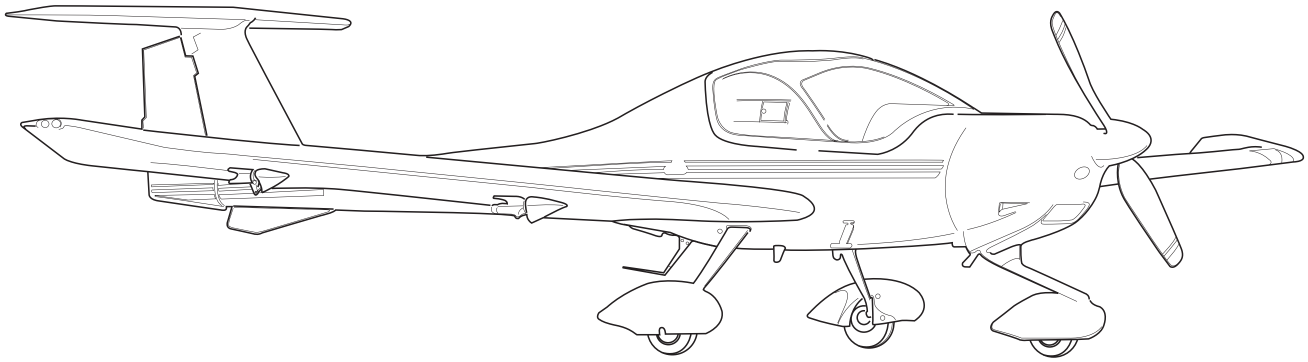
AIRCRAFT MAINTENANCE MANUAL



DA20-A1

DOC # DA 201-A1

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RECORD OF REVISIONS

Use this list to record and control all of the revisions that you put in this Aircraft Maintenance Manual (AMM). Put the affected pages of the revision into the AMM as soon as you get them. Remove and destroy the pages that are superseded. Complete the table below when you have put the revised pages into the AMM.

A vertical bar in the left margin shows changes on text pages and illustrations.

DAIC: Diamond Aircraft Industries, Inc., Canada

Revision Number	Date Issued	Date Inserted	Inserted By	Revision Number	Date Issued	Date Inserted	Inserted By
Initial Issue	01 May 94	01 May 94	DAIC				
1	01 Jan 95	01 Jan 95	DAIC				
2	01 Jan 96	01 Jan 96	DAIC				
3	01 Apr 96	01 Apr 96	DAIC				
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16	06 Jan 21		DAIC				

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HIGHLIGHTS

1. General

This revision (Rev 16) is a normal revision cycle of the Aircraft Maintenance Manual (AMM) and the pages that have been revised have a date of 06 Jan 21. Changes of technical material are described below and are indicated in the text pages by revision bars in the margin adjacent to the change.

With this Revision 16 being an extensive revision and with Incremental Revisions no longer being provided, it would be best to replace the complete AMM at Revision 15 with this Revision 16.

The table below highlights the changes that have been incorporated in this Revision 16.

CH-SE-SU	Pages	Highlights
Front Matter	ALL	Revised the front and back of the Cover Page, Record of Revisions (ROR), Highlights, List of Effective Pages (LOEP), & Master Table of Contents (TOC).
Master TOC	1 - 6	Revised the format of the master TOC to remove the page numbering. Each chapter now has a table of contents.
01-TITLE	1	Revised the title format.
01-TOC	1 & 2	Revised the TOC format.
01-00-00	1 - 6 5	Pagination. Section now starts at Page 1. Revised Para 8. A.
02-TITLE	1	Revised the title format.
02-TOC	1 & 2	Revised the TOC format.
02-00-00	1 - 4	Pagination. Section now starts at Page 1.
03-TITLE	1	Revised the title format.
03-TOC	1 & 2	Revised the TOC format.
03-00-00	1 - 8	Pagination. Section now starts at Page 1.
04-TITLE	1	Revised the title format.
04-TOC	1 & 2	Revised the TOC format.
04-00-00	1 - 4	Pagination. Section now starts at Page 1. New format for Page 1.
04-20-00	1	First paragraph revised to read type certificate holder rather than manufacturer.
05-TITLE	1	Revised the title format.
05-TOC	1 & 2	Revised the TOC format. Page 2 is a pagination change.

CH-SE-SU	Pages	Highlights
05-00-00	1 & 2	Pagination. Section now starts at Page 1.
05-10-00	1 2	Removed “and mounted equipment.” Not required. Added airplane life-limited components.
05-20-00	4	Changed the interval for spark plug replacement. Added engine controls with push pull cables. Added warning.
05-20-00	5 6 - 32	Step 10. Added a detailed examination of the exhaust system. Pagination.
06-TITLE	1	Revised the title format.
06-TOC	1 & 2	Revised the TOC format.
06-00-00	1 - 6	Pagination. Section now starts at Page 1.
07-TITLE	1	Revised the title format.
07-TOC	1 & 2	Revised the TOC format.
07-00-00	1 & 2	Pagination. Section now starts at Page 1.
08-TITLE	1	Revised the title format.
08-TOC	1 & 2	Revised the TOC format.
08-00-00	1 - 4 2 & 3	Pagination. Section now starts at Page 1. Revised the formula for the empty weight moment.
09-TITLE	1	Revised the title format.
09-TOC	1 & 2	Revised the TOC format.
09-00-00	1 & 2	Pagination. Section now starts at Page 1.
10-TITLE	1	Revised the title format.
10-TOC	1 & 2	Revised the TOC format.
10-00-00	1 & 2	Pagination. Section now starts at Page 1.
11-TITLE	1	Revised the title format.
11-TOC	1 & 2	Revised the TOC format.
11-00-00	1 2	Revised Para 3 to replace the plastic foil placards. Pagination.
11-10-00	6	Added new placards for the canopy locked position.

CH-SE-SU	Pages	Highlights
12-TITLE	1	Revised the title format.
12-TOC	1 & 2	Revised the TOC format.
12-00-00	1 & 2	Pagination. Section now starts at Page 1.
12-20-00	4 & 5	Reformatted the table.
	6 & 7, 8	Pages 6 and 7 new graphics. Pagination for Page 8.
20-TITLE	1	Revised the title format.
20-TOC	1 & 2	Revised the TOC format.
20-00-00	1 - 12	Pagination. Section now starts at Page 1. Paras re-numbered.
	1	Title given to the figure.
	2 & 3	Added Paras 4 and 5.
	4 & 5	Added Paras 6 and 7.
	7 - 11	Added Para 10 and graphics.
21-TITLE	1	Revised the title format.
21-TOC	1 & 2	Revised the TOC format.
21-00-00	1 & 2	Pagination. Section now starts at Page 1.
23-TITLE	1	Revised the title format.
23-TOC	1 & 2	Revised the TOC format.
23-00-00	1 & 2	Pagination. Section now starts at Page 1.
24-TITLE	1	Revised the title format.
24-TOC	1 & 2	Revised the TOC format.
24-00-00	1 - 6	Pagination. Section now starts at Page 1.
24-30-00	2	New Figure 3 for the generator system.
	3 - 5	Revised the figure numbers & references.
	6	Changed “throw” to “set.”
24-31-00	4 & 5	Changed “throw” to “set.”
24-50-00	1 & 2	Revised the figure number & reference.
	4	Changed “throw” to “set.”

CH-SE-SU	Pages	Highlights
25-TITLE	1	Revised the title format.
25-TOC	1 & 2	Revised the TOC format.
25-00-00	1 & 2	Pagination. Section now starts at Page 1.
25-10-00	1	Revised para 1.B. to refer the fire extinguisher info to chapter 26.
26-TITLE	1 & 2	Added a new chapter (Fire Protection) to the AMM.
26-TOC	1 & 2	Added a new TOC for the new chapter 26.
26-00-00	1 - 4	Added a new pageblock for the fire protection information.
27-TITLE	1	Revised the title format.
27-TOC	1 & 2	Revised the TOC format.
27-00-00	1 & 2	Pagination. Section now starts at Page 1.
27-40-00	1	“Flap actuator” changed to “trim actuator.”
	2 & 3	Revised figure 6, new Figure 7.
	4, 7 & 8	Pagination.
	5	Revised Para 4. B. and the figure reference.
	6	Revised Para 4. C. and the figure reference.
28-TITLE	1	Revised the title format.
28-TOC	1 & 2	Revised the TOC format.
28-00-00	1 - 4	Pagination. Section now starts at Page 1.
28-20-00	1 & 3	Figure references revised.
	4	Figure 4 changed to Figure 3.
28-40-00	1	Reference to Figure 5 changed to Figure 2.
	2	Reference to Figure 5 changed to Figure 4. Figure 6 changed to Figure 4.
	3	Reference to Figure 5 changed to Figure 2.
		Reference to Figure 7 changed to Figure 5. Figure 7 changed to Figure 5.
31-TITLE	1	Revised the title format.
31-TOC	1 & 2	Revised the TOC format.

