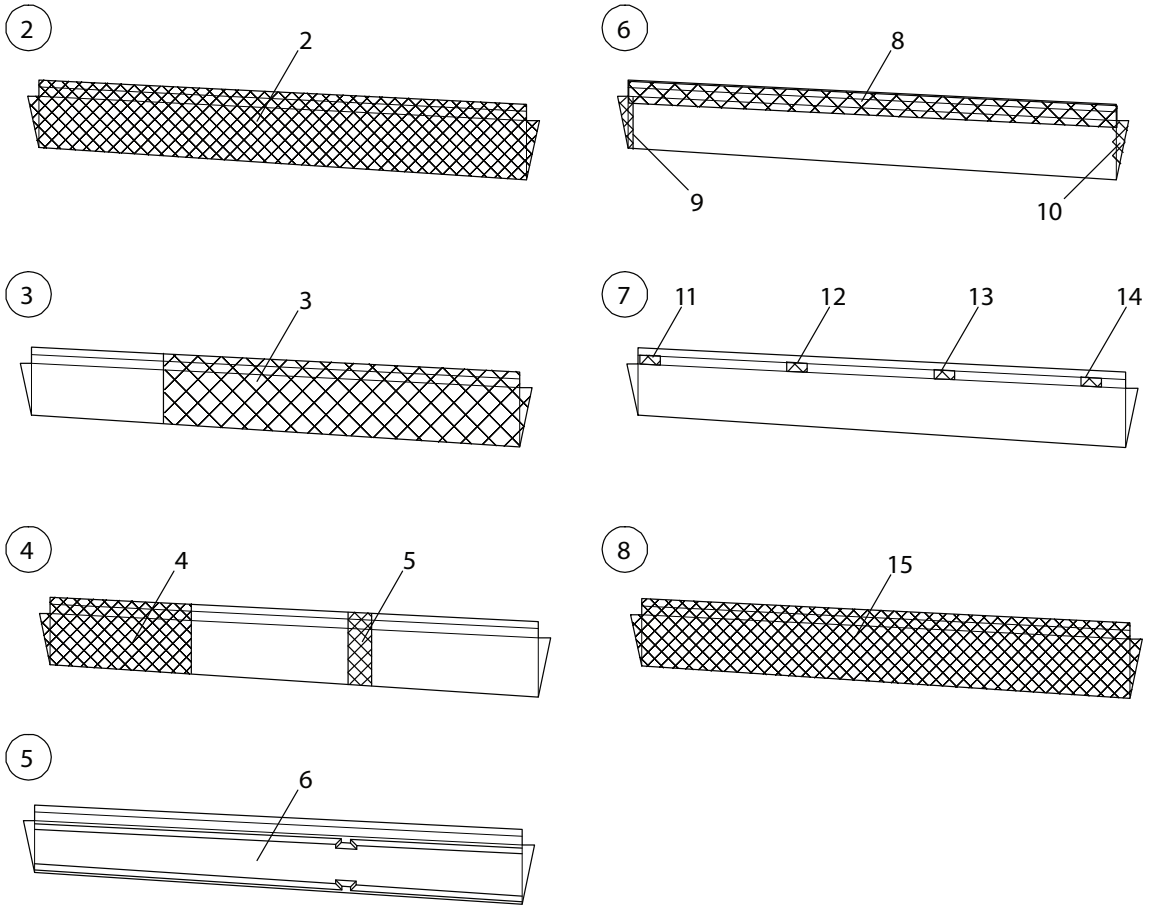
	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the hinge pins are clean and not damaged.	
(2)	Put the aileron into position on the airplane.	
(3)	Install the four hinge pins in the hinges and aileron horn: - Push the hinge pins into position from the inboard side. - Align the holes in the hinges with the holes in the hinge pins and install the roll pins.	Make sure that there is a gap of 0.5 - 2.5 mm (0.002 - 0.010 in) between the faces of the hinge at the horn and a gap of 1 - 3 mm (0.004 - 0.012 in) between the faces at the other hinges
(4)	Install the bolt which attaches the aileron push rod to the aileron horn: - Install a washer on the bolt. - Push the bolt through the horn and the push rod. - Install the washer and the nut on the bolt.	
(5)	Do a test for correct adjustment of the aileron.	Refer to Section 27-60.
(6)	If necessary for your Airworthiness Authority, do a second inspection of the flap controls.	

3. Repair Data for the Aileron Shells

Figures 201 and 202 show the layers of glass/carbon fiber cloth in the aileron shells. Use this data when you need to repair the aileron.

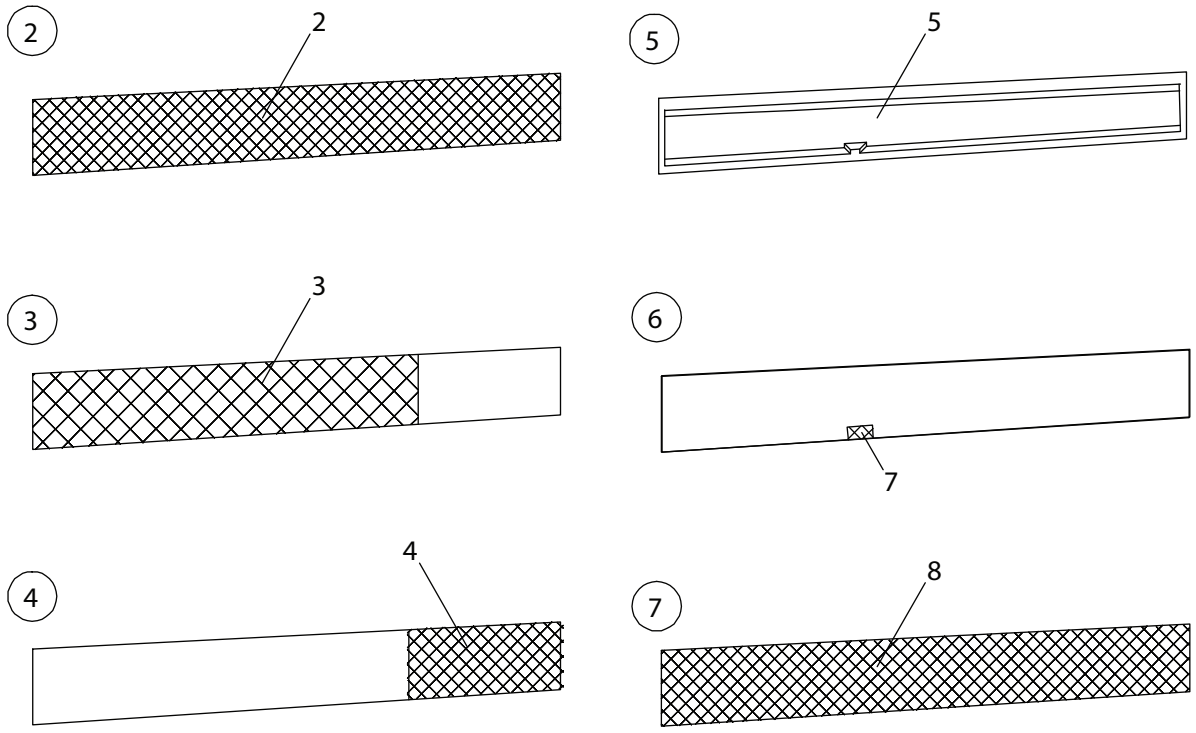
The Figures show the main layers of cloth. The cross-hatching on the figure shows the orientation of the fibers. The orientation is also given in the related table. When you repair the aileron, you must use the same type of cloth with the same fiber orientation.

The numbers in the circles beside each drawing give the order in which the layers are applied ('Stages'). The first stage is a layer of filler and is not shown. Stage 1 is the outer face of the shell.



Item No.	Layers	Reference No.	Type	Remarks
2	2	8.4548.60 glass	twill 2/2	±45°
3	1	8.3520.8 carbon		±45°, 270 mm x 1220 mm
4	1	8.4548.60 glass	twill 2/2	±45°, 270 mm x 520 mm
5	3	8.3520.8 carbon		±45°, 80 mm x 270 mm
6	1	H 60	3 mm rigid foam	
8	1	8.3520.8 carbon		±45°, 90 mm x 1670 mm
9	2	8.4548.60 glass	twill 2/2	±45°, 80 mm x 270 mm
10	8	8.3520.8 carbon		±45°, 80 mm x 270 mm
11 - 14	8 each	8.3520.8 carbon		±45°, 20 mm x 70 mm
15	1	8.4548.60 glass	twill 2/2	±45°

Figure 201 : Layers of Cloth in the Aileron Bottom Shell



Item No.	Layers	Reference No.	Type	Remarks
2	2	8.4548.60 glass	twill 2/2	±45°
3	1	8.3520.8 carbon		±45° 300 mm x 1220 mm
4	1	8.4548.60 glass	twill 2/2	±45° 300 mm x 480 mm
5	1	H 60	3 mm rigid foam	
7	2	8.3520.8 carbon		±45° 40 mm x 80 mm
8	1	8.4548.60 glass	twill 2/2	±45°

Figure 202 : Layers of Cloth in the Aileron Top Shell

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CHAPTER 61
PROPELLER

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TABLE OF CONTENTS

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PROPELLER

1. General

This Chapter describes the propeller installation of the DA 40 NG. Refer to Section 61-10 for data about the propeller and refer to Section 61-20 for data about the propeller control.

For more data on the propeller refer to the propeller manufacturer's manuals.

NOTE: Equipment which is certified for installation in the DA 40 NG is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

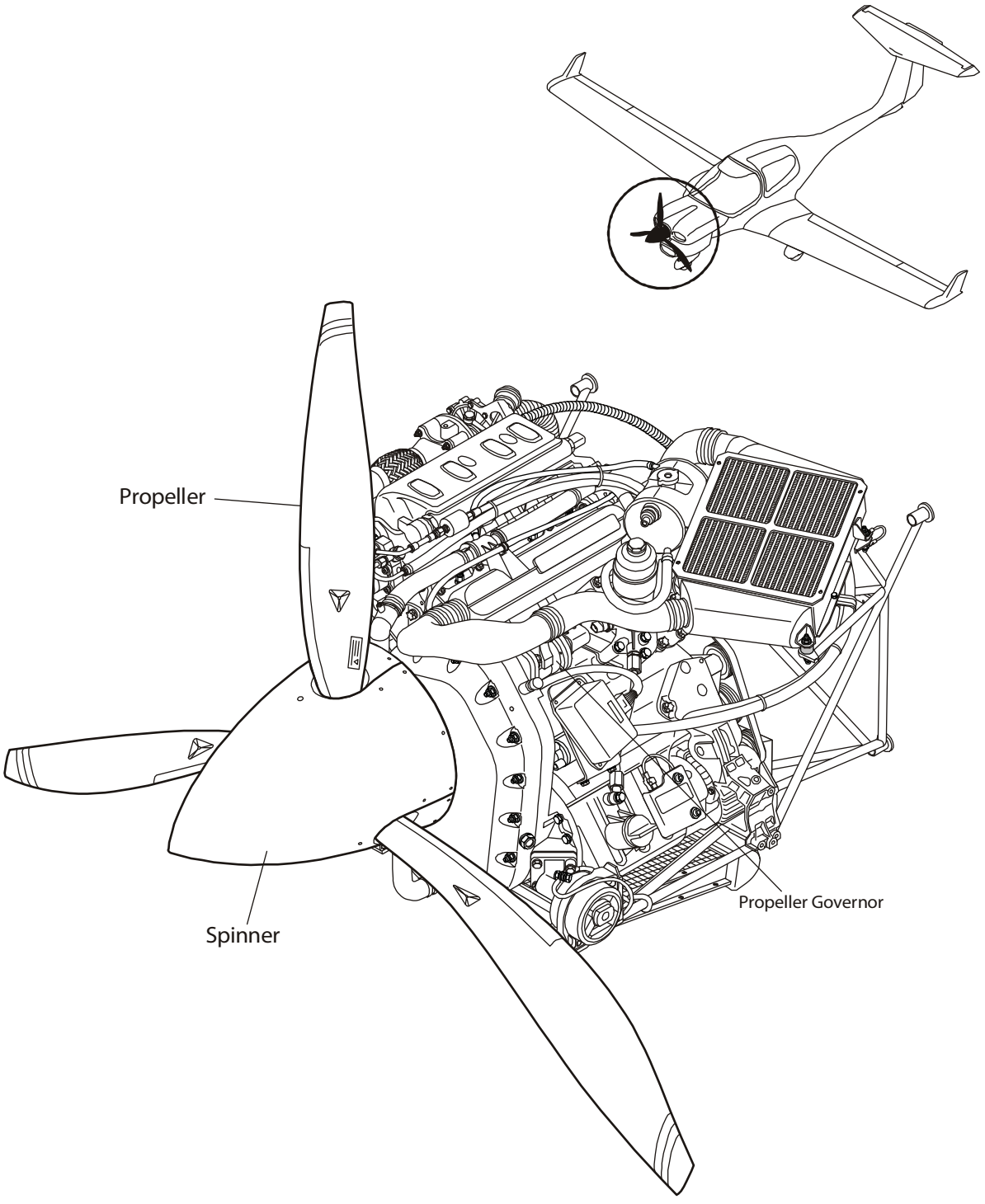

Figure 1 : Propeller Assembly

PROPELLER ASSEMBLY

1. General

The DA 40 NG has a MTV-6-R/190-69 variable pitch propeller installed. The propeller has three blades. The blades are made from wood and are covered with GFRP. The blades have an acrylic lacquer painted finish. The outboard leading-edges of the blades are protected from erosion by a stainless-steel sheath. The stainless-steel sheath is bonded into position. The inboard section of the leading-edge is protected by a self-adhesive rubber strip (PU tape).

This Section describes how to remove and install the propeller and how to do a propeller blade tracking test.

Refer to the propeller and governor manufacturer manuals for more data.

If OÄM 40-314 is installed, a gearbox fan with an additional alternator pulley is installed on the gearbox flange.

2. Description

Figures 1 and 2 show the propeller. The propeller hub has six studs on the rear face. The propeller attaches to the engine gearbox flange with six nuts and washers.

If OÄM 40-314 is installed, an additional alternator gearbox fan with an additional alternator pulley is installed on the gearbox flange using a prop flange pulley support. The six propeller attachment nuts mount the gearbox fan assy and the propeller to the gearbox flange.

A spinner bulkhead (spinner backplate) attaches to the rear of the hub with six bolts. The bolts are secured with lock-wire. A front support plate attaches to the front of the hub with six screws. The screws are also secured with lock-wire. The spinner dome which is made from composite material attaches to the front/aft bulkhead with screws.

When the engine is running, aerodynamic as well as spring forces push the propeller blades towards fine pitch.

The engine has an electronic engine control system EECS which includes an electronic engine control unit (EECU). The EECU controls the propeller pitch via the governor hydraulically. Gearbox oil flows through the constant speed governor and controls the oil pressure in the propeller pitch change mechanism. The oil pressure is increased to obtain propeller blade pitch increase and reduced to lower the blade pitch angles. The oil to govern the propeller blade pitch flows through the hollow propeller and gearbox hub.

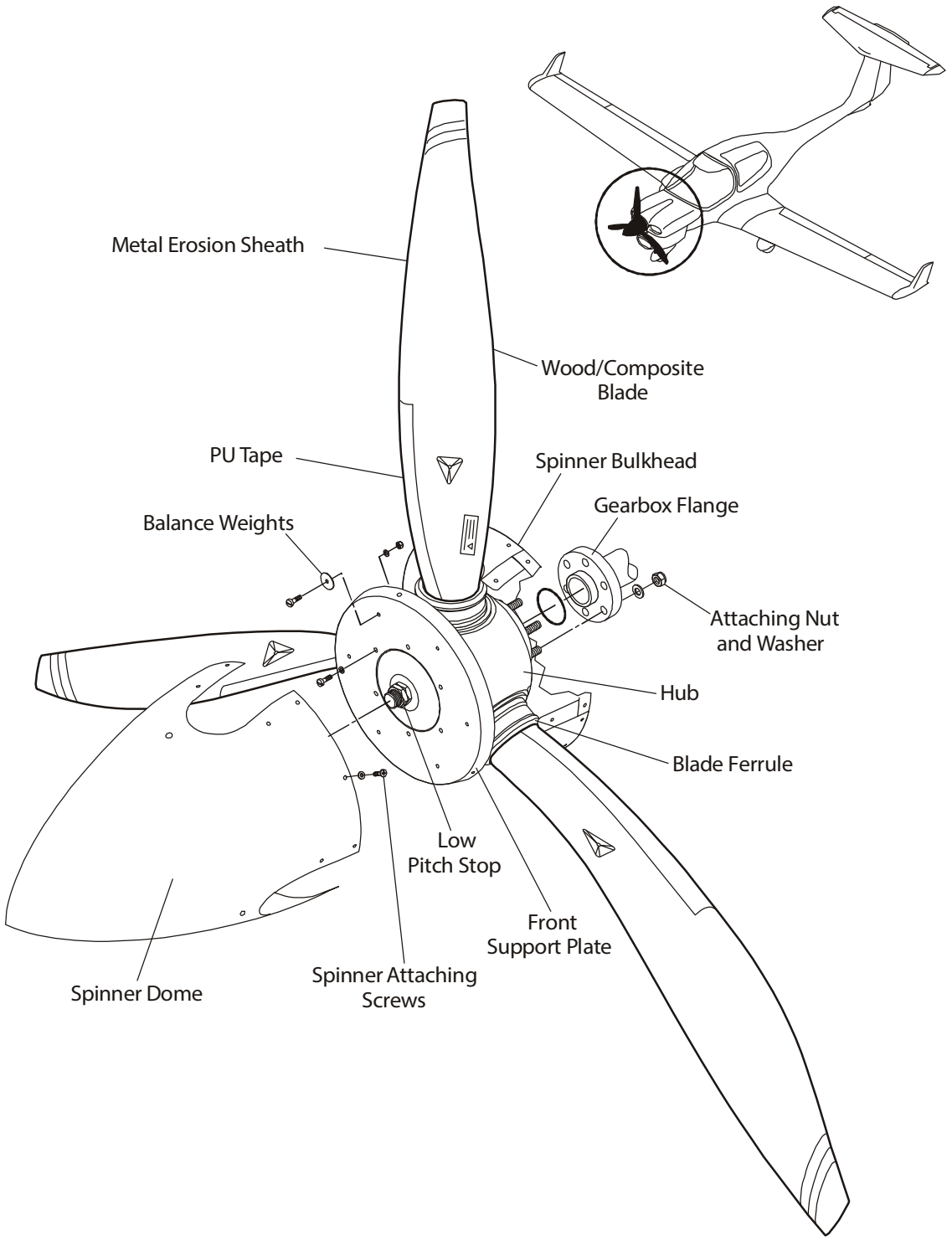

Figure 1 : Propeller Assembly

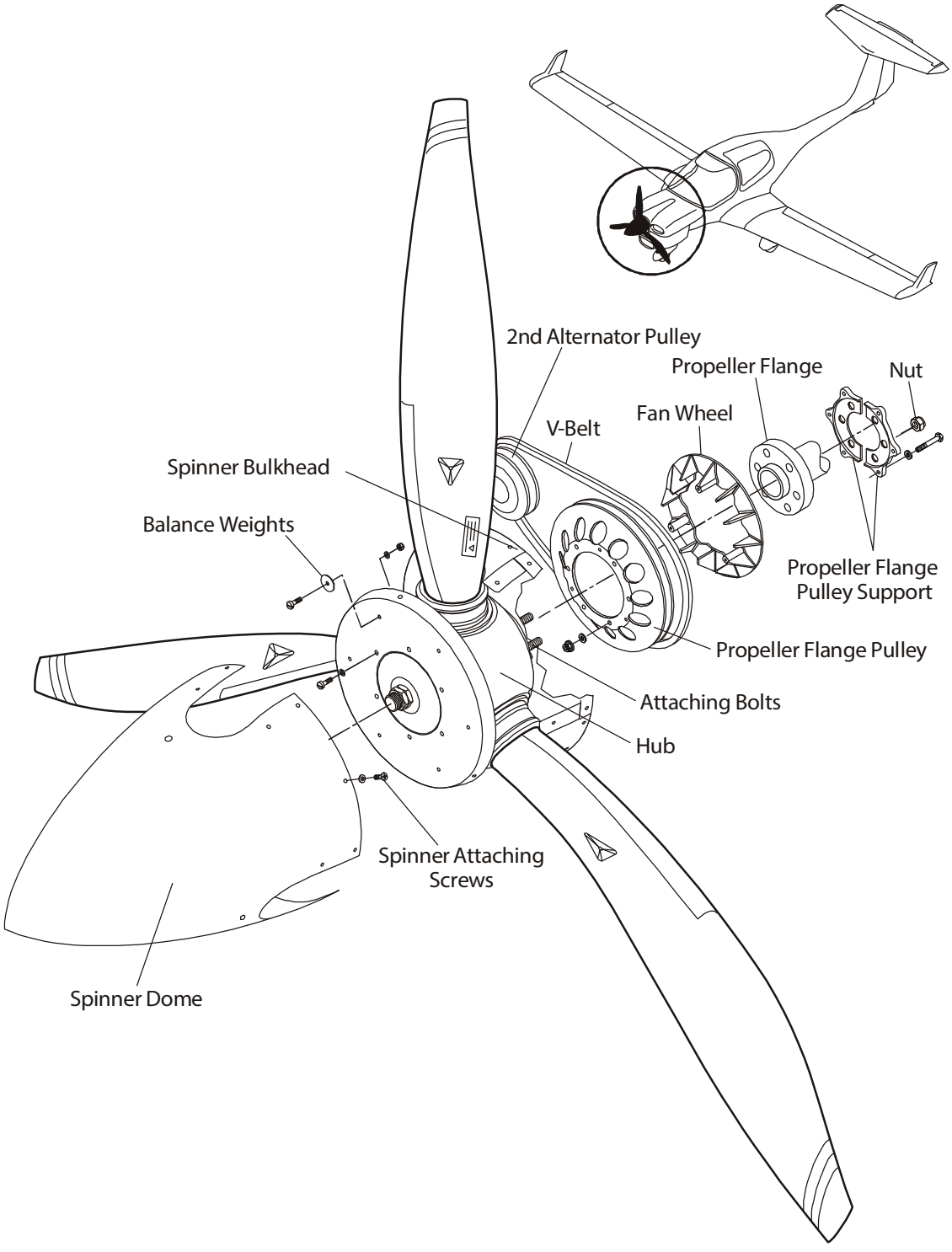

Figure 2 : Propeller Assembly (if OÄM 40-314 is installed)

3. Operation

When the propeller is turning aerodynamic and spring forces cause the blades to turn towards fine pitch.

High pressure oil is used to move the propeller blades to high pitch. Oil from the engine gearbox is pumped to the governor. The governor directs the oil to the propeller as necessary to control the propeller pitch.

The propeller pitch control system is integrated into the engine EECS system. The pitch is controlled automatically by the EECU. Depending on the power setting the propeller pitch is adjusted such that the required RPM will be obtained as shown in Figure 3.

An adjustable pitch stop limits the amount of blade movement towards coarse pitch.

If the oil pressure fails during normal flight aerodynamic propeller blade forces and spring forces of the propeller pitch change mechanism pushes the blades into fine pitch.

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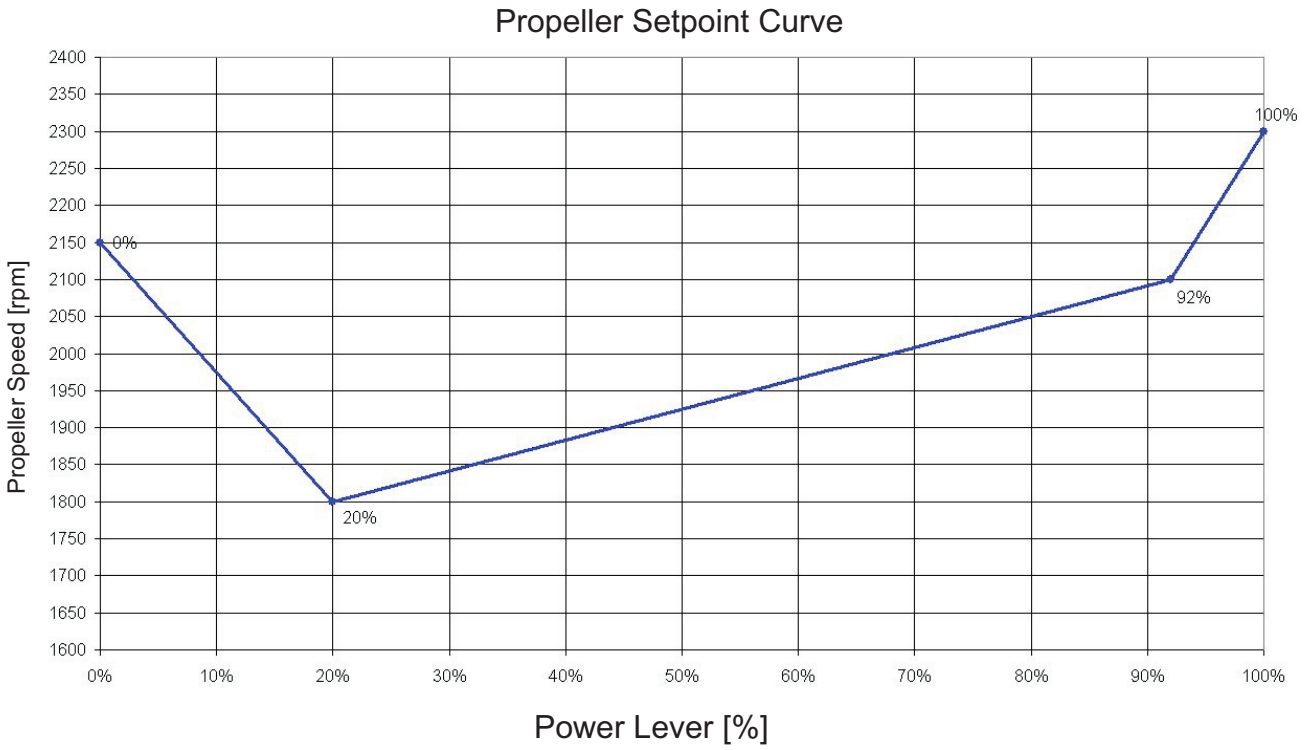

Figure 3 : Propeller RPM Adjusted by the Engine ECU System

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TROUBLE-SHOOTING

1. General

The table below lists the possible defects of the propeller.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Engine vibration.	Propeller out of balance.	Examine the propeller. If you find damage refer to the manufacturer's Owners Manual.
	Spinner out of balance.	Replace the spinner.
	Propeller mounting loose.	Tighten the mounting nuts to the correct torque. Refer to the manufacturer's Owners Manual. Use new nuts.
	Spinner attaching screws loose.	Tighten the attaching screws. Refer to the manufacturer's Owners Manual.
	Blade tracking not correct.	Refer to the manufacturer's Owners Manual.
Cracks in the blades.	Over-speed.	Refer to the manufacturer's Owners Manual.
Holes/nicks/dents in the blade.	Stone damage.	Repair/replace the propeller. Refer to the manufacturer's Owners Manual.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices describe the following procedures:

- How to remove and install the MTV-6-R/190-69 propeller
- How to conduct a propeller blade tracking test
- How to check and adjust the V-Belt tension of the additional alternator (if OÄM 40-314 is installed)
- How to remove and install the additional alternator V-Belt assembly (if OÄM 40-314 is installed, and
- How to remove and install the additional alternator (if OÄM 40-314 is installed.

2. Remove/Install the MTV-6-R/190-69 Propeller

A. Remove the Propeller.

Refer to Figure 201 (if OÄM 40-314 **is not** installed) or Figure 202 (if OÄM 40-314 is installed).

	Detail Steps/Work Items	Key Items/References
WARNING:	**MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.**	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Remove the engine cowling.	Refer to Section 71-10.
NOTE:	Mark the propeller, spinner, front support plate and spinner bulkhead, with an index mark. This will help you install these items in the correct position.	
(4)	Remove the spinner dome: - Mark the spinner dome and spinner bulkhead with index marks to aid installation. - Release the screws holding the spinner dome to the spinner bulkhead and move the spinner dome clear of the airplane.	

	Detail Steps/Work Items	Key Items/References
(5)	Remove the nuts and washers which attach the propeller to the propeller/gearbox shaft flange.	Hold the propeller!
(6)	Pull the propeller forward and clear of the propeller/gearbox shaft flange.	Make note of the angular position of the gearbox flange for the installation procedure.
(7)	Remove the propeller from the airplane.	
(8)	Put caps on all of the open lines.	

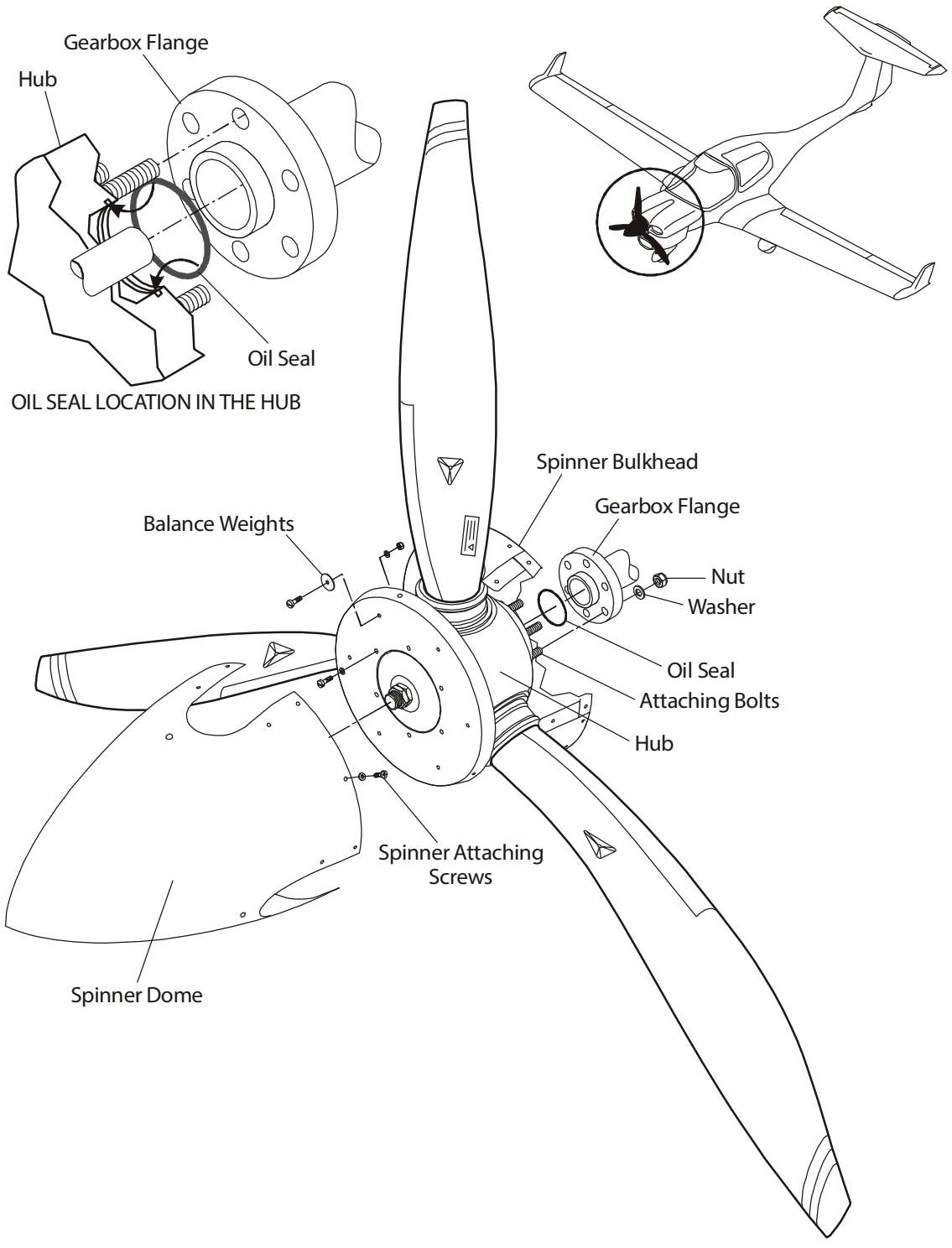

Figure 201 : Propeller Installation (if OÄM 40-314 is not installed)

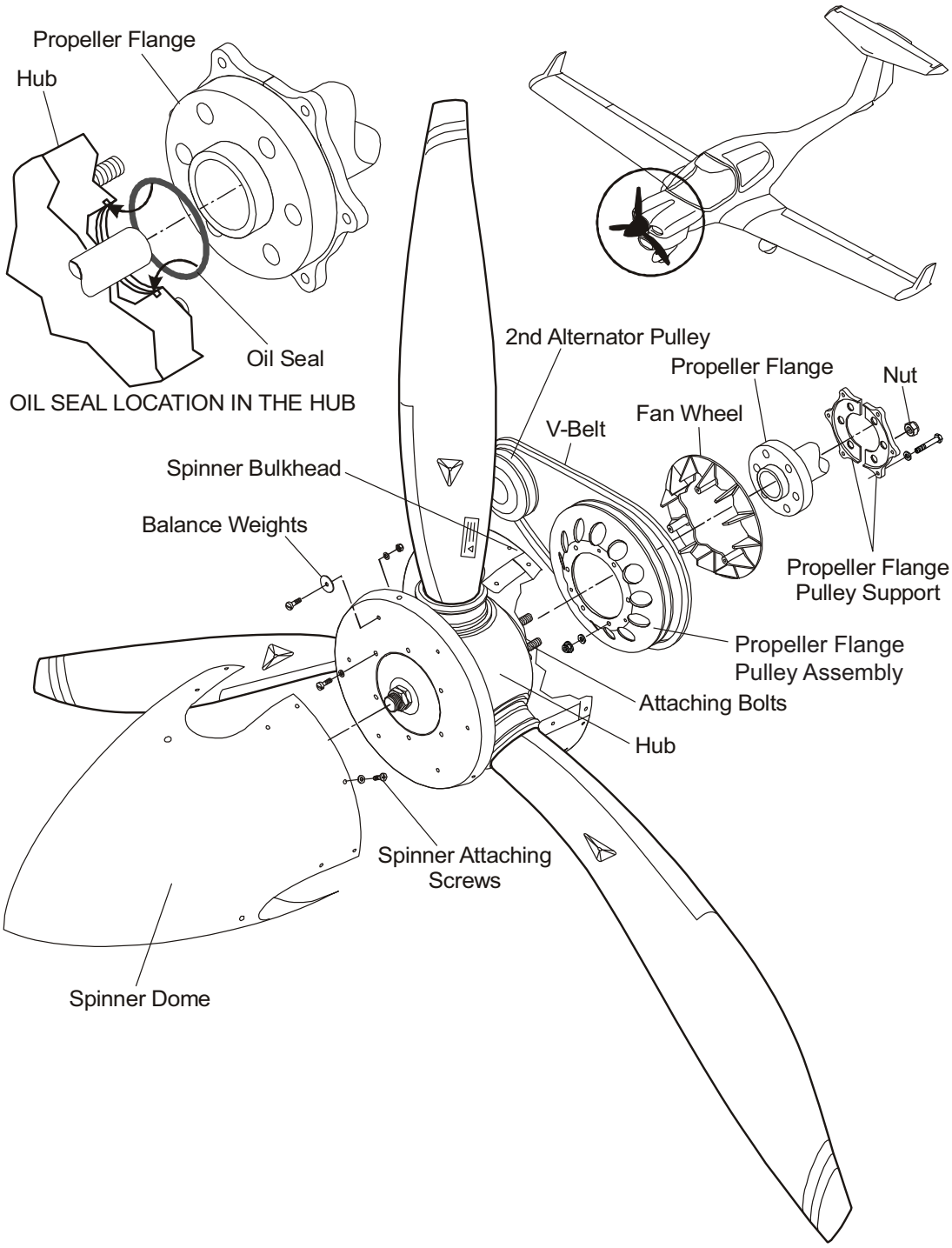

Figure 202 : Propeller Installation (if OÄM 40-314 is installed)

B. Install the Propeller.

Refer to Figure 201 (if OÄM 40-314 **is not** installed) or Figure 202 (if OÄM 40-314 is installed)

	Detail Steps/Work Items	Key Items/References
WARNING:	**MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.**	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Verify that the airplane battery is disconnected.	
(3)	Make sure that the propeller shaft flange and the propeller flange are clean and dry.	
(4)	Make sure that the shipping plug is removed and check the inside of the propeller hub area for contamination.	If the propeller to be installed is a new propeller.
(5)	Make sure that a new O-ring oil seal is in place in the propeller hub. Lightly oil the seal.	Use clean gearbox oil.
CAUTION:	WHEN THE PROPELLER IS INSTALLED, ALWAYS INSTALL IT AT THE SAME ANGULAR POSITION ON THE GEARBOX FLANGE AS THE REMOVED PROPELLER.	
(6)	Move the propeller into the correct angular position on the propeller/gearbox flange.	Take care not to damage the propeller O-ring seal. Refer to the MT E-124 Operation and Installation Manual, latest revision.
NOTE:	Make sure that the propeller is pushed into the correct position by hand. Do not use the nuts to pull the propeller into position.	
(7)	Install the six washers and nuts	
(8)	When the propeller is in the correct position, fully tighten the nuts in opposing pairs.	Refer to the MT E-124 Operation and Installation Manual, latest revision.
(9)	Check the gearbox oil level and refill if necessary.	Refer to Section 12-10.

	Detail Steps/Work Items	Key Items/References
(10)	Do a test for correct blade track.	Refer to Paragraph 3.
(11)	Install the spinner dome: - Loosely install the screws and plastic washers which attach the spinner dome to the spinner bulkhead. - Tighten all the attaching screws.	Align the index mark. Refer to the MT E-124 Operation and Installation Manual, latest revision.
(12)	Install the engine cowlings.	Refer to Section 71-10.
(13)	Connect the airplane main battery.	Refer to Section 24-31.
(14)	Do an engine run-up. Do a test for correct operation of the propeller.	Refer to Section 71-00.
(15)	Check for oil leaks.	
(16)	Check the gearbox oil level and refill if necessary.	Refer to Section 12-10.

3. Propeller Blade Tracking-Test

A. Equipment.

Item	Quantity	Part Number
Tracking stand.	1	Commercial

B. Procedure.

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Put the tracking stand behind the propeller that you will test.	Do not move the tracking stand during the test.
(4)	Turn the propeller backwards to align a blade with the tracking stand.	
(5)	Measure the distance from the stand to the blade.	Measure from the stand to a point on the trailing edge 10 cm (4 in) from the blade tip.
(6)	Do steps (3) and (4) for the other blades and record the values.	
(7)	The difference between any blades must not be more than 3 mm (1/8 in).	
(8)	When complete with the blade tracking test, connect the airplane main battery.	Refer to Section 24-31.

4. Check/Adjust the V-Belt Tension of the Additional Alternator (if OÄM 40-314 is installed)

Refer to Figure 202.

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE ADDITIONAL ALTERNATOR ASSEMBLY. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Remove the engine cowling.	Refer to Section 71-10.
(4)	Check the v-belt tension: - Pull the v-belt half way between the pulleys down with 25 N (5.6 lbf) and measure the deflection.	
(5)	If OÄM 40-314/j or earlier is installed: If the deflection is 4 mm to 5 mm (0.16 in to 0.20 in): - Refer to item (6) of this checklist. If the deflection is not in between 4 mm and 5 mm (0.16 in and 0.20 in): Remove the safety wires on the alternator bracket bolts. - Release the two alternator bracket bolts. - Adjust the v-belt tension. - Tighten the bracket bolts. - Check the v-belt tension. If the deflection is 4 mm to 5 mm (0.16 in to 0.20 in): - Tighten the bracket bolts. - Install the safety wires.	Refer to item (4) of this checkllist.

	Detail Steps/Work Items	Key Items/References
	If OÄM 40-314/k or later is installed: Check the v-belt tension by conducting one of the following test methods: - Pull the v-belt half way between the pulleys down with 25 N (5.6 lbf) and measure the deflection. - Measure the natural frequency of the v-belt half way between the pulleys according the instructions of the tension gauge manufacturer. Repeat this measurement four times turning the propeller blade each time 90°. If the deflection is 4 mm to 5 mm (0.16 in to 0.20 in) respectively the natural frequency is 123 Hz +12/-0: - Refer to item (6) of this checklist. If the deflection is **not** in between 4 mm and 5 mm (0.16 in and 0.20 in) respectively the natural frequency is not 123 Hz +12/-0: - Remove the safety wires on the alternator bracket bolts. - Release the two alternator bracket bolts. - Install the Diamond tool. - Adjust the v-belt tension. - Tighten the accessible bracket bolt. - Check the v-belt tension. - If the deflection is 4 mm to 5 mm (0.16 in to 0.20 in) respectively the natural frequency is 123 Hz +12/-0: - Remove the Diamond tool. - Tighten the remaining bracket bolt. - Install the safety wires.	Recommended tension gauge: CONTI® VSM-1 Use Diamond tool No. D44-6116-00-00-SW Refer to item (4) of this checklist.
(6)	Install the engine cowlings.	Refer to Section 71-10.
(7)	Connect the airplane main battery.	Refer to Section 24-31.
(8)	Do an engine run-up. Do a test for correct operation of the propeller.	Refer to Section 71-00.

5. Remove/Install the Additional Alternator V-Belt (if OÄM 40-314 is installed)

A. Remove the Additional Alternator V-Belt.

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE ADDITIONAL ALTERNATOR ASSEMBLY. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Remove the engine cowling.	Refer to Section 71-10.
(4)	Remove the safety wires on the alternator bracket bolts.	Refer to Figures 203 - 205.
(5)	Release the alternator bracket bolts.	Refer to Figures 203 - 205.
(6)	Lift the v-belt from the additional alternator pulley.	
(7)	Remove the six bolts which attach the propeller flange pulley-assembly to the propeller flange pulley-support and move the assembly towards the propeller.	Refer to Figure 202.
(8)	Release the six propeller attachment nuts.	Support the propeller.
(9)	Remove the propeller, v-belt and the propeller flange pulley-assembly.	Refer to paragraph 2. A. for additional information on removing the propeller.

B. Install the Additional Alternator V-Belt.

	Detail Steps/Work Items	Key Items/References
	WARNING: **MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE ADDITIONAL ALTERNATOR ASSEMBLY. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.**	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Verify that the airplane main battery is disconnected.	Refer to Section 24-31.
(3)	Make sure that the propeller shaft, the propeller flange and the propeller flange pulley support are clean and dry.	Refer to Section 71-10.
(4)	Assemble the propeller flange pulley and the fan wheel with six bolts, washers and self locking nuts.	Use new self locking nuts.
(5)	Remove the caps which cover the propeller and the gearbox hub.	
(6)	Make sure that a new O-ring oil seal is in place in the propeller hub. Lightly oil the seal.	Refer to Figure 202. Use clean gearbox oil.
(7)	Move the v-belt, the propeller flange pulley-assembly and the propeller into position on the propeller flange.	Take care not to damage the propeller O-ring seal.
	NOTE: Make sure that the propeller is pushed into the correct position by hand. Do not use the nuts to pull the propeller into position.	
(8)	Put the propeller flange pulley-support into position and install the six nuts.	
(9)	If the propeller is in the correct position fully tighten the nuts in opposing pairs.	Refer to the MT E-124 Operation and Installation Manual, latest revision.

	Detail Steps/Work Items	Key Items/References
(10)	Install the six bolts which attach the propeller flange pulley-assembly to the propeller flange pulley-support.	Refer to paragraph 2. B. for additional information on installing the propeller.
(11)	Lift the v-belt into position on the additional alternator and the propeller flange pulley assembly.	
(12)	Install the alternator bracket bolts.	Refer to Figures 203 - 205.
(13)	Install the safety wires on the alternator bracket bolts.	Refer to Figures 203 - 205.
(14)	Adjust the additional alternator v-belt tension.	Refer to Paragraph 4.
(15)	Check the gearbox oil level and refill if necessary.	Refer to Section 12-10.
(16)	Install the engine cowlings.	Refer to Section 71-10.
(17)	Connect the airplane main battery.	Refer to Section 24-31.
(18)	Do an engine run-up. Do a test for correct operation of the propeller.	Refer to Section 71-00.
(19)	Check for oil leaks.	
(20)	Check the gearbox oil level and refill if necessary.	Refer to Section 12-10.
(21)	Check - and if necessary adjust - the tension of the v-belt.	Refer to Paragraph 5.
(22)	If the v-belt was replaced, check the v-belt tension after five hours of operation.	

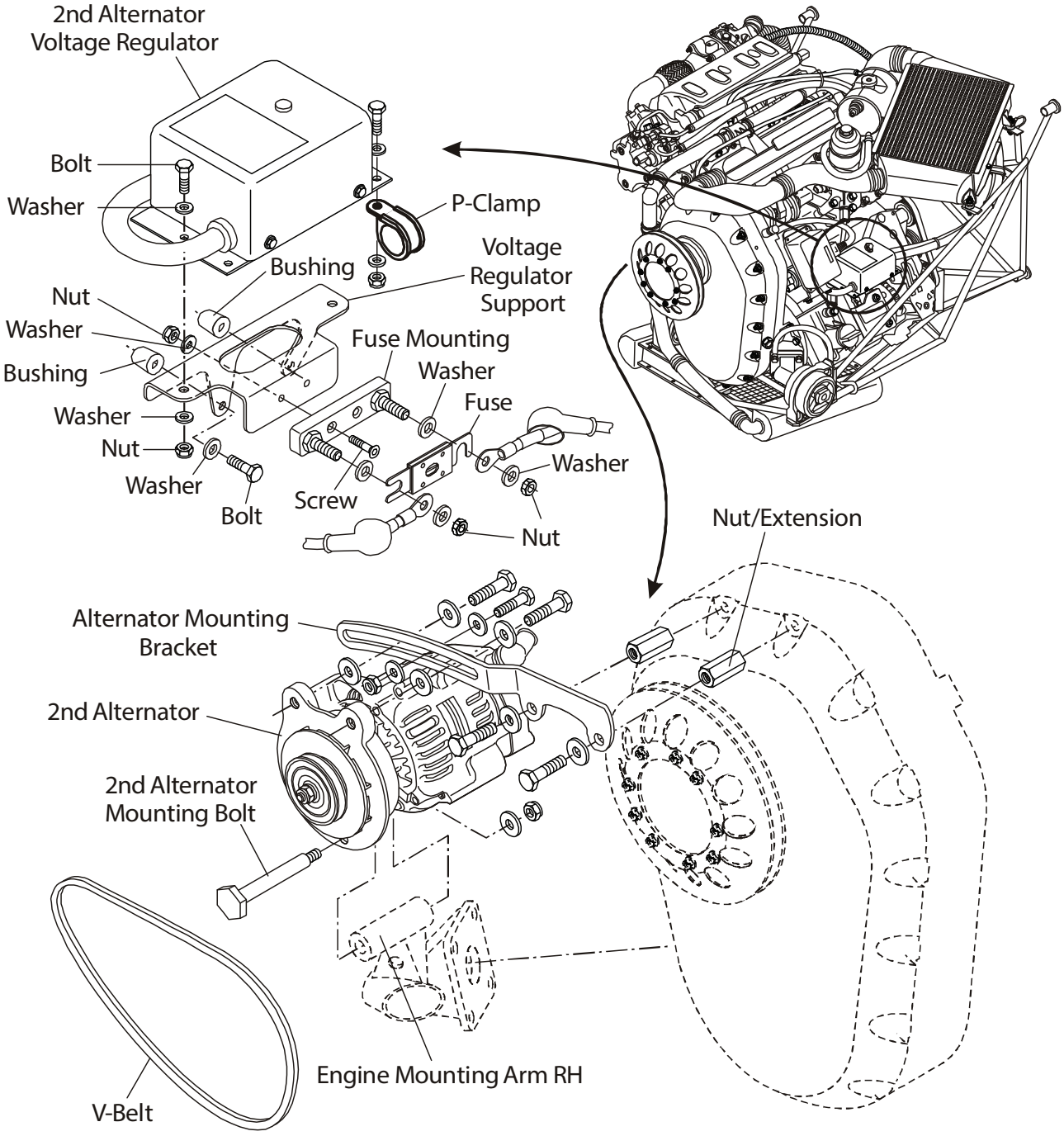

Figure 203 : Additional Alternator and Regulator Installation (if OÄM 40-314/j or earlier is installed)

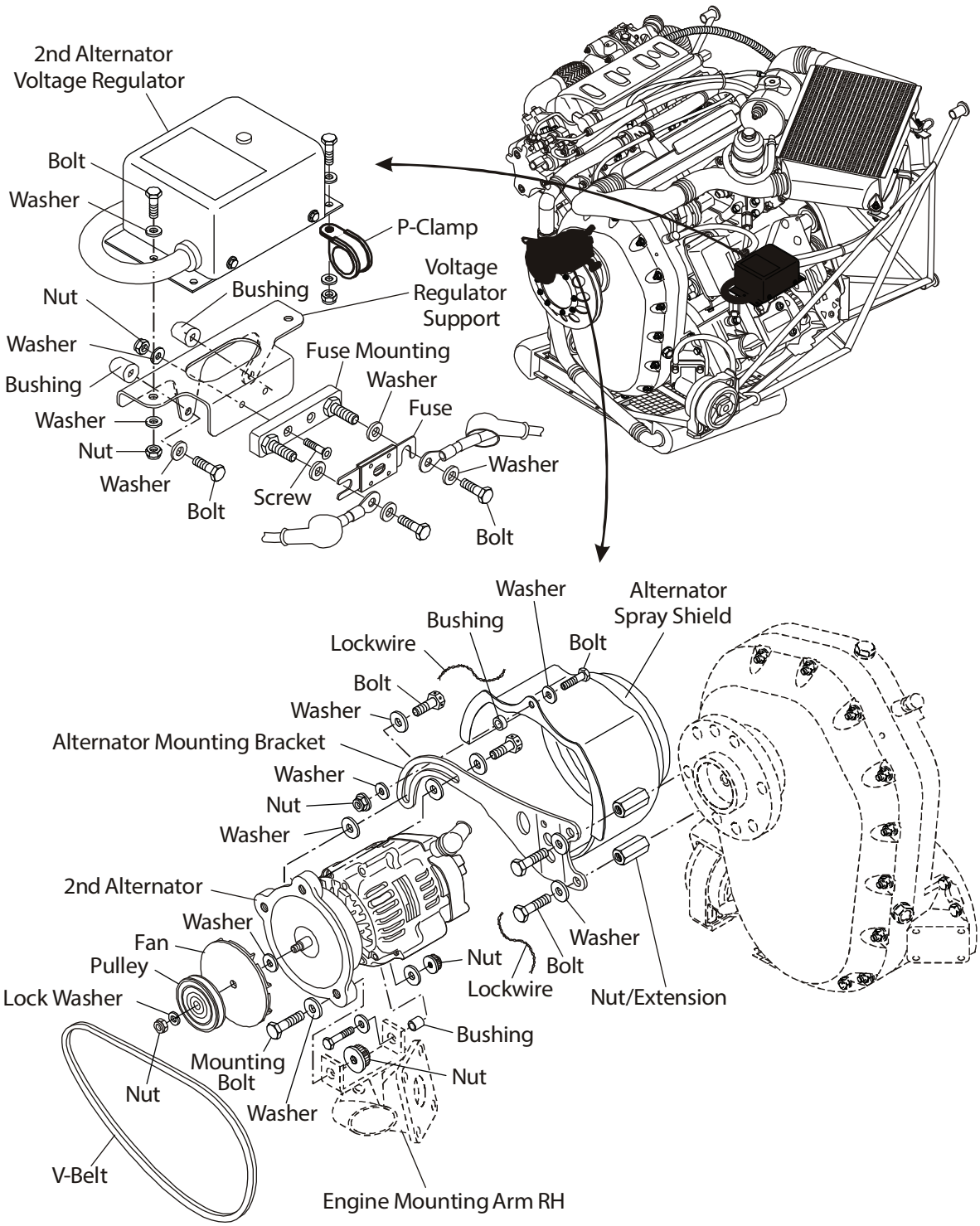

Figure 204 : Additional Alternator and Regulator Installation (if OÄM 40-314/k through OÄM 40-314/t is installed)

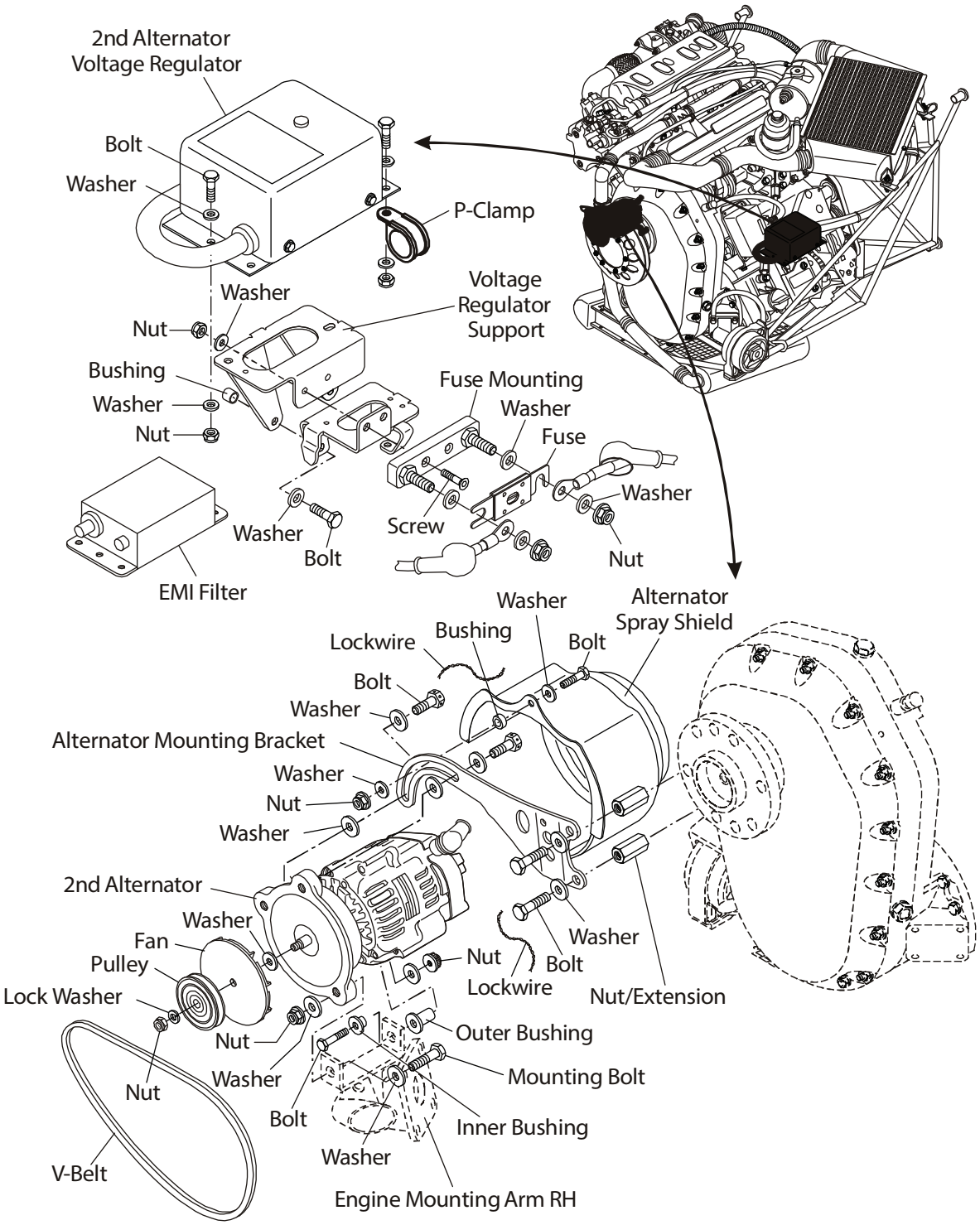

Figure 205 : Additional Alternator and Regulator Installation (if OÄM 40-314/u or later is installed)

6. Remove/Install the Additional Alternator (if OÄM 40-314 is installed)

A. Remove the Additional Alternator.

Refer to Figure 203, 204 or 205 (determined by which version of OÄM 40-314 is installed).

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE ADDITIONAL ALTERNATOR ASSEMBLY. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Remove the engine cowling.	Refer to Section 71-10.
(4)	Remove the safety wires on the additional alternator bracket bolts.	
(5)	Remove the alternator bracket bolts.	
(6)	Lift the v-belt from the additional alternator pulley.	
(7)	Remove the two additional alternator bracket bolts.	Support the additional alternator.
(8)	Remove the additional alternator composite cover.	
(9)	Remove the alternator cooling hose from the additional alternator.	
(10)	Remove the electrical wiring harness from the additional alternator.	

	Detail Steps/Work Items	Key Items/References
(11)	Remove the bolt or bolts attaching the additional alternator to the RH engine mounting arm.	Support the additional alternator. Refer to Figure 203 or 204.
(12)	Move the additional alternator clear of the airplane.	

B. Install the Additional Alternator.

Refer to Figure 203, 204 or 205 (determined by which version of OÄM 40-314 is installed).

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE ADDITIONAL ALTERNATOR ASSEMBLY. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Verify that the airplane main battery is disconnected.	Refer to Section 24-31.
(3)	Position the additional alternator on the forward RH engine mounting arm.	Refer to Figure 203 or 204.
(4)	Connect the electrical wiring harness to the additional alternator.	Refer to Section 24-33.
(5)	Install the bolt or bolts which attaches the additional alternator to the forward RH engine mounting arm.	Refer to Figure 203 or 204. Torque: 6.4 Nm (4.7 lbf.ft).

	Detail Steps/Work Items	Key Items/References
(6)	If OÄM 40-314/j or earlier is installed: Measure the gap between the engine mounting arm and the aft. alternator attachment with the alternator pushed to the aft. position. If the gap is more than 0.1 mm, install adequate number of shim rings (according DIN 988). Use CA 1000-RRC De Sato.	
(7)	Install the composite cover to the additional alternator.	
(8)	Attach and secure the additional alternator cooling hose.	
(9)	Install the additional alternator mounting bracket to the gear box and tighten the bolts.	
(10)	Position the v-belt on the propeller pulley assembly and the additional alternator pulley.	
(11)	Adjust the v-belt tension.	Refer to Paragraph 4.
(12)	Check the two safety wires on the additional alternator bracket bolts.	
(13)	Connect the airplane main battery.	Refer to Section 24-31.
(14)	Install the engine cowlings.	Refer to Section 71-10.
(15)	Do an engine run-up. Do a test for correct operation of the propeller.	Refer to Section 71-00.

PROPELLER CONTROL

1. General

The DA 40 NG has a MTV-6-R/190-69 variable pitch propeller with an engine mounted constant speed governor P-853-16. The constant speed governor is controlled by the engine EECS system. The constant speed governor controls the propeller blade angle (pitch).

For further information about the constant speed governor unit refer to mt-Propeller Operation and Installation Manual, latest revision.

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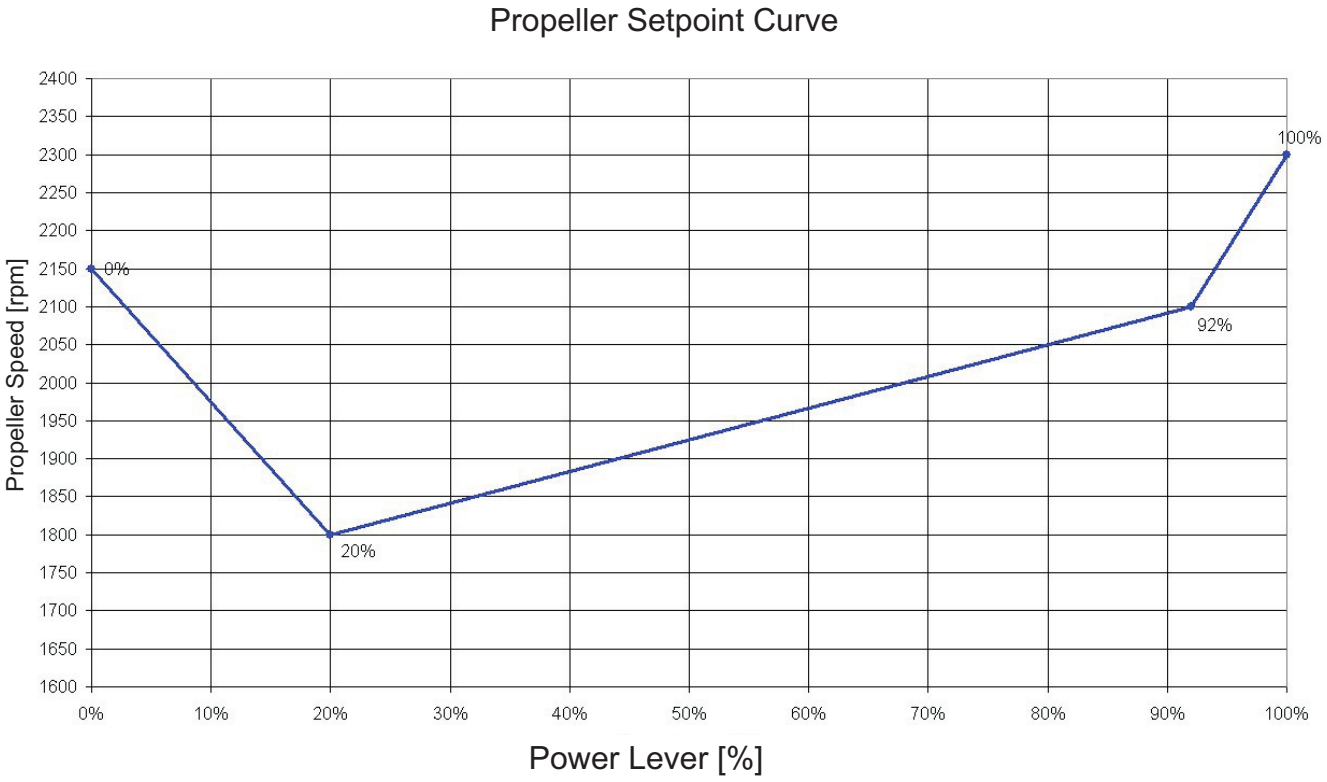

Figure 1 : Propeller RPM Adjusted by the EECU System

2. Description and Operation

The DA 40 NG has a MTV-6-R/190-69 variable pitch propeller. When the propeller is rotating the aerodynamic and spring forces causes the blades to move towards fine pitch. The propeller uses oil pressure to increase the blade angle (pitch).

The constant speed governor is controlled by the engine control units (EECUs). The pilot has only one lever to control the engine performance. The propeller blade angle is adjusted automatically based on power lever position. Figure 1 shows the propeller RPM as set by the engine EECU system for a given load.

As with other constant speed propeller control systems, the EECU senses engine performance and sets the governor to regulate oil pressure to the propeller to change blade angle as required. Depending on the power setting the propeller pitch is adjusted such that the required RPM will be obtained as shown in Figure 1.

Figure 2 shows the propeller control system schematic diagram.

The oil pressure at the governor is approximate 7 bar (100 PSI). If the engine speed is too high, the constant speed governor operates the pilot valve such that the oil flows in the propeller hub which increases the propeller pitch and reduces the RPM.

If the engine speed is too low, the governor releases oil flow out of the propeller hub. The piston moves aft to reduce the blade angle which will increase engine RPM.

For further information of the governor's working principles refer to the mt-Propeller Operation and Installation Manual, latest revision.

During normal operation a preset coarse-pitch-stop prevents the propeller blades from moving past a preset maximum blade angle. If the engine fails in flight, or if the propeller oil supply fails in flight, aerodynamic and spring forces will reduce the blade pitch angle which keeps the propeller rotating.

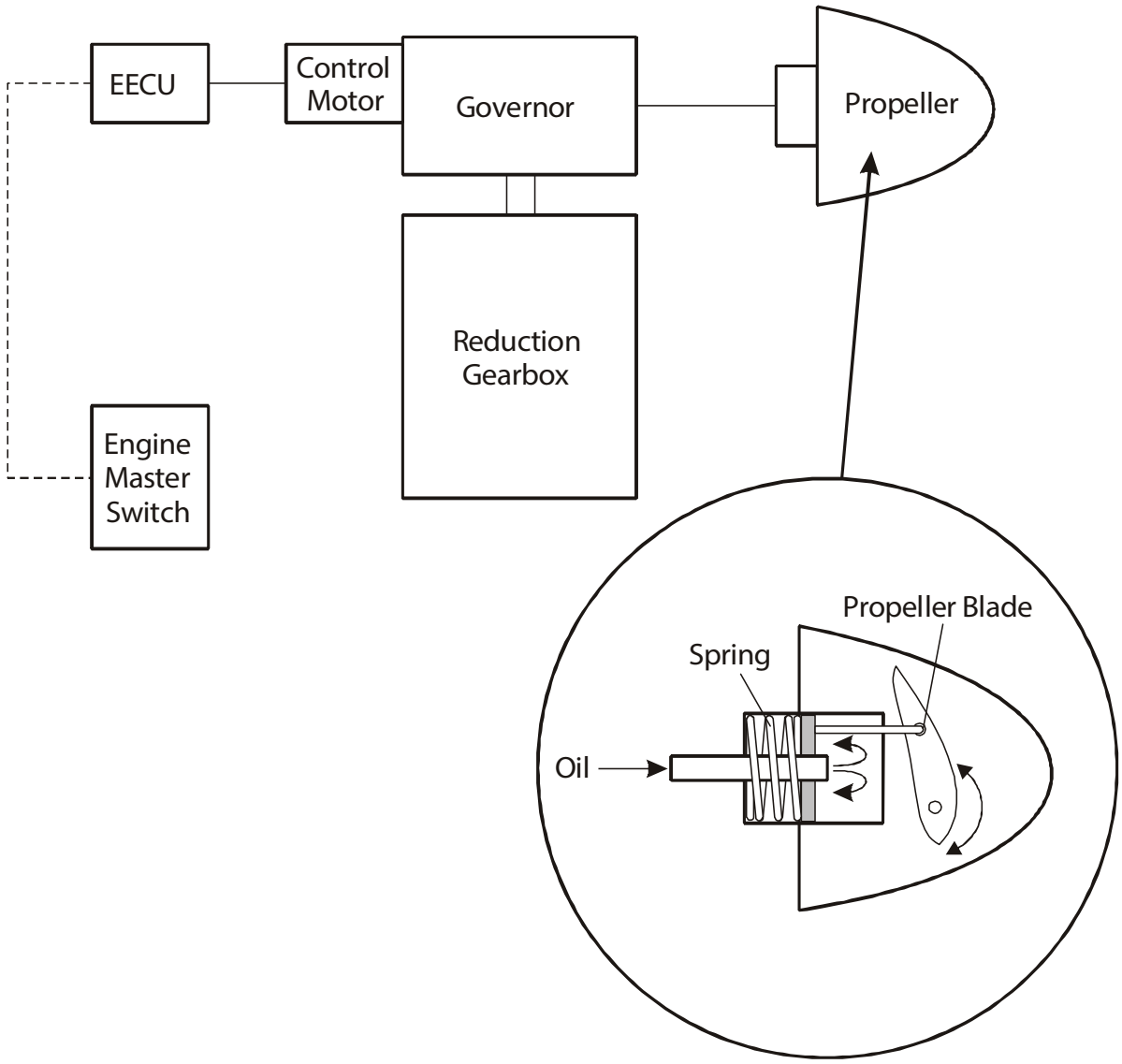

Figure 2 : Propeller Control System - Schematic Diagram

The specified propeller settings are given as follows:

- Low pitch: 14.5° ± 0.2° @ 0.75 R)
- High pitch: 35° ± 1° @ 0.75 R)

Technical data governor:

- Specific installation: DA 40 NG
- Specific engine: Austro Engine E4A
- Max. revolution: 2680 RPM ± 10 RPM
- Min. revolution: 2030 RPM ± 10 RPM
- Rotation: LH
- Control head position: 355°

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TROUBLE-SHOOTING

1. General

The table below lists the possible defects you could have for the propeller control.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Propeller RPM fluctuating.	Engine gearbox oil level low.	Replenish the gearbox oil level. Refer to Chapter 72.
	Engine gearbox oil contaminated.	Replace the engine gearbox oil. Refer to Chapter 72.
	Electrical connection between the engine EECU system and governor.	Do a continuity check of the wiring between the EECU system and the governor. Replace/repair faulty wiring. Refer to Chapter 92 for the wiring diagrams.
	Governor defective.	Replace the governor.

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MAINTENANCE PRACTICES

1. General

This Section describes how to remove/install the governor.

2. Remove/Install the Propeller Governor

A. Remove the Propeller Governor.

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Remove the engine cowlings.	Refer to Section 71-10.
(4)	Disconnect the cable connector GOV from the governor.	Refer to the AE Maintenance Manual, latest revision, Chapter 71-50-05.
(5)	Release the four nuts which attach the governor to the drive-pad and remove the governor from the gearbox.	Use a container to catch the small amount of oil from the governor.
(6)	Remove and discard the gasket.	
(7)	Put a blanking cover on the governor drive-pad and put a cover over the governor mounting face.	

B. Install the Propeller Governor.

NOTE: It is prohibited to adjust the propeller RPM.

	Detail Steps/Work Items	Key Items/References
(1)	Compare the governor Equipment Log-Sheet with the settings given in Section 61-20, page 5.	
(2)	Put the governor and gasket in position on the gearbox drive pad.	Use a new gasket. Verify installation direction.
(3)	Install the four nuts which attach the governor to the drive pad.	Torque: 28 Nm (20.7 lbf.ft). Use new self locking nuts.
(4)	Connect the propeller control cable connector GOV to the governor.	Refer to the AE Maintenance Manual, latest revision.
(5)	Install the engine cowlings.	Refer to Section 71-10.
(6)	Connect the airplane main battery.	Refer to Section 24-31.
(7)	Do an engine ground run.	
(8)	Check for oil leaks.	
(9)	Check the gearbox oil level.	Refer to Section 12-10.

3. Governor Maximum RPM Stop Adjustment

The procedure that follows describes how to adjust the governors' value settings.

A. Equipment.

Item	Quantity	Part Number
MT Governor Test Box	1	T-719-A
MT Governor Adjusting Wrench	1	T-720

B. Procedure.

	Detail Steps/Work Items	Key Items/References
WARNING:	**DO NOT LET PERSONS INTO THE SAFETY RANGE OF THE AIRPLANE. PROPELLERS CAN CAUSE INJURY OR DEATH.**	
(1)	Start the engine and run it at idle	Refer to Section 71-00. Let the engine reach the normal operating temperature.
(2)	Shut down the engine.	Refer to Section 71-00.
(3)	Remove the engine cowlings.	Refer to Section 71-10.
(4)	Disconnect the governor electrical connector.	
WARNING:	**APPLY FULL POWER ON THE ENGINE GROUND RUN CAREFULLY. RESPECT ALL SAFETY MEASURES:** **- AIRPLANE IS CHOCKED** **- GROUND RUN IN AN OPEN AREA, FREE OF FOD AND PERSONNEL.** **IF THIS WARNING IS NOT FOLLOWED AIRCRAFT DAMAGE AND/OR PERSONNEL INJURY COULD RESULT.**	
NOTE:	The rotation speed given in Service Letter 71, latest revision, from MT-Propeller are for governor speeds. To convert to propeller RPM, divide the given RPM by 1.16. Example: 2680 RPM (Governor) / 1.16 = 2310.3 RPM (Propeller)	
(5)	Start the engine and run the engine at full power.	Refer to Section 71-00. Note the max propeller RPM (2310 ± 20 RPM).
(6)	If the propeller speed doesn't reach the target value (2310 ± 20 RPM), shut down the engine.	Refer to Section 71-00.

	Detail Steps/Work Items	Key Items/References
(7)	Use the MT Governor Test Box and pull back the max RPM stop switch.	Refer to the MT Propeller E-1048 Installation and Operation manual for hydraulically constant speed governor P8 series, latest revision.
	CAUTION: NEVER PULL BACK THE MAX RPM STOP SWITCH WITH THE GOVERNOR MT TEST BOX. THIS WILL DAMAGE THE STOP SWITCH.	
(8)	Use the MT Governor Adjusting Wrench and adjust the RPM max screw on the governor.	
(9)	Connect the governor electrical connector. Start the engine and run the engine at idle speed for 15 to 20 seconds.	Refer to Section 71-00.
(10)	Shut down the engine. Disconnect the governor electrical connector.	Refer to Section 71-00.
(11)	Start the engine and run the engine at full power.	Refer to Section 71-00. Monitor the propeller RPM value.
(12)	If the max propeller RPM value is not reached: - Shut down the engine. - Repeat the procedural steps (8) through (11) until the correct max propeller RPM value is reached.	Refer to Section 71-00. Max propeller RPM (2310 ± 20 RPM)
(13)	Shut down the engine.	Refer to Section 71-00.
(14)	Connect the governor electrical connector.	
(15)	Install the engine cowlings.	Refer to Section 71-10.

CHAPTER 71
POWER PLANT

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POWER PLANT

1. General

This Chapter describes the power plant removal and installation of the DA 40 NG.

For data on conducting an engine test after installation refer also to the Operation Manual for the E4-A engine. Refer to the DA 40 NG Airplane Flight Manual for engine start/stop procedures. For particular information on the firmware refer to applicable DAI Service Bulletin.

Refer to these Chapters for data about other engine systems:

- Chapter 72. Engine. Refer to the AE Operation Manual, latest revision for data on the engine.
- Chapter 73. Engine fuel and control. Refer to the AE Operation Manual, latest revision for data on the fuel injection system.
- Chapter 76. Engine controls.
- Chapter 77. Engine indicating.
- Chapter 78. Exhaust system.
- Chapter 79. Oil system. Refer to the AE Operation Manual, latest revision for data on the engine oil system.
- Chapter 80. Starter system control and installation. Refer to the AE Operation Manual, latest revision for data on the starter.
- Chapter 81. Turbo charger.

NOTE: Equipment which is certified for installation in the DA 40 NG is listed in Section 6.5 of the Airplane Flight Manual. Such equipment may be installed in accordance with the Airplane Maintenance Manual.

Any equipment which is not listed in Section 6.5 of the Airplane Flight Manual is called "Additional Equipment". The installation of Additional Equipment is a modification which must be handled in accordance with national regulations or a Service Bulletin.

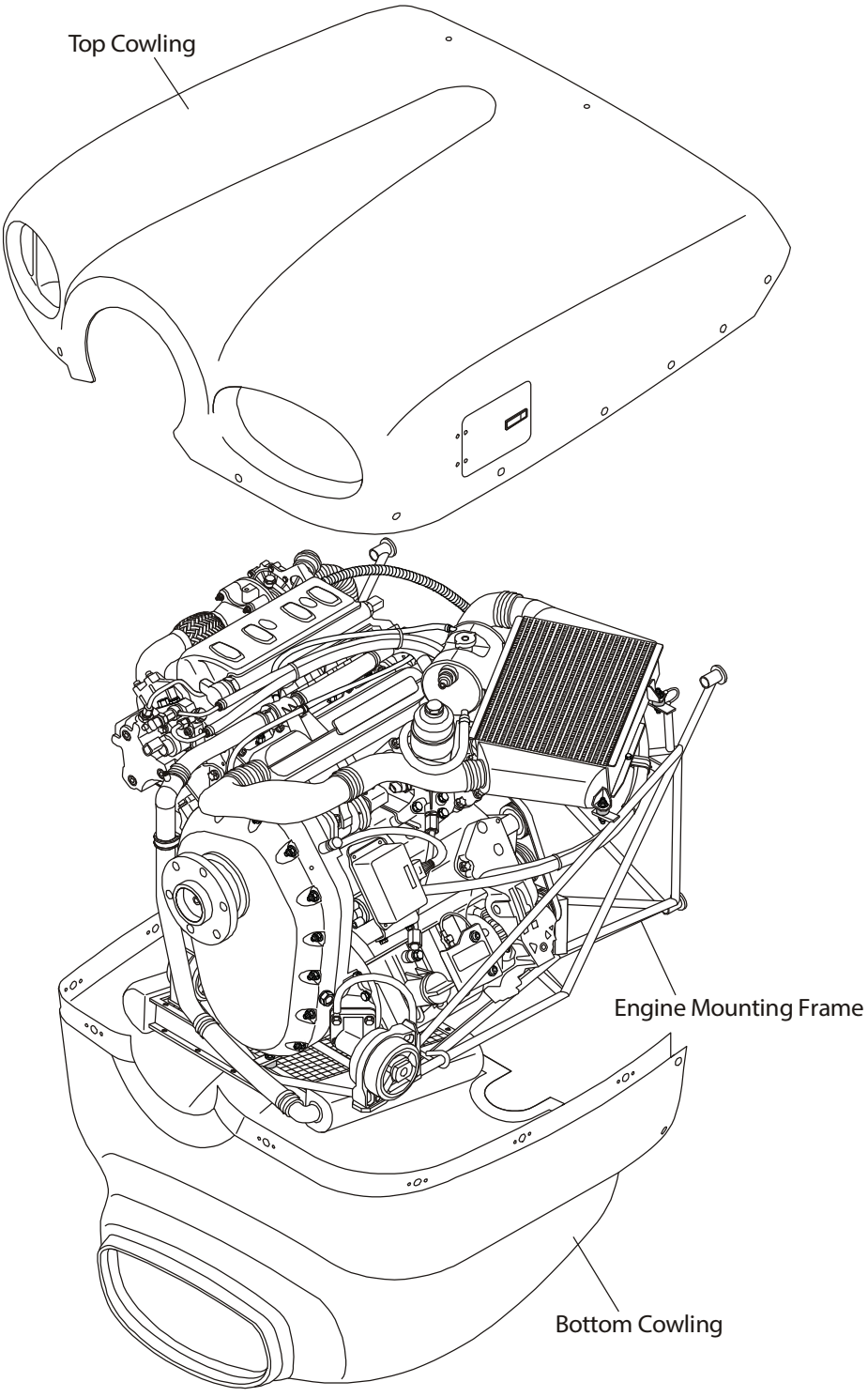

Figure 201 : Power Plant (if MÄM 40-434 is not installed)

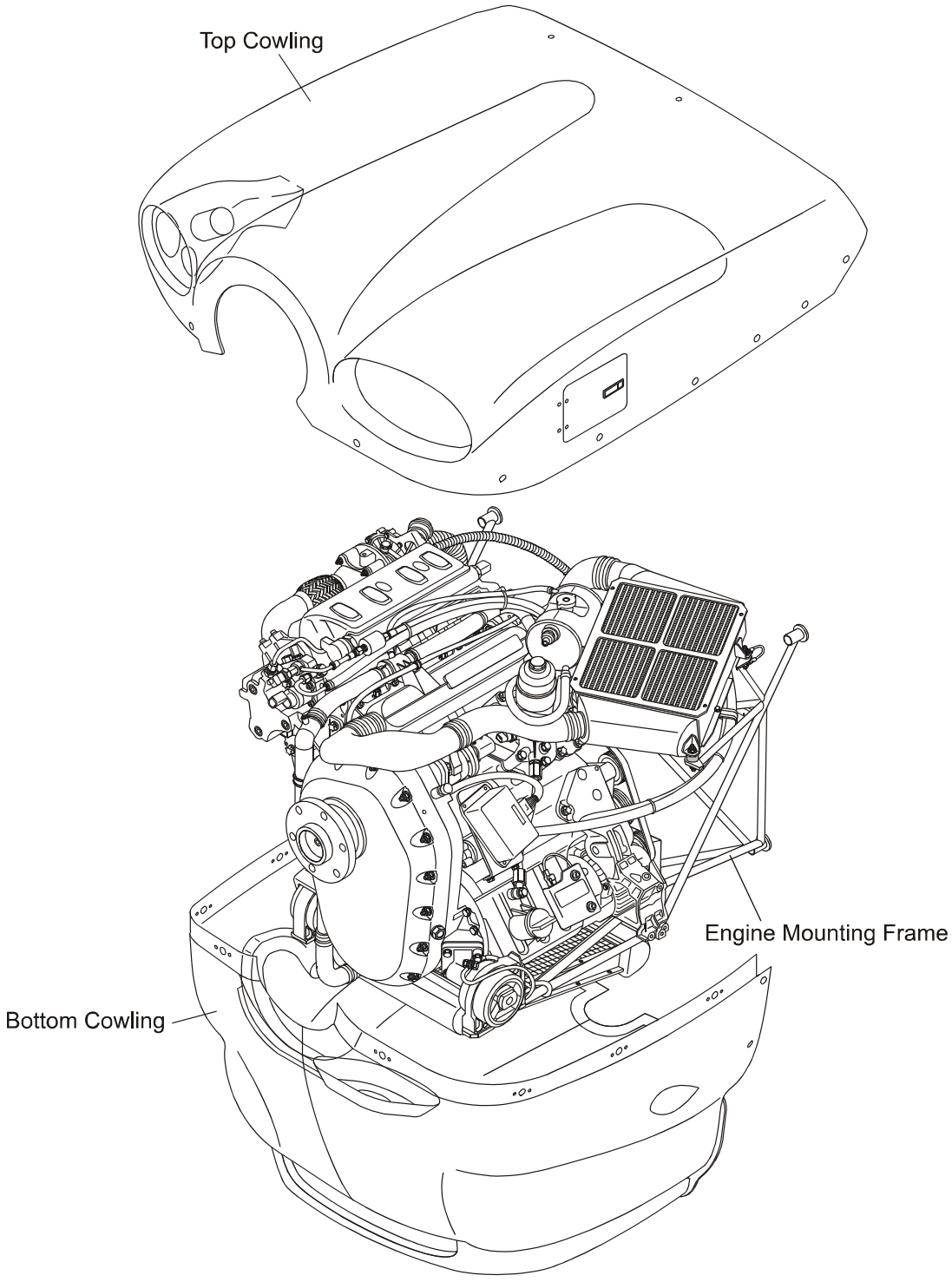

Figure 202 : Power Plant (if MÄM 40-434 is installed)

2. Description and Operation

The DA 40 NG has an Austro Engine E4-A liquid-cooled, in-line four-stroke four cylinder engine with a double overhead camshaft (DOHC) with four valves per cylinder. The valves are actuated by the cam follower. The direct fuel injection is realized by means of a common rail technique and the engine is charged by a turbo charger in combination with an inter-cooler.

The propeller is activated by a gearbox driven governor which is controlled by the EECUs. All engine components are controlled by an EECU system.

The power plant is protected by a top and bottom engine cowling. The two halves attach to each other and to the airframe with Camloc quick release fasteners.

The bottom cowling has air intakes one for engine liquid cooling and one for the engine air intake. The top cowling has air intakes for cabin heat, engine gearbox cooling and intercooler air intake.

The engine mount attaches to the firewall at five locations. The engine attaches to the engine mount with four oil-filled rubber elements which make the engine shock-mounts.

The wiring harness is lead through the firewall to connect the engine to the ECUs and give electrical supply to the engine sensors. Electrical cables from the main battery and from the generator supply electrical power to the airplane electrical system.

3. Engine Specification

NOTE: The engine drives the propeller through a speed-reducing gear. All RPMs are shown as propeller RPMs.

AE E4-A Engine Specification	
Engine manufacturer.	Austro Engine GmbH.
Engine model.	E4-A.
Engine operating limits: - Maximum take-off power. - Maximum continuous power. - Maximum overspeed (max. 20 sec).	 123.5 kW (165.6 DIN-hp) at 2300 RPM. 114.0 kW (152.9 DIN-hp) at 2100 RPM. 2500 RPM.
Oil pressure:	Refer to the Airplane Flight Manual.
Oil temperature:	Refer to the Airplane Flight Manual.
Oil consumption: - 185 kg (407.9 lb).Maximum.	 0.1 liter/hr. (0.11 US qt/hr.).
Oil quantity:	Refer to the Airplane Flight Manual.
Coolant temperature:	Refer to the Airplane Flight Manual.
Fuel consumption:	Refer to the Airplane Flight Manual.
Gearbox oil capacity:	2.1 liter (2.22 US qts).
Engine weight, bare:	185 kg (407.9 lb).
Fuel grade:	Refer to the Airplane Flight Manual.
Engine oil:	Refer to the Airplane Flight Manual.
Coolant:	Refer to the Airplane Flight Manual.
Gearbox oil:	Refer to the Airplane Flight Manual.

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TROUBLE-SHOOTING

1. General

The table below lists possible defects of the power plant. It does NOT give information about trouble shooting for the engine or the engine systems. Refer to the AE Operation Manual, latest revision or AE Maintenance Manual, latest revision for engine and engine system trouble-shooting.

WARNING: **YOU MUST BE CAREFUL WHEN YOU DO POWER PLANT TROUBLE SHOOTING. OPERATION OF A DAMAGED ENGINE CAN CAUSE MORE DAMAGE TO THE ENGINE. THIS CAN CAUSE INJURY TO PERSONNEL.**

When experiencing trouble as detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Engine vibration.	Damaged shock mounts.	Replace the shock mounts.
	Propeller imbalance.	Balance the propeller.
	Engine operates with only three fuel injectors.	Refer to the engine manufacturer.
Engine does not produce full power.	Engine air intake blocked.	Examine the air intake.
	Air filter blocked.	Examine/Replace air filter.
	Sensor signal out of limits.	Read AE engine data with laptop computer via CAN interface. Refer to the AE Maintenance Manual, latest revision.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to remove/install the engine.

WARNING: **DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS.**

WARNING: **YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU TURN THE PROPELLER. DISCONNECT THE BATTERY.**

WARNING: **DO NOT GO BELOW THE ENGINE WHEN YOU LIFT THE ENGINE WITH THE HOIST. THE HOIST CAN FAIL. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.**

WARNING: **DO NOT GET ENGINE OIL, GEAR OIL OR COOLANT ON YOU. THESE LIQUIDS CAN CAUSE SKIN DISEASE.**

WARNING: **DO NOT GET FUEL ON YOU. FUEL CAN CAUSE SKIN DISEASE. DO NOT ALLOW FIRE OR SPARKS NEAR FUEL. FUEL BURNS AND BURNING FUEL CAN CAUSE INJURY TO PEOPLE AND DAMAGE TO EQUIPMENT.**

CAUTION: YOU MUST ATTACH CAPS TO ENGINE OPENINGS AND PIPES WHEN YOU REMOVE THE ENGINE. IF YOU DO NOT DO THIS, CONTAMINATION CAN ENTER THE ENGINE OPENINGS AND PIPES. THIS CAN CAUSE BLOCKAGE TO THE AIRPLANE SYSTEMS AND DAMAGE FOR THE ENGINE.