CH-SE-SU	Pages	Highlights
31-00-00	1 2	Indicated where Figures 1 & 2 can be located. Pagination.
31-10-00	1 2 & 3	Figure reference revised. Figures 1 & 2 revised.
32-TITLE	1	Revised the title format.
32-TOC	1 & 2	Revised the TOC format.
32-00-00	1 & 2	Pagination. Section now starts at Page 1.
32-10-00	2 5 6	Gave Figure 1 a title. Revised the effectivity wording. Revised the graphic to make it legible.
32-20-00	8 9	Reference to Figures 6 and 7 changed to Figure 6. Changed distance from 235 to 245. Figure 6 & 7 changed to Figure 6. Figure revised.
32-40-00	3 9 & 10	Revised the figure references. Revised the figure references.
33-TITLE	1	Revised the title format.
33-TOC	1 & 2	Revised the TOC format.
33-10-00	1, 2 & 4 3	Pagination. Section now starts at Page 1. Gave Figure 1 a title.
34-TITLE	1	Revised the title format.
34-TOC	1 & 2	Revised the TOC format.
34-00-00	1 & 2	Pagination. Section now starts at Page 1.
34-10-00	2	Reworded the third para in B. Drain System.
51-TITLE	1	Revised the title format.
51-TOC	1 & 2	Revised the TOC format.
51-00-00	1 - 4	Pagination. Section now starts at Page 1.

CH-SE-SU	Pages	Highlights
51-10-00	1	Added to the resin & hardeners.
	2	Added Fire Retardant Paint Hensotherm 2 KS to Approved Materials.
	3	Replaced Paint N56582/T508 with Paint Steel Guard FM 585.
51-10-00	4	Pagination.
52-TITLE	1 & 2	New chapter to the manual.
52-TOC	1 & 2	New TOC for the new chapter.
52-00-00	1 - 8	New contents for the chapter.
53-TITLE	1	Revised the title format.
53-TOC	1 & 2	Revised the TOC format.
53-00-00	1 & 2	Pagination. Section now starts at Page 1.
53-10-00	3 - 10	Added High Temperature Paint Repair of the Fuselage - with Steel Guard FM 585 & with Hensotherm 2 KS
53-11-00	N/A	Section has been removed & contents are now in Ch. 52.
55-TITLE	1	Revised the title format.
55-TOC	1 & 2	Revised the TOC format.
55-00-00	1 & 2	Pagination. Section now starts at Page 1.
55-10-00	1	Revised Para 3. A. (1) (a) to be more clear.
57-TITLE	1	Revised the title format.
57-TOC	1 & 2	Revised the TOC format.
57-00-00	1 & 2	Pagination. Section now starts at Page 1.
61-TITLE	1	Revised the title format.
61-TOC	1 & 2	Revised the TOC format.
61-00-00	1 - 6	Pagination. Section now starts at Page 1.
71-TITLE	1	Revised the title format.
71-TOC	1 & 2	Revised the TOC format.
71-00-00	1 - 14	Pagination. Section now starts at Page 1.
	10	Revised the warnings and the removal procedure (C) thru (e).

CH-SE-SU	Pages	Highlights
71-00-00	11	Changed the warning to a caution.
	12	Labeled Figure 2.
71-10-00	1	Changes to the High Temperature Paint Repair statement.
	3	Changed to High Temperature Paint Repair of a Cowling with Steel Guard FM 585.
	7 - 10	Added High Temperature Paint Repair of a Cowling with Hensotherm 2 KS.
75-TITLE	1	Revised the title format.
75-TOC	1 & 2	Revised the TOC format.
75-10-00	1 & 2	Pagination. Section now starts at Page 1.
	3 & 4	Made reference to the correct figures.
76-TITLE	1	Revised the title format.
76-TOC	1 & 2	Revised the TOC format.
76-10-00	1 - 12	Pagination. Section now starts at Page 1.
77-TITLE	1	Revised the title format.
77-TOC	1 & 2	Revised the TOC format.
77-00-00	1	Revised the reference to the figures.
	2 - 4	Pagination. Section now starts at Page 1.
78-TITLE	1	Revised the title format.
78-TOC	1 & 2	Revised the TOC format.
78-00-00	1	Revised Figure 1 - Exhaust System.
	2	Revised the figure references.
	3 & 4	Para 4. Revised the Removal and Installation procedure.
	5	Inspection for leaks changed to 100 Hrs vs 200 Hrs. Revised the reference for inspection of the heat exchanger.
	6	Pagination. Section now starts at Page 1.
79-TITLE	1	Revised the title format.
79-TOC	1 & 2	Revised the TOC format.

CH-SE-SU	Pages	Highlights
79-00-00	1	Revised the caution.
	2	Pagination. Section now starts at Page 1.
79-30-00	2	Graphic revised for Figure 3.
	4	Gave a title to Figure 5.
92-TITLE	1	Revised the title format.
92-TOC	1 & 2	Revised the TOC format.
92-00-00	1 & 2	Revised the List of Wiring Diagrams/Schematics.
92-10-00	1 - 7, & 9	Footer on the schematic revised to show the revision.
	8, 10 & 11	New schematics.
92-30-00	2, 3, 13, 14 & 21	Footer on the schematic revised to show the revision.
	1, 4-12, 15-20, 22-30	New schematics.

LIST OF SERVICE BULLETINS

Service Bulletin Number	Revision Number	Title of SB / Description	Incorporated On
DA20-10-01	0	Installation, Control Lock and Fixed Provisions (Recommended)	19/06/1996
DA20-12-01	0	Installation, Fuel Pipette and Fixed Provision (Recommended)	19/06/1996
DA20-24-01	0	Alternator Belt (Optional)	09/03/1996
DA20-24-02	0	DC Generation (Improved Generator Grounding) (Recommended)	08/01/1996
DA20-24-03	0	Electrical Cables, Engine Compartment (Recommended)	18/04/1997
DA20-24-04	0	Replacement of Battery Relay Contactor (Optional)	08/11/2012
DA20-25-01	0	Installation of Rescue Hammer (Optional)	21/09/2011
DA20-27-01	0	Flap Actuator (Recommended)	09/03/1996
DA20-27-02	0	Trim Display Modification (Optional)	03/09/1996
DA20-27-03A	0	Rudder Control Cables, Forward (Alert)	24/09/1996
DA20-27-04A	0	Rudder Pedal Adjust Cable (Alert)	24/09/1996
DA20-27-05	0	Rudder Support Bracket Inspection (Mandatory)	13/11/1996
DA20-27-06A	0	Hinges, Flight Controls (Alert)	17/04/1997
DA20-27-07	0	Rudder Pedal Adjust System (Optional)	21/04/1997
DA20-27-08A	1	Control Surface Hinge Inspection (Alert)	19/01/2001
DA20-27-09	0	Installation of the Diamond Aircraft flap control module unit and microswitch tray (Optional)	14/08/2019
DA20-28-01	0	Fuel Cap, Safety chain (Recommended)	26/08/1996
DA20-28-02A	0	Fuel System Indicating and Storage (Alert)	11/12/1996
DA20-28-03	1	Fuel Filler Cap, Locking (Optional)	09/09/1999
DA20-28-04A	0	Inspection for Twisted Fuel Hoses (Alert)	08/11/2000
DA20-31-01	0	Temperature Limitation (Optional)	09/03/1996
DA20-31-02	1	Hourmeter, Engine Activated Installation (Optional)	02/05/2006
DA20-32-01	3	Brake System Retrofit (Recommended)	28/11/1997

Service Bulletin Number	Revision Number	Title of SB / Description	Incorporated On
DA20-32-02	0	Nose Gear Fork, Fatigue (Recommended)	08/01/1999
DA20-32-04	1	Inspection of NLG Elastomer Spring and Installation of Replacement Elastomer Elements (Recommended)	09/06/2008
DA20-32-05	3	Replacement of Steel MLG Struts with Aluminum MLG Struts (Optional)	23/09/2021
DA20-32-06	0	NLG Wheel and Fork Installation Improvements (Recommended)	15/07/2011
DA20-33-02	0	Instrument Lighting, Dimming Circuit for KLX 135 or KLX 135A GPS/COM (Recommended)	08/01/1996
DA20-33-03	0	Cockpit Night Lighting System Installation (Optional)	27/05/2013
DA20-52-01	0	Canopy Locking Mechanism Inspection and Adjustment (Recommended)	10/12/2012
DA20-53-01A	0	Interference, Rudder Pedal/Foot (Alert)	05/06/1997
DA20-53-02A	0	A-Bolt Washer Size (Alert)	05/02/1999
DA20-55-02A	0	Mount, Forward Attachment, Horizontal Stabilizer (Alert)	09/03/1996
DA20-55-03	0	Stabilizer Shim, Mount, Forward (Recommended)	09/09/1996
DA20-55-04	1	Rudder Upper Bearing (Recommended)	27/03/2008
DA20-56-01	0	Canopy, Side Window Water Drain (Recommended)	10/01/1996
DA20-56-02	0	Canopy, Spring (Recommended)	30/11/1996
DA20-57-01	0	Wing, “B” bolt access cover locking device (Recommended)	09/03/1996
DA20-57-02A	0	Aileron Control Fairing Modification (Alert)	07/03/1996
DA20-61-01	0	Propeller Pitch Stop (Recommended)	09/03/1996
DA20-72-01	0	Inspection, Coolant Bottle (Recommended)	06/03/1997
DA20-72-02	0	DA20-A1 - Evans NPG+ Coolant (Mandatory)	22/08/2006
DA20-72-03	2	Use of 50/50 Glycol Coolant types to comply with EASA AD 2007-0155 (Optional)	23/07/2009
DA20-72-04A	0	Change of measurement from CHT to Coolant Temperature (Mandatory)	22/01/2015

Service Bulletin Number	Revision Number	Title of SB / Description	Incorporated On
DA20-73-01	0	Rotax 912 A3 to Rotax 912 F3 Airframe Conversion (Optional)	18/04/1997
DA20-73-02A	0	Fatigue, Fuel Pump Outlet (Alert)	17/04/1997
DA20-73-03	2	Automotive Fuel Conversion (Optional)	13/04/1998
DA20-73-04A	2	Fuel System, Fuel Supply Hose (Alert)	23/03/1998
DA20-73-05	0	Introduction of New Fuel Pump Assembly (Recommended)	12/08/2011
DA20-74-01	0	Activation of an Advanced Start Module (Recommended)	28/09/2011
DA20-75-01	0	Rotax Airbox Installation (DA20-A1/100) (Recommended)	24/05/2001
DA20-76-01A	5	Throttle Cable Replacement (Alert)	07/05/1997
DA20-77-01	0	Tachometer, Cable Assembly Inspection (Recommended)	30/07/1996
DA20-77-02	2	Electric Tachometer (Optional)	30/09/2016
DA20-77-03	1	Superior Labs Tachometer Installation (Optional)	30/11/2006
DA20-78-01	1	Exhaust System, Improved Joint Sealing (Recommended)	28/11/1997
DA20-78-02	0	Exhaust Header, Type 3 & 4 (Optional)	18/04/1997
DA20-78-03A	0	Exhaust Header, Security (Alert)	18/04/1997
DA20-78-04A	2	Exhaust System, Fatigue (Recommended)	14/10/2021
DA20-79-01	1	Remote Mounting of Oil Pressure Transducer (Recommended)	28/11/1997
DA20-79-02	1	Winterization Kit (Optional)	18/09/1996
DA20-79-03	1	Oil Dipstick, Thermal Insulator (Recommended)	15/03/2011
DA20-79-04A	1	Defective Oil Filter (Alert)	28/11/1997
DA20-79-05	4	DA20 A1 - Oil Line Retrofit - F3 Engine (Recommended)	13/06/2014
DA20-79-06A	1	Inspection of Oil Tank Cover (Alert)	02/05/2000
DA20-79-07	0	Oil Quantity Placard DA20-A1/DA20-100 (Mandatory)	18/09/2003

Service Bulletin Number	Revision Number	Title of SB / Description	Incorporated On
DA20-79-08	2	Introduction of a new Oil Pressure Indicator (Mandatory)	17/12/2012
DA20-92-04	0	Installation of Photo Luminescent Placards (Optional)	27/05/2013
DA20-92-05	0	Operation Limitations (Mandatory)	27/05/2013

LIST OF TEMPORARY REVISIONS

NOTE: All Temporary Revisions have been incorporated into the manual at Revision 16. There are no outstanding Temporary Revisions at this time.

Temporary Revision Number	Date Issued	Date Inserted	Inserted By

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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
- SB = Service Bulletin
- TR = Temporary Revisions

All Chapters have a Title page.

Each revision to the Aircraft Maintenance Manual (AMM) will have a new List of Effective Pages. Revised pages and the revision date will be shown by a revision bar.

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CHAPTER 01
INTRODUCTION

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INTRODUCTION

1. General

The purpose of this Aircraft Maintenance Manual (AMM) is to furnish the maintenance personnel with all data required to maintain the DA20-A1 aircraft. It is comprised of a detailed description of systems, troubleshooting and correction, removal and installation, as well as maintenance information.

This manual only contains information regarding tasks to be performed on the airplane itself, e.g. removal and installation of components.

For the electric system, only the diagrams referred to in this manual and those which are of importance for understanding of the task are shown.

Maintenance work, repairs, and inspections must be performed in accordance with the procedures given in this Maintenance Manual.

The following documentation should be used in conjunction with this manual:

- DA20-A1 Airplane Flight Manual (AFM)
- DA20/100 KATANA Airplane Flight Manual (AFM)
- Instruction Manual for the Hoffmann propeller
- Service Bulletins
- Operator's Manual for all versions of the ROTAX 912
- Maintenance Manual for ROTAX Engine Type 912 Series

2. Revision Service

Each page of the AMM has the date of issue of the first edition printed in the footer, or, if the page has already been revised, the date of issue of the revision.

The Record of Revisions, which is part of each Revision issued shows the pages affected.

It is the responsibility of each aircraft owner to make sure that the latest revision to the Maintenance Manual has been received.

3. Warning, Cautions and Notes

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

This AMM also contains warnings, cautions and notes before applicable instructions:

WARNING: A WARNING TELLS THE PERSON DOING THE MAINTENANCE THAT INJURY OR DEATH IS POSSIBLE IF THEY DO NOT FOLLOW THE INSTRUCTIONS.

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

NOTE: A Note tells the person doing the maintenance how to make the task easier.

4. Manual Configuration

The lay-out of the AMM in general is in accordance with the Air Transport Association of America, ATA Specification No. 100. The title of each chapter can be found in the general table of contents located at the beginning of the manual.

Each system is described in a chapter which is subdivided into sections in which the subsystems are described.

The chapters are combined in main groups as follows:

General	Chapters 01-12
Aircraft Systems	Chapters 20-34
Airframe	Chapters 51-57
Propeller	Chapter 61
Power Plant	Chapters 71-92

Each of the main groups as well as each chapter is divided by a cover page showing the chapter no. and the title.

5. Contents (Peculiarities)

A. MAIN GROUP 01, GENERAL

Chapter 05 defines maintenance and inspection intervals. References to applicable chapters, for maintenance and inspection procedures, are provided as required.

Chapter 12 describes all ground support activities such as refueling and lubrication schedules.

B. MAIN GROUP 02, EQUIPMENT

Chapter 20 consists of standard practices valid for the airplane.

In chapter 31, only the instrument locations are described. A detailed description of each instrument is given with each of the system descriptions, e.g. flaps position indicator in chapter 27, etc.

C. MAIN GROUP 03, AIRFRAME

Chapter 51 includes a description of the airframe structure, procedures for cleaning and surface treatment, and instructions for minor repairs of the entire airframe.

D. MAIN GROUP 04, PROPELLER

Chapter 61 contains maintenance procedures for the propeller with references to the manufacturer's manual.

E. MAIN GROUP 05, ENGINE

These chapters contain information pertaining to only the parts manufactured by Diamond Aircraft.

Only the most important aspects, regarding the maintenance of the Rotax 912 A3 and F3 engine are mentioned in this chapter. For further maintenance information, the engine manufacturer’s manuals should be consulted.

6. Chapters

Refer to the table of contents in the maintenance manual.

7. Arrangement of Chapters

A. STRUCTURE

xx	yy	zz
Chapter	Section	Unit
Example:		
27	20	10
(Flight Controls)	(Rudder)	(Pedal assy)

This type of chapter structure, in three groups, provides a clear and understandable organization of the Maintenance Manual and facilitates easy integration of any new or revised pages.

The description of each system is kept straight forward, which leaves the third group free for the more complex assembly groups so that they can be described in detail.

B. CHAPTER CONTENTS

Each chapter, section, and subsection is subdivided as follows:

- Description and Function
- Troubleshooting
- Maintenance Comments
- The maintenance comments consist of:
    - Ground Service
    - Removal and Installation
    - Adjustment/Test
    - Checks/Inspections
    - Cleaning/Painting
    - Repairs

8. Order of Pages

A. PAGES PRECEDING THE ACTUAL MANUAL

	Pages
Cover Page	1 and 2
Record of Revisions	1 and 2
Revision Highlights	1 thru xx
List of Service Bulletins	1 thru xx
List of Temporary Revisions	1 and 2
List of Effective Pages (LOEP)	1 thru 12
Table of Contents (TOC)	1 thru 6

9. Illustrations

The illustrations are arranged in accordance with the chapter in which they are presented. The numbering will start with (1) for each section and will be continued throughout the section.

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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

To search for information regarding a specific system of the airplane, the manual user should refer to the Table of Contents for the correct chapter number.

A detailed breakdown of each chapter can be found in each chapter's Table of Contents, located at the beginning of that chapter.

2. Validity

To determine if a description is valid for a specific serial number, refer to the markings showing the validity data.

e.g. valid for S/N:
10067 through 10090

This can be interpreted that such information can be applied to serial numbers 10067 through 10090, inclusive.

3. Revisions

Revisions to the Maintenance Manual are issued as required. Maintenance Manual revisions are typically the result of modifications of the type design, revisions of the inspection and maintenance intervals and procedures, changes of the applicable airworthiness regulations, or editorial and typographical corrections.

Routine changes to the Maintenance Manual are usually collected until a revision is warranted. In cases where the revision of information presented in the Maintenance Manual is urgent, Temporary Revisions may be issued as detailed in section 2.A).

All changes, additions, as well as deletions are identified by a vertical revision bar located next to the revised portion.

4. Temporary Revisions

In cases where the revision of information presented in the Maintenance Manual is urgent, Temporary Revisions may be issued. Temporary revisions are identified as such and are printed on yellow paper. Temporary revisions must be inserted in place of the superseded pages and must be registered in the List of Temporary Revisions, located in the front section of this Manual.

Temporary Revisions are replaced by the next regular revision of the Maintenance Manual.

5. Record of Revisions

A Record of Revisions is located in the front section of the manual. The Record of Revisions is reissued with each Maintenance Manual Revision and records the pages affected by each revision.

6. Highlights

The Highlights located in the front section of the manual, is used to record the changes that have been made in the revision in each chapter of the Maintenance Manual. An incremental revision change instructions is provided at the beginning of the AMM which would advise the users the pages that are to be removed and the pages that are to be inserted in the revised AMM. It is the responsibility of the holder to make sure that the revised pages are inserted as soon as they are received.