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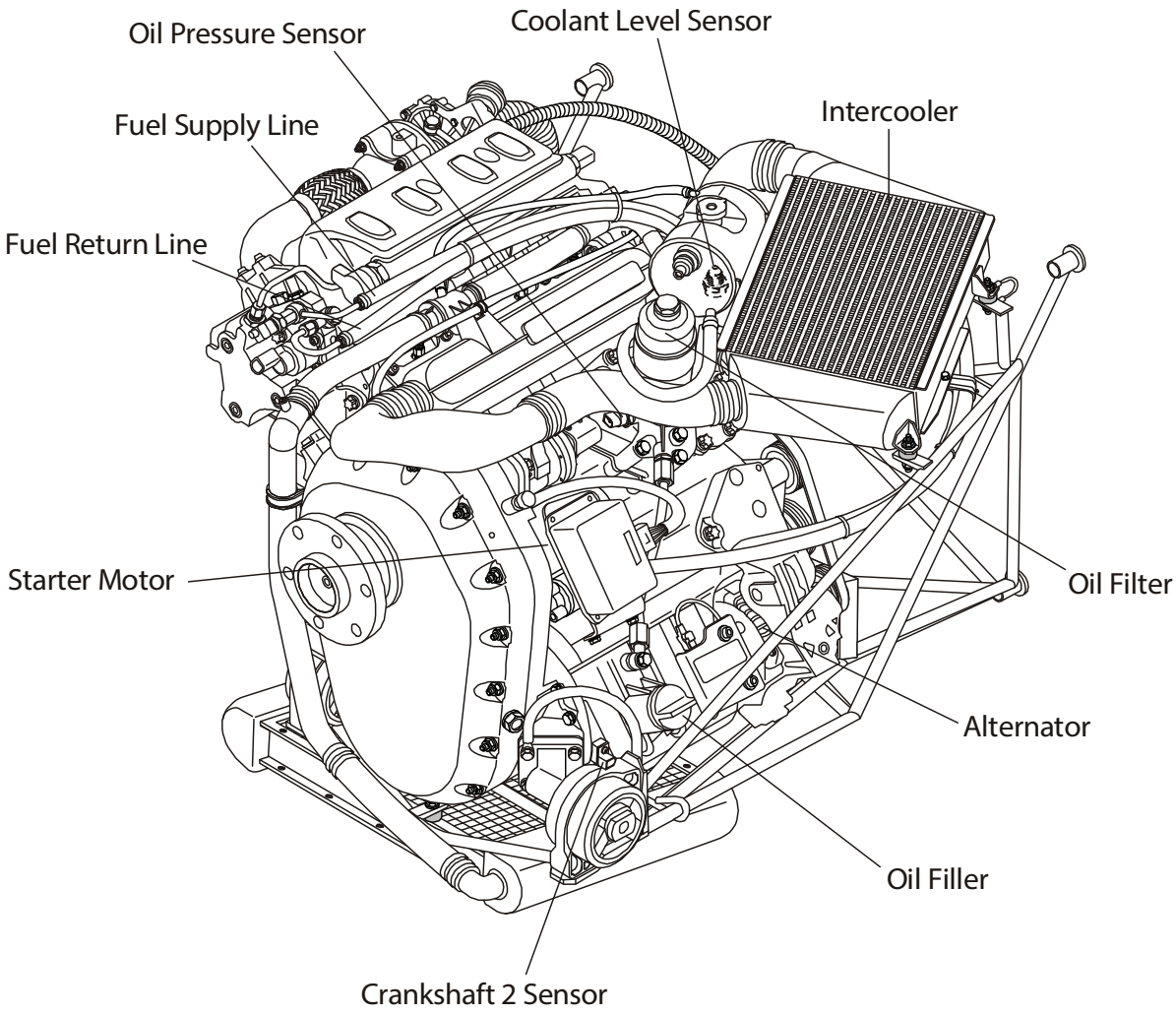

Figure 201 : Engine Sensors (if MÄM 40-434 is not installed)

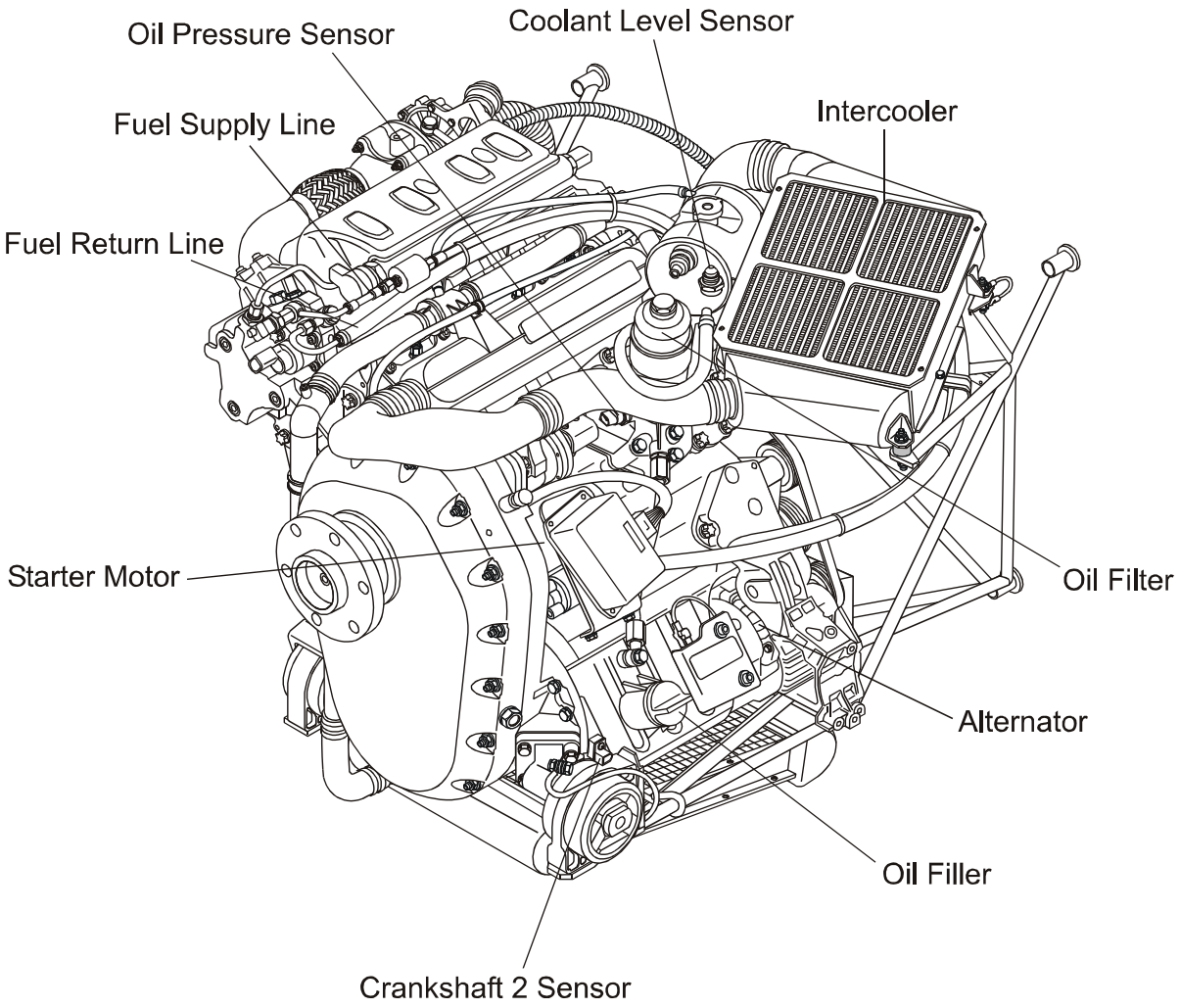

Figure 202 : Engine Sensors (if MÄM 40-434 is installed)

2. Remove/Install the Engine

A. Equipment.

Item	Quantity	Part Number
Engine hoist.	1	Commercial.
Engine sling.	1	Commercial.
Tail trestle.	1	Commercial.
Hoisting points.	3	Delivered with engine.

B. Remove the Engine without Cable Harness.

	Detail Steps/Work Items	Key Items/References
(1)	Read the engine EECU data out and send them via email to Austro Engine GmbH. Refer to the AE Maintenance Manual, latest revision.	Refer to Section 72-00..
WARNING:	**MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.**	
(2)	Set the engine FUEL SELECTOR to OFF.	
(3)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(4)	Disconnect the airplane main battery.	Refer to Section 24-31.
(5)	Remove the engine cowling.	Refer to Section 71-10.
(6)	Remove the propeller.	Refer to Section 61-10.
(7)	Drain the coolant system.	Refer to Section 75-00.
(8)	Drain the engine oil.	Refer to the AE Maintenance Manual, latest revision.
(9)	Drain the gearbox oil.	Refer to the AE Maintenance Manual, latest revision.

	Detail Steps/Work Items	Key Items/References
(10)	Remove the hose from the alternate air valve to the turbo charger.	
(11)	Remove the intercooler with the coolant tank.	Refer to Section 75-00.
(12)	Disconnect the coolant hoses from the coolant radiator: - Remove the eight worm-drive-clamps. - Remove the hoses. - Remove the forward cooling pipe.	Refer to Section 75-00. four on each hose.
(13)	Disconnect the coolant hoses from the heating radiator.	Refer to Section 75-00.
(14)	Disconnect the breather line.	
(15)	Disconnect the electrical cables on the alternator: - Release all clips and ties holding the cables to the engine.	
(16)	Disconnect the electrical cables from the starter motor: - Disconnect the two control cables at the solenoid. - Disconnect the main supply cable at the solenoid. - Release all clips and ties holding the cables to the engine.	Do not remove clips and ties on the engine mount.
(17)	Disconnect all electrical connections (glow plugs, injectors, etc.).	Refer to the AE Maintenance Manual, latest revision.
(18)	Remove the hose that connects the turbo charger outlet to the inter-cooler: - Remove the four worm-drive-clamps. - Remove the hose.	Refer to Section 73-00.
(19)	Remove the exhaust.	Refer to Section 78-00.

	Detail Steps/Work Items	Key Items/References
(20)	Release clips, ties and clamps holding the engine wire harness to the engine mount. Move the harness clear of the engine.	
(21)	Disconnect the fuel supply hose and remove the fuel line mounting bracket.	At the high-pressure fuel pump.
(22)	Disconnect the fuel return hose.	Behind the rail pressure regulator.
(23)	Remove the bonding cable at the engine near each engine shock-mount.	
(24)	Support the airplane at the tail.	Use the tail trestle. Refer to Section 07-10.
(25)	Remove the mounting bracket: - Remove the three bolts located at the upper right side of the gearbox and engine housing.	
(26)	Install hoisting points.	Refer to the AE Installation Manual, latest revision.
(27)	Attach the sling to the engine. Attach the sling to the hoist.	There are lifting points at: - Front right cylinder head. - Rear left of the cylinder head near coolant pump. - Rear right at the alternator bracket. Refer to the AE Installation Manual, latest revision.
(28)	Support the weight of the engine with the hoist.	
(29)	Remove the nuts, bolts and washers that attach the engine support brackets to the engine mount.	
(30)	Remove the safety rope from the engine.	
(31)	Lift the engine a small distance, turn it slightly to the right side and move it at the same time forward and clear of the engine mount.	Make sure that the engine does not hit the engine mount.
(32)	Remove the mounting arms from the engine.	

	Detail Steps/Work Items	Key Items/References
(33)	Attach the shipping stand to the engine.	Refer to the AE Installation Manual, latest revision.
(34)	Put caps on the engine openings and pipes.	
(35)	Prepare engine for shipping.	Note the TTSO hours and the reason for removal.
(36)	Clean firewall and engine mount.	
(37)	Examine the engine mount for cracks and corrosion.	
(38)	Check lifetime of the hoses and replace as necessary.	

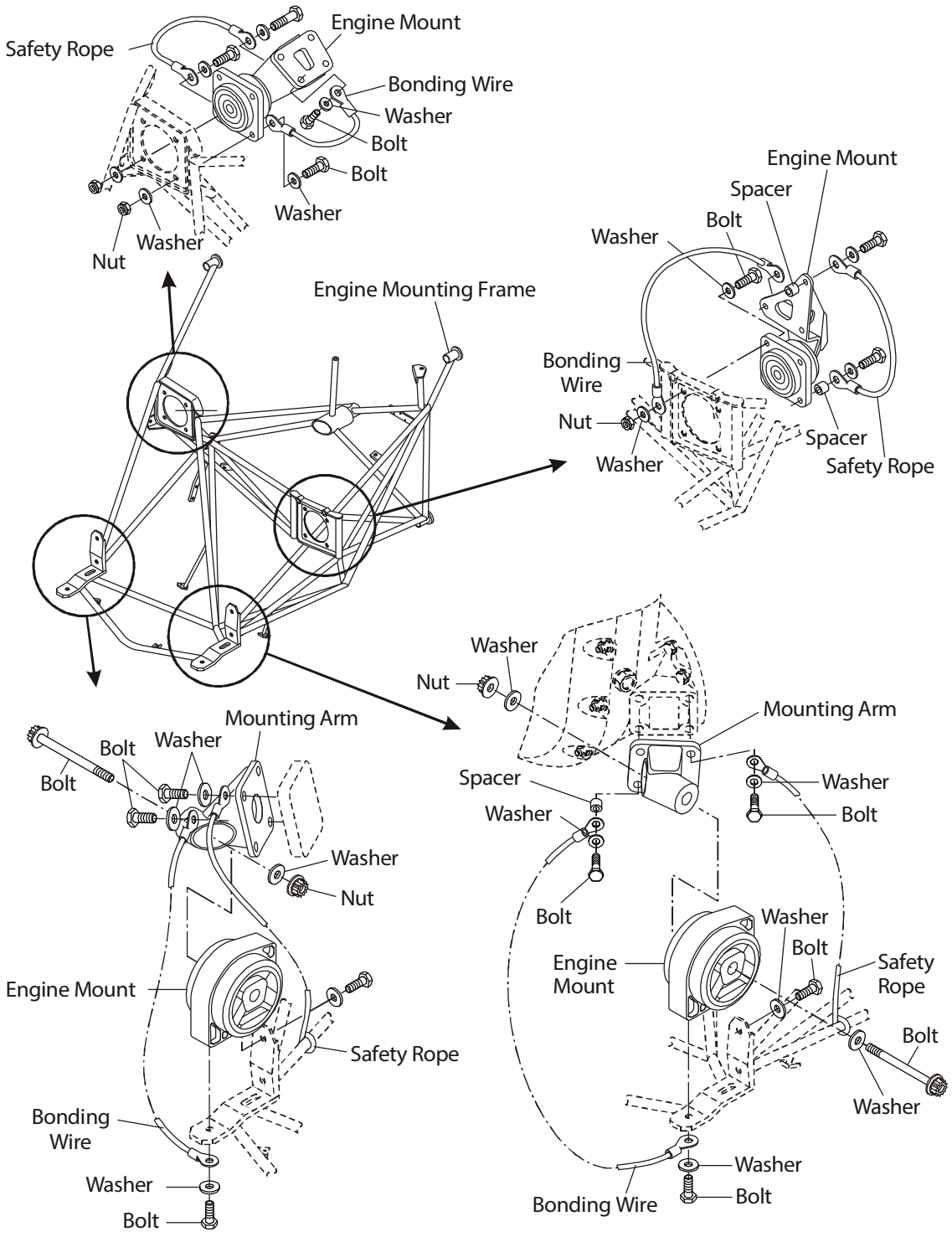

Figure 203 : Engine Shock-Mounts (if MÄM 40-434 is not installed)

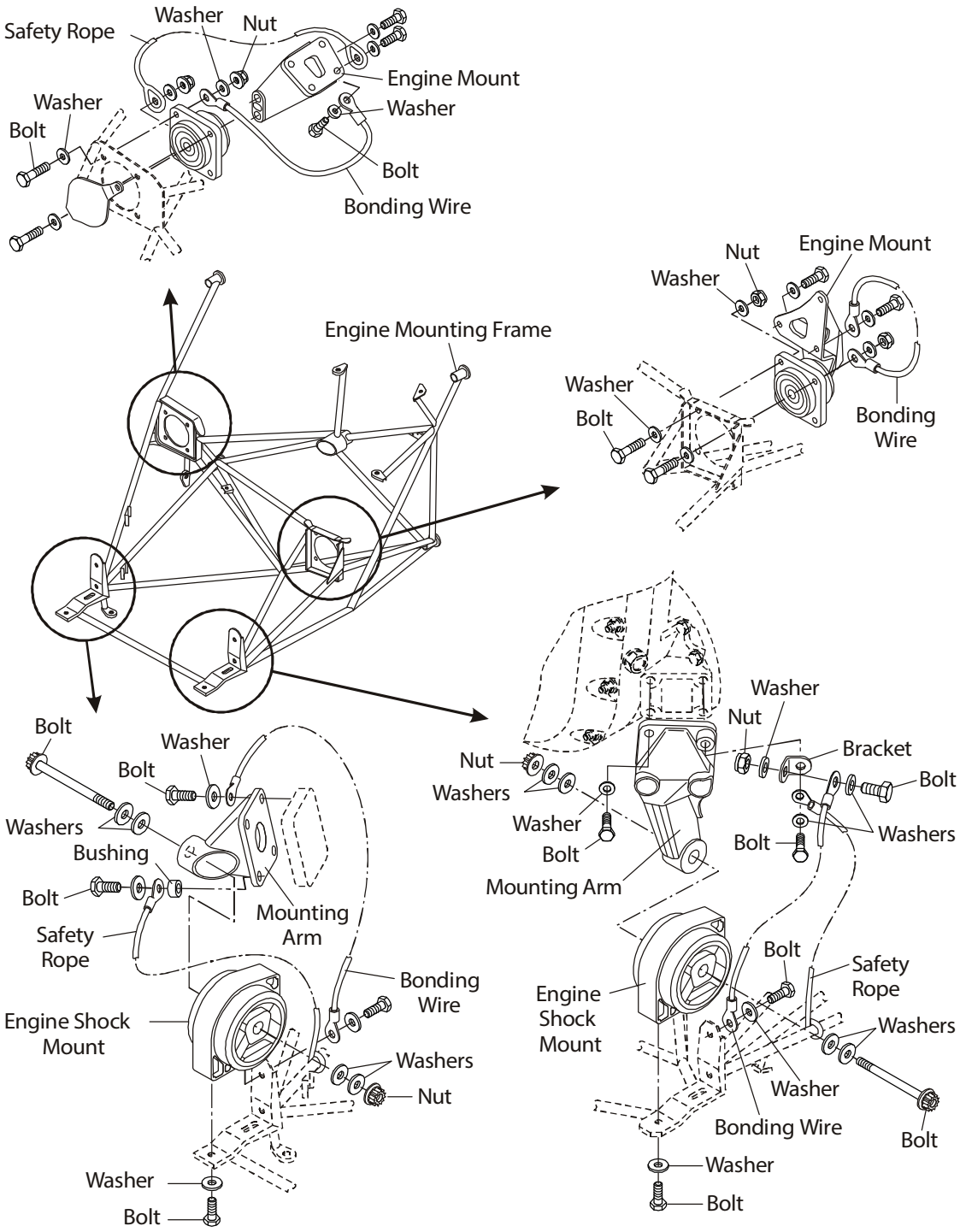

Figure 204 : Engine Shock-Mounts (if MÄM 40-434 is installed)

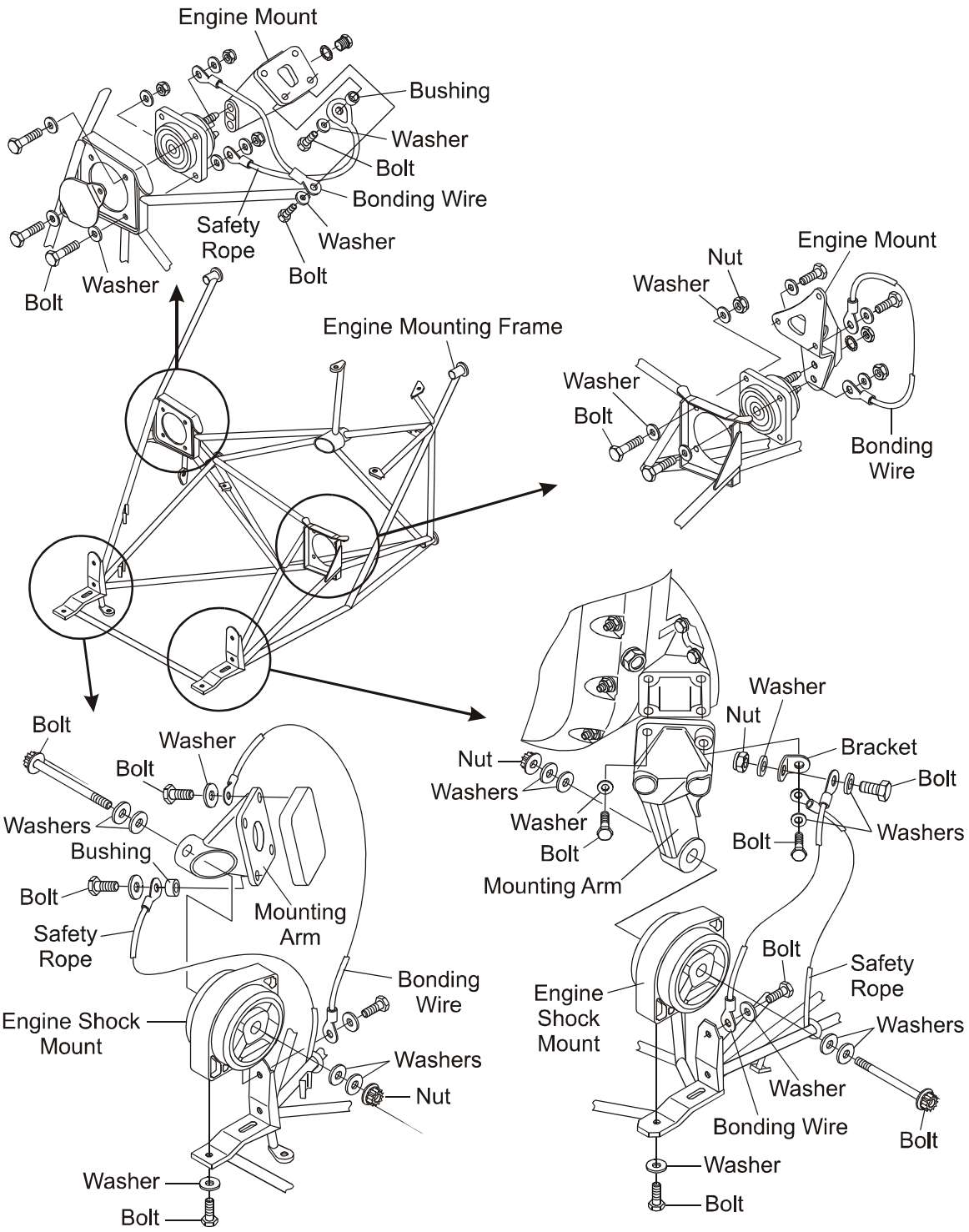

Figure 205 : Engine Shock-Mounts (if MÄM 40-568 is installed)

C. Install the Engine.

	Detail Steps/Work Items	Key Items/References
(1)	Attach the sling to the engine. Attach the sling to the hoist.	There are lifting points at: - Front right cylinder head. - Front left of the reduction gear housing. - Rear left of the cylinder head near coolant pump. - Rear right at the alternator bracket.
(2)	Remove the shipping stand from the engine.	
(3)	Install the engine shock-mounts at the engine mount.	Front: Torque: 16 Nm (11.8 lbf.ft.), Use Loctite 243. Rear: Torque: 28 Nm (20.64 lbf.ft.).
(4)	Install engine mounting arms at the engine.	Use Loctite 243.
(5)	Carefully move the engine back into position in the engine mount.	
(6)	Install the bolts, nuts, and washers that attach the engine shock-mounts to the engine mounting arms.	Front bolts: Wet installation with CA 1000-PRC De Soto, Use Loctite 243, Torque: 85 ± 8 Nm (62.7 ± 5.9 lbf.ft.). Rear bolts: Use Loctite 243, LH bolts Torque: 44 ± 5 Nm (32.5 ± 4 lbf.ft.). RH bolts Torque: 54 ± 5 Nm (39.9 ± 4 lbf.ft.).
(7)	Install the bonding cable at the engine near each shock-mount.	
(8)	Install the forward cooling pipe with clamps at the engine mount.	
(9)	Connect the electrical cables to the starter motor: - Connect the two control cables at the solenoid. - Connect the main supply cable at the solenoid. - Attach all clips and ties holding the cables to the engine.	

	Detail Steps/Work Items	Key Items/References
(10)	Move the engine wire harness into position on the engine. Connect the engine wire harness and bonding cables to the electrical sensors.	Refer to the AE Maintenance Manual, latest revision.
(11)	Install clips and ties clamps holding the engine wire harness to the engine.	
(12)	Connect the fuel supply hose.	At the high pressure pump.
(13)	Connect the fuel return hose.	At the high pressure pump.
(14)	Install the intercooler with coolant tank.	Refer to Section 75-00.
(15)	Install the coolant hoses to the coolant radiator: - Install the two hoses, at the radiator. - Install the eight worm-drive-clamps that hold the hoses.	Refer to Section 75-00. Four on each hose.
(16)	Install the hose which connects the alternate air to the turbo charger.	
(17)	Install the hose which connects the intercooler to the turbo charger.	
(18)	Connect the breather line.	At the oil pre-separator.
(19)	Install the exhaust.	Torque: 25 - 34 Nm (18.44 - 25.08 lbf.ft.).
WARNING:	**MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.**	
(20)	Install the mounting bracket: - Install the three bolts located at the upper right side of the gearbox and engine housing.	
(21)	Install the propeller.	Refer to Section 61-00.
(22)	Fill and bleed the cooling system.	Refer to Section 75-00.
(23)	Fill the engine with oil.	Refer to Section 12-10.
(24)	Fill the gearbox with oil.	Refer to Section 12-10.

	Detail Steps/Work Items	Key Items/References
(25)	Connect the airplane main battery.	Refer to Section 24-31.
(26)	Install the engine cowling.	Refer to Section 71-10.
(27)	Remove the tail trestle.	Refer to Section 07-10.
(28)	Do an engine test.	Refer to Paragraph 3.

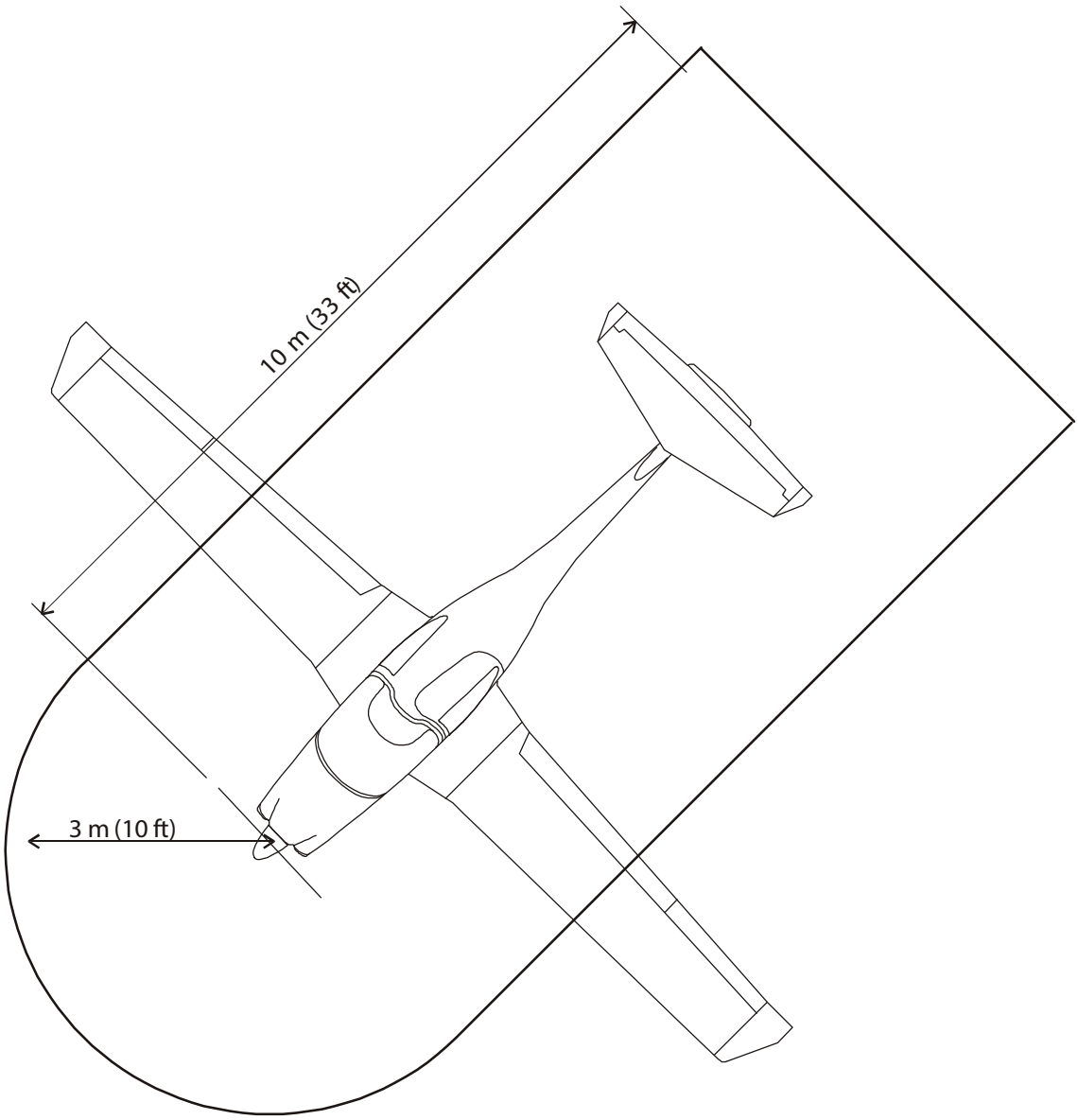

Figure 206 : Engine Testing Safety Zone

3. Engine Test - General

These procedures describe how to conduct an engine test.

For data on the engine and engine performance testing, refer to the AE Operation Manual, latest revision.

NOTE: The engine drives the propeller through a speed-reducing gear. All RPMs are shown as propeller RPMs.

CAUTION: ONLY AUTHORIZED PERSONNEL MAY READ ENGINE DATA WITH THE 'ECU OPERATOR' SOFTWARE.

A. Equipment.

Item	Quantity	Part Number
Airplane chocks.	2	Commercial.
Fuel sample kit.	1	Commercial.
Laptop computer.	1	Commercial.
“Wizard 300” software, latest approved versiion.	N/A	N/A.
CAN interface.	1	N/A.

B. Preparation.

	Detail Steps/Work Items	Key Items/References
WARNING: DO NOT LET PERSONS INTO THE SAFETY RANGE OF THE AIRPLANE. PROPELLERS CAN CAUSE INJURY OR DEATH.		
(1)	Proceed according to Pre-Flight Inspection given in the AFM.	Refer to the Airplane Flight Manual, latest revision.

C. Engine Starting and Warm-Up.

Refer to the AE Operation Manual, latest revision for operating limitations.

	Detail Steps/Work Items	Key Items/References
(1)	Conduct the Engine Start and Warm Up according to the AFM.	Refer to the Airplane Flight Manual, latest revision.

D. ECU Test, Propeller Control Test and ECU Voter Test

Conduct these tests with the engine warm (see Paragraph C).

NOTE: The engine drives the propeller through a speed-reducing gear. All RPMs are shown as propeller RPMs.

WARNING: DO NOT CONTINUE WITH THE TEST IF THE ECU CAUTION LIGHTS DO NOT GO ON AND OFF WHEN REQUIRED, OR IF A CAUTION LIGHT STARTS FLASHING. STOP THE GROUND TEST AND FIND THE FAULT.

WARNING: DO NOT OPERATE THE AIRPLANE IF THE ENGINE STOPS RUNNING DURING THE TEST.

Use the procedures below for the engine/system that will be tested.

	Detail Steps/Work Items	Key Items/References
(1)	Perform an ECU Test according to the AFM.	Refer to the Airplane Flight Manual, latest revision.

E. Performance Check.

CAUTION: THE ENGINE PARAMETERS MUST BE IN THE GREEN RANGE FOR THIS CHECK. DO THE PERFORMANCE CHECK IMMEDIATELY AFTER WARM-UP AND ECU TESTS (SEE PARAGRAPHS C AND D).

NOTE: The engine is controlled by the EECUs. The performance check is therefore different from the usual airplane engines. If the values are within the limits as shown in the AFM and no caution or warning light is illuminated the engine works properly.

	Detail Steps/Work Items	Key Items/References
(1)	Perform an Available Power Check according to the AFM.	Refer to the Airplane Flight Manual, latest revision.

ENGINE COWLING

1. General

The DA 40 NG cowling is made of two carbon fiber reinforced plastic (CFRP) halves. The cowling gives aerodynamic shape to the nose of the airplane. The parts are very easy to remove and give good access to the engine.

Refer to Section 51-20 for repair data for the cowling. Refer to Section 51-60 for data on the quick-release fasteners.

2. Description

Figures 1 and 2 show the cowling.

Camloc quick-release fasteners attach the cowling halves to each other and to the fuselage. Both cowling halves are very light and one person can hold them easily.

The top cowling has two air intakes, one on the front right side and one on the front left side of the cowling. The left opening supplies air to the intercooler and the right one for the cabin heat and gearbox cooling. The bottom cowling has an air intake at the front to supply air for the coolant radiator. The side-NACA-intake which is built into the bottom cowling supplies air for the engine intake system.

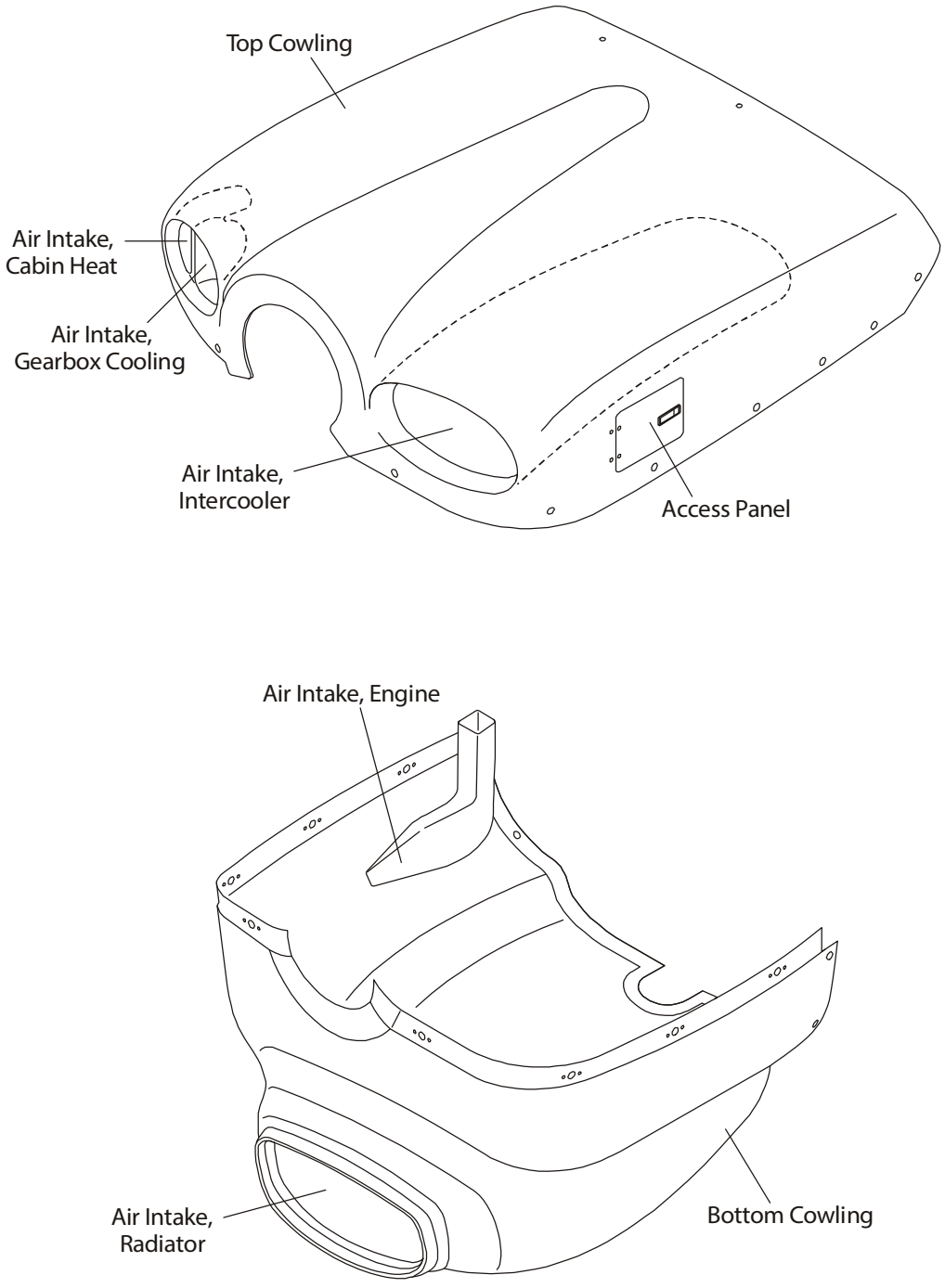

Figure 1 : Engine Cowling (if MÄM 40-434 is not installed)

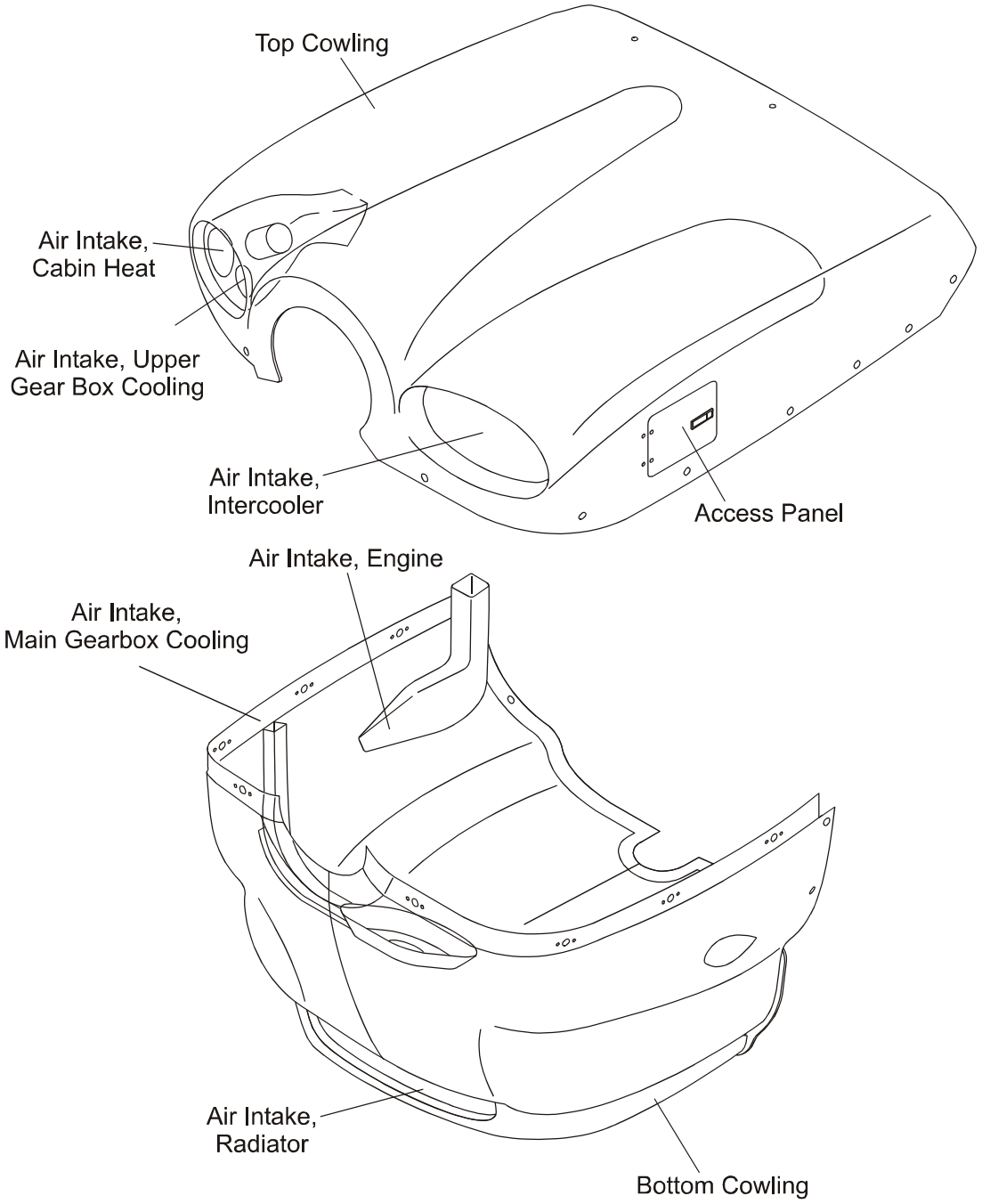

Figure 2 : Engine Cowling (if MÄM 40-434 is installed)

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TROUBLE-SHOOTING

1. General

The table below lists the possible defects of the engine cowling.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Outer surface of the cowling discolored. Paint blistered. Black soot on the inner surface.	Engine overheating. Hot gas leak. Engine fire.	Examine the engine for hot gas leaks. Examine the exhaust for cracks and leaking gaskets. Replace damaged items. Repaint the cowling.
Oil/fuel/coolant on the inner surface of the cowling.	Oil, fuel or coolant leak.	Examine the engine. Look specially for oil, fuel and coolant leaks. Correct the problems which you have found. Clean the cowling.

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MAINTENANCE PRACTICES

1. General

This Section contains the Maintenance Practices for the cowling. It describes how to remove/install, clean and paint the cowling.

2. Remove/Install the Engine Cowling

WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU WORK NEAR TO THE PROPELLER.
- SET THE ELECTRIC MASTER KEY SWITCH TO "OFF".
- SET THE ENGINE MASTER SWITCH TO "OFF".
- SET THE POWER LEVER TO "0%".
- DISCONNECT THE AIRPLANE MAIN BATTERY.

A. Remove the Top Cowling.

	Detail Steps/Work Items	Key Items/References
WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO ANY WORK ON THE PROPELLER. IF THE ENGINE IS TURNED, THE PROPELLER CAN CAUSE INJURY OR DEATH.		
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Release the quick-release fasteners which hold the top cowling.	Refer to Figures 1 and 2 in the Description and Operation Pageblock 71-10-00.
(4)	Pull the side of the upper cowling gently outwards and upwards.	Be careful not to scratch the cowling on the propeller!
(5)	Disconnect the cabin heat air intake hose from the upper cowling.	
(6)	Move the cowling away from the airplane.	Be careful not to scratch the cowling on the propeller!

B. Remove the Bottom Cowling.

	Detail Steps/Work Items	Key Items/References
(1)	Release the quick-release fasteners which hold the bottom cowling.	Refer to Figures 1 and 2 in the Description and Operation Pageblock 71-10-00. Hold the bottom cowling.
(2)	Remove the bottom cowling. - Lower the rear of the cowling. - Move the cowling down and forward. - Move the cowling clear of the airplane.	 Be careful not to scratch the cowling on the propeller and spinner. Be careful not to damage the engine air intake duct.

C. Install the Bottom Cowling.

	Detail Steps/Work Items	Key Items/References
(1)	Examine the bottom cowling. Make sure that: - The cowling is clean. - The cowling is not damaged. - The quick-release fasteners are not missing/damaged. - Drain holes must be clear.	Refer to Figures 1 and 2 in the Description and Operation Pageblock 71-10-00. Repair any damage. Replace missing/damaged fasteners.
(2)	Lift the cowling into position: - Move the cowling upwards. - Lift the cowling fully into position. - Tighten the quick-release fasteners that attach the cowling to the engine nacelle.	 Make sure that the air intake ducts connect.

D. Install the Top Cowling.

	Detail Steps/Work Items	Key Items/References
(1)	Examine the top cowling. Make sure that: - The cowling is clean. - The cowling is not damaged. - The quick-release fasteners are not missing/damaged.	Refer to Figures 1 and 2 in the Description and Operation Pageblock 71-10-00. Repair any damage. Replace missing/damaged fasteners.
(2)	Move the top cowling into position.	
(3)	Connect (worm drive clamp) the cabin heat air intake to the upper cowling.	
(4)	Gently pull the edges of the cowling apart and lower the cowling into position.	
(5)	Tighten the quick-release fasteners.	
(6)	Connect the airplane main battery.	Refer to Section 24-31.

3. Cleaning and Painting

A. Clean the Cowling.

	Detail Steps/Work Items	Key Items/References
(1)	Wash the outer surface with a mixture of water and a mild detergent.	Obey the detergent manufacturer's instructions.
(2)	Wash the inner surface with a mixture of water and a mild detergent.	Obey the detergent manufacturer's instructions.
CAUTION: DO NOT USE POLISH CONTAINING SILICONE. SILICONE MAKES CFRP REPAIR DIFFICULT.		
(3)	Polish the outer surface with wax polish.	Obey the polish manufacturer's instructions. Do not use silicone polish.

B. Paint the Insides of the Cowling.

This Paragraph gives the data for painting the inside of the engine cowling with fire protection paint. Refer to Section 51-20 for repairs and painting the outside of the cowling.

	Detail Steps/Work Items	Key Items/References
(1)	Clean the inside of the cowling.	
(2)	Make the area rough for painting.	Use 150-320 grade wet and dry paper.
WARNING: DO NOT GET ACETONE ON YOUR SKIN. ACETONE CAN CAUSE SKIN DISEASE. **WARNING: DO NOT BREATHE ACETONE FUMES. ACETONE FUMES CAN CAUSE ILLNESS.** CAUTION: REMOVE ACETONE AS SOON AS POSSIBLE FROM GFRP. ACETONE CAN CAUSE THE RESIN TO SOFTEN AND FAIL.		
(3)	Clean the area for painting.	Use acetone.
(4)	Paint the inside of the cowling with fire protection paint.	Obey the paint manufacturer's instructions.

C. Applying Fire Resistant Resin inside the Cowling.

This Paragraph gives the data for applying fire resistant resin to the inside of the engine cowling, instead of painting the cowling with fire resistant paint.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT BREATHE THE DUST FROM THE FIRE RESISTANT PAINT; IT IS HARMFUL.	
(1)	Wet the inside of the cowling with water, and use a scraper to remove the paint inside the cowling.	The fire resistant paint has a clear lacquer on it. The surface of the paint may have to be scored to allow the water to affect the paint.
(2)	Sand the inside of the cowling using 80 to 120 grit sandpaper.	Make sure there are no shiny surfaces in order for the resin to have a good bonding surface.
(3)	Remove dust from the inside of the cowling by vacuum cleaning or rinsing with water.	Do not blow off dust e.g. with pressurized air.
	WARNING: DO NOT GET ACETONE, FILLER, OR PAINT ON YOUR SKIN. ACETONE, FILLER, AND PAINT CAN CAUSE SKIN DISEASE. **WARNING: DO NOT BREATHE ACETONE, FILLER, OR PAINT FUMES. ACETONE, FILLER, AND PAINT FUMES CAN CAUSE DISEASE.** CAUTION: THERE MUST BE NO GREASE OR DUST IN THE COWLING. GREASE AND DUST PREVENT A GOOD BOND.	
(4)	Wet a clean, lint-free cloth with acetone and wipe the inside of the cowling. Immediately wipe off with another clean, lint-free cloth.	Do not pour acetone onto the cowling. Do not allow acetone to dry on the surface. Do not reuse cloths.
(5)	Pigment the Sika CR132 FR self-extinguishing resin/hardener mixture with Universal Colour Paste deep black (RAL 9005), P/N 1321300.	Do not add more than 5% colour paste by weight.
(6)	Coat the inside of the cowling with the pigmented Sika CR132 FR self-extinguishing resin.	
(7)	Cure the cowling at 55 °C for 6 hours.	

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ENGINE MOUNTING

1. General

The engine mount is constructed from tubular steel which is welded at the joints. Powder coating protects the frame from corrosion. Welded brackets hold components such as the coolant radiator and the intercooler in position. Rubber lined P-clamps and cable ties hold electrical cables and other equipment components to the engine mount.

The engine mounting-frame has five small mounting pads at the rear of the frame. Bolts through the pads attach the engine mount to the firewall.

The engine attaches to the engine mount at four mounting pads. Oil-filled rubber shock-mounts are built between the engine mounting arms and the engine mount pads and isolate the airframe from engine vibrations.

Additionally there are safety ropes (steel wire ropes) at each engine mounting pad installed.

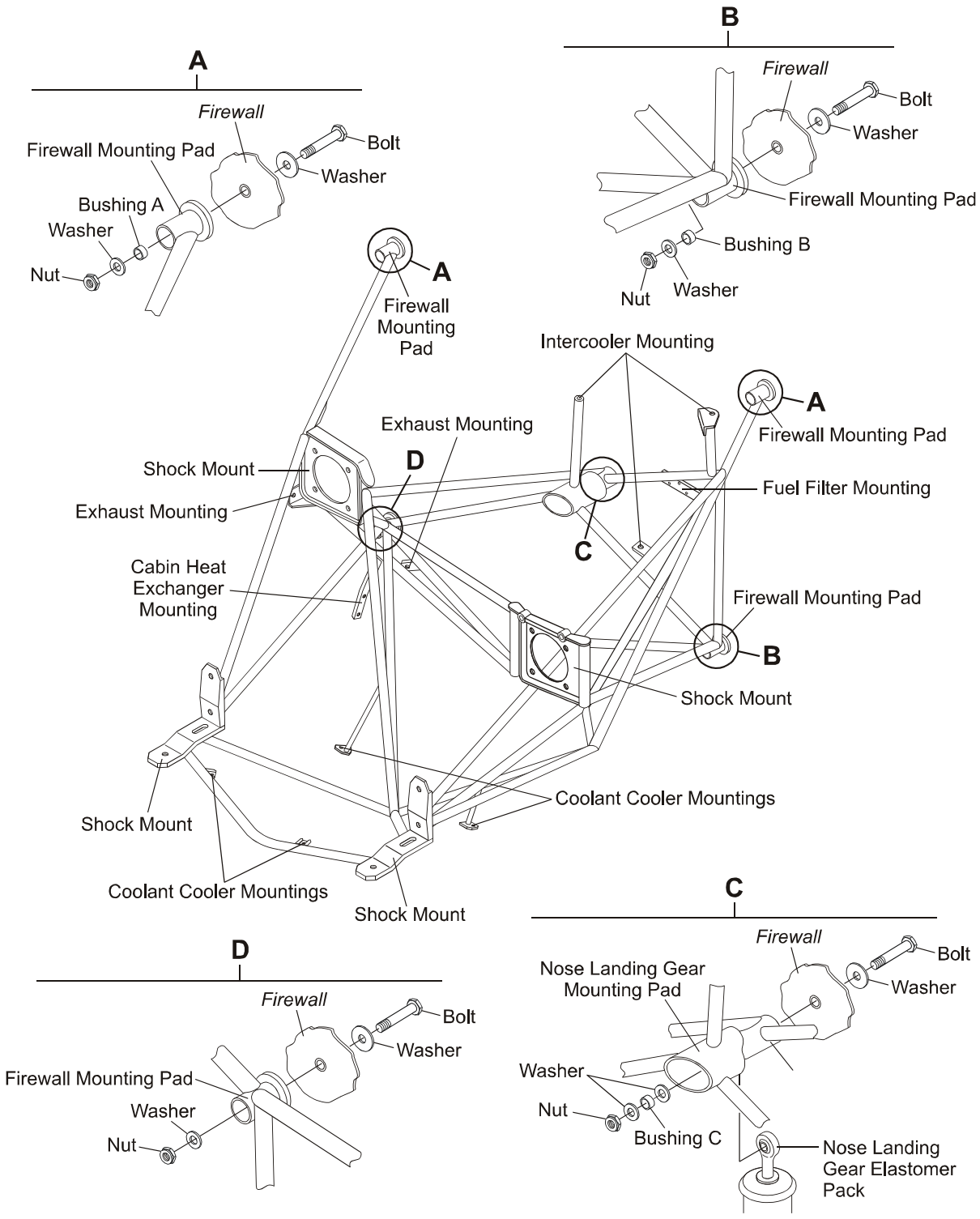

Figure 1 : Engine Mount Assembly (if MÄM 40-434 is not installed)

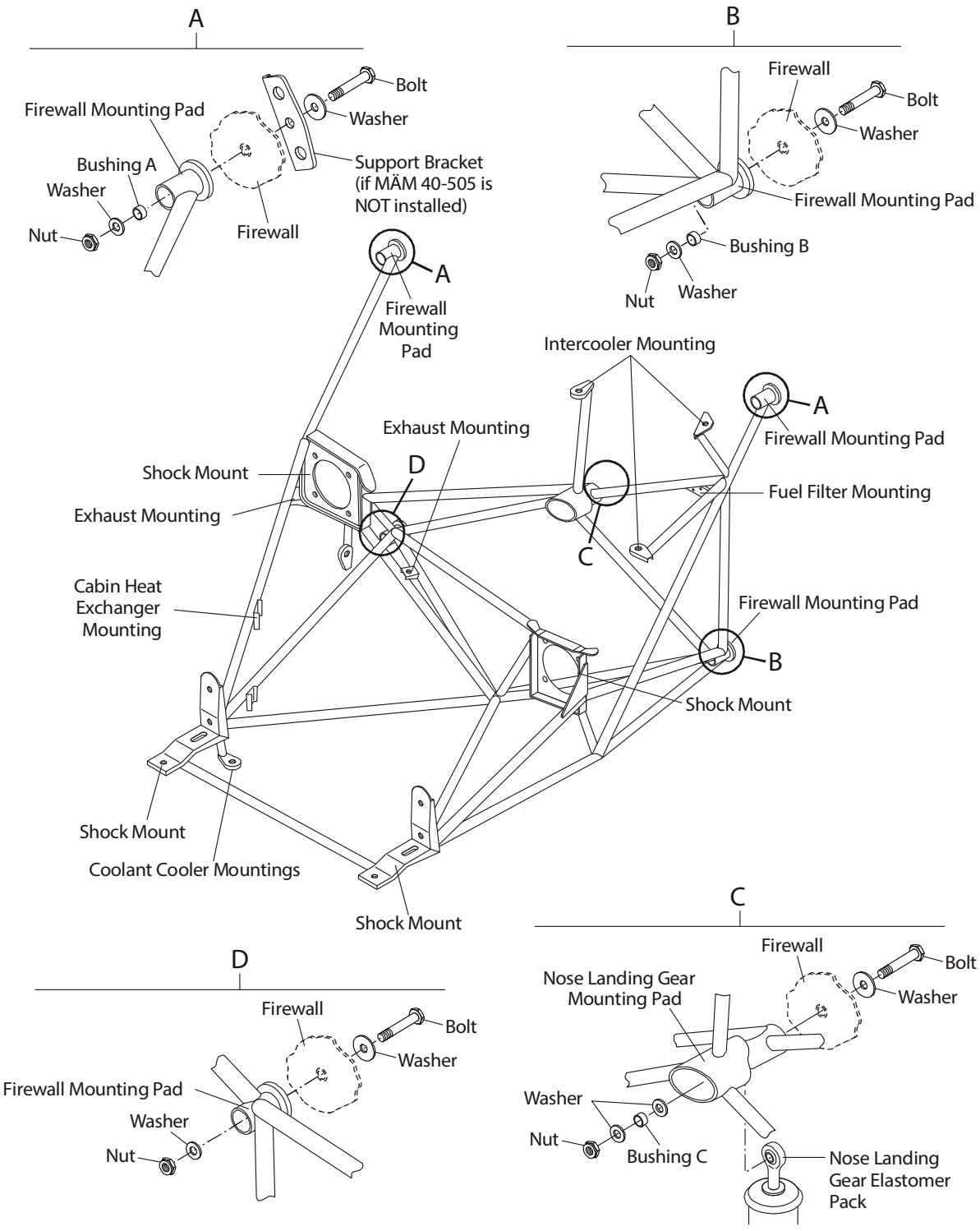

Figure 2 : Engine Mount Assembly (if MÄM 40-434 is installed)

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TROUBLE-SHOOTING

1. General

The table below lists the possible defects of the engine mounting.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Engine vibration.	Cracked engine mount. Examine the engine mount. Look specially for cracks at the welded joints.	Replace the engine mount.
Defective shock mounts.	Refer to the engine manufacturer.	Refer to the engine manufacturer.

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MAINTENANCE PRACTICES

1. General

The Maintenance Practices for the engine mount are limited to the removal and installation. If the engine mount is damaged it must be repaired by an authorized repair facility.

2. Remove/Install the Engine Mount (Without the Engine Installed)

A. Equipment.

Item	Quantity	Part Number
Engine hoist.	1	Commercial.
Engine sling.	1	Commercial.
Tail trestle.	1	Commercial.

B. Remove the Engine Mount (Without the Engine Installed).

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine.	Refer to Section 71-00.
(2)	Release all clamps, clips and ties holding the electrical harness and hoses to the engine mount.	
(3)	Remove the cabin heat-exchanger and shroud.	Refer to Section 21-00.
(4)	Remove the engine coolant radiator.	Refer to Section 75-00.
(5)	Remove the inter-cooler with coolant tank.	Refer to Section 81-00.
(6)	Remove the five bolts and washers which attach the engine mount to the firewall and remove elastomer pack of the nose landing gear from its mounting pad.	
(7)	Move the engine mount clear of the airplane.	

C. Install the Engine Mount (Without the Engine Installed).

	Detail Steps/Work Items	Key Items/References
(1)	Move the engine mount into position on the firewall.	
(2)	Install the five bolts which attach the engine mount to the engine firewall and connect the elastomer pack of the nose landing gear to the nose landing gear mounting pad: –Fasten the bolts through the firewall.	The center firewall bolt: Torque: 60 ± 6 Nm (44.3 ± 4 lbf.ft.). The remaining four bolts: Torque: 40 ± 4 Nm (29.5 ± 3 lbf.ft.).
(3)	Install the engine coolant radiator.	Refer to Section 75-00.
(4)	Install the intercooler with coolant tank.	Refer to Section 81-00.
(5)	Install the cabin heat-exchanger and shroud.	Refer to Section 21-00.
(6)	Install all the clamps, clips and ties that hold the electrical harness and hose to the engine mount.	The clamps, clips and ties that you removed in Paragraph 2 B, item (2).

ELECTRICAL CABLES IN THE ENGINE COMPARTMENT

1. General

The engine compartment has a main electrical wiring harness. The harness is supplied as part of the engine installation. The harness incorporates all of the low-power cables for the engine control system. It is integral part of the engine control system.

- Refer to Section 76-00 for data about the main electrical wiring harness.

There is a small number of separate cables for the alternator and starter.

- See Chapter 24 for data about the battery and alternator wiring.
- See Chapter 80 for more data about the starter cables.
- See Chapter 92 wiring diagrams for data about the cables in each system..

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AIR INTAKES

1. General

An air filter housing, air filter and alternate air valve assembly make up the low pressure engine air intake system of the DA 40 NG airplane. The air filter box is connected to the air intake duct via by a flexible hose. The same sort of hose feeds the air from the alternate air valve to the turbo-charger. A lever below the instrument panel, right-side of the pilot, operates the alternate air valve.

Figure 1 shows the engine air filter and alternate air valve.

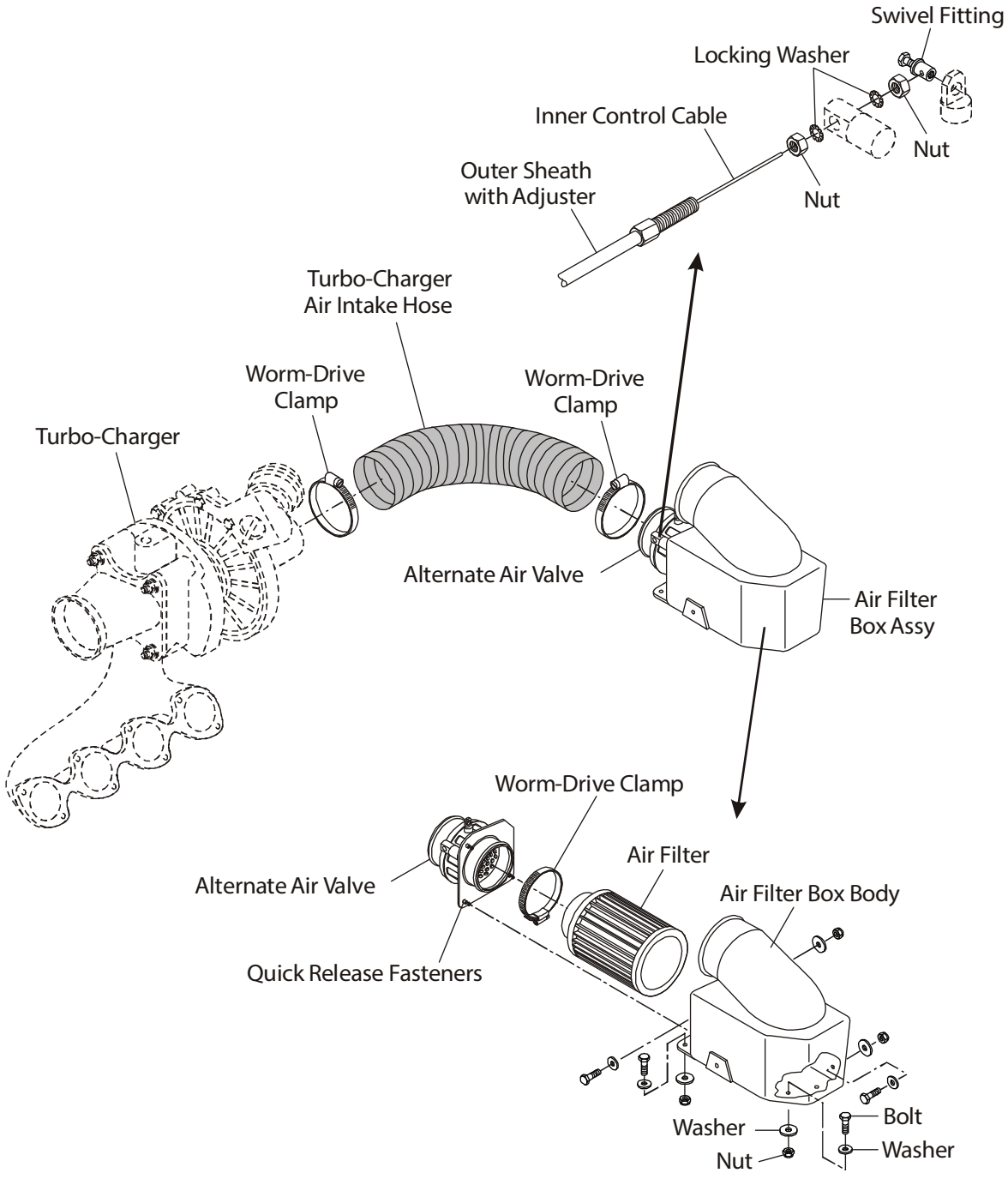

Figure 1 : Air Filter and Alternate Air Assembly

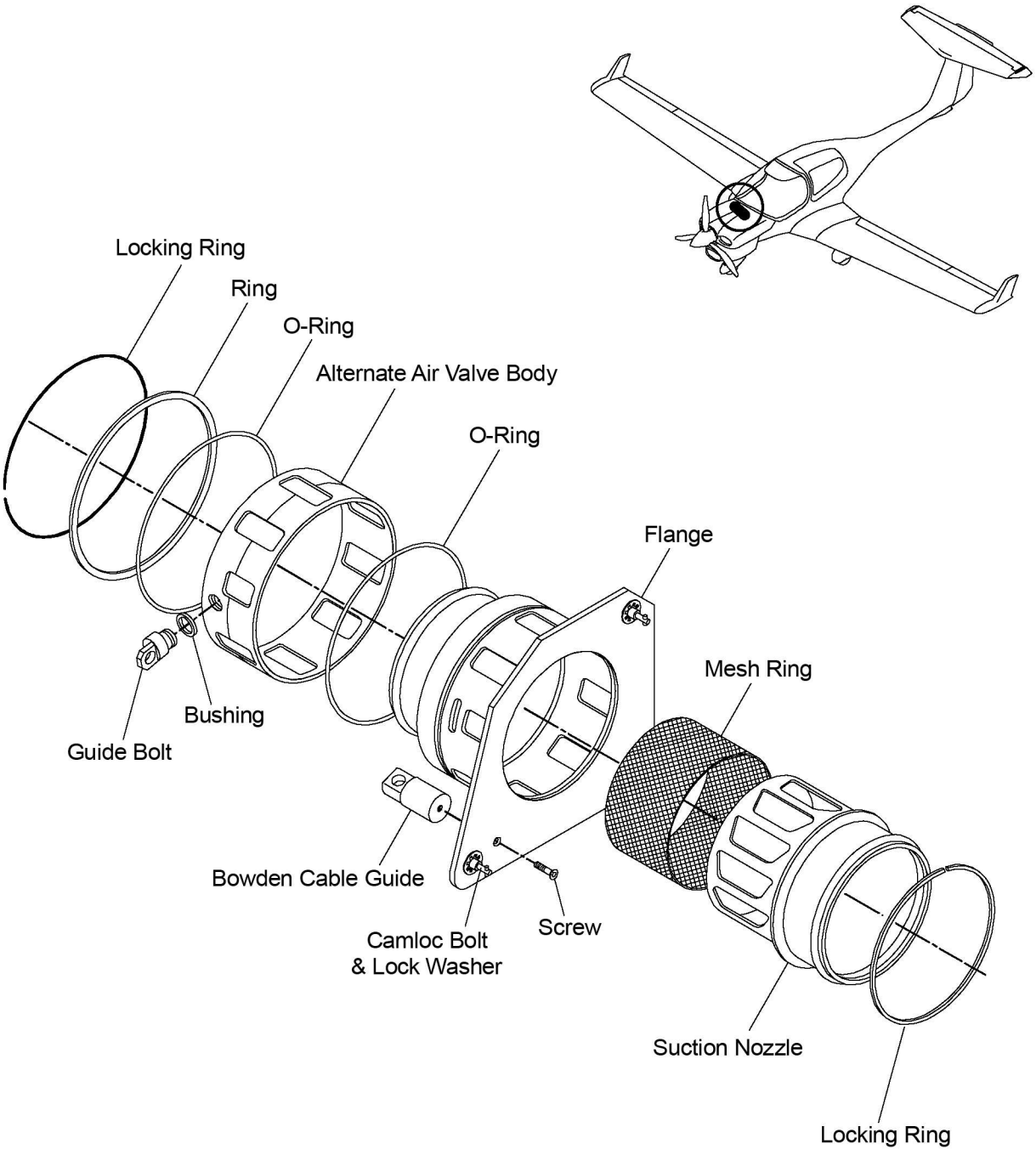

Figure 2 : Air Valve Assembly

2. Description

The air intake has three main parts:

- Alternate air valve assembly.
- Air filter housing.
- Air filter.

A. Alternate Air Assembly

Refer to Figure 1. The alternate air valve is attached to the RH face of the air filter housing. The air filter attaches to the front of the alternate air valve. The alternate air valve also has an intake direct from the engine compartment. Rotary motion of the outer ring opens different holes to the engine compartment which allows unfiltered air to enter the engine induction system.

B. Air Filter Housing

The air filter housing is made of aluminum. A flexible hose connects the housing to the air intake duct. Bolts attach the air filter housing to the firewall.

C. Air Filter

Refer to Figure 1. The air filter is a K&N RU high-flow air filter. The air filter is connected to the alternate air valve assembly via a worm-drive clamp.

3. Operation

When the pilot pulls the alternate air valve control lever towards the rear of the airplane the alternate air valve screen opens and air from the engine compartment (unfiltered air) enters the engine induction system.

When the pilot moves the alternate air valve control lever forward the alternate air valve moves back to the normal (OFF) position.

TROUBLE-SHOOTING

1. General

The table below lists the possible defects of the air intake system.

If you have the trouble detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
The engine does not develop full power.	Air filter is blocked/defective on the engine.	Replace the air filter.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices describe how to remove and install the air filter, the alternate air valve assembly and instruct how to adjust, remove and install the alternate air valve control cable.

2. Remove/Install the Air Filter

A. Remove the Air Filter.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Remove the engine top cowling.	Refer to Section 71-10.
(4)	Remove the air intake duct from the air filter box.	Refer to Figure 1 in the Description and Operation Pageblock 71-60-00.
(5)	Disconnect the alternate air valve Bowden cable.	
(6)	Open the three Camlocs of the alternate air valve.	
(7)	Pull out the alternate air valve with the attached filter element.	
(8)	Open the worm-drive clamp which holds the filter element. Pull off the filter from the alternate air valve.	

B. Install an Air Filter.

	Detail Steps/Work Items	Key Items/References
(1)	Place the filter on the alternate air valve. Close the worm drive clamp which holds the filter element. Do not use the worm drive clamp provided with K&N filter package. Use a 9 mm (3/8 in) wide worm drive clamp instead.	Refer to Figure 1 in the Description and Operation Pageblock 71-60-00.
(2)	Place the alternate air valve with the attached filter element into the air filter box.	
(3)	Close the three Camlocs of the alternate air valve.	
(4)	Connect the alternate air valve Bowden cables.	
(5)	Install the air intake duct to the air filter box.	
(6)	Check if the position of the alternate air valve is in accordance to the selector handle position.	Refer to Paragraph 5.
(7)	Install the engine top cowling.	Refer to Section 71-10.

3. Remove/Install the Alternate Air Valve

A. Remove the Alternate Air Valve.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Remove the engine top cowling.	Refer to Section 71-10.
(4)	Remove the air intake duct from the air filter box.	Refer to Figure 1 in the Description and Operation Pageblock 71-60-00.
(5)	Disconnect the alternate air control cable.	Refer to Figure 201.
(6)	Open the three Camlocs of the alternate air valve.	
(7)	Disconnect the hose that connects the alternate air valve to the turbo-charger inlet: - Open the worm-drive-clamp. - Pull the hose off the valve.	Refer to Figure 1 in the Description and Operation Pageblock 71-60-00. At the alternate air valve.
(8)	Move the alternate air valve clear of the airplane.	

B. Install the Alternate Air Valve.

	Detail Steps/Work Items	Key Items/References
(1)	Install the air filter.	Refer to Paragraph 2.
(2)	Install the alternate air valve to the air filter housing.	Refer to Figure 1 in the Description and Operation Pageblock 71-60-00.
(3)	Connect the alternate air valve control cable.	Refer to Figure 201.
(4)	Check if position of the alternate air valve is in accordance to the selector handle position.	Refer to Paragraph 5.
(5)	Connect the hose that connects the alternate air valve to the turbo-charger inlet: - Connect the hose to the valve. - Tighten the worm-drive clamp.	At the alternate air valve.
(6)	Install the air intake duct to the air filter box.	

4. Remove/Install the Alternate Air Valve Control-Cable

A. Remove the Alternate Air Valve Control-Cable.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Remove the engine top cowling.	Refer to Section 71-10.
(4)	Disconnect the control cable from the alternate air control operating lever in the cockpit: - Loosen the screw on the cable swivel fitting at the operating lever. - Remove the swivel fitting from the cable.	Refer to Figure 201. Retain the swivel fitting.
(5)	Disconnect the control cable from the alternate air valve.	
(6)	Remove the firewall feed-thru from the engine side of the firewall: - Remove the firewall sealant from the feed-thru. - Drill out the two rivets which hold the shields to the firewall. - Remove the shields. - Pull the two parts of the feed-thru clear of the firewall.	Keep the two parts of the feed-thru.
(7)	Move the control cable clear of the airplane.	

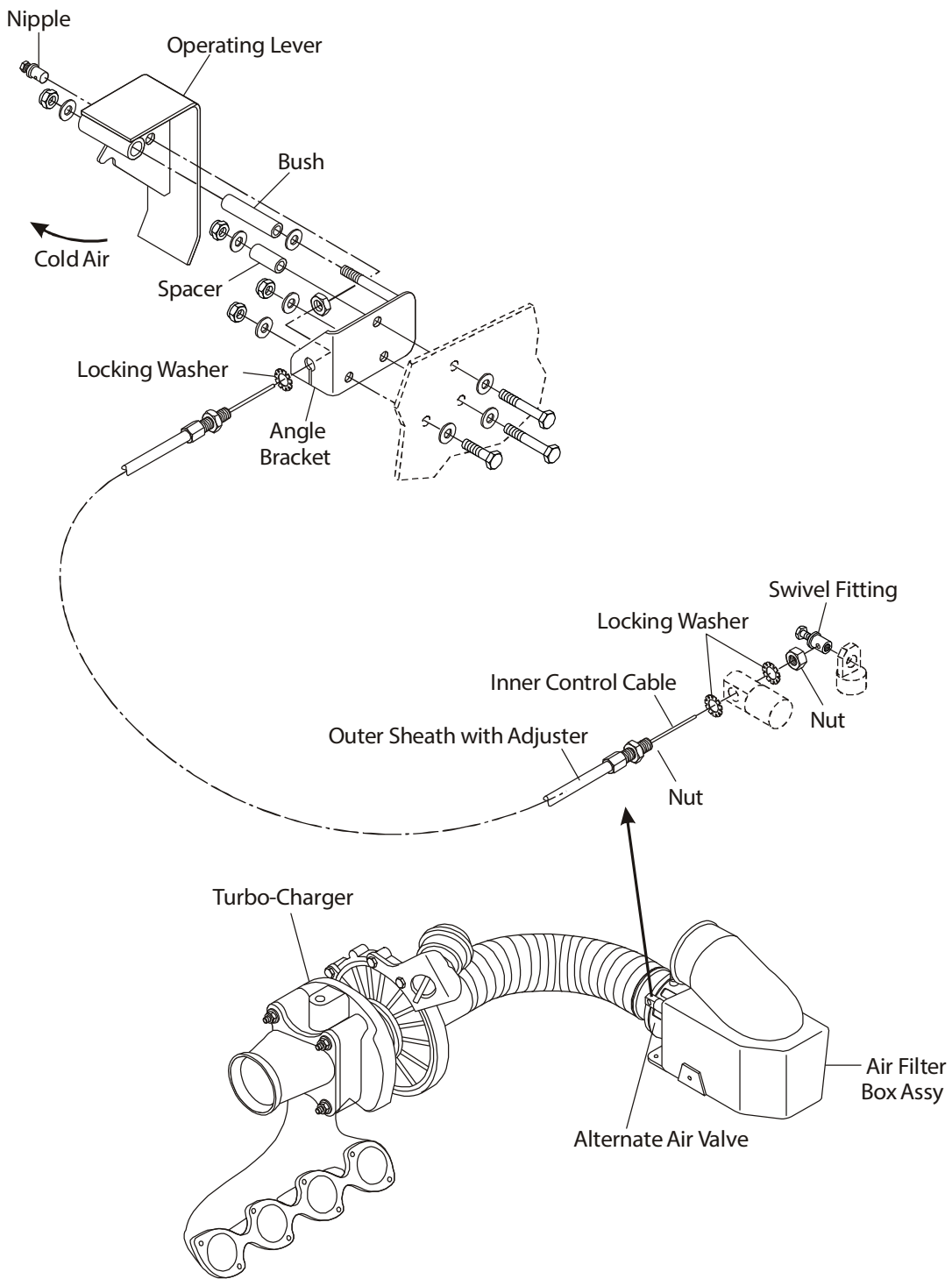

Figure 201 : Alternate Air Valve - Operating Cables

B. Install an Alternate Air Valve Control-Cable.

	Detail Steps/Work Items	Key Items/References
(1)	Move the alternate air control cable in position in the airplane.	Through the hole in the firewall and the slot in the floor area near the alternate air lever.
(2)	Connect the alternate air control cable to the alternate air lever in the cockpit.	
(3)	Install the feed-thru to the engine side of the firewall with firewall sealant: - Put the two parts of the feed-thru round the control cable. - Push the feed-thru in the firewall. - Put the two shields in position over the feed-thru. Apply firewall sealant. - Install two pop-rivets to attach the shields to the firewall.	Use PR 812 (MIL-S-38249 Type 1) firewall sealant.
(4)	Install the alternate air valve.	Refer to Paragraph 3.
(5)	Connect the alternate air control cable to the alternate air valve and adjust as necessary.	Refer to Paragraph 5.
(6)	Install the engine cowling.	Refer to Section 71-10.

5. Adjust the Alternate Air Valve Control-Cable

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	If necessary, disconnect the airplane main battery.	Refer to Section 24-31.
(3)	If necessary, remove the engine top cowling.	Refer to Section 71-10.
(4)	Move the alternate air lever in the cockpit from OFF to ON: - Make sure the lever moves freely with no restrictions.	
(5)	Set the alternate air lever in the cockpit to OFF and hold it in position: - Make sure that the alternate air valve is fully closed.	Fully forward.
(6)	Set the alternate air lever in the cockpit to ON and hold it in position: - Make sure that the alternate air control valve is in the fully open position.	
(7)	If necessary, adjust the alternate air control cable to get the correct settings at item 5.	At the alternate air lever.
(8)	Connect the airplane battery.	Refer to Section 24-31.
(9)	Install the engine top cowling.	Refer to Section 71-10.

ENGINE DRAINS

1. General

The DA 40 NG has a breather for the oil separator. Refer to Chapter 72 for more data about the engine oil system and refer to Chapter 75 for more data about the engine liquid cooling system.

2. Description

Figures 1 and 2 show the engine drains of the Austro Engine E4-A engine.

The breather hose of the oil separator connects to an outlet at the top of the oil separator. A worm-drive-clamp secures the hose at the outlet. The other end of the breather hose connects to a drain adapter, which is an additional breather line outlet. From there a second breather hose leads the breather air to the drain collector at the bottom of the firewall.

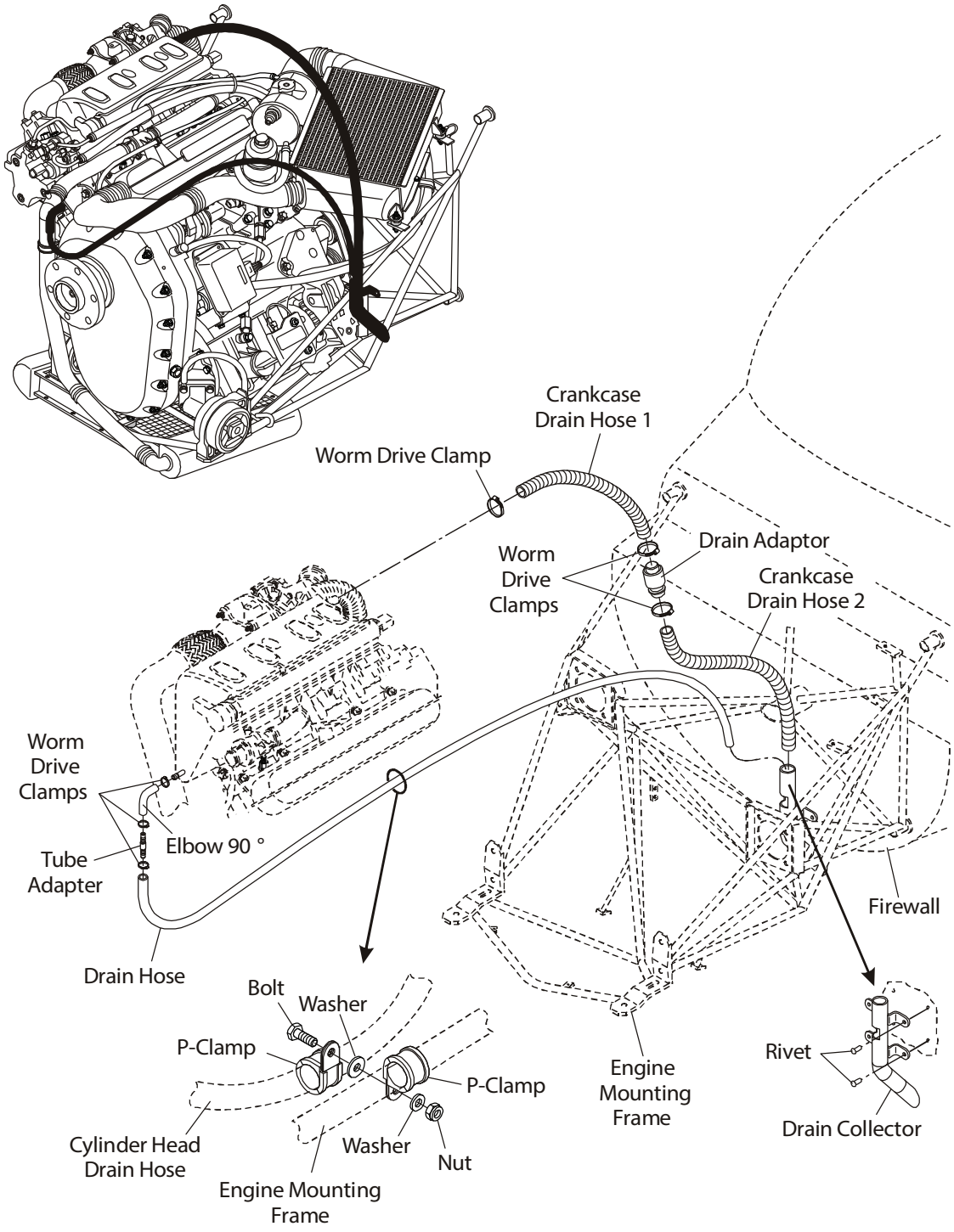

Figure 1 : Engine Nacelle Drains

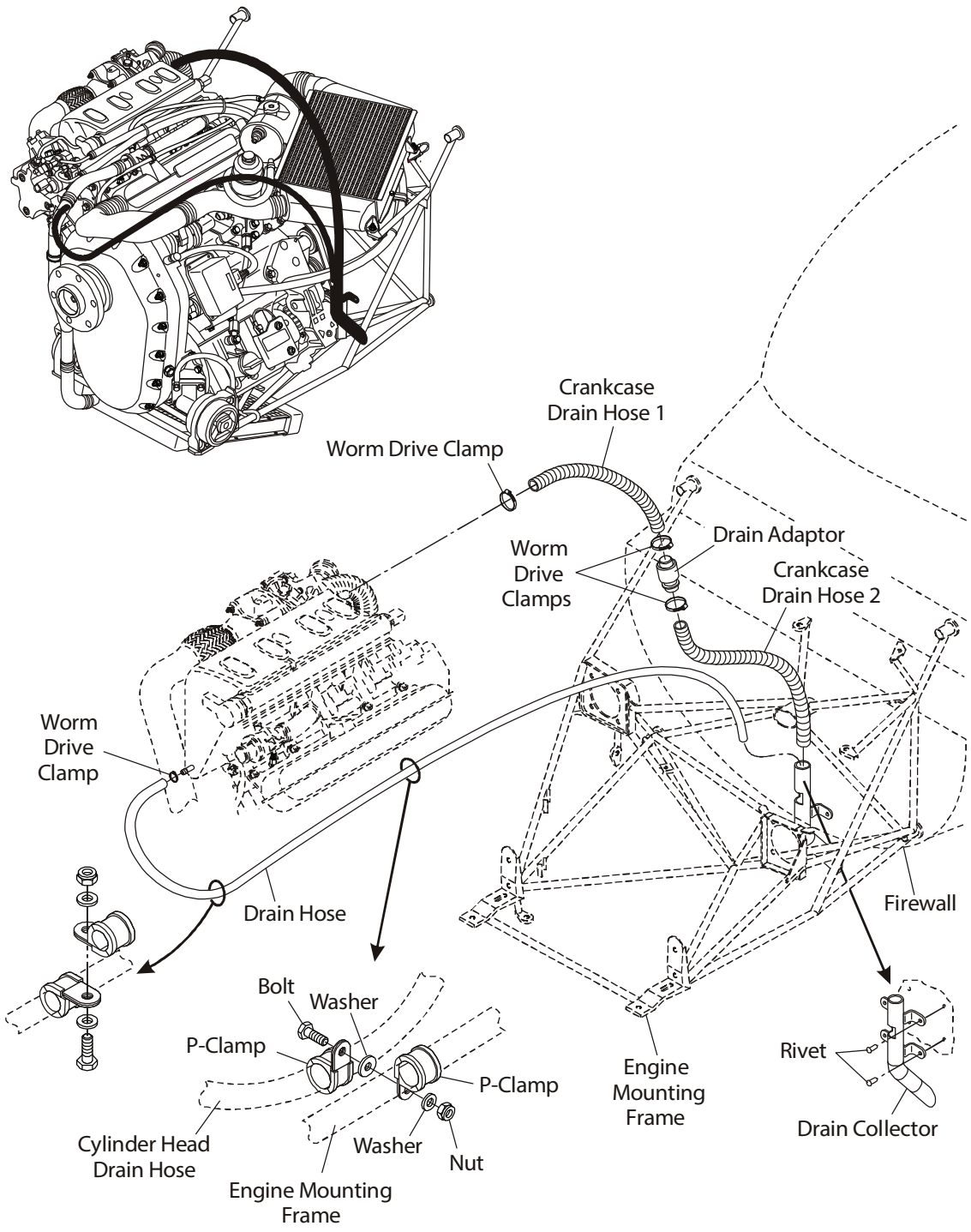

Figure 2 : Engine Nacelle Drains (if MÄM 40-434 is installed)

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to remove/install the oil separator breather hose.

2. Remove/Install the Oil Separator Breather-Hose

A. Remove the Oil Separator Breather-Hose.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Remove the engine cowlings.	Refer to Section 71-10.
(4)	Remove the cable ties and P-clamps that secure the breather hoses and the drain adapter.	Refer to Figure 1 or Figure 2 in the Description and Operation Pageblock 71-70-00.
(5)	Remove the breather hose: - Remove the hose clamp that secures the breather hose to the outlet at the top of the oil separator. - Pull the breather hose from the outlet at the top of the separator. - Remove the hose clamps that attach the breather hose to the air filter box and drain adapter to the engine mount. - Pull the breather hose assy out of the drain collector at the bottom of the fuselage and move the breather hose assy clear of the fuselage.	

B. Install the Oil Separator Breather-Hose.

	Detail Steps/Work Items	Key Items/References
(1)	Install a new hose clamp onto the breather hose and connect the hose to the breather outlet. Tighten the hose clamp.	
(2)	Install the breather hose assy with the drain adapter and attach them with P-clamps to the air filter box and engine mount.	Refer to Figure 1 or Figure 2 in the Description and Operation Pageblock 71-70-00.
(3)	Install the P-clamps that attaches the breather hose assembly.	
(4)	Install the engine cowlings.	Refer to Section 71-10.
(5)	Connect the airplane main battery.	Refer to Section 24-31.

CHAPTER 72
ENGINE

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ENGINE

1. General

This Section provides background information about the Austro Engine E4-A engine installed on the DA40 NG airplane and describes maintenance events of the oil system of the Austro Engine E4-A engine.

Refer to these Chapters for more data about the engine systems:

- Chapter 73. Engine fuel and control.
- Chapter 75. Liquid cooling system.
- Chapter 76. Engine controls.
- Chapter 77. Engine indicating.
- Chapter 78. Engine exhaust.
- Chapter 79. Oil cooling.
- Chapter 80. Engine starting.
- Chapter 81. Turbo charger.

NOTE: Only Austro Engine authorized maintenance organizations may carry out maintenance and inspection work on the Austro Engine E4-A engine. Any engine malfunction must be reported to Austro Engine.

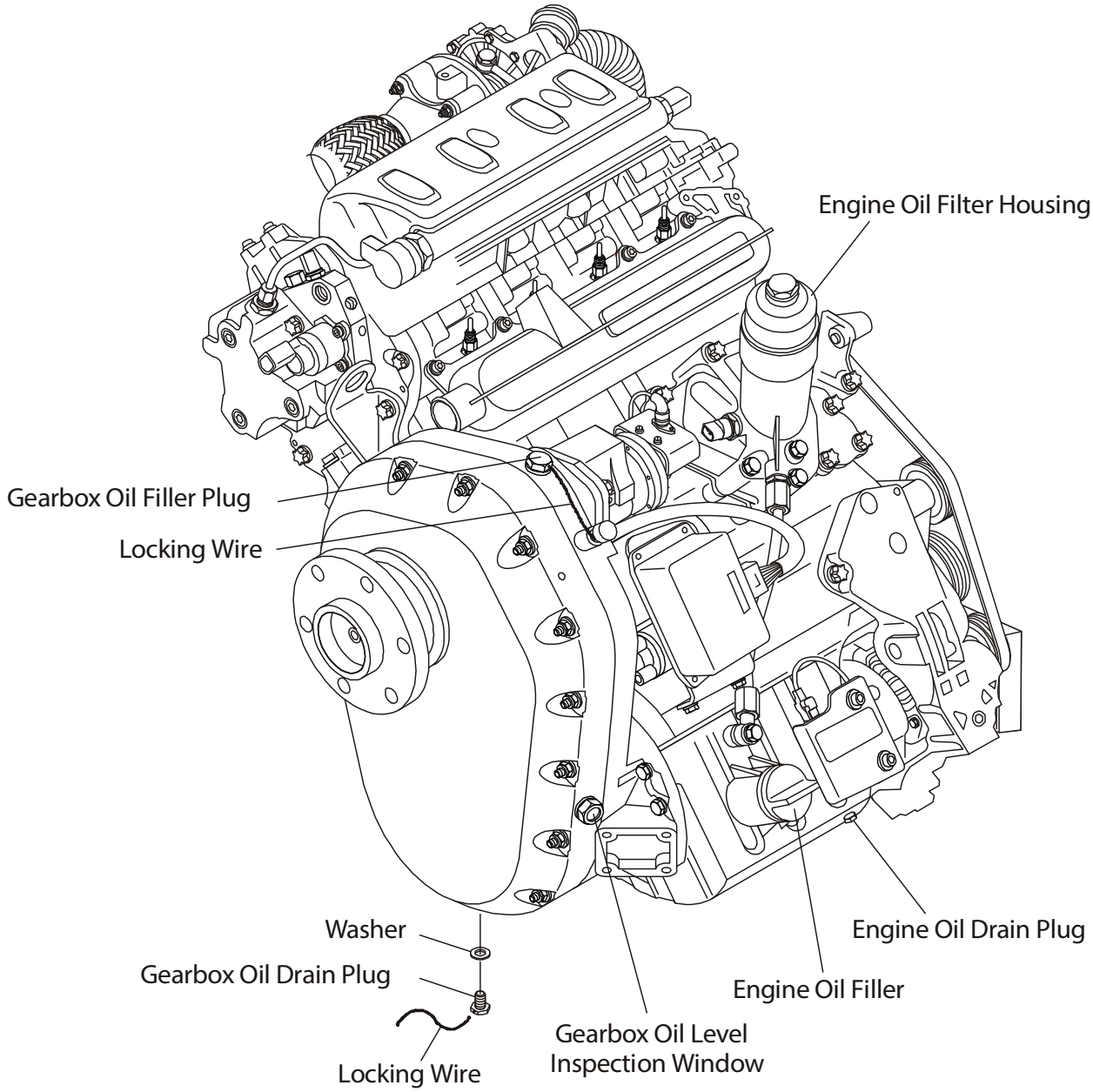

Figure 1 : Oil System Maintenance Locations

2. Description

The Austro Engine E4-A engine is a liquid-cooled, in-line four-stroke four cylinder engine with a double overhead camshaft (DOHC). The valves are actuated by the cam follower. The direct fuel injection is realized with a common rail technique and the engine is charged by a turbo charger. All engine components are controlled by an EECU system. The engine is equipped with an electrical starter, an alternator, a water pump, an oil pump, a coolant system and an oil cooler. The propeller is powered by a directly integrated gearbox with an integral torsional vibration damper.

3. Engine Oil System

The engine has a regular wet sump oil system. The sump has a maximum capacity of 7 liter (7.4 US qt). Refer to the Airplane Flight Manual Chapter 2 for data about the oil types to be used in the engine.

The internal oil pump supplies oil to all bearings and other components that require oil. Oil galleries inside the engine crankcase and cylinder head supply oil to the internal components.

Figure 1 shows the location of the items that you can maintain on the engine oil system of the AE E4-A engine. The engine has the following maintenance points:

- A oil filter located at the top left side of the engine adjacent to the cylinder head. You must replace the filter at the times specified in Chapter 05.
- An engine oil drain plug at the rear left of the engine sump.
- An engine oil filler located at the top of the oil sump.
- A gearbox oil filler plug located at the top of the gearbox.
- A gearbox oil level window located at the LH side of the gearbox.
- A gearbox oil drain plug located at the bottom of the gearbox.
- An oil separator is located under the injector cover.

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TROUBLE-SHOOTING

1. General

The trouble-shooting given in this Section is limited to those items where maintenance is permitted. For all other engine troubles, refer to an approved Austro Engine E4-A repair facility or the engine manufacturer.