7. Service Bulletins

Service Bulletins are issued, as necessary, to provide the operator with supplemental information regarding inspection, maintenance, repair, or modifications.

Service Bulletins are classified as follows:

A. Alert Service Bulletins

Airworthiness is directly affected. Alert Service Bulletins are identified as such and are printed on blue paper. The essential details of an Alert Service Bulletin may be distributed by fax, as advance information. It is urgently recommended that operators comply with the requirements of each Alert Service Bulletin as soon as possible but no later than the compliance date specified in the Alert Service Bulletin.

B. Service Bulletins

Service Bulletins are issued to provide information regarding inspection and maintenance procedures, product improvements or optional modifications. Service Bulletins are classified as “RECOMMENDED” or “OPTIONAL”, depending on the subject of the bulletin.

8. List of Applicable Publications

Diamond Aircraft publishes a List of Applicable Publications (LOAP) on a quarterly basis. The LOAP lists applicable supporting documentation which is produced by Diamond Aircraft, Rotax, and Hoffmann Propellers.

Specifically, the LOAP lists applicable Flight Manuals, Maintenance Manuals, Parts Manuals, Operators Manuals and Service Bulletins. The latest applicable revision level for each document is identified.

The purpose of the LOAP is to allow the operator to verify that documentation is current and that the subscription service is active

9. Abbreviations

Where appropriate, abbreviations are used that are in accordance with applicable regulations and standard industry practice..

ACL:	Anti-Collision Light
A.M.E:	Aircraft Maintenance Engineer
A&P:	Airframe and Powerplant Mechanic
FRP:	Fiber Reinforced Plastic
GFRP:	Glass Fiber Reinforced Plastic
SB:	Service Bulletin
S/N:	Serial Number
TBO:	Time Between Overhaul
TSMOH:	Time Since Major Overhaul
UHMW:	Ultra High Molecular Weight
VFR:	Visual Flight Rules
VLA:	Very Light Aircraft

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CHAPTER 03
GENERAL DESCRIPTION
OF THE AIRCRAFT

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GENERAL DESCRIPTION OF THE AIRCRAFT

1. General

The DA20-A1 is manufactured by

Diamond Aircraft Industries Inc.
1560 Crumlin Sideroad
London, Ontario, N5V 1S2
CANADA
Tel: (519) 457-4000
Fax: (519) 457-4045

and is approved as a "Utility" airworthiness category airplane.

2. Description

The DA20-A1 may be operated under DAY-VFR conditions.

The single engine, two-seat, low wing airplane consists of a self supporting wing structure and a T-tail.

The latest state-of-the-art fiber composite production techniques were used in the manufacturing of the DA20-A1.

The fuselage is built in a semi monocoque construction consisting of a self supporting, partly sandwich, GFRP-shell design, with bulkheads and stiffeners. The one part canopy ensures a generous all around view.

The cantilever wing is a semi monocoque sandwich construction and has a trapezoidal shape. It incorporates an I-shaped spar with caps constructed of carbon fiber rovings.

The wing spar stumps reach to the middle of the fuselage. Each wing is attached to the fuselage using three bolts. Conventional ailerons and electrically operated wing flaps are attached at the trailing edge of the wing.

The vertical stabilizer consists of two GFRP half-shells which are integrated into the fuselage, and are reinforced by a web and a stiffener.

The horizontal stabilizer is also of semi monocoque construction, and incorporates two root ribs, stiffeners, and a spar. The horizontal stabilizer is attached to the vertical stabilizer with four bolts and a locating pin.

The construction of elevator and rudder is similar to that of the flaps and ailerons.

An epoxy filler and a polyurethane paint is used to protect the outside skin against ultraviolet rays and humidity.

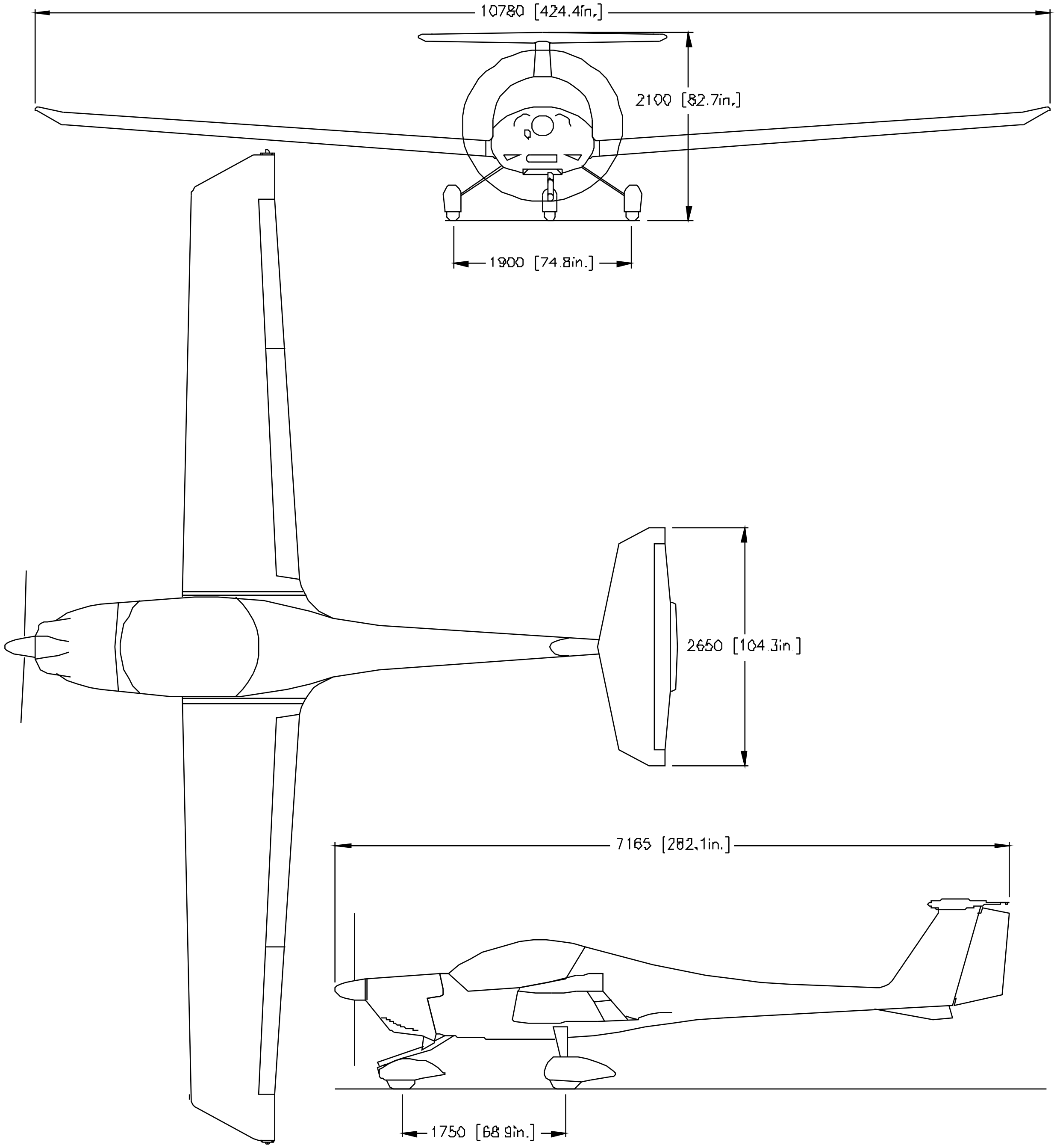

Figure 1 - Three View Drawing of the DA20-A1

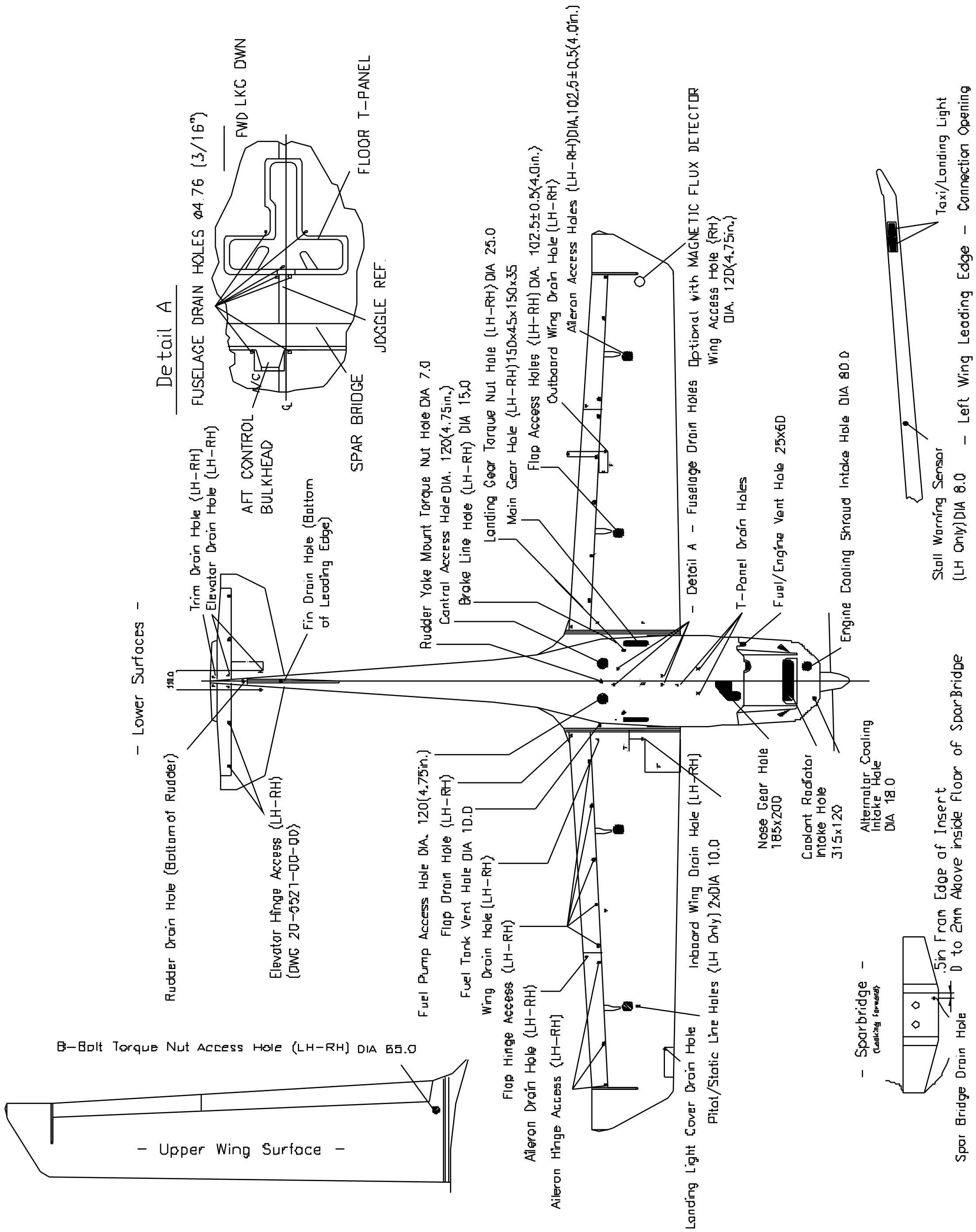

Figure 2a - Access Holes and Other Openings

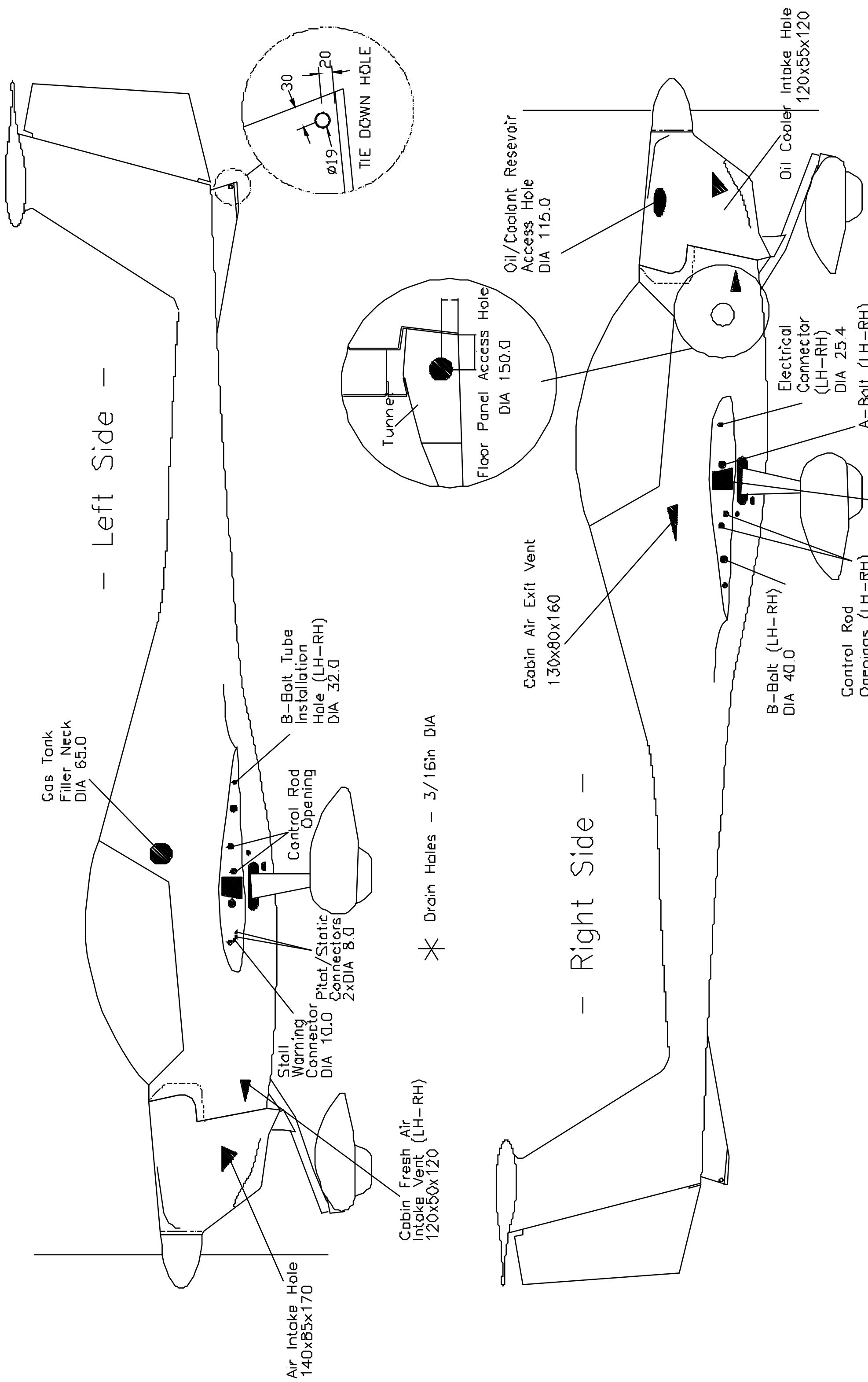

Figure 2b - Access Holes and Other Openings

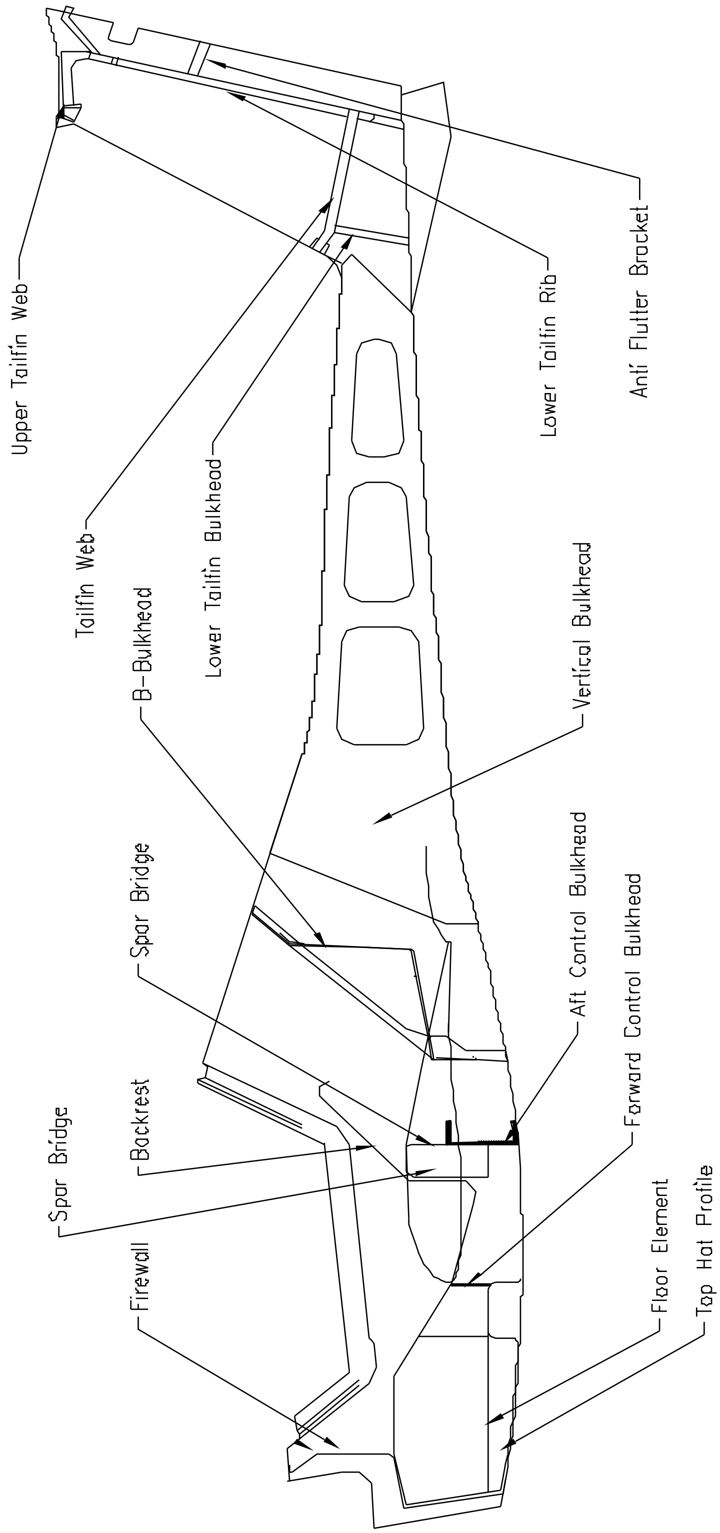

Figure 3 - Stiffeners and Bulkheads

The DA20-A1 is equipped with a fixed tricycle landing gear. The main wheels are equipped with hydraulically operated disk brakes.