When experiencing trouble as detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Engine oil pressure low.	Not enough oil in the engine oil sump.	Fill the engine with oil.
	Oil pressure regulator valve does not operate correctly.	Refer to the engine manufacturer.
	Defective oil pump.	Refer to the engine manufacturer.
Gearbox oil temperature high.	Not enough oil in the gearbox.	Find the reason for the loss of gearbox oil and correct the problem. Fill the gearbox with oil. Refer to the AFM for approved oil types.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices describe how to service the oil system on the E4-A engine. Further maintenance practices are described in the Austro Engine service documents. Refer to an approved Austro Engine E4-A maintenance facility or the engine manufacturer for all other engine maintenance.

WARNING: DO NOT GET OIL ON YOU. OIL CAN CAUSE SKIN DISEASE.

CAUTION: ALWAYS PUT A CAP ON OPEN CONNECTIONS. IF YOU DO NOT PUT A CAP ON OPEN CONNECTIONS, THEN CONTAMINATION CAN GET INTO THE SYSTEM AND CAUSE DAMAGE.

CAUTION: DO NOT MIX OIL TYPES. IF YOU MIX OIL TYPES THE OIL CAN LOSE ITS PROPERTIES AND THE ENGINE WILL WEAR MORE QUICKLY.

NOTE: A sample of the oil and the used oil filter must be stored in a clean container, labeled, and made available to Austro Engine GmbH on request for the complete engine life time. The label must show the airplane serial number, registration number, engine serial number, operation time and date. Quantity of the oil sample must be 100 ml.

2. Change the Engine Oil and Replace the Oil Filter

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.** NOTE: For environment protection, changing the engine oil is only allowed on sealed surfaces. Used engine oil has to be disposed according to the applicable regulations. The environment and ground water must not be contaminated.	
(1)	Do an engine ground run until the engine oil has operating temperature.	
(2)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(3)	Disconnect the airplane main battery.	Refer to Section 24-34.
(4)	Remove the engine cowlings.	Refer to Section 71-10.
	CAUTION: USE ONLY APPROVED ENGINE OIL. REFER TO CHAPTER 2 OF THE AIRPLANE FLIGHT MANUAL FOR APPROVED ENGINE OIL SPECIFICATION. IF YOU DO NOT USE APPROVED ENGINE OIL, THE ENGINE CAN BE DAMAGED.	
(5)	Change the engine oil and replace the engine oil filter.	Refer to the AE Maintenance Manual, latest revision.
	NOTE: For change the engine oil and replace the oil filter procedures refer to the AE Maintenance Manual, latest revision. If an engine oil quick drain equipment is available, refer to Chapter 79 for more details.	
(6)	Visually check engine oil for coolant.	No coolant is allowed in the oil.

	Detail Steps/Work Items	Key Items/References
(7)	Cut open the used oil filter. Look for particles of metal.	If the filter contains particles of metal, refer to the engine manufacturer.
(8)	Install the engine cowlings.	Refer to Section 71-10.
(9)	Do a ground test of the engine, allow the engine to reach normal operating temperatures.	Refer to Section 71-00 and the AE Maintenance Manual, latest revision.
(10)	Shut down the engine and do a test for oil leaks: - Remove the engine cowlings. - Look for oil leaks, specially in the areas where you have done work (drain). - Install the engine cowlings.	 Refer to Section 71-10. Refer to Section 71-10.

3. Replace the Gearbox Oil

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.** NOTE: For environment protection, changing the gearbox oil is only allowed on sealed surfaces. Used gearbox oil has to be disposed according to the applicable regulations. The environment and ground water must not be contaminated.	
(1)	Do an engine ground run until the engine oil has operating temperature.	
(2)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(3)	Disconnect the airplane main battery.	Refer to Section 24-34.
(4)	Remove the engine cowlings.	Refer to Section 71-10.
	CAUTION: USE ONLY APPROVED GEARBOX OIL. REFER TO CHAPTER 2 OF THE AIRPLANE FLIGHT MANUAL FOR APPROVED GEARBOX OIL SPECIFICATION. IF YOU DO NOT USE APPROVED GEARBOX OIL, THE ENGINE CAN BE DAMAGED.	
(5)	Change the gearbox oil.	Refer to the AE Maintenance Manual, latest revision.

	Detail Steps/Work Items	Key Items/References
(6)	Install the engine cowlings.	Refer to Section 71-10.
(7)	Do a ground test of the engine.	Refer to Section 71-00 and the AE Maintenance Manual, latest revision.
(8)	Shut down the engine and check for gearbox oil leaks: - Remove the engine cowlings. - Look for leakage, specially in the area of the gearbox oil drain plug and gearbox oil filler plug. - Install the engine cowlings.	 Refer to Section 71-10. Refer to Section 71-10.

4. Complete an Engine Electronic Control Unit (EECU) Software Update, if required.

NOTE: Only Austro Engine GmbH service partners may do software updates

The intention of this procedure is to:

- Record the status of the EECU
- Update the EECU Software (SW) according to MSB-E4-003 with the AE300-Wizard
- Record the updated status of the EECU.

The AE300-Wizard uses a Flash Container, which includes the Software file to update the EECU. The Flash Container is available on the Austro Engine Homepage / Client Area.

Obey the diagram below for the Software Update procedure by use of references to the AE300-Wizard. For detailed instructions, refer to latest revision of the AE300-Wizard User Guide E4.08.09.

Use the appendix of MSB E4-003 “Execution Report” to record the updated status of the EECU.

Refer to MSB E4-003 for current software versions and compatibility information.

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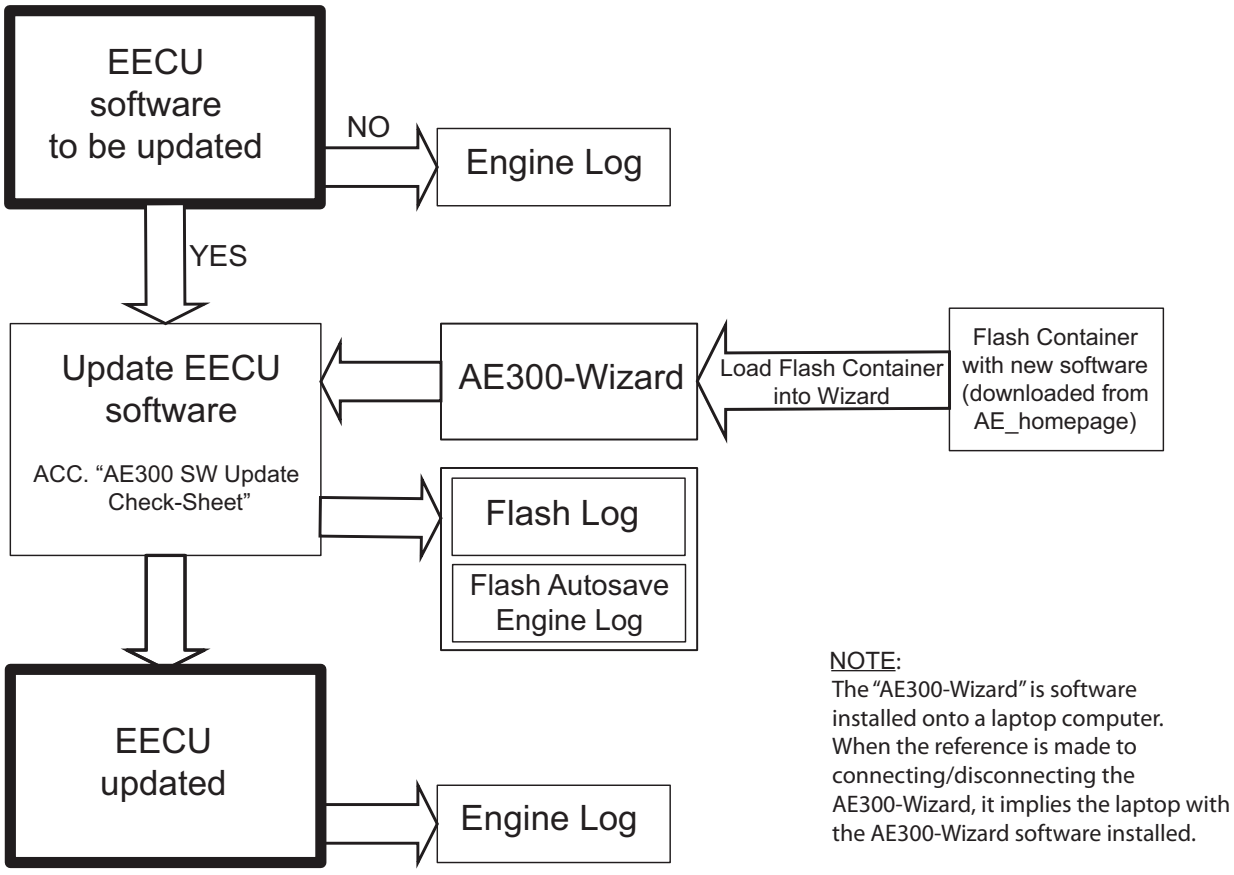

Figure 201 : Update of the EECU Software

A. Software Update Procedure

NOTE: The “AE300-Wizard” is software installed onto a laptop computer. When the reference is made to connecting/disconnecting the AE300-Wizard, it implies the laptop with the AE300-Wizard software installed.

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
NOTE: For reference, use the latest revision of the AE300-Wizard User Guide E4.08.09. Always use the latest AE300-Wizard software version.		
(1)	Connect the AE300-Wizard to the EECU.	
(2)	Identify the EECU software version on ECU A and ECU B.	
(3)	Compare the EECU software version on ECU A and ECU B with the last valid EECU software version.	Refer to MSB E4-003 for the last valid software version. If the EECU software version is obsolete and/or not the last version, continue with the following steps.
(4)	Upload the last valid “Flash Container” of the EECU software version into the AE300-Wizard.	The last valid EECU software version according to MSB E4-003.
(5)	Do the “EECU SW Update”.	Refer to the AE300-Wizard User Guide section “EECU Software Update.”
(6)	Make sure that the GREEN MESSAGE BOX shows.	- Update process successful. - If the RED MESSAGE BOX shows, obey the steps explained in the AE300-Wizard User Guide section “Detailed Steps of the Software Update Process”.
(7)	Identify the EECU software version on ECU A and ECU B.	
(8)	Compare the EECU software version on ECU A and ECU B.	Make sure that ECU A and ECU B have the same EECU software version according to the AE300-Wizard User Guide.
(9)	Read out “Engine Log” and compare with the last valid EECU software version.	

	Detail Steps/Work Items	Key Items/References
(10)	Do a check of the function and connection to the Engine Display: - Start the engine - Set manually to ECU A - Make sure the engine data is correctly displayed - Make sure that no engine caution Indication is generated or active - Set manually to ECU B - Make sure the engine data is correctly displayed - Make sure that no engine caution Indication is generated or active - Stop the engine.	
(11)	Disconnect the AE300-Wizard.	

B. Examine the EECU Fault Log.

	Detail Steps/Work Items	Key Items/References
(1)	Read the fault code memory of the EECU. Examine for “real time clock failure” occurrences (DTC 1d06).	If this failure shows on one of the ECUs (ECU A or ECU B) with the error type “NPL: RTC-oscillator has stopped, time/date 00:00:00 2000- 01-01 substituted”, replace the EECU within the next 12 months. Refer to the 76-00-00, Maintenance Practices.
		If this failure shows on the two ECUs (ECU A and ECU B) with minimum one with error type “NPL: RTC-oscillator has stopped, time/date 00:00:00 2000-01-01 substituted”, replace the EECU immediately. Refer to the 76-00-00, Maintenance Practices

5. Read out EECU data using the AE300-Wizard Software

CAUTION: ONLY AE-AUTHORIZED PERSONNEL MAY DOWNLOAD DATA FROM THE ENGINE.

CAUTION: WHEN OPERATING THE AIRPLANE ELECTRICAL SYSTEM WITH ENGINE MASTER ON AND THE ENGINE IS NOT RUNNING ALWAYS CONNECT AN EXTERNAL POWER SUPPLY WITH A PRESET VOLTAGE OF 29V TO THE AIRPLANE. IF MÄM 40-551 IS INSTALLED, USE A PRESET VOLTAGE LOWER THAN 26.0 V. OTHERWISE THE ALTERNATORS MAY BE DAMAGED.

A. Equipment.

Item	Quantity	Part Number
Laptop computer.	1	Commercial.
EECU software (latest approved version).	N/A	N/A.
AE300-Wizard software (latest approved version).	N/A	N/A.
CAN driver for the AE300-Dongle.	1	Commercial.
AE-300 Dongle [connects the EECU (9-pin CAN connector) to your Laptop (USB connector)].	1	Commercial.
Latest revision of the AE300-Wizard User Guide E4.08.09.	1	Commercial.

B. Set up the laptop with AE300-Wizard software on the airplane and download the following data:

NOTE: Refer to the latest revision of the AE300-Wizard User Guide E4.08.09. for set up of the laptop on the airplane and saving of information.

- Engine event log
- Event recorder
- Engine data log.

Send the recorded data to Austro Engine GmbH via e-mail.

For the list of engine control system errors and their error handling refer to the latest revision of the Austro Engine Operation Manual, Doc. No. E4.01.01.

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CHAPTER 73
ENGINE FUEL AND CONTROL

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ENGINE FUEL AND CONTROL

1. General

This Section describes the fuel system of the Austro Engine E4-A engine and provides general data and trouble shooting information of the system.

Refer also to the engine manufacturer's Repair Manual for the Austro Engine E4-A engine. You can replace components in the air intake system and the fuel filter. Refer to the engine manufacturer for data on the engine fuel system.

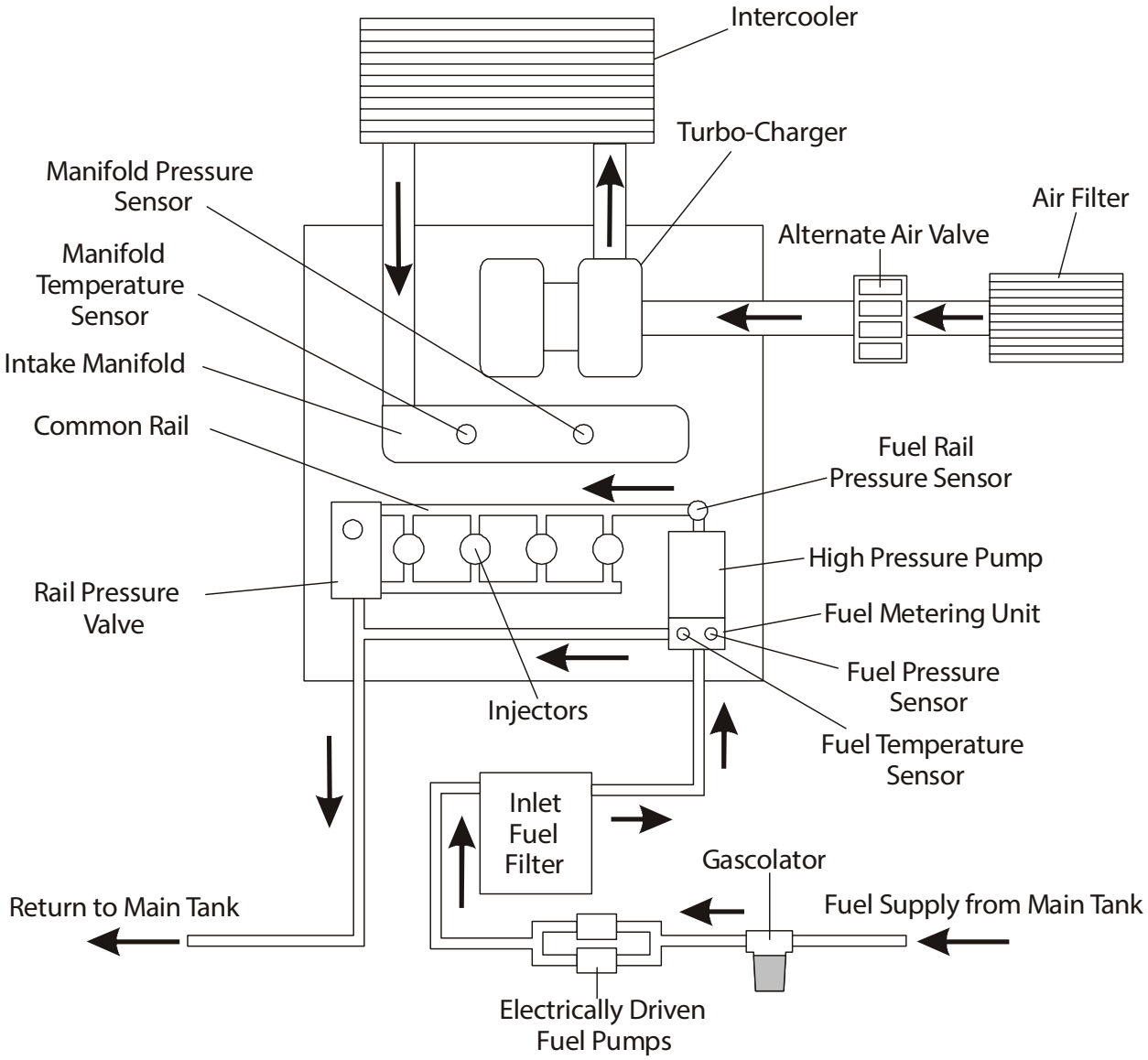

Figure 1 : Engine Fuel System Schematic

2. Description and Operation

Figure 1 shows the schematic diagram for DA 40 NG with the AE E4-A engine. The power generation system has two main parts:

- Air intake system. This system supplies air from the inlet to the air filter to the engine intake manifold.
- Engine fuel system. The engine fuel system takes fuel from the airplane fuel system and injects it into the cylinders.

A. Air Intake System

The air intake system has an air filter which is located at the firewall in the engine compartment. The filter attaches to the forward face of the alternate air valve. The alternate air valve inlet takes air direct from the engine compartment. The valve can be selected to provide filtered air or warm, unfiltered air to the engine. Refer to Section 71-60 for more data on the air filter and alternate air valve.

The outlet of the alternate air valve connects to the turbo charger. The outlet of the turbo-charger connects then to an intercooler and the engine intake manifold. Refer to Chapter 81 for more data on the turbo charger and intercooler.

B. Engine Fuel System

The fuel from the main tank flows through the fuel selector, gascolator (filter size 210 µm) to the electrically driven low pressure fuel pumps. These fuel pumps supply the high pressure pump with the required fuel pressure and flow. A fine fuel filter is installed upstream of the high pressure pump to assure clean fuel supply. Located between the fine fuel filter and the high pressure fuel pump is a damper to reduce the fuel pressure pulsations if MÄM 40-468 is installed.

The high-pressure pump supplies fuel to a common rail connected to the injectors. A fuel metering unit at the engine driven high pressure fuel pump which ensures that only the required quantity of fuel is compressed. The necessary rail pressure, which is measured directly at the rail, is controlled by the rail pressure valve. Surplus fuel returns to the airplane main fuel system. The fuel returning from the engine is hot. The hot fuel passes through a fuel cooler located in the fuselage wing attachment area. From there the fuel returns via a cooling loop through the auxiliary tank to the fuel main tank.

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TROUBLE-SHOOTING

1. General

The table below lists possible defects of the engine fuel and control system. Only data about the air intake, air filter and fuel filter are provided. For more data on troubleshooting the engine fuel and control system refer to the engine manufacturer.

When experiencing trouble as detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Loss of engine power.	Blocked air intake.	Examine the air intake. Remove any obstructions. Refer to Section 71-60.
	Dirty/damaged air filter.	Replace the air filter. Refer to Section 71-60.
	Dirty/damaged fuel filter.	Replace the fuel filter. Look for contaminated fuel in the airplane fuel system. Refer to Section 28-00 and Section 28-20.
	Air in the fuel distribution system.	Bleed the fuel distribution system. Refer to Section 28-20.

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MAINTENANCE PRACTICES

1. General

Only an approved Austro Engine repair shop can repair the engine fuel system. For more data on the engine fuel and control system refer to the engine manufacturer.

- Refer to Section 28-20 for more data on the fuel distribution system.
- Refer to Section 71-60 for maintenance data on the air filter and alternate air valve.
- Refer to Chapter 81 for maintenance data on the turbo charger system.

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CHAPTER 75
LIQUID COOLING SYSTEM

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LIQUID COOLING SYSTEM

1. General

This Section describes the liquid cooling system of the DA 40 NG airplane. It provides Maintenance Practices to remove/install the liquid cooling system components.

Figure 1 shows the liquid cooling system schematic and a basic overview of components in the system. Figures 2 thru 5 show the installation of the liquid cooling system in the airplane for the different configurations.

2. Description

The engine has a water-based liquid cooling system. The liquid coolant is a mixture of water and antifreeze. Refer to the Airplane Flight Manual for approved coolant types.

The engine has an integral coolant pump. The coolant pump is located at the rear of the engine and is powered by the v-ribbed belt. An automatic tensioner keeps the belt tension at the correct value.

A temperature sensor at the engine coolant outlet connects to the engine control system. The integrated cockpit system (ICS) or the main engine display (MED) displays the coolant temperature (COOLING TEMPERATURE or CT).

The cooling system has three circuits (see Figure 1 - Sheet 1):

A. Small Cooling Circuit

The circuit is active at cooling temperature below 80 °C (176 °F). Coolant circulates from the closed thermostatic valve to the water pump and the engine.

B. Bypass Cooling Circuit

The bypass cooling circuit is always active. Coolant circulates from the engine to the heat exchanger, to the water pump and back to the engine.

C. Large Cooling Circuit

This circuit starts opening at 80 °C (176 °F) and is fully opened at 95 °C (203 °F). Coolant circulates post the thermostatic valve to the radiator (located below the engine mount) back to the water pump and the engine.

A coolant expansion tank is located on top of the engine next to a thermostatic valve. This is the highest point in the system. A small diameter hose connects the highest point of the system to the top of the coolant expansion tank. The tank has an over pressure valve which opens when max. coolant system pressure is exceeded.

A small diameter hose connects the bottom of the coolant tank to the inlet to the coolant pump.

A coolant level sensor is installed in the coolant tank. It operates the WATER LEVEL caution light in the ICS or the WATERLEV caution light on the SED.

On top of the coolant expansion tank a pressure relief valve is installed. The pressure relief valve limits the over and under pressure in the cooling circuit.

If MÄM 40-763 is NOT installed:

A silicate cartridge contains a replaceable silicate pouch and is situated on the bottom side of the coolant expansion tank.

If MÄM 40-763 is installed:

A cartridge contains a replaceable silicate pouch and is situated in the filler neck of the coolant expansion tank.

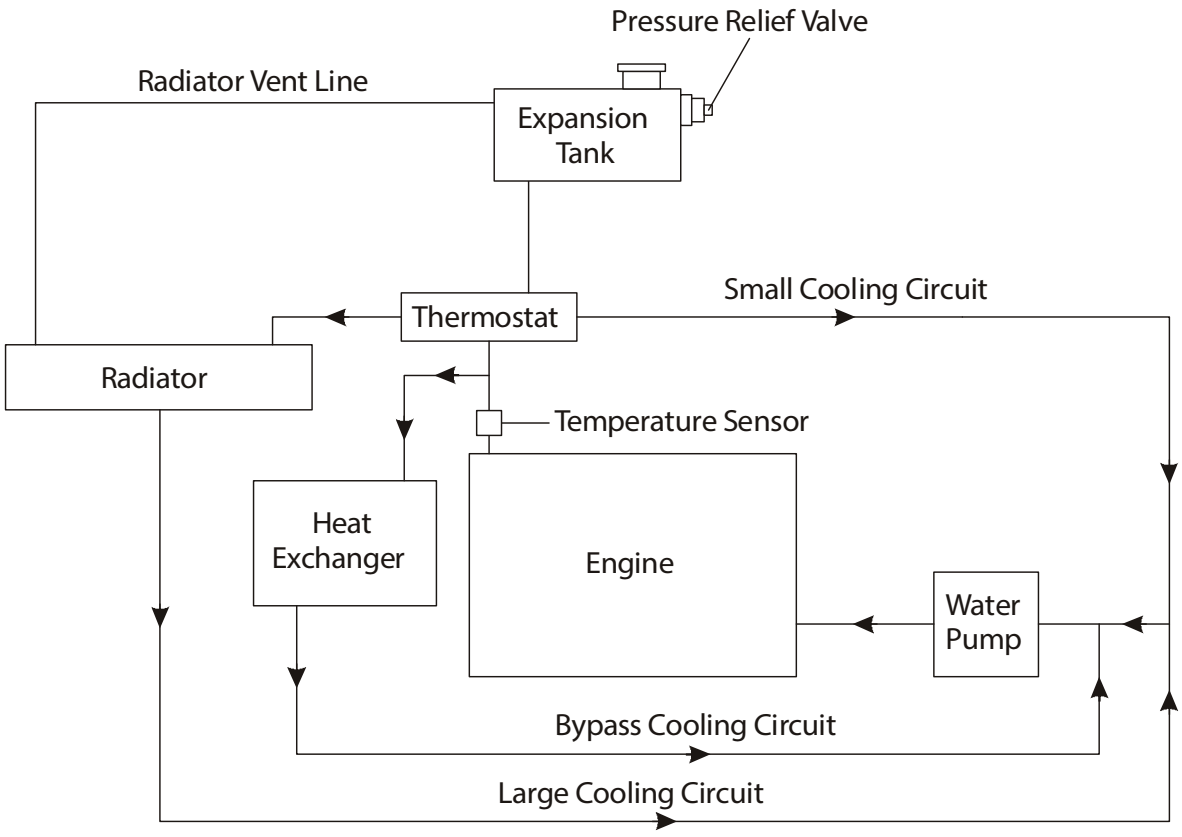

Figure 1 : Liquid Cooling - System Schematic Diagram (Sheet 1 of 2)

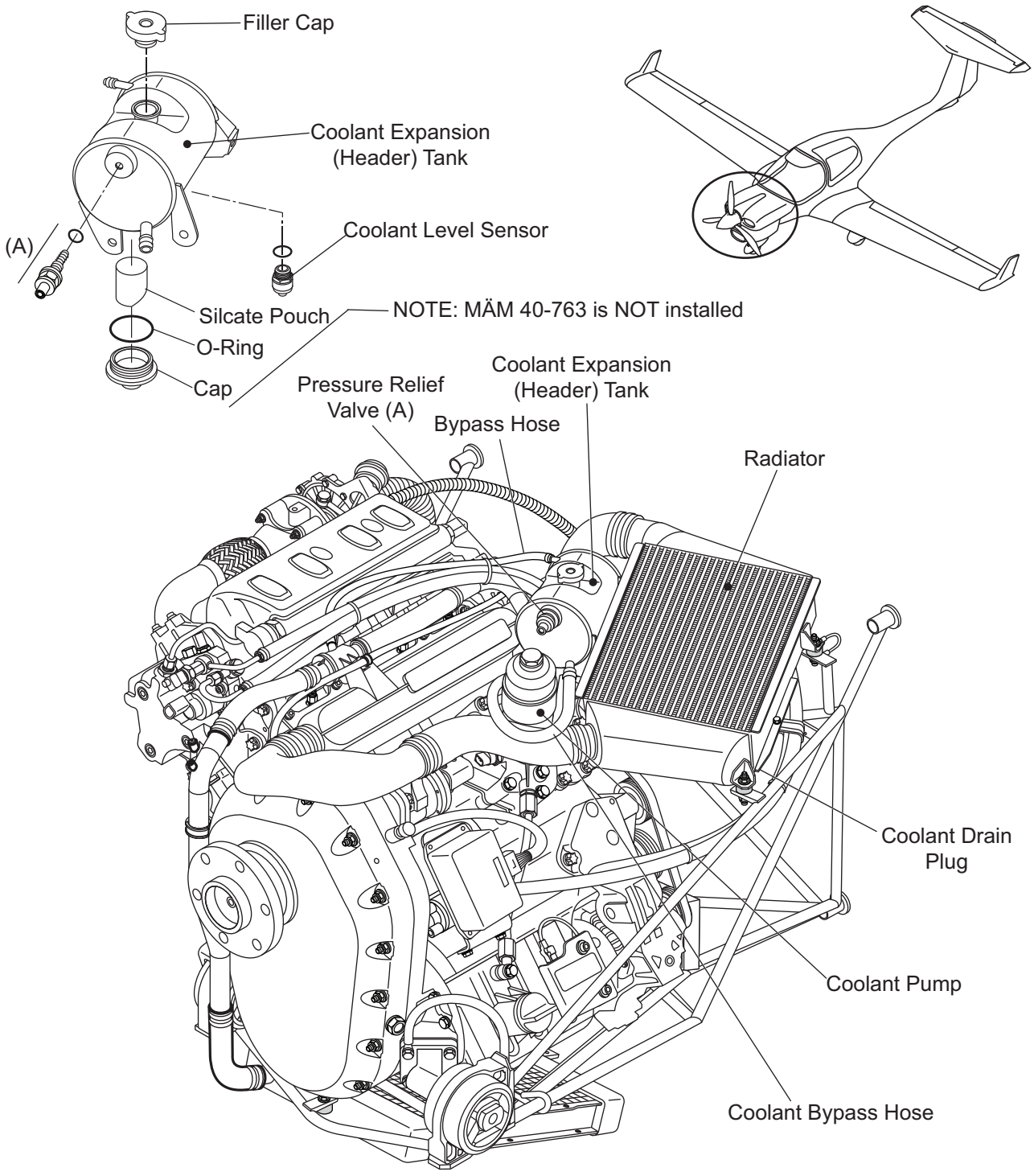

Figure 1 : Liquid Cooling - Components of the System (Sheet 2 of 2)

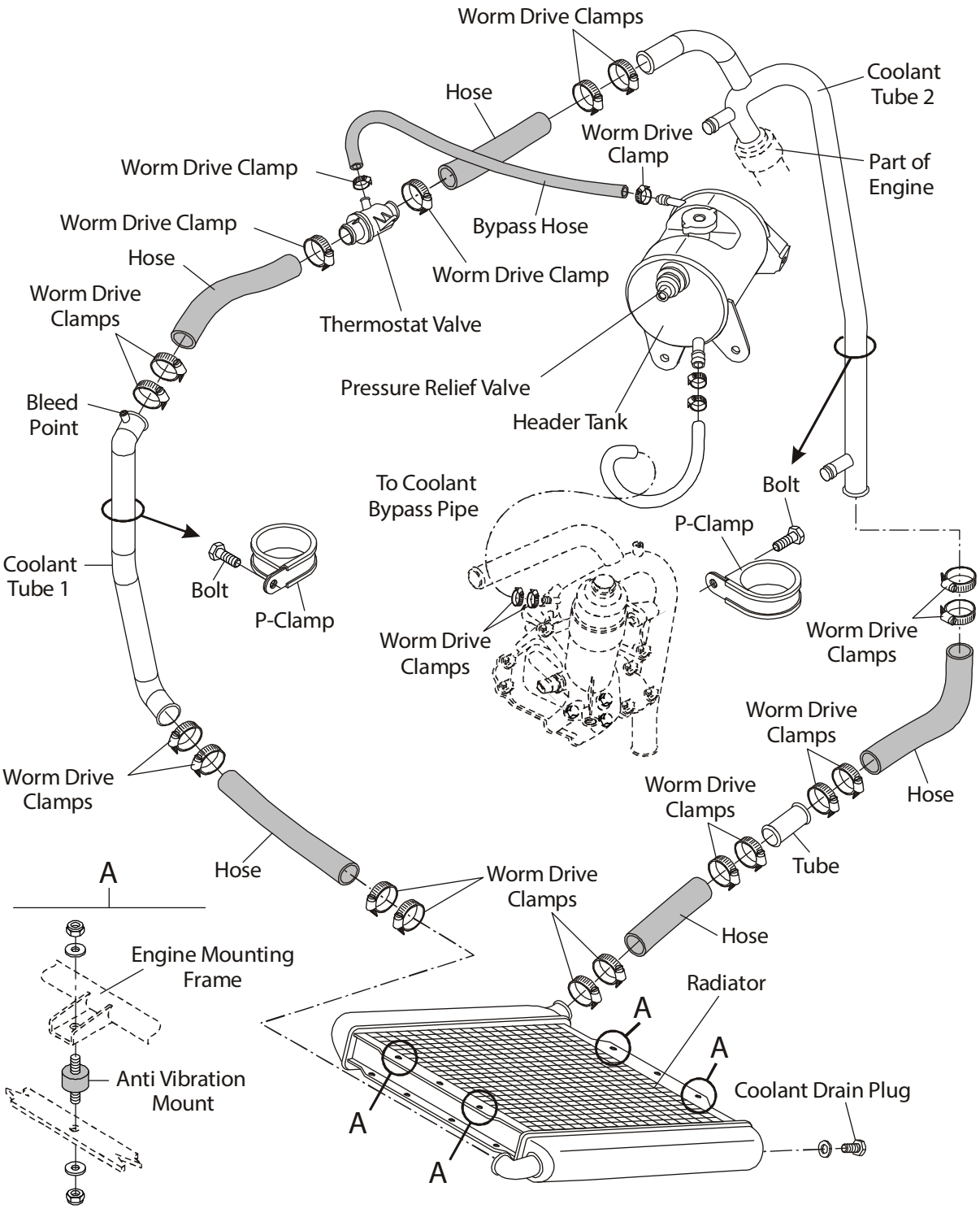

Figure 2 : Liquid Cooling System Installation (if MÄM 40-434 is not installed)

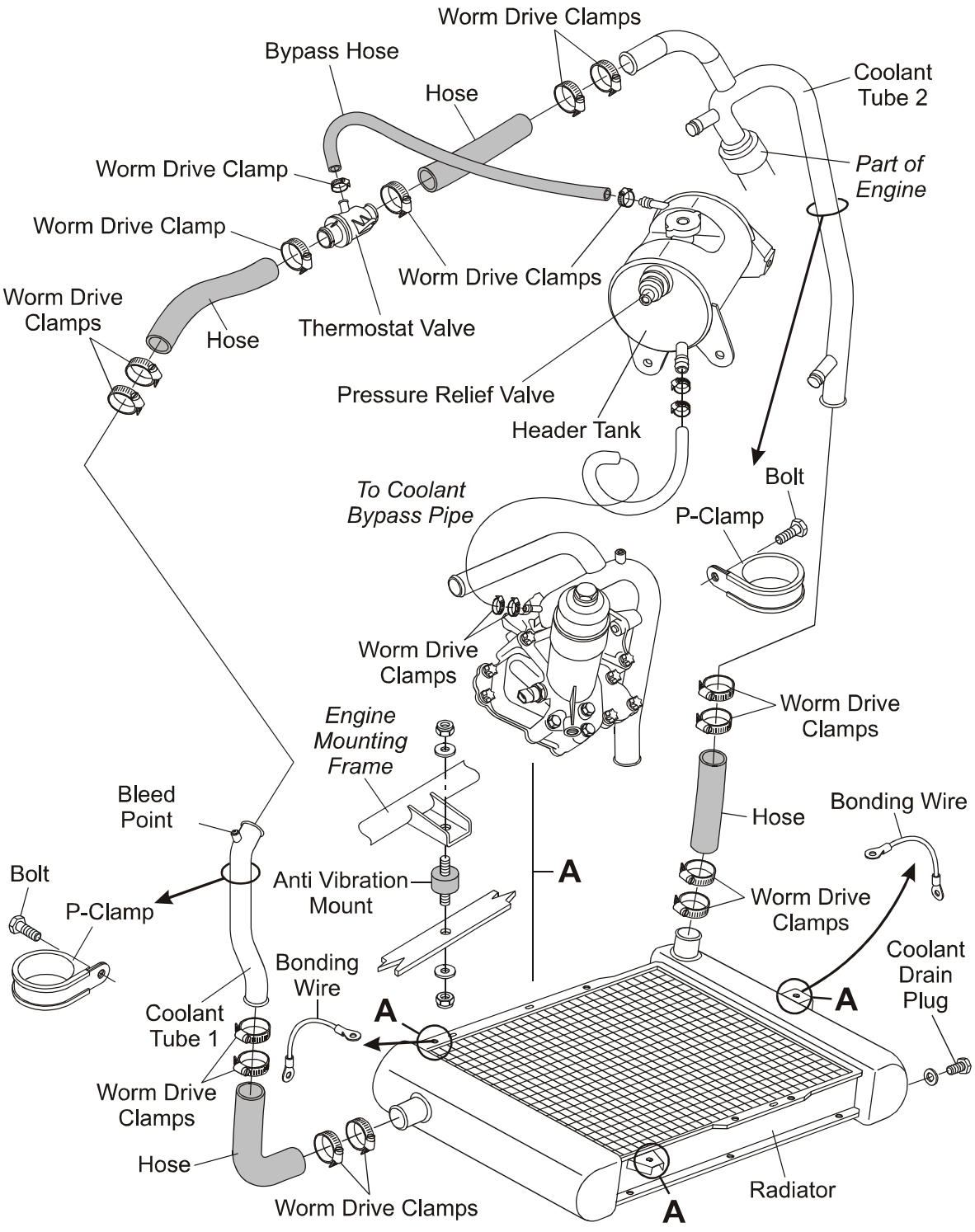

Figure 3 : Liquid Cooling System Installation (if MÄM 40-434 is installed)

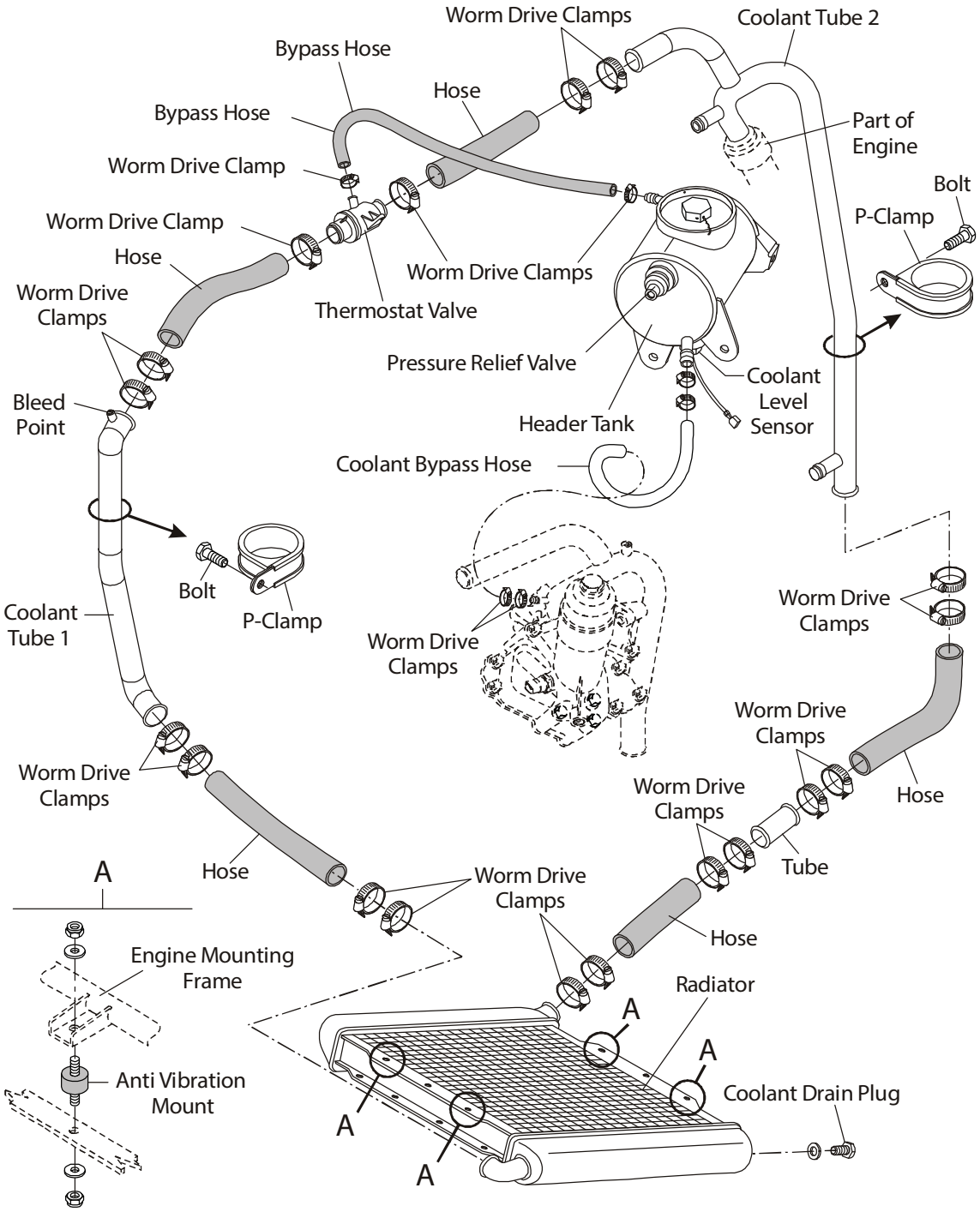

Figure 4 : Liquid Cooling System Installation (if MÄM 40-763 is installed)

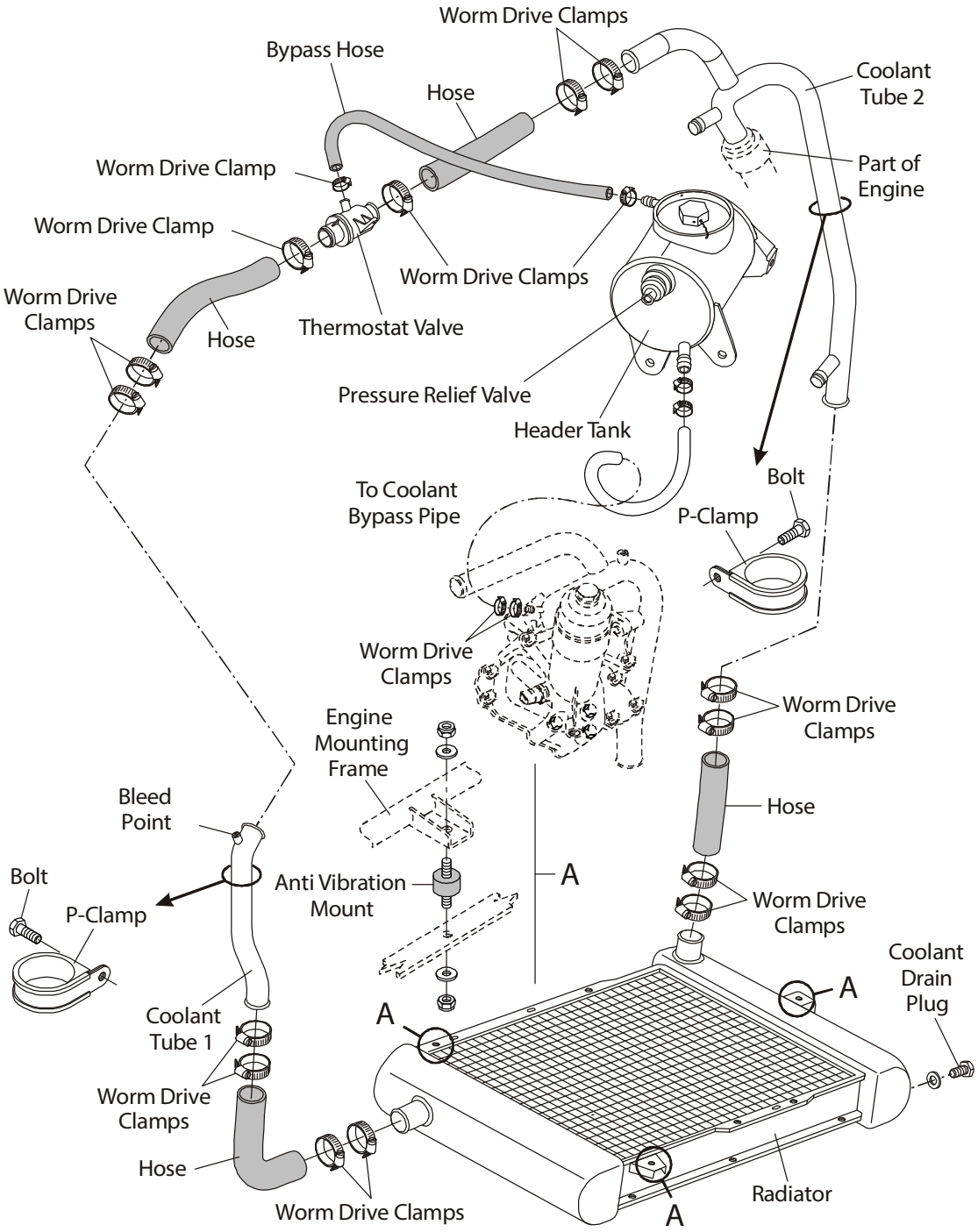

Figure 5 : Liquid Cooling System Installation (if MÄM 40-434 AND MÄM 40-463 are installed)

TROUBLE-SHOOTING

1. General

This table describes how to troubleshoot the liquid cooling system. This table gives only troubles to the airplane parts of the cooling system.

When experiencing trouble as detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
Engine overheats.	Flat-belt worn or broken.	Refer to the engine manufacturer.
	Coolant level low.	Fill the cooling system. Refer to Section 12-10.
	Coolant leak.	Look for leaks at all system joints. Repair or replace defective components.
	Air in cooling system.	Bleed the cooling system.
	Radiator matrix blocked by foreign objects.	Remove foreign objects and clean radiator matrix.
	Thermostat valve defective.	Refer to the engine manufacturer.
	Coolant pump defective.	Refer to the engine manufacturer.
	Defective cylinder head gasket.	Refer to the engine manufacturer.

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MAINTENANCE PRACTICES

1. General

This Section describes the Maintenance Practices of the liquid cooling system components.

2. Remove/Install the Coolant Expansion (Header) Tank

Refer to Figure 1 and Figures 2 through 5 in the Description and Operation Pageblock, relative to the airplane configuration.

A. Remove the Coolant Expansion (Header) Tank.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Remove the engine cowling.	Refer to Section 71-10.
	WARNING: DO NOT REMOVE THE PRESSURE CAP FROM THE COOLANT TANK IF THE ENGINE IS HOT. THE PRESSURE IN THE SYSTEM CAN FORCE HOT COOLANT TO COME OUT AND BURN YOU.	
(4)	Remove the filler cap from the coolant tank: - If installed, remove the safety lock wire from the filler cap. - Turn the cap counterclockwise a small distance to release the pressure. - When the pressure has fully released, remove the cap. - Drain coolant.	Refer to Paragraph 8.

	Detail Steps/Work Items	Key Items/References
(5)	Disconnect the hose that connects the coolant tank to the supply system: - Remove the worm-drive-clamp that secures the hose. - Pull the hose from the connector at the coolant tank.	Use a suitable container to collect the coolant.
(6)	Disconnect the electrical cables for the coolant tank level sensor.	At the inline connector, at the sensor.
(7)	Remove the hose from the coolant tank which connects to the thermostat vent.	
(8)	Remove the nuts and bolts which attach the coolant tank to the intercooler.	
(9)	Move the coolant tank clear of the engine.	

B. Install the Coolant Expansion (Header) Tank.

	Detail Steps/Work Items	Key Items/References
(1)	Install the nuts and bolts which attach the coolant tank to the intercooler.	
(2)	Connect the electrical cables for the coolant tank level sensor.	
(3)	Install the hose that connects the coolant tank to the thermostat vent.	
(4)	Connect the hose that connects the coolant tank to the supply system: - Push the hose onto the connector at the coolant tank. - Install the worm-drive-clamp that secures the hose connection.	
(5)	Fill and bleed the liquid coolant system.	Refer to Paragraph 7.
(6)	Install the engine cowling.	Refer to Section 71-10.
(7)	Perform a coolant pressure test.	Refer to Paragraph 9.

3. Remove/Install the Pressure Relief Valve

Refer to Figure 1 in the Description and Operation Pageblock.

A. Remove the Pressure Relief Valve.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Remove the engine cowling.	Refer to Section 71-10.
	WARNING: DO NOT REMOVE THE PRESSURE CAP FROM THE COOLANT TANK IF THE ENGINE IS HOT. THE PRESSURE IN THE SYSTEM CAN FORCE HOT COOLANT TO COME OUT AND BURN YOU.	
(3)	At the coolant expansion (header) tank, remove the locking wire from the pressure relief valve.	
(4)	Remove the pressure relief valve.	

B. Install the Pressure Relief Valve.

	Detail Steps/Work Items	Key Items/References
(1)	Install the pressure relief valve.	Torque 12-15 Nm (8.85 - 11.06 lbf.ft.). Check O-ring for deformation and delocation. Apply EZ TURN.
(2)	Install locking wire.	Wire diameter 0.8 mm (0.032 in).
(3)	Install the engine cowling.	Refer to Section 71-10.

4. Replace the Silicate Pouch (If MÄM 40-763 is installed)

Refer to Figure 4 in the Description and Operation Pageblock, relative to the airplane configuration.

NOTE: If MÄM 40-763 is NOT installed, refer to Paragraph 11.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-10.
	WARNING: DO NOT REMOVE THE FILLER CAP FROM THE COOLANT TANK IF THE ENGINE IS HOT. THE PRESSURE IN THE SYSTEM CAN FORCE HOT COOLANT TO COME OUT AND BURN YOU.	
(2)	Remove the safety lock wire from the filler cap on the coolant expansion (header) tank.	
(3)	Remove the filler cap from the coolant expansion tank to relief any pressure which may be resident in the system: - Turn the cap counterclockwise a small distance to release the pressure. - When the pressure has fully released, turn the cap fully counterclockwise.	
(4)	Remove the retaining ring inside the filler neck.	
(5)	Remove the max coolant level plate.	
(6)	Remove the used silicate pouch and replace it with the new silicate pouch. Remove cartridge and clean it with water. Reinstall cartridge.	
(7)	Install the max coolant level plate.	Be sure that the engraved max coolant marking is on the top.
(8)	Install the retaining ring.	
(9)	Check the coolant level, refill if required.	Refer to Paragraph 7.
(10)	Install the cap on the coolant expansion tank. Check O-ring for deformation.	Refer to Section 20-70. Torque 12-15 Nm (8.85 - 11.06 lbf.ft.). Renew O-ring if necessary. Apply EZ TURN.
(11)	Install safety lock wire to secure the filler cap.	Wire diameter 0.8 mm (0.032 in).

5. Replace the Coolant Level Sensor

Refer to Figure 4 in the Description and Operation Pageblock.

	Detail Steps/Work Items	Key Items/References
(1)	Remove the engine cowlings.	Refer to Section 71-10.
	WARNING: DO NOT REMOVE THE FILLER CAP FROM THE COOLANT TANK IF THE ENGINE IS HOT. THE PRESSURE IN THE SYSTEM CAN FORCE HOT COOLANT TO COME OUT AND BURN YOU.	
(2)	If MÄM 40-763 is installed: Remove the safety lock wire from the filler cap on the coolant expansion (header) tank.	
(3)	Remove the filler cap from the coolant expansion tank to relief any pressure which may be resident in the system: - Turn the cap counterclockwise a small distance to release the pressure. - When the pressure has fully released, turn the cap fully counterclockwise.	
(4)	Drain the engine cooling system.	Refer to Paragraph 8.
(5)	Disconnect the electrical cables for the coolant level sensor.	At the inline connector, at the sensor.
(6)	Remove the coolant level sensor.	
(7)	Install a new coolant level sensor. Use a new copper gasket.	Use Loctite 243. Torque: 25-30 Nm (18.44-21.13 lbf.ft.).
(8)	Fill and bleed the engine coolant system.	Refer to Paragraph 7.

6. Remove/Install the Coolant Radiator

Refer to Figure 1 and Figures 2 through 5 in the Description and Operation Pageblock, relative to the airplane configuration.

A. Remove the Coolant Radiator.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Remove the engine cowling.	Refer to Section 71-10.
	WARNING: DO NOT REMOVE THE PRESSURE CAP FROM THE COOLANT TANK IF THE ENGINE IS HOT. THE PRESSURE IN THE SYSTEM CAN FORCE HOT COOLANT TO COME OUT AND BURN YOU.	
(4)	Remove the filler cap from the coolant tank: - If installed, remove the safety lock wire from the filler cap. - Turn the cap counterclockwise a small distance to release the pressure. - When the pressure has fully released, remove the cap.	

	Detail Steps/Work Items	Key Items/References
(5)	Drain the coolant system.	Refer to Paragraph 8.
(6)	Remove the hoses from the radiator: - Remove the worm-drive-clamps that secure the hoses. - Pull the hoses from the connectors on the radiator.	Note the position and orientation of the hoses on the radiator, for the installation.
(7)	Remove the radiator: - Remove the nuts and washers that attach the radiator to the engine mount. - Move the radiator clear of the engine compartment.	

B. Install a Coolant Radiator.

	Detail Steps/Work Items	Key Items/References
(1)	Install the radiator: - Move the radiator into position at the bottom of the engine mount. - Install the washers and nuts that attach the radiator to the engine mount.	
(2)	Install the hoses onto the radiator that you removed in Paragraph 6A, item 6: - Install the radiator hoses onto the radiator inlet and outlet. - Secure the hoses with worm-drive-clamps	In the position and orientation noted in Paragraph 6A, item (6).
(3)	Fill and bleed the liquid coolant system.	Refer to Paragraph 7.
(4)	Install the engine cowling.	Refer to Section 71-10.
(5)	Connect the airplane main battery.	Refer to Section 24-31.
(6)	Perform a coolant pressure test.	Refer to Paragraph 9.

7. Fill and Bleed the Engine Cooling System

Refer to Figures 2 through 5 in the Description and Operation Pageblock, relative to the airplane configuration.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Remove the engine cowling.	Refer to Section 71-10.
	WARNING: DO NOT REMOVE THE PRESSURE CAP FROM THE COOLANT TANK IF THE ENGINE IS HOT. THE PRESSURE IN THE SYSTEM CAN FORCE HOT COOLANT TO COME OUT AND BURN YOU.	
(4)	Remove the filler cap from the coolant tank: - If installed, remove the safety lock wire from the filler cap. - Turn the cap counterclockwise a small distance to release the pressure. - When the pressure has fully released, remove the cap.	

	Detail Steps/Work Items	Key Items/References
(5)	Fill the cooling system: - Open the bleed point at the coolant radiator pipes. - Add coolant to the tank. - When coolant comes from the bleed points without air bubbles, close bleed points. If MÄM 40-763 is NOT installed: - Install the cap to the coolant tank. If MÄM 40-763 is installed: - Fill coolant to max. coolant level marking in the filler neck. - Check O-ring for deformation. - Install the filler cap to the coolant expansion tank.	Allow time for coolant to move through the system. Renew if necessary. Apply EZ TURN. Refer to Section 20-70. Torque 12-15 Nm (8.85 - 11.06 lbf.ft.)
(6)	Connect the airplane main battery.	Refer to Section 24-31.
(7)	Do an engine ground run: - Let the coolant temperature rise up to the point where the coolant flows from the thermostat valve through the main circuit. - After shut down, check for leaks	Refer to the Airplane Flight Manual.
(8)	Let the engine cool down.	
	WARNING: DO NOT REMOVE THE PRESSURE CAP FROM THE COOLANT TANK IF THE ENGINE IS HOT. THE PRESSURE IN THE SYSTEM CAN FORCE HOT COOLANT TO COME OUT AND BURN YOU.	
(9)	Remove the filler cap from the coolant tank: - Turn the cap counterclockwise a small distance to release the pressure. - When the pressure has fully released, remove the cap.	
(10)	Check the coolant level.	Make sure that the fluid level is at the coolant tank tab.

	Detail Steps/Work Items	Key Items/References
(11)	Repeat items 4, 5, and 7 through 10 until the system is completely free of trapped air and the fluid level is at the coolant tank tab.	
(12)	Install the filler cap to the coolant tank. If MÄM 40-763 is installed: - Install safety lock wire to secure filler cap.	Torque refer to Section 20-70. Check O-ring, apply EZ TURN Wire diameter 0.8 mm (0.032 in).
(13)	Install the engine cowling.	Refer to Section 71-10.

8. Drain the Engine Coolant System

Refer to Figures 2 through 5 in the Description and Operation Pageblock, relative to the airplane configuration.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Remove the engine cowling.	Refer to Section 71-10.
	WARNING: DO NOT REMOVE THE PRESSURE CAP FROM THE COOLANT TANK IF THE ENGINE IS HOT. THE PRESSURE IN THE SYSTEM CAN FORCE HOT COOLANT TO COME OUT AND BURN YOU.	
(4)	Remove the filler cap from the coolant tank: - If installed, remove the safety lock wire from the filler cap. - Turn the cap counterclockwise a small distance to release the pressure. - When the pressure has fully released, remove the cap.	
(5)	Drain the coolant system: - Remove the safety lock wire from the drain plug at the coolant radiator. - Remove the drain plug from the bottom left side of the coolant radiator. - Open the drain plug on the engine RH lower side above the turbo-charger.	You need not remove this drain plug. Use a suitable duct to guide the coolant into the container.

	Detail Steps/Work Items	Key Items/References
(6)	When the engine coolant system is completely drained: - Close the drain plug on the engine RH lower side above the turbo-charger. - Install the drain plug on the bottom left side of the coolant radiator. - Safety lock wire the drain plug.	
(7)	If the airplane is to be left without coolant, make sure to enter the information in the log books.	

9. Coolant System Pressure Test

A. Equipment.

Item	Quantity	Part Number
Pressure test equipment.	1	Commercial

B. Coolant System Pressure Test.

Refer to Figures 2 through 5 in the Description and Operation Pageblock, relative to the airplane configuration.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Remove the engine cowling.	Refer to Section 71-10.
	WARNING: DO NOT REMOVE THE PRESSURE CAP FROM THE COOLANT TANK IF THE ENGINE IS HOT. THE PRESSURE IN THE SYSTEM CAN FORCE HOT COOLANT TO COME OUT AND BURN YOU.	
(4)	Remove the filler cap from the coolant tank: - If installed, remove the safety lock wire from the filler cap. - Turn the cap counterclockwise a small distance to release the pressure. - When the pressure has fully released, remove the cap.	

	Detail Steps/Work Items	Key Items/References
(5)	Install the pressure test equipment in place of the filler cap.	
(6)	Remove the locking wire and remove the pressure relief valve. Plug the opening with a blind plug	
(7)	Pressurize the coolant system.	Apply 2.0 bar (29 PSI) relative pressure. Max. allowable pressure drop in 15 minutes: 0.1 bar (1.45 PSI).
(8)	Check the coolant system for leaks.	Make sure that there are no leaks.
(9)	Remove the pressure test equipment from the coolant tank. - Open the pressure relief valve of the test equipment. - Remove the test equipment carefully to relieve the remaining pressure.	
(10)	Remove the blind plug. Install the pressure relief valve. Safety lock wire the pressure relief valve.	 Wire diameter 0.8 mm (0.032 in).
(11)	Install the filler cap to the coolant tank. If MÄM 40-763 is installed: Install safety lock wire to secure the filler cap.	 Torque refer to Section 20-70. Check O-ring, apply EZ TURN Wire diameter 0.8 mm (0.032 in).
(12)	Install the engine cowling.	Refer to Section 71-10.
(13)	Connect the airplane main battery.	Refer to Section 24-31.

10. Pressure Relief Valve Test

A. Equipment.

Item	Quantity	Part Number
Pressure test equipment.	1	Commercial
Test cap.	1	D44-7521-00-00-ST (if MÄM 40-763 is installed).

B. Pressure Relief Valve Test.

Refer to Figures 2 through 5 in the Description and Operation Pageblock, relative to the airplane configuration.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Remove the engine cowling.	Refer to Section 71-10.
	WARNING: DO NOT REMOVE THE PRESSURE CAP FROM THE COOLANT TANK IF THE ENGINE IS HOT. THE PRESSURE IN THE SYSTEM CAN FORCE HOT COOLANT TO COME OUT AND BURN YOU.	

	Detail Steps/Work Items	Key Items/References
(4)	Remove the filler cap from the coolant tank: - If installed, remove the safety lock wire from the filler cap. - Turn the cap counterclockwise a small distance to release the pressure. - When the pressure has fully released, remove the cap.	
(5)	Install the pressure test equipment in place of the filler cap. If MÄM 40-763 is installed: - use pressure tool D44-7521-00-00-ST. - Torque refer to Section 20-70	
(6)	Pressurize the coolant system.	Apply 2.3 bar (33.4 PSI).
(7)	Verify: - The pressure relief valve (PRV) opens between 1.8 and 2.3 bar (26.1 and 33.4 PSI). - If the PRV does not open, depressurize the coolant system by opening the pressure relief valve of the test equipment. Mechanically open the PRV by pulling on the outer ring until it moves approx. 2 mm (0.08 in) outward. Remove the PRV. - Clean the PRV with water. - Install the PRV. - Repeat the PRV test. If the PRV does not open between 1.8 and 2.3 bar (26.1 and 33.4 PSI): Replace the PRV with a new PRV.	
(8)	Remove the pressure test equipment.	
(9)	Install the filler cap to the coolant tank. If MÄM 40-763 is installed: - Install safety lock wire to secure the filler cap.	 Torque refer to Section 20-70. Check O-ring, apply EZ TURN Wire diameter 0.8 mm (0.032 in).

	Detail Steps/Work Items	Key Items/References
(10)	Install the engine cowling.	Refer to Section 71-10.
(11)	Connect the airplane main battery.	Refer to Section 24-31.

11. Replace the Silicate Pouch (If MÄM 40-763 is NOT installed)

Refer to Figure 1, Sheet 2 in the Description and Operation Pageblock.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Drain the engine cooling system.	Refer to Paragraph 8.
(2)	Remove the coolant expansion tank.	Refer to Paragraph 2.
(3)	Remove the lock wire from the cartridge cap.	
(4)	Remove the cartridge cap.	
(5)	Remove the used silicate pouch and replace it with the new silicate pouch.	
(6)	Replace the used O-ring with a new O-ring.	Grease the O-ring with EZ TURN lubricant.
(7)	Install the cartridge cap.	Torque: 32.5 ± 2.5 Nm (24.0 ± 1.8 lbf.ft.).
(8)	Secure the cartridge cap with lock wire.	
(9)	Install the coolant expansion tank.	Refer to Paragraph 2.
(10)	Fill and bleed the engine coolant system.	Refer to Paragraph 7.
(11)	Perform a coolant system pressure test.	Refer to Paragraph 9.

CHAPTER 76
ENGINE CONTROLS

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ENGINE CONTROLS

1. General

This Section describes the DA 40 NG engine controls. The engine has one control (power) lever. Electrical cables connect the power lever to the engine control system.

2. Description and Operation

Figure 1 shows the schematic diagram of the engine control system if the G1000 system is installed.

Figure 2 shows the schematic diagram of the engine control system if the conventional cockpit is installed.

The system has an electronic engine control system (EECS). The control system has two independent computers, either of which can provide all control functions for the engine and propeller. The system has these main parts:

- Two digital engine control units (ECU A and ECU B located in one box in the fuselage compartment).
- An electrical harness that connects the ECUs to the engine, the power lever, the annunciator panel, control buttons and some instruments.
- Sensors that measure engine parameters.
- An electrical power lever located in the center console.
- An ECU TEST button for testing the engine control system.
- An ECU VOTER switch for switching between AUTO, ECU A and ECU B in emergency.

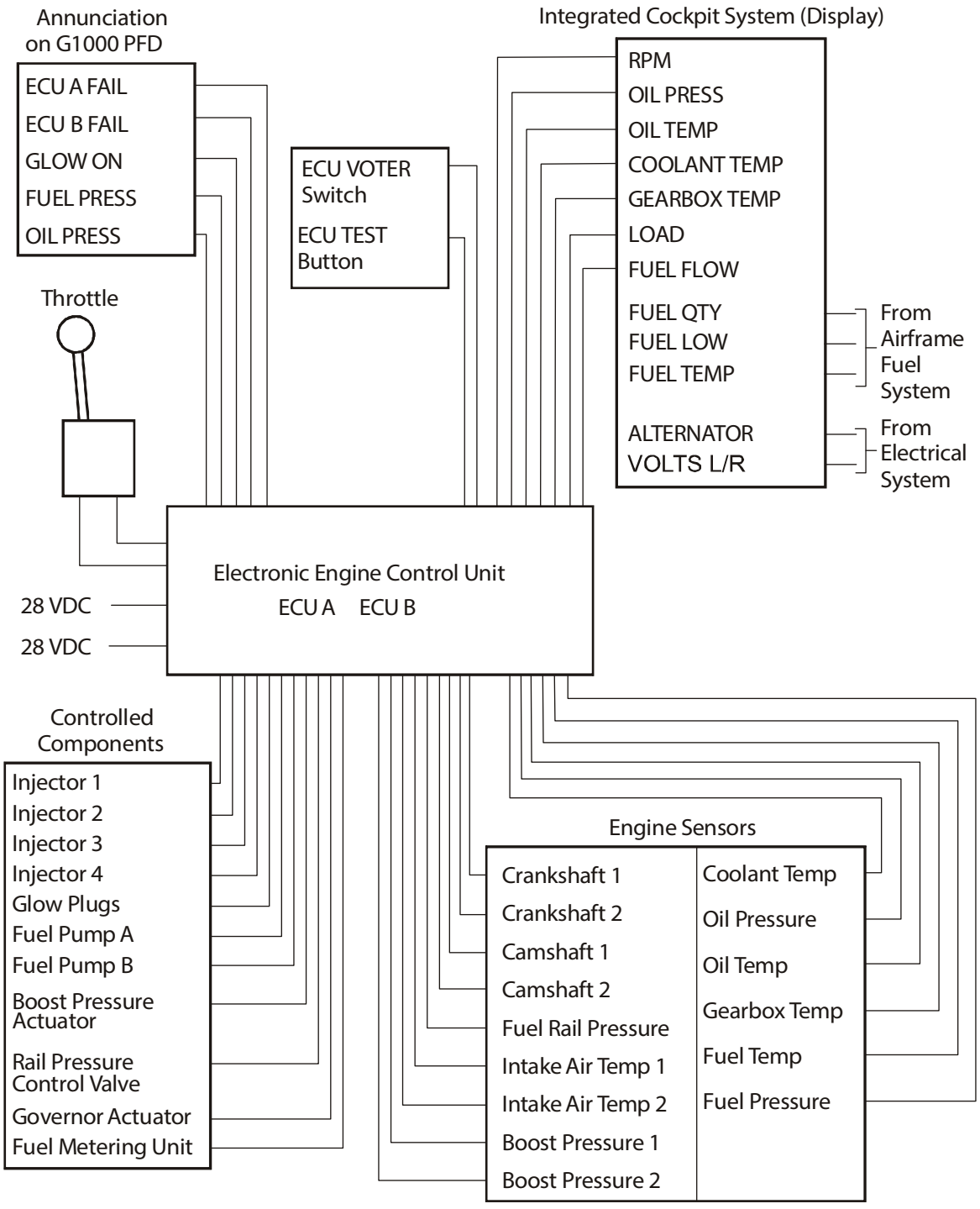

Figure 1 : Engine Control System - Schematic Diagram (if the G1000 System Is Installed)

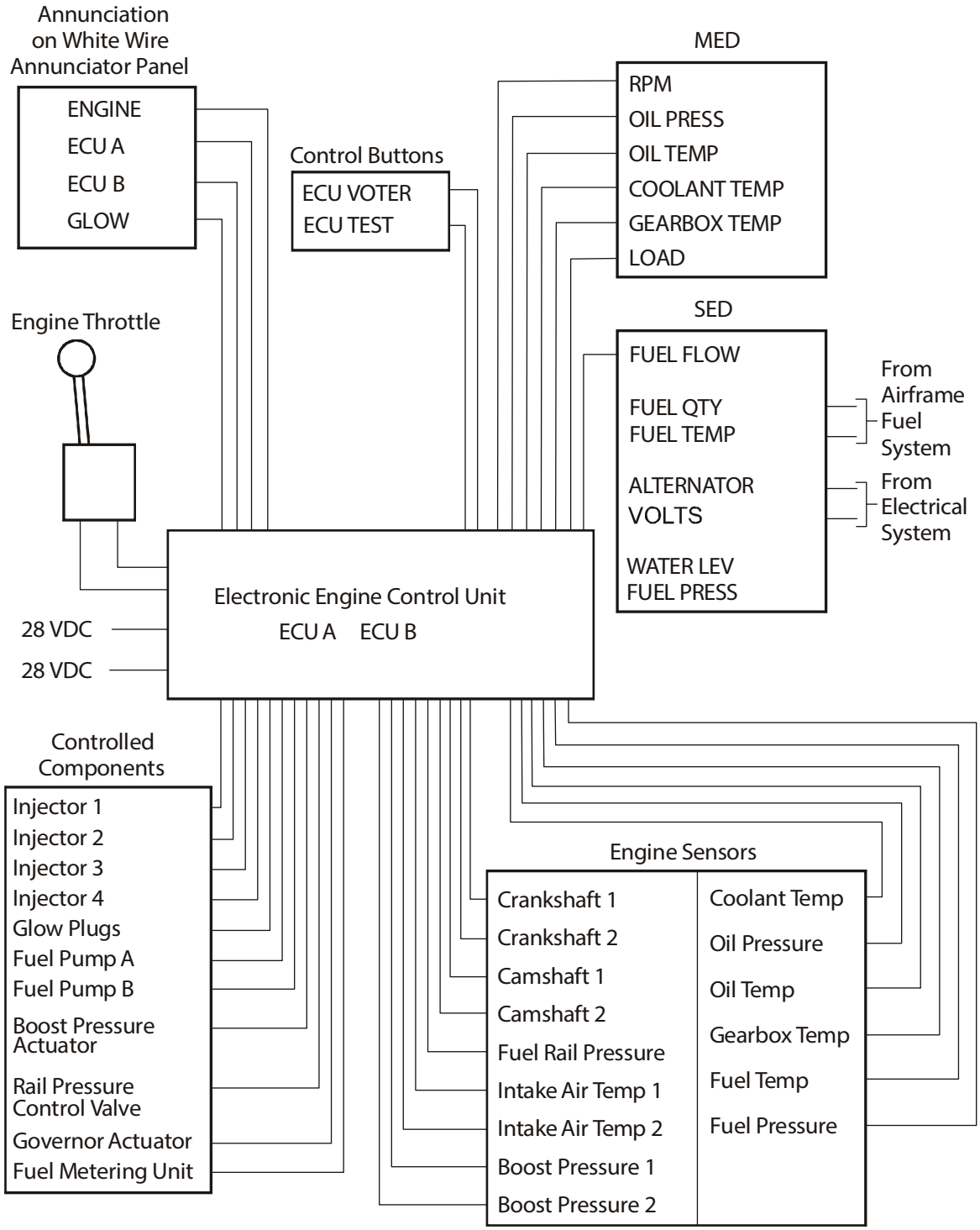

Figure 2 : Engine Control System - Schematic Diagram (if the Conventional Cockpit (OÄM 40-321) Is Installed)

A. Engine Control Units.

The ECU A and ECU B are contained in one box located in the fuselage compartment, below the pilot seat. A wire harness connects the box to the engine, the power lever and the airplane's systems.

During normal operation, the alternator supplies power for the system. If the alternator fails, the ECU B automatically takes over and the ECU backup battery provides power.
Refer to Section 24-00 for more data about the electrical supply for the engine control system.

The integrated cockpit system (ICS, if the G1000 system is installed) has two amber caution lights for the engine control system (marked ECU A FAIL and ECU B FAIL).

The annunciator panel (if the conventional cockpit is installed) has two amber caution lights for the engine control system (marked ECU A and ECU B).

The ECU VOTER switch on the left hand side of the instrument panel let you toggle between ECU A and ECU B. For all normal operation, the VOTER switch is set to AUTO and one automatic selected ECU controls the engine.

The ECU TEST button on the left hand side of the instrument panel activates the test sequence of the system. Refer to Section 71-00 for the ECU test procedure.

B. Electrical Harness.

The electrical harness is an engine component. The harness connects the power lever and sensors to the ECU A and ECU B. It also provides connections for the ECU buttons and the airplane's systems.

The electrical harness comes through the engine firewall. P-clamps and tie-wraps attach the electrical harness to the engine.

The repair of the electrical harness is limited to damage that occurs near the ends of the cables, outside of the isolated section. If a cable fails within the isolated section, then you must replace the complete harness.

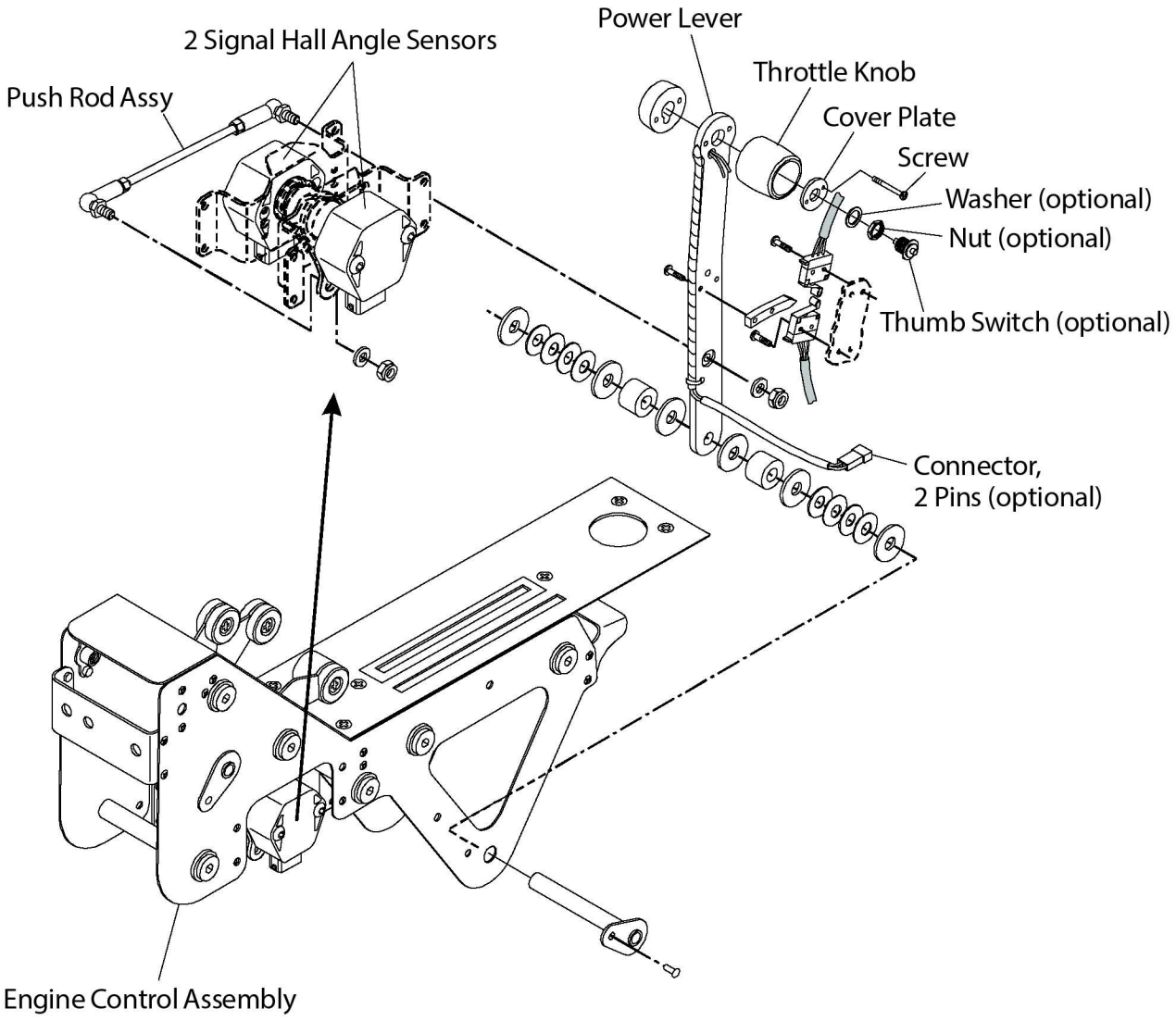

Figure 3 : Engine Power Levers

C. Manifold Pressure.

Manifold pressure is measured by two sensors for each ECU located at the air intake manifold.

D. Power Lever.

Figure 3 shows the installation of the engine power lever. The power lever is located in the center console.

The power lever has two separate and independent electrical systems. One system provides signals to the ECU A. The other system provides signals to the ECU B. Either system can control the engine.

The lever operates electrical sensors (HALL effect) that give signals in proportion to the power lever position. The signals are used by the engine control system to set the power output. The control system also sets the propeller governor to give best RPM for the power setting. Refer to Section 61-20 for more data on the propeller control function.

A push rod connects the power lever to the Hall-sensors. The power lever can be calibrated by adjusting the installation angle of the Hall sensors in the elongated hole and by modification of the length of the push rod.

E. Sensors.

Both ECUs get data about engine performance from the following sensors mounted on the engine.

Sensor	Location
Crankshaft 1.	Front, right of the crankcase.
Crankshaft 2.	Front, left of the crankcase.
Crankshaft 1.	Front between the camshafts.
Crankshaft 2.	Aft between the camshafts.
Coolant temperature.	Beneath the air intake manifold.
Oil temperature.	On the top side of the oil sump.
Oil pressure.	Behind the oil filter.
Manifold air temperature 1 and 2.	On the air intake manifold.
Manifold air pressure 1 and 2.	On the air intake manifold.
Fuel rail pressure.	At the front of the fuel rail.
Gearbox temperature.	At the back side of the gearbox next to the starter.
Fuel inlet pressure.	At the inlet of the high pressure pump.

TROUBLE-SHOOTING

1. General

The table below lists the possible defects of the engine control system..

When experiencing trouble as detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

For all other engine control troubles, refer to the engine manufacturer.

Trouble	Possible Cause	Repair
An ECU caution light comes ON.	The related ECU is defective.	Read the engine event log (Refer to Section 72-00). Refer to the engine manufacturer.
The engine does not respond correctly to power lever movement.		Run the diagnostic routine in the ECU Operator software (Refer to Section 72-00). Refer to the engine manufacturer.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices describe how to remove and install the main components of the engine control system. All other work on the engine control system can only be done by an Austro Engine approved maintenance shop or the manufacturer.

2. Remove/Install the Power Lever Hall-Sensor

A. Remove the Power Lever Hall-Sensor.

Refer to Figure 3 in the Description and Operation Pageblock 76-00-00.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Remove the handles of cabin heat, parking brake, defrost, power lever and fuel selector.	
(4)	Remove the cover plate.	
(5)	Remove the four bolts which position the throttle quadrant to the center console.	
(6)	Remove both center console side access panels (four screws).	
(7)	Lower the throttle quadrant until obtaining access to the Hall sensor installation bolts.	
(8)	Loosen the allen key screw which connects the Hall sensor to the throttle quadrant push rod.	
(9)	Remove the two bolts which attach the Hall sensor to the throttle quadrant bracket.	
(10)	Remove the Hall sensor from the throttle quadrant and disconnect the wire harness from the Hall sensor.	

B. Install the Power Lever Hall-Sensor.

Refer to Figure 3 in the Description and Operation Pageblock 76-00-00.

	Detail Steps/Work Items	Key Items/References
(1)	Connect the wire harness to the Hall sensor. Position the Hall sensor on the proper location of the throttle quadrant bracket.	
(2)	Install and tighten the two bolts which attach the Hall sensor to the throttle quadrant.	
(3)	Tighten the allen key screw which connects the Hall sensor to the throttle quadrant push rod.	
(4)	Calibrate the Hall sensor.	Contact Austro Engine for the required information.
(5)	Lift the throttle quadrant into position on the center console and fix it with the four bolts.	
(6)	Install both center console side access panels.	
(7)	Install the cover plate.	
(8)	Install the handles of the cabin heat, parking break, defrost, power lever and fuel selector.	
(9)	Connect the airplane main battery.	Refer to Section 24-31.
(10)	Conduct an engine test.	

3. Remove/Install the Electronic Engine Control Unit (EECU)

A. Remove the EECU.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Read out and write down the EECU IQA-Codes and engine serial number.	Refer to the AE Maintenance Manual, latest revision.
(2)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(3)	Disconnect the airplane main battery.	Refer to Section 24-31.
(4)	Remove the pilot's seat.	Refer to Section 25-10.
(5)	Disconnect the three electrical connectors from the EECU.	Refer to Figure 201.
(6)	Remove the EECU from the mounting brackets: - Release the four bolts and washers that hold the EECU to the mounting brackets.	Refer to Figure 201.

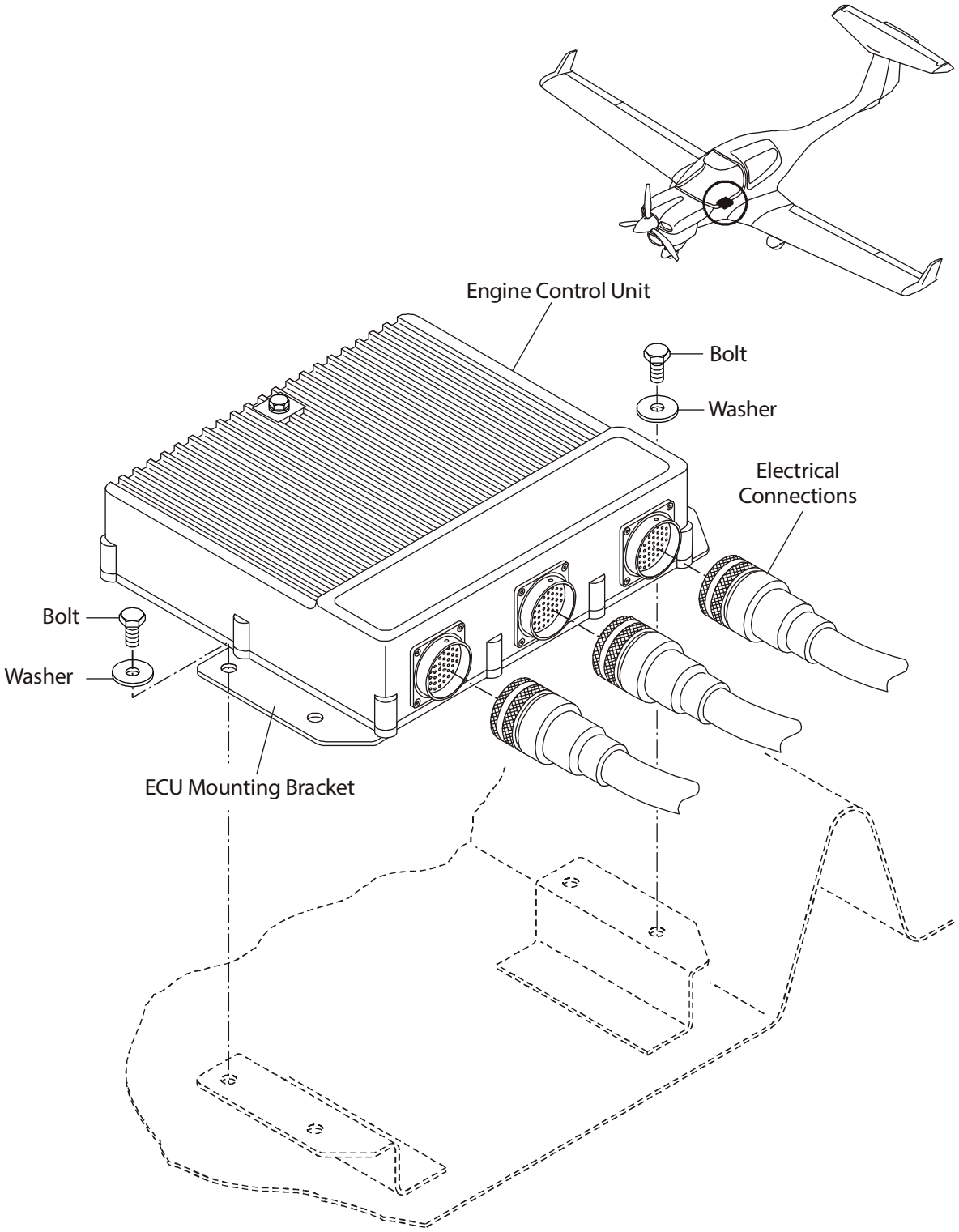

Figure 201 : Electronic Engine Control Unit (EECU) Installation

B. Install the EECU.

	Detail Steps/Work Items	Key Items/References
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Install the EECU: - –Move the EECU into position in the fuselage compartment. - Install the four washers and bolts that attach the ECU to the mounting brackets.	Refer to Figure 201.
(3)	Connect the three electrical connectors to the EECU.	Refer to Figure 201.
(4)	Install the pilot’s seat.	Refer to Section 25-10.
(5)	Connect the airplane main battery.	Refer to Section 24-31.
(6)	Check that IQA-Codes and engine serial number at the new ECU match the ones of the engine.	Refer to the AE Maintenance Manual, latest revision.

4. Remove/Install the Electrical Harness for the Engine Control System

A. Remove the Electrical Harness for the Engine Control System.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Remove the engine cowling.	Refer to Section 71-10.
(4)	Remove the pilot's seat.	Refer to Section 25-10.
(5)	Disconnect the three electrical connectors from the EECU.	Refer to Figure 201.
(6)	Remove the cockpit access panels.	
(7)	Disconnect the two cockpit connectors.	Behind the instrument panel.
(8)	Disconnect the engine wire harness and bonding cables from the electrical sensors.	Refer to Figures 202 and 203. Refer to the AE Maintenance Manual, latest revision.
(9)	Remove the cable ties and P-clamps that attach the cable harness to the engine and structure.	Refer to Figures 202 and 203. Make a note of the type and location of each attachment.
(10)	Remove the shields and Teflon lines for the feed-through at the firewall.	
(11)	Carefully move the harness forward through the firewall.	Take care not to damage the connectors.
(12)	Remove the harness from the fuselage.	

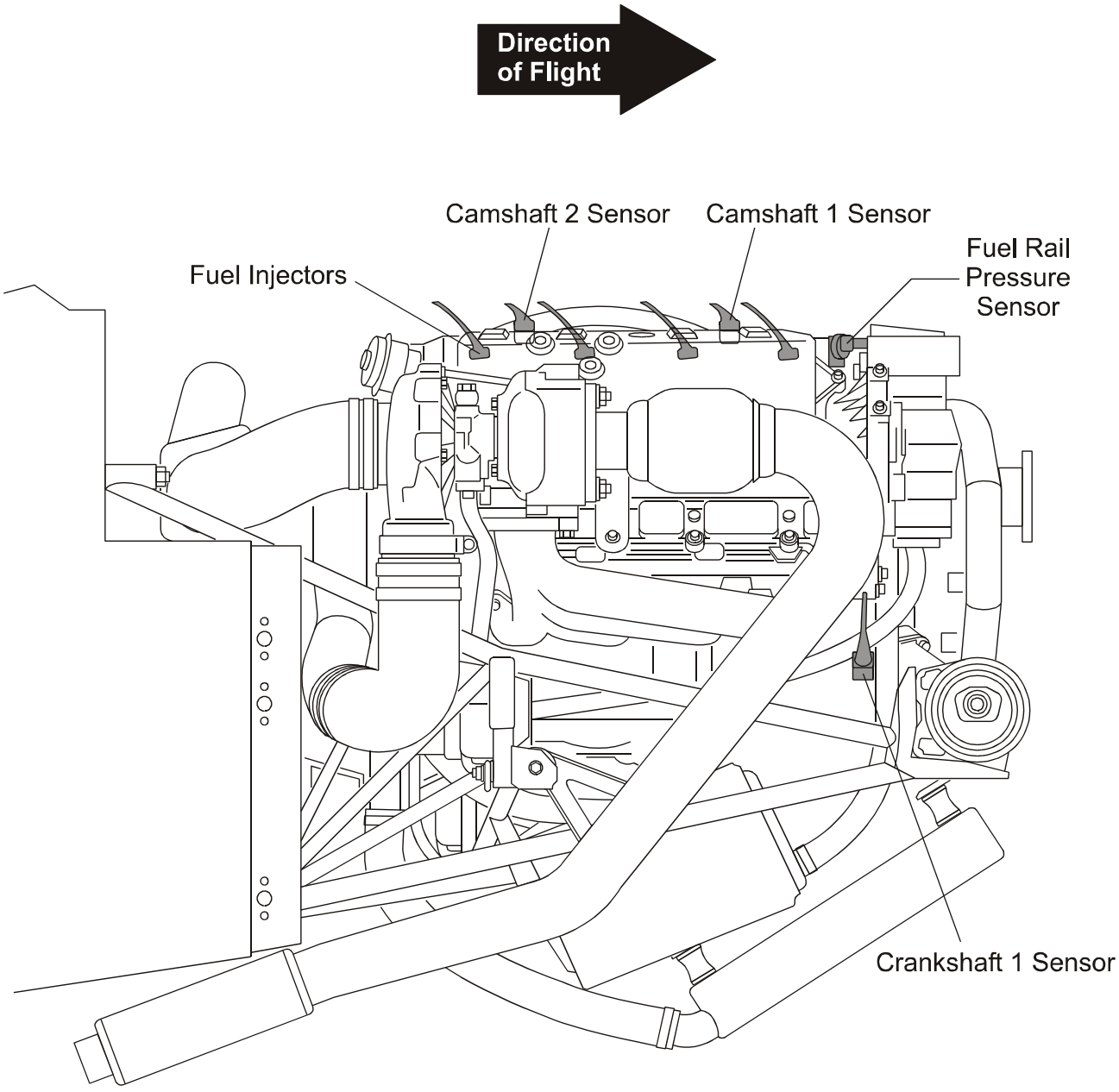

Figure 202 : Engine Sensors - RH Side of the Engine

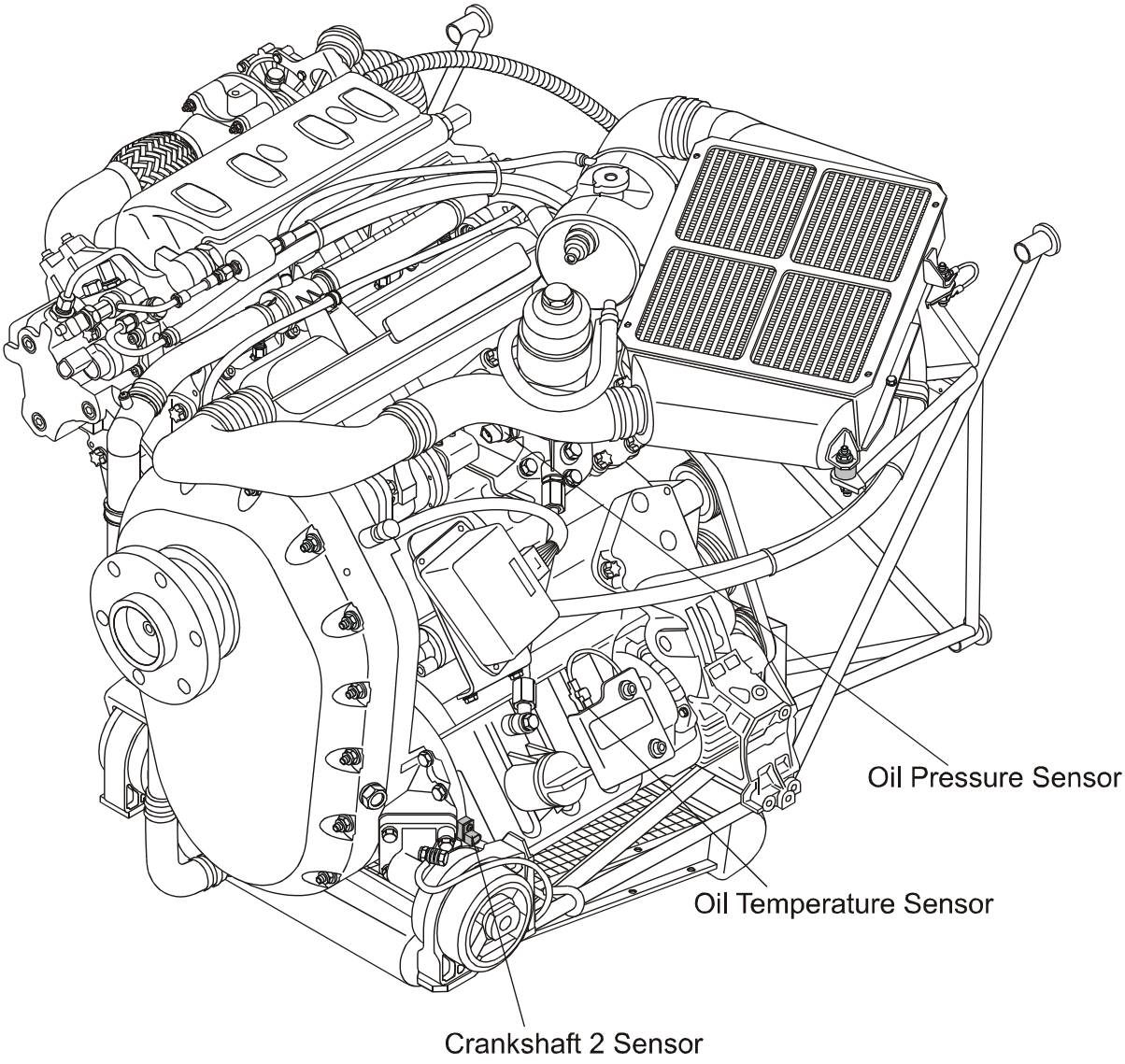

Figure 203 : Engine Sensors - LH Side of the Engine

B. Install the Electrical Harness for the Engine Control System.

	Detail Steps/Work Items	Key Items/References
(1)	Carefully move the engine wire harness from the firewall aft through the firewall feed-through	Take care not to damage the connectors. Adjust the harness position so that all connections can be made without stress.
(2)	Connect the engine wire harness and bonding cables to the electrical sensors.	Refer to Figures 202 and 203. Refer to the AE Maintenance Manual. Latest revision.
(3)	Connect the two cockpit connectors.	Behind the instrument panel.
(4)	Connect the three electrical connectors to the EECU.	Refer to Figure 201. Make sure that the bayonet locks are correctly engaged.
(5)	Install the cable-ties and clamps that attach the cable harness to the engine and structure.	Refer to Figures 202 and 203. Refer to the notes that you made during removal for the type and location of each attachment.
(6)	Install the Teflon lines and shields for the feed-through at the firewall.	Seal with PR 812 or equivalent.
(7)	Install the engine cowling.	Refer to Section 71-10.
(8)	Install the pilot’s seat.	Refer to Section 25-10.
(9)	Connect the main airplane battery.	Refer to Section 24-31.
(10)	Do an engine run up.	Refer to Section 71-00.

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CHAPTER 77
ENGINE INDICATING

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ENGINE INDICATION
WITH G1000 SYSTEM INSTALLED

1. General

This Section describes the engine indicating system of the DA 40 NG airplane if the G1000 system is installed. An integrated cockpit system (ICS) with two large display screens located in the instrument panel show all engine related indications.

The electronic engine control unit (EECU) provides most of the indications for the engine. Figure 1 shows a schematic of the engine control and indication system. Refer to Section 76-00 for data about the engine control system. The ICS also shows airframe fuel system data. Refer to Section 28-40 for data about the airframe parts of the system.

2. Description and Operation

The ICS gives all engine indications. The ICS displays are located in the left and right sides of the instrument panel. Each display has a combination of digital and analog displays.

Either display can show all the engine indications. Refer to Section 77-40 for more data about the system sensors. Refer to Section 31-40 for more data about the ICS.

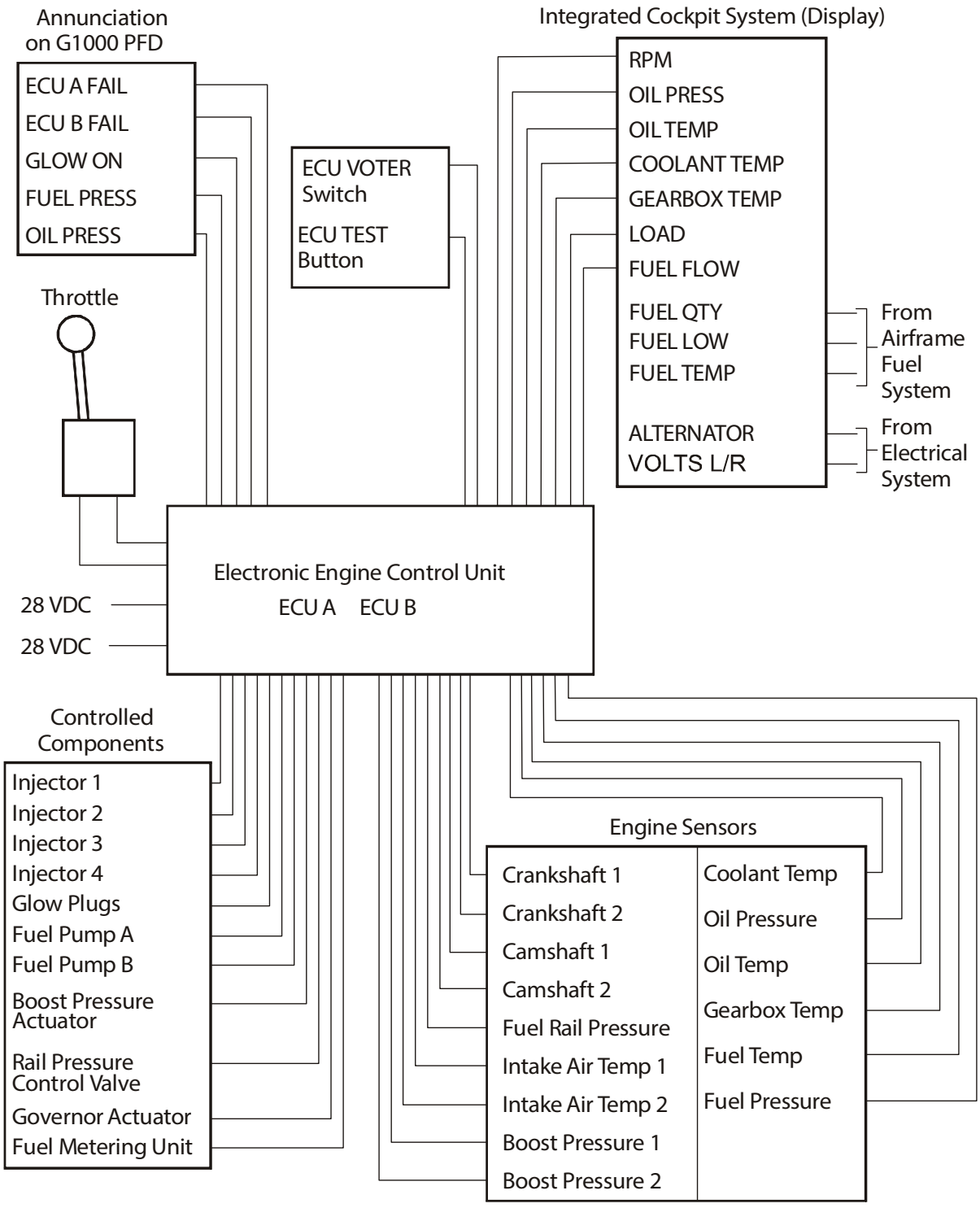

Figure 1 : Engine Control and Indication Schematic

ENGINE INSTRUMENTATION
WITH CONVENTIONAL COCKPIT INSTALLED

1. General

This Section tells you about the engine indicating system for airplanes with the conventional cockpit installed. Two instruments located in the right side of the instrument panel show all engine related indications.

The engine control unit (ECU) provides most of the indications for the engine. Refer to Section 76-00 for data about the engine fuel control system. The engine instrumentation also shows airframe fuel system data. Refer to Section 28-40 for data about the airframe parts of the system.

2. Description and Operation

Two instruments give all of the engine indications. The instruments are located in the right side of the instrument panel. Each instrument has a combination of digital and analogue displays.

The left instrument is the main engine display (MED). It shows RPM, oil pressure, temperatures and load.

The right instrument is the secondary engine display (SED). It shows fuel quantity, flow, temperature, the fuel pressure warning and the coolant level caution. It also shows the electrical system current and voltage.

Refer to Section 77-41 for data about the system.

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ENGINE INDICATING SYSTEM
WITH G1000 SYSTEM INSTALLED

1. General

This Section describes the engine indicating system of the DA 40 NG airplane. The integrated cockpit system (ICS) display screens which are located in the instrument panel give all engine and related airplane system indications. For normal operations the left display is the primary flight display (PFD) and the right is the multi-function display (MFD). Both displays are similar, except for the autopilot control buttons.

Refer to Section 31-40 for more data about the ICS.

The engine control unit (ECU) provides most of the indications for the engine. Refer to Section 76-00 for data about the engine control system. The ICS also shows fuel and systems data. Refer to Section 28-40 for data about the airframe parts of the system.

2. Description and Operation

The ICS displays the engine indications on the MFD screen. The MFD gives the following engine indications:

- Load. Indicates the engine loads from 0 to 100%.
- RPM. Indicates the engine RPM from 0 to 2500 RPM.
- Gearbox temperature in °C.
- Coolant temperature in °C.
- Oil temperature in °C.
- Oil pressure in bar.

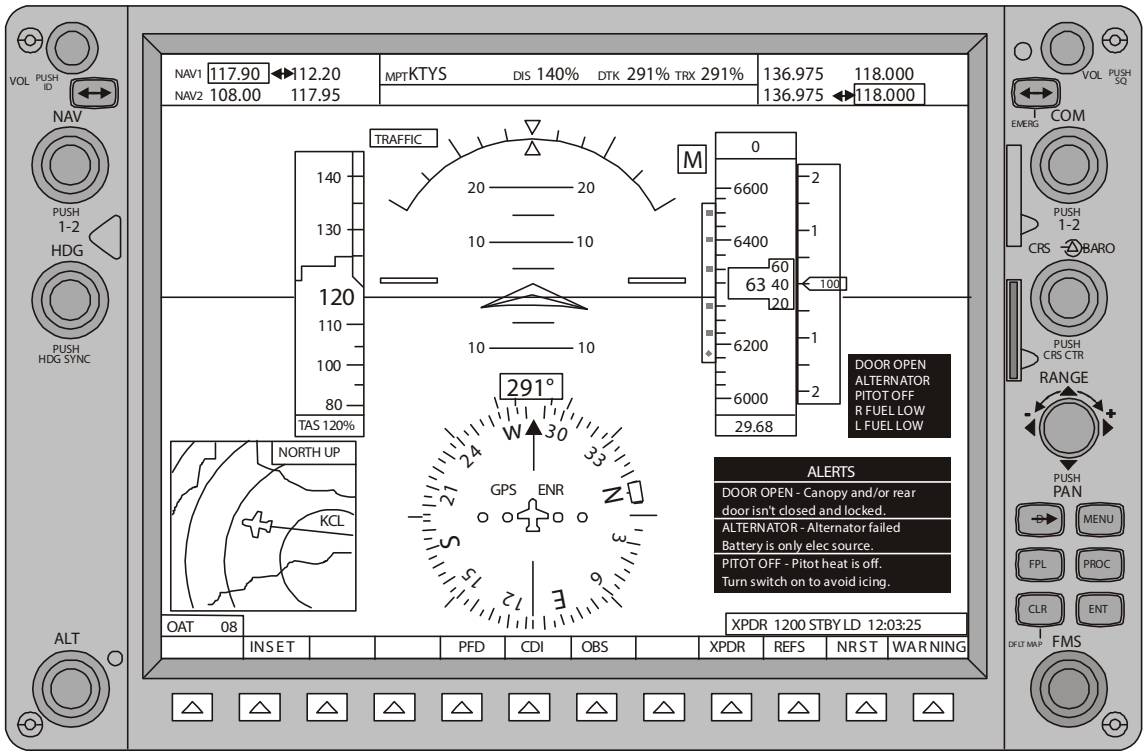

Figure 1 : Display Screen - Integrated Cockpit System

The MFD also gives these auxiliary displays with the engine displays:

- Voltage.
- Generator output, in AMPS.

The MFD can also display the following fuel system information:

- L and R fuel tank quantity (Refer to Section 28-40).
- L and R fuel tank temperature in °C (Refer to Section 28-40).
- Engine fuel flow in gal/hour (Refer to Section 28-40).

Engine alerts are given on the PFD screen. A flashing warning annunciator appears in the PFD when an alert is activated. Pressing the WARNING softkey at the bottom of the PFD opens an alert window on the PFD. The alerts window gives more details of the alert. The ICS alert system gives alerts and warning captions for engine and airplane systems. Refer to Section 31-40 for more data about the ICS.

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TROUBLE-SHOOTING

1. General

The table below lists the possible defects of the engine indication system. For more data on the system refer to the equipment manufacturer's manual.

When experiencing trouble as detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
One of the indicators in an integrated instrument does not indicate correctly.	Sensor/transducer defective.	Do a test for continuity of the cables for the relevant sensor. If the cables are serviceable, then refer to the engine manufacturer. Refer to Section 28-40 for the fuel quantity indicating system. Refer to Section 76-00 for the location of engine sensors.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices give instructions how to replace the following sensors:

- Crankshaft (RPM).
- Gearbox oil temperature.
- Liquid coolant temperature.
- Engine oil temperature.
- Engine oil pressure.

Refer to the related Chapter or the Austro Engine Maintenance Manual, latest revision for maintenance data on the sensors.

Where the engine control system provides data for the engine indicating system, only the engine manufacturer or an Austro Engine approved maintenance shop can replace sensors.

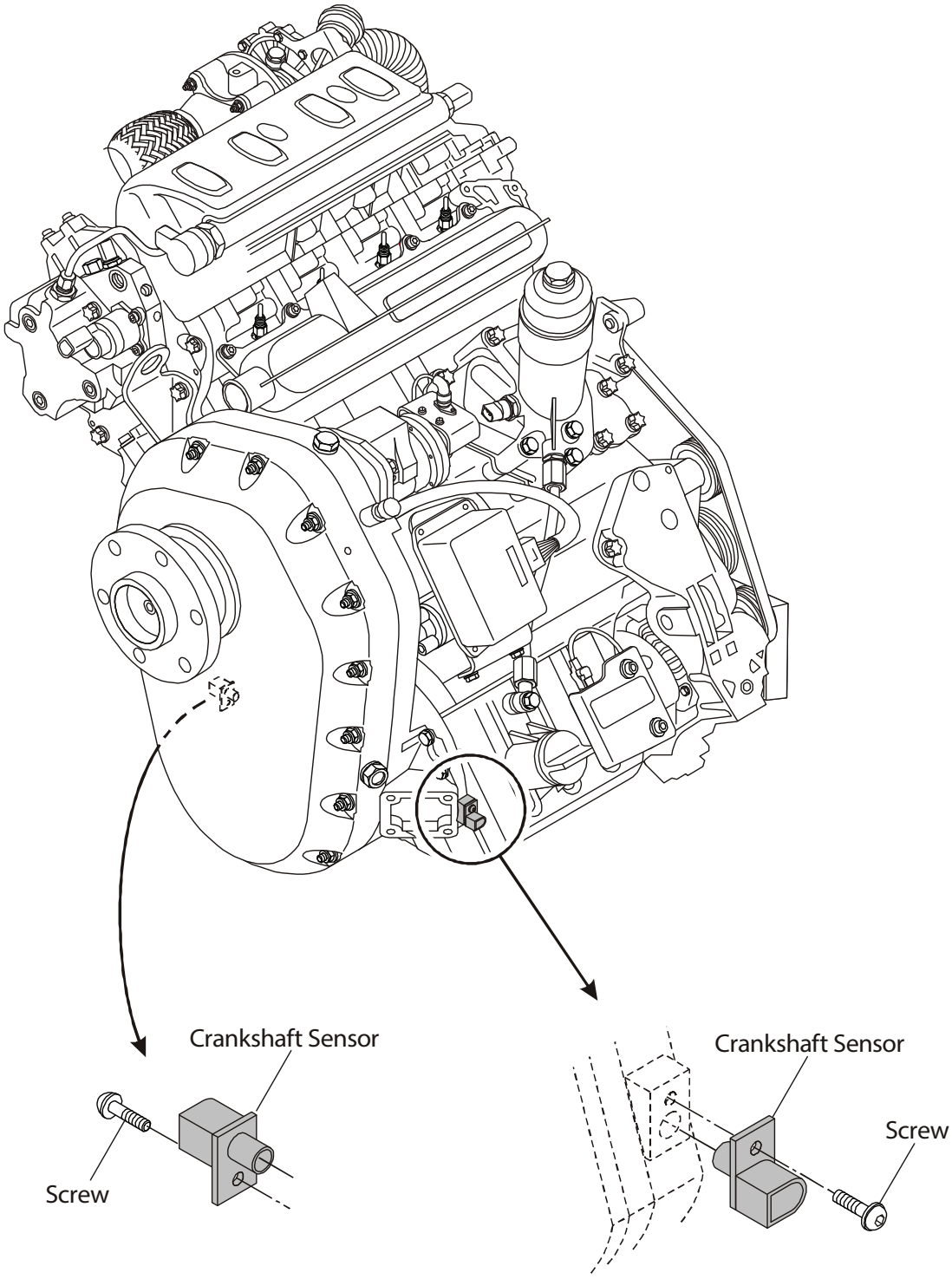

Figure 201 : Crankshaft (RPM) Sensor Installation

2. Replace/Install a Sensor

Figures 201 through 205 show the sensors for the engine indications.

Use the following general procedure for replacing all of the sensors on the engine. If any of the sensors has a different procedure then the procedure will be described.

A. Replace a Sensor.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Remove the engine cowling.	Refer to Section 71-10.
(4)	Locate the sensor that you will replace.	Refer to Figures 201 thru 205.
(5)	Disconnect the electrical cables of the sensor.	At the sensor or at the in-line connector.
(6)	Replace the sensor.	Refer to the AE Maintenance Manual, latest revision.
(7)	Connect the electrical cables to the sensor.	At the sensor or at the in-line connector.
(8)	Install the engine cowling.	Refer to Section 71-10.
(9)	Connect the airplane main battery.	Refer to Section 24-31.
(10)	Do a ground test of the engine and monitor the engine indication.	Refer to Section 71-00.

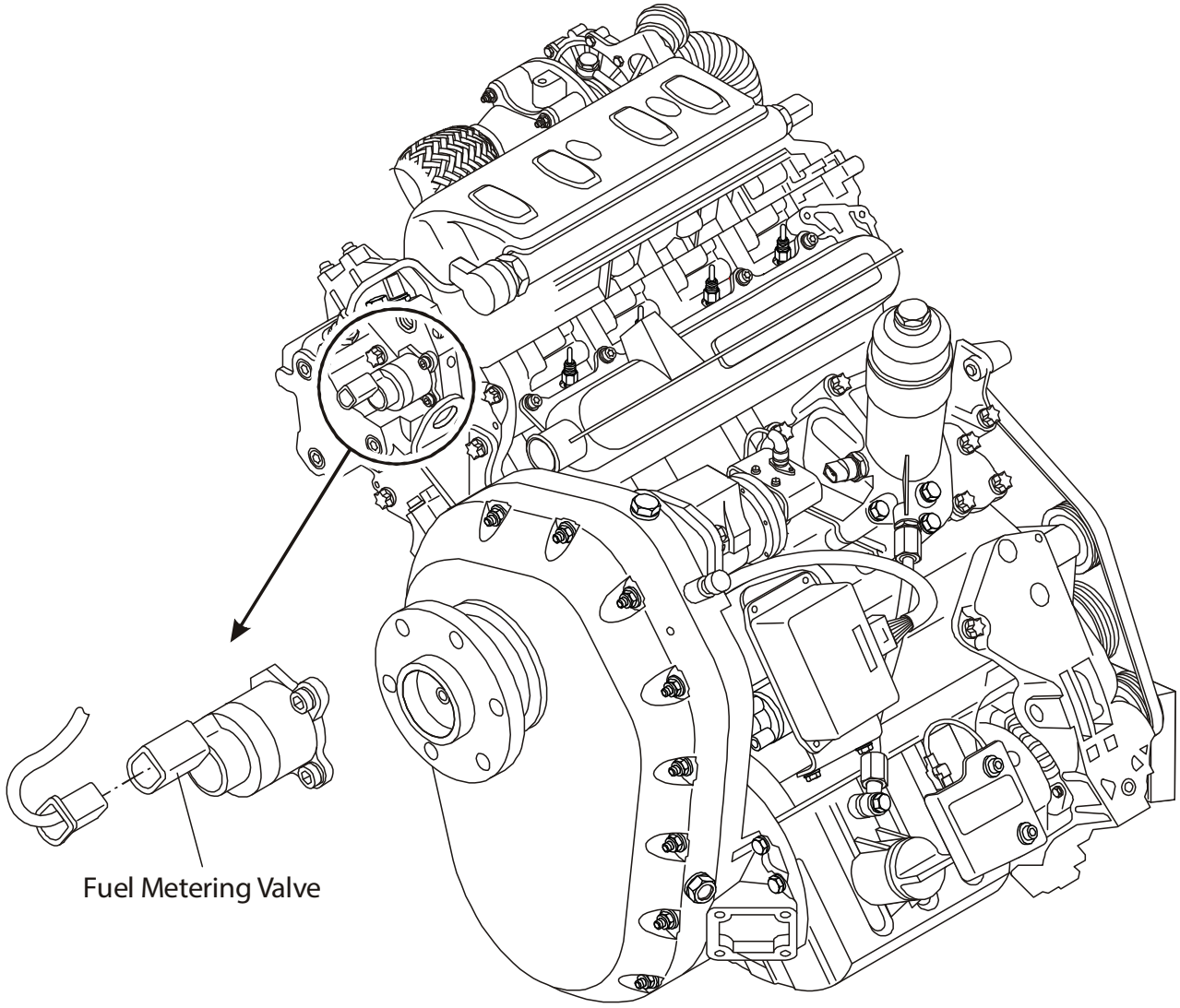

Figure 202 : Fuel Metering Valve Installation

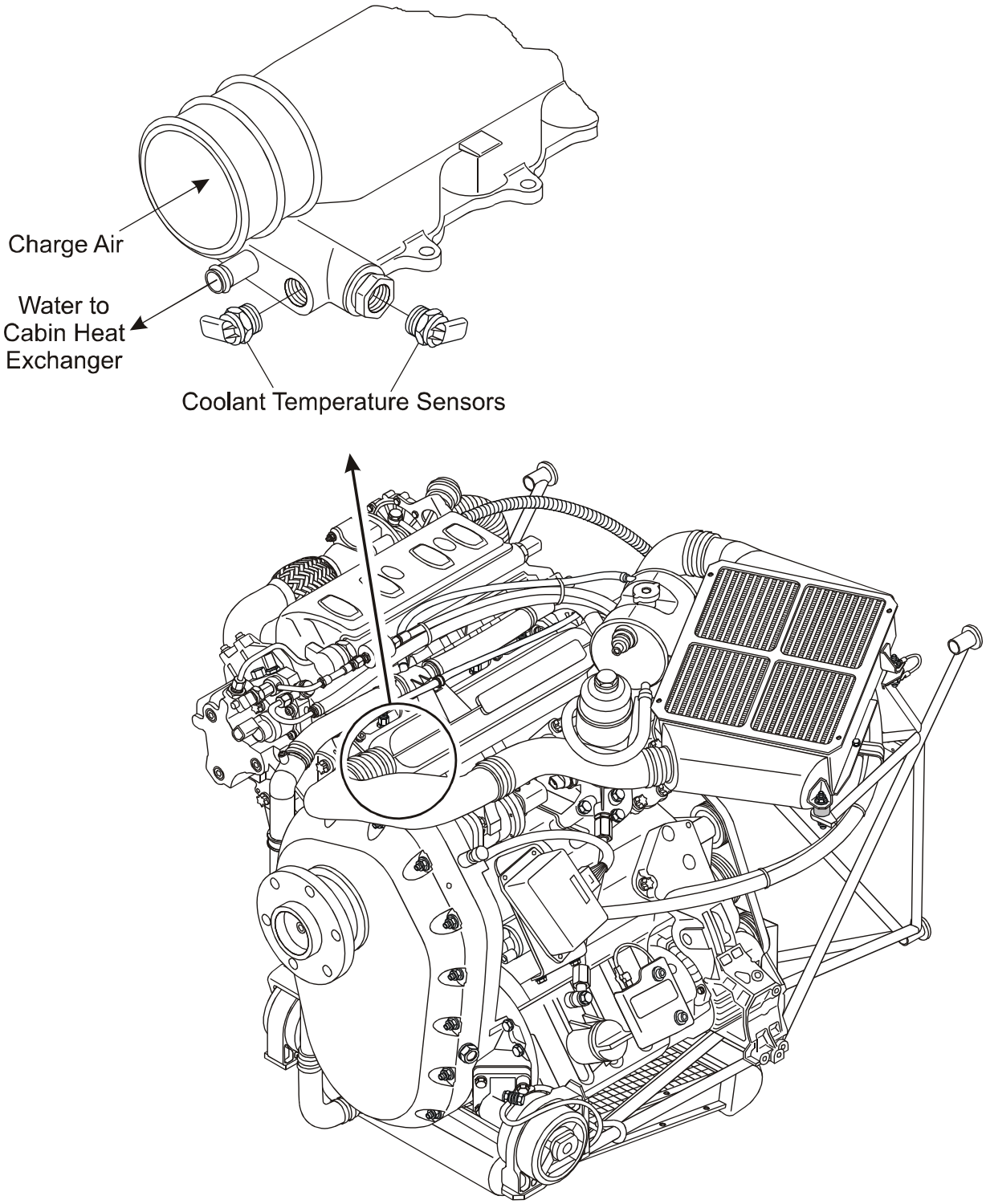

Figure 203 : Engine Coolant Temperature Installation

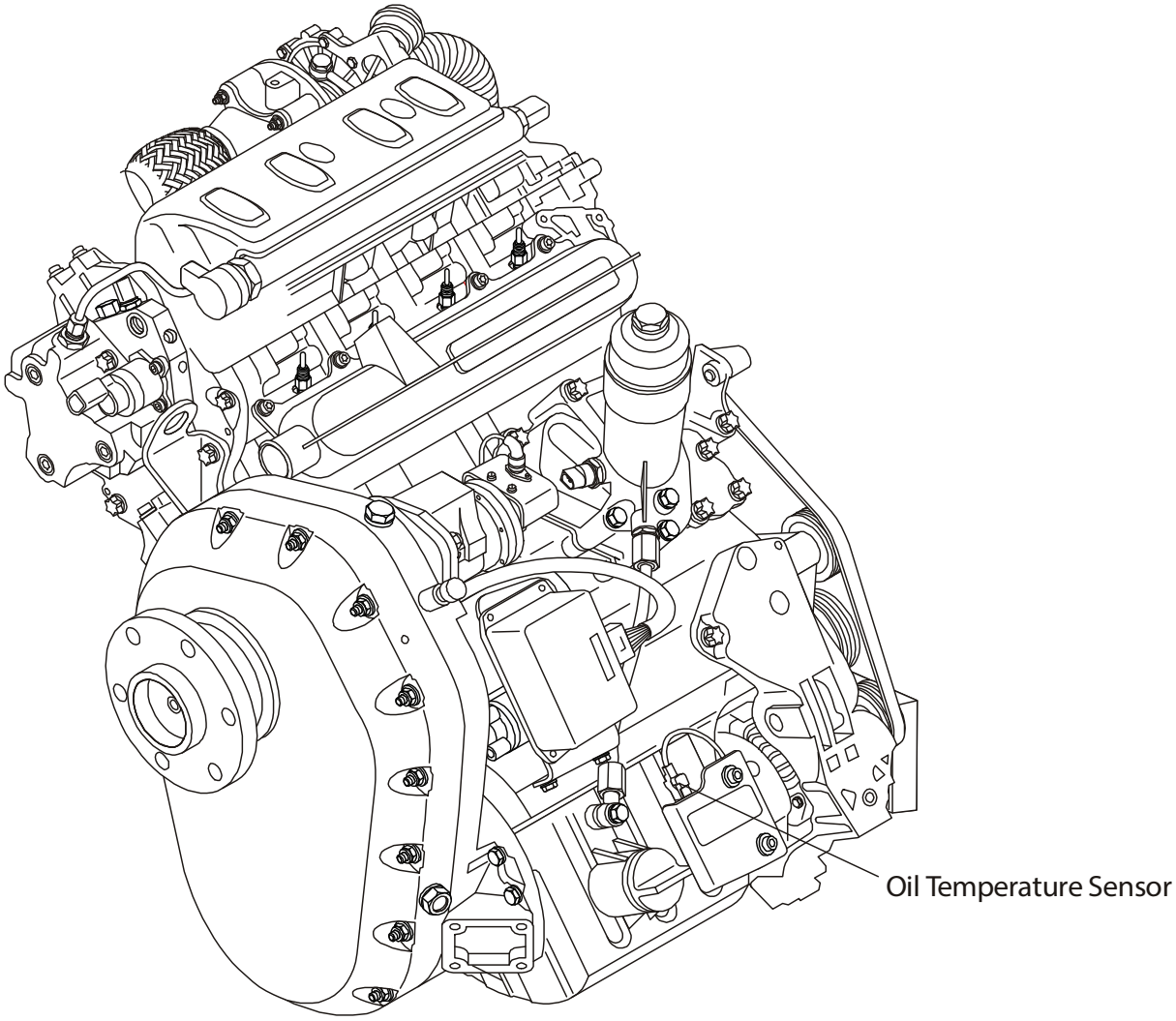

Figure 204 : Engine Oil Temperature Installation

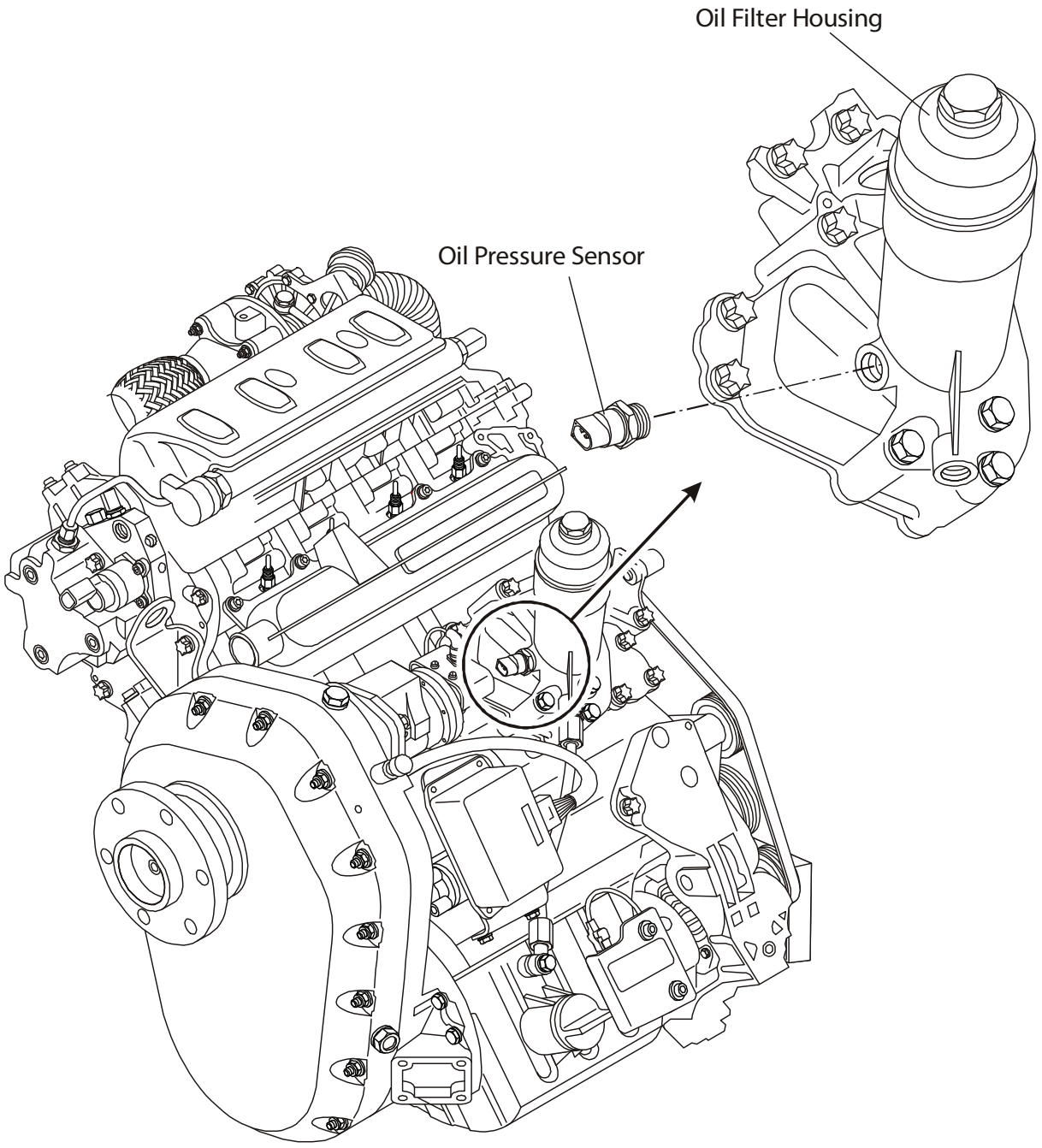

Figure 205 : Engine Oil Pressure Sensor Installation

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ENGINE INTEGRATED INSTRUMENT SYSTEM WITH CONVENTIONAL COCKPIT INSTALLED

1. General

This Section tells you about the engine indicating system for airplanes with the conventional cockpit installed. Two instruments located in the right side of the instrument panel show all engine related indications.

The engine control unit (ECU) provides most of the indications for the engine. Refer to Section 76-00 for data about the engine fuel control system. The engine instrumentation also shows airframe fuel system data. Refer to Section 28-40 for data about the airframe parts of the system.

2. Description and Operation

Two instruments give all of the engine indications. The instruments are located in the right side of the instrument panel. Each instrument has a combination of digital and analog (LED chain) displays.

The main engine display (MED; Figure 1, top) gives the following indications:

- Propeller RPM. This has a 4-character digital display and a linear analog display from 0 to 2300 RPM.
- Oil Pressure. This is a linear analog display from 0.9 to 6.5 bar.
- Oil Temperature. This is a linear analog display from -30 ºC to 140 ºC.
- Coolant Temperature. This is a linear analog display from -30 ºC to 105 ºC.
- Gearbox Temperature. This is a linear analog display from -30 ºC to 120 ºC.
- Load. This has a 4-character digital display and a linear analog display from 0 % to 100 %.

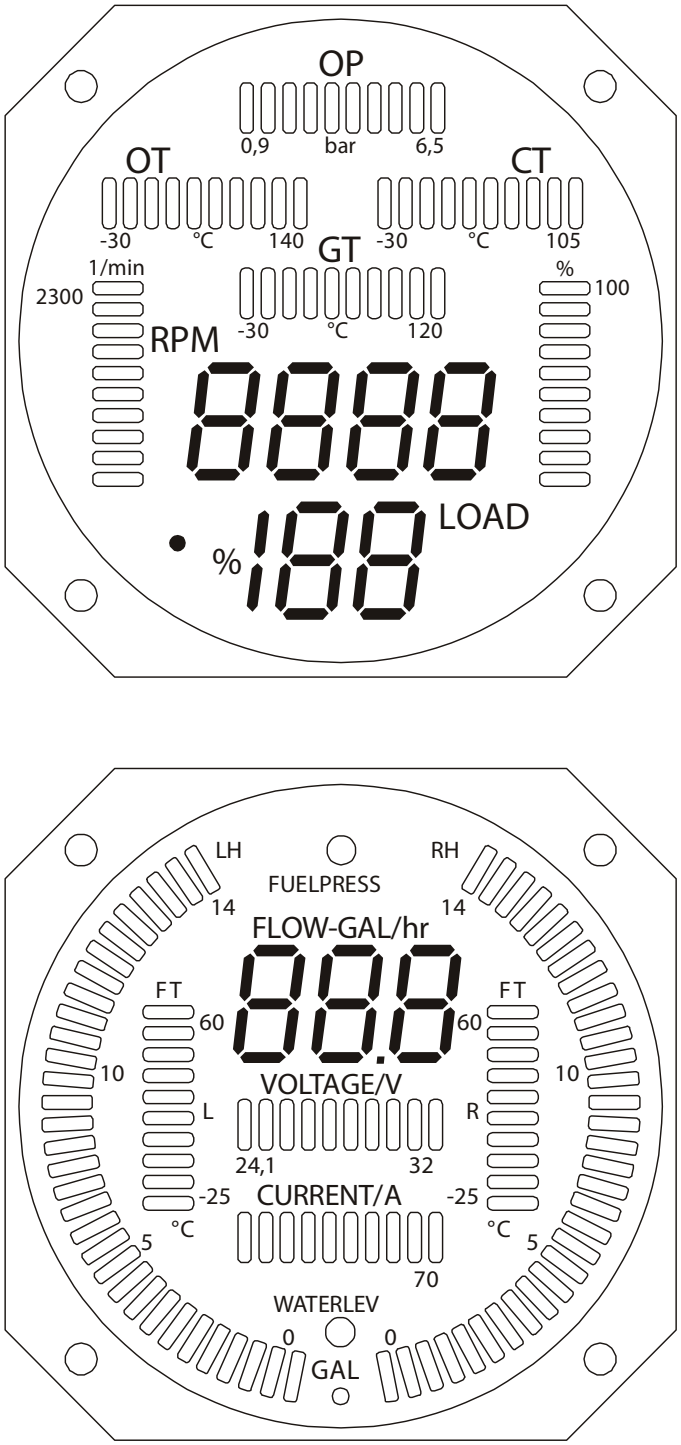

Figure 1 : Engine Instruments

The secondary engine display (SED; Figure 1, bottom) gives the following indications:

- Water Level (Coolant). This is a low coolant level caution light (color: amber).
- Fuel Quantity Main. This is a circular analog display from 0 to 14 gal.
- Fuel Quantity Aux. This is a circular analog display from 0 to 14 gal.
- Fuel Temp Main. This is a linear analog display from -25 ºC to 60 ºC.
- Fuel Temp Aux. This is a linear analog display from -25 ºC to 60 ºC.
- Generator. This is a linear analog display from 0 to 70 Ampères.
- Volts. This is a linear analog display from 24.1 to 32 Volt.
- Fuel Flow. This is a 4-character digital display.
- Fuel Pressure. This is a fuel pressure warning light (color: red).
- Both digital and analog displays use groups of light-emitting diodes (LEDs).

A. Digital Displays

The RPM, load and fuel flow displays use the usual 7-segment LEDs.

B. Fuel Quantity Analog Displays

Each fuel quantity analog display has a group of 32 LEDs arranged in an arc. All but one of the LEDs are green. The LED adjacent to the zero mark is red.

C. Linear Analog Displays

All of the linear analog displays use similar groups of 10 LEDs set in a horizontal or vertical line. Displays showing pressure, temperature, current and voltage use combinations of red, yellow and green LEDs. The colors have the usual meanings for instrument markings.

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TROUBLE-SHOOTING

1. General

The table below lists the defects you could have with the engine-indication system. For more data on the system refer to the equipment manufacturer's manual.

When experiencing trouble as detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
No indication on the engine indicators with the engine operating or with the ELECTRIC MASTER key switch set to ON.	INST 1 circuit-breaker not set.	Make sure that the circuit-breaker for the engine instruments is set.
One of the indicators in an integrated instrument does not indicate correctly.	Sensor/transducer defective.	Do a test for continuity of the cables for the relevant sensor. Refer to Section 28-40 for the fuel quantity indicating system. Refer to Section 76-00 for the engine sensors.
	One instrument defective.	Replace the instrument.

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CHAPTER 78
EXHAUST

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EXHAUST

1. General

The DA 40 NG engine has a simple 1-piece exhaust system. The exhaust pipe flange attaches with four bolts to the turbo-charger outlet and is supported at two locations to the engine mount. The exhaust exits through the bottom cowling opening the cowling outside.

If OÄM 40-310 or MÄM 40-434 is installed, an exhaust muffler is an integral part of the exhaust pipe

2. Description

Figure 1 shows the engine exhaust system.

No maintenance can be done on the exhaust system.

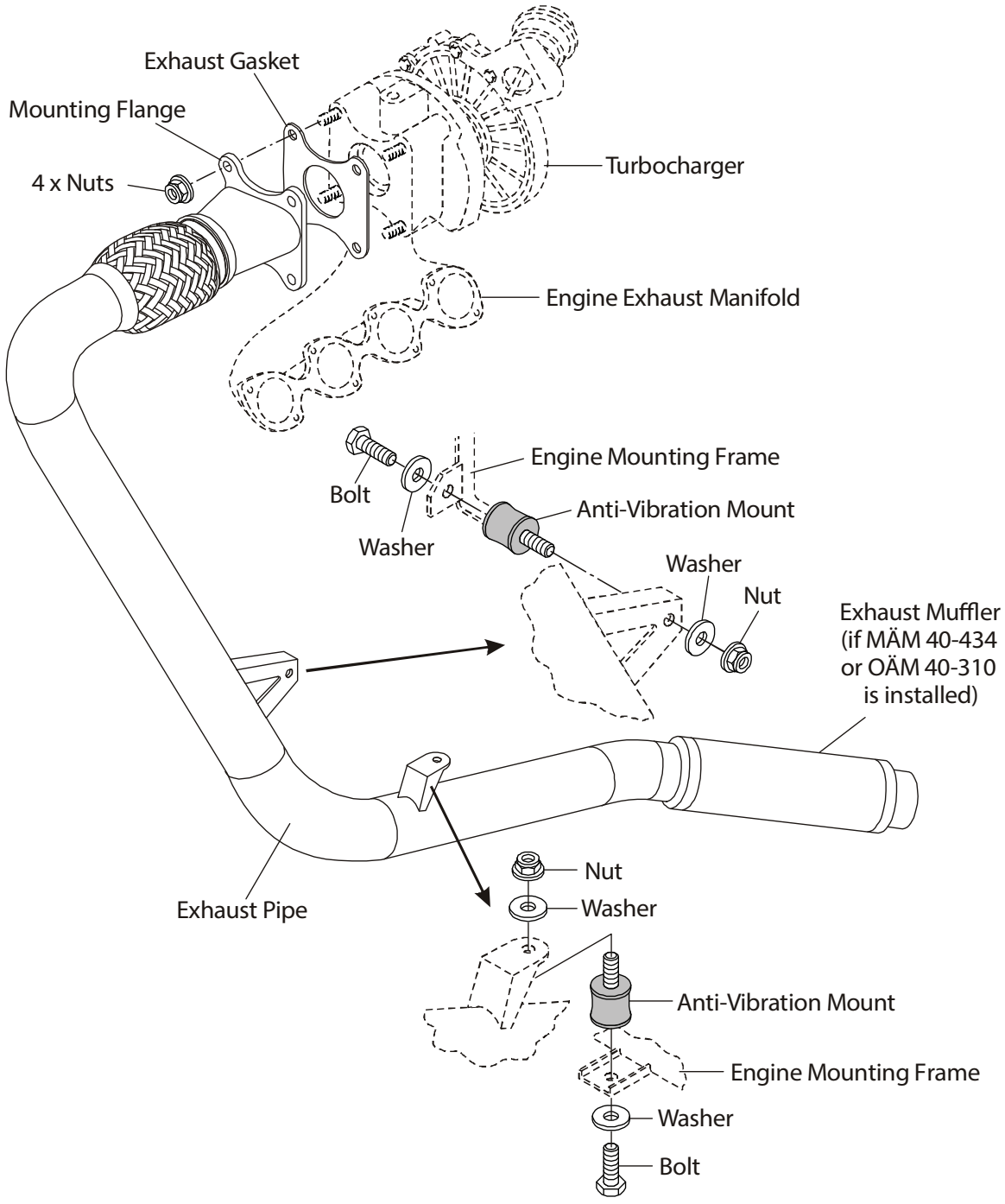

Figure 1 : Exhaust System Installation

TROUBLE-SHOOTING

1. General

The table below lists possible defects of the exhaust system.

When experiencing trouble as detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
More noise than usual.	Exhaust pipe cracked.	Look for signs of exhaust gas leaks. Replace cracked pipes.
	Exhaust muffler (if installed) cracked.	Replace cracked muffler
Signs of exhaust gas leaks in the engine compartment.	Exhaust pipe cracked.	Look for signs of exhaust gas leaks. Replace cracked pipes.
	Exhaust muffler (if installed) cracked.	Replace cracked muffler

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to remove and install an engine exhaust pipe and an engine exhaust pipe with an integrated muffler system (if OÄM 40-310 is installed).
Refer to Section 81-00 for data about the turbo-charger.

2. Remove/Install the Engine Exhaust Pipe

WARNING: MAKE SURE THAT THE EXHAUST SYSTEM IS COOL BEFORE YOU TOUCH IT. THE EXHAUST SYSTEM CAN BE VERY HOT, THIS CAN CAUSE INJURY TO PERSONS.

A. Remove the Engine Exhaust Pipe.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Remove the engine cowling.	Refer to Section 71-10.
(4)	Remove the exhaust pipe: - Remove the four nuts that attach the exhaust pipe to the turbo charger. - Remove the two elastomeric shock absorber supports. - Remove the exhaust pipe from the airplane.	Refer to Figure 1 in the Description and Operation Pageblock 78-00-00.

B. Install the Engine Exhaust Pipe.

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Install the exhaust pipe: - Move the exhaust pipe into position. - Move the exhaust pipe flange over the studs on the turbo charger outlet. - Install the four nuts that attach the exhaust pipe to the turbo charger outlet. - Install the two elastomeric shock absorber supports.	Refer to Figure 1 in the Description and Operation Pageblock 78-00-00. Use new nuts.
(2)	Install the engine cowling.	Refer to Section 71-10.
(3)	Connect the airplane main battery.	Refer to Section 24-31.
(4)	Do an engine ground run-up and then check the exhaust pipe for leaks.	Specially around the gasket at the turbo charger outlet.

CHAPTER 79
ENGINE OIL SYSTEM

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ENGINE OIL

1. General

The engine has a regular wet-sump lubrication system. The bottom part of the engine crankcase makes up the oil sump. An oil filler tube with a screw cap connects to the crankcase on the left of the engine.

The oil cooler is an integrated oil water heat exchanger which is located under the oil filter case.

The oil breather system has an oil separator located under the injector cover. A flexible hose at the rear of the oil separator vents blow-by gases and any remaining oil mist to the outside of the cowling. A small hose drains accumulated oil underneath the injector cover.

To protect the breather system from blockage due to icing of moist blow by gases an engine integrated over pressure valve is provided below the injector cover.

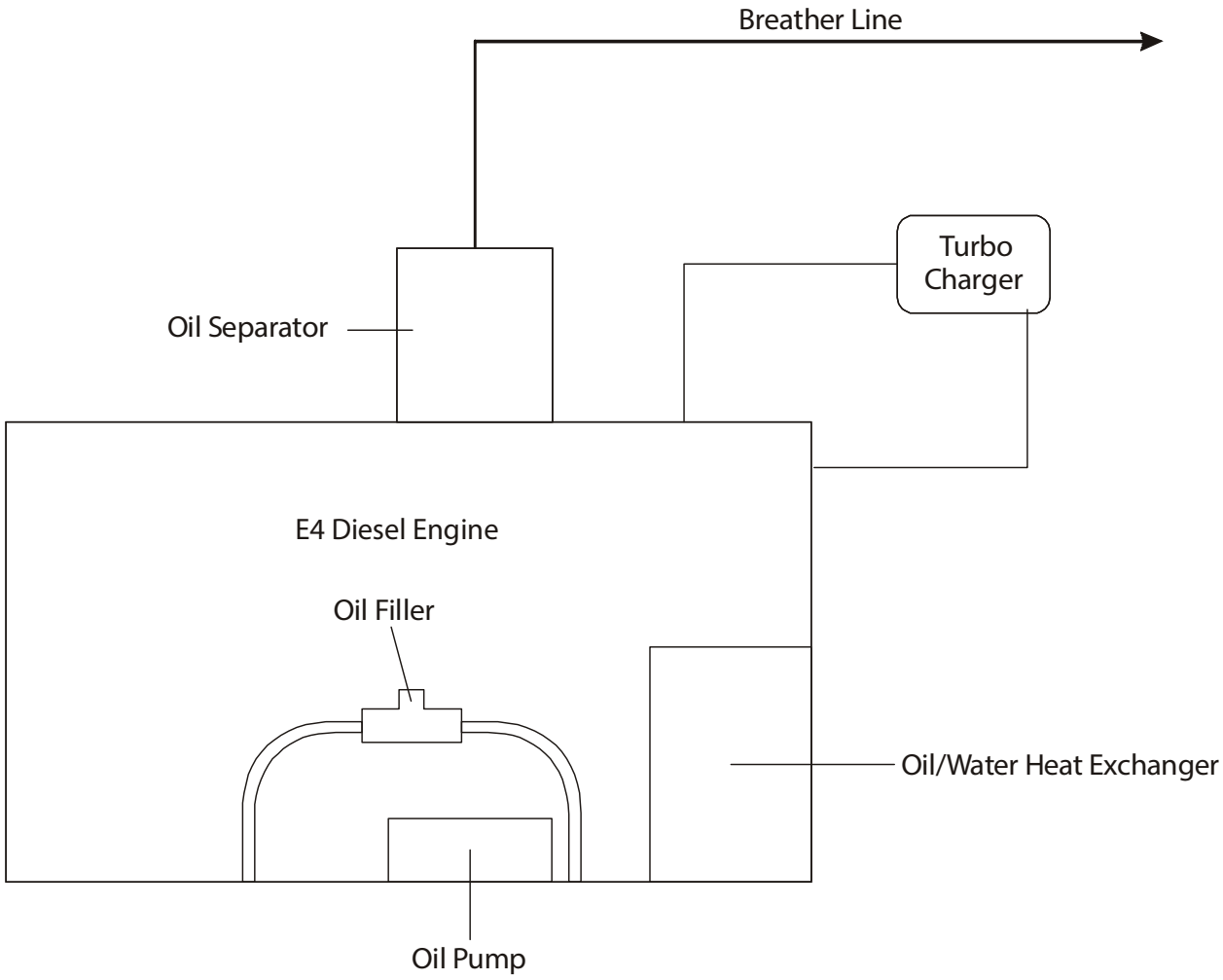

Figure 1 : Oil System Schematic

TROUBLE-SHOOTING

1. General

The table below lists possible defects of the oil system.

When experiencing trouble as detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
The engine oil temperature is too high.	Oil cooler blocked internally.	Contact engine manufacturer.
	Low oil level.	Replenish the oil system. Refer to Section 12-10
The engine oil pressure is too high.	Defective oil pressure sensor.	Refer to the AE Maintenance Manual, latest revision.
The engine oil pressure is too low at normal operating temperatures.	Low oil level.	Replenish the oil system. Refer to Section 12-10.
	Defective oil pressure sensor.	Refer to the AE Maintenance Manual, latest revision.

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MAINTENANCE PRACTICES

1. General

These Maintenance Practices tell you how to drain and refill the engine oil (with the engine oil quick-drain) and how to remove and install the oil quick-drain valve.

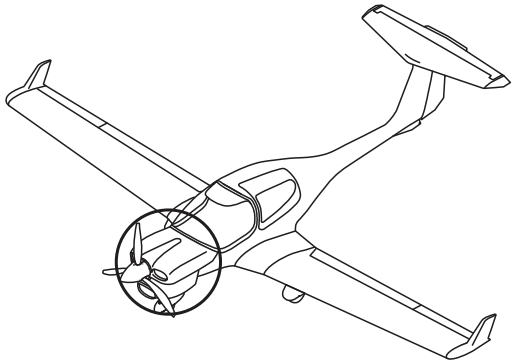
2. Drain/Refill the Engine Oil (with the Engine Oil Quick-Drain)

A. Drain the Engine Oil (with the Engine Oil Quick-Drain).

	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Remove the engine cowling.	Refer to Section 71-10.
(4)	Put a drain hose on the oil quick drain.	
(5)	Put a container (min. capacity 8.5 l (2.25 US gal)) below the drain hose.	
(6)	Open the oil dipstick.	This is to permit a better flow of the oil from the engine.
(7)	Open the oil quick drain.	Refer to Figure 201.
(8)	Let the oil drain from the engine.	

B. Refill the Engine Oil (with the Engine Oil Quick-Drain).

	Detail Steps/Work Items	Key Items/References
(1)	Close the oil quick drain.	Refer to Figure 201.
(2)	Remove the drain hose.	
CAUTION: USE ONLY APPROVED ENGINE OIL. REFER TO CHAPTER 2 OF THE AIRPLANE FLIGHT MANUAL FOR APPROVED ENGINE OIL SPECIFICATION. IF YOU DO NOT USE APPROVED ENGINE OIL, THE ENGINE CAN BE DAMAGED.		
(3)	Refill the engine with oil.	
(4)	Install the oil dipstick and check the oil level.	Make sure that the oil is at the correct level.
(5)	Install the engine cowling.	Refer to Section 71-10.
(6)	Connect the airplane main battery.	Refer to Section 24-31.
(7)	Do a ground test of the engine, allow the engine to reach normal operating temperatures.	Refer to Section 71-00 and the AE Maintenance Manual, latest revision
(8)	Remove the engine cowling.	Refer to Section 71-10.
(9)	Do a test for oil leaks: - Look for oil leaks, specially in the areas where you have done work (drain). - Install the engine cowling.	 Refer to Section 71-10.



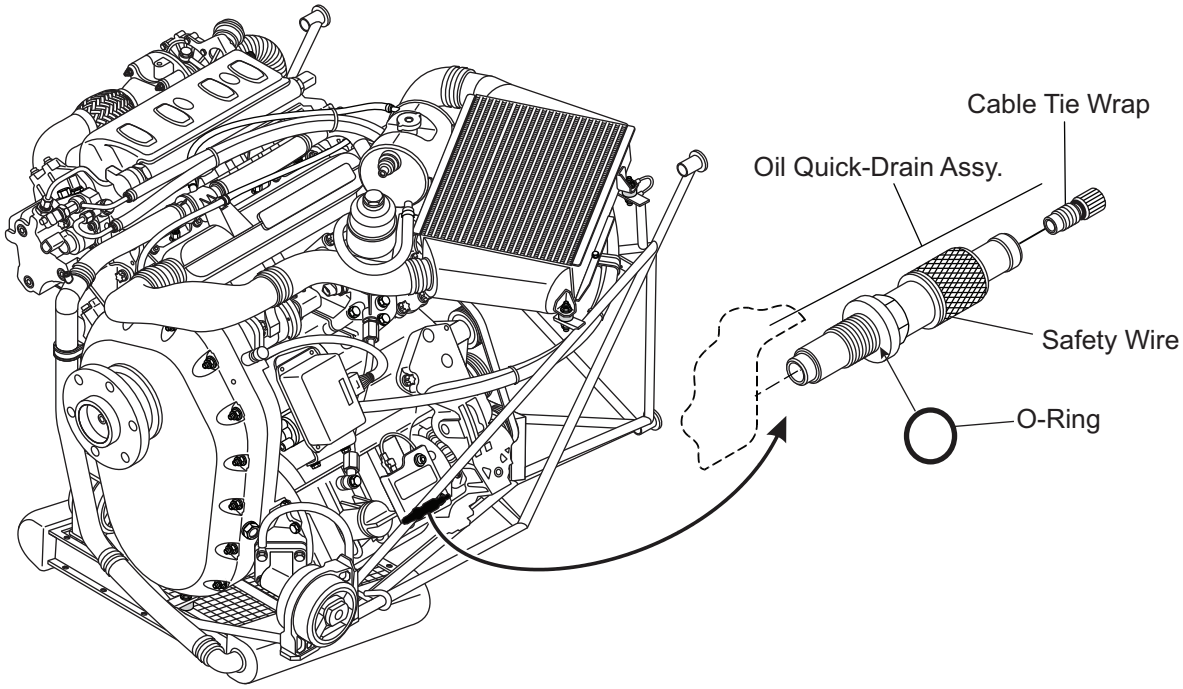


Figure 201 : Engine Oil Quick-Drain

3. Remove/Install the Oil Quick-Drain Valve

A. Remove the Oil Quick-Drain Valve.

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(1)	Drain the engine oil.	Refer to Paragraph 2.A.
(2)	Remove the safety wire at the oil quick-drain valve.	
(3)	Remove the oil quick-drain valve.	

B. Install the Oil Quick-Drain Valve.

Refer to Figure 201.

	Detail Steps/Work Items	Key Items/References
(1)	Turn in the oil quick-drain valve with a new O-ring and torque it to 14 Nm (10.3 lbf.ft).	
(2)	Secure the oil quick-drain valve with safety wire diameter 0.8 mm (0.032 in).	
(3)	Refill the engine with oil.	Refer to Paragraph 2.B.
(4)	Install the oil dipstick and check the oil level.	Make sure that the oil is at the correct level.
(5)	Do a test for oil leaks: - Look for oil leaks, specially in the areas where you have done work (drain). - Install the engine cowling.	 Refer to Section 71-10.

CHAPTER 80
STARTING

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STARTING

1. General

This Section tells you about the system that cranks the engine for starting.

Refer to Section 24-30 for more data on the electrical supplies to the system Refer to Section 76-00 for data about the engine control system.

2. Description and Operation

Figure 1 shows the simplified schematic diagram of the starter system. The system operates off a 24 VDC supply.

The engine has a small, high-powered electric starter. The starter motor is located on the left side of the engine near the front. It has an integral solenoid to connect the starter motor to the relay junction box bus. Either the airplane battery or the external power system can supply the starter.

The ELECTRIC MASTER key switch (marked OFF ON START) is located on the bottom center of the instrument panel. Turn the key clockwise against the spring to operate the starter. Release the key when the engine starts. The spring returns the key to the ON position.

A starter relay located on the instrument panel floor controls the current to the starter solenoid. The ENGINE MASTER switch located on the center left or center bottom of the instrument panel controls the ground connection for the starter relay. This switch must be set to ON for the starter system to operate.

A STARTER or START warning light on the G1000 or annunciator panel comes ON when there is power to the starter. If this light stays on after the engine has started, set the ELECTRIC MASTER key switch and the ENGINE MASTER switch to OFF.

If necessary during starting, the engine control unit operates the glow plugs to heat intake air for the engine.

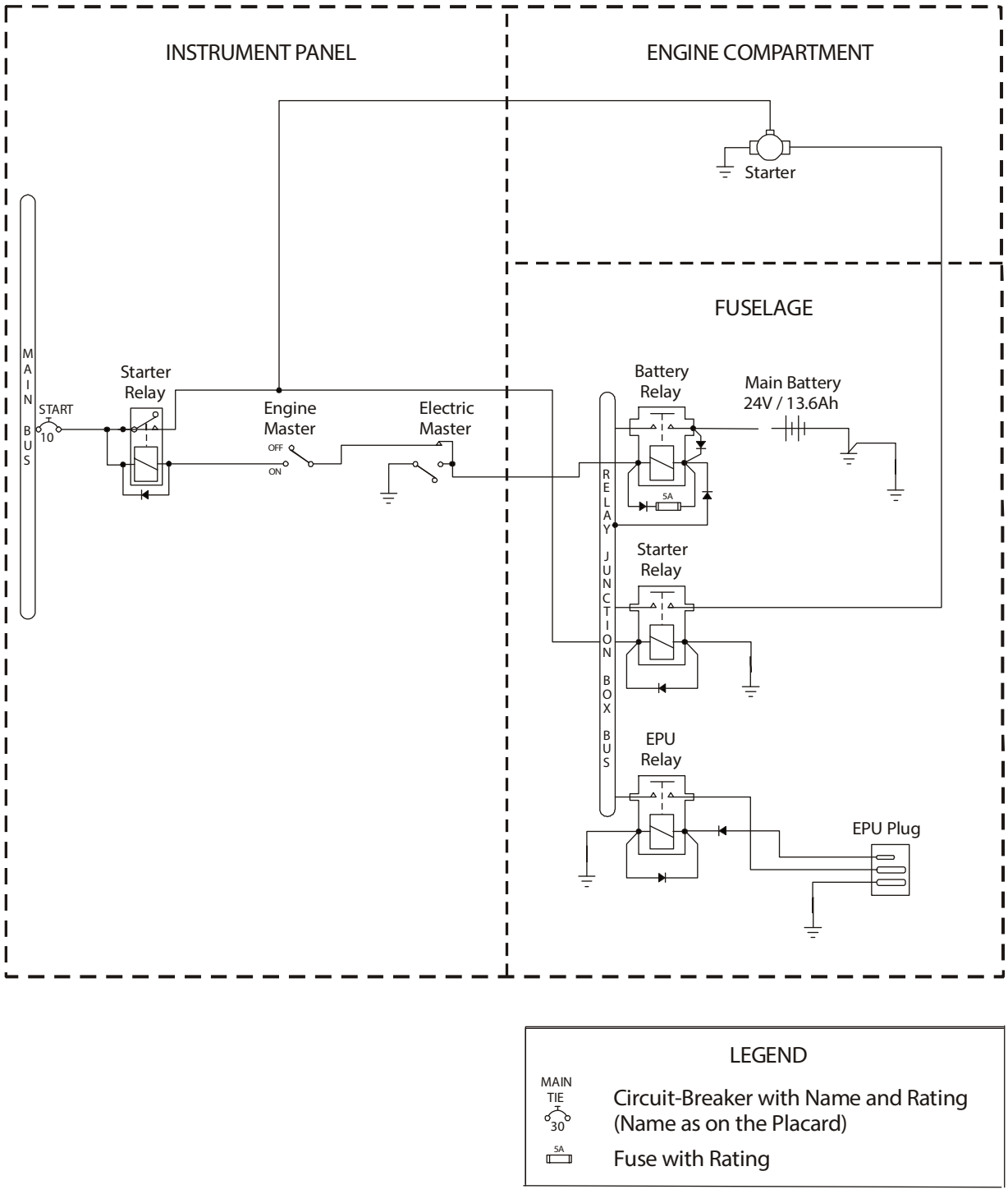

Figure 1 : Starter System Schematic Diagram

TROUBLE-SHOOTING

1. General

The table below lists the defects you could have with the starting system.

When experiencing trouble as detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

WARNING: DO NOT ALLOW PERSONS TO ENTER THE DANGER AREA OF THE PROPELLER. THE PROPELLER MAY TURN AND CAUSE INJURY TO PERSONS.

WARNING: DISCONNECT AND ISOLATE THE STARTER POWER CABLE BEFORE DOING TESTS IN THIS SECTION. THE ENGINE MAY START AND CAUSE INJURY TO PERSONS.

Trouble	Possible Cause	Repair
The starter does not operate when the ELECTRIC MASTER key switch is set to START and the ENGINE MASTER switch is set to ON.	The START circuit-breaker is not set.	Set the START circuit-breaker.
	The battery is discharged.	Replace/recharge the battery.
	The ELECTRIC MASTER key switch is defective.	Replace the ELECTRIC MASTER key switch.
	The ENGINE MASTER switch is defective.	Replace the ENGINE MASTER switch.
	The starter relay is defective.	Starter relay on starter motor: Refer to the engine manufacturer. Starter relay in relay junction box: Replace.
	Starter defective.	Refer to the engine manufacturer.
	Defective cable.	Do a test of the electrical cables. Refer to Chapter 92 for the wiring diagrams. Repair/replace the defective cable. Refer to Section 71-50 for repair limits of the engine harness.

Trouble	Possible Cause	Repair
The starter Power-On light stays on after the key is released from the START position.	The starter relay is defective.	Starter relay on THE starter motor: Refer to the engine manufacturer. Starter relay in relay junction box: Replace.
	The starter solenoid is defective.	Refer to the engine manufacturer.
Difficult cold starting.	Glow plugs worn.	Replace the glow plugs. Refer to the engine manufacturer

MAINTENANCE PRACTICES

1. General

This Section gives you only Maintenance Practices for the airplane part of the starter system. No repairs are permitted on the engine. Only an authorized repair shop or the manufacturer can repair the engine part of the system.

2. Remove/Install the ELECTRIC MASTER Key Switch

A. Remove the ELECTRIC MASTER Key Switch.

	Detail Steps/Work Items	Key Items/References
WARNING:	**MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE STARTER SYSTEM. IF THE ENGINE STARTS, THE PROPELLER TURNS AND CAN CAUSE INJURY OR DEATH.**	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Remove the instrument panel cover.	Refer to Section 25-10.
(4)	Release the retaining nut from the cockpit side of the ELECTRIC MASTER key switch.	
(5)	Move the ELECTRIC MASTER key switch towards the front of the airplane.	Get access to the switch from the firewall side of the instrument panel.
(6)	Disconnect the cables from the ELECTRIC MASTER key switch	Make a note of the position of the cables.
(7)	Remove the ELECTRIC MASTER key switch from the airplane.	

B. Install the ELECTRIC MASTER Key Switch.

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE STARTER SYSTEM. IF THE ENGINE STARTS, THE PROPELLER TURNS AND CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Put the ELECTRIC MASTER key switch in position between the instrument panel and the firewall.	
(3)	Connect the cables to the ELECTRIC MASTER key switch.	Refer to the wiring diagrams and the notes you made during removal.
(4)	Move the ELECTRIC MASTER key switch into position in the instrument panel.	
(5)	Install the retaining nut to the cockpit side of the ELECTRIC MASTER key switch.	
(6)	Install the instrument panel cover.	Refer to Section 25-10.
(7)	Connect the airplane main battery.	Refer to Section 24-31.
(8)	Do an engine ground run-up.	Refer to Section 71-00.

3. Remove/Install the ELECTRIC MASTER Switch

A. Remove the ELECTRIC MASTER Switch.

	Detail Steps/Work Items	Key Items/References
WARNING:	**MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE STARTER SYSTEM. IF THE ENGINE STARTS, THE PROPELLER TURNS AND CAN CAUSE INJURY OR DEATH.**	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery and the ECU backup battery.	Refer to Section 24-31.
(3)	Remove the instrument panel cover.	Refer to Section 25-10.
(4)	Release the retaining nut from the cockpit side of the ELECTRIC MASTER switch.	
(5)	Move the ELECTRIC MASTER switch towards the front of the airplane.	Get access to the switch from the firewall side of the instrument panel.
(6)	Disconnect the cables from the ELECTRIC MASTER switch	Make a note of the position of the cables.
(7)	Remove the ELECTRIC MASTER switch from the airplane.	

B. Install the ELECTRIC MASTER Switch.

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE STARTER SYSTEM. IF THE ENGINE STARTS, THE PROPELLER TURNS AND CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Put the ELECTRIC MASTER switch in position between the instrument panel and the firewall.	
(3)	Connect the cables to the ELECTRIC MASTER switch.	Refer to the wiring diagrams and the notes you made during removal.
(4)	Move the ELECTRIC MASTER switch into position in the instrument panel.	
(5)	Install the retaining nut to the cockpit side of the ELECTRIC MASTER switch.	
(6)	Install the instrument panel cover.	Refer to Section 25-10.
(7)	Connect the airplane main battery and the ECU backup battery.	Refer to Section 24-31.
(8)	Do an engine ground run-up.	Refer to Section 71-00.

4. Remove/Install the Starter Relay

A. Remove the Starter Relay.

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE STARTER SYSTEM. IF THE ENGINE STARTS, THE PROPELLER TURNS AND CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Disconnect the cables from the starter relay.	Make a note of the position of the cables.
(4)	Remove the screw, washer and nut that attach the relay to the junction box.	
(5)	Remove the starter relay from the airplane.	

B. Install the Starter Relay.

	Detail Steps/Work Items	Key Items/References
	WARNING: MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE STARTER SYSTEM. IF THE ENGINE STARTS, THE PROPELLER TURNS AND CAN CAUSE INJURY OR DEATH.	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Put the starter relay in position in the junction box.	
(3)	Install the screw, washer and nut that attach the relay.	
(4)	Connect the cables to the starter relay.	Refer to the wiring diagrams and the notes you made during removal.
(5)	Connect the airplane main battery.	Refer to Section 24-31.
(6)	Do an engine ground run-up.	Refer to Section 71-00.

CHAPTER 81
TURBO CHARGER

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TURBO CHARGER

1. General

This Chapter describes the turbo-charger system of the Austro Engine E4-A engine.

2. Description and Operation

The air intake system has an air filter located downstream of the NACA inlet and air intake duct. Aft of the air filter is the alternate air valve which has an alternate air inlet from the engine compartment. A rotating cage in the alternate air valve can be set to take air into the air intake system through the filter or it can be set to take unfiltered air directly from the engine compartment. Refer to Section 71-60 for more data about the air filter and the alternate air valve.

The outlet from the alternate air valve connects to the turbo charger inlet. The turbo charger compresses and therefore heats up the air. The outlet from the turbo charger connects to the intercooler, which cools down the hot compressed air.

The intercooler is located on the top left rear section of the engine. The outlet of the intercooler connects to the engine intake manifold. A manifold pressure and air temperature sensor is attached to the engine intake manifold.

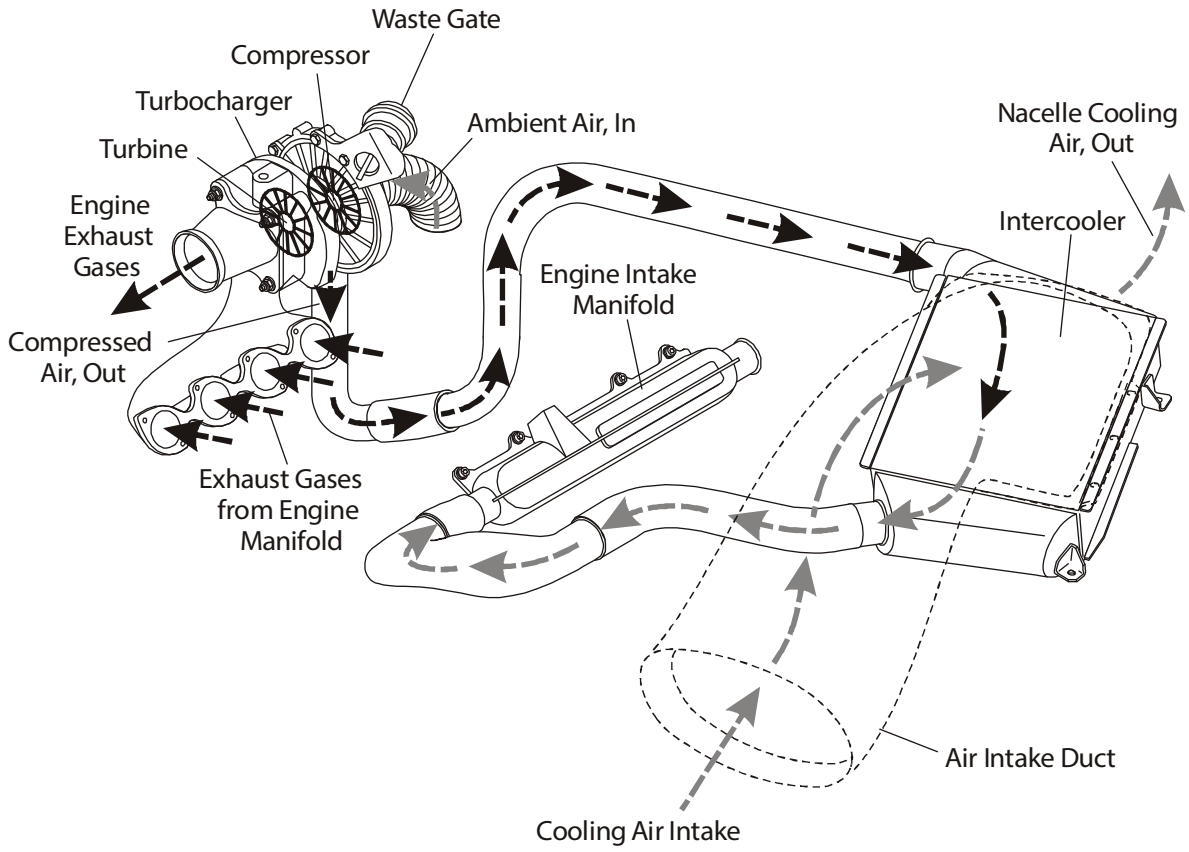

Figure 1 : Engine Turbo Charger Schematic Diagram

3. Operation

Figure 1 shows the turbo charger system schematic.

When the engine is running the exhaust gases from the engine flow through a manifold to the turbo charger turbine. A waste gate in the turbo charger turbine inlet can open to allow some of the exhaust gases from the engine to bypass the turbine and flow directly in to the engine exhaust pipe. The waste gate opening is controlled by the engine EECU.

Ambient air flows through the air filter (normal operation) or from the fuselage compartment (alternate air operation) into the turbo charger compressor. The air gains heat while being compressed in the turbo charger. The hot compressed air flows through a flexible hose to the intercooler.

The hot compressed air flows through the matrix of the intercooler. Cooling air is guided from the left side of the cowling duct to the intercooler and flows around the intercooler matrix. This will cool the compressed air. The cooled compressed air from the intercooler matrix flows through a flexible hose and a charge air duct to the engine air intake manifold.

Figures 2 through 5 show the various installations of the Intercooler in the turbo charger system.

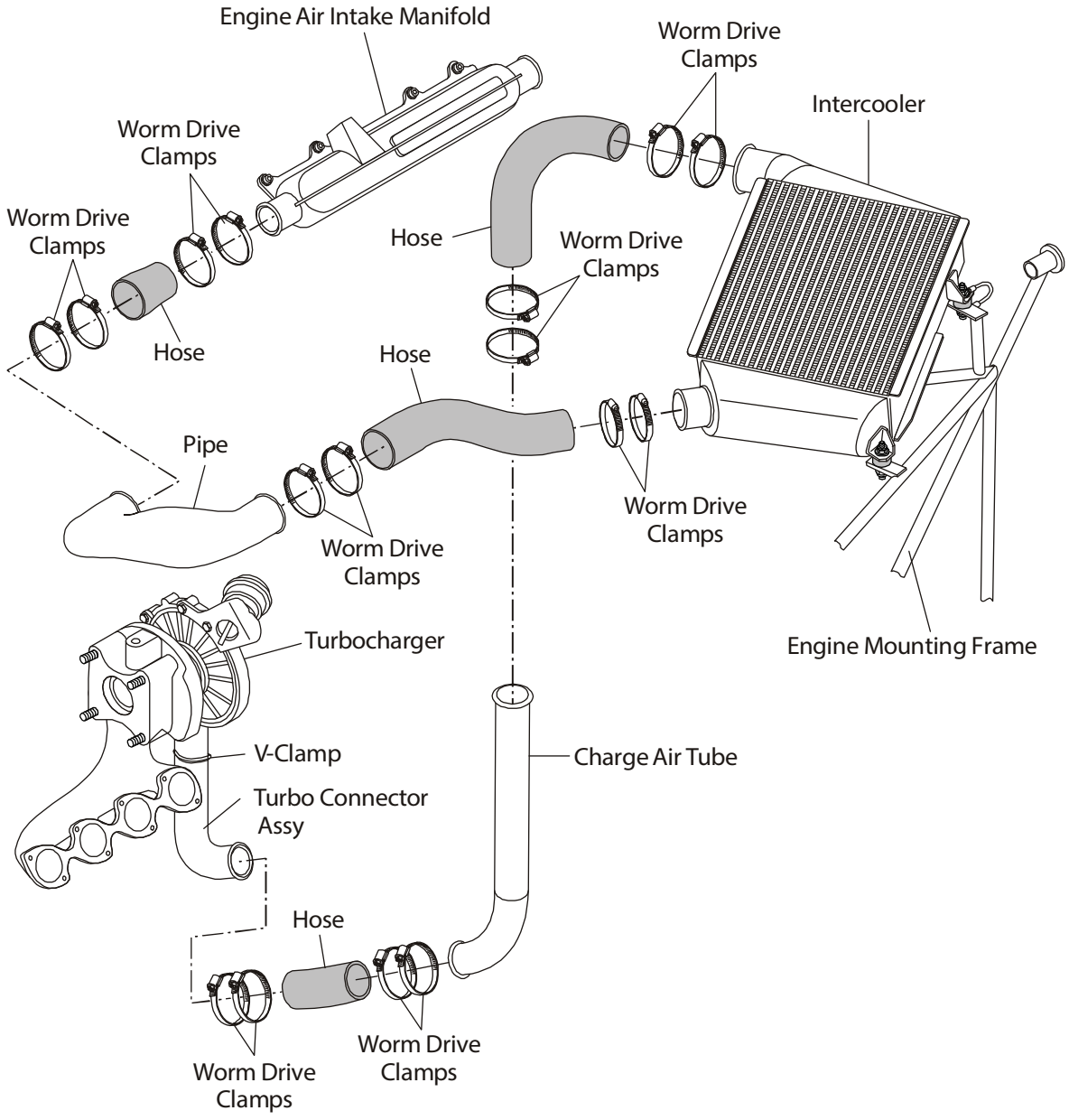

Figure 2 : Intercooler Installation

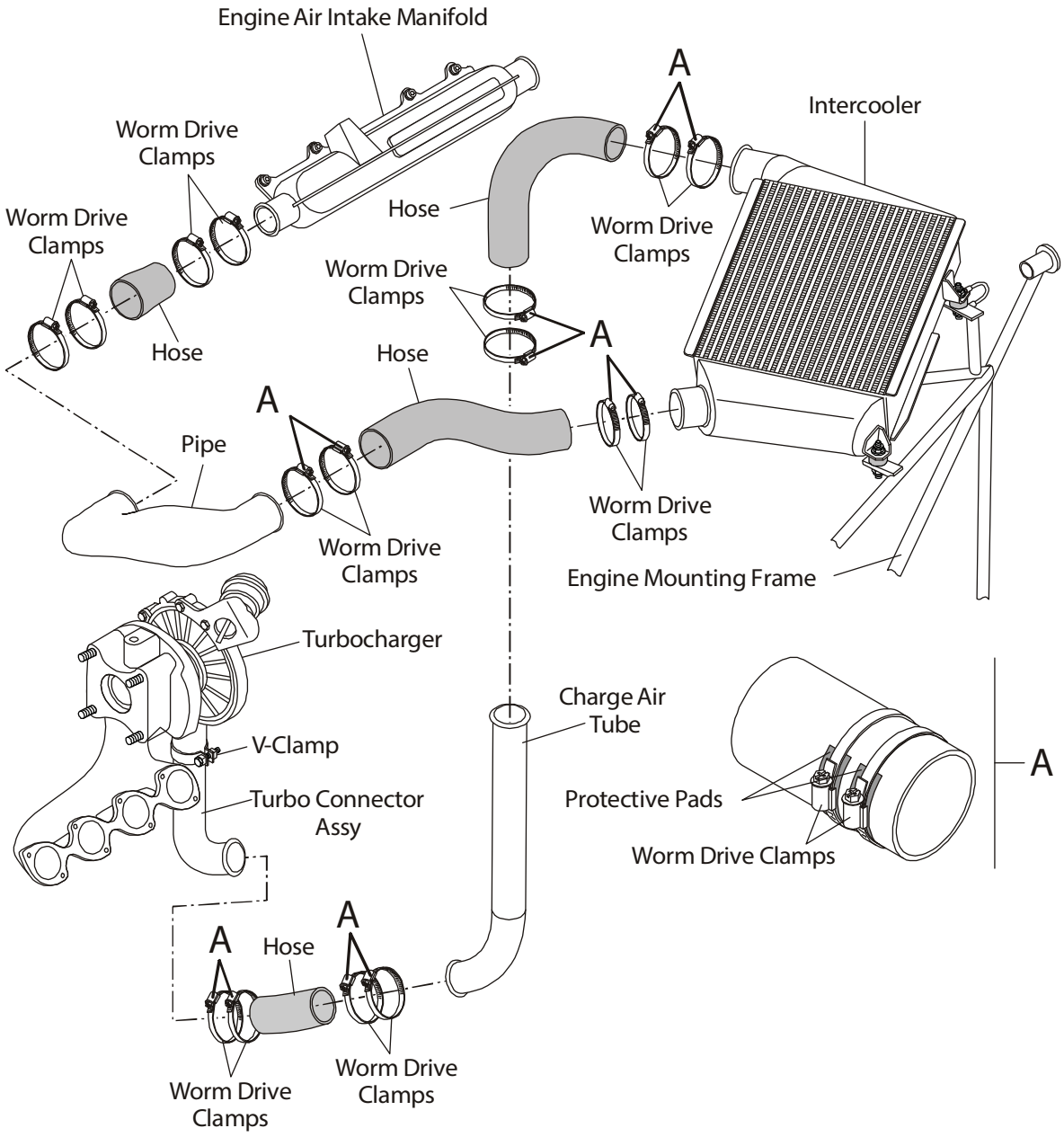

Figure 3 : Intercooler Installation
(if MÄM 40-630, MÄM 40-639 and MÄM 40-691 are installed)

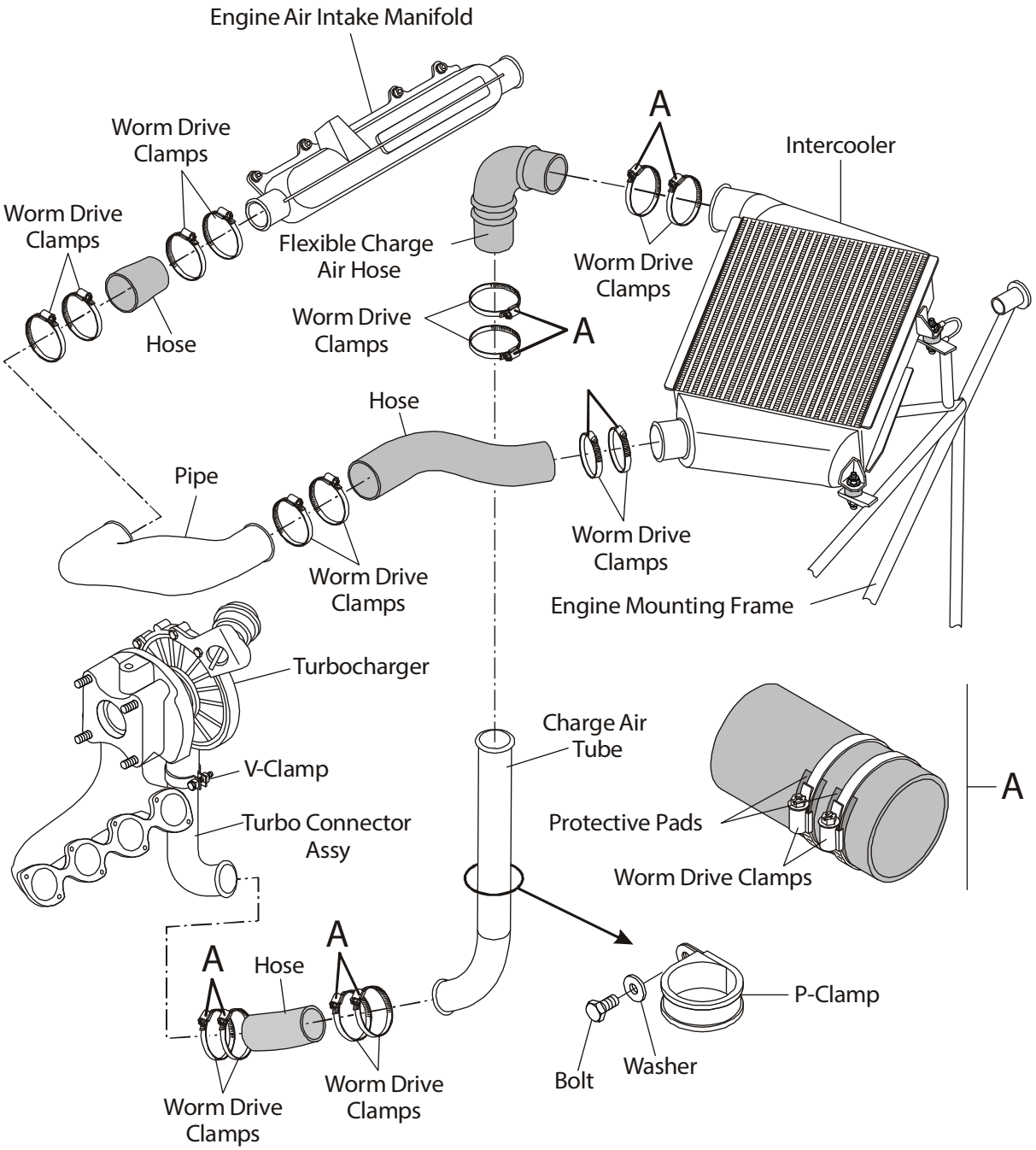

Figure 4 : Intercooler Installation
(if MÄM 40-630, MÄM 40-639, MÄM 40-691 and MÄM 40-820 are installed)

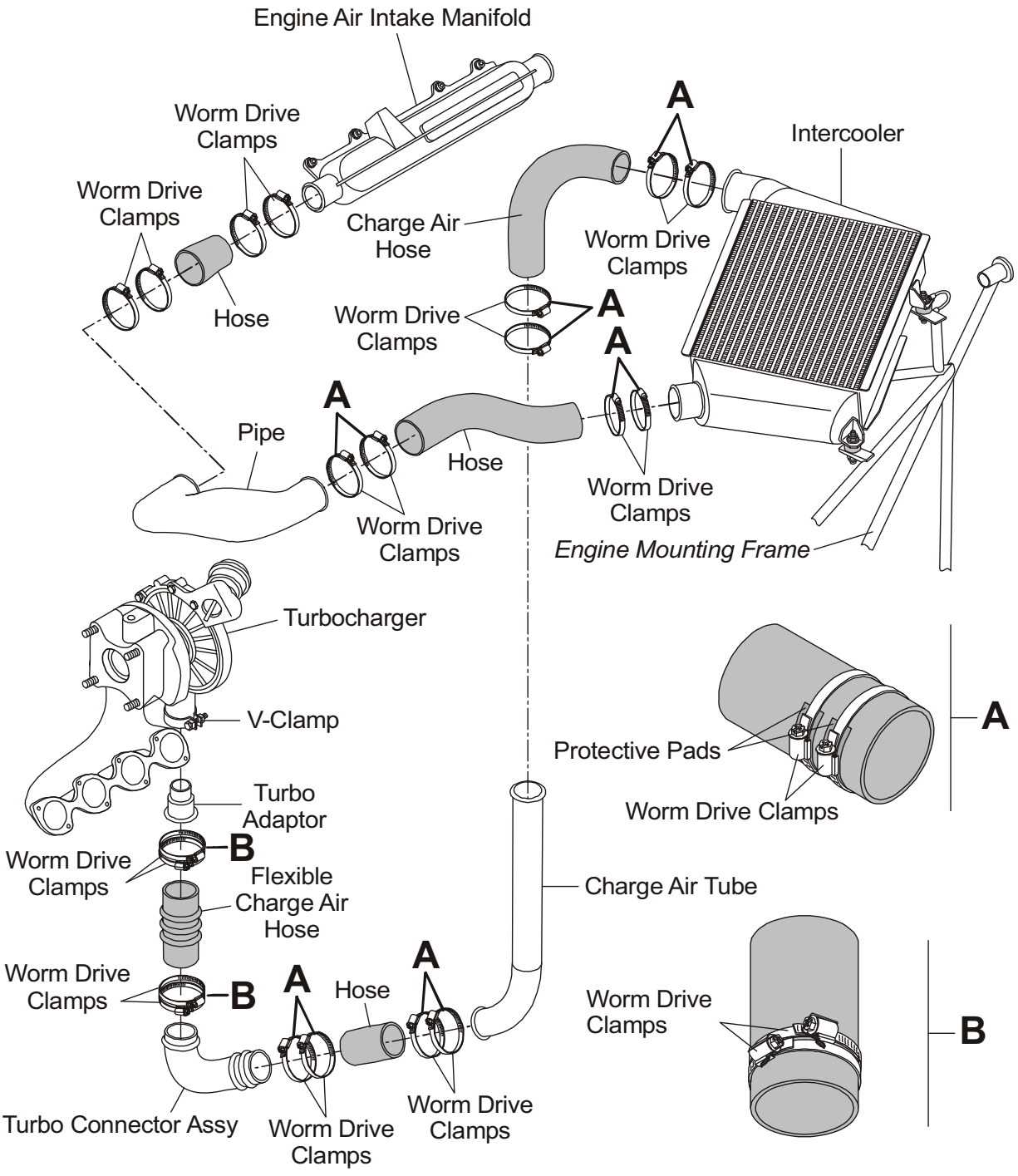

Figure 5 : Intercooler Installation
(if MÄM 40-639, MÄM 40-691 and MÄM 40-899/b are installed)

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TROUBLE-SHOOTING

1. General

The table below lists the possible defects of the turbo charger system.