The flight controls consist of conventional ailerons, elevator, and rudder. Ailerons and elevator are deflected through push rods, while the rudder is controlled by the use of control cables. The elevator trim and wing flaps are electrically actuated.

All models of the Rotax 912 engine are of a four cycle, four cylinder horizontally opposed configuration. The cylinder heads are cooled by liquid while the cylinders are cooled by ram air flow.

The DA20-A1, serial numbers 10002 through 10092 were originally fitted with the Rotax model 912 A3 engine. Serial numbers 10093 and subsequent were originally fitted with the Rotax model 912 F3 engine. Serial numbers 10002 through 10092 are eligible for retro-fitting with the Rotax 912 F3 model engine. Serial numbers 10002 and subsequent are eligible for retro-fitting with the Rotax 912 S3 model engine.

Engine output is transferred to the constant speed two-bladed propeller (Hoffmann HO V352F) using a reduction gearbox. The propeller blades are of wood composite construction, with the spinner manufactured of aluminum.

Fuel is supplied using a tank located in the fuselage. It has a capacity of 20.1 US gallons (76 liters), of which 19.5 US gallons (74 liters) are usable. The aluminum tank is located between the backrest of the seat and the B bulkhead below the floor of the baggage compartment.

3. Vendor Documentation

The following table lists suppliers of vendor systems and equipment installed in the DA20-A1. It will be helpful when detailed information on the respective systems and equipment is to be obtained.

Engine: Rotax 912 Supplier:	Bombardier-Rotax GmbH A-4623 Gunskirchen Austria Phone No.: +43-7246-271-0 Fax No.: +43-7246-370
Propeller: Hoffmann (HO-V352F) Supplier:	Hoffmann Propeller Küpferlingstr. 9 D-83022 Rosenheim, Germany Phone No.: +49-8031-32011 Fax No.: +49-8031-15832

Available Manuals:	Operation and Maintenance Manual, Doc. No. E540 Overhaul Manual, Doc. No. E569
Propeller Governor: A210786 Supplier:	Woodward 5125-35th St. Rockford, Il 61125 Phone No.: 815 624-2499 Fax No.: 815 874-9598
Main Wheel Brakes: Cleveland 30-9 Supplier:	Parker Hannifin Corporation Aircraft Wheel and Brake Division P.O. Box 158 Avon, Ohio 44011 USA Phone No.: (216) 934-5221
Navigation and Communications Equipment: Supplier: Supplier:	Bendix/King 400 North Rogers Road. Olathe, Kansas 66062-1212 USA Phone No.: (913) 782-0400 Mitchell Aircraft Products 910 Sherwood Drive, Suite 20 Lake Bluff, ILL. 60044 USA Phone No.: (708) 615-2887
Supplier:	R.C Allen Instruments Inc. 535 South Topeka Wichita, Kansas. 67226 USA Phone No.: (316) 265-4271
Supplier:	United Instruments Inc. 3625 Comotara Ave. Wichita, Kansas. 67226 USA Phone No.: (316) 265-4271
Materials: Supplier:	Loctite Canada 1-800-263-5043 U.S.A. 1-800-842-0041

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CHAPTER 04
AIRWORTHINESS LIMITATIONS

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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-VLA.

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:
Michel Lopez
C9358B25C4794F6...

March 14, 2023

Chief, Engineering

Date

National Aircraft Certification

Transport Canada.

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1. General

It is the responsibility of the operator to ensure that time limits or operating limitations for equipment described within this chapter are not exceeded.

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LIMITED TIME PARTS

1. General

The items listed below are life limited items which must be removed from service at the replacement times shown, and discarded (scrapped).

Component	Replacement Time
Flexible Rubber brake lines (not flexible Stainless Steel Braided lines)	8 years
Fuel lines (only the flexible fuel lines which are attached to the mechanical fuel pump) Note: On some aircraft this may require replacement of the fuel pump assembly in which the fuel lines are integral with the fuel pump.	5 years or with engine overhaul, which ever comes first
All rubber hoses of the cooling system	5 years
Oil Hoses A3 and F3 model engines *	5 years
ELT Battery	Refer to ELT documentation.

*If the latest revision of service bulletin DA-20-79-05 which uses TSO specified hoses is accomplished there is no mandatory replacement time.

To ensure correct observation of these times, the date of removal and installation of such components as well as the flight hours must be entered in the aircraft maintenance records.

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PAINT FINISH

1. General

To ensure that the temperature of the composite structure is kept below 129 °F (54 °C), the outer surface of the aircraft must be painted white, except for the areas of registration marks, placards and minor trim, as specified by the type certificate holder.

The paint specified in Sub-Chapter 51-10 or an equivalent product must be used.

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CHAPTER 05
TIME LIMITS AND MAINTENANCE CHECKS

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TIME LIMITS AND MAINTENANCE CHECKS

1. General

During the design of the DA20-A1 maintainability of the equipment was one of the prime considerations.

Chapters 04 and 05 should be used by the maintenance personnel as reference in the execution of proper maintenance and inspections.

The inspections and their intervals described in Chapters 04 and 05 are the minimum required to keep the airplane in airworthy condition.

From time to time, the time-intervals could be changed as new experiences are constantly evaluated. Information with regard to any such changes will be issued through the revision service.

In the event that the usage of the airplane prevents maintenance at the recommended time intervals, the time interval should be decreased. Under no circumstances should the time intervals be extended without the express approval of the manufacturer.

WARNING: TO PREVENT INJURY TO PERSONNEL, IT MUST BE ENSURED THAT THE PROPELLER AREA IS CLEAR OF ANY PERSON, IN THE EVENT THAT AN INSPECTION OR MAINTENANCE MUST BE PERFORMED WITH THE MASTER SWITCH IN THE ON POSITION, THE BATTERY CONNECTED, THE IGNITION SWITCH ACTUATED, AND THE PROPELLER BEING MOVED. IN SUCH CASES, UNINTENTIONAL FIRING OF THE ENGINE CANNOT BE RULED OUT.

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TIME LIMITS

1. Time Limits for Equipment

Component	Specified Time Between Overhaul
Engine Rotax 912 A3 or F3	600 hours or 10 years, whichever comes first ** 1000 hours or 10 years, whichever comes first ** 1200 hours or 10 years, whichever comes first ** 1500 hours or 12 years, whichever comes first ** 2000 hours or 15 years, whichever comes first ** ** Specified TBO is dependent on configuration/ inspection status of engine. Refer to the latest revision of ROTAX Technical Bulletins 912-004, 912-014, 912-041 and Service Bulletin SB-912-057 for details.
Engine Rotax 912 S3	1200 hours or 10 years, whichever comes first ** 1500 hours or 12 years, whichever comes first ** 2000 hours or 15 years, whichever comes first ** ** Specified TBO is dependent on configuration/ inspection status of engine. Refer to the latest revision of ROTAX Technical Bulletin 912-041 and Service Bulletin SB-912-057 for details.
Propeller HO-V352F Installed on engine model 912 A3 or F3	2000 hours or 6 years maximum whichever comes first. In accordance with the latest revision of Hoffmann Propeller Service Bulletin 61-10-03 E1.
Propeller HO-V352F Installed on engine model 912 S3	2000 hours or 6 years maximum whichever comes first. In accordance with the latest revision of Hoffmann Propeller Service Bulletin 61-10-03 E1.

To ensure correct observation of these times, the date of removal and installation of such components as well as the flight hours must be entered in the aircraft maintenance records.

AIRPLANE LIFE-LIMITED COMPONENTS

1. Airplane Life-Limited Components

ATA Ch.	COMPONENT	REPLACEMENT TIME	
		Hours	Calendar Time
26	Amerex 337TS fire extinguisher	-	12 yrs ± 90 days

SCHEDULED MAINTENANCE CHECKS

1. General

The tasks contained in this sub-chapter include the requirements for performing daily checks, regular inspections, and annual inspections.

Daily checks are done before the first flight of the day and are described in the Flight Manual.

Perform a 100 hour inspection at 25 hours after commencing operation of a new aircraft.

Perform a 100 hour inspection of the engine and propeller at 25 hours after an engine installation.

Regular inspections are required at 50, 100, 200, and 1000 hour intervals. The 50 hour inspections are recommended for aircraft being used in severe conditions i.e. flight training, extremely high or low outside air temperatures etc.

All inspections are general visual inspections, unless otherwise stated.

Airplanes NOT Serviced in Accordance with FAR 91

Annual inspections are 200 hour inspections, performed at intervals not to exceed one year.

Airplanes Serviced in Accordance with FAR 91

Annual inspections are 100 hour inspections, performed at intervals not to exceed one year.

2. 50, 100, 200, and 1000 hour Inspection Checklist

All inspection items listed in Tables 2 through 8 must be performed within the specified intervals.

All items performed must be signed by the airplane maintenance engineer. Completion of the properly performed inspection must be recorded in the airplane maintenance log.

MAINTENANCE PRACTICES

INSPECTION CHECKLIST DA20-A1

1. General

Enter the applicable data in the blocks below:

Table 1	
Aircraft S/N: ____________	Registration: ____________
Date: ____________	Engine Hours, TTSN/ TSMOH: ____________
Scope: ____________	Aircraft Operating Hours: ____________
(50, 100, 200, 1000)	

Do the following inspection before running the Initial Test Run:

	Interval (Flight Hours)				
Inspection Items	**50**	**100**	**200**	**1000**	**Initials**
Prior to inspection: - Review Airworthiness Directives for compliance.		X	X	X	
FOR AIRPLANES OTHER THAN U.S. REGISTRY: - Review Service Bulletins for compliance. - Check Service Time Record. - Check log book for unattended findings/complaints.		X	X	X	
Clean the aircraft fully (Refer to Chapter 12-30).		X	X	X	

2. Initial Test Run

Refer to Aircraft Flight Manual, Chapter 4, and Rotax 912 Maintenance Manual, Chapter 12.

Table 2	Interval (Flight Hours)				
Inspection Items	**50**	**100**	**200**	**1000**	**Initials**
1. Run engine until oil temperature reaches 40 °C (100°F). - Check engine instruments for normal operation.	X	X	X	X	
2. Ignition circuit check (RPM=1700) Drop LH: ________________________(max. 130 RPM) Drop RH: ________________________(max. 130 RPM) Difference: ________________________(max. 50 RPM)	X	X	X	X	
3. Carburetor heat check (RPM=1500) Drop: __________________________(max. 50 RPM)	X	X	X	X	
4. Ignition switch: - check for proper operation	X	X	X	X	
5. Ignition “OFF”: - Master switch “OFF” (remove ignition key)	X	X	X	X	

3. Engine

Table 3	Interval (Flight Hours)				
Inspection Items	**50**	**100**	**200**	**1000**	**Initials**
1. Remove upper and lower cowling, check for cracks, overheated areas, deformation, loose or missing fasteners and oil. Clean spills.	X	X	X	X	
2. Check engine for leakage. Refer to Rotax 912 Maintenance Manual, Chapter 12.	X	X	X	X	
3. Do an Oil Level Check. Refer to Rotax 912 Maintenance Manual, Chapter 12.	X	X	X	X	
4. Check external engine parts and engine components. Refer to Rotax 912 Maintenance Manual, Chapter 12		X	X	X	
5. Do an Oil Change, Inspect oil tank for sludge build up and clean as required. Refer to Rotax 912 Maintenance Manual, Chapter 12 and to Rotax Service Information, 18UL 97-D/E.	X	X	X	X	

Table 3	Interval (Flight Hours)				
Inspection Items	**50**	**100**	**200**	**1000**	**Initials**
6. Oil filter; replace and inspect. Refer to Rotax 912 Maintenance Manual, Chapter 12.	X	X	X	X	
7. Perform compression test. Refer to Rotax 912 Maintenance Manual, Chapter 12. (Engine warm, throttle open). cylinder 1 = _____ cylinder 2 = _____ cylinder 3 = _____ cylinder 4 = _____		X	X	X	
8. Replace the spark plugs if leaded fuel is used for more than 30% of operation. Refer to Rotax 912 Maintenance Manual, Chapter 12.			X	X	
NOTE: If leaded fuel is not used, or used for less than 30% of operation, it is necessary to replace the spark plugs only every **400 Flight Hours**. Refer to Rotax 912 Maintenance Manual, Chapter 12.					
9. Check the following systems and parts for breakage, looseness, leakage, chafing, kinks and cracks: - Coolant, drain, vent, fuel and oil hoses, mechanical fuel pump and fuel distribution block. - Oil and coolant radiator - Airbox and Air filter - Carburetor with manifolds - Carburetor heat system - Cabin heat system - Ignition and electrical system - Exhaust - Engine controls including push pull cables - Cylinder air duct and fins. Refer to Rotax 912 Maintenance Manual, Chapter 12.	X	X	X	X	
WARNING: MAKE SURE THAT THE EXHAUST SYSTEM IS COOL BEFORE YOU DO MAINTENANCE ON THE EXHAUST SYSTEM. THE EXHAUST SYSTEM CAN BE HOT AND THIS MAY CAUSE INJURY TO PERSONS.					

Table 3	Interval (Flight Hours)				
Inspection Items	**50**	**100**	**200**	**1000**	**Initials**
10. Perform a detailed examination of the exhaust system. Look especially for cracks and heat damage. Some disassembly may be required to gain proper access to areas being inspected. -Remove heat insulating material from the forward exhaust header pipes. -Inspect exhaust system for general condition, specifically signs of exhaust leakage which could indicate exhaust system cracks. -Thoroughly clean the exhaust headers and muffler as required and carefully inspect areas typically prone to cracking. -Repair or replace, before any further flight, any part containing cracks or holes. Ensure self locking hardware is not reused if removed. -Install new exhaust wrap to the exhaust headers. Refer to Chapter 78-00 for more information.		X	X	X	
11. Check generator drive belt. Refer to Rotax 912 Maintenance Manual, Chapter 12		X	X	X	
12. Clean engine. Refer to Rotax 912 Maintenance Manual, Chapter 12.		X	X	X	
13. Check security of spark plug cables. Refer to Rotax 912 Maintenance Manual, Chapter 12.		X	X	X	
14. Intentionally Omitted.					
15. Intentionally Omitted.					
16. Check air filter cartridge. Refer to Rotax 912 Maintenance Manual, Chapter 12.		X	X		
17. Replace air filter.				X	
18. Oil tank breather; check for blockage. NOTE: Extended operations with low engine temperature in conjunction with high air humidity may lead to blockage of the breather pipe.		X	X	X	
19. Engine mount; check for cracks, deformation, corrosion, and missing fasteners and safetying devices; check condition of shock mounts. Check engine suspension points. Refer to Rotax 912 Maintenance Manual, Chapter 12.		X	X	X	

Table 3	Interval (Flight Hours)				
Inspection Items	**50**	**100**	**200**	**1000**	**Initials**
20. Check torque of nut on engine mount to firewall bolts. Refer to Chapter 20-00, section 4.			X	X	
21. Reduction gear; Gearbox friction. Refer to Rotax 912 Maintenance Manual, Chapter 12. Friction = _______________ Record in log book.		X	X	X	
22. Starter, relays, and ignition boxes: - check for secure attachment.		X	X	X	
23. Open heat exchanger to check muffler for cracks and leakage. Refer to Chapter 21-40.		X	X	X	
24. Clean filter in electrical fuel pump; close and secure pump cap; install lockwire; check for fuel leakage.		X	X	X	
25. Check the carburetors and choke. Refer to Rotax 912 Maintenance Manual, Chapter 12.			X	X	
26. Fuel shut off valve and check valve; check for proper function. Refer to Chapter 28-00. (Note: Inspection of check valve is applicable for aircraft up to S/N 10092 only)			X	X	
27. Battery; check clean, charge and capacity, acid level and mounting.		X	X	X	
28. Do a check of the wiring. Refer to Rotax 912 Maintenance Manual, Chapter 12.		X	X	X	
29. Renew all rubber parts. Refer to Rotax 912 Maintenance Manual, Chapter 05.					

Table 3	Interval (Flight Hours)				
Inspection Items	**50**	**100**	**200**	**1000**	**Initials**
Operating fluids used: (Type and quantity) Oil: ____________________ Coolant: ____________________ Misc: ____________________ Parts Replaced: ____________________ ____________________ ____________________ Remarks:					

4. Propeller

Table 4	Interval (Flight Hours)				
Inspection Items	**50**	**100**	**200**	**1000**	**Initials**
1. Remove spinner; check spinner and spinner mount for cracks, dents, and run-out.		X	X	X	
2. Blades; check for radial play, maximum: 1º check for bladeshake		X	X	X	
3. Clean propeller and hub. - Check hub and main parts for cracks and corrosion; - Check for grease and oil leakage.		X	X	X	
4. Blades; check for secure attachment; check blade pitch change mechanism for ease of movement.		X	X	X	
5. Self-locking nuts on propeller flange; - Note: Do not loosen the attaching hardwares. Refer to Chapter 20 for Special Torque Values.		X	X	X	
6. Sealing of blade retention nuts; - Check (sealing agent: RTV-109).		X	X	X	
7. Blades; check for tracking and damage (see Propeller Instruction Manual), maximum admissible: 3 mm (0.12”).		X	X	X	
8. Install spinner.		X	X	X	
9. Governor; for secure mounting: - Check condition of lines and for leaks; - Check bowden cable for sufficient travel		X	X	X	

5. Cabin

Table 5	Interval (Flight Hours)				
Inspection Items	**50**	**100**	**200**	**1000**	**Initials**
1. Canopy: - Check for defects; - Check bond of canopy to frame for signs of separation. - Check locking mechanism for proper operation; make sure unlatching force lies between 58-80 N (13-18 lbf). - Check the door warning annunciation. - Refer to Chapter 52-00.		X	X	X	
2. Safety belts, baggage straps, and their locking mechanisms; check for proper operation and safetying.		X	X	X	
3. Remove seat shells; remove any dirt.			X	X	
4. Flap actuator, stops, support and position switch and indicator; check for secure attachment and proper operation.		X	X	X	
5. Rudder pedals, rudder cables and their attachments, pulleys and rollers; check for chafing, looseness, cracking and proper function. Check cables and pedals. Refer to Chapter 27-20-20.		X	X	X	
6. Brake cylinders and brake lines: - Check for leakage; - Brake fluid level in the reservoirs of the brake cylinders on the copilot's side; check;		X	X	X	
7. Parking brake; check for proper operation.		X	X	X	
8. Check control sticks for interference: - Check stops for defects; - Check zero position; - Check all fittings and bearings for looseness		X	X	X	
9. All instrument markings, knobs and handles: - Check for missing placards in accordance with Maintenance Manual, Chapter 11-10.		X	X	X	
10. Remove instrument panel cover: - Check all components, switches, instruments, breakers, hoses and wiring for secure attachment; remove any dirt.			X	X	
11. Wing main bolt locking device: - Check for proper operation and condition.		X	X	X	