When experiencing trouble as detailed in the Trouble column read across to the Possible Cause column. Then, do the repair given in the Repair column.

Trouble	Possible Cause	Repair
The engine intake manifold pressure is too low/ too high.	Waste gate valve defective.	Refer to the engine manufacturer.
Inlet air temperature too high.	Intercooler matrix blocked/ damaged.	Clear intercooler matrix of obstructions. Replace intercooler if necessary.

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MAINTENANCE PRACTICES

1. General

This Section tells you how to remove/install the intercooler.

CAUTION: YOU CANNOT DO MAINTENANCE ON THE INTERCOOLER.

CAUTION: DO NOT TRY TO ADJUST THE WASTE GATE CONTROL PUSH ROD. ANY ADJUSTMENT WILL AFFECT THE CHARACTERISTICS OF THE ELECTRONIC CONTROL SYSTEM.

Refer to Section 71-60 for maintenance data on the air filter and the alternate air valve.

2. Remove/Install an Engine Intercooler

NOTE: All hose clamp connections (except such secured with self locking nuts) in the charge air system must be secured with lock wire.

A. Remove an Engine Intercooler.

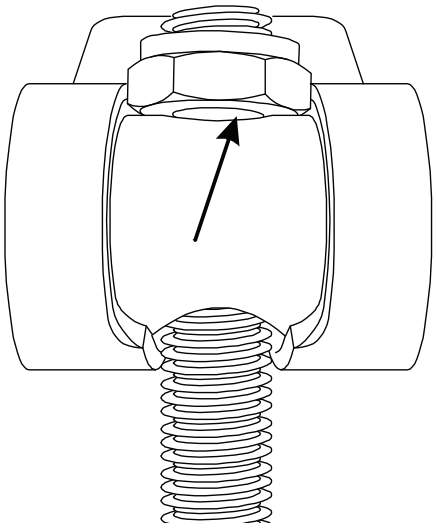
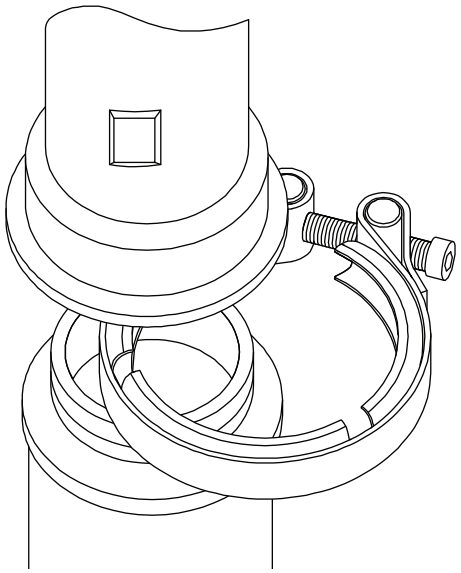
	Detail Steps/Work Items	Key Items/References
	WARNING: DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. IF THE ENGINE STARTS, THE PROPELLER CAN CAUSE DEATH OR INJURY TO PERSONS. **WARNING: YOU MUST MAKE SURE THAT THE ENGINE IS SAFE BEFORE YOU DO WORK ON THE ENGINE CONTROLS. IF THE PROPELLER TURNS IT CAN CAUSE INJURY TO PERSONS.**	
(1)	Make sure that the engine is safe: - Set the ELECTRIC MASTER key switch to OFF. - Set the ENGINE MASTER switch to OFF. - Set the power lever to 0%.	
(2)	Disconnect the airplane main battery.	Refer to Section 24-31.
(3)	Remove the engine cowling.	Refer to Section 71-10.

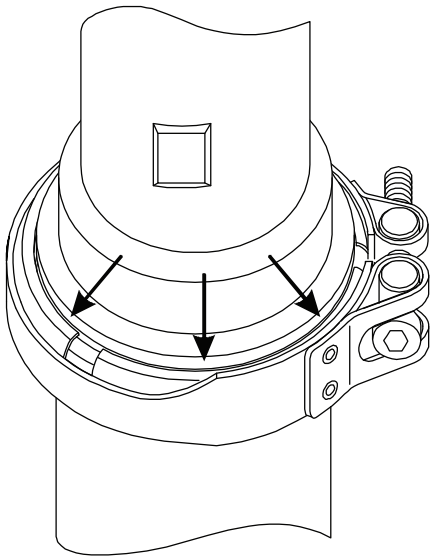
	Detail Steps/Work Items	Key Items/References
(4)	Disconnect the flexible hoses and aluminium tubes that connect the intercooler to the turbo charger and engine air intake manifold: - Remove the worm-drive-clamps. - Pull the hoses off the intercooler connectors and the turbo charger inlet.	Refer to Figure 2 in the Description and Operation (D&O) Pageblock 81-00-00. At the intercooler.
(5)	Remove the intercooler: - Remove the nuts and washers that attach the intercooler to the engine mount and that attach the coolant tank to the intercooler. - Move the intercooler clear of the engine.	 Take care not to damage the intercooler matrix!

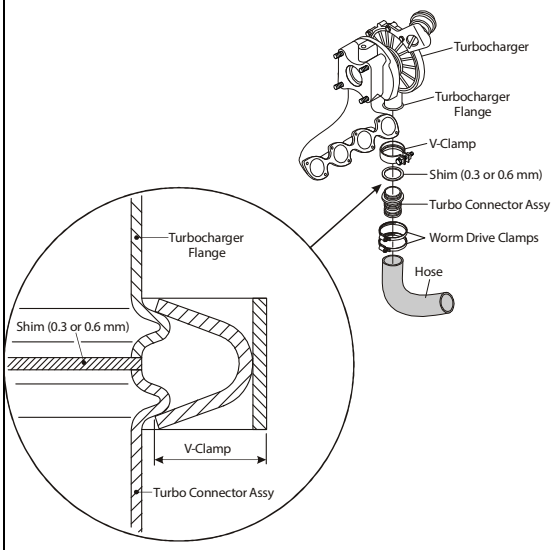
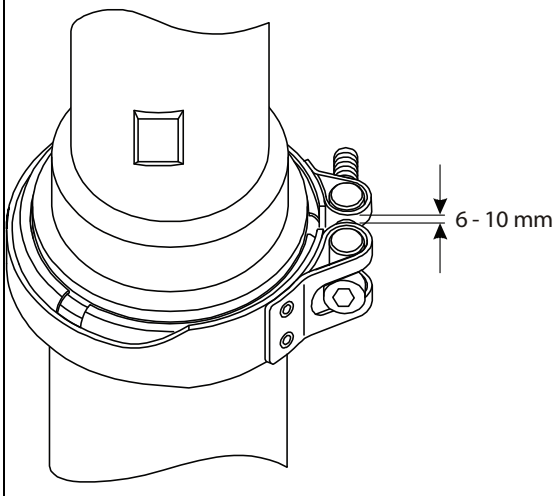
B. Install an Engine Intercooler.

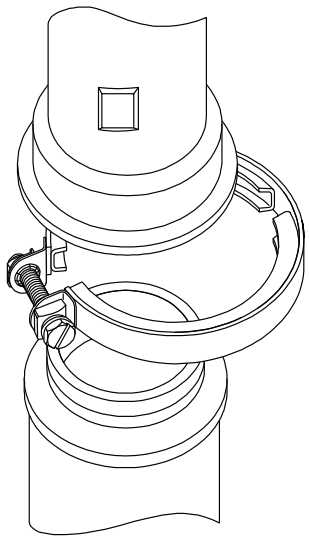
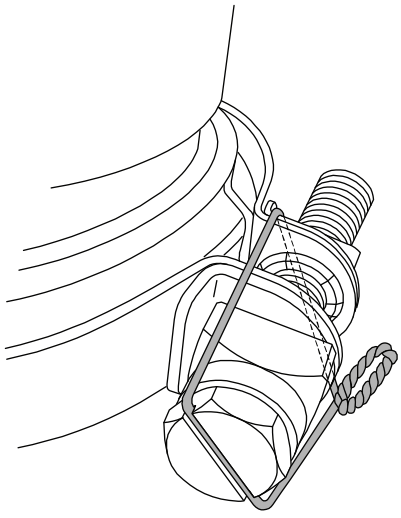
	Detail Steps/Work Items	Key Items/References
	CAUTION: MAKE SURE THAT TURBO CHARGER INLET HOSES ARE ROUTED WITHOUT KINKS AND CONTRADICTIONS. INCORRECT ROUTED HOSES MAY RESULT IN DAMAGE TO THE TURBO CHARGER.	
(1)	Install the intercooler to the engine mount: –Install the nuts and washers that attach the intercooler to the engine mount.	
	NOTE: Do not bend or kink the charger hoses during installation. If there are signs of kinking, replace the engine intercooler hose.	

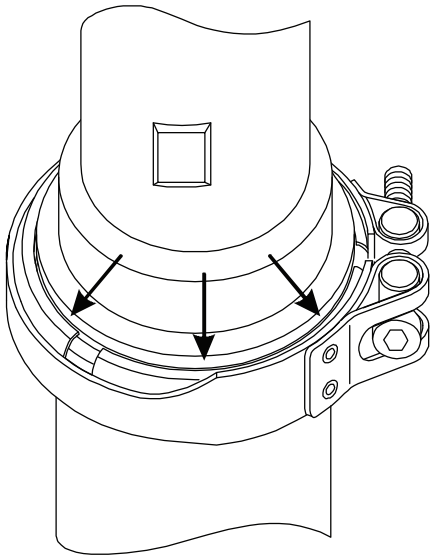
	Detail Steps/Work Items	Key Items/References
(2)	Connect the flexible hoses and aluminum tubes that connect the intercooler to the turbo charger and engine air intake manifold:	
	- Move the worm-drive-clamps into position on the flexible hoses.	Do not tighten the worm-drive-clamps!
	- Apply water to the inside of the hoses to ease hose installation.	
	- Push the flexible hose onto the intercooler connector.	Refer to Figure 201 or 202.
	- If MÄM 40-820 is installed:	Refer to Figure 4 in the D&O Pageblock.
	- Make sure that the position of the support rings of the bellows are in front of the aluminum connector and not on it. Check that the bellows of the hose are not compressed or stretched. If necessary realign charge air hose.	
	- The aluminum charge air tube must have at least 5 mm (0.2 in.) (12 mm (0.47 in.), if MÄM 40-630 is incorporated) clearance to the fire wall and positive clearance (5 mm (0.2 in.), if MÄM 40-630 is incorporated) to the RSGU clamp at the coolant aluminum tube aft of the engine.	
	- Move the worm-drive-clamps into the correct position.	
	- If MÄM 40-639 or MÄM 40-691 or MÄM 40-820 is installed, bond the protective pad using Dow Corning 736 to the red turbo charger hoses underneath the housings of the worm-drive-clamps.	Refer to Figure 3 in the D&O Pageblock.
	- Move the worm-drive-clamps into the correct position and tighten the worm-drive-clamps.	Refer to Chapter 20 for correct installation and tightening torque of worm-drive-clamps.
	- Install the coolant tank to the intercooler.	

	Detail Steps/Work Items	Key Items/References
(3)	If MÄM 40-853/c & MÄM 40-873 is installed: - Install the nut BN175-M6-PZ on the end of the screw of the new V-clamp so that there is no gap.  - Put the V-clamp in position on the flanges. NOTE: Do not pull the V-clamp over the turbo charger tube since the V-clamp will be permanently deformed. 	

	Detail Steps/Work Items	Key Items/References
	- Before tightening the V-clamp make sure that there is no gap between the aluminum charged air tube and the turbo charger flange. When correctly installed the aluminum charged air tube must fit into the turbo charger flange without tension. - Tighten V-clamp on turbo-charger. - Make sure the circumferential gap to the turbo charger is equal (if not, use rubber mallet to tap V-clamp into position). If tapping with a rubber mallet was required, retighten the V-clamp.  - Make sure that the distance between V-flanges on the lock is between 6 mm (0.24 in.) and 10 mm (0.39 in.). If necessary insert turbo connector shims to obtain the required distance.	Torque: 5.5 ± 0.4 Nm (4.0 ± 0.4 lbf.ft).

	Detail Steps/Work Items	Key Items/References
	.  	

	Detail Steps/Work Items	Key Items/References
(3)	If MÄM 40-853/c & MÄM 40-873 are NOT installed: - Put the V-clamp in position on the flanges. NOTE: Do not pull the V-clamp over the turbo charger tube since the V-clamp will be permanently deformed.  - Tighten the V-clamp on the turbo-charger.. 	

	Detail Steps/Work Items	Key Items/References
	- Secure bolt of V-clamp with lock wire. - Make sure the circumferential gap to the turbo charger is equal (if not, use rubber mallet to tap V-clamp into position). If tapping with a rubber mallet was required, retighten the V-clamp. 	
(4)	Install the engine cowling.	Refer to Section 71-10.
(5)	Connect the airplane main battery.	Refer to Section 24-31.
(6)	Do an engine ground run-up and do a test for the correct operation of the engine intercooler.	Refer to Section 71-00.

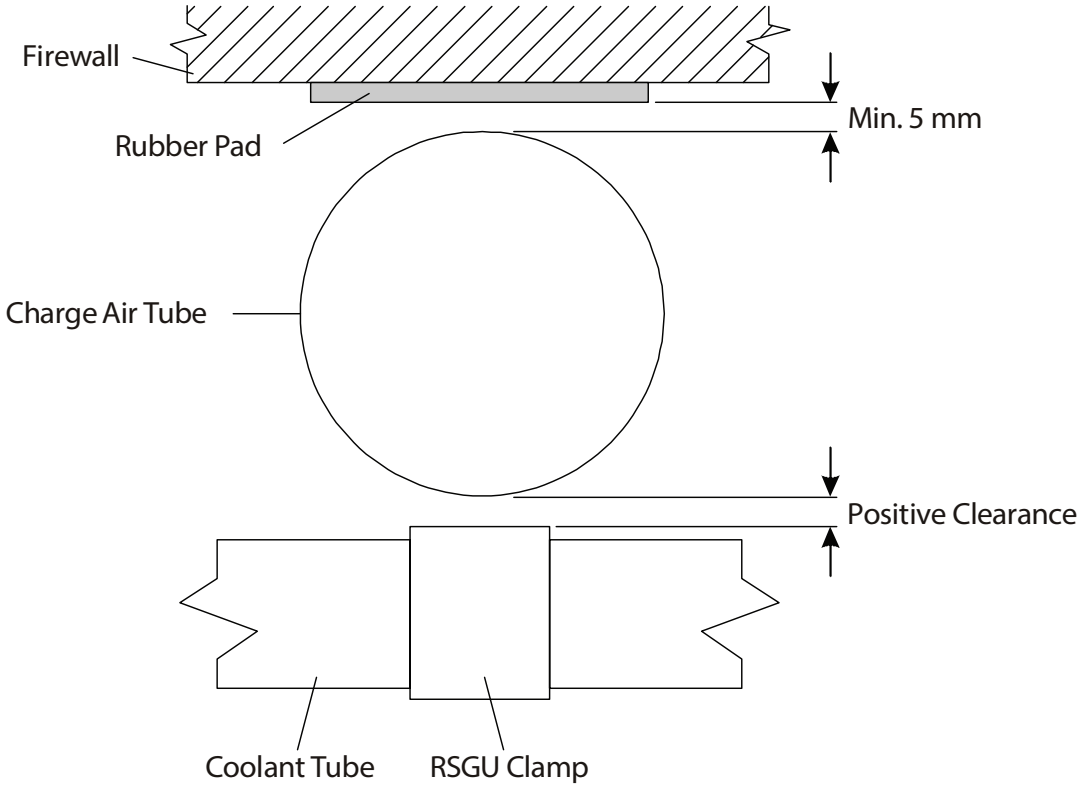


Figure 201 : Engine Intercooler Tubes - Clearances

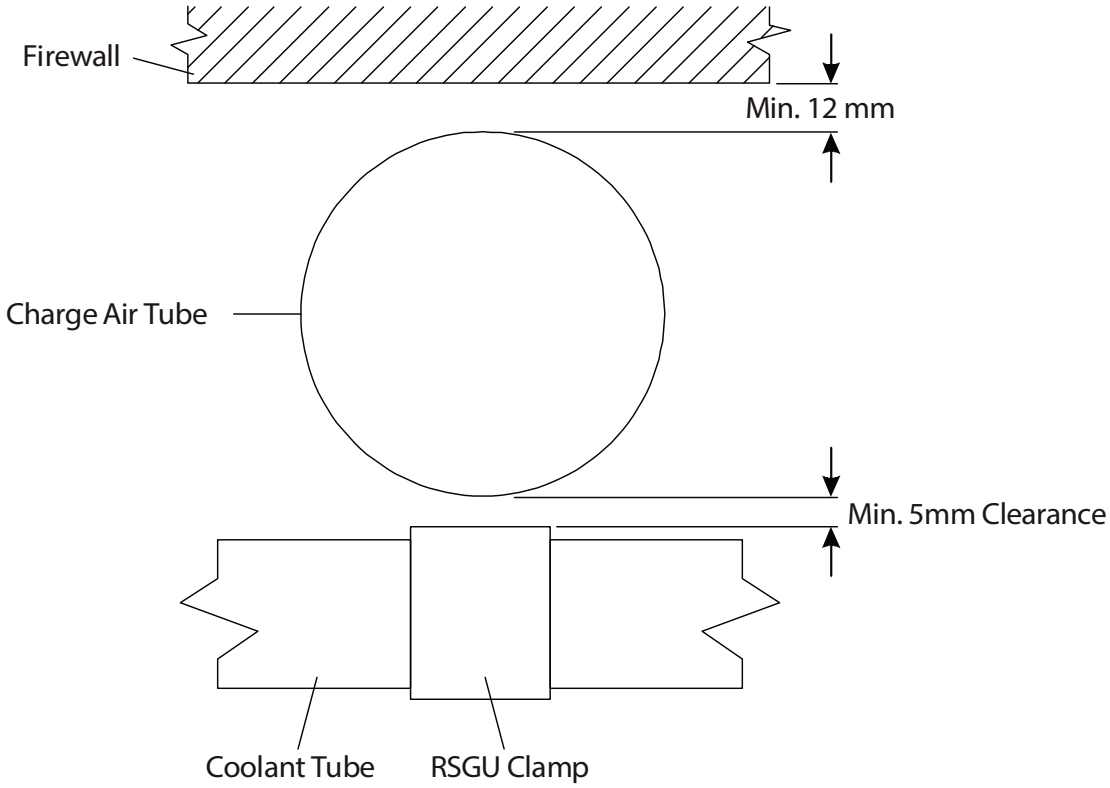


Figure 202 : Engine Intercooler Tubes - Clearances (if MÄM 40-630 is installed)

C. Install an Engine Intercooler (if MÄM 40-899/b is installed).

	Detail Steps/Work Items	Key Items/References
	CAUTION: MAKE SURE THAT TURBO CHARGER INLET HOSES ARE ROUTED WITHOUT KINKS AND CONTRADICTIONS. INCORRECT ROUTED HOSES MAY RESULT IN DAMAGE TO THE TURBO CHARGER.	
(1)	Install the intercooler to the engine mount: - Install the nuts and washers that attach the intercooler to the engine mount.	
	NOTE: Do not bend or kink the charger hoses during installation. If there are signs of kinking, replace the engine intercooler hose.	
(2)	Connect the hoses and aluminum tubes that connect the intercooler to the turbo charger and engine air intake manifold:	
	- Move the worm-drive-clamps into position on the hoses.	Do not tighten the worm-drive-clamps!
	- Apply water to the inside of the hoses to ease hose installation.	
	- Assemble the hoses.	Refer to Figure 5 in the D&O Pageblock.
	- Make sure that the position of the support rings of the bellows are in front of the aluminum connector and not on it. Check that the bellows of the hose are not compressed or stretched. If necessary realign charge air hose.	Refer to Figure 5 in the D&O Pageblock.
	- The aluminum charge air tube must have at least 12 mm (0.47 in.) clearance to the fire wall and 5 mm (0.2 in.) to the RSGU clamp at the coolant aluminum tube aft of the engine.	
	- The hose between the turbo connector assy and the charge air tube must have at least 18 mm (0.7 in.) clearance to the lower engine mount tube.	
	- Move the worm-drive-clamps into the correct position.	

	Detail Steps/Work Items	Key Items/References
	- Bond the protective pad using Dow Corning 736 to the red turbo-charger hoses underneath the housings of the worm-drive-clamps except for the four worm-drive-clamps aft of the turbo charger. - Move the worm-drive-clamps into the correct position. The locks of the worm drive clamps have to point towards each other. See datail B on Figure 5. Tighten the worm-drive-clamps. Secure the worm-drive-clamps with locking wire. - Install the coolant tank to the intercooler.	Refer to Figure 5 in the D&O Pageblock. Refer to Figure 5 in the D&O Pageblock. Refer to Chapter 20 for the correct installation and tightening torque of worm-drive-clamps.
(3)	Install the engine cowling.	Refer to Section 71-10.
(4)	Connect the airplane main battery.	Refer to Section 24-31.
(5)	Do an engine ground run-up and do a test for the correct operation of the engine intercooler.	Refer to Section 71-00.

CHAPTER 92
WIRING DIAGRAMS

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TABLE OF CONTENTS

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SCHEMATICS LISTING

1. General

This Chapter contains the wiring diagrams for each system. The wiring diagrams use the ATA numbering system (e.g. 9221 - Chapter 92, Wiring Diagrams / Section 21, Air Conditioning).

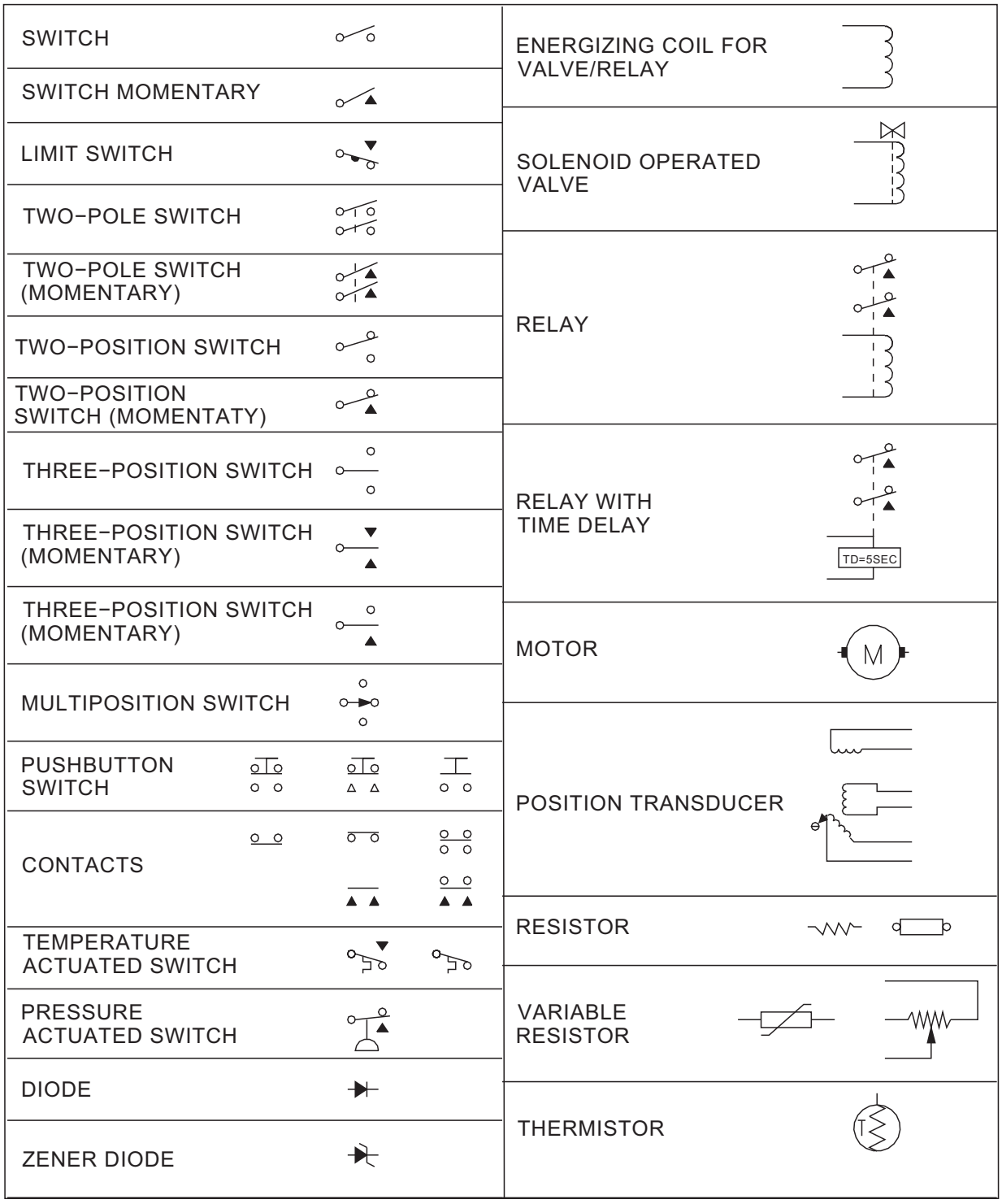
Title	Drawing Number	Revision Number	Number of Sheets
Schematic, Equipment Cooling	D44-9221-20-01	-	1
Schematic, Equipment Cooling	D44-9221-20-02	A	1
Schematic, Battery Heaters	D44-9221-40-01	-	1
Schematic, RACC Wiring	D44-9221-50-01	B	1
Schematic, GFC700 Wiring	D44-9222-10-01	-	1
Schematic, KAP 140 - G1000 Wiring	D44-9222-10-02	-	1
Schematic, GSR 56 Wiring	D44-9223-15-00	-	1
Schematic, PM 1000 Intercom Wiring	D44-9223-50-01	A	1
Schematic, Electrical System	D44-9224-30-01	C	1
Schematic, Electrical System (D44-9224-30-01_01)	Superseded by D44-9224-30-01_02		
Schematic, Electrical System	D44-9224-30-01_02	A	1
Schematic, Electrical System (D44-9224-30-01x01)	Superseded by D44-9224-30-01x03		
Schematic, Electrical System (D44-9224-30-01_03)	Superseded by D44-9224-30-01x03		
Schematic, Electrical System, Conversion	D44-9224-30-01x03	-	1
Schematic, Electrical System (D44-9224-30-02)	Superseded by D44-9224-30-02_02		
Schematic, Electrical System, Club	D44-9224-30-02_02	-	1
Schematic, Second Alternator	D44-9224-30-05	D	1
Schematic, USB Charging Ports	D44-9224-60-01	-	1
Schematic, Emergency Power Package Wiring	D44-9225-60-01	-	1
Schematic, ELT ME406/1000, Wiring	D44-9225-60-02	-	1
Schematic, ME406/1000, Wiring	D44-9225-60-03	-	1
Schematic, Kannad 406 AF-Compact ELT	D44-9225-60-04	-	1
Schematic, Rudder Pedals Adjust., Wiring	D44-9227-20-01	A	1
Schematic, Flaps Wiring	D44-9227-50-01	A	1
Schematic, Flaps Wiring	D44-9227-50-01x01	-	1

Title	Drawing Number	Revision Number	Number of Sheets
Schematic, Flaps Wiring	D44-9227-50-02	-	1
Schematic, Fuel Transfer Wiring	D44-9228-20-01	A	1
Schematic, Fuel Transfer Wiring	D44-9228-20-01x01	-	1
Schematic, Fuel Transfer Wiring	D44-9228-20-02	-	1
Schematic, Pitot Heat Wiring	D44-9230-30-01	-	1
Schematic, Pitot Heat Wiring	D44-9230-30-01x01	-	1
Schematic, Pitot Heat Wiring	D44-9230-30-02	-	1
Schematic, Hourmeter Wiring	D44-9231-20-01	-	1
Schematic, Hourmeter Wiring	D44-9231-20-02	-	1
Schematic, OAT	D44-9231-20-03	A	1
Schematic, FDR Wiring	D44-9231-30-01	B	1
Schematic, GDL 59 Wiring	D44-9231-30-02	-	1
Schematic, Caution & Warning Wiring	D44-9231-50-01	A	1
Schematic, G1000 Wiring	D44-9231-60-01	C	6
Schematic, G1000 Wiring	D44-9231-60-01x01	-	6
Schematic, G1000 NXi Wiring	D44-9231-60-02	-	6
Schematic, G1000 NXi (Phase I and Phase II)	D44-9231-60-03	C	6
Schematic, G1000 NXi (Phase III)	D44-9231-60-03_01	-	6
Schematic, Flood Light Wiring	D44-9233-10-01	-	1
Schematic, Instrument Lights & Placards	D44-9233-10-02	-	1
Schematic, Instrument Lights, Compass	D44-9233-10-02x01	-	1
Schematic, Instrument & Placard Lights, MD 302	D44-9233-10-02x02	-	1
Schematic, Instrument Flood Light Wiring	D44-9233-10-03	-	1
Schematic, Instrument Panel Light Wiring	D44-9233-10-05	-	1
Schematic, Map/Reading Light Wiring	D44-9233-20-01	-	1
Schematic, Map/Reading Light Wiring, RACC	D44-9233-20-01x01	-	1
Schematic, Exterior Lights Wiring	D44-9233-40-01	-	1
Schematic, Exterior Lights Wiring	D44-9233-40-01x01	-	1
Schematic, Exterior Lights Wiring	D44-9233-40-01x02	-	1

Title	Drawing Number	Revision Number	Number of Sheets
Schematic, HID Taxi & Landing Light Wiring	D44-9233-40-01x03	-	1
Schematic, Exterior Lights Wiring	D44-9233-40-01x04	-	1
Schematic, Artificial Horizon Wiring	D44-9234-10-01	-	1
Schematic, Standby Attitude Module MD302 Wiring	D44-9234-10-01X01	-	1
Schematic, Directional Gyro	D44-9234-10-02	-	1
Schematic, Turn & Bank	D44-9234-10-03	-	1
Schematic, Artificial Horizon	D44-9234-10-04	-	1
Schematic, ADF Wiring	D44-9234-50-01	-	1
Schematic, GTX328	D44-9234-50-02	-	1
Schematic, GPS MAP Wiring	D44-9234-50-08	-	1
Schematic, IMT.14 GPS Tracker	D44-9234-60-01	-	1
Schematic, EECU Wiring	D44-9274-10-00	D	2
Schematic, EECU Wiring	D44-9274-10-00x01	-	2
Schematic, EECU Wiring	D44-9274-10-01	A	2
Schematic, Engine Indicating	D44-9277-40-01	-	1

The Schematics that follow can be printed off individually on 11” x 17” paper in Landscape Format.

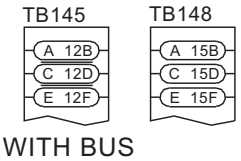
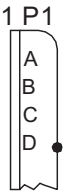
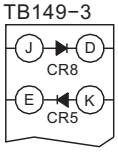
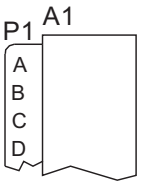
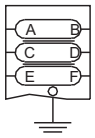
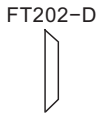
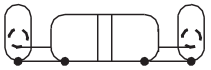
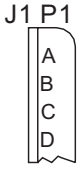
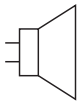
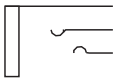
The Schematics are in Vector PDF, published from Framemaker with Adobe Illustrator graphics.



Electrical/Electronic Symbols - (Sheet 1 of 3)

THERMAL OVERLOAD DEVICE	CIRCUIT BREAKER
HEATER ELEMENT	CIRCUIT BREAKER THREE−PHASE
TRANSFORMER	WIRE WITH IDENTIFICATION (FB3A22)
INDUCTANCE	COAXIAL CABLE
VARIABLE INDUCTANCE	STOWED WIRE
THERMOCOUPLE	SHIELDED WIRE
SQUIB	DOUBLE TWISTED AND SHIELDED CONDUCTOR
CAPACITOR	DOUBLE TWISTED CONDUCTOR
TEMPERATURE SENSING ELEMENT/WIRE FIRE	TRIAX SHIELDED CONDUCTOR
INCADESCENT LAMP	WIRE GROUP
INDICATOR LIGHT (A = AMBER, B = BLUE, G = GREEN, R = RED, Y = YELLOW)	SPLICE (SP1 CRIMP TYPE, SP2 SOLDER TYPE)
FLUORESCENT LIGHT	GROUND STUD
INTEGRAL LIGHTING CONNECTOR	GROUND CONNECTION
BUS BAR CURCUIT BREAKER	CHASSIS OR FRAME GROUND
BUS BAR WITH THREE−PHASE CIRCUIT BREAKER (øA, øB, øC)	STUD TERMINAL BLOC (PARTIAL ASSEMBLY) (TB205, TB209) WITH BUS

Electrical/Electronic Symbols - (Sheet 2 of 3)

TERMINAL BLOC MODULE PARTIAL ASSEMBLY WITH BUS 	CONNECTOR WITH BACKSHELL CONNECTION (PARTIAL ASSEMBLY) 
DIODE MODULE (PARTIAL ASSEMBLY) 	EQUIPMENT CONNECTION (PLUG IS PART OF EQUIPMENT) 
GROUND STUD MODULE (PARTIAL ASSEMBLY) 	COAX CONNECTOR 
FEEDTHROUGH 	COAX CONNECTOR WITH BULKHEAD ADAPTER 
CONNECTOR (COMPLETE ASSEMBLY) 	ANTENNA (GENERAL) 
CONNECTOR (PARTIAL ASSEMBLY) 	SPEAKER 
	PHONE JACK 

Electrical/Electronic Symbols - (Sheet 3 of 3)

10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

F

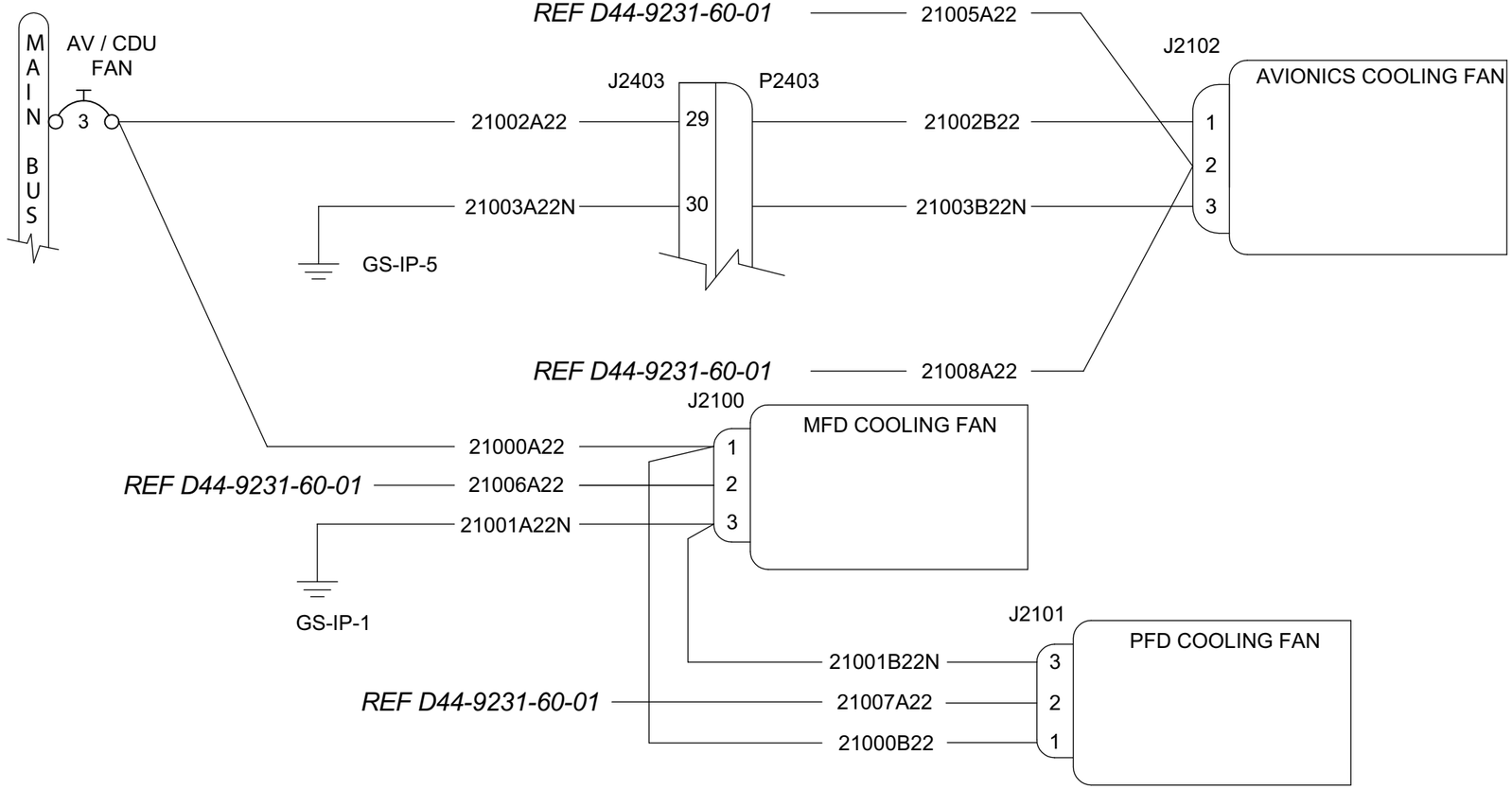
E

D

C

B

A



REV.	SCHEMATIC	DRAWING NO.	SHEET
—	Equipment Cooling	D44-9221-20-01	1/1

10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

F

E

D

C

B

A

MAIN BUS

FAN/OAT

3A

31202A22 REF D44-9231-20-03

21000A22

21001A22N

GS-IP-11

J2100 P2100

1

2

RED

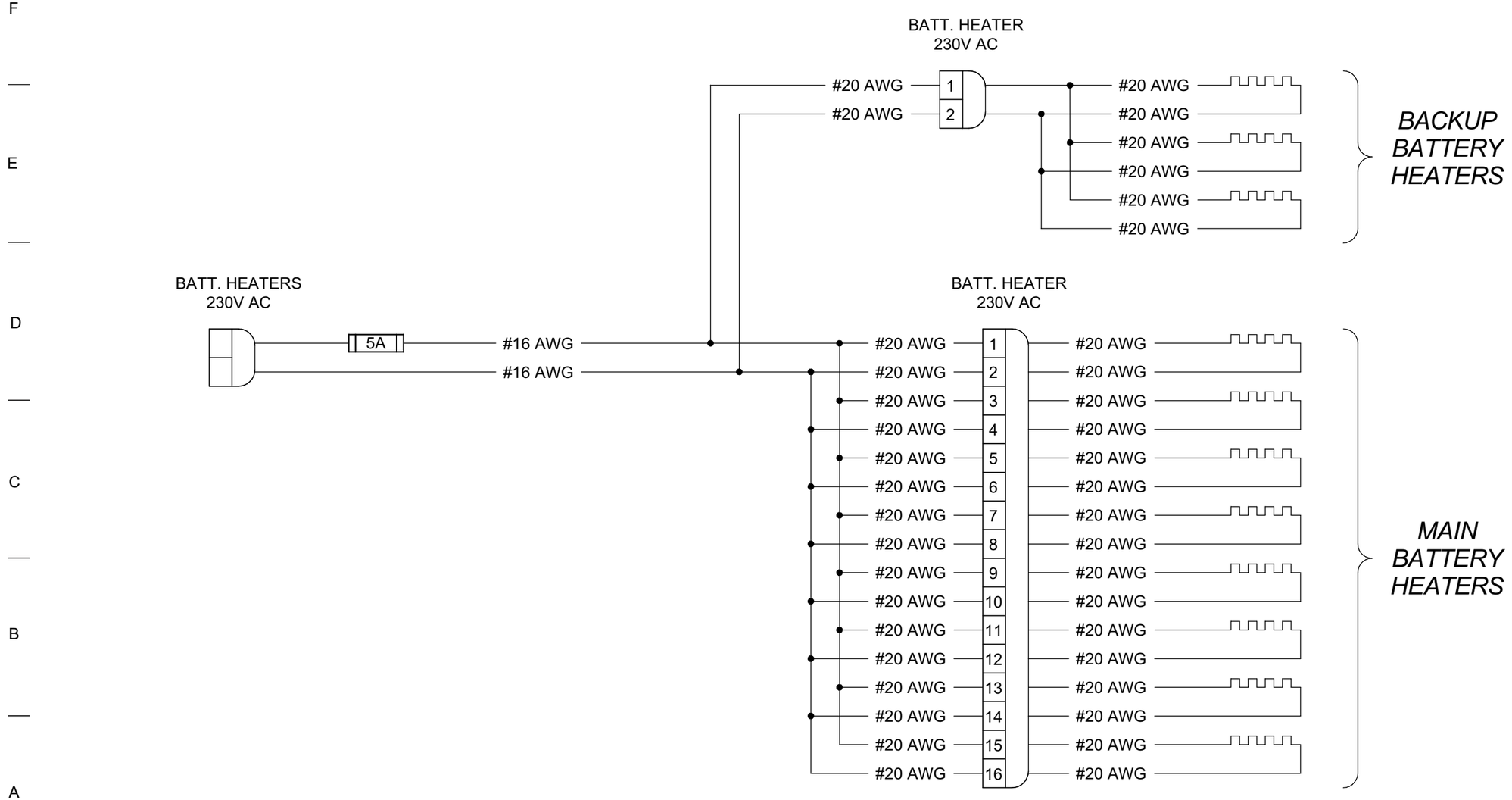
BLACK

AVIONICS COOLING FAN

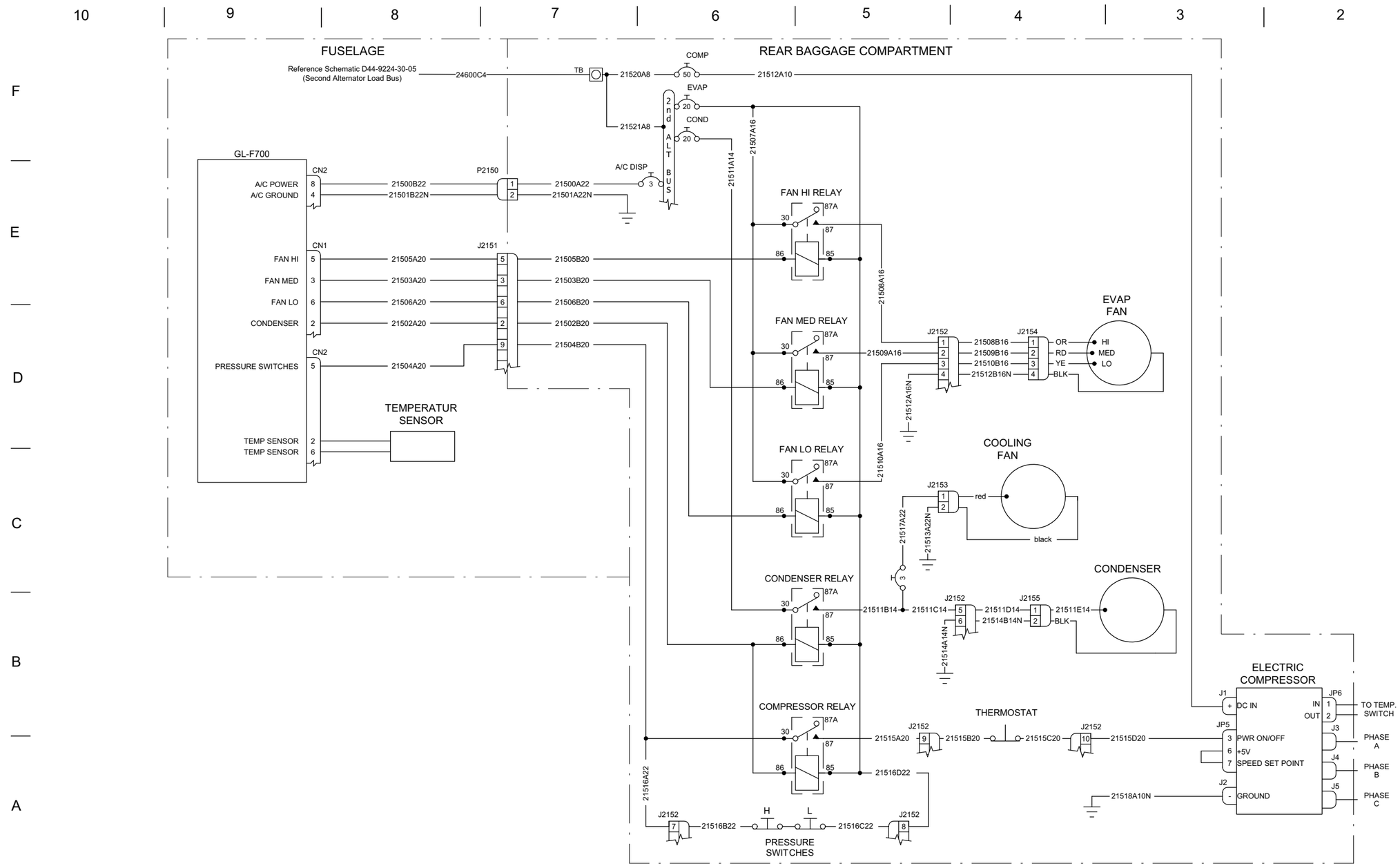
+

-

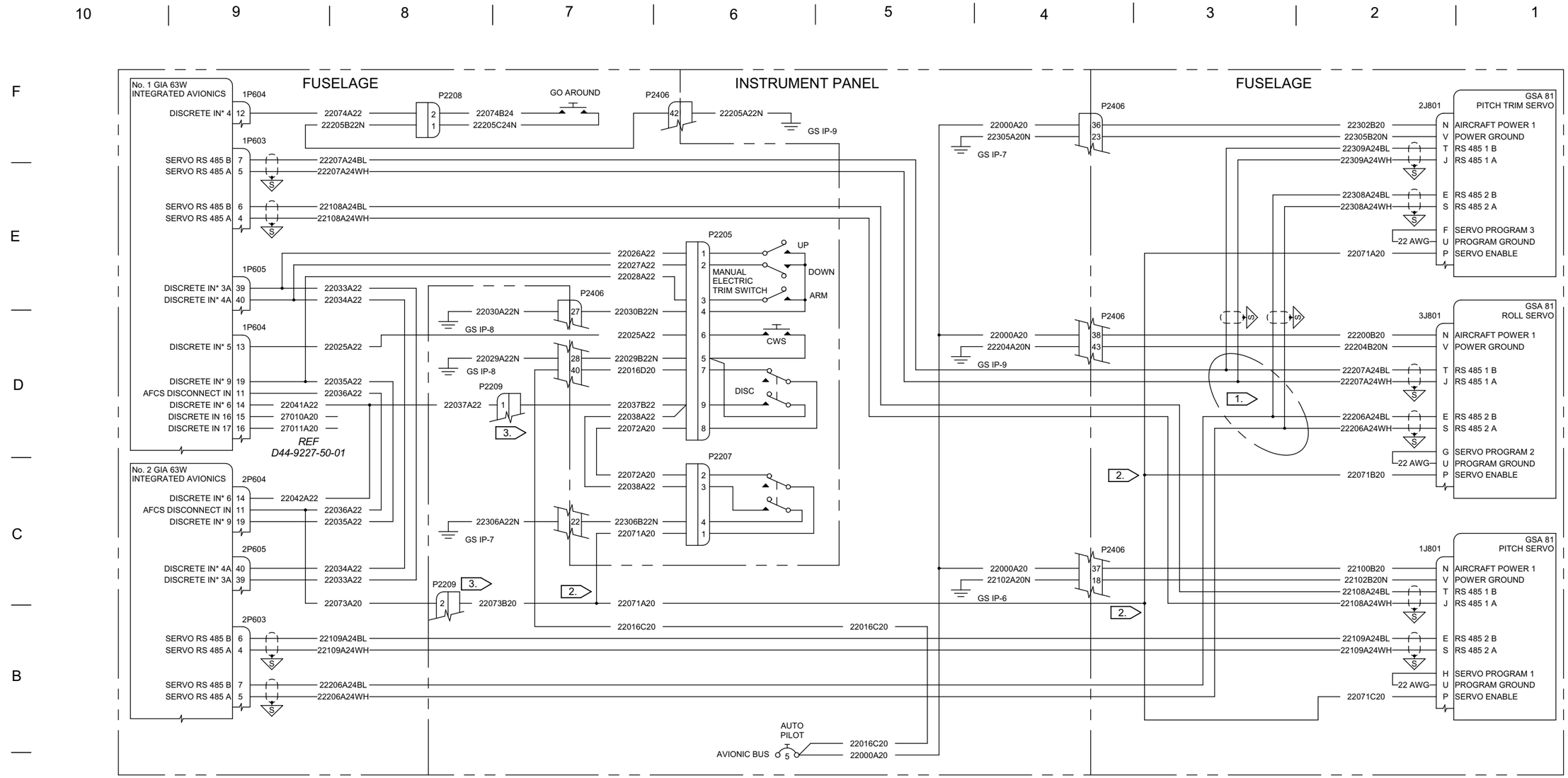
REV.	SCHEMATIC	DRAWING NO.	SHEET
A	Equipment Cooling	D44-9221-20-02	1/1



REV.	SCHEMATIC	DRAWING NO.	SHEET
–	Battery Heaters	D44-9221-40-01	1/1



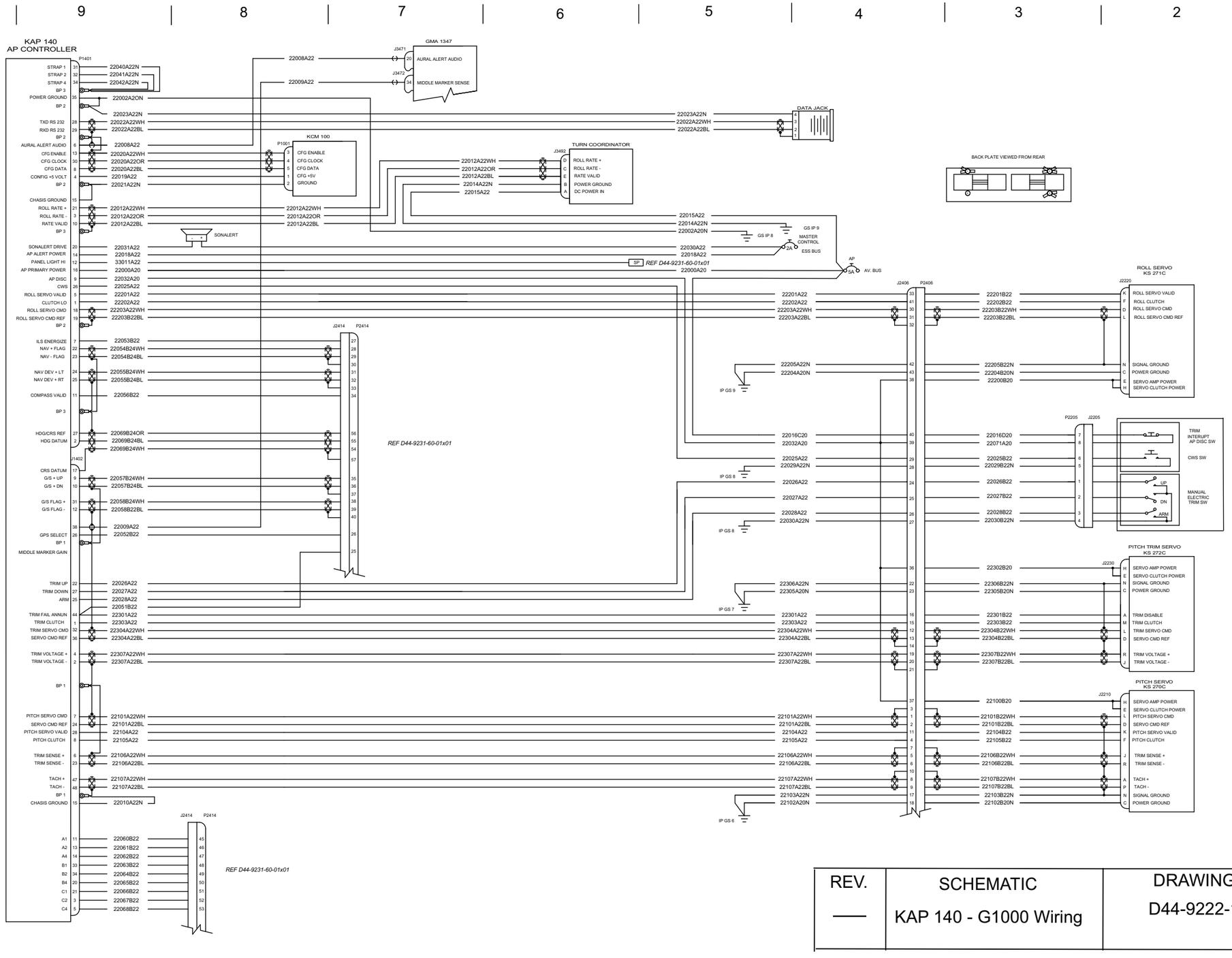
REV.	SCHEMATIC	DRAWING NO.	SHEET
C	RACC Wiring	D44-9221-50-01	1/1



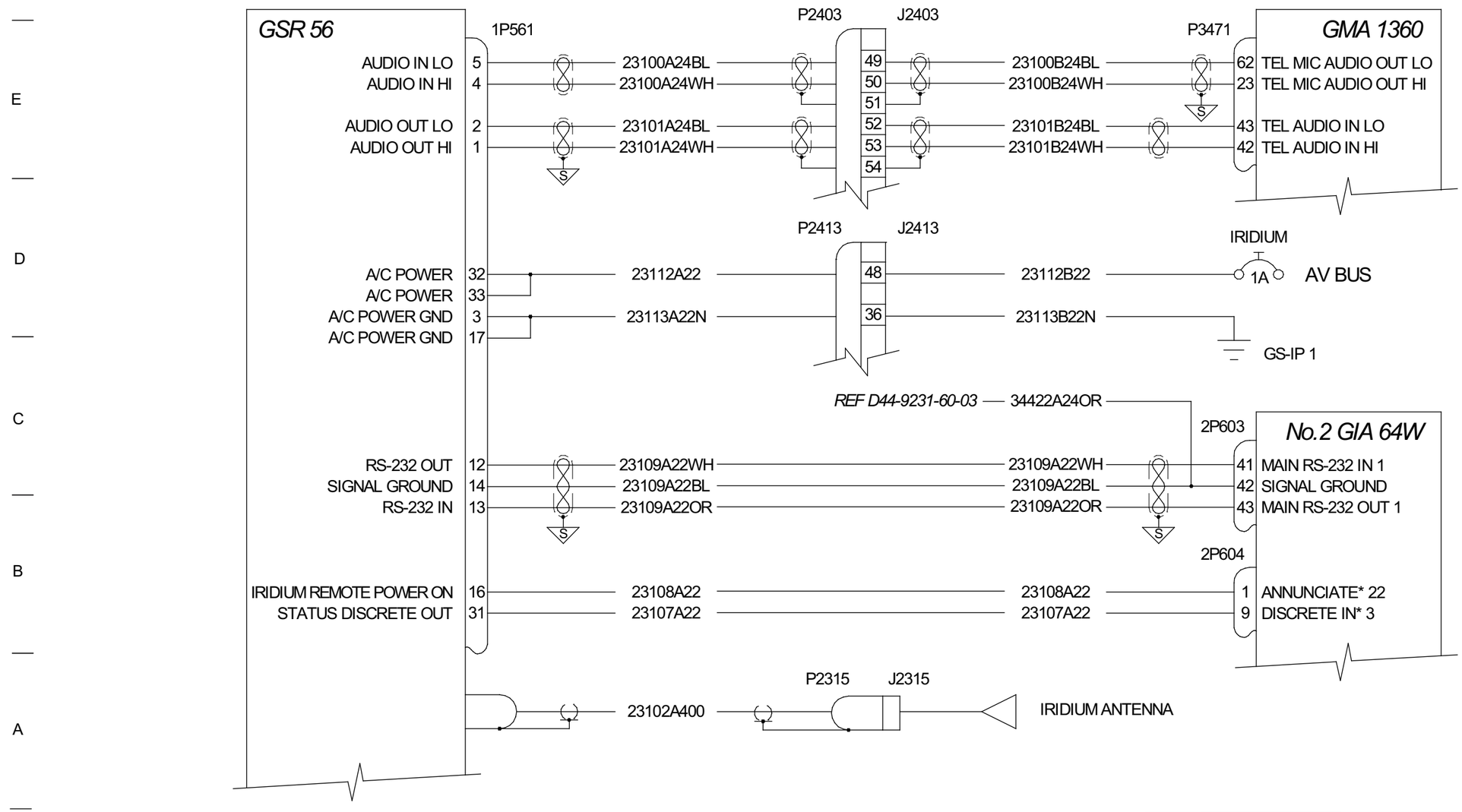
NOTES:

1. TERMINATED AT GIA CONNECTORS.
2. TERMINATED AT CONNECTOR J2207.
3. LOCATED IN FUSELAGE.

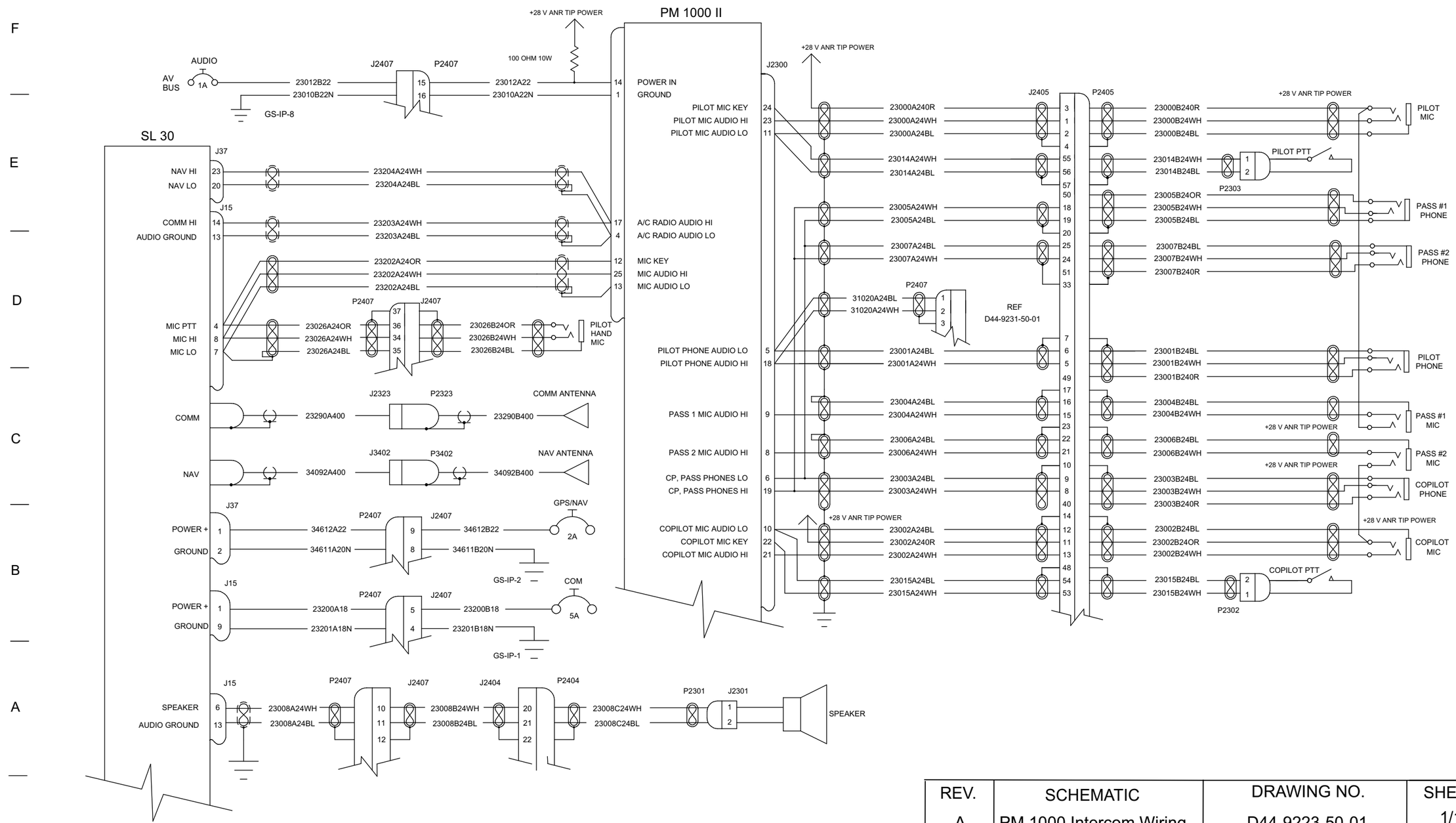
REV.	SCHEMATIC	DRAWING NO.	SHEET
–	GFC 700 Wiring	D44-9222-10-01	1/1



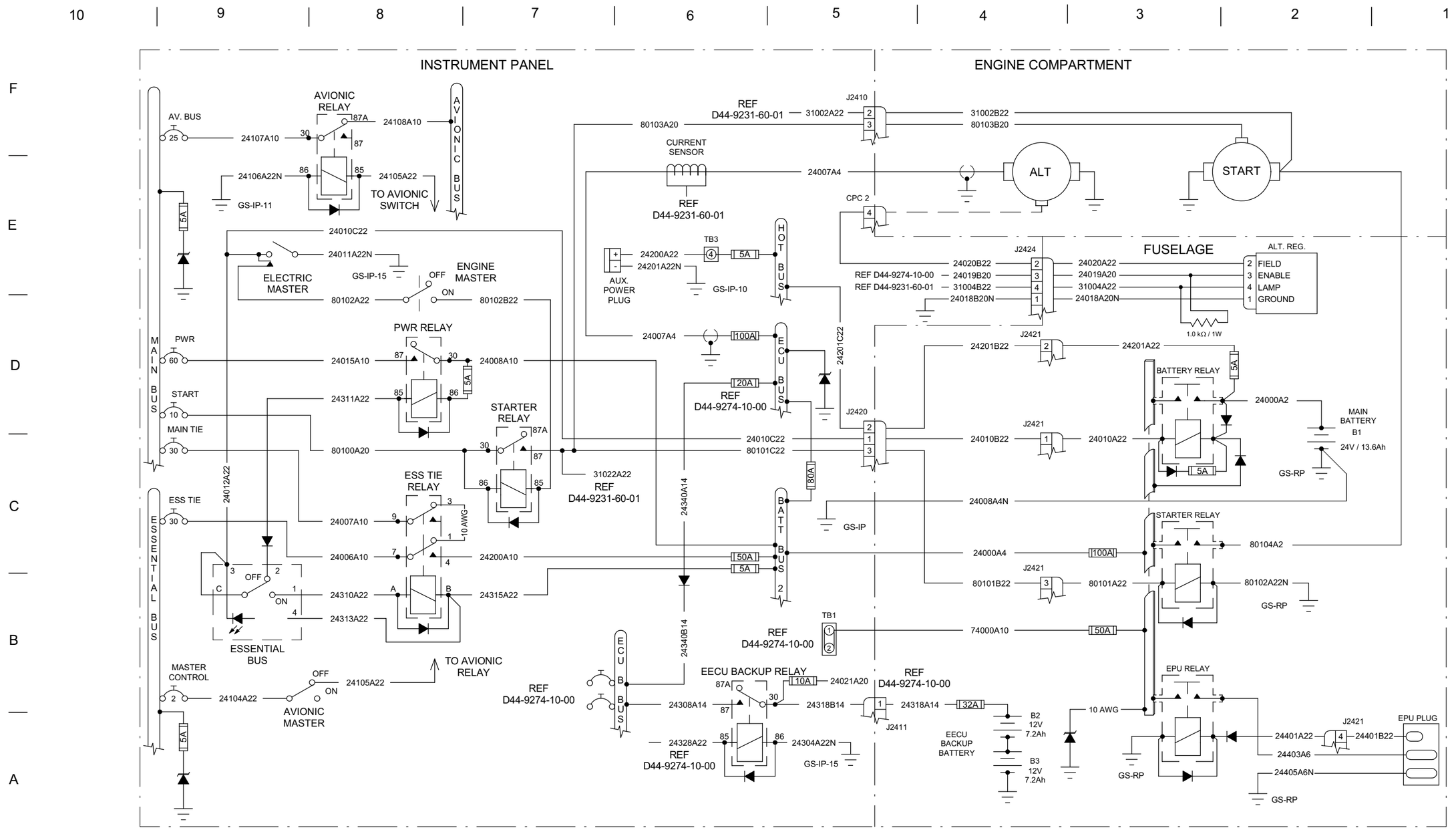
REV.	SCHEMATIC	DRAWING NO.	SHEET
——	KAP 140 - G1000 Wiring	D44-9222-10-02	1/1



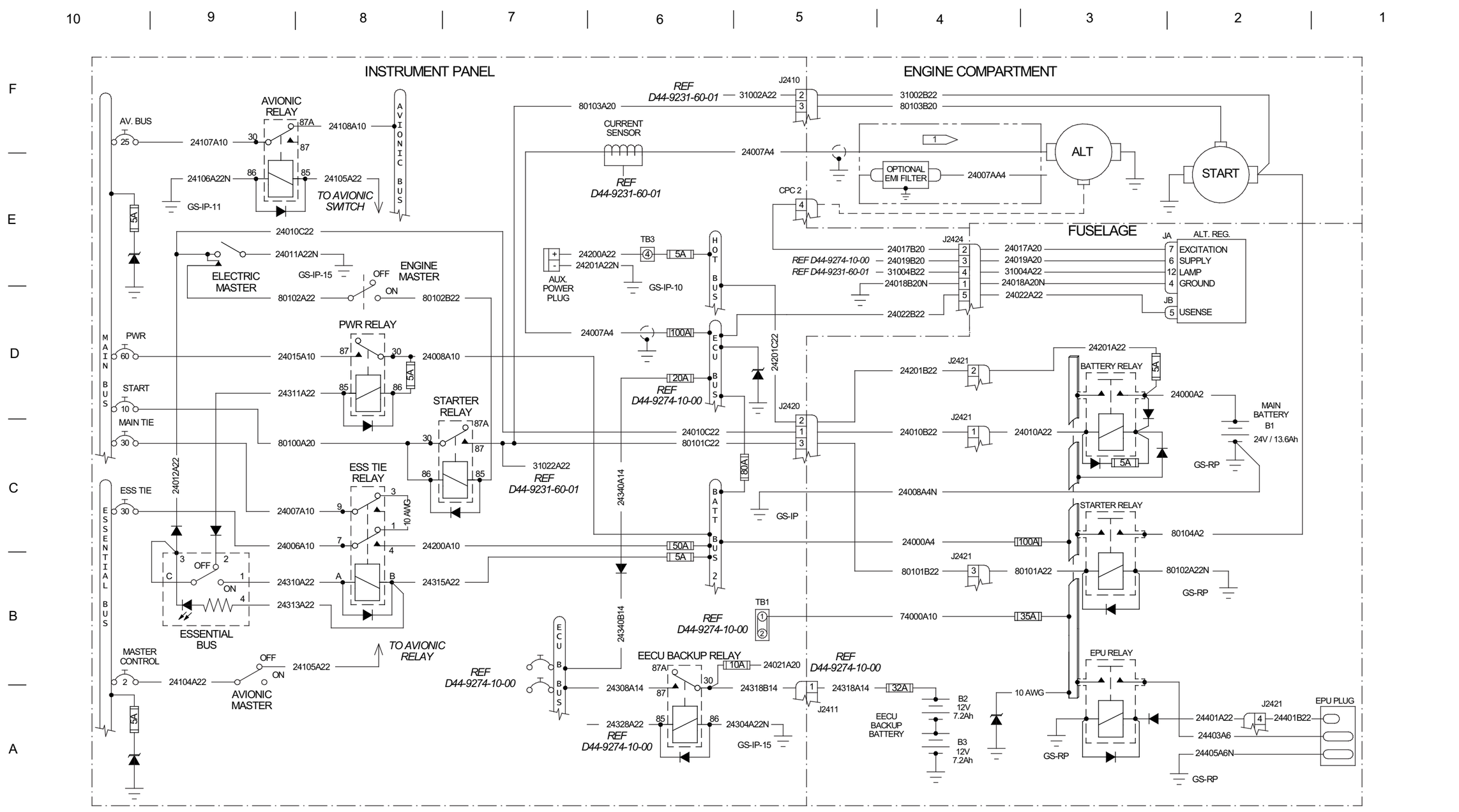
REV.	SCHEMATIC	DRAWING NO.	SHEET
—	GSR 56 Wiring	D44-9223-15-00	1/1



REV.	SCHEMATIC	DRAWING NO.	SHEET
A	PM 1000 Intercom Wiring	D44-9223-50-01	1/1



REV.	SCHEMATIC	DRAWING NO.	SHEET
C	Electrical System	D44-9224-30-01	1/1



FLAG NOTES

1 EMI Filter may be optionally installed (OÄM 40-313).

REV.	SCHEMATIC	DRAWING NO.	SHEET
A	Electrical System Wiring	D44-9224-30-01_02	1/1

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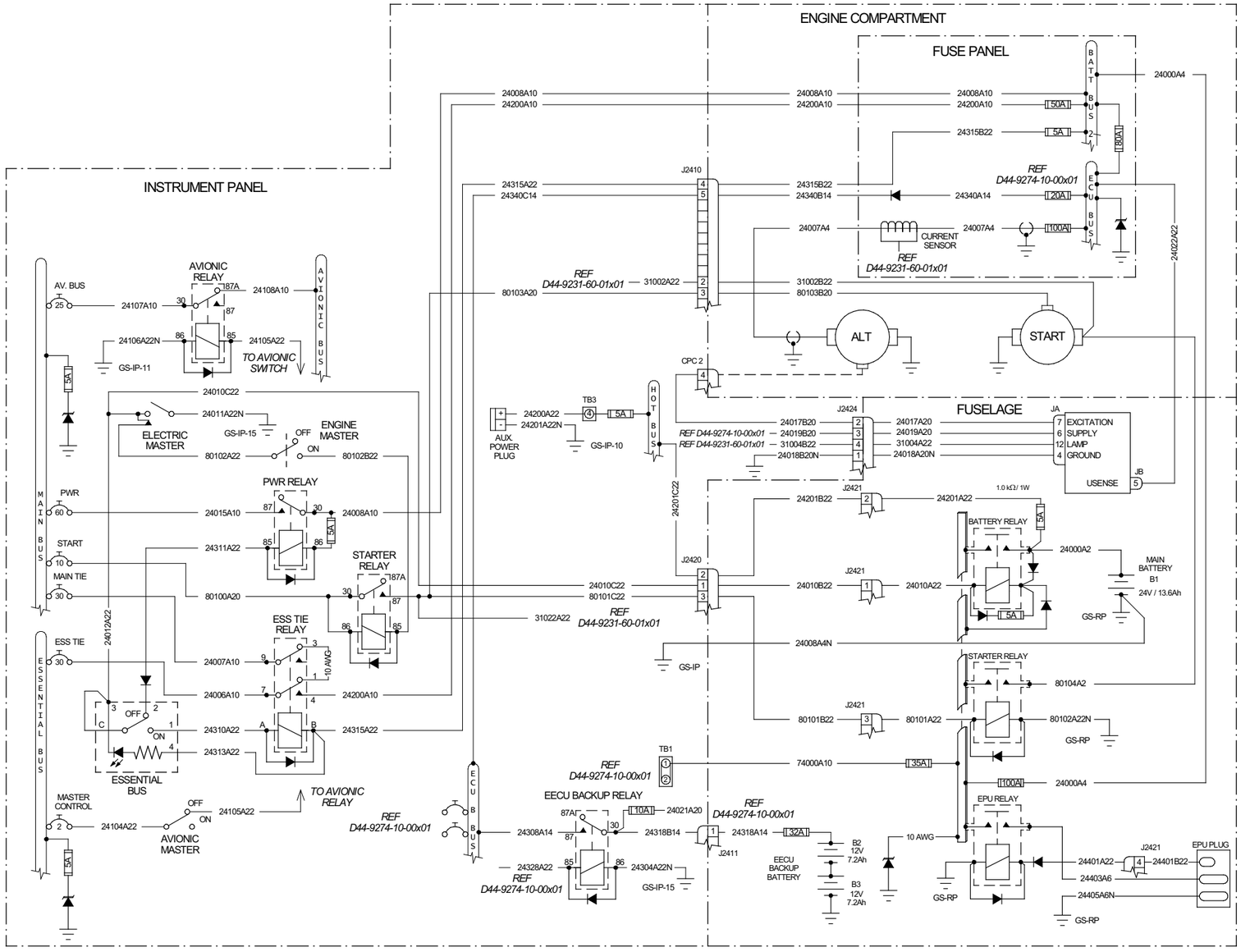
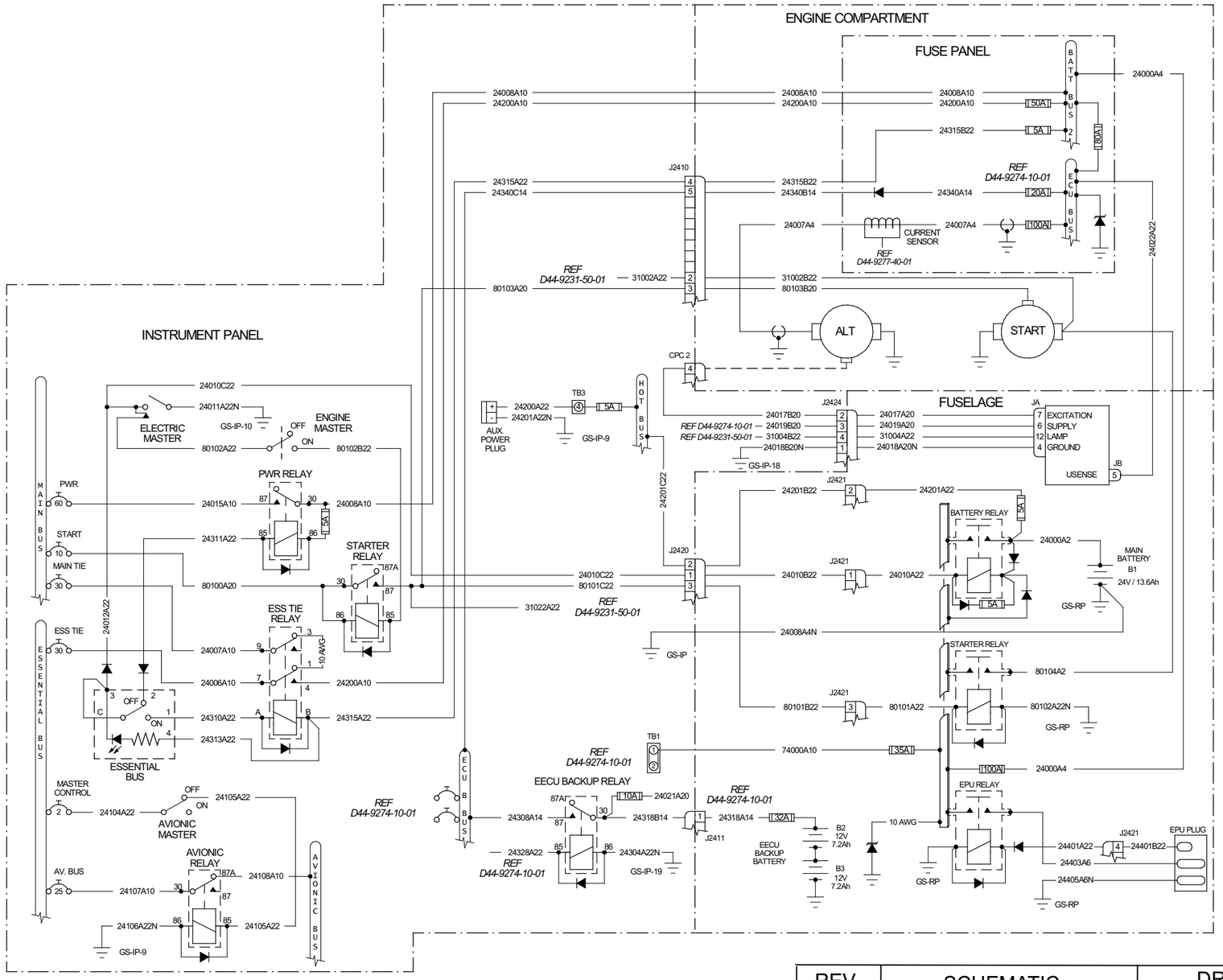
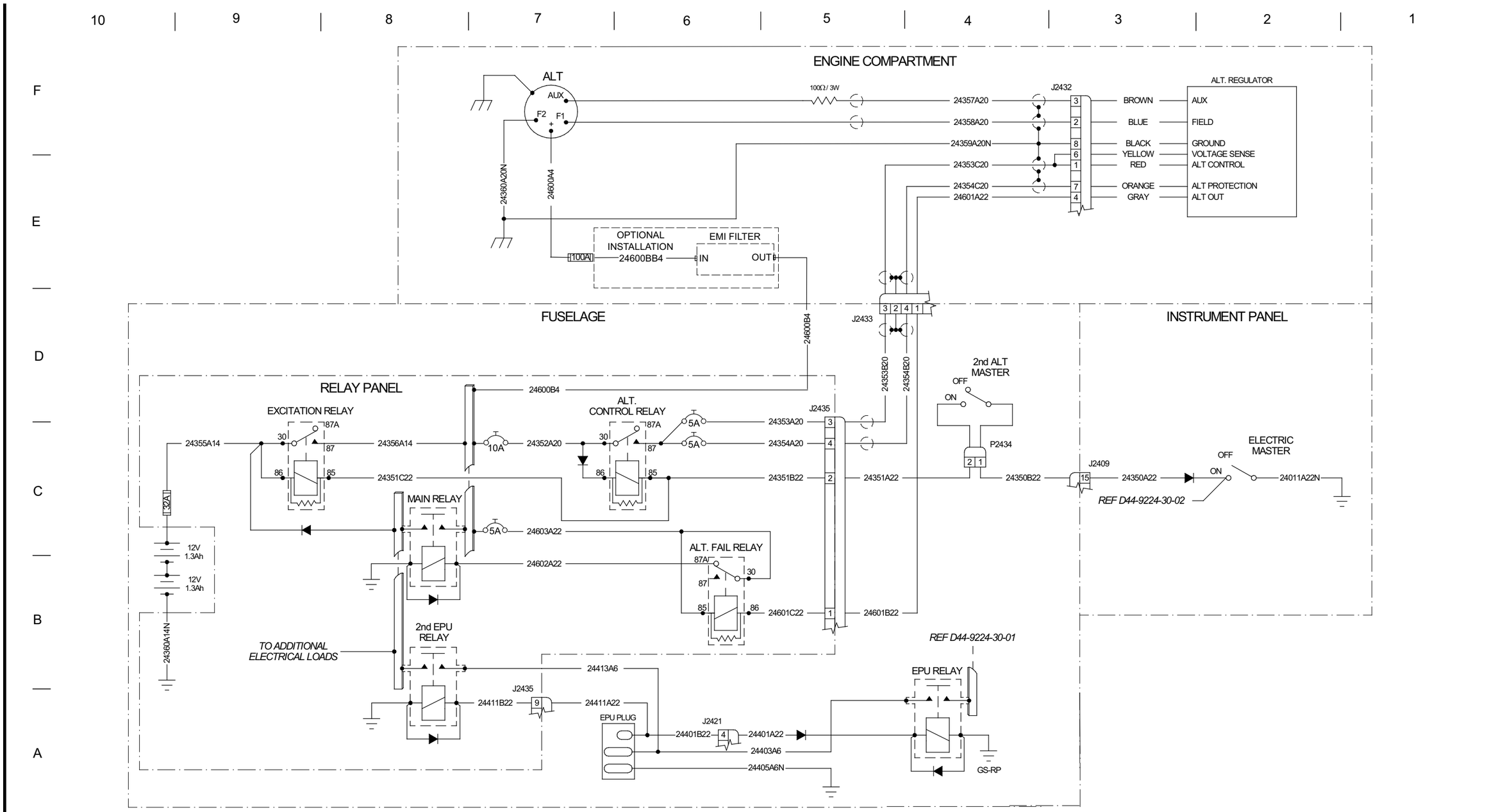


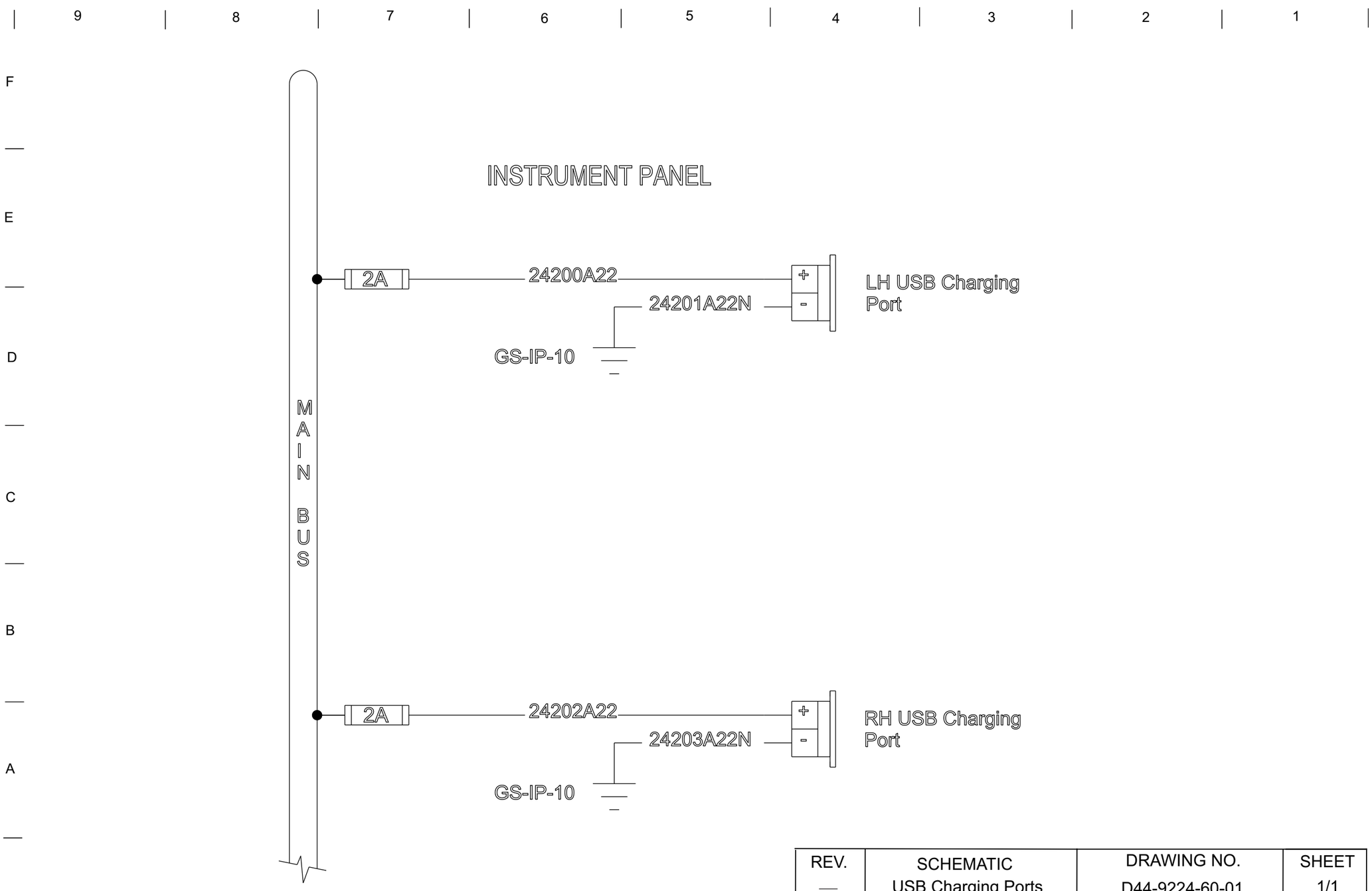
REV.	SCHEMATIC	DRAWING NO.	SHEET
—	Electrical System, Conversion	D44-9224-30-01X03	1/1



REV.	SCHEMATIC	DRAWING NO.	SHEET
—	Electrical System, Club	D44-9224-30-02_02	1/1



REV.	SCHEMATIC	DRAWING NO.	SHEET
D	Second Alternator	D44-9224-30-05	1/1



REV.	SCHEMATIC	DRAWING NO.	SHEET
—	USB Charging Ports	D44-9224-60-01	1/1

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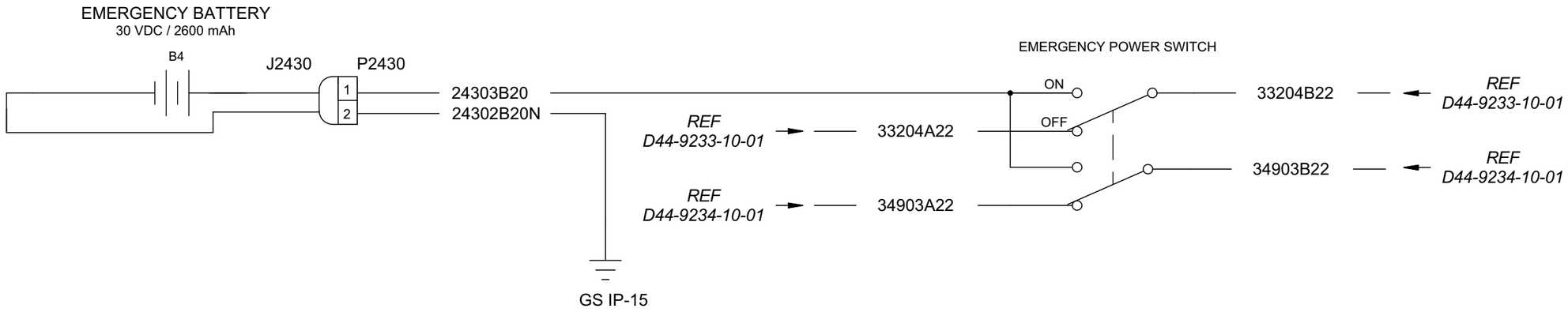
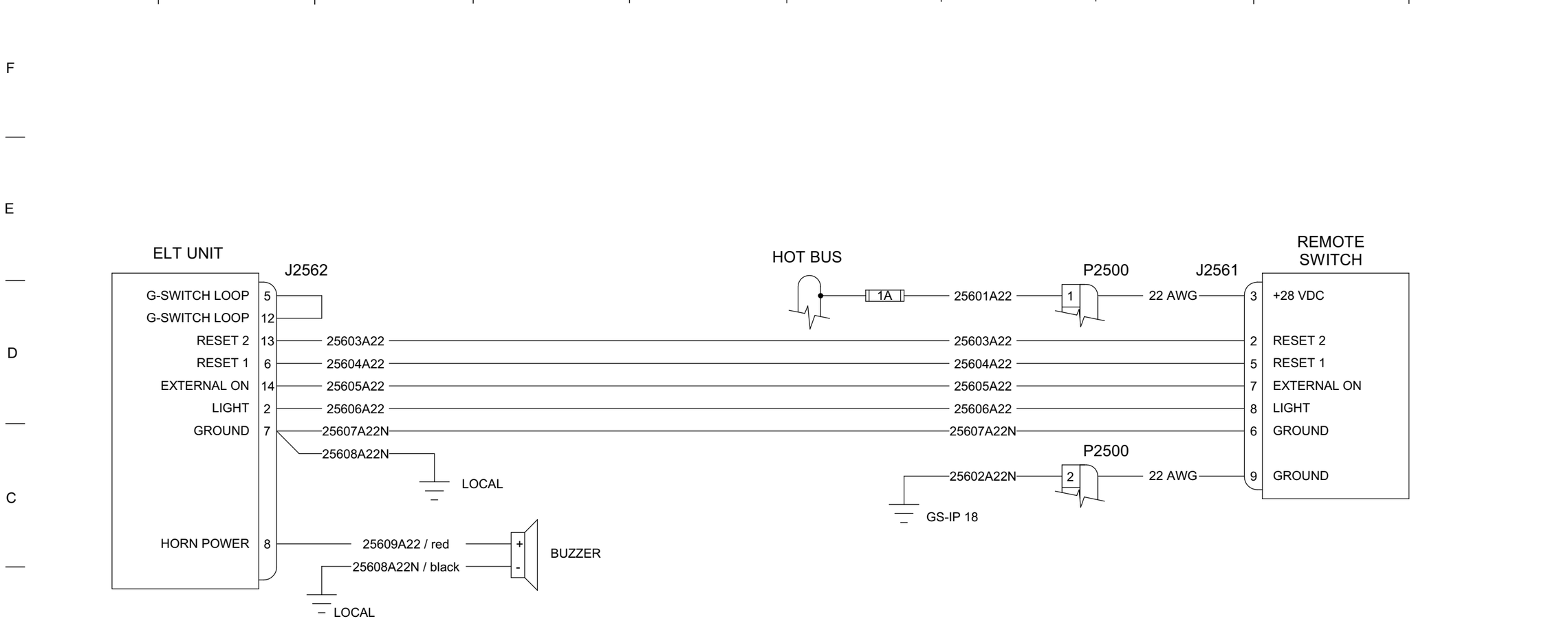


REV.	SCHEMATIC	DRAWING NO.	SHEET
–	Emergency Power Package Wiring	D44-9225-60-01	1/1



REV.	SCHEMATIC	DRAWING NO.	SHEET
—	ELT ME 406/1000 Wiring	D44-9225-60-02	1/1

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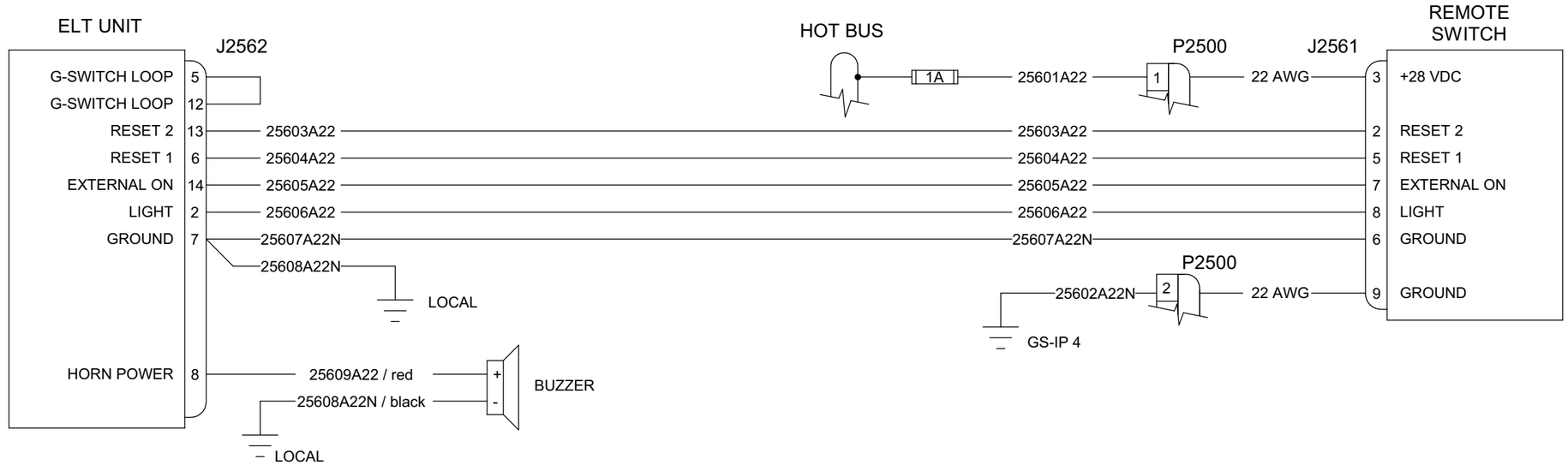
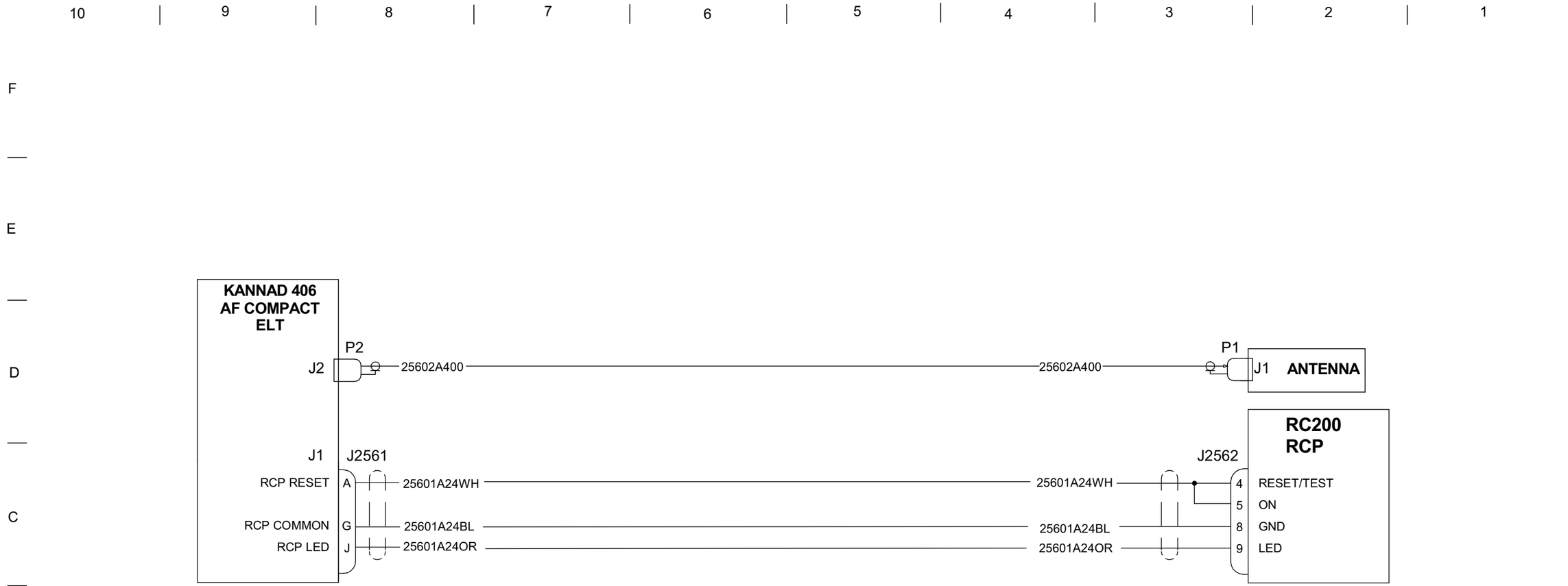
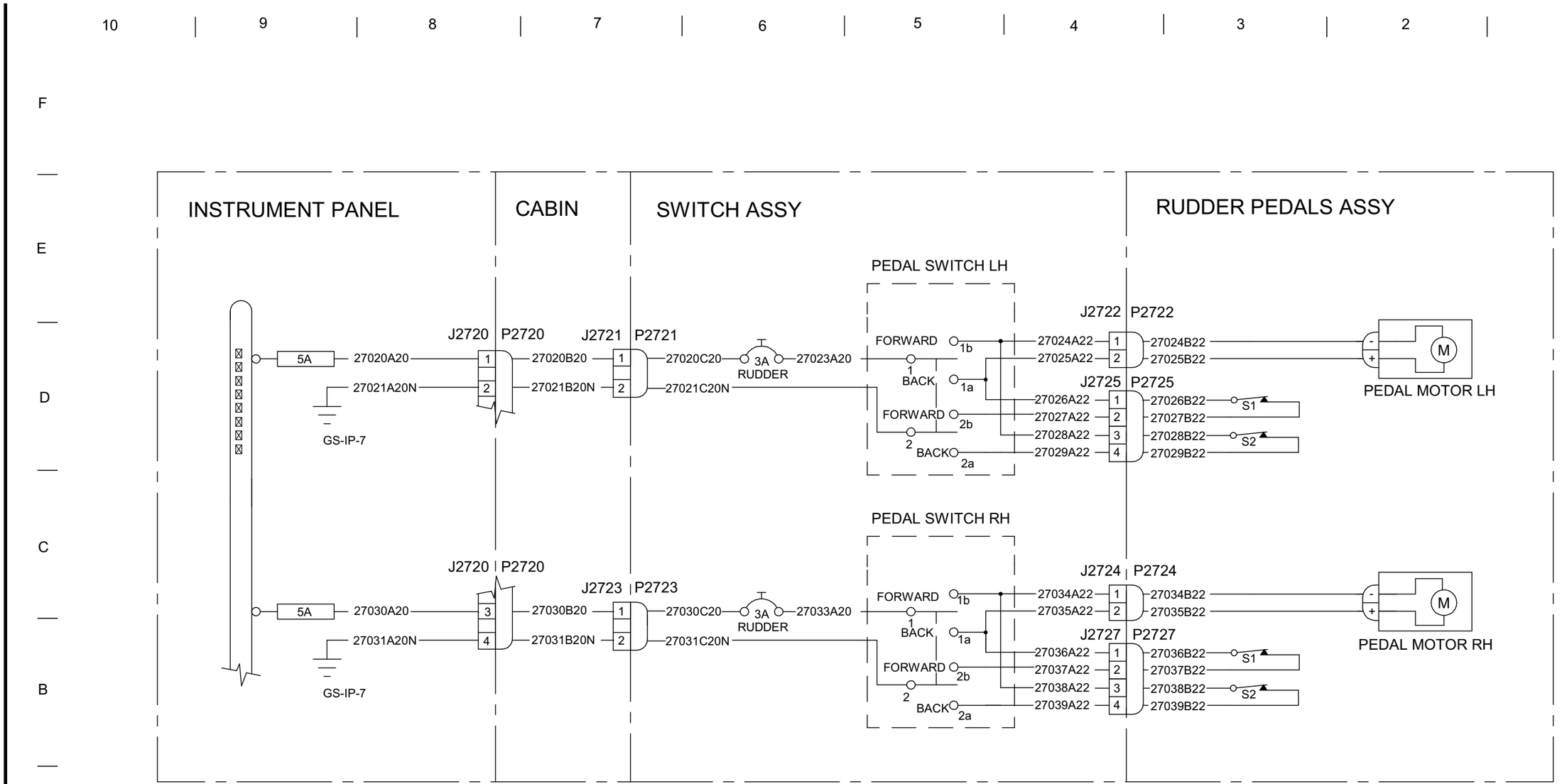


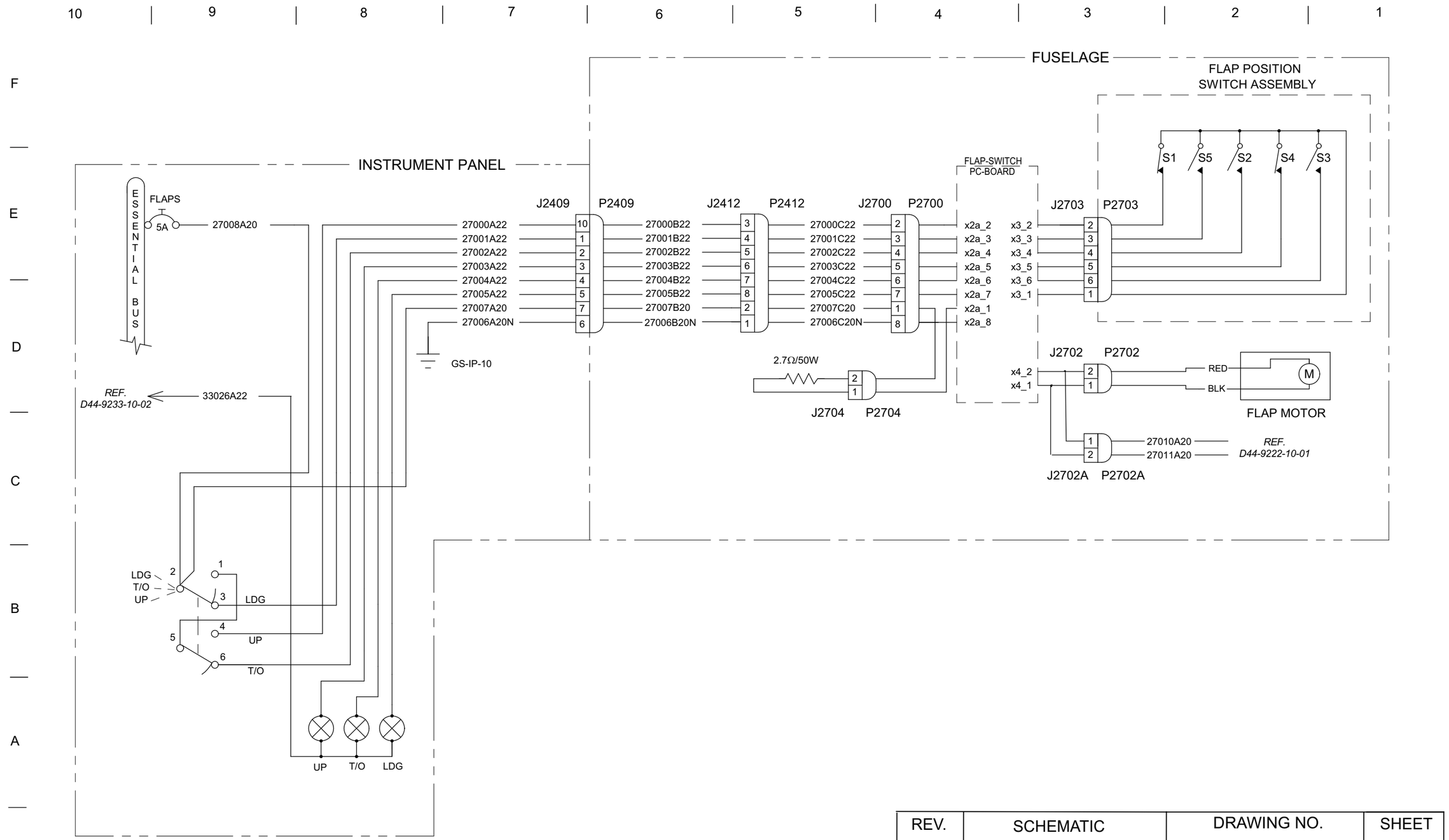
REV.	SCHEMATIC	DRAWING NO.	SHEET
—	ELT ME 406/1000 Wiring	D44-9225-60-03	1/1



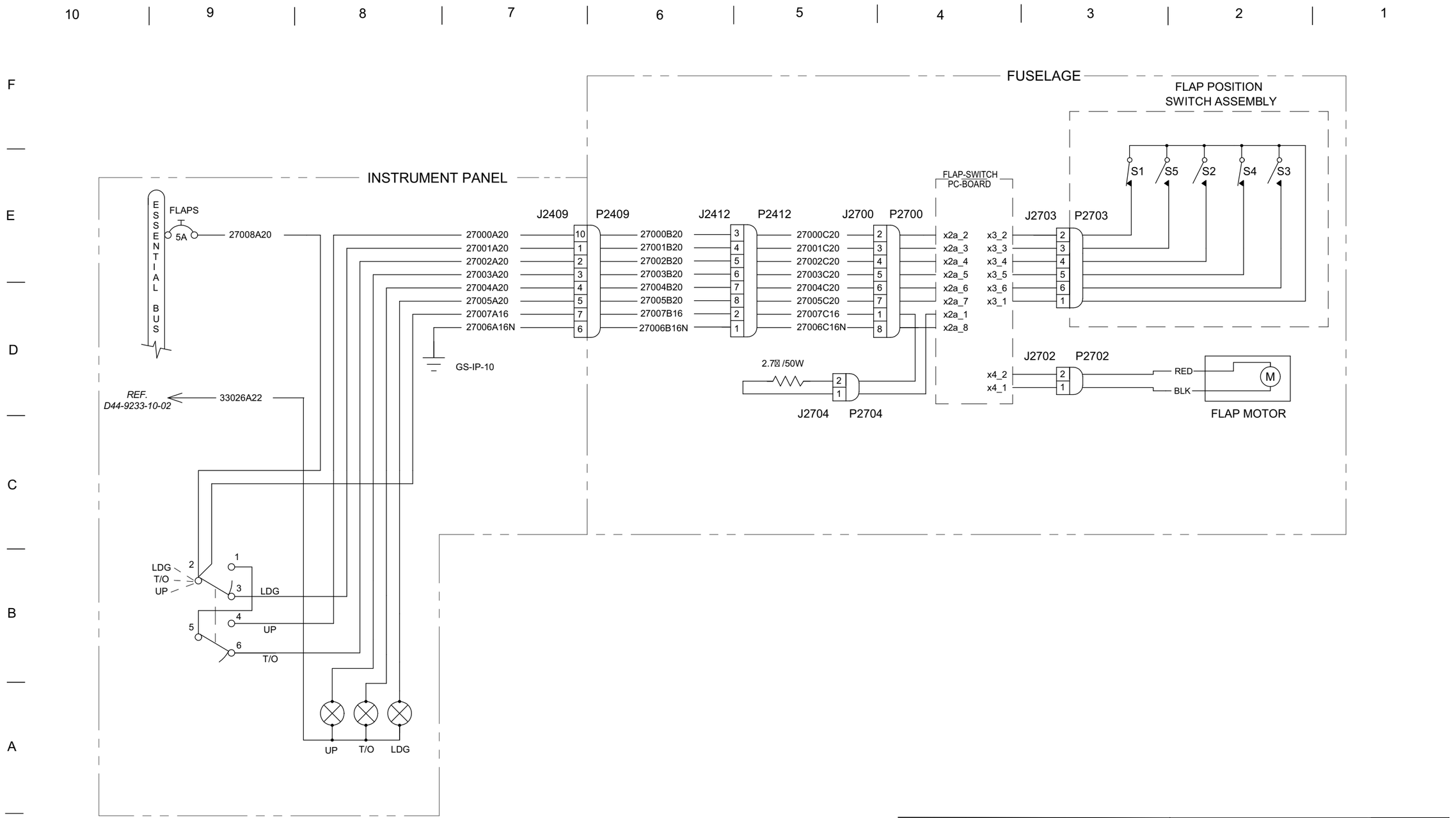
REV.	SCHEMATIC	DRAWING NO.	SHEET
—	Kannad 406 AF-Compact ELT	D44-9225-60-04	1/1



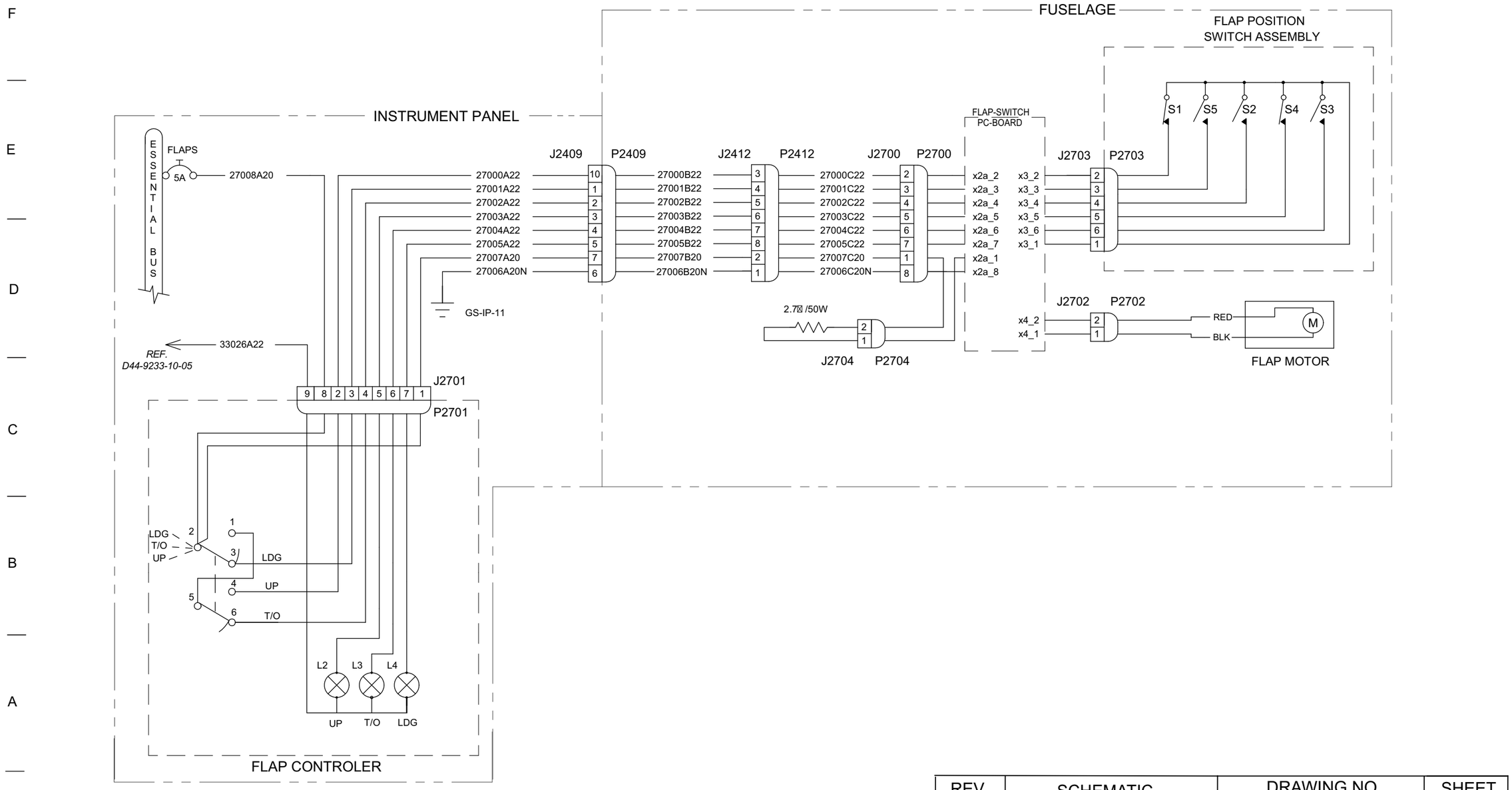
REV.	SCHEMATIC	DRAWING NO.	SHEET
A	Rudder Pedal ADJ. Wiring	D44-9227-20-01	1/1



REV.	SCHEMATIC	DRAWING NO.	SHEET
A	Flaps Wiring	D44-9227-50-01	1/1



REV.	SCHEMATIC	DRAWING NO.	SHEET
—	Flaps Wiring	D44-9227-50-01x01	1/1



REV.	SCHEMATIC	DRAWING NO.	SHEET
—	Flaps Wiring	D44-9227-50-02	1/1

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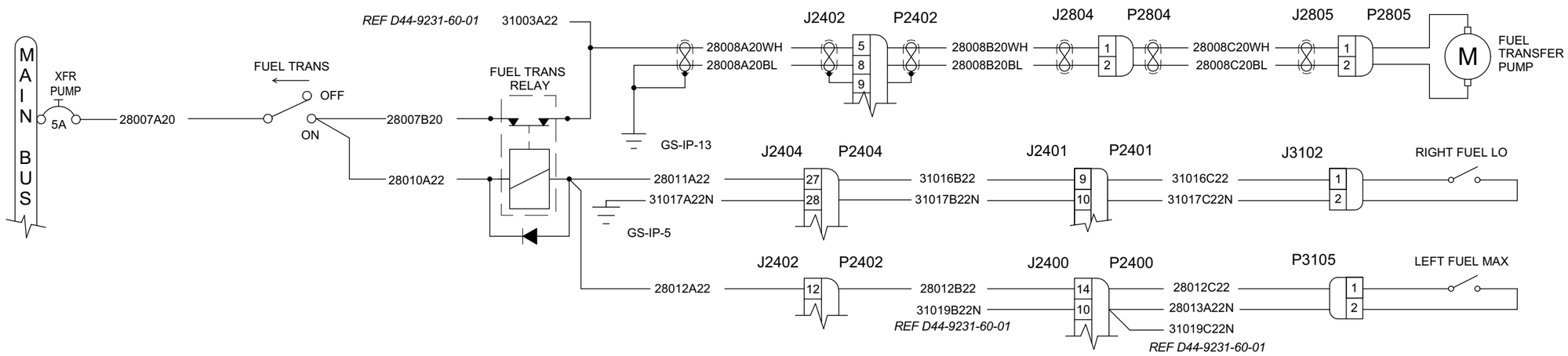

REV.	SCHEMATIC	DRAWING NO.	SHEET
A	Fuel Transfer Wiring	D44-9228-20-01	1/1

10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

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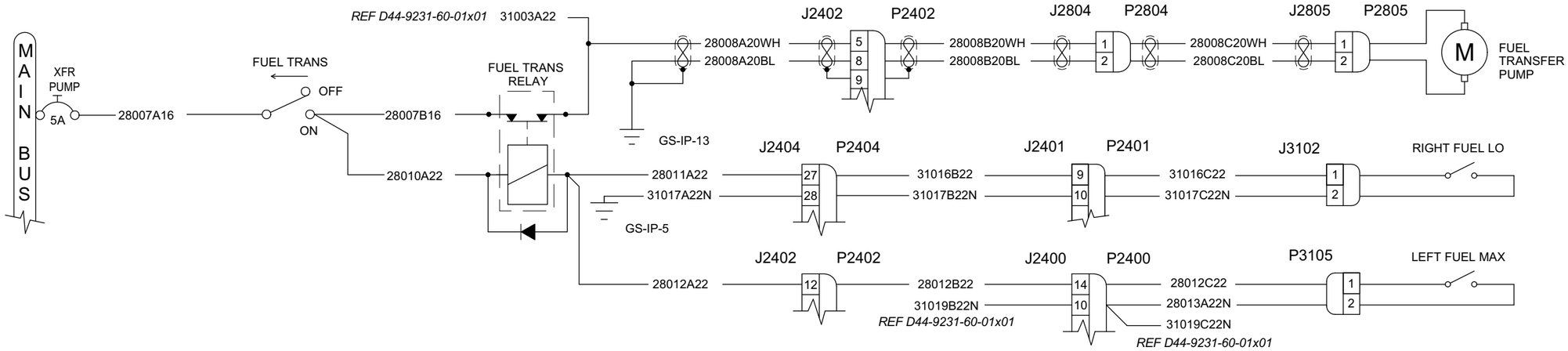
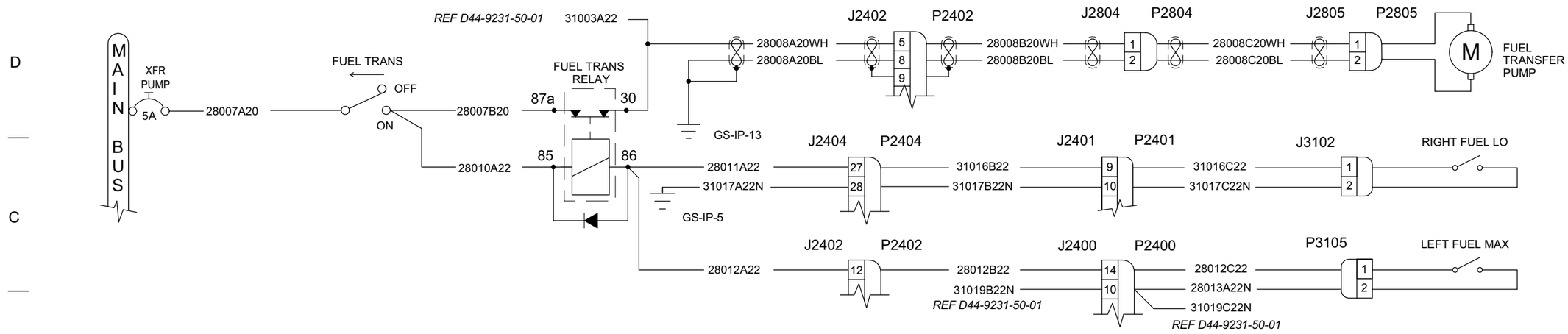


REV.	SCHEMATIC	DRAWING NO.	SHEET
——	Fuel Transfer Wiring	D44-9228-20-01x01	1/1



REV.	SCHEMATIC	DRAWING NO.	SHEET
——	Fuel Transfer Wiring	D44-9228-20-02	1/1

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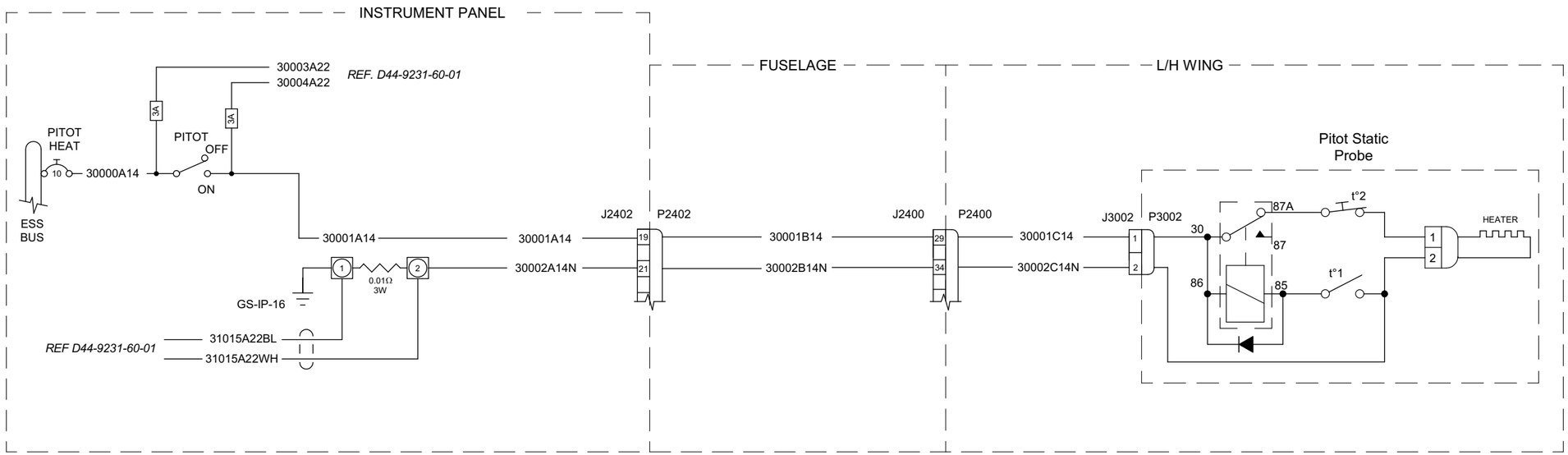
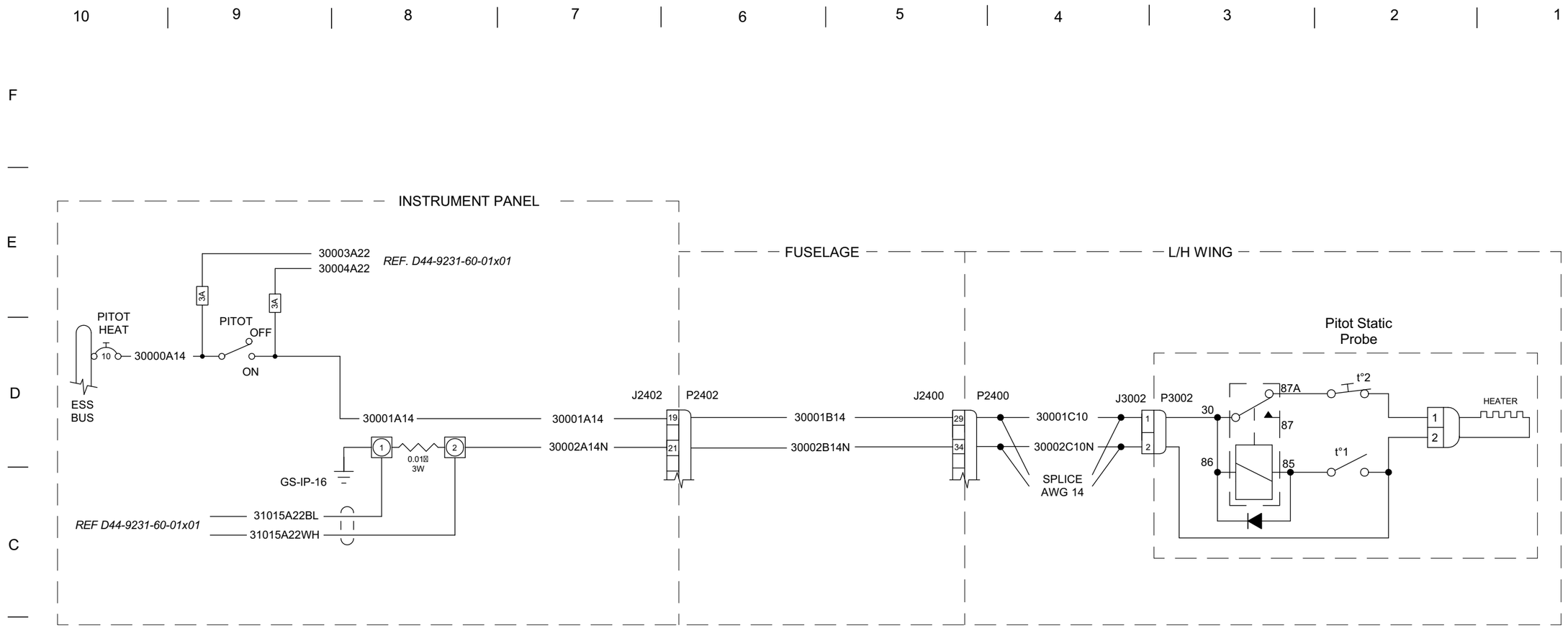


REV.	SCHEMATIC	DRAWING NO.	SHEET
—	Pitot Heat Wiring	D44-9230-30-01	1/1



REV.	SCHEMATIC	DRAWING NO.	SHEET
——	Pitot Heat Wiring	D44-9230-30-01x01	1/1

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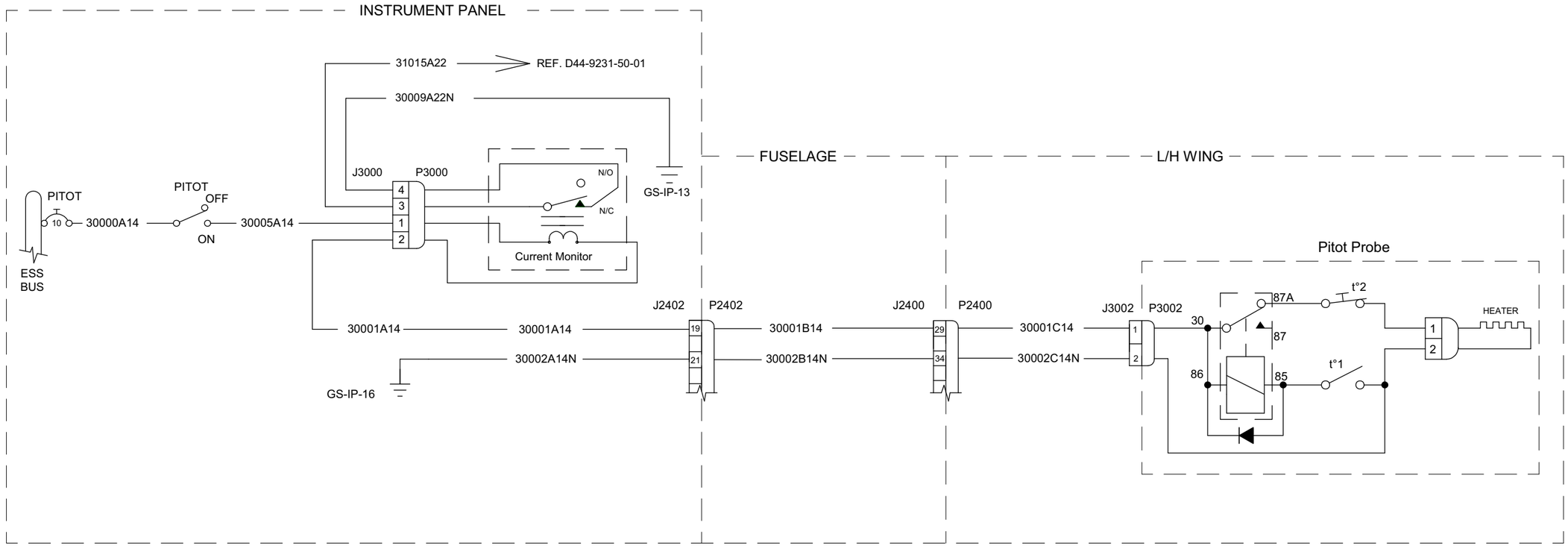

REV.	SCHEMATIC	DRAWING NO.	SHEET
——	Pitot Heat Wiring	D44-9230-30-02	1/1

10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

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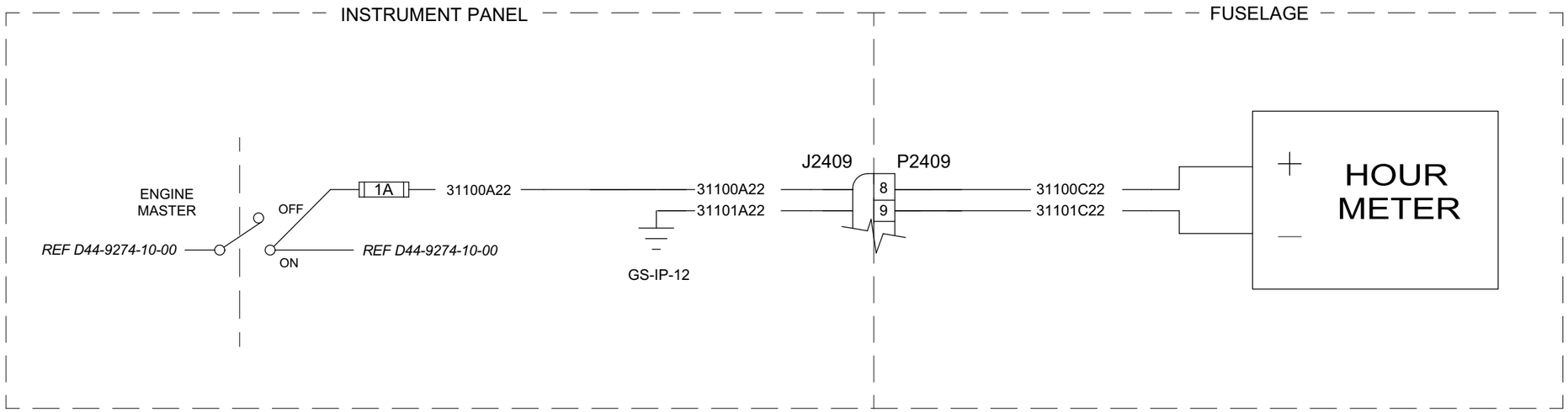

REV.	SCHEMATIC	DRAWING NO.	SHEET
—	Hourmeter Wiring	D44-9231-20-01	1/1

10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

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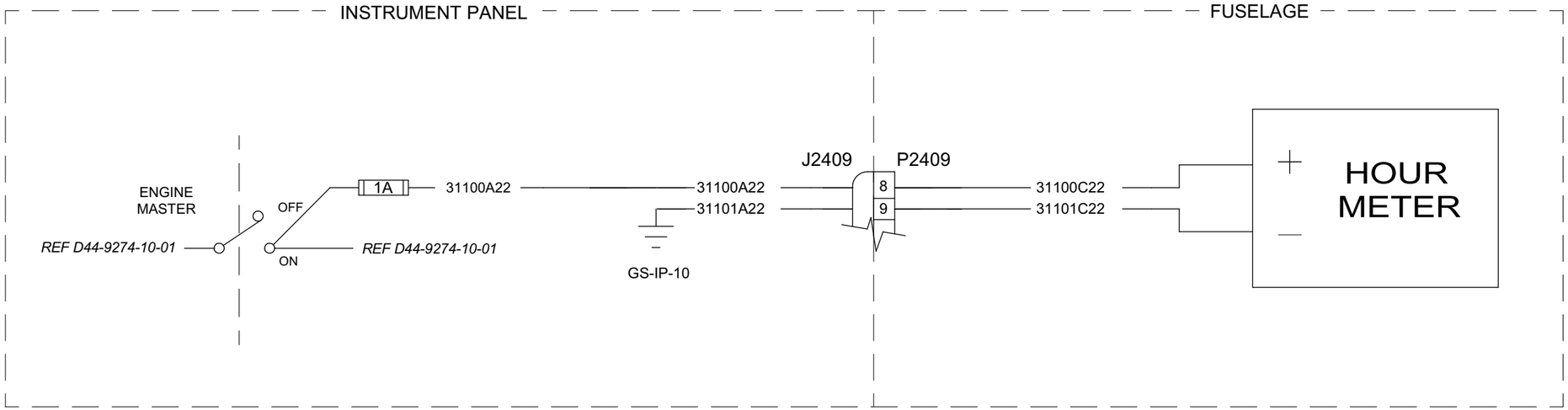
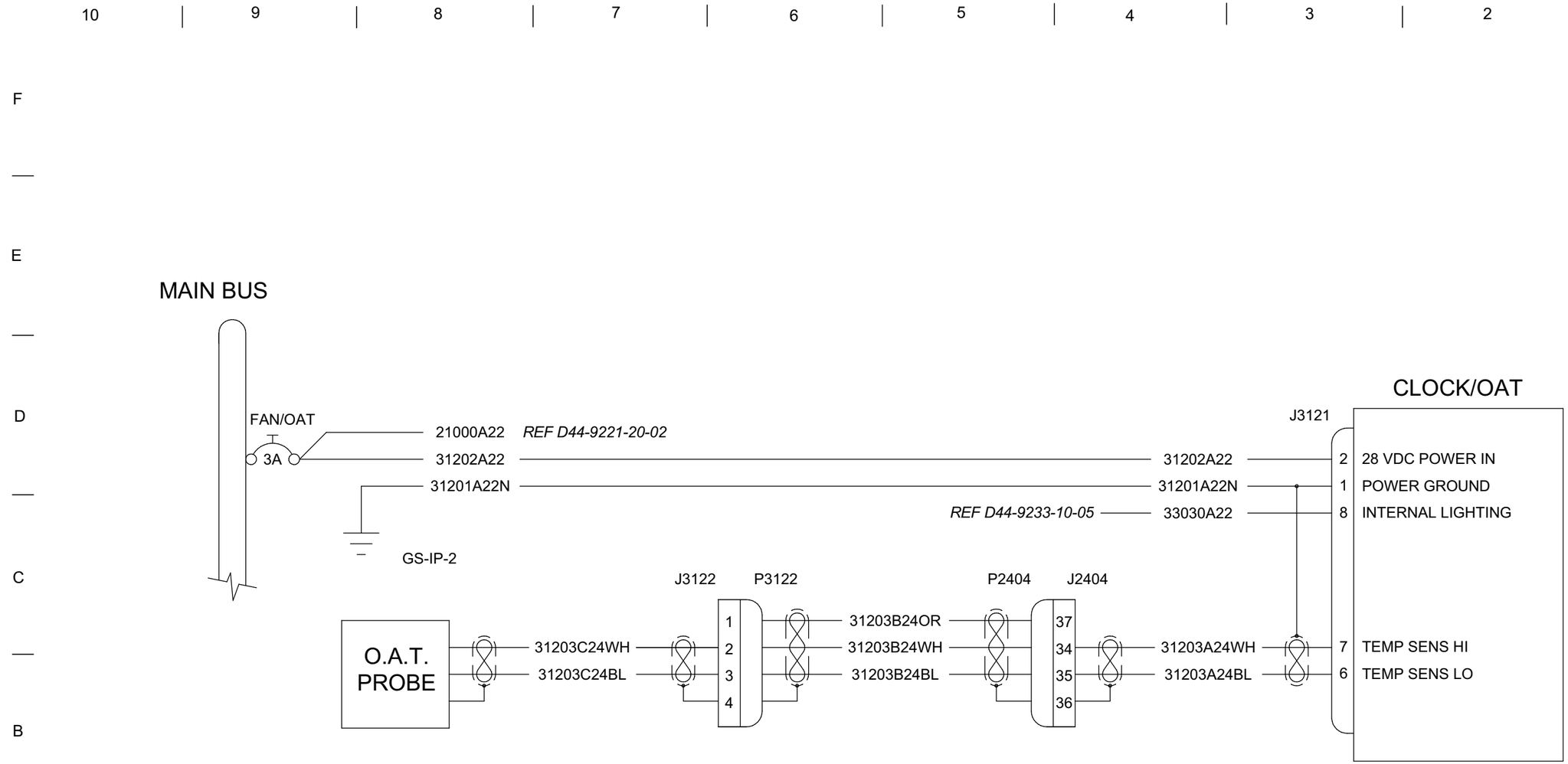
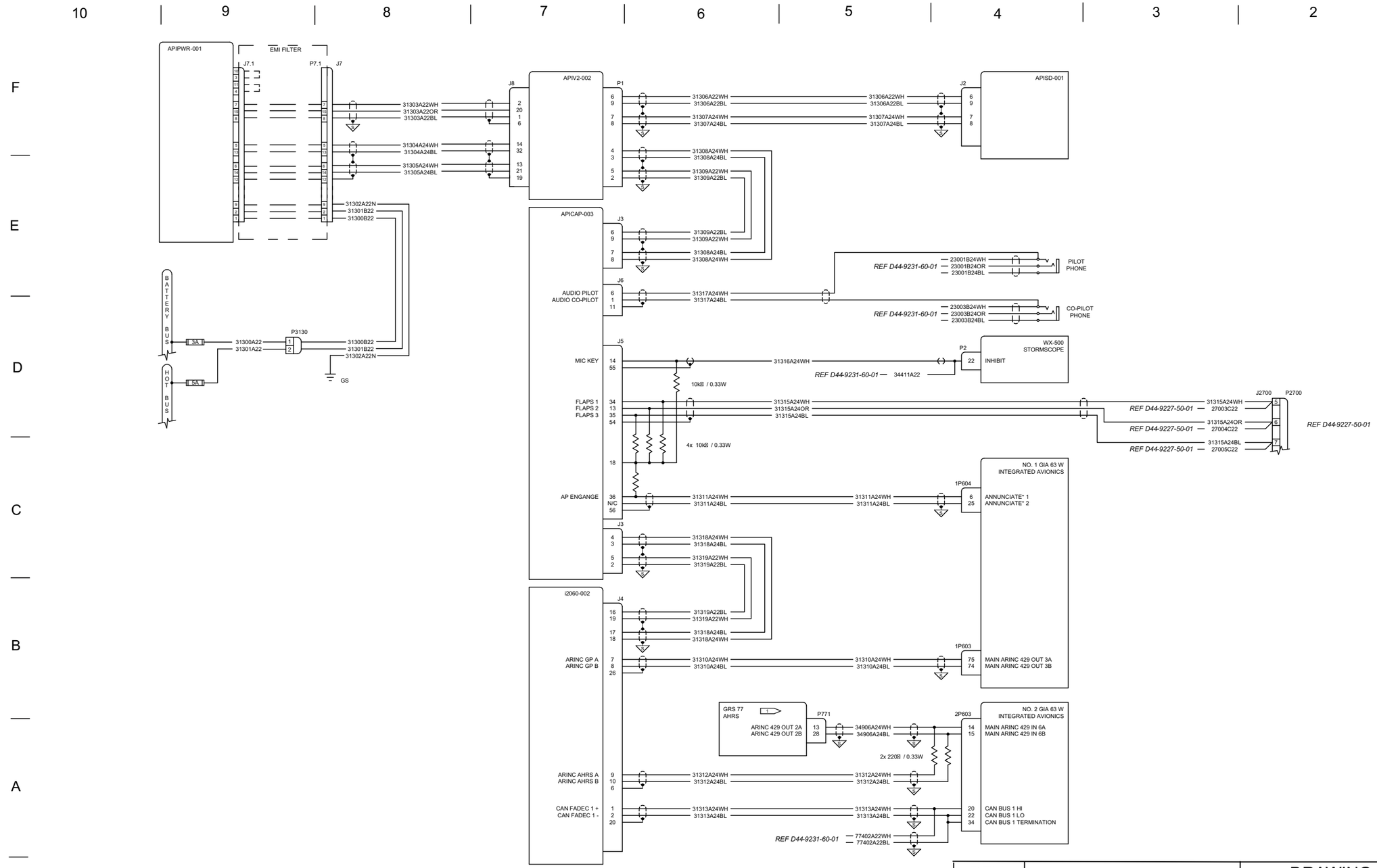


REV.	SCHEMATIC	DRAWING NO.	SHEET
—	Hourmeter Wiring	D44-9231-20-02	1/1



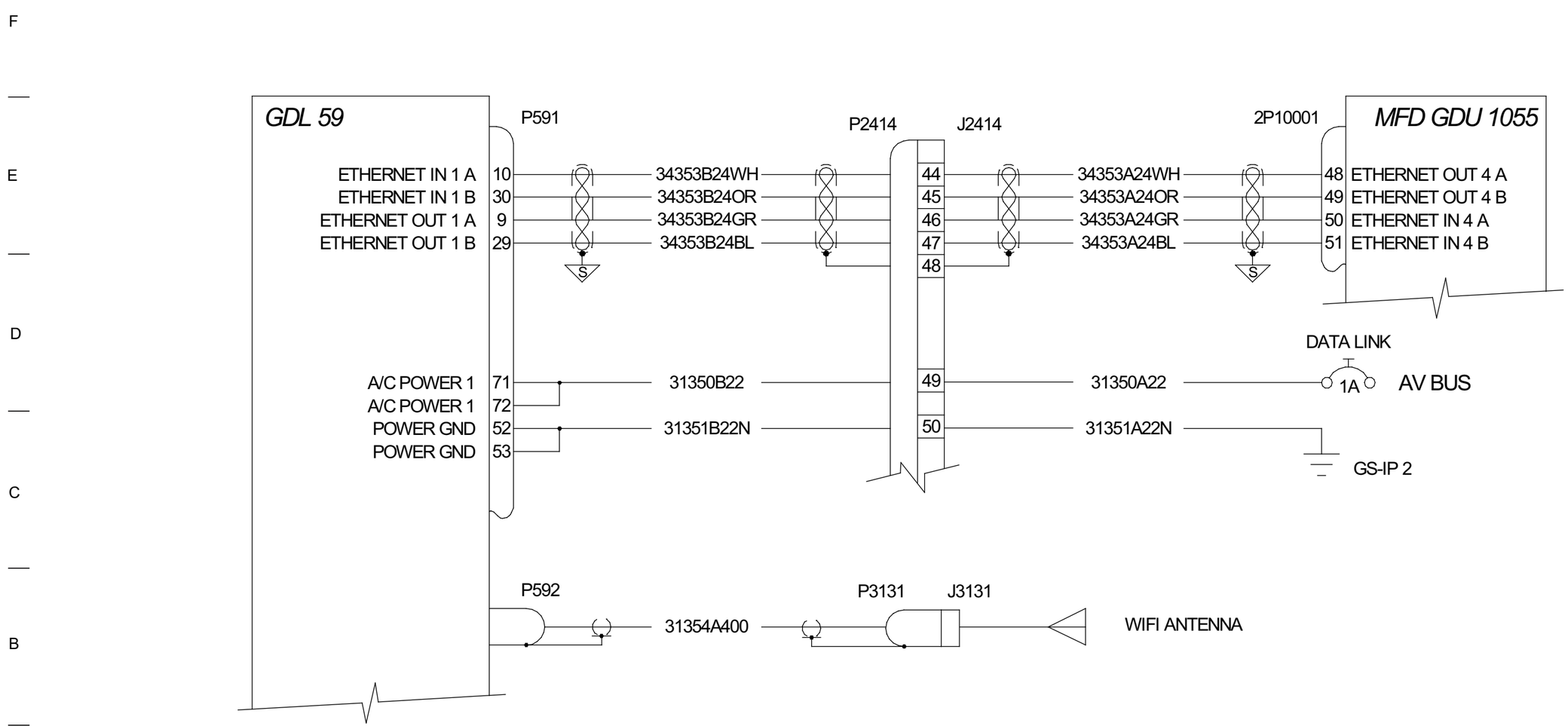
REV.	SCHEMATIC	DRAWING NO.	SHEET
A	OAT Wiring	D44-9231-20-03	1/1



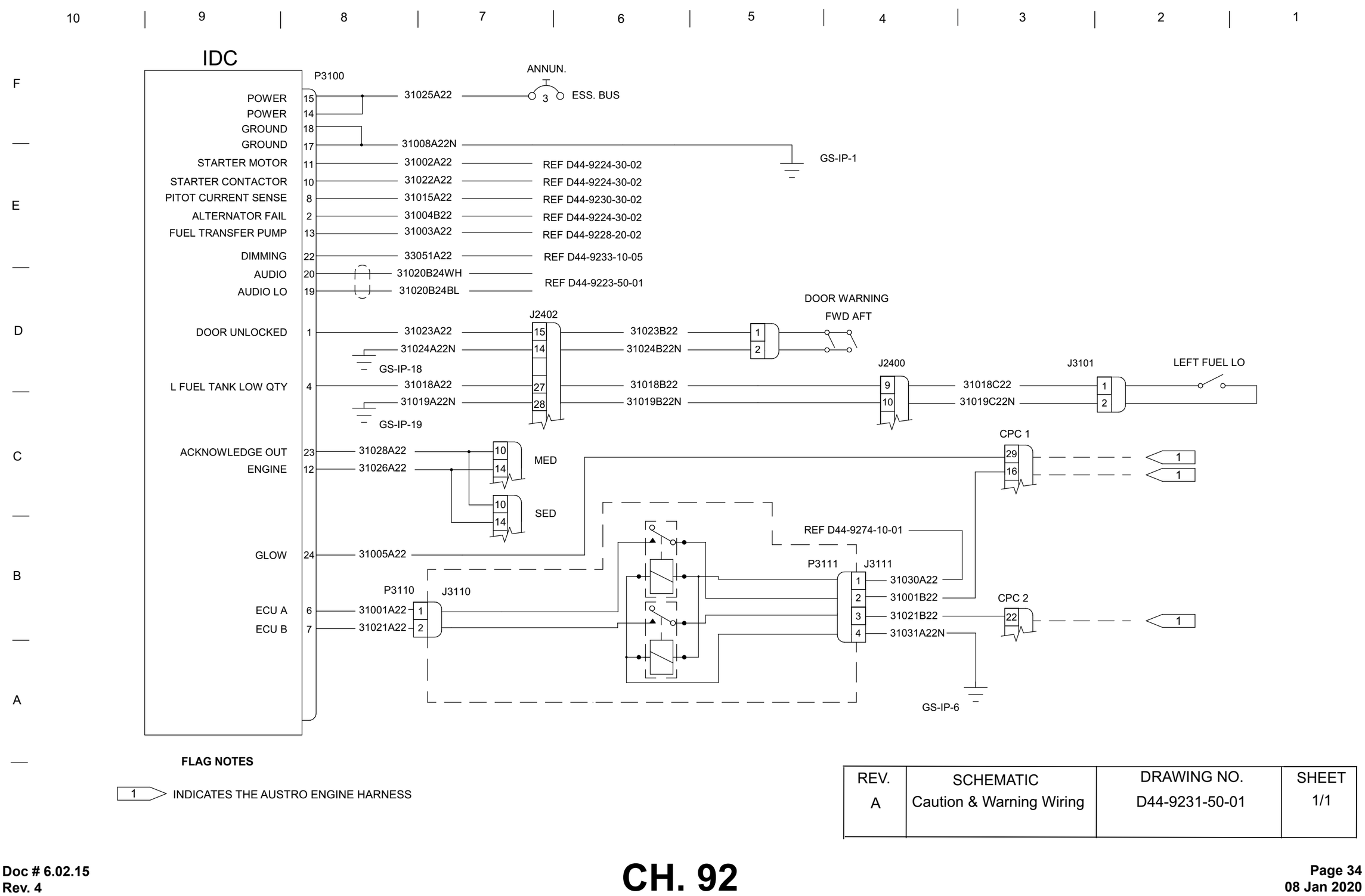
FLAG NOTES

1 GRS 77 SHOWN FOR REFERENCE ONLY.

REV.	SCHEMATIC	DRAWING NO.	SHEET
B	FDR Wiring	D44-9231-30-01	1/1



REV.	SCHEMATIC	DRAWING NO.	SHEET
—	GDL 59 Wiring	D44-9231-30-02	1/1



FLAG NOTES

1 INDICATES THE AUSTRO ENGINE HARNESS

REV.	SCHEMATIC	DRAWING NO.	SHEET
A	Caution & Warning Wiring	D44-9231-50-01	1/1

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NOTES:

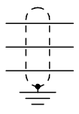
1. SYMBOL DESIGNATIONS


TWISTED SHIELDED SINGLE CONDUCTOR
SHIELD TERMINATED TO GROUND

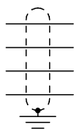

TWISTED SHIELDED SINGLE CONDUCTOR
SHIELD FLOATS

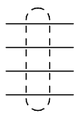

TWISTED SHIELDED PAIR
SHIELD TERMINATED TO GROUND


TWISTED SHIELDED PAIR
SHIELD FLOATS

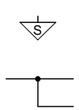

TWISTED SHIELDED 3 CONDUCTOR
SHIELD TERMINATED TO GROUND


TWISTED SHIELDED 3 CONDUCTOR
SHIELD FLOATS


TWISTED SHIELDED 4 CONDUCTOR
SHIELD TERMINATED TO GROUND


TWISTED SHIELDED 4 CONDUCTOR
SHIELD FLOATS


AIRCRAFT GROUND


GARMIN (SHIELD BLOCK) GROUND
REFER TO DOC. 190-00313-09


WIRE SPLICE CONNECTION

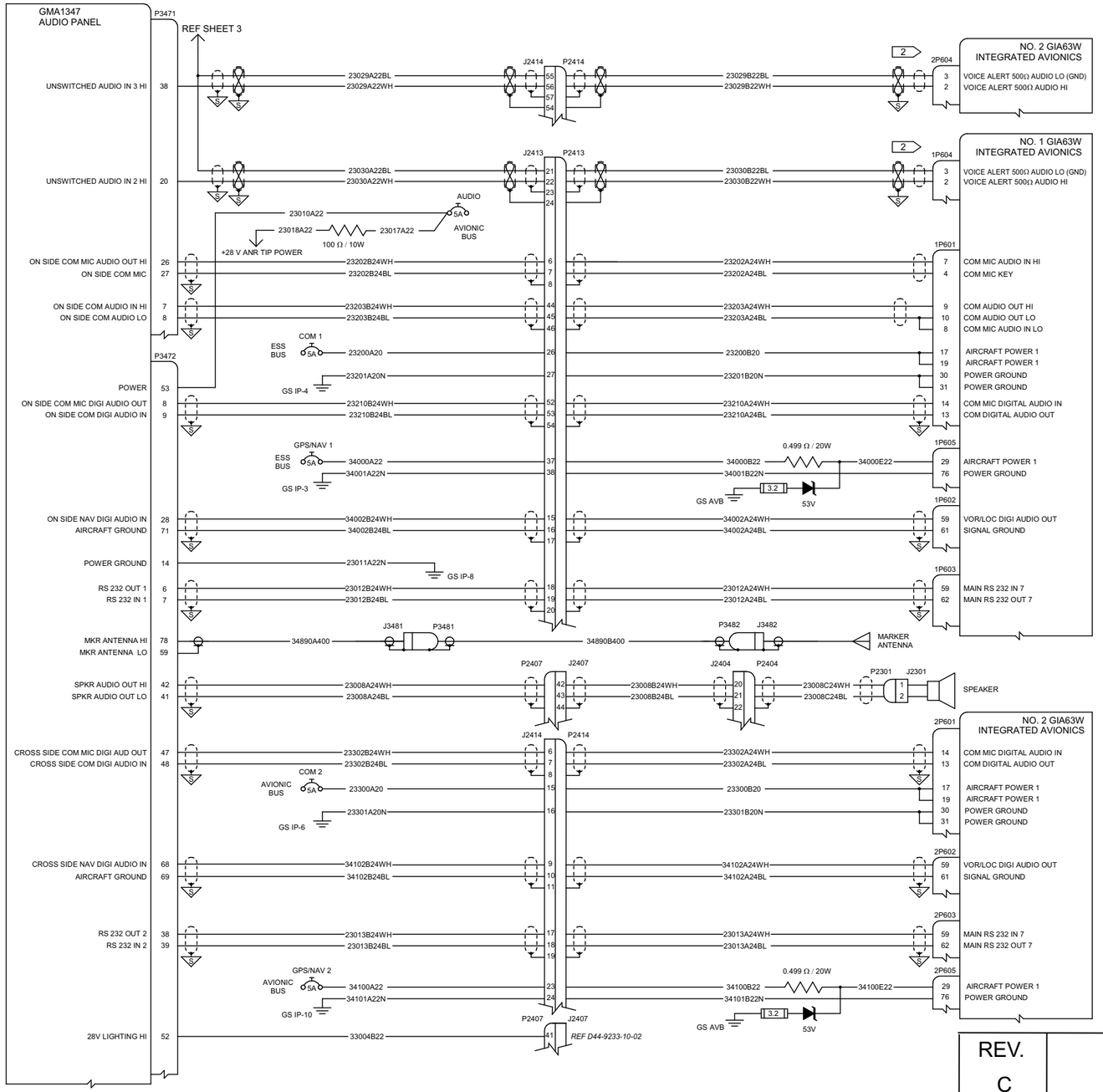

COAXIAL CABLE

N/C = NO CONNECTION

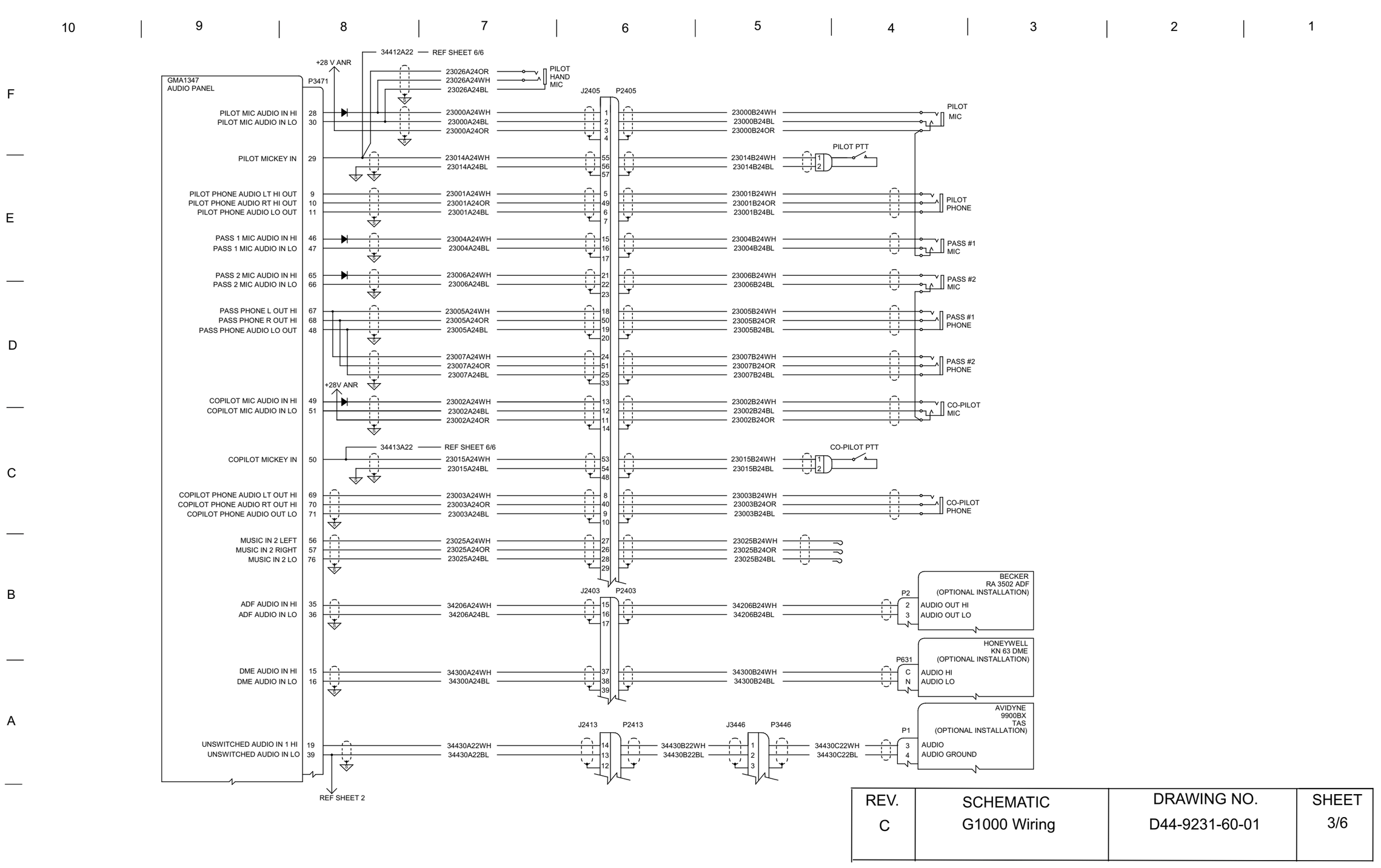
2. USE DOUBLE-SHIELDED WIRING: BOTH SHIELDS SHOULD BE GROUNDED ON THE RECEIVING SIDE; ON THE TRANSMITTING SIDE, ONLY THE OUTER SHIELD SHOULD BE GROUNDED, WHILE THE INNER SHIELD SHOULD FLOAT.

3. OPTIONAL JUMPER FOR TOP MOUNTED ANTENNA INSTALLATION.

REV.	SCHEMATIC	DRAWING NO.	SHEET
C	G1000 Wiring	D44-9231-60-01	1/6



REV.	SCHEMATIC	DRAWING NO.	SHEET
C	G1000 Wiring	D44-9231-60-01	2/6



REV.	SCHEMATIC	DRAWING NO.	SHEET
C	G1000 Wiring	D44-9231-60-01	3/6

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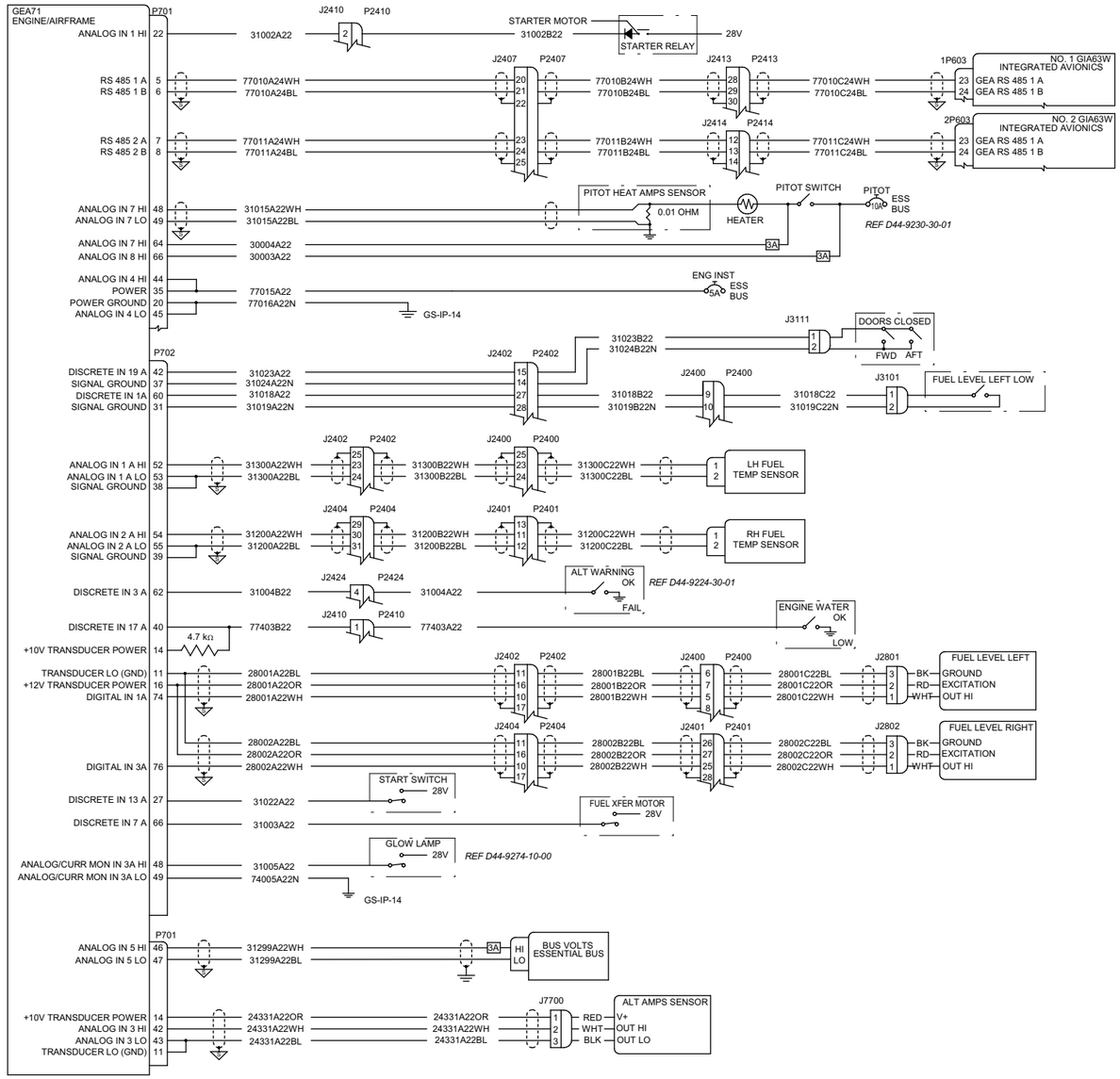
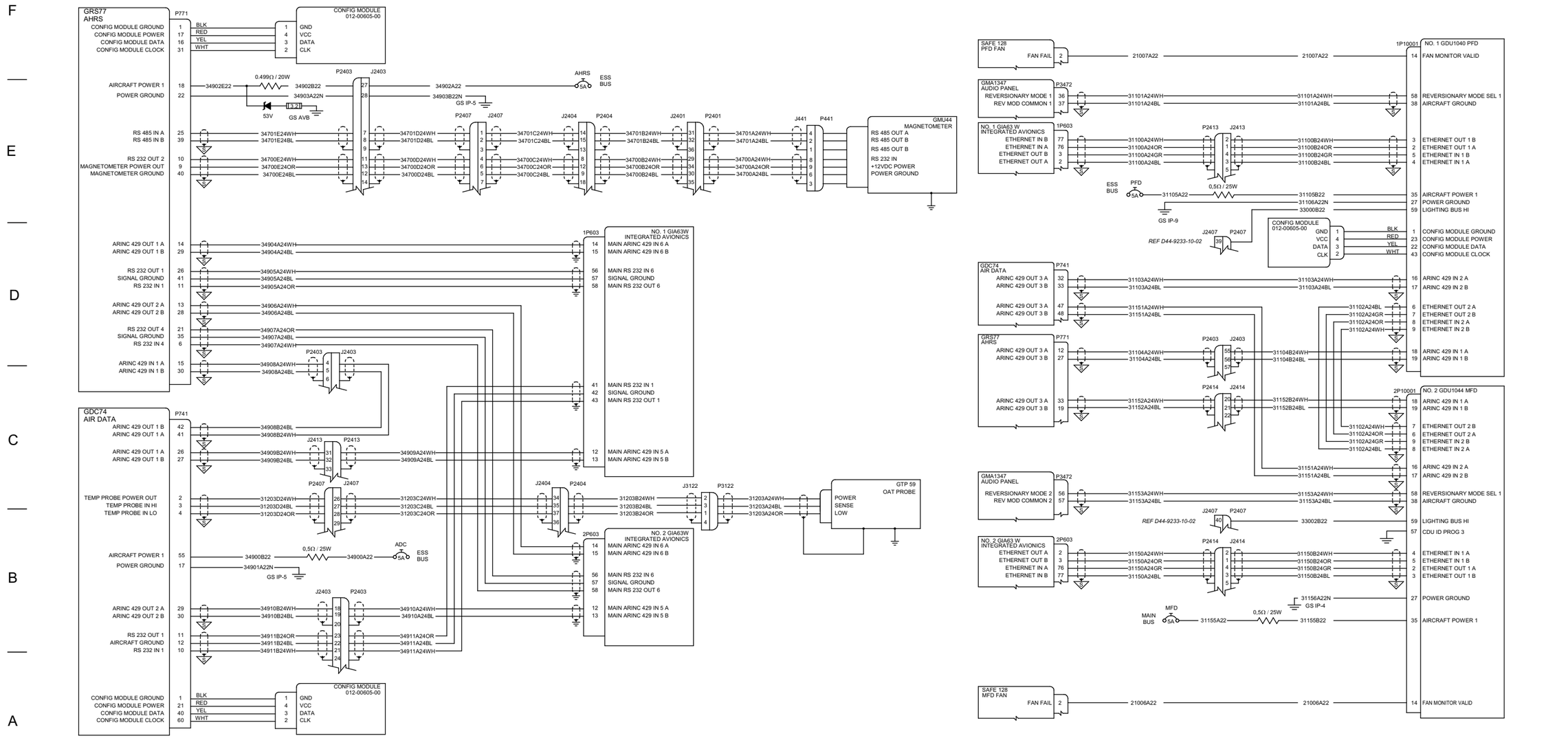
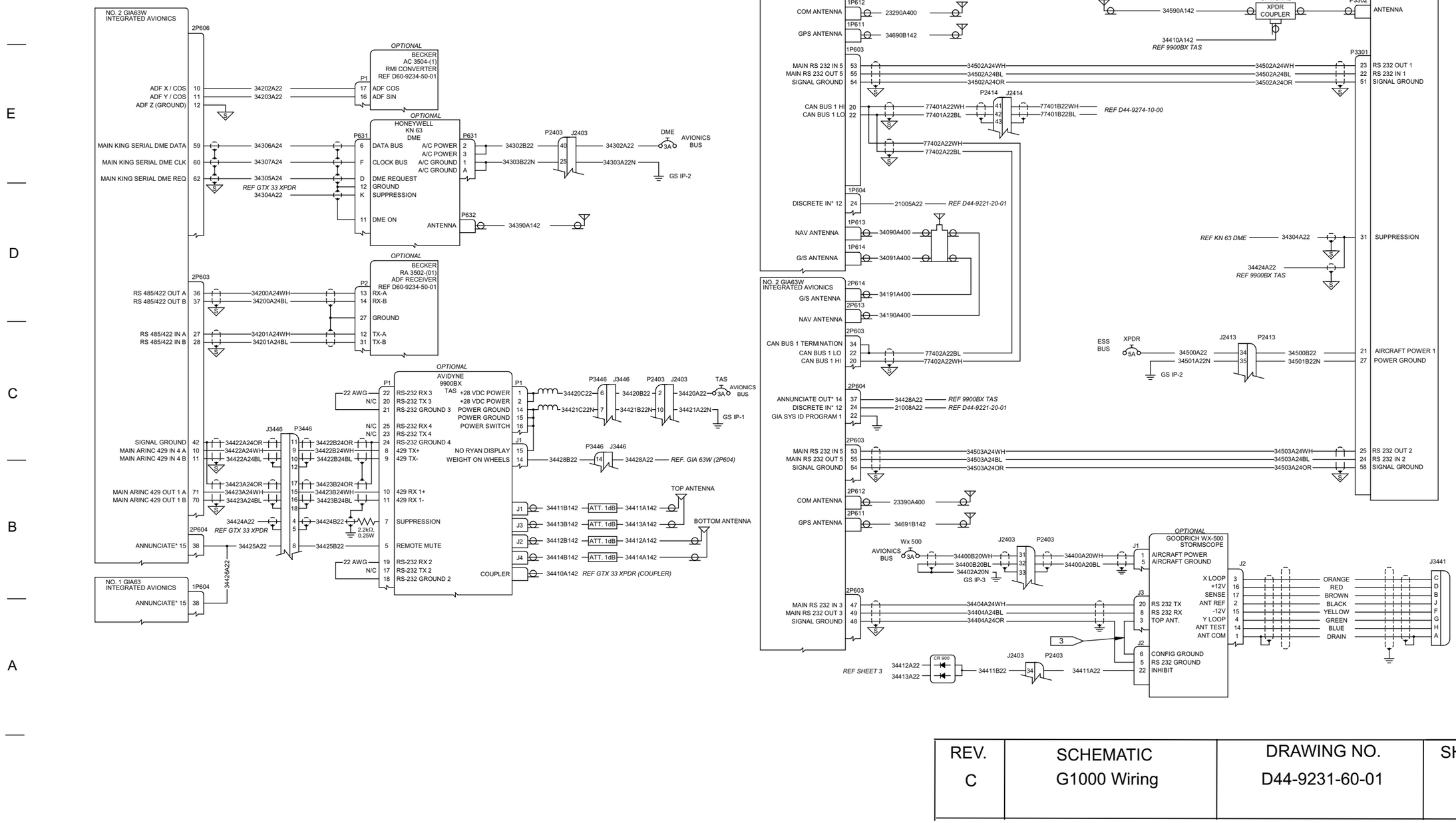


REV.	SCHEMATIC	DRAWING NO.	SHEET
C	G1000 Wiring	D44-9231-60-01	4/6



REV.	SCHEMATIC	DRAWING NO.	SHEET
C	G1000 Wiring	D44-9231-60-01	5/6



REV.	SCHEMATIC	DRAWING NO.	SHEET
C	G1000 Wiring	D44-9231-60-01	6/6

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NOTES:

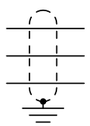
1. SYMBOL DESIGNATIONS

TWISTED SHIELDED SINGLE CONDUCTOR
SHIELD TERMINATED TO GROUND

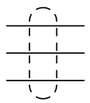
TWISTED SHIELDED SINGLE CONDUCTOR
SHIELD FLOATS

TWISTED SHIELDED PAIR
SHIELD TERMINATED TO GROUND

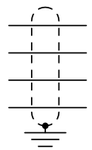
TWISTED SHIELDED PAIR
SHIELD FLOATS



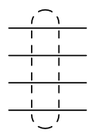
TWISTED SHIELDED 3 CONDUCTOR
SHIELD TERMINATED TO GROUND



TWISTED SHIELDED 3 CONDUCTOR
SHIELD FLOATS



TWISTED SHIELDED 4 CONDUCTOR
SHIELD TERMINATED TO GROUND

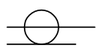


TWISTED SHIELDED 4 CONDUCTOR
SHIELD FLOATS

AIRCRAFT GROUND

GARMIN (SHIELD BLOCK) GROUND
REFER TO DOC. 190-00313-09

WIRE SPLICE CONNECTION

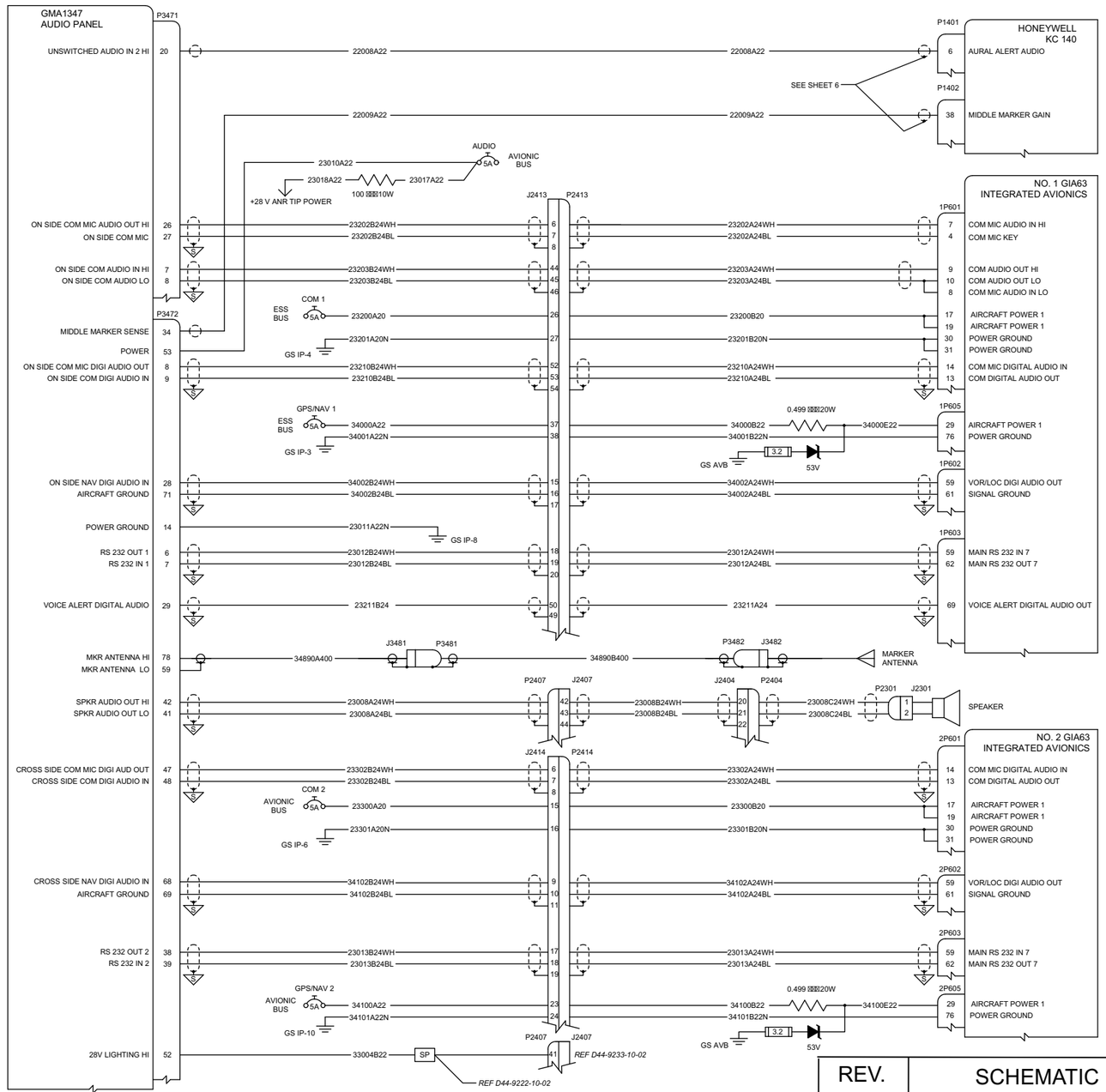


COAXIAL CABLE

N/C = NO CONNECTION

2. OPTIONAL JUMPER FOR TOP MOUNTED ANTENNA INSTALLATION.

REV.	SCHEMATIC	DRAWING NO.	SHEET
—	G1000 Wiring	D44-9231-60-01x01	1/6



REV.	SCHEMATIC	DRAWING NO.	SHEET
—	G1000 Wiring	D44-9231-60-01x01	2/6

10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

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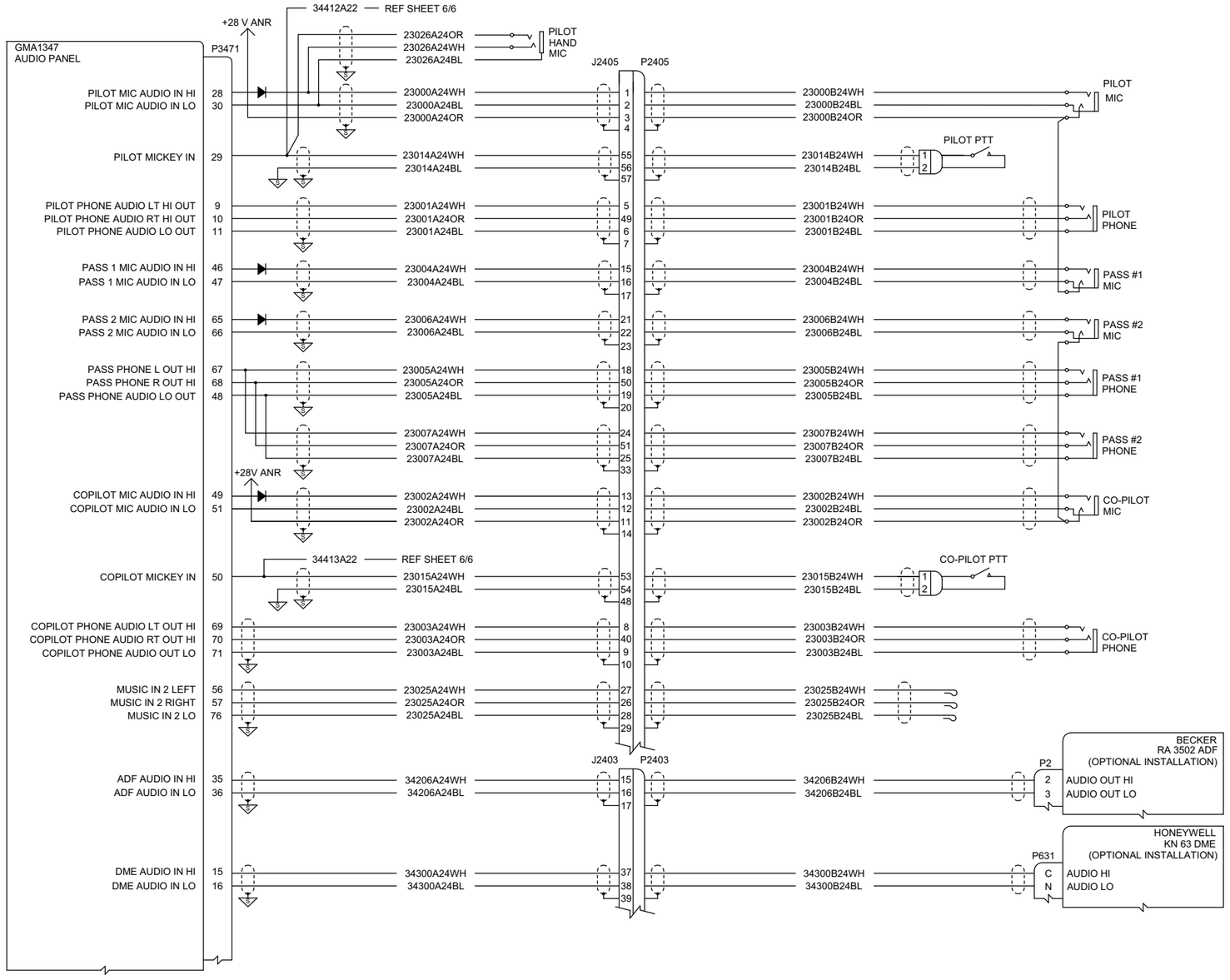