Table 5	Interval (Flight Hours)				
Inspection Items	**50**	**100**	**200**	**1000**	**Initials**
12. Navigation and Landing lights: - Check for proper operation.		X	X	X	
13. Compass; check for proper operation.			X	X	
14. Verify compliance with FAA AD 93-05-06 Reference ACS / Gerdes Service Bulletin, SB92-01-ACS, ignition switch lubrication/inspection.				X	

6. Structure and Control Surfaces

Table 6	Interval (Flight Hours)				
Inspection Items	**50**	**100**	**200**	**1000**	**Initials**
1. Skin of wings, tail surfaces, and fuselage; check for defects, especially dents, cracks, holes, etc. All unpainted parts for delaminations (white spots).		X	X	X	
2. Flight control hinges (airframe and control surface), check flap, aileron, and elevator hinge components for corrosion and/or cracks. Use of a 10X magnifying glass is recommended. Cracks and corrosion may be indicated by lifting or bubbling of the paint. Refer to Maintenance Manual chapter 27.		X	X	X	
3. Flight control hinges; check for excessive play. If play exists, measure with dial indicator. Allowable: axial: ± 2.0 mm (± 0.08 in.) radial: ± 0.25 mm (± 0.01 in.)			X	X	
4. Check play of aileron and elevator control system with control surface blocked. Maximum allowable play: 10 mm (3/8”), measured at the top of control stick.		X	X	X	
5. Aileron and flap control system in wings; check through Plexiglas windows for proper connection and proper safetying.		X	X	X	

Table 6	Interval (Flight Hours)				
Inspection Items	**50**	**100**	**200**	**1000**	**Initials**
6. Flaps and flap control mechanism in fuselage; check for proper connection and proper safetying, through bottom access panels.		X	X	X	
7. Flaps; check pre-tension and adjust if required. Correct pre-tension: 30 to 50 N (6.7 to 11.2 lbs.).			X	X	
8. Remove rudder; lubricate hinge bushings: - Check vertical stabilizer interior structure for damage.			X	X	
9. Rudder mounting and control cable connection points; check for wear in the cable eyes, looseness, play, and proper safetying; - Check rudder lower edge for cracks. - Check lower ‘Rudder Support Bracket’ for deformation, cracks or corrosion around the area of the rudder stop reinforcement bars.		X	X	X	
10. Anti-Servo Tab; inspect for cracks and other damage, check attachment points for proper safetying and operation.			X	X	
11. Trim System; check actuator motor and trim position indicator for proper operation and correct indication.		X	X	X	
12. Trim Actuator; check for secure attachment; Spring pack; check spring retainer, center spring mount, roll pin, spring, for wear or foreign objects. Snubber: check fork weld for cracks or corrosion.			X	X	
13. Remove horizontal stabilizer; check mounting hardware for secure attachment and corrosion; check forward bolts for corrosion; lubricate; reinstall.				X	
14. Elevator; check for secure and proper attachment and proper safetying.		X	X	X	
15. Remove elevator; check interior structure for damage; remove elevator push rod in fuselage tube; check for chafing.				X	

Table 6	Interval (Flight Hours)				
Inspection Items	**50**	**100**	**200**	**1000**	**Initials**
16. Remove floor plate from baggage compartment and remove seat shell; Landing gear mounting; check for secure attachment and proper safetying. Rudder control cables, rudder bellcrank (in B-bulkhead) and aileron and flap control system parts; check for damage, corrosion, proper operation, and proper safetying; remove any dirt, can gain access through access panels in fuselage.		X	X	X	
17. Rudder cable tension; check. Nominal: 15 ± 2 daN (33.7 ± 4.5 lbs.) Refer to Chapter 27-20-20.		X	X	X	
18. Remove fuel tank, check for damage and corrosion; Remove and clean integrated fuel screen. Calibrate fuel quantity indicating system after reinstalling the tank. Refer to Chapter 28-40.				X	
FOR GERMAN REGISTERED AIRCRAFT: Verify date and operating time at last calibration of fuel quantity indicating system. Calibration is required every 600 hours or every 3 years, whichever is first.		X	X	X	
19. Fuselage tube; check for deformation and cracks; Elevator push rod guidance; check for secure mounting; Rudder control cables and turnbuckles; check for corrosion, wear, and proper safetying; remove any dirt.		X	X	X	
20. Fuel lines and tank; check for leakage; check tank fastening for defects		X	X	X	
21. Electrical system and ground straps; check for chafing; Cable ties and all connectors; check by lightly pulling by hand.		X	X	X	
22. Pitot head and antennas; check for secure attachment; Stall warning system; check for proper operation.		X	X	X	

Table 6		Interval (Flight Hours)				
Inspection Items		**50**	**100**	**200**	**1000**	**Initials**
23.	Drain and vent bores in wings, fuselage, and control surfaces; check		X	X	X	
24.	Remove aileron push rods; check for chafing.				X	
25.	B-bolts; check for axial play. Refer to Maintenance Manual, Chapter 57.		X	X	X	

7. Landing Gear

Table 7		Interval (Flight Hours)				
Inspection Items		**50**	**100**	**200**	**1000**	**Initials**
1.	Clean main landing gear and nose wheel; remove fairings; check fairing mounts for cracks.		X	X	X	
2.	Main landing gear; check for cracks, paint chips, corrosion, and any unusual deformation, and damage.		X	X	X	
3.	Check toe and camber according to Maintenance Manual, Chapter 32-10.				X	
4.	Brake lining for leaks; check corrosion and wear. Minimum thickness: 2.54 mm (0.10”).		X	X	X	
5.	Brake disks; check for wear. Minimum thickness: 4.242 mm (0.167”).		X	X	X	
6.	Examine the nose-gear journal-bearings in the bottom of the fuselage. Look especially for play.		X	X	X	
7.	Examine the bearing in the shock absorber retainer and strut bushings. Look especially for play.		X	X	X	

Table 7	Interval (Flight Hours)				
Inspection Items	**50**	**100**	**200**	**1000**	**Initials**
8. Examine the nose landing gear shock absorber assembly as follows: - Inspect for damage, corrosion or cracks - Inspect rubber dampers for deterioration, cracks or damage - Inspect for proper attachment and loose components. - If any component of the assembly is found loose, the assembly must be removed and check for proper length and to determine the cause. Refer to Chapter 32-20-00 for further information.		X	X	X	
9. Remove the NLG fork. (Refer to Chapter 32-20-00).		X	X	X	
10. Inspect the fork for cracks, corrosion and deformation. - Carefully inspect the NLG fork for cracks - Look especially for cracks in radius areas.		X	X	X	
11. Visually examine the NLG fork pivot. - Look especially for cracks in the radius where the fork makes contact, corrosion and wear. Any corrosion needs to be assessed, treated and/or the component replaced - Inspect the pivot stud threads of the lower end of the strut for cracks/damage.		X	X	X	
12. Lubricate the NLG fork pivot as per Chapter 12-00 and install the NLG fork.		X	X	X	
13. Remove and disassemble the NLG shock absorber assembly. (Refer to Chapter 32-20-00)				X	
14. Examine the rubber damper condition for cracks, compression, or deterioration.				X	
15. Examine the shock absorber rod for deformation, wear, corrosion or cracks.				X	
16. Assemble the shock absorber assembly and install the shock absorber. (Refer to Chapter 32-20-00).				X	
17. Remove the NLG strut. (Refer to Chapter 32-20-00).				X	

Table 7	Interval (Flight Hours)				
Inspection Items	**50**	**100**	**200**	**1000**	**Initials**
18. Visually examine the NLG strut condition. Look especially for distortion, corrosion and condition of the paint.				X	
19. Visually examine the NLG strut upper journal assembly lock bolt. Look especially for cracks and corrosion.				X	
20. Do a visual inspection of the NLG bushings in the T-panel on the bottom of fuselage. - Check for the security of the bushing in the T-panel - Do a tap test to check for the condition of the surrounding laminate - Check the bond of the T-panel to the floor panel and to the fuselage skin.				X	
21. Install the nose landing-gear strut. (Refer to Chapter 32-20-00).				X	
22. Tire check for cuts and wear; Ensure correct tire pressure: Main: 33 psi (228 kPa) Nose: 26 psi (179 kPa)		X	X	X	
23. Rims of main wheels and nose wheel; check for cracks.		X	X	X	
24. Wheel bearings; check for play, corrosion, and irregular running.		X	X	X	
25. Remove main wheels; clean and lubricate bearings.			X	X	
26. Install wheel fairings; check for looseness.		X	X	X	

8. General

Table 8	Interval (Flight Hours)				
Inspection Items	50	100	200	1000	Initials
1. Pitot-static system; check for leaks and cleanliness.				X	
2. Drain any water which may have accumulated in the Pitot static system.		X	X	X	
3. Lubricate in accordance with Lubrication Schedule in Chapter