REV.	SCHEMATIC	DRAWING NO.	SHEET
—	G1000 Wiring	D44-9231-60-01x01	3/6

10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

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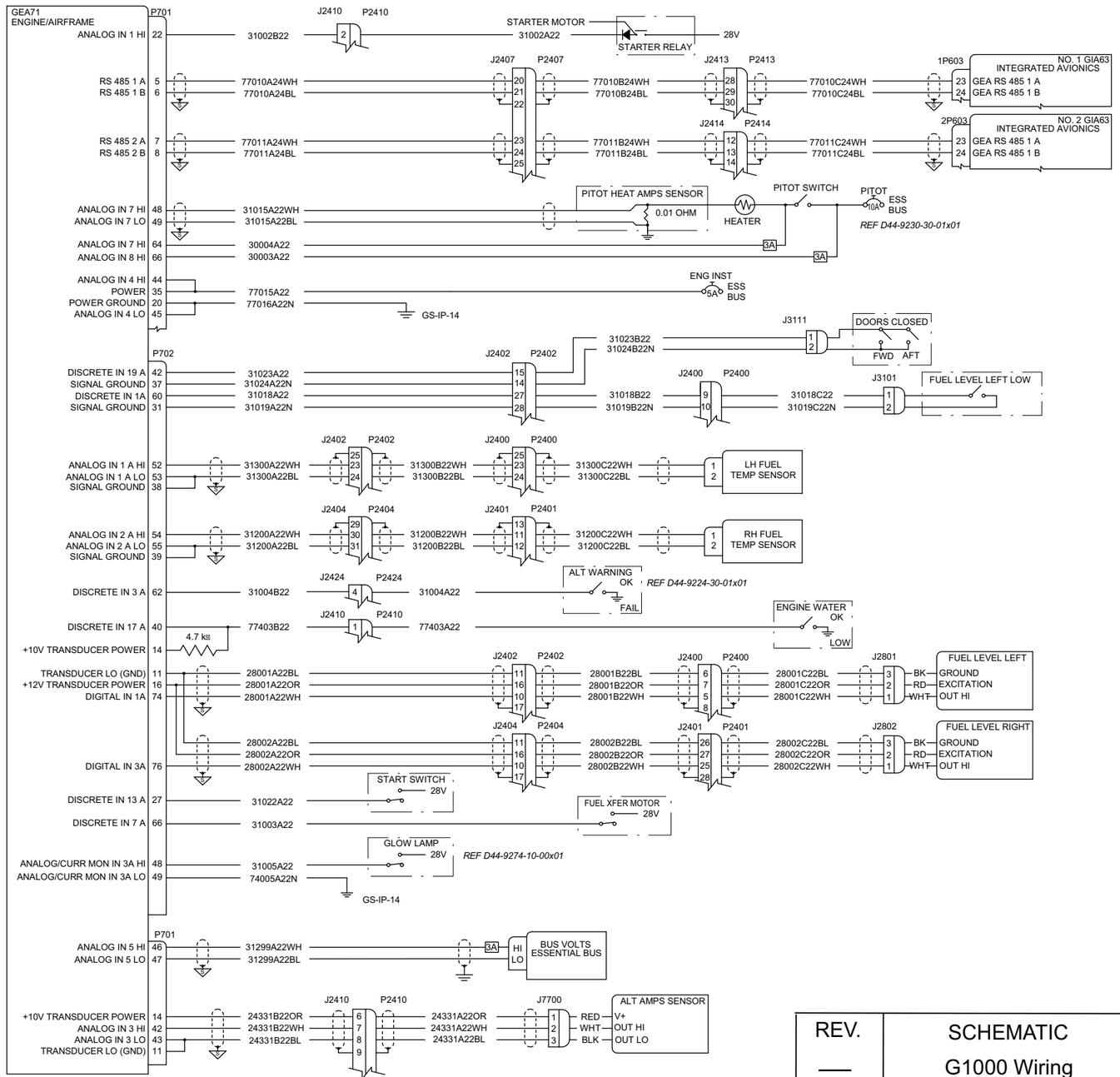
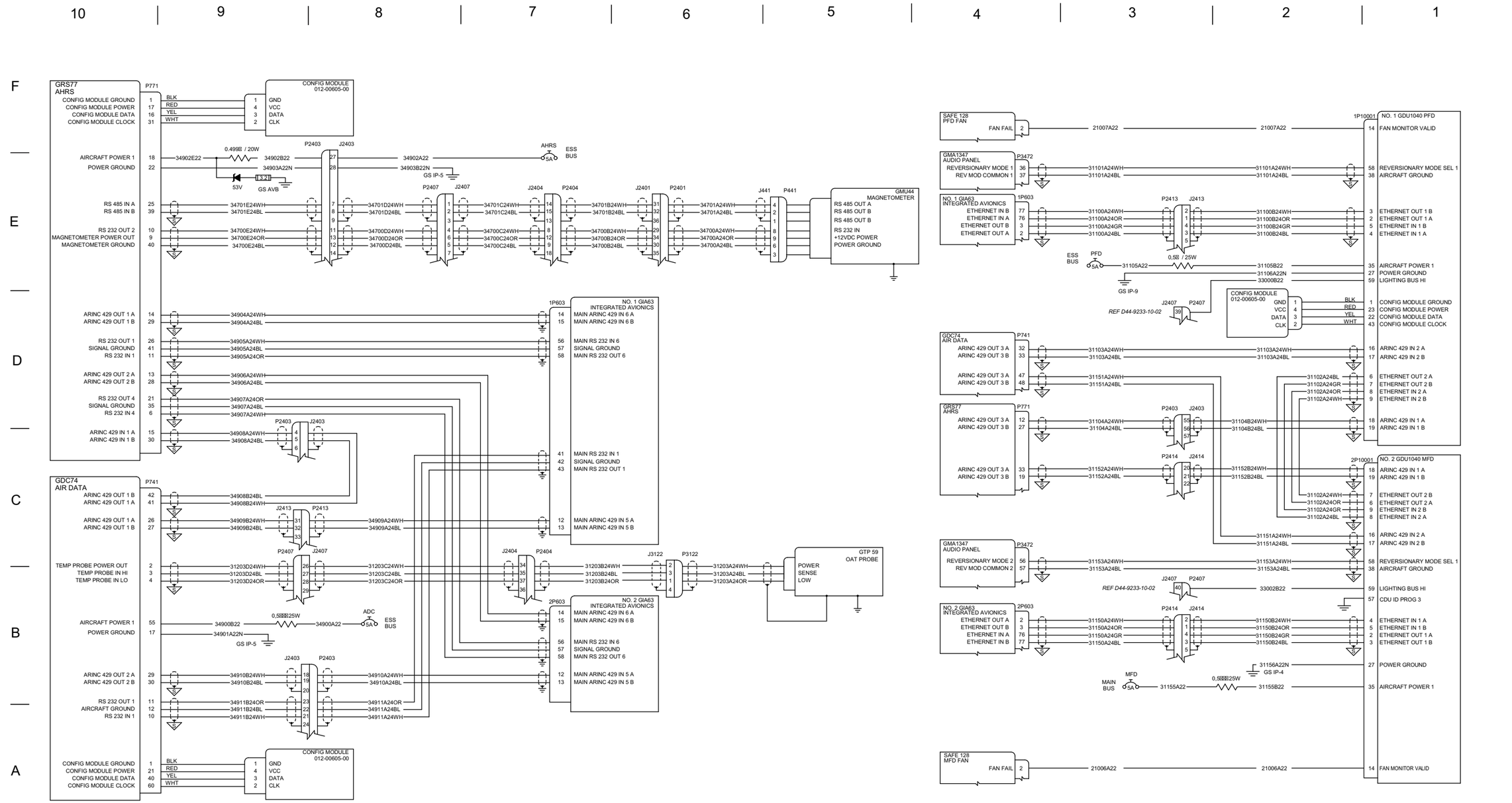
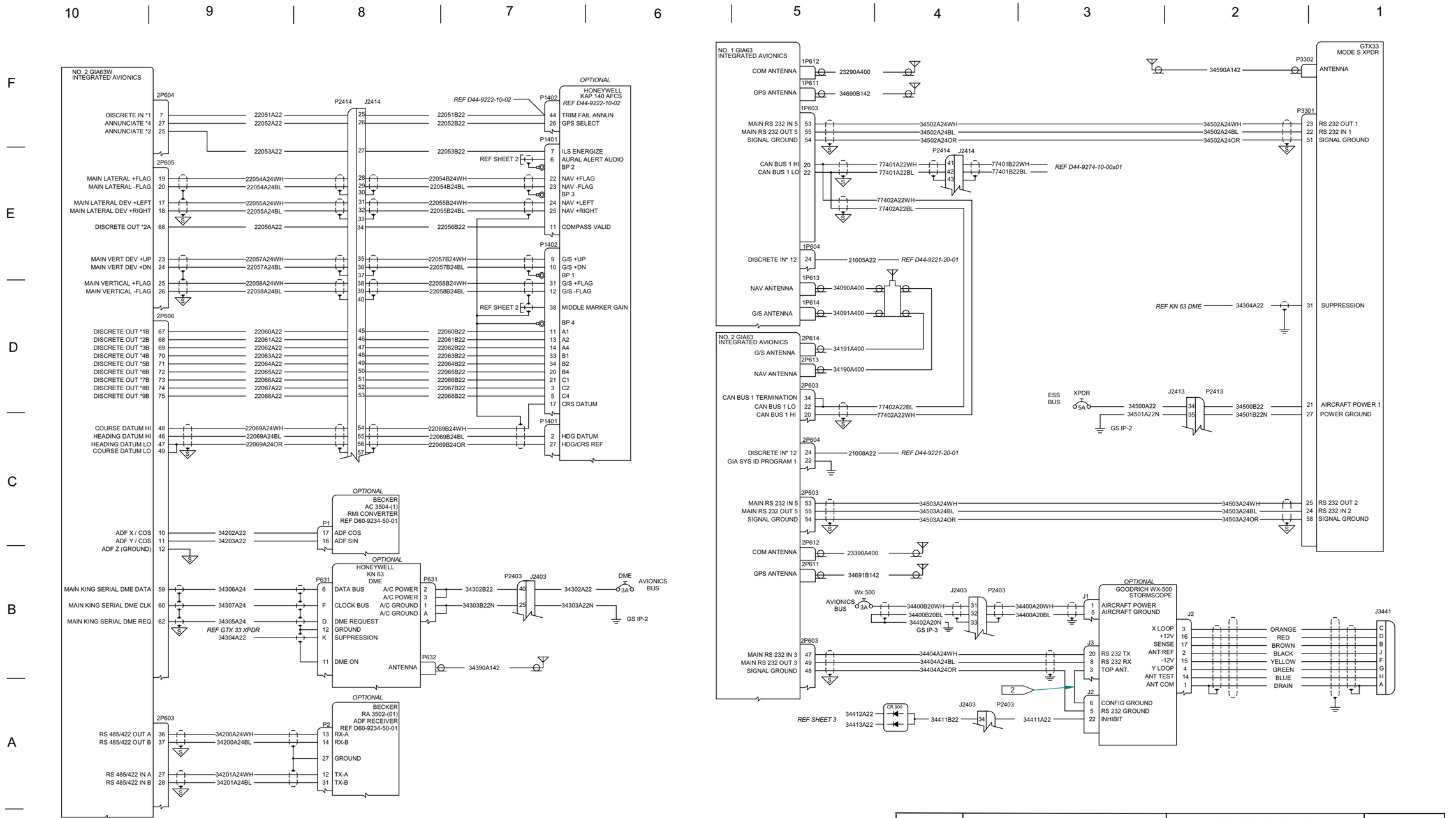


REV.	SCHEMATIC	DRAWING NO.	SHEET
—	G1000 Wiring	D44-9231-60-01x01	4/6



REV.	SCHEMATIC	DRAWING NO.	SHEET
—	G1000 Wiring	D44-9231-60-01x01	5/6



REV.	SCHEMATIC	DRAWING NO.	SHEET
—	G1000 Wiring	D44-9231-60-01x01	6/6

10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

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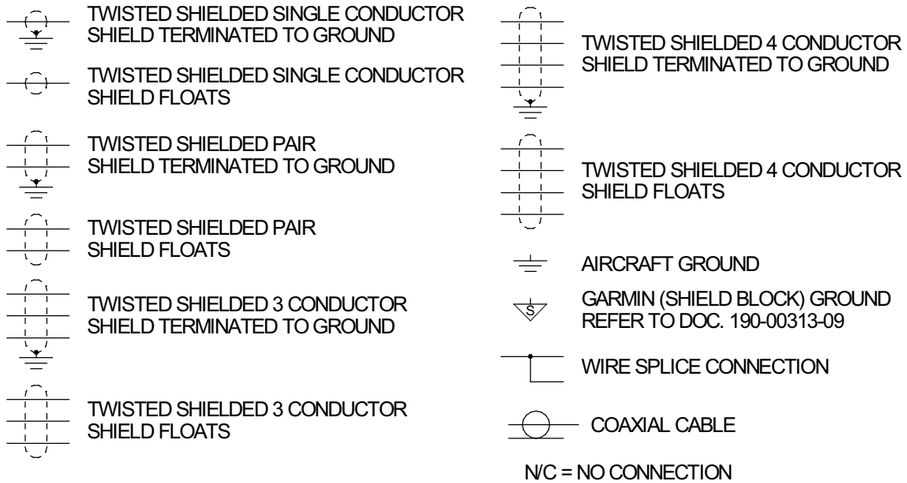
NOTES:

1. SYMBOL DESIGNATIONS

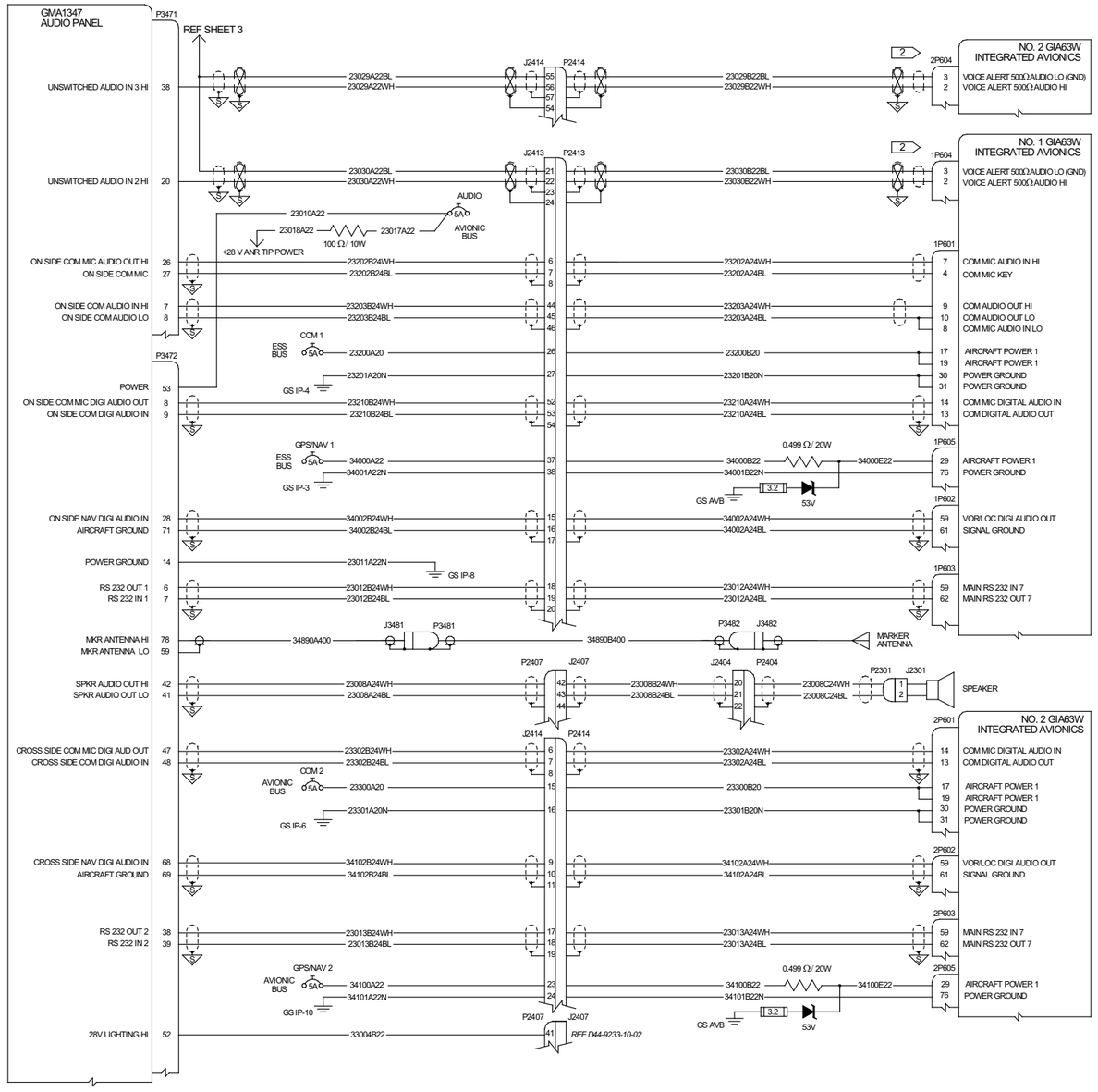


N/C = NO CONNECTION

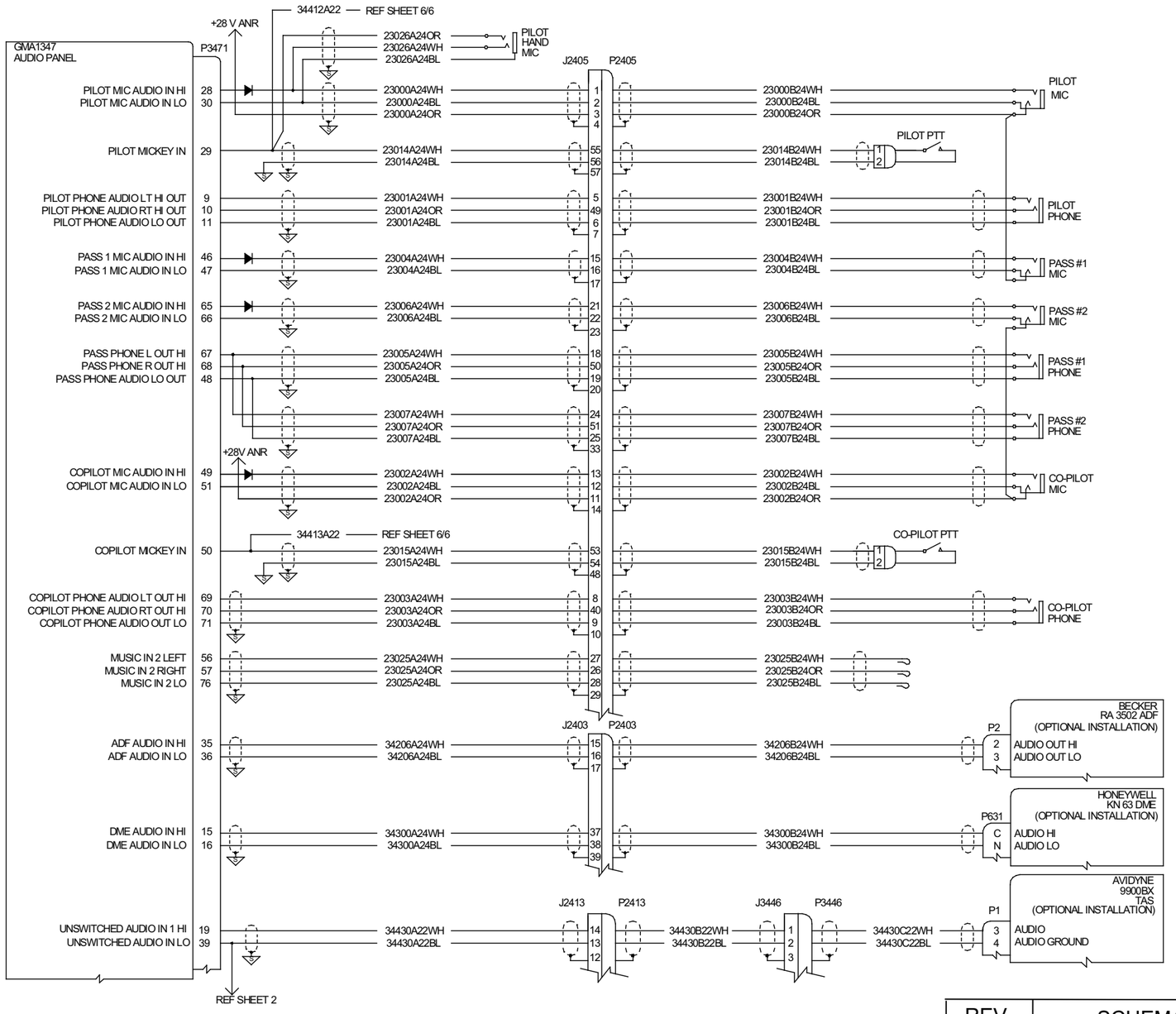
2. USE DOUBLE-SHIELDED WIRING: BOTH SHIELDS SHOULD BE GROUNDED ON THE RECEIVING SIDE; ON THE TRANSMITTING SIDE, ONLY THE OUTER SHIELD SHOULD BE GROUNDED, WHILE THE INNER SHIELD SHOULD FLOAT.

3. OPTIONAL JUMPER FOR TOP MOUNTED ANTENNA INSTALLATION.

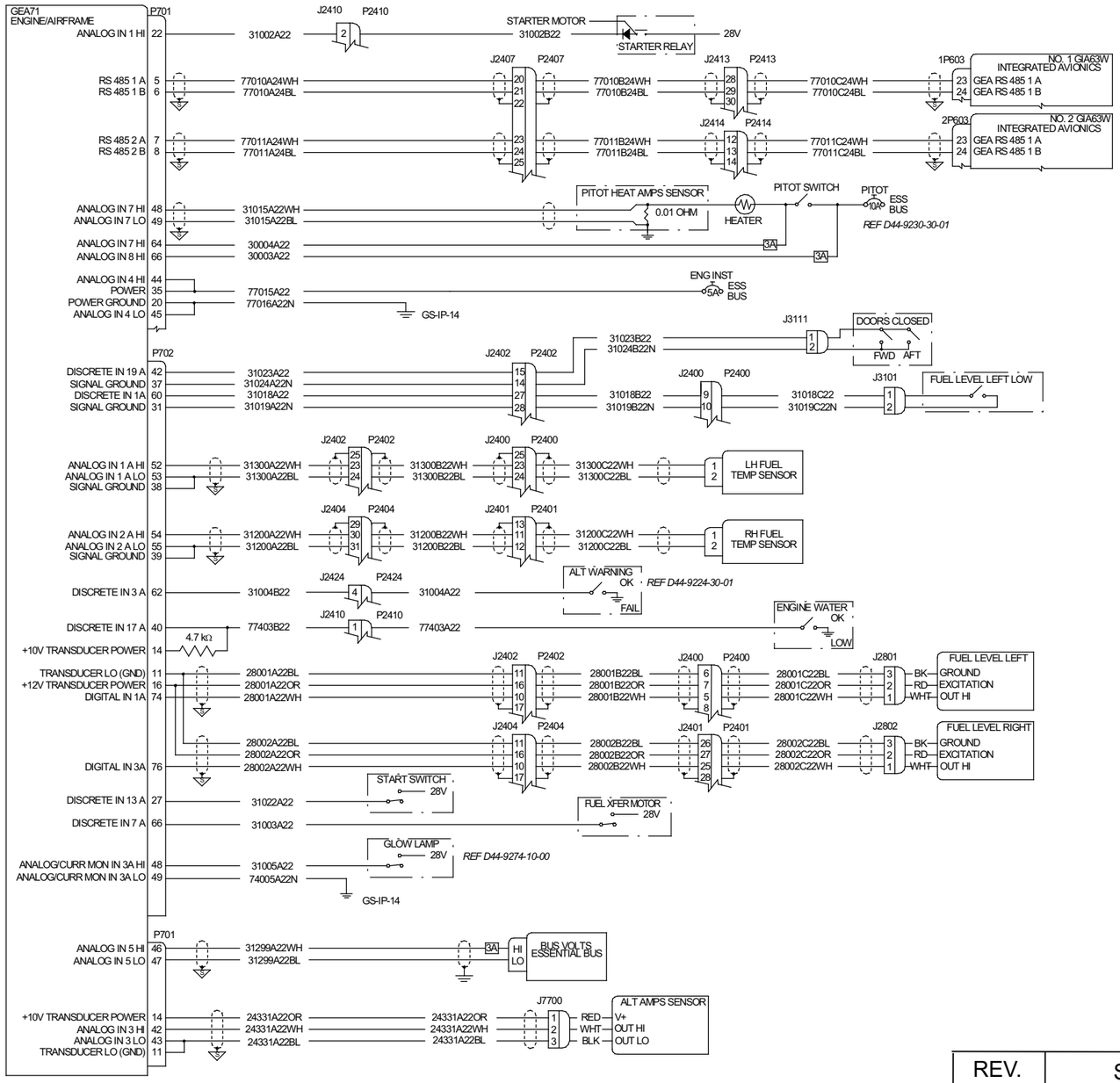
REV.	SCHEMATIC	DRAWING NO.	SHEET
—	G1000 NXi	D44-9231-60-02	1/6



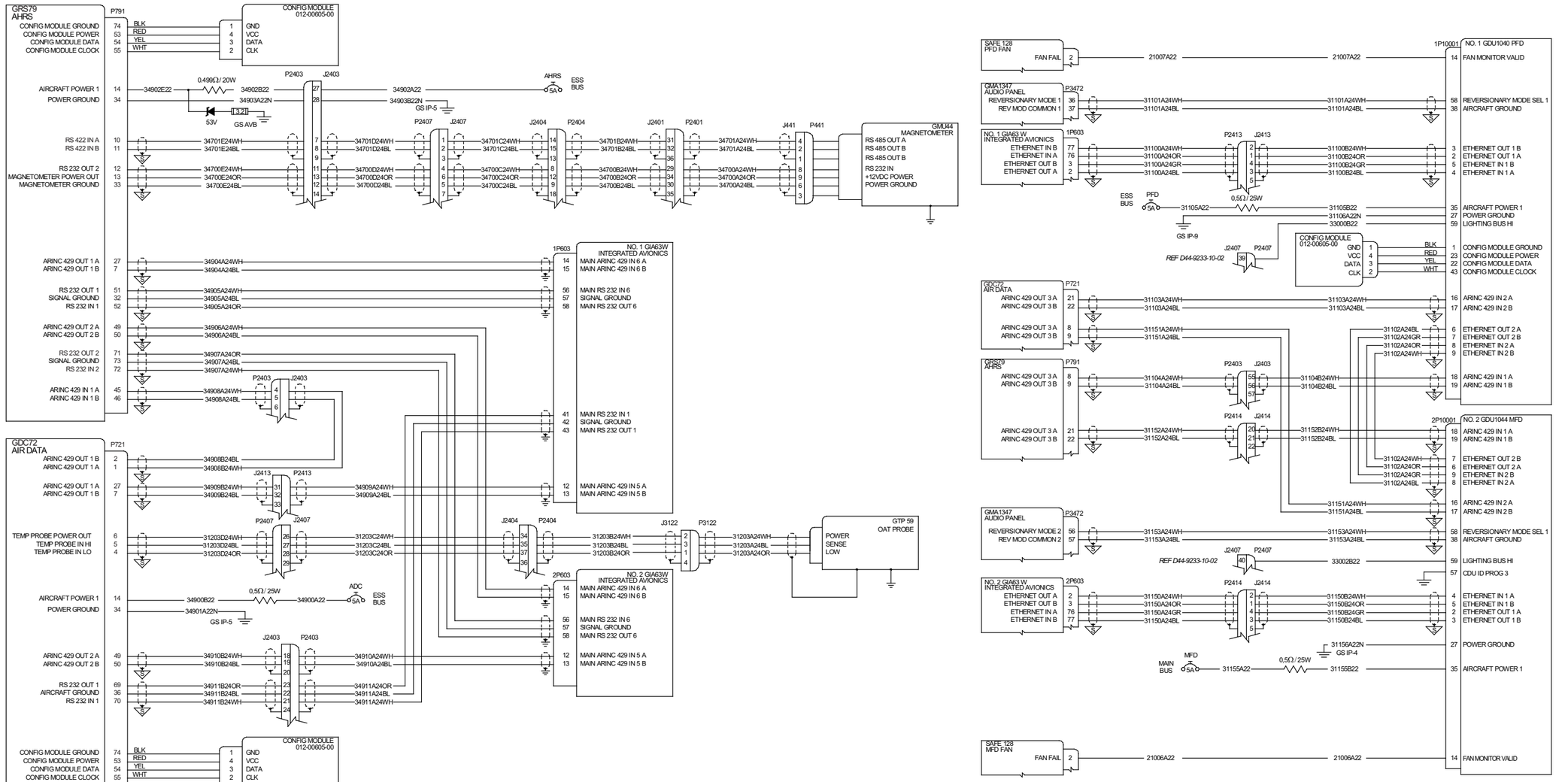
REV.	SCHEMATIC	DRAWING NO.	SHEET
—	G1000 NXi	D44-9231-60-02	2/6



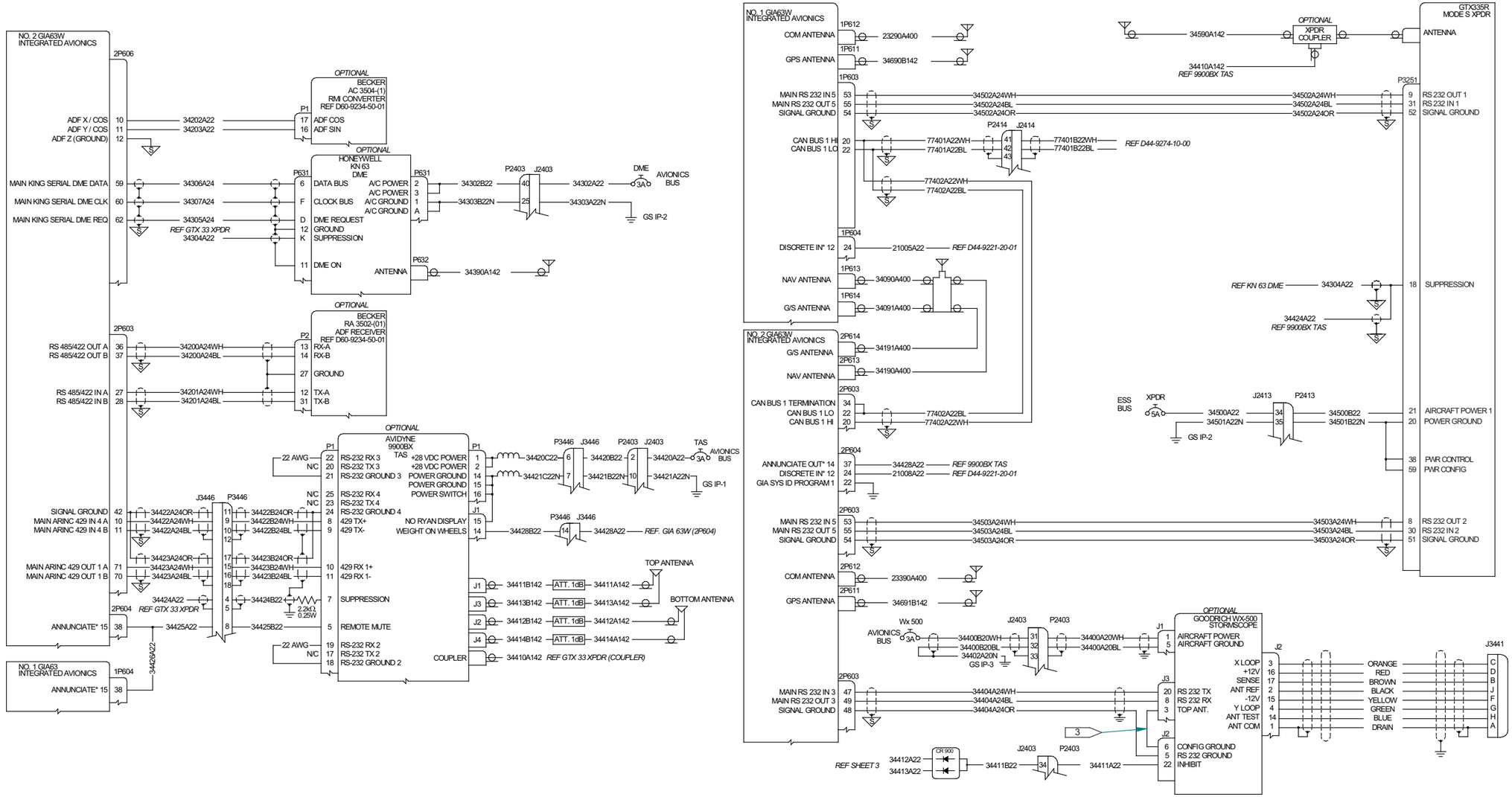
REV.	SCHEMATIC	DRAWING NO.	SHEET
—	G1000 NXi	D44-9231-60-02	3/6



REV.	SCHEMATIC	DRAWING NO.	SHEET
—	G1000 NXi	D44-9231-60-02	4/6



REV.	SCHEMATIC	DRAWING NO.	SHEET
—	G1000 NXi	D44-9231-60-02	5/6



REV.	SCHEMATIC	DRAWING NO.	SHEET
—	G1000 NXi	D44-9231-60-02	6/6

10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

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NOTES:

1. SYMBOL DESIGNATIONS

E

TWISTED SHIELDED SINGLE CONDUCTOR SHIELD TERMINATED TO GROUND

TWISTED SHIELDED SINGLE CONDUCTOR SHIELD FLOATS

TWISTED SHIELDED PAIR SHIELD TERMINATED TO GROUND

TWISTED SHIELDED PAIR SHIELD FLOATS

D

TWISTED SHIELDED 3 CONDUCTOR SHIELD TERMINATED TO GROUND

TWISTED SHIELDED 3 CONDUCTOR SHIELD FLOATS

TWISTED SHIELDED 4 CONDUCTOR SHIELD TERMINATED TO GROUND

TWISTED SHIELDED 4 CONDUCTOR SHIELD FLOATS

AIRCRAFT GROUND

GARMIN (SHIELD BLOCK) GROUND REFER TO DOC. 190-00313-09

WIRE SPLICE CONNECTION

COAXIAL CABLE

N/C = NO CONNECTION

C

2. USE DOUBLE-SHIELDED WIRING: BOTH SHIELDS SHOULD BE GROUNDED ON THE RECEIVING SIDE; ON THE TRANSMITTING SIDE, ONLY THE OUTER SHIELD SHOULD BE GROUNDED, WHILE THE INNER SHIELD SHOULD FLOAT.

3. OPTIONAL JUMPER FOR TOP MOUNTED ANTENNA INSTALLATION.

4. WIRES SPLICED TOGETHER IF AUXILLARY MUSIC JACK NOT INSTALLED.

5. CAP AND STOW IF GTX345 IS INSTALLED.

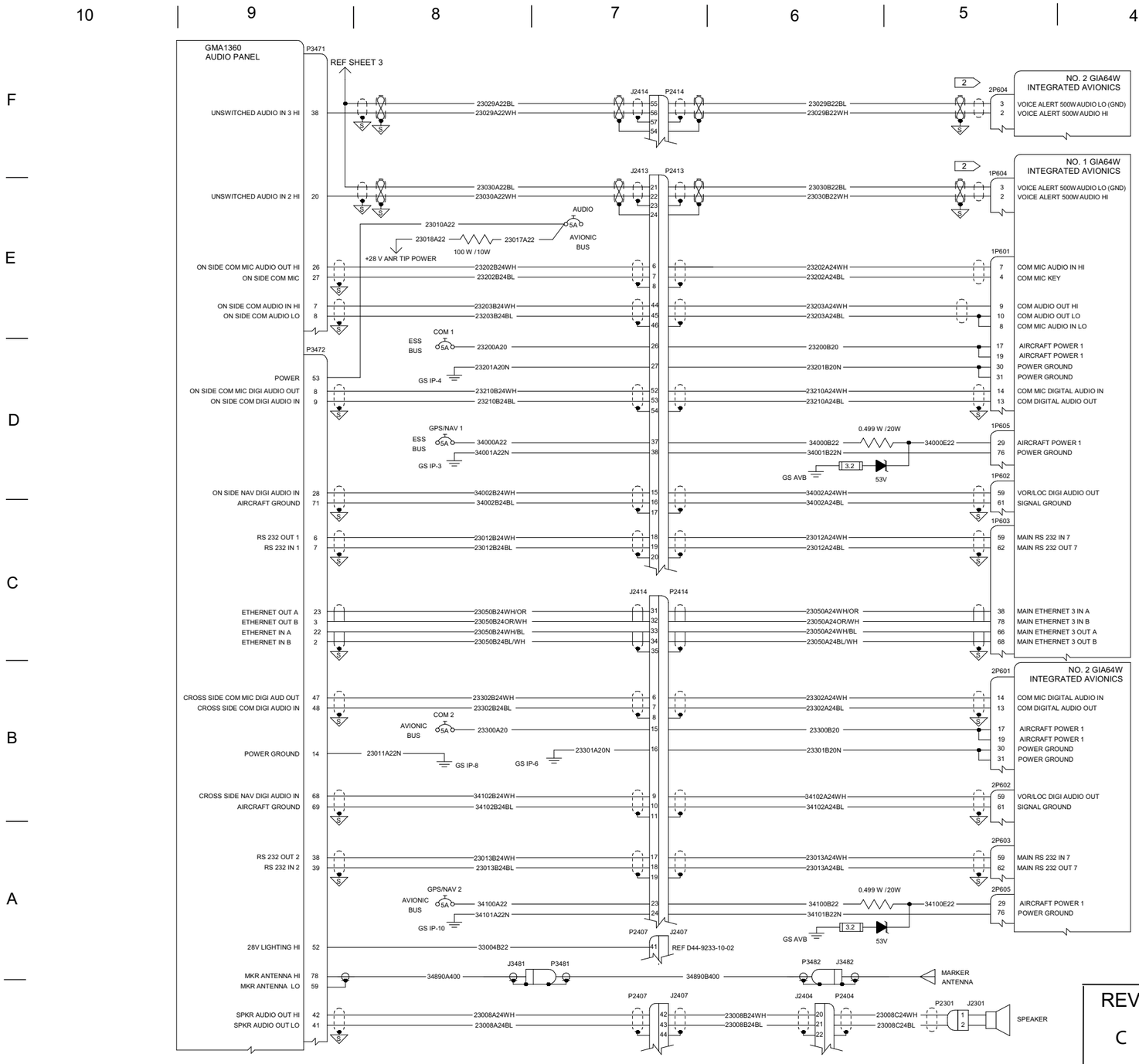
B

6. ETHERNET COLOUR CODING MAY VARY DEPENDEN ON ETHERNET CABLE TYPE. BELOW ARE EQUIVALENT WIRE COLOUR CODES.

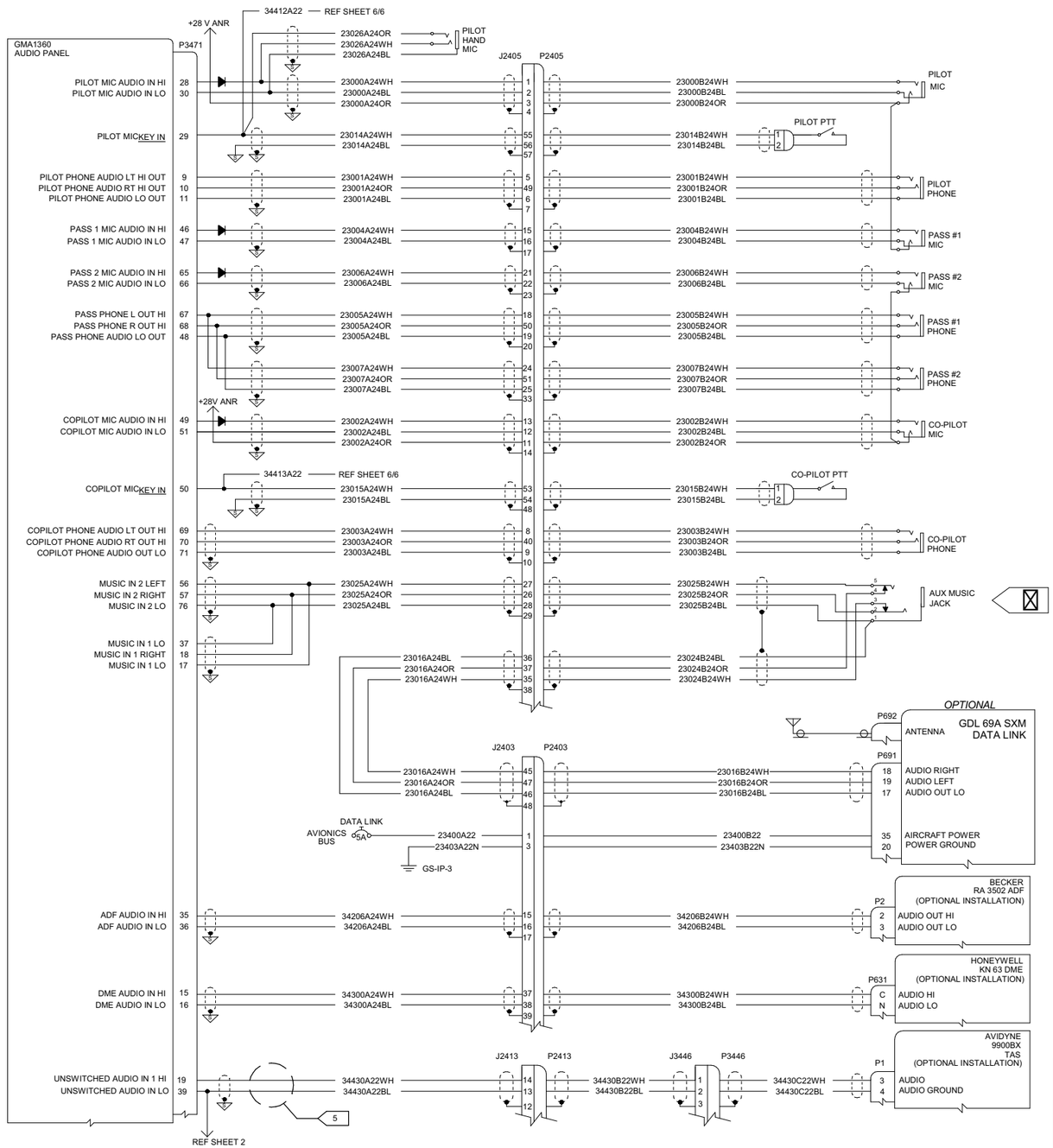
ETHERNET CABLE LEGEND	
E40424 (PIC WIRE)	392404 (CARLISLE)
WHITE	WHITE w/ORANGE STRIPE
ORANGE	ORANGE w/WHITE STRIPE
GREEN	WHITE w/BLUE STRIPE
BLUE	BLUE w/WHITE STRIPE

A

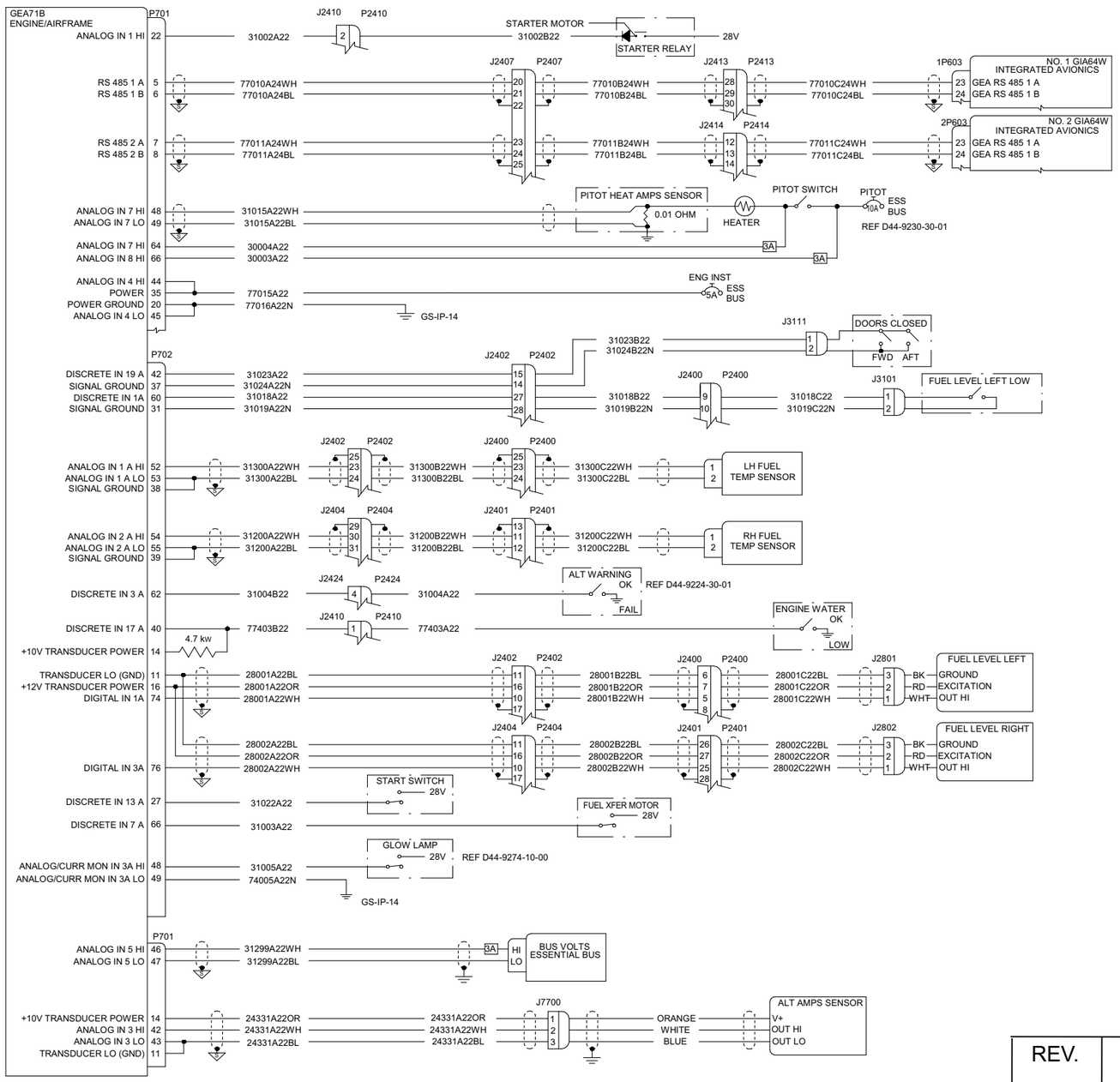
REV.	SCHEMATIC	DRAWING NO.	SHEET
C	G1000 NXi (Phase I and Phase II)	D44-9231-60-03	1/6



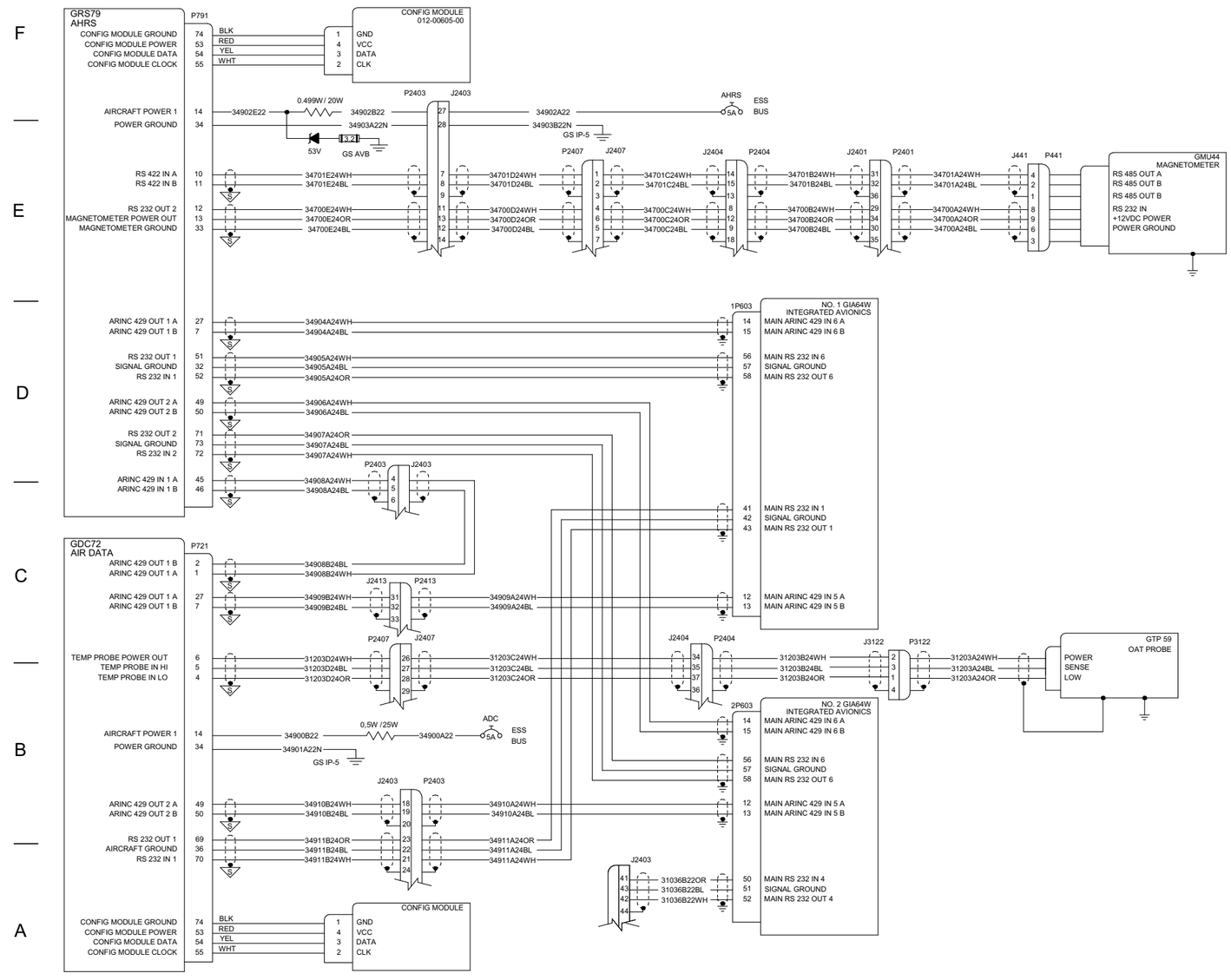
REV.	SCHEMATIC	DRAWING NO.	SHEET
C	G1000 NXi (Phase I and Phase II)	D44-9231-60-03	2/6

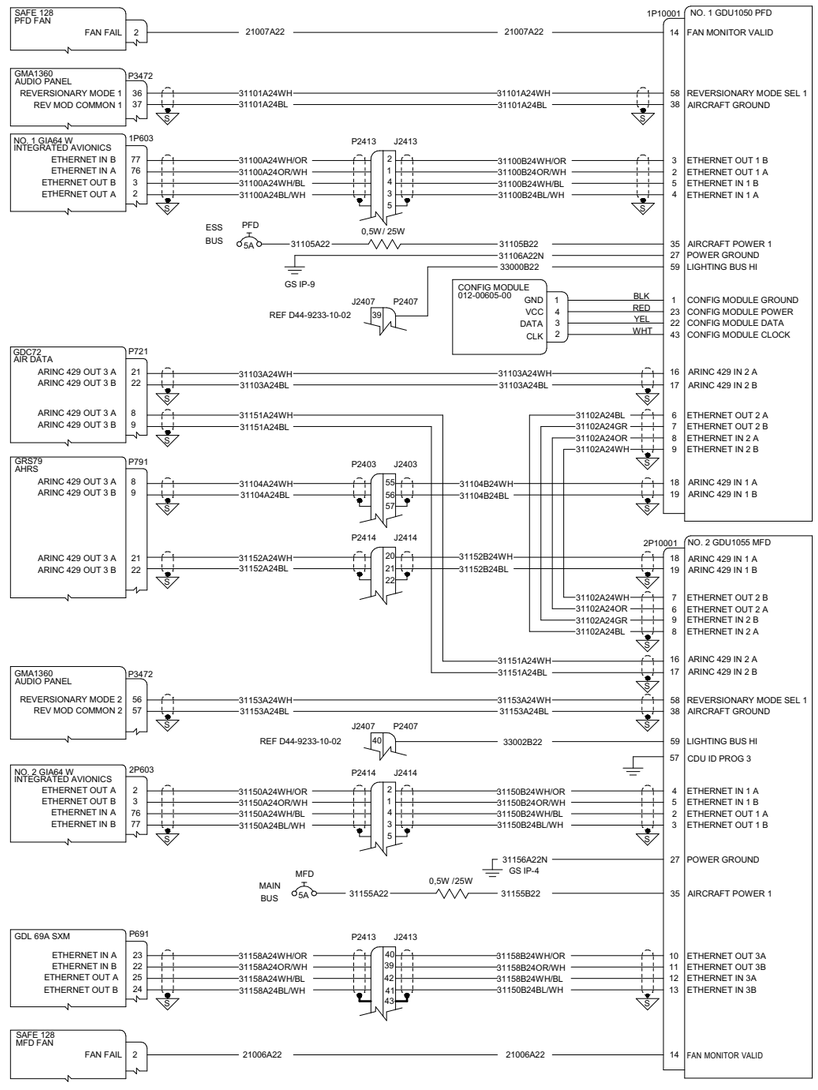


REV.	SCHEMATIC	DRAWING NO.	SHEET
C	G1000 NXi (Phase I and Phase II)	D44-9231-60-03	3/6

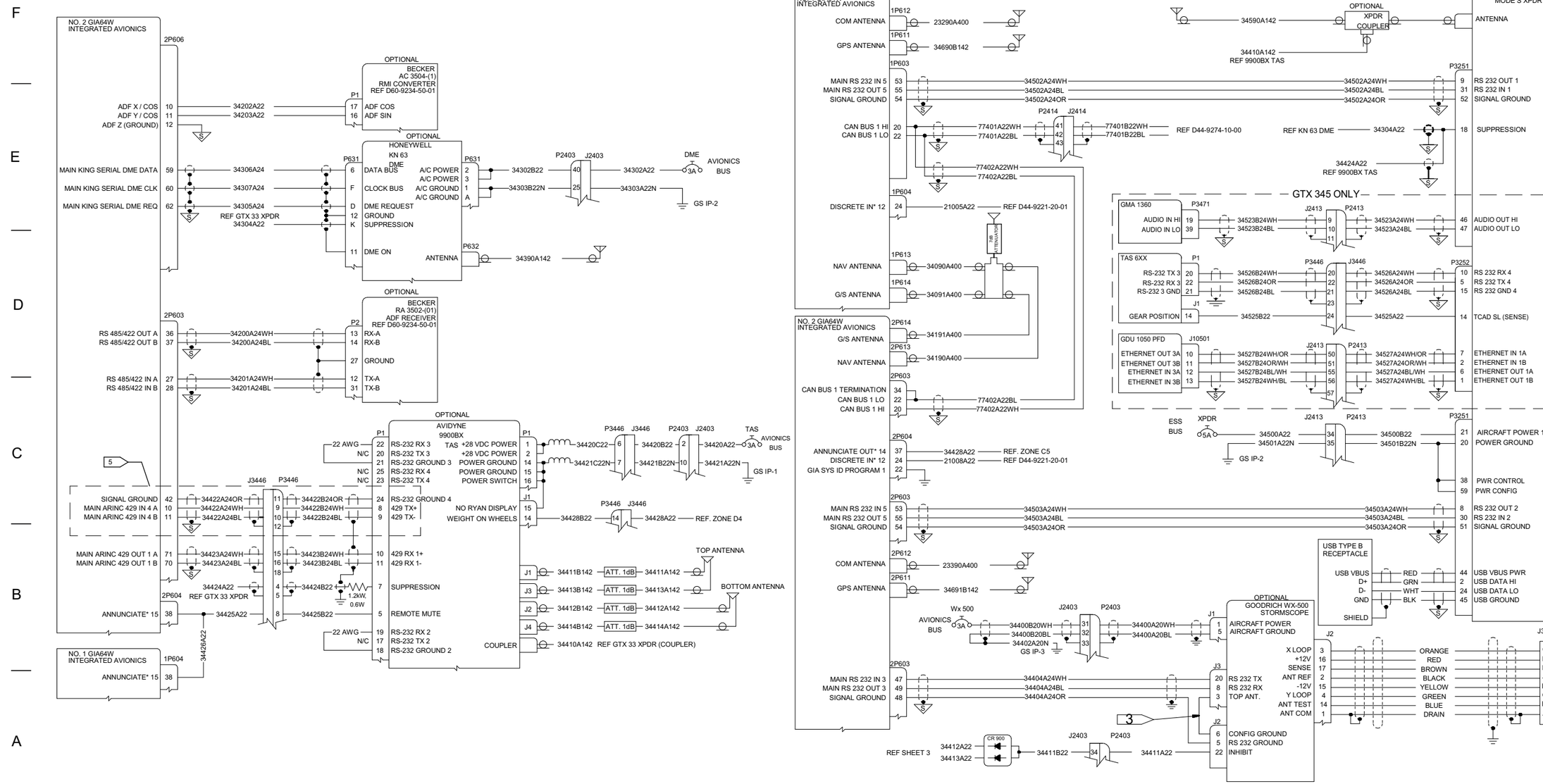


REV.	SCHEMATIC	DRAWING NO.	SHEET
C	G1000 NXi (Phase I and Phase II)	D44-9231-60-03	4/6





REV.	SCHEMATIC	DRAWING NO.	SHEET
C	G1000 NXi (Phase I and Phase II)	D44-9231-60-03	5/6



REV.	SCHEMATIC	DRAWING NO.	SHEET
C	G1000 NXi (Phase I and Phase II)	D44-9231-60-03	6/6

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NOTES:

1. SYMBOL DESIGNATIONS


TWISTED SHIELDED SINGLE CONDUCTOR SHIELD TERMINATED TO GROUND

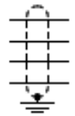

TWISTED SHIELDED SINGLE CONDUCTOR SHIELD FLOATS

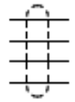

TWISTED SHIELDED PAIR SHIELD TERMINATED TO GROUND


TWISTED SHIELDED PAIR SHIELD FLOATS


TWISTED SHIELDED 3 CONDUCTOR SHIELD TERMINATED TO GROUND


TWISTED SHIELDED 3 CONDUCTOR SHIELD FLOATS


TWISTED SHIELDED 4 CONDUCTOR SHIELD TERMINATED TO GROUND


TWISTED SHIELDED 4 CONDUCTOR SHIELD FLOATS


AIRCRAFT GROUND


GARMIN (SHIELD BLOCK) GROUND REFER TO DOC. 190-00313-09


WIRE SPLICE CONNECTION


COAXIAL CABLE

N/C = NO CONNECTION

2. USE DOUBLE-SHIELDED WIRING: BOTH SHIELDS SHOULD BE GROUNDED ON THE RECEIVING SIDE; ON THE TRANSMITTING SIDE, ONLY THE OUTER SHIELD SHOULD BE GROUNDED, WHILE THE INNER SHIELD SHOULD FLOAT.

3. OPTIONAL JUMPER FOR TOP MOUNTED ANTENNA INSTALLATION.

4. WIRES SPLICED TOGETHER IF AUXILLARY MUSIC JACK NOT INSTALLED.

5. CAP AND STOW IF GTX345 IS INSTALLED.

6. ETHERNET COLOUR CODING MAY VARY DEPENDEN ON ETHERNET CABLE TYPE. BELOW ARE EQUIVALENT WIRE COLOUR CODES.

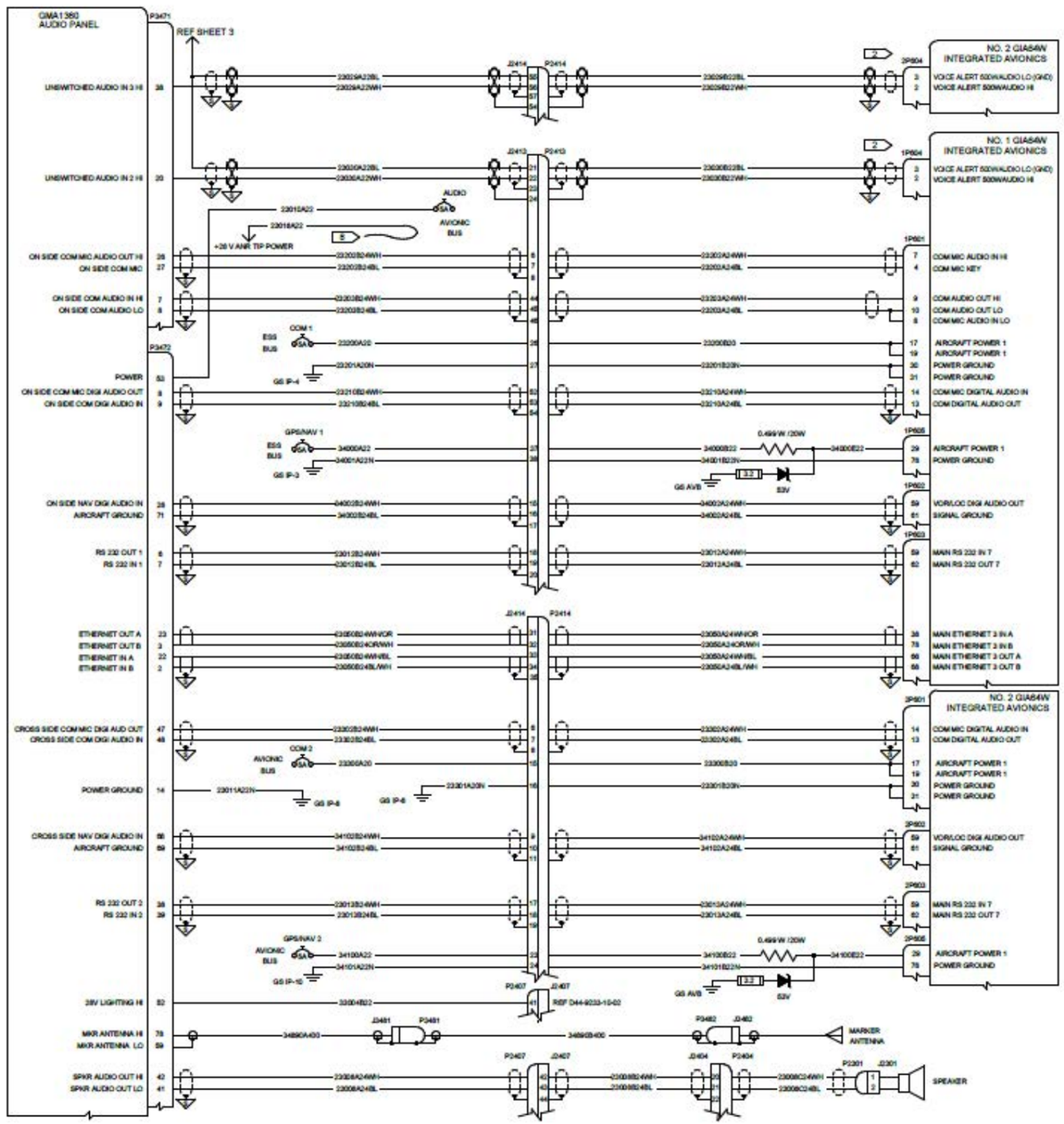
ETHERNET CABLE LEGEND	
E40424 (PIC WIRE)	392404 (CARLISLE)
WHITE	WHITE w/ORANGE STRIPE
ORANGE	ORANGE w/WHITE STRIPE
GREEN	WHITE w/BLUE STRIPE
BLUE	BLUE w/WHITE STRIPE

7. INSTALL JUMPER ONLY WHEN GTX 335 IS INSTALLED.

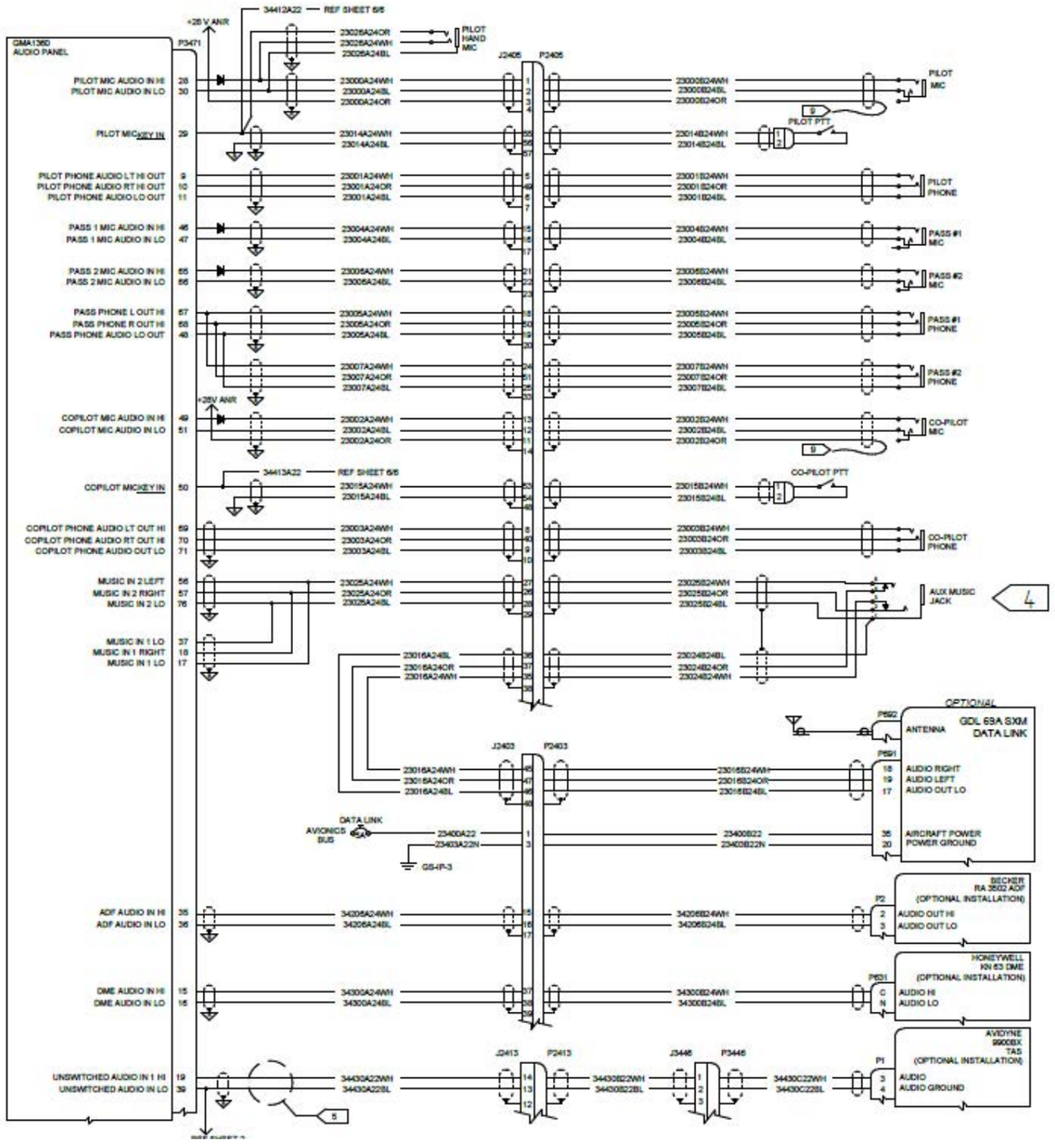
8. CONNECT TO AVIONICS AUDIO BREAKER ONLY IF OÄM 40-1020 IS INSTALLED. OTHERWISE CAP AND STOW.

9. CAPPED AND STOWED.

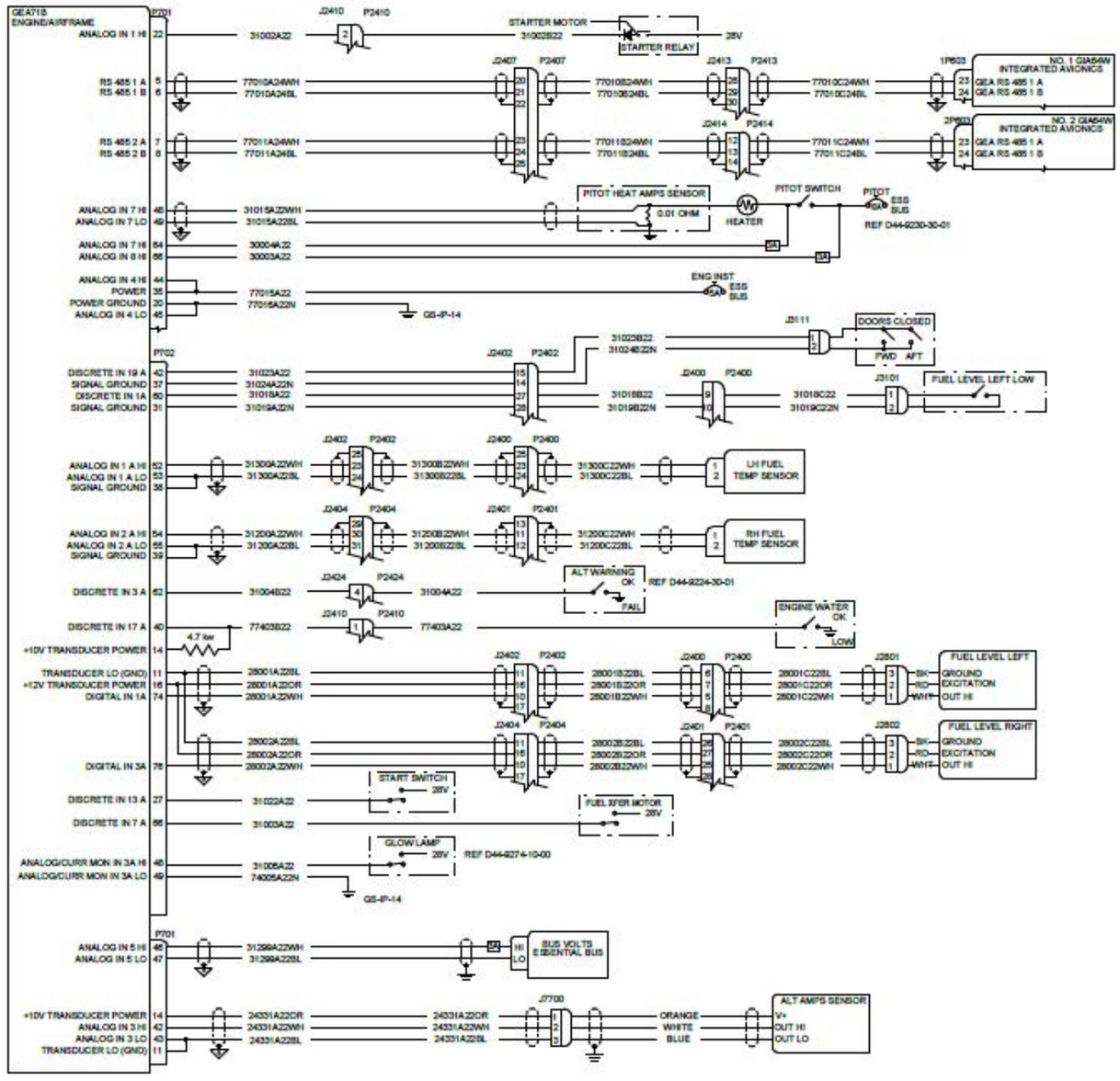
REV.	SCHEMATIC	DRAWING NO.	SHEET
–	G1000 NXi (Phase III)	D44-9231-60-03_01	1/6



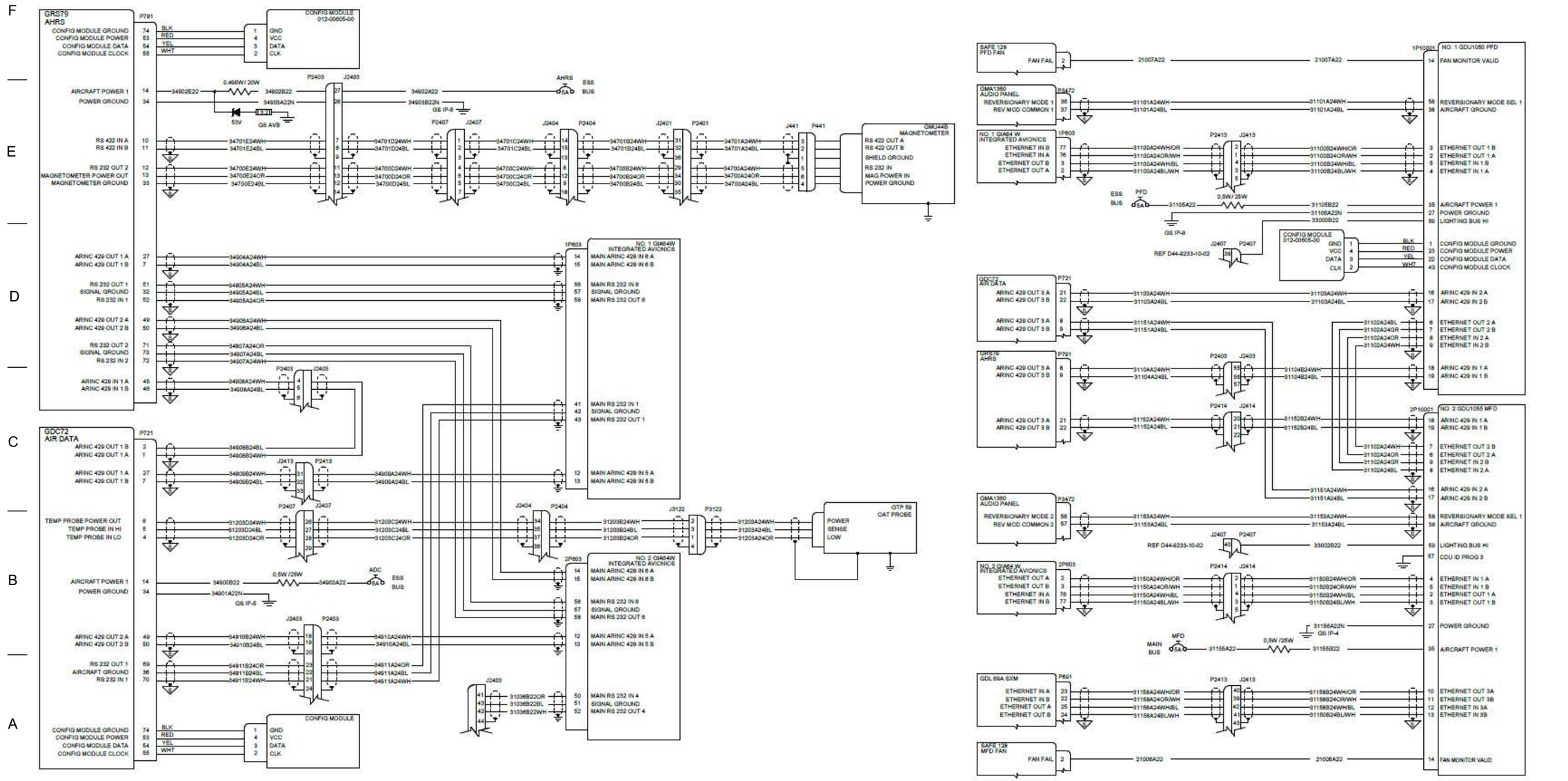
REV.	SCHEMATIC	DRAWING NO.	SHEET
–	G1000 NXi (Phase III)	D44-9231-60-03_01	2/6



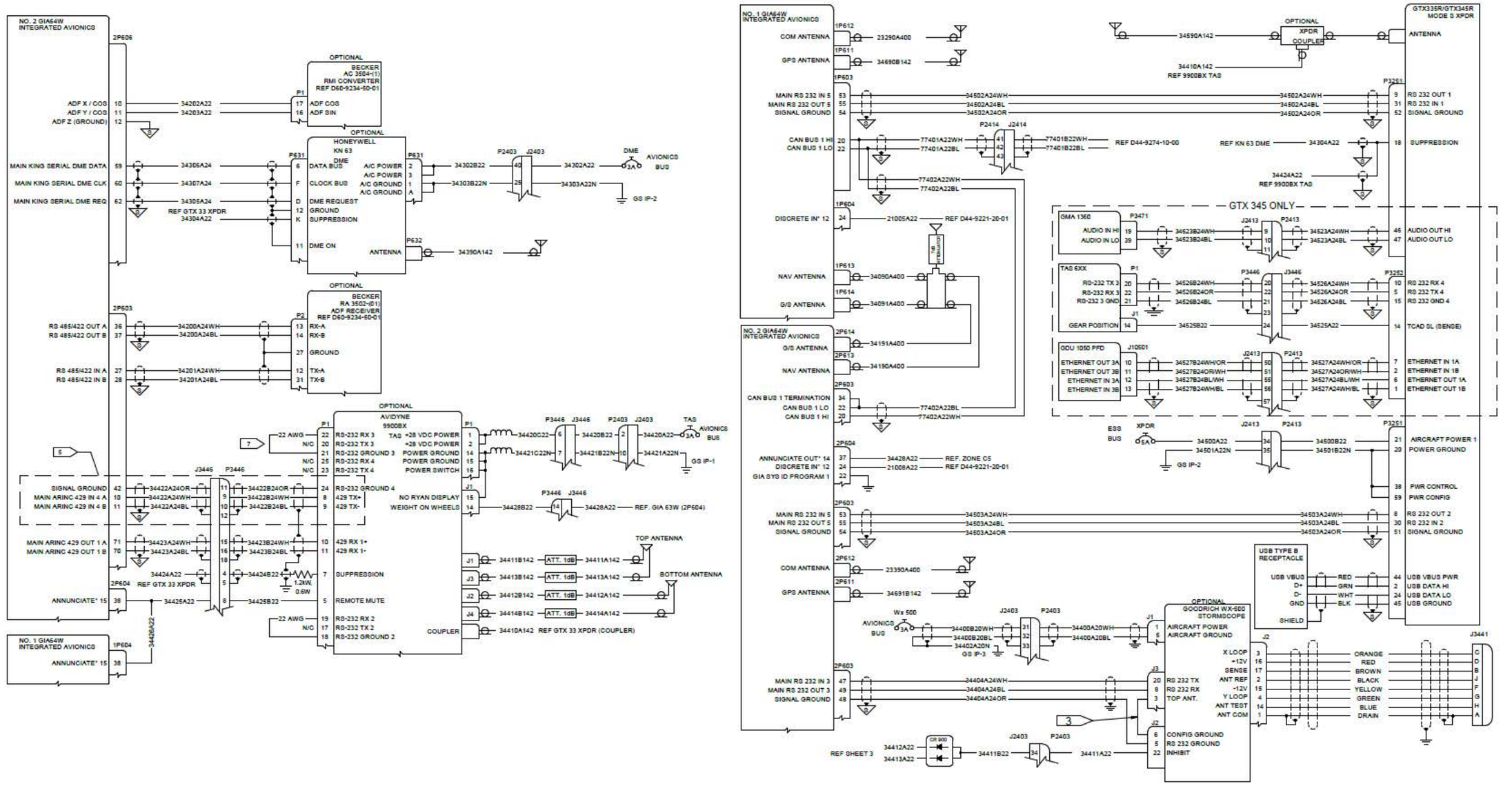
REV.	SCHEMATIC	DRAWING NO.	SHEET
–	G1000 NXi (Phase III)	D44-9231-60-03_01	3/6



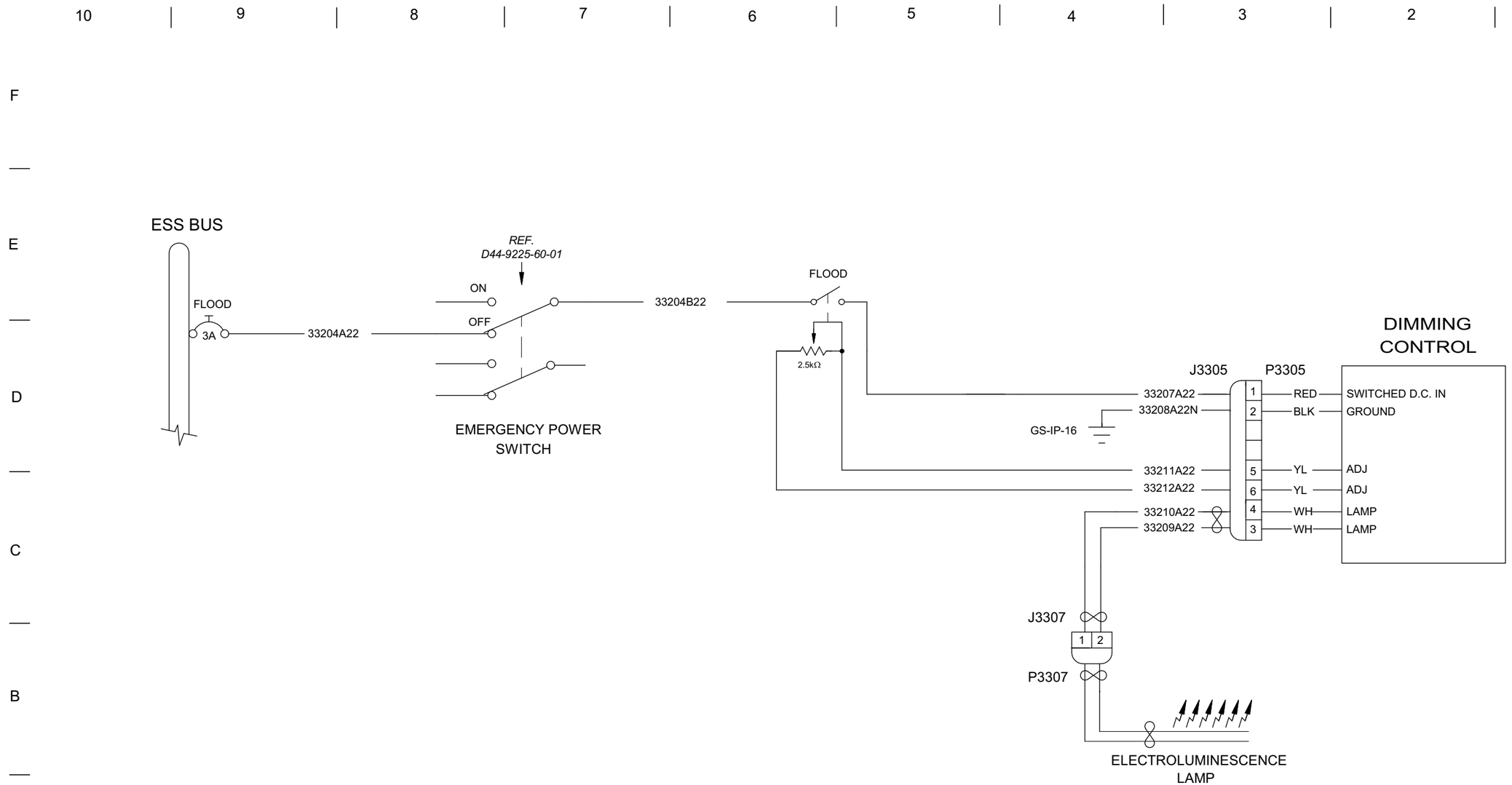
REV.	SCHEMATIC	DRAWING NO.	SHEET
–	G1000 NXi (Phase III)	D44-9231-60-03_01	4/6



REV.	SCHEMATIC	DRAWING NO.	SHEET
–	G1000 NXi (Phase III)	D44-9231-60-03_01	5/6



REV.	SCHEMATIC	DRAWING NO.	SHEET
–	G1000 NXi (Phase III)	D44-9231-60-03_01	6/6



REV.	SCHEMATIC	DRAWING NO.	SHEET
——	Flood Light Wiring	D44-9233-10-01	1/1

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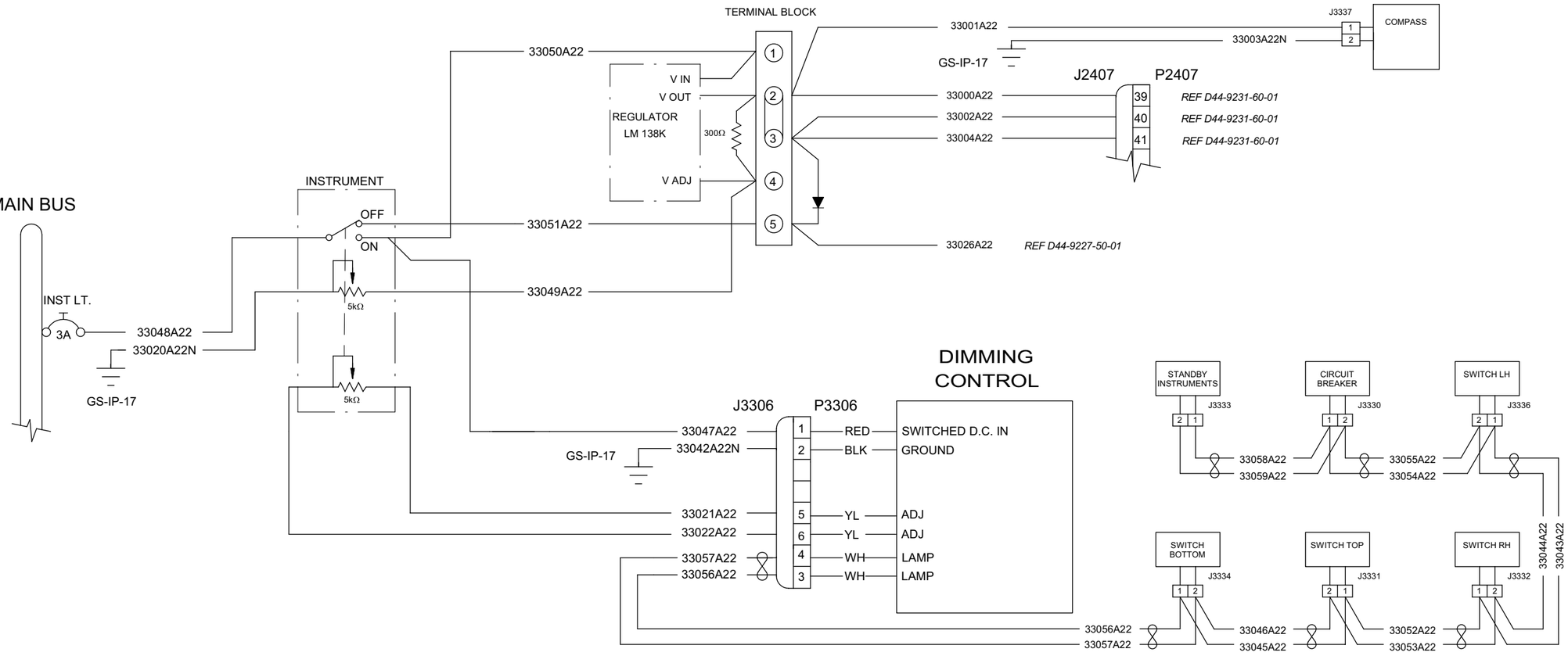
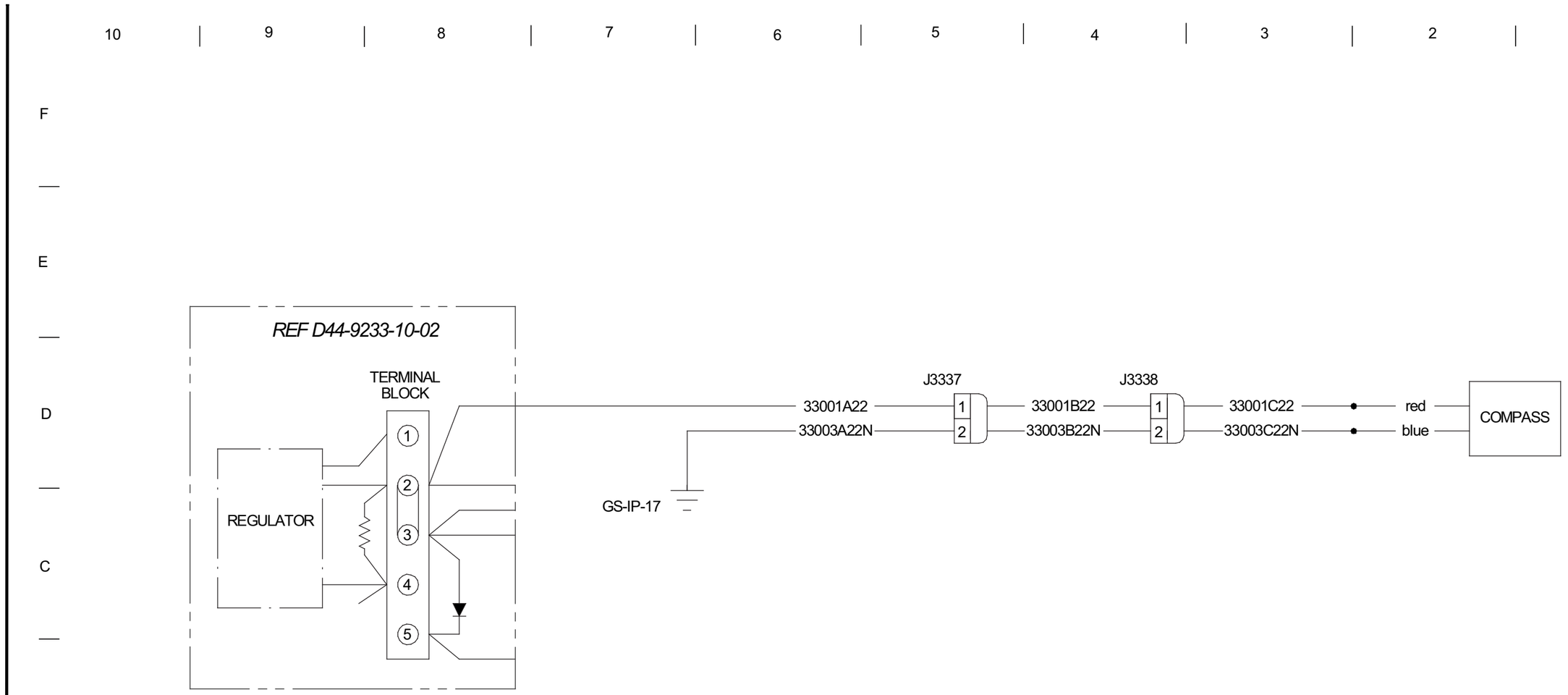
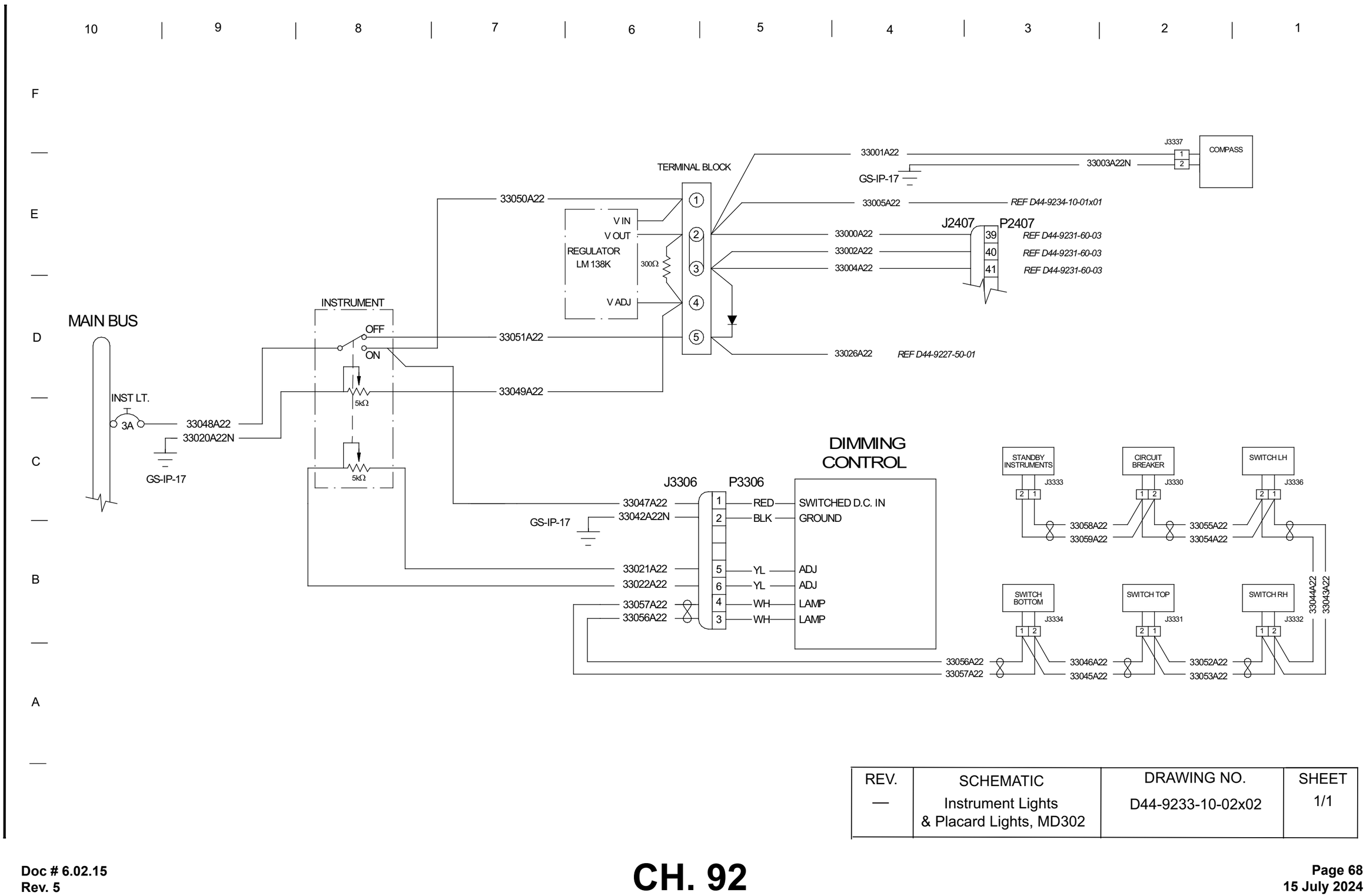


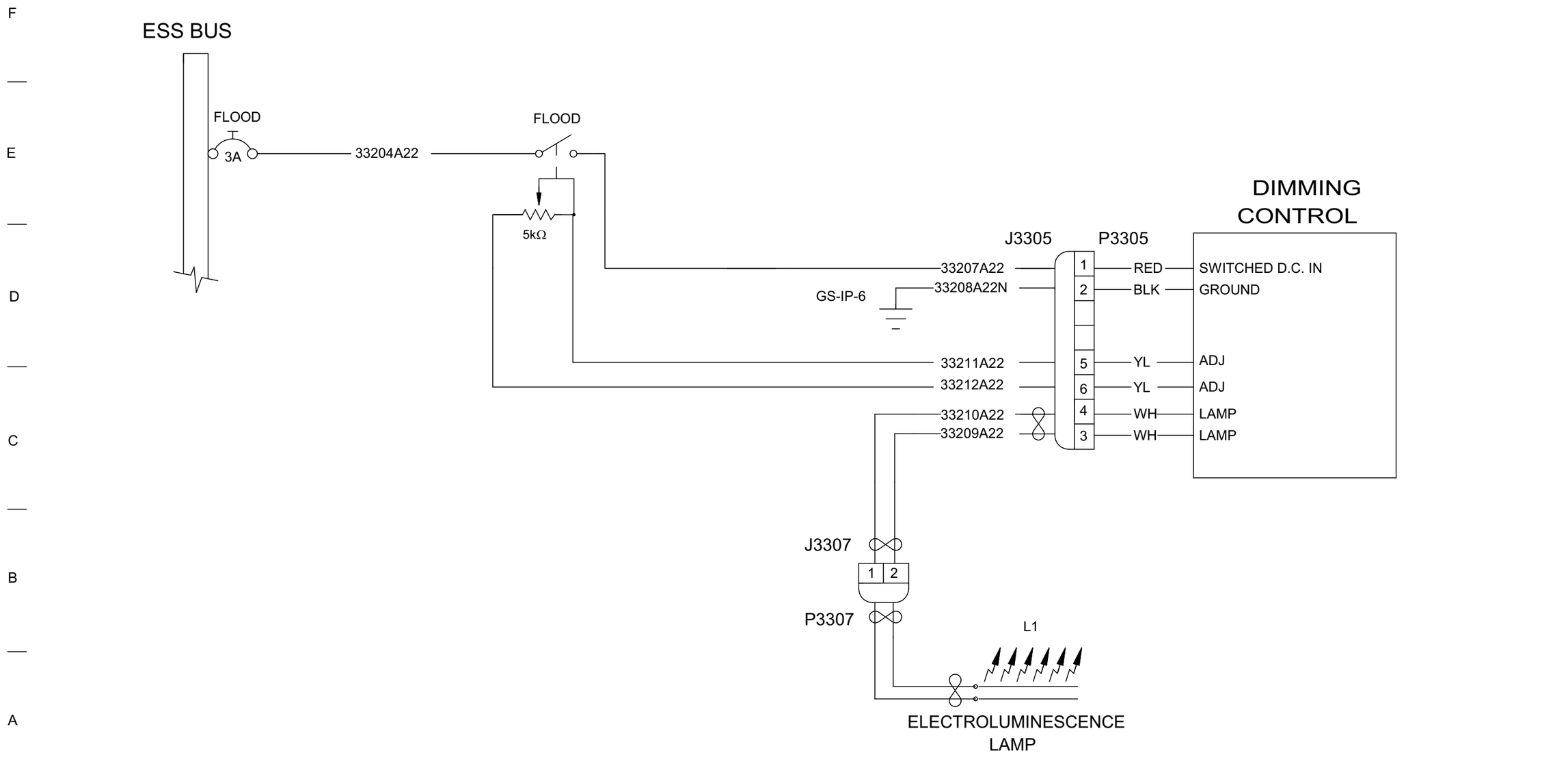
REV.	SCHEMATIC	DRAWING NO.	SHEET
——	Instrument Lights & Placards	D44-9233-10-02	1/1



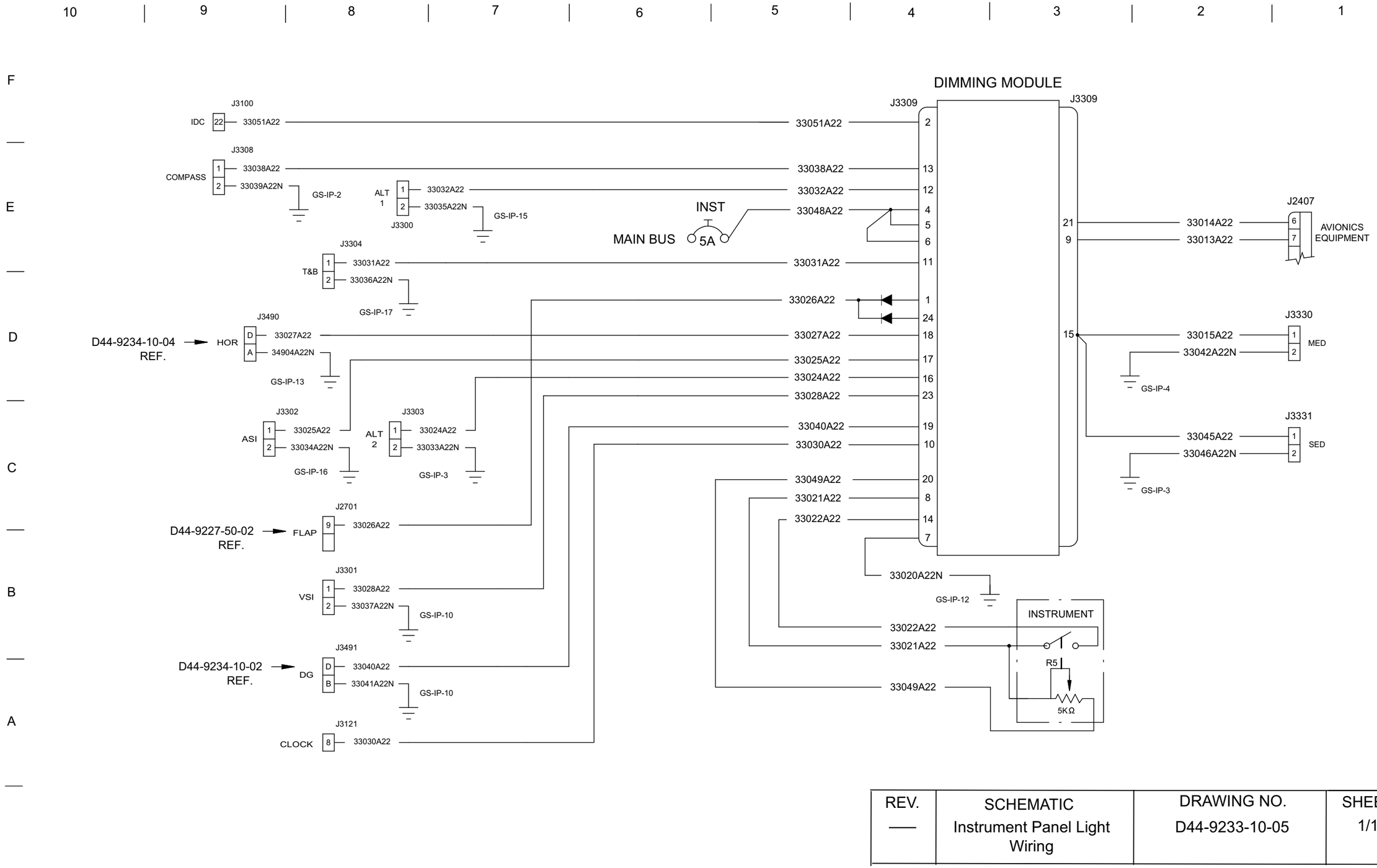
REV.	SCHEMATIC	DRAWING NO.	SHEET
—	Instrument Lights, Compass	D44-9233-10-02x01	1/1



REV.	SCHEMATIC	DRAWING NO.	SHEET
—	Instrument Lights & Placard Lights, MD302	D44-9233-10-02x02	1/1



REV.	SCHEMATIC	DRAWING NO.	SHEET
——	Instrument Flood Light Wiring	D44-9233-10-03	1/1



REV.	SCHEMATIC	DRAWING NO.	SHEET
——	Instrument Panel Light Wiring	D44-9233-10-05	1/1

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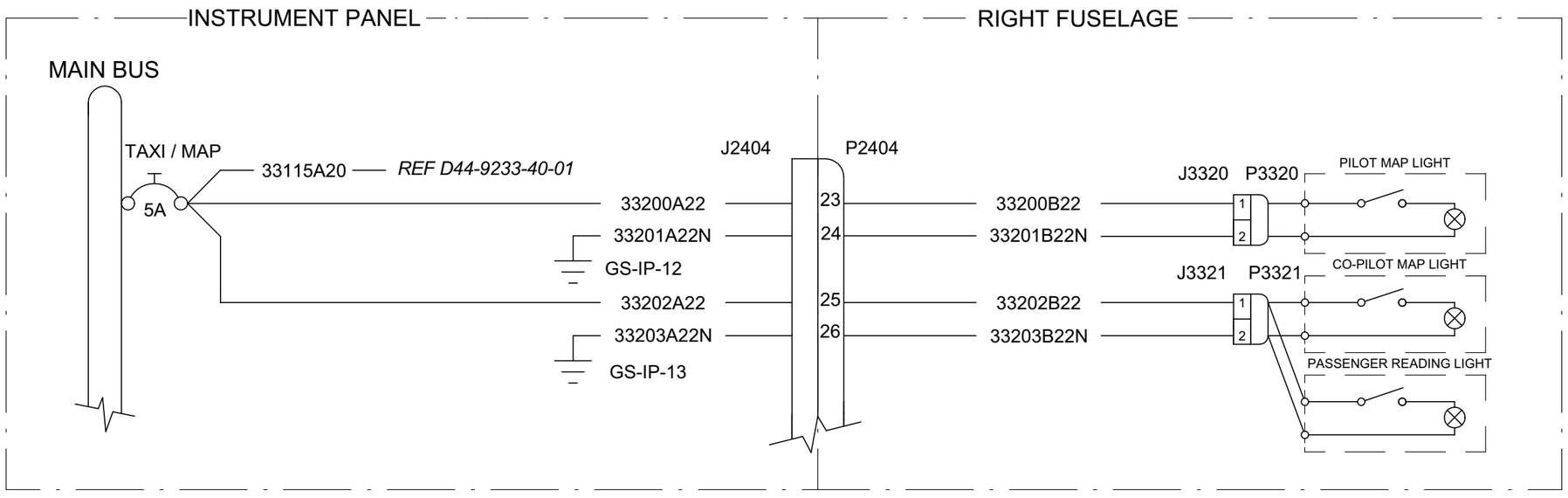

REV.	SCHEMATIC	DRAWING NO.	SHEET
—	Map/Reading Light Wiring	D44-9233-20-01	1/1

10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

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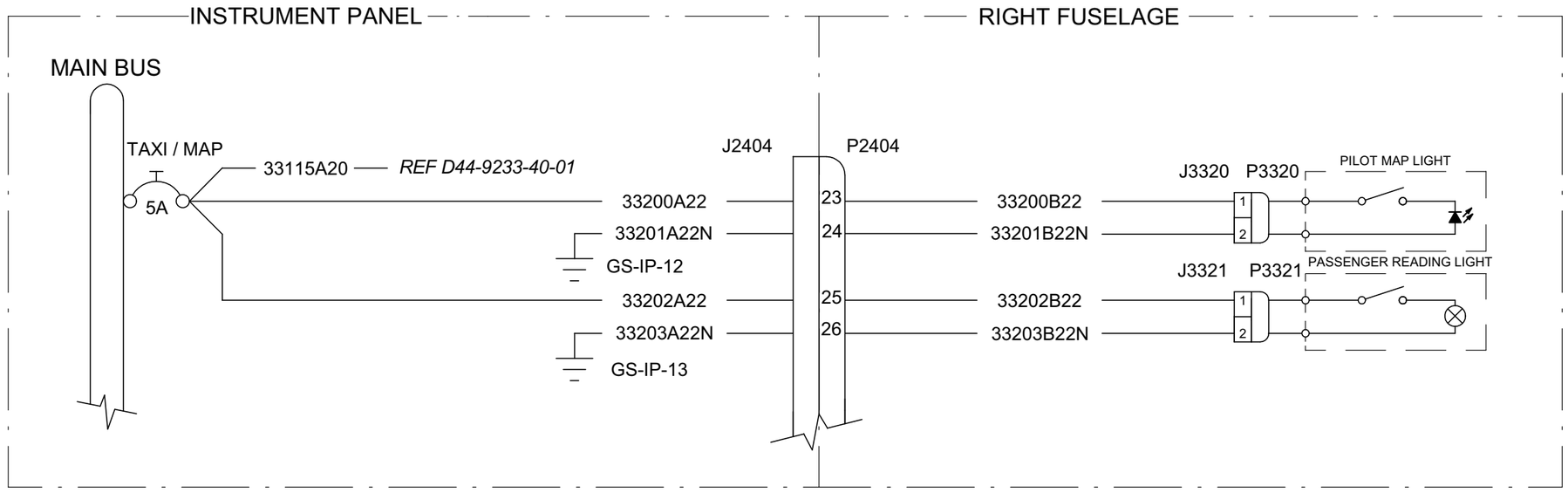
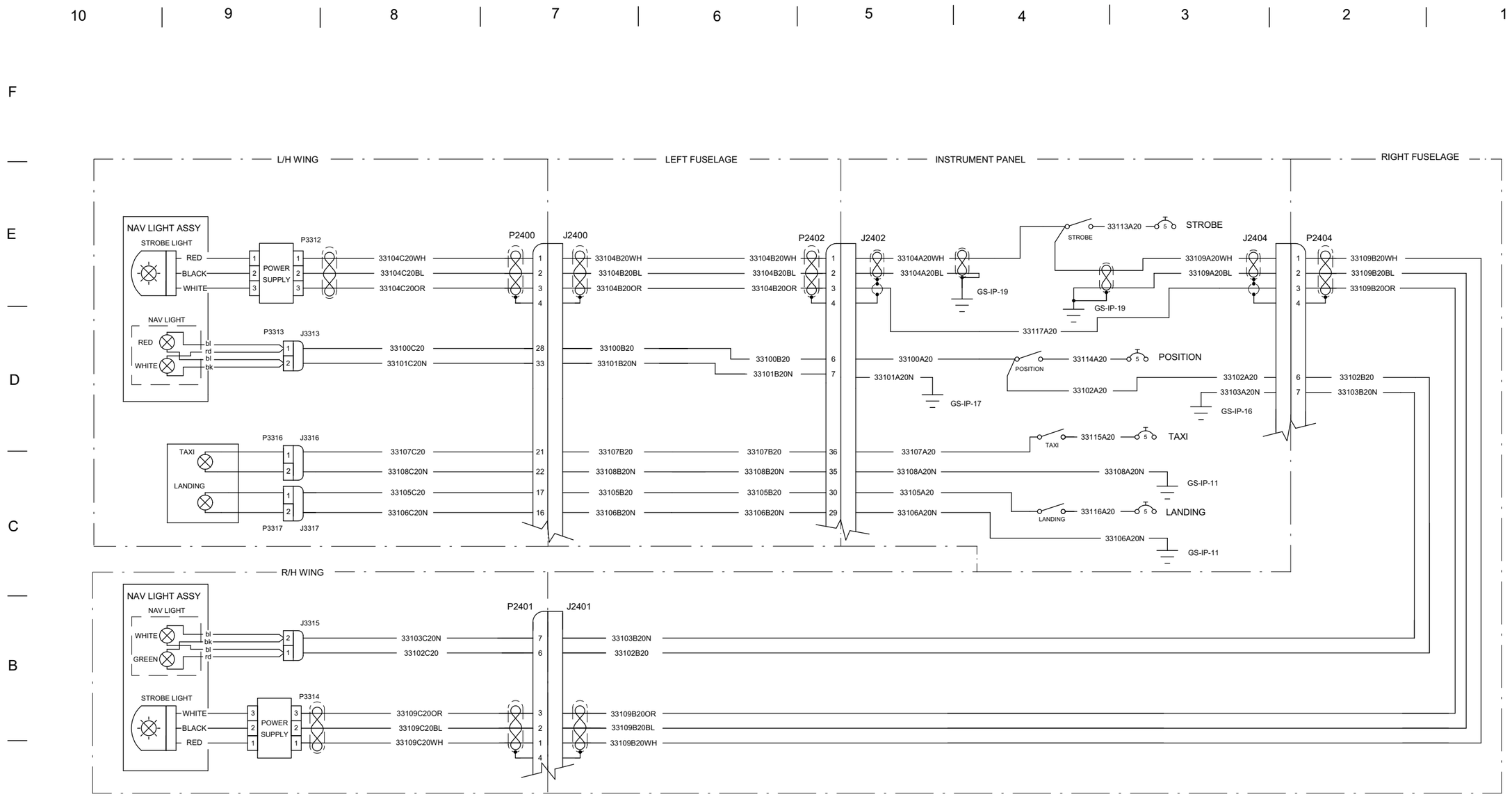
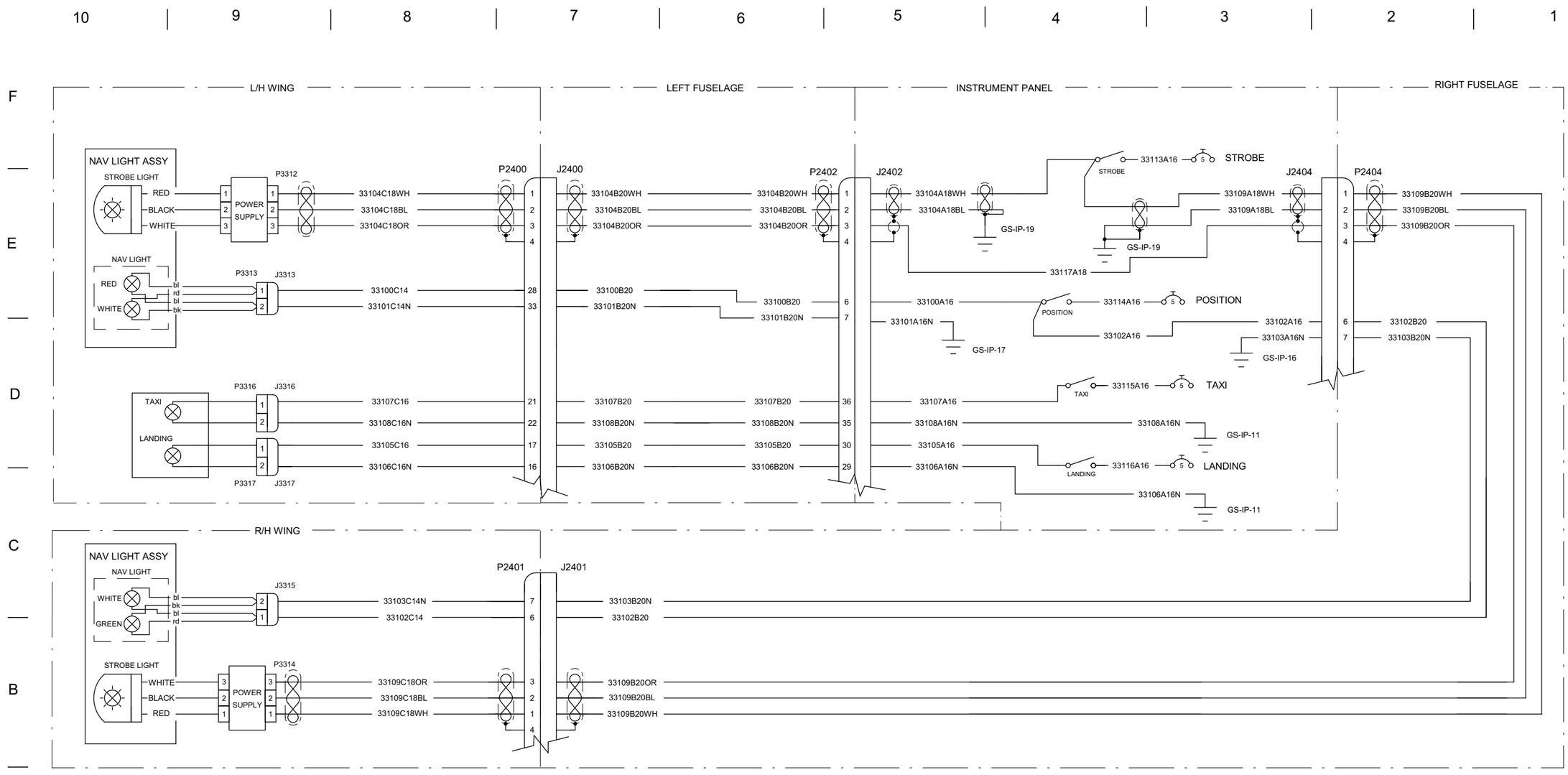


REV.	SCHEMATIC	DRAWING NO.	SHEET
—	Map/Reading Light Wiring, RACC	D44-9233-20-01x01	1/1



REV.	SCHEMATIC	DRAWING NO.	SHEET
——	Exterior Lights Wiring	D44-9233-40-01	1/1



REV.	SCHEMATIC	DRAWING NO.	SHEET
—	Exterior Lights Wiring	D44-9233-40-01x01	1/1

10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

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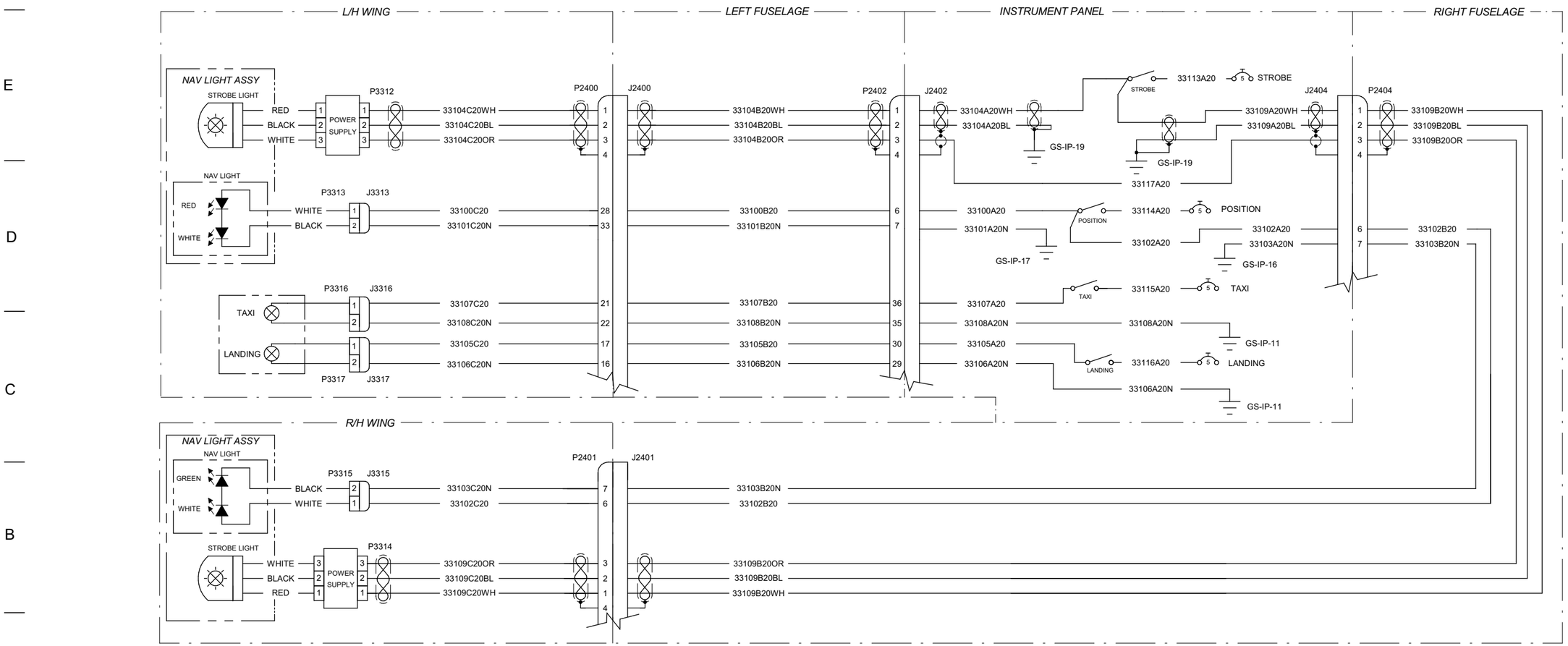

REV.	SCHEMATIC	DRAWING NO.	SHEET
——	Exterior Lights Wiring	D44-9233-40-01x02	1/1

10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

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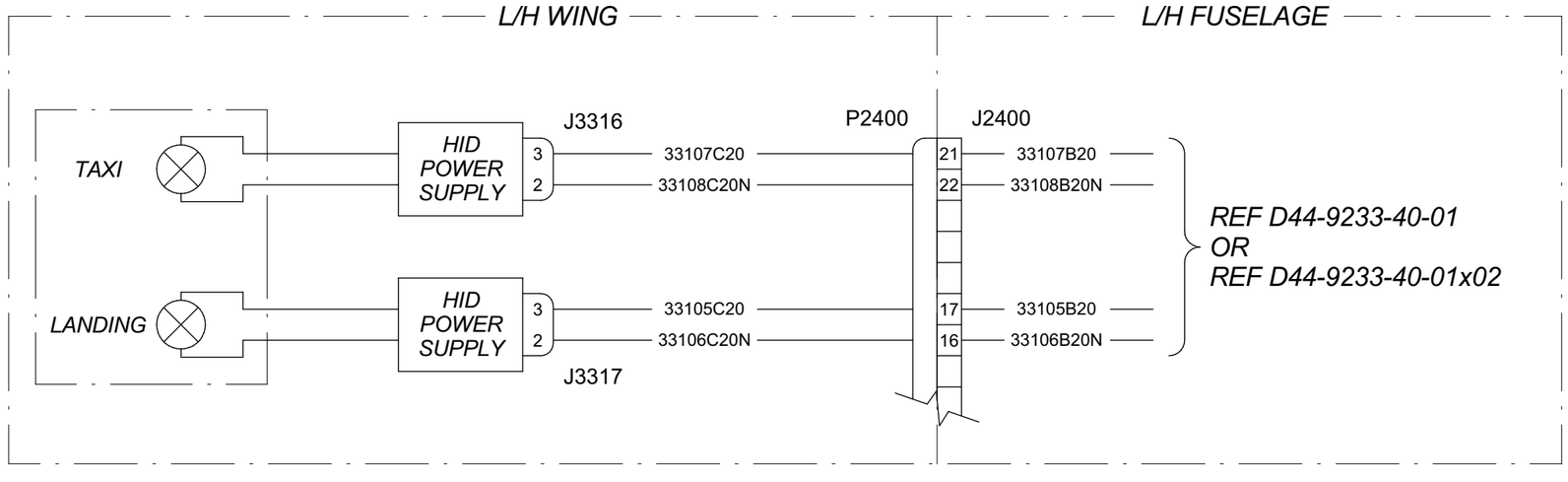

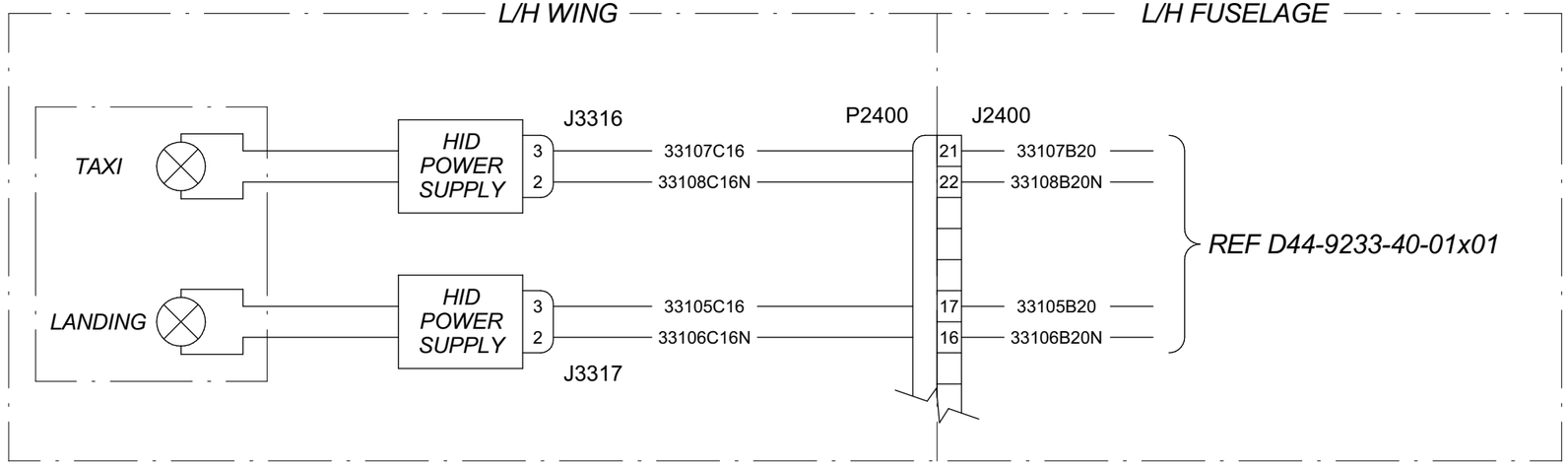

REV.	SCHEMATIC	DRAWING NO.	SHEET
——	HID Taxi & Landing Light Wiring	D44-9233-40-01x03	1/1

10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

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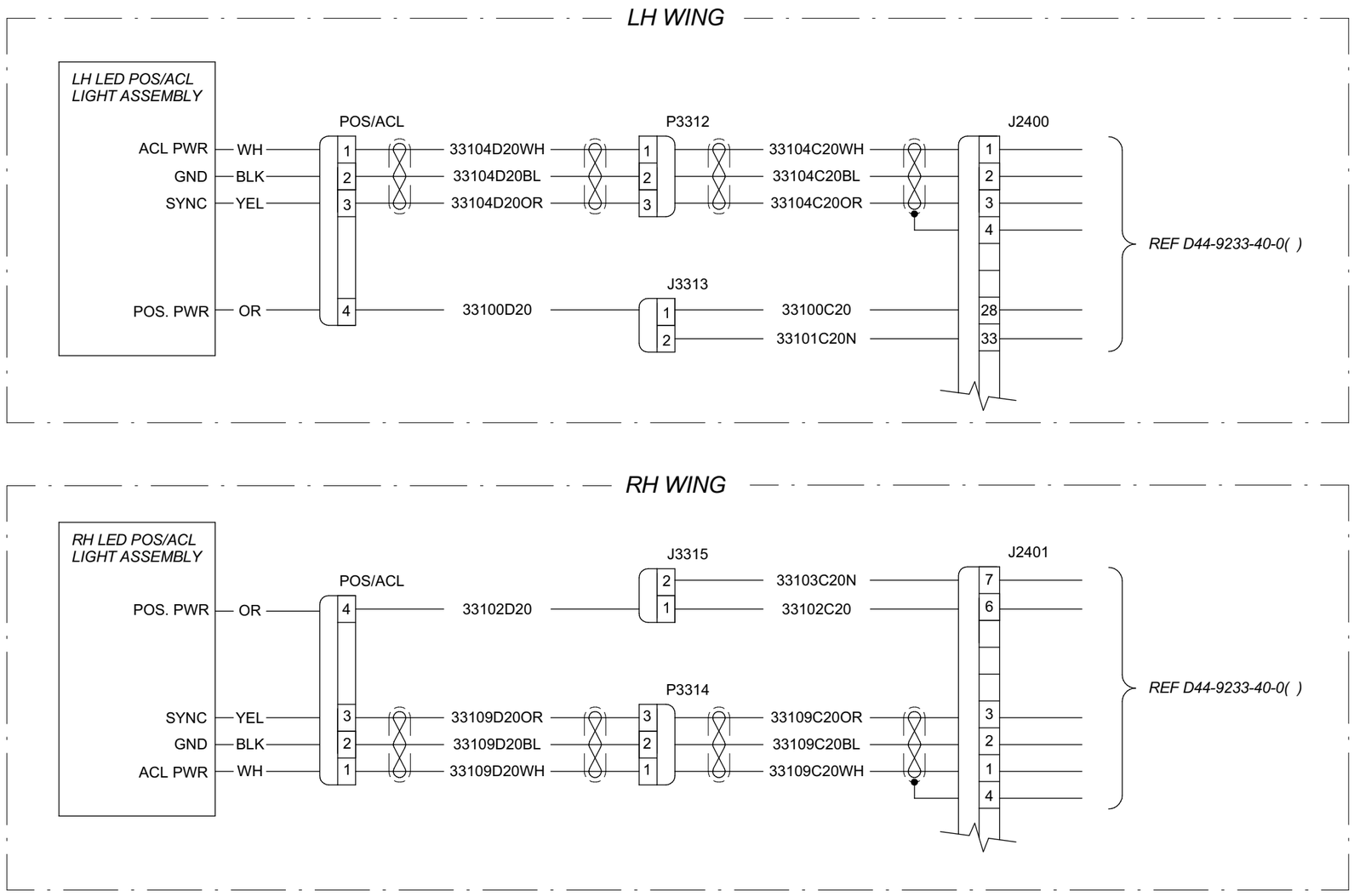
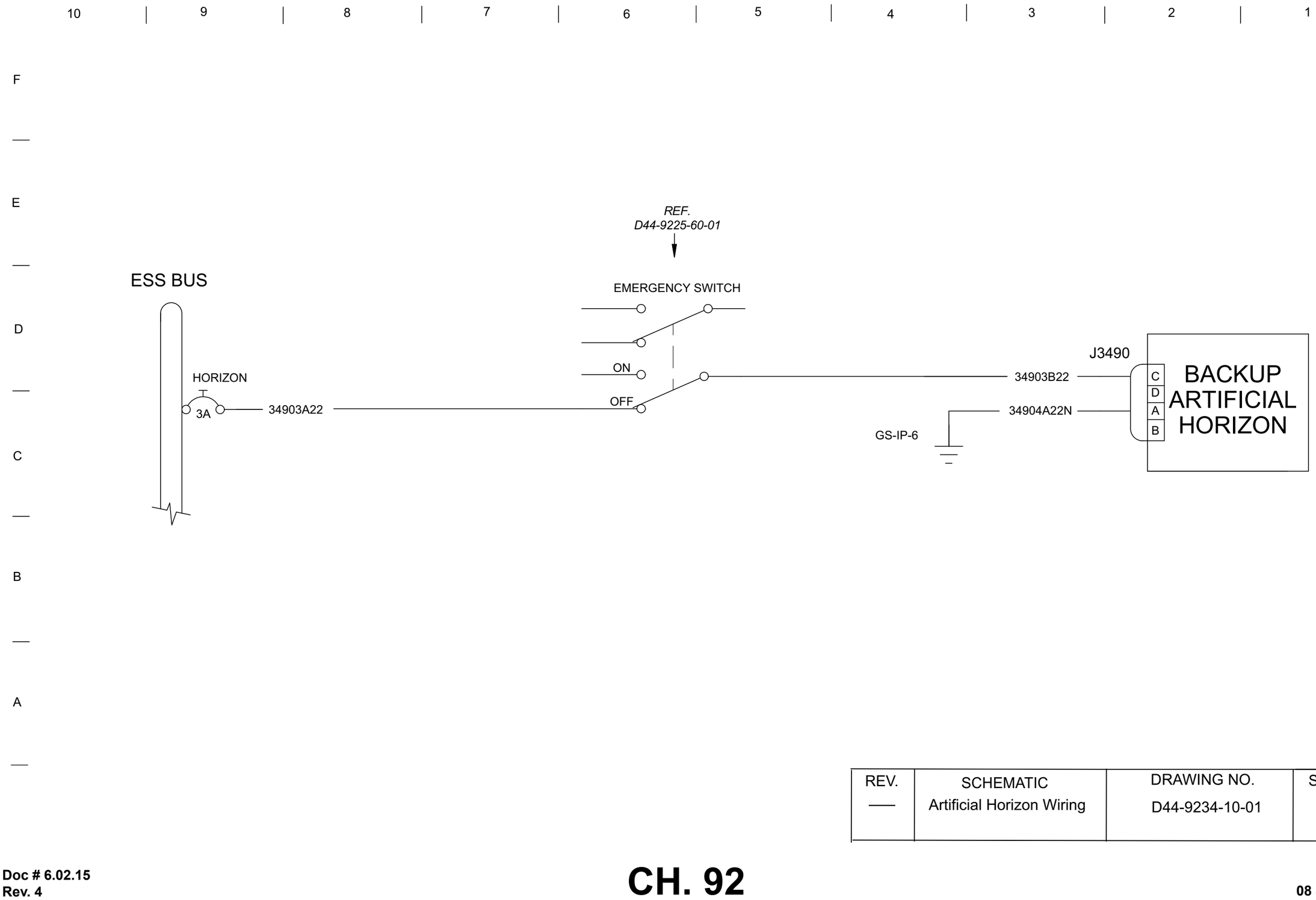
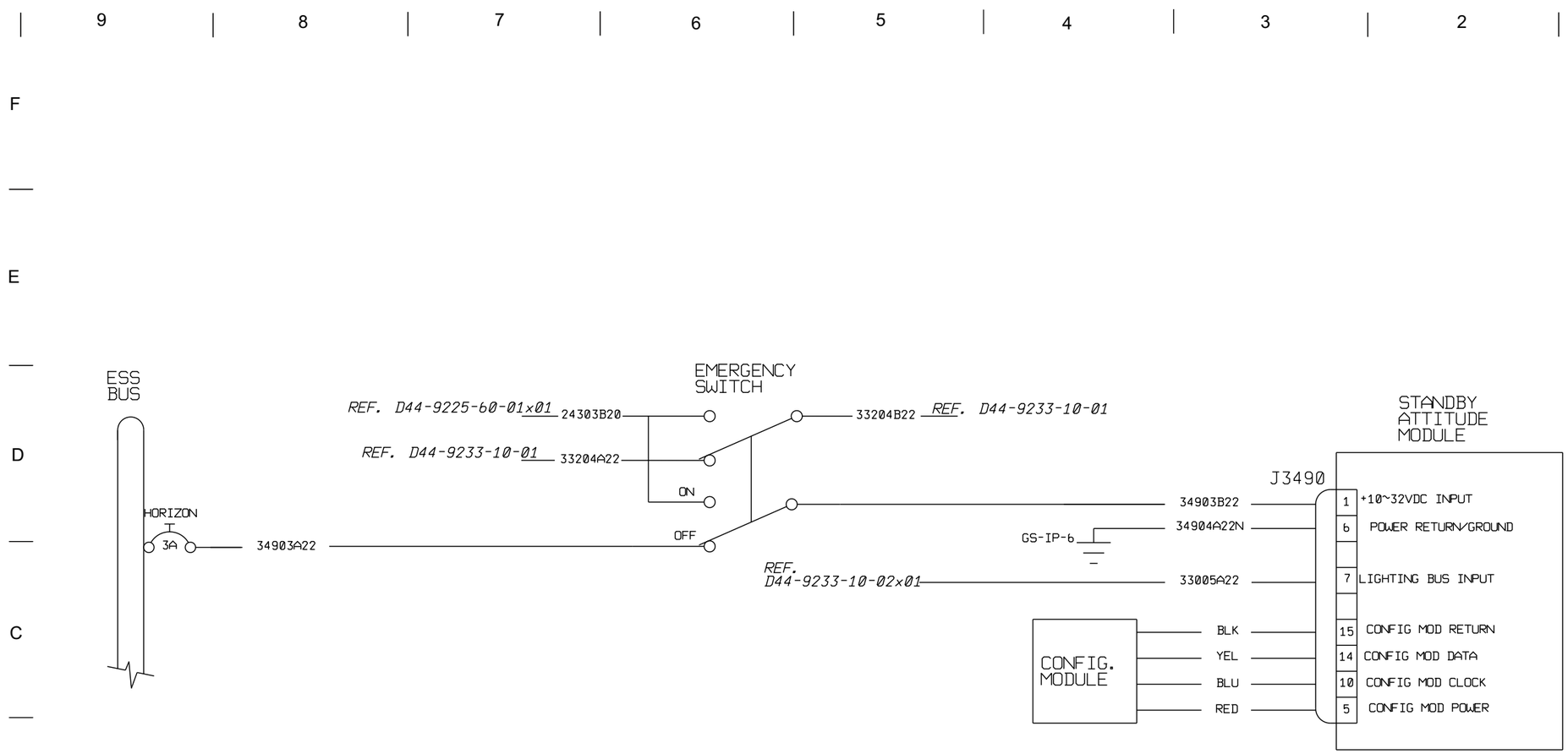


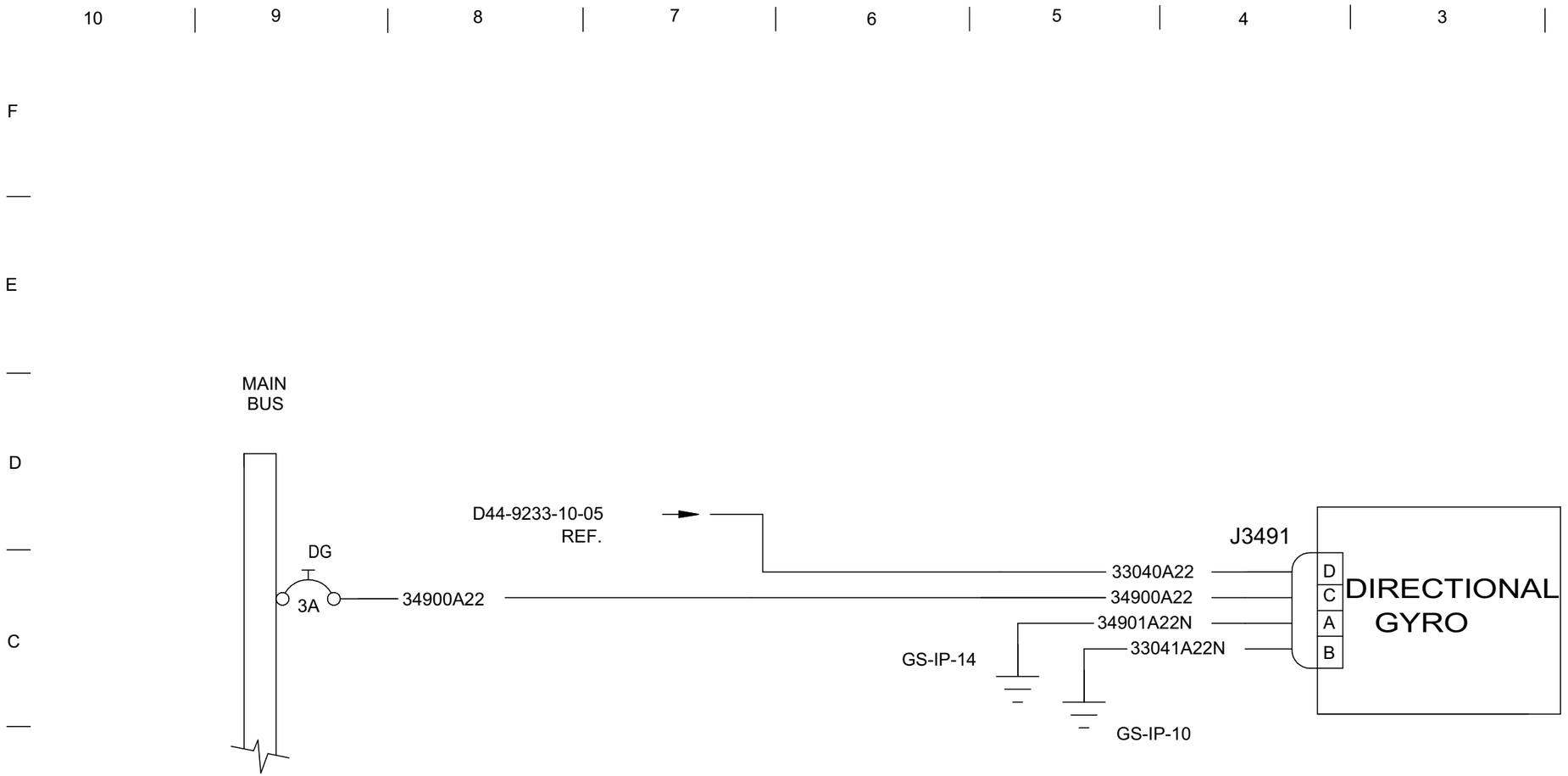
REV.	SCHEMATIC	DRAWING NO.	SHEET
——	Exterior Lights Wiring	D44-9233-40-01x04	1/1



REV.	SCHEMATIC	DRAWING NO.	SHEET
——	Artificial Horizon Wiring	D44-9234-10-01	1/1



REV.	SCHEMATIC	DRAWING NO.	SHEET
—	Standby Attitude Module MD302 Wiring	D44-9234-10-01X01	1/1



REV.	SCHEMATIC	DRAWING NO.	SHEET
——	Directional Gyro	D44-9234-10-02	1/1

10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

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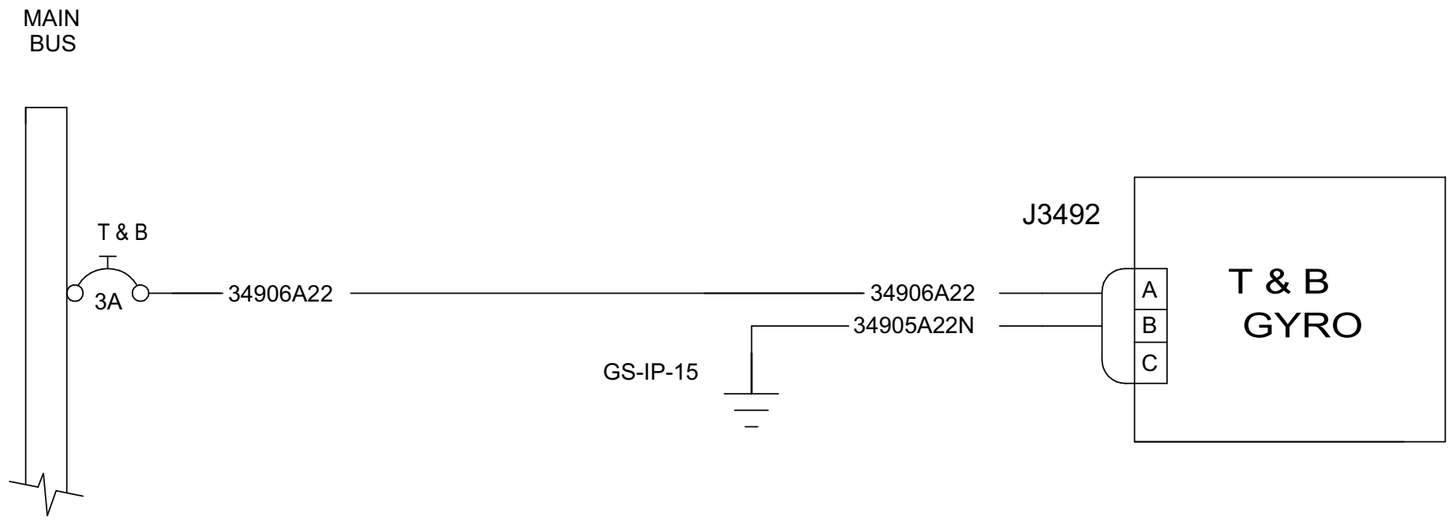

REV.	SCHEMATIC	DRAWING NO.	SHEET
——	Turn and Bank	D44-9234-10-03	1/1

10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

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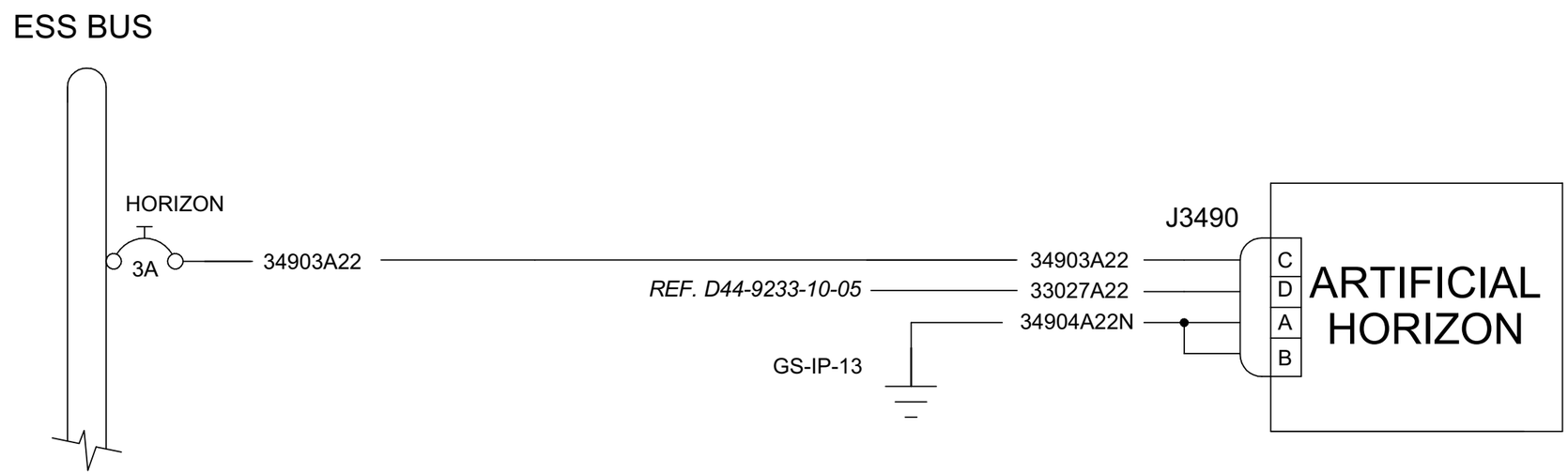
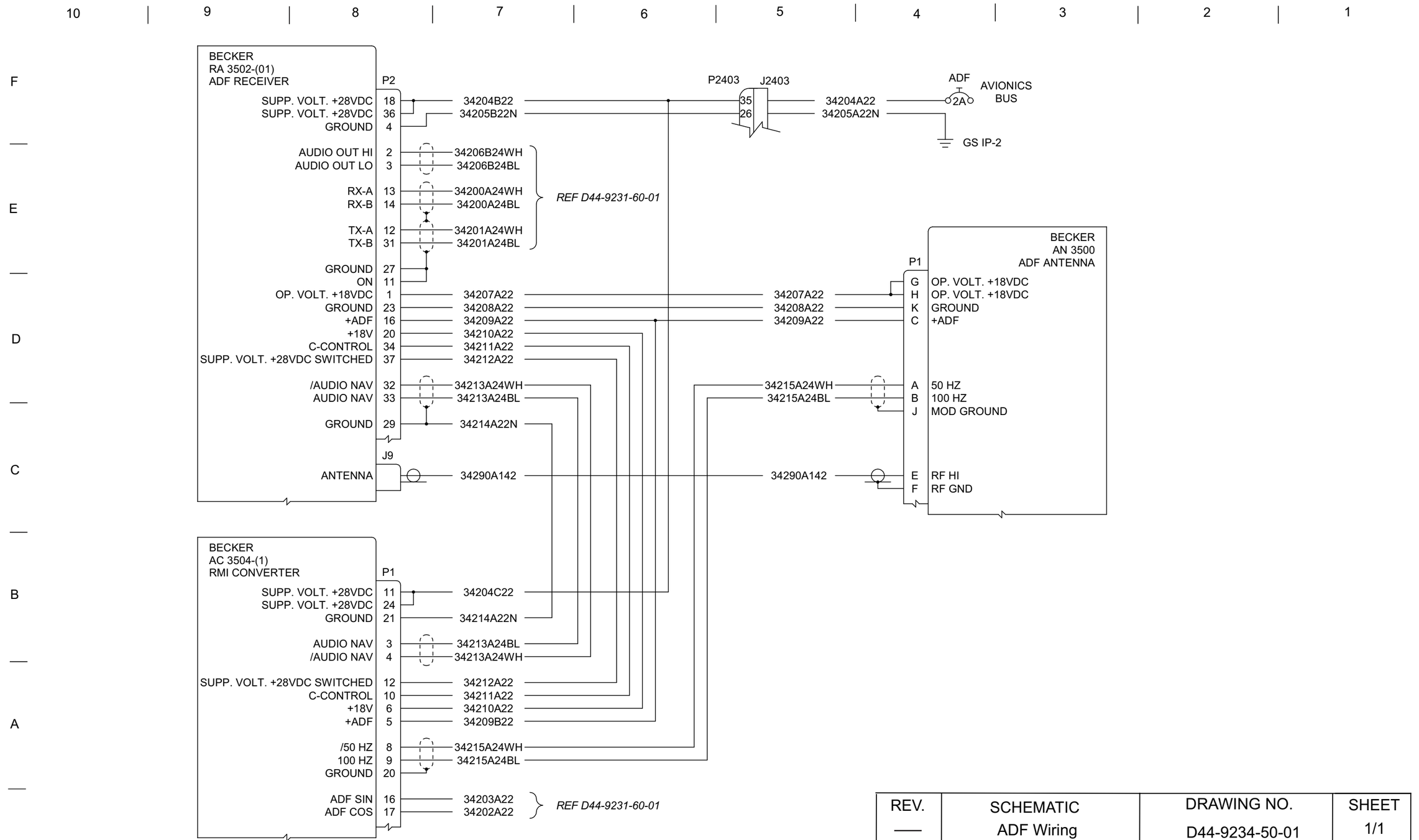
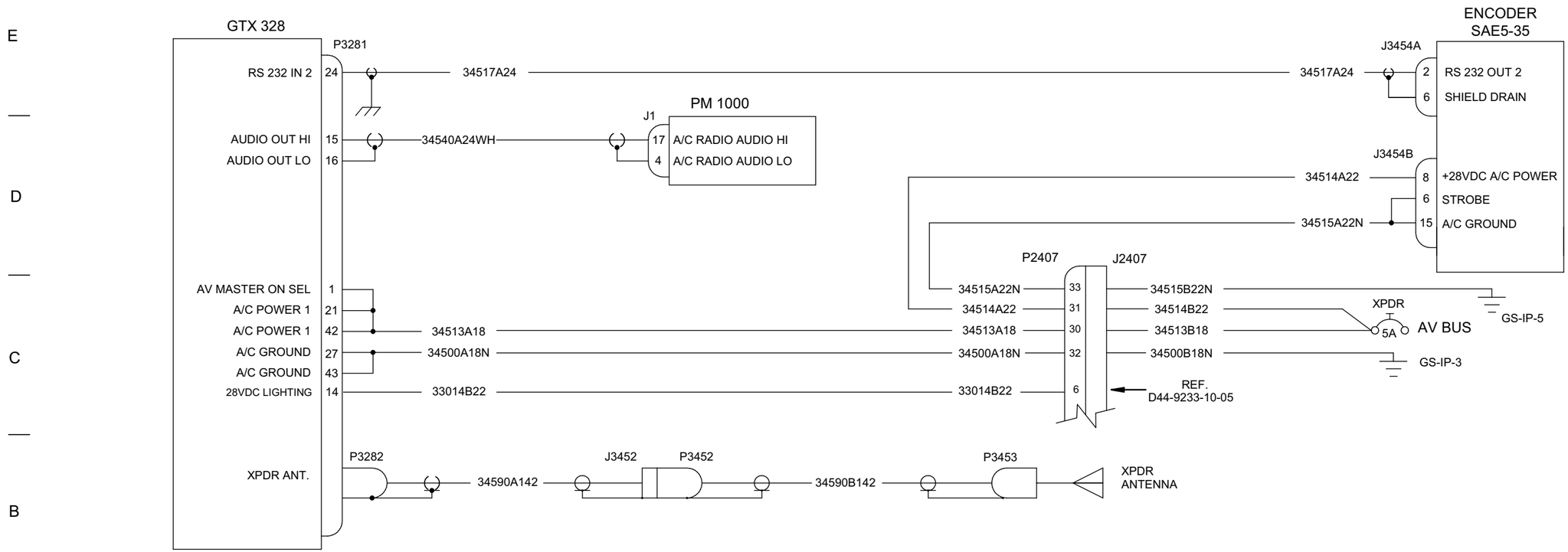


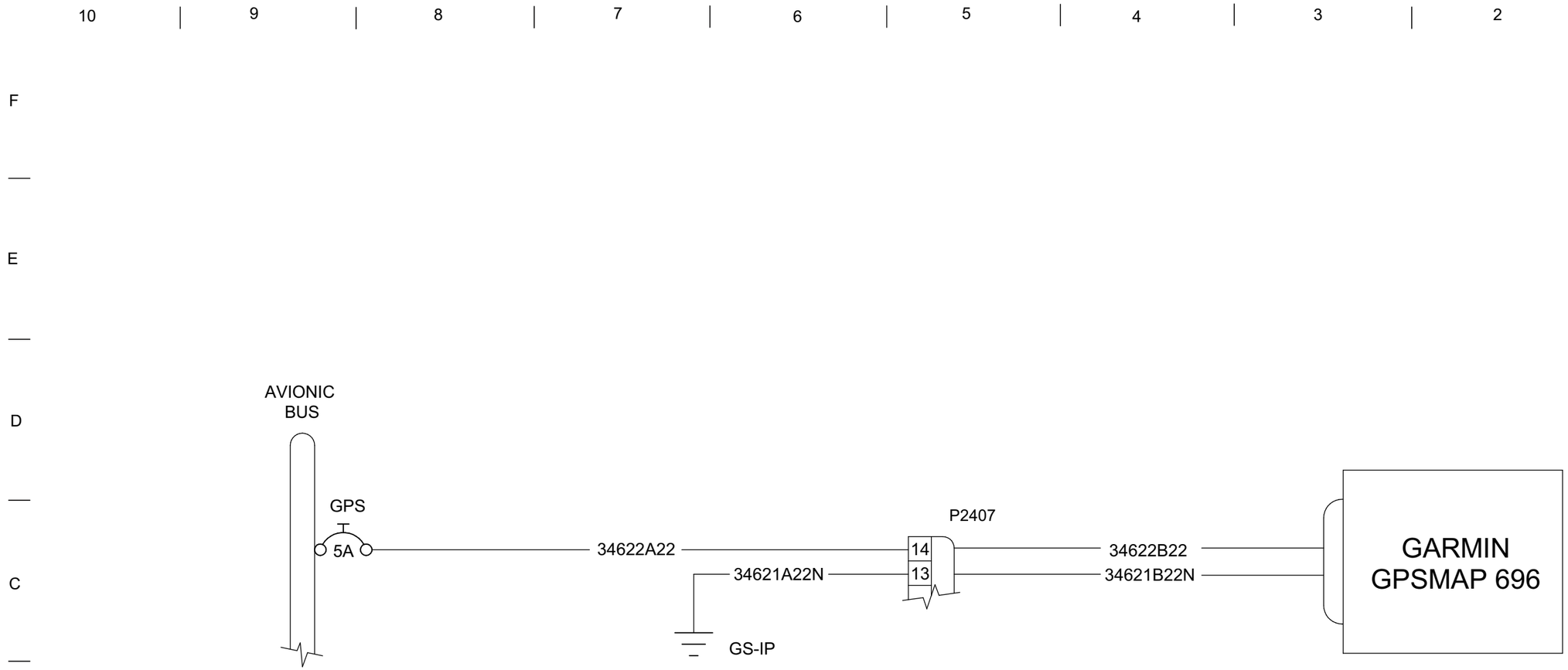
REV.	SCHEMATIC	DRAWING NO.	SHEET
—	Artificial Horizon	D44-9234-10-04	1/1



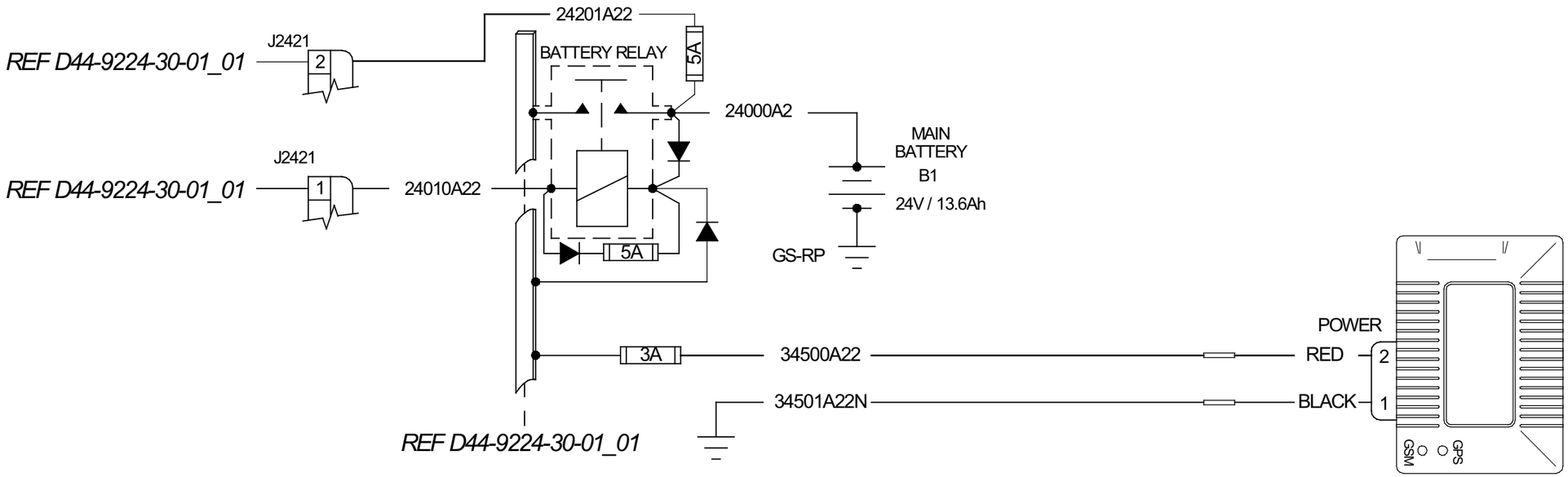
REV.	SCHEMATIC	DRAWING NO.	SHEET
——	ADF Wiring	D44-9234-50-01	1/1



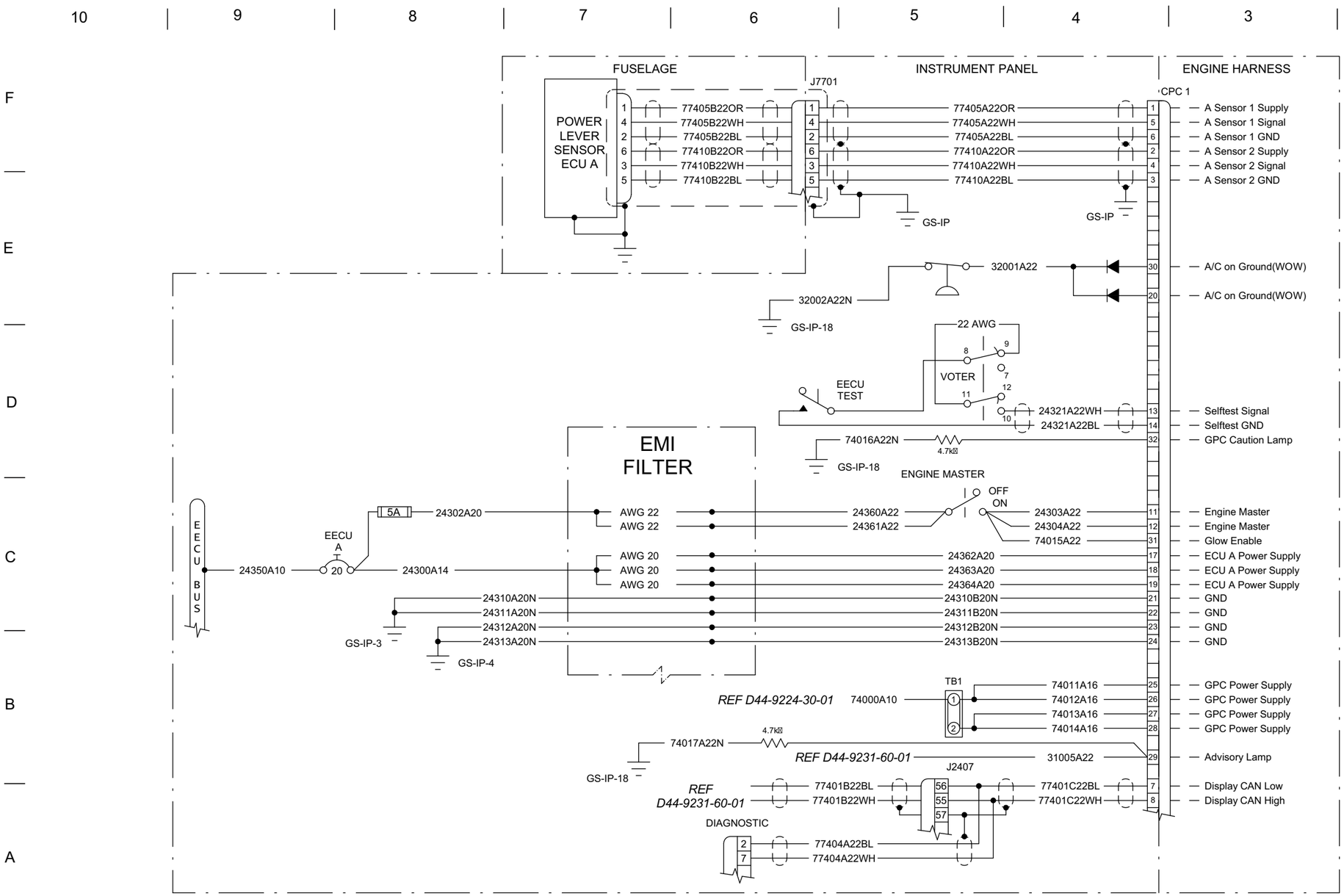
REV.	SCHEMATIC	DRAWING NO.	SHEET
—	GTX 328	D44-9234-50-02	1/1



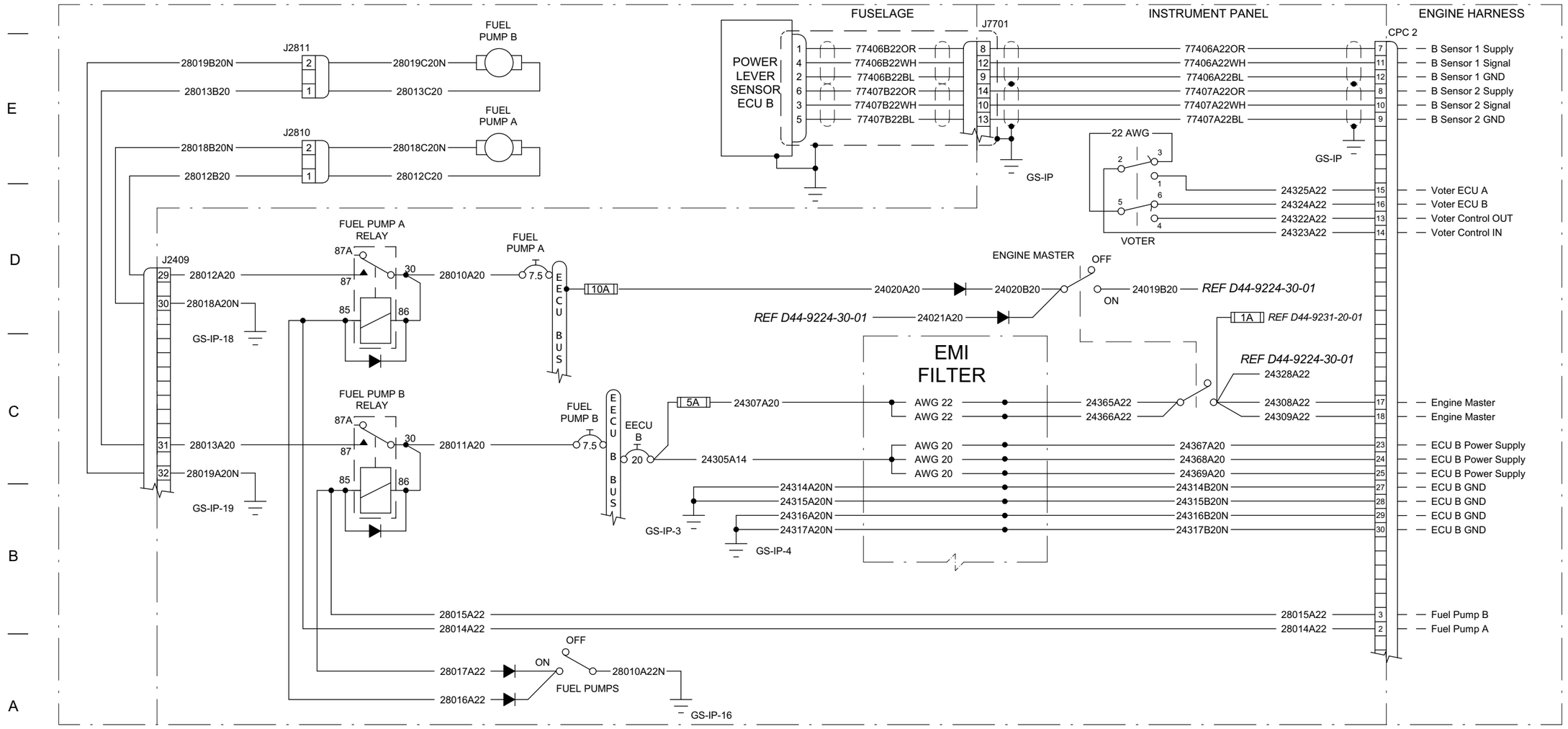
REV.	SCHEMATIC	DRAWING NO.	SHEET
——	GPSMAP Wiring	D44-9234-50-08	1/1



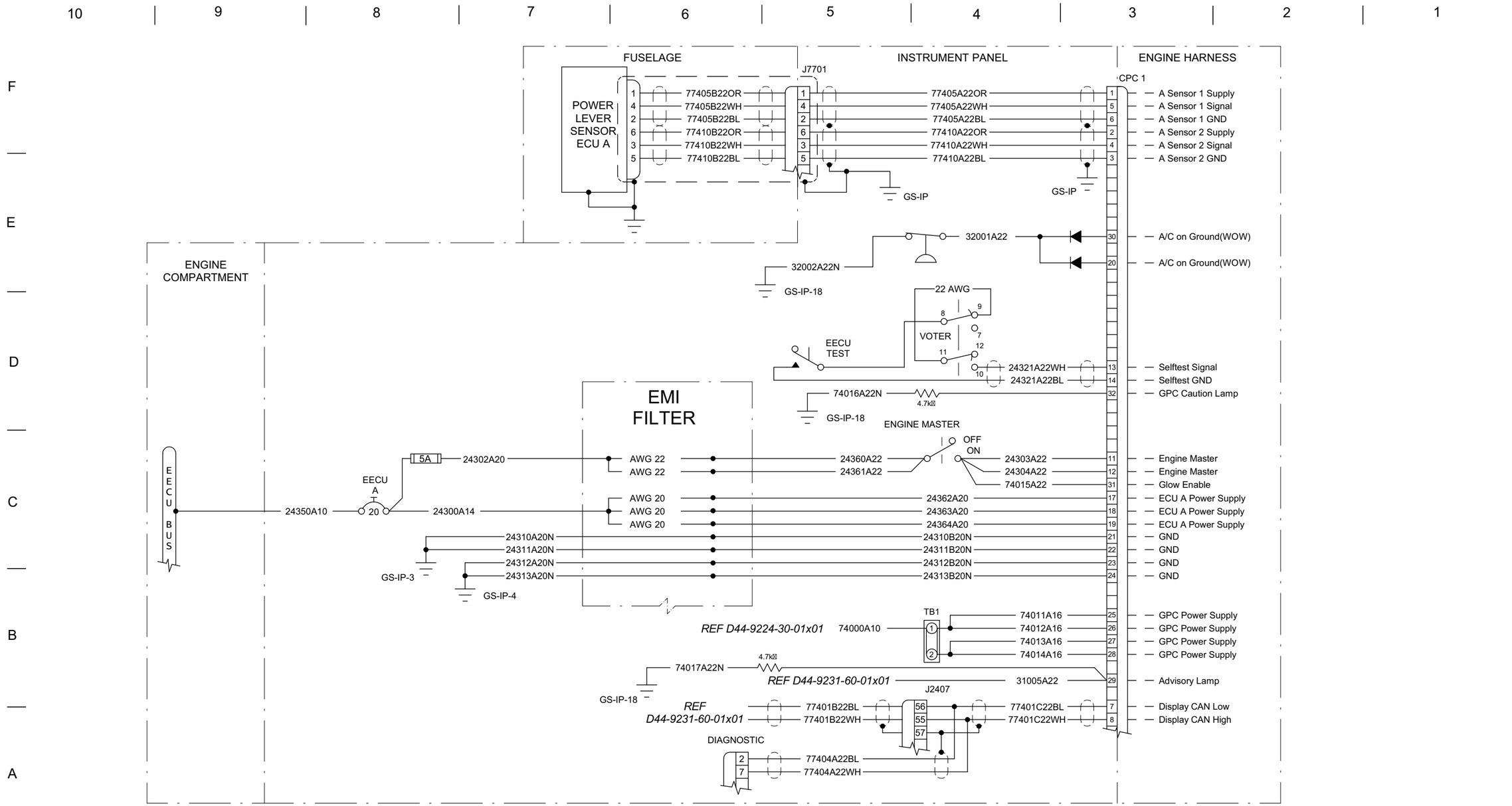
REV.	SCHEMATIC	DRAWING NO.	SHEET
—	IMT.14 GPS Tracker	D44-9234-60-01	1/1



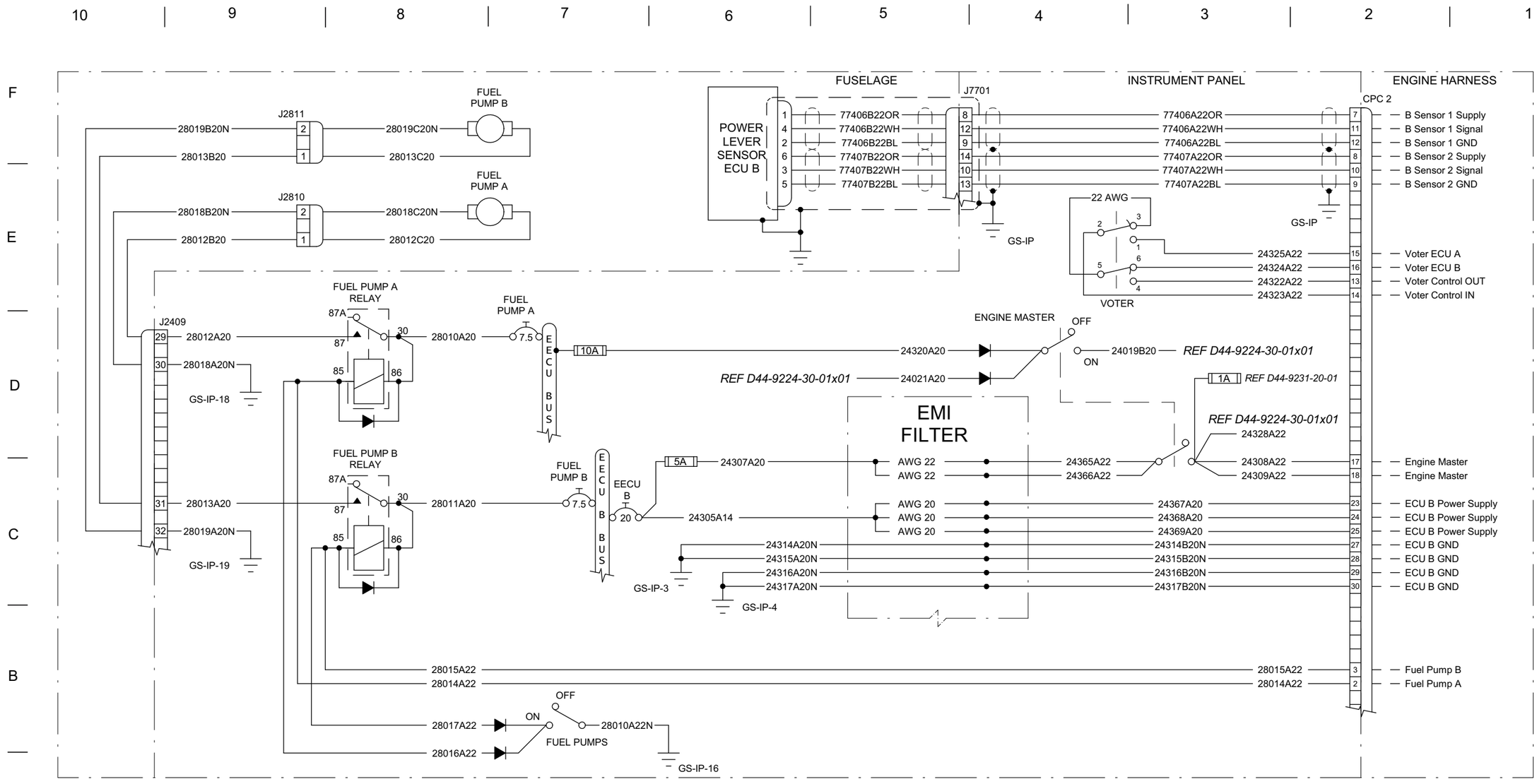
REV.	SCHEMATIC	DRAWING NO.	SHEET
D	EECU Wiring	D44-9274-10-00	1/2



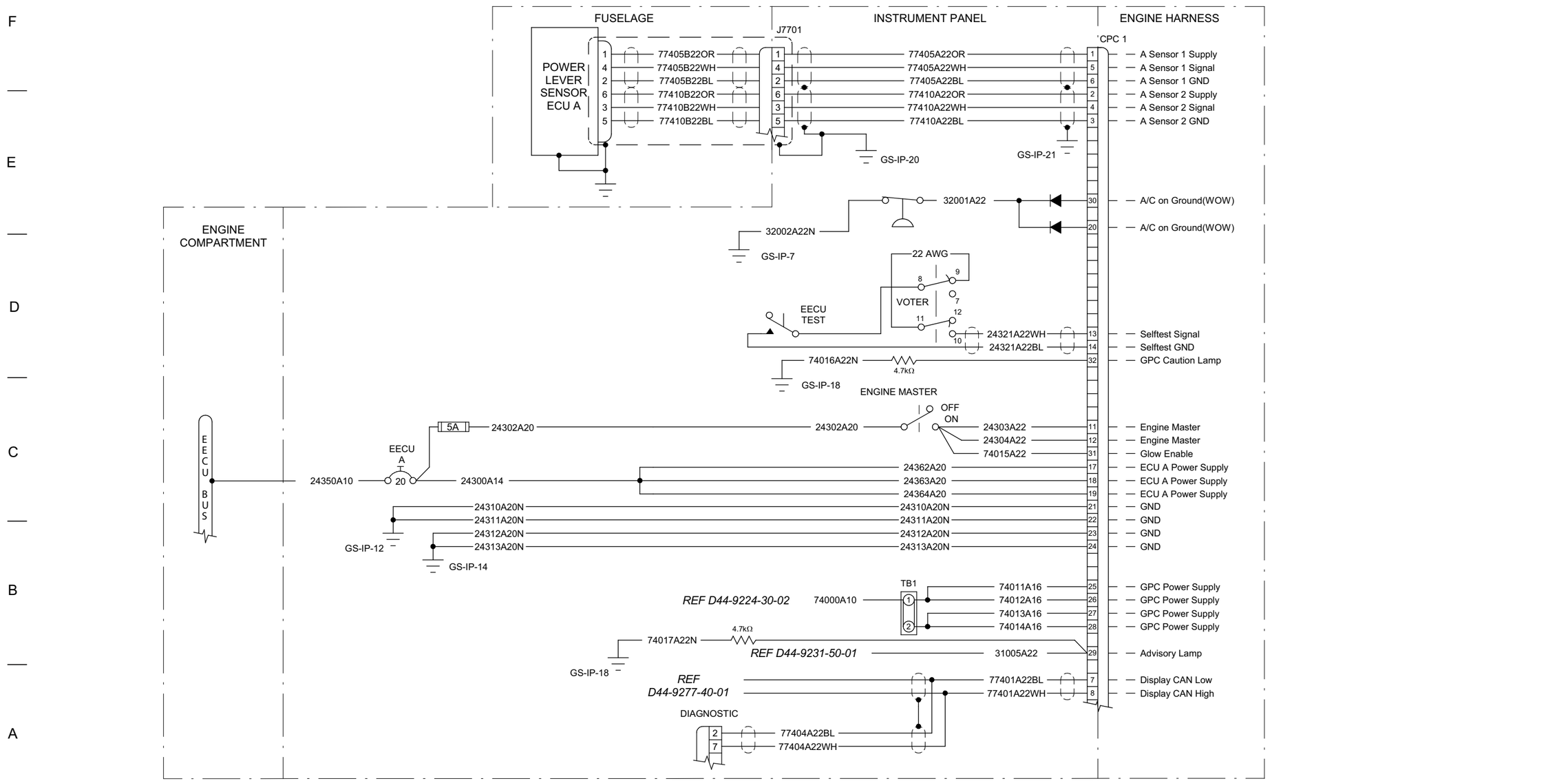
REV.	SCHEMATIC	DRAWING NO.	SHEET
D	EECU Wiring	D44-9274-10-00	2/2



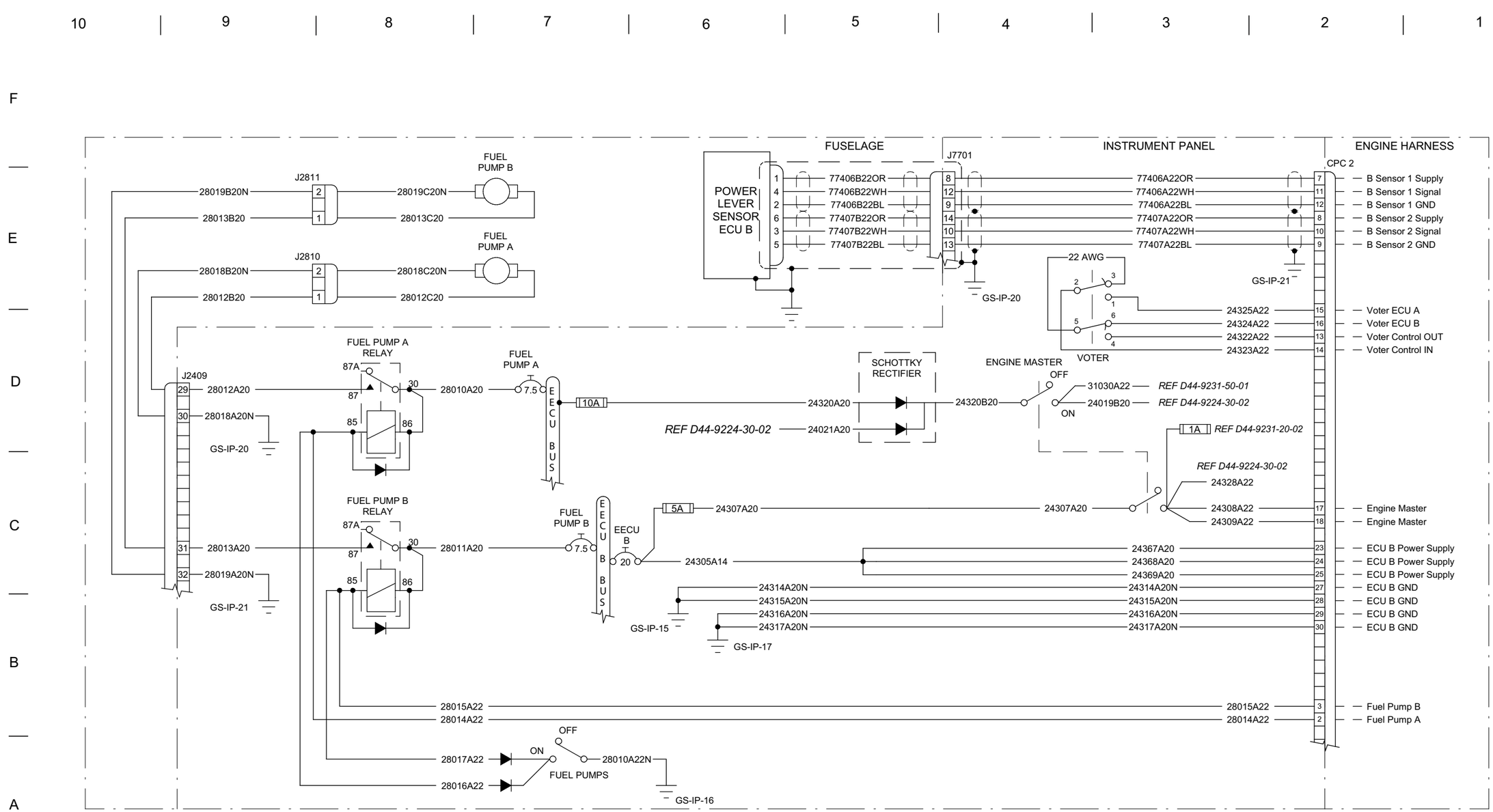
REV.	SCHEMATIC	DRAWING NO.	SHEET
—	EECU Wiring	D44-9274-10-00x01	1/2



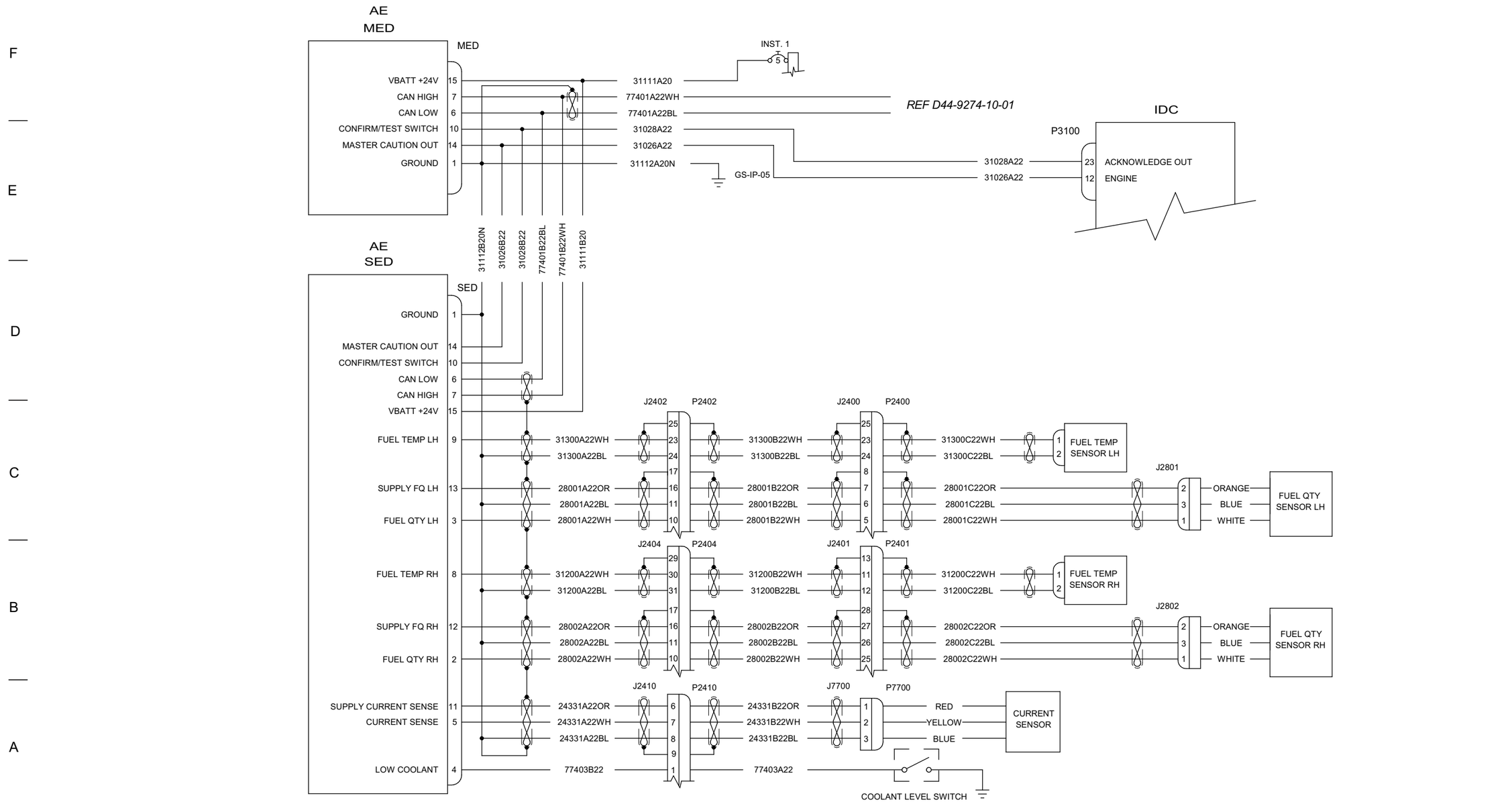
REV.	SCHEMATIC	DRAWING NO.	SHEET
—	EECU Wiring	D44-9274-10-00x01	2/2



REV.	SCHEMATIC	DRAWING NO.	SHEET
A	EECU Wiring	D44-9274-10-01	1/2



REV.	SCHEMATIC	DRAWING NO.	SHEET
A	EECU Wiring	D44-9274-10-01	2/2



REV.	SCHEMATIC	DRAWING NO.	SHEET
____	Engine Indicating	D44-9277-40-01	1/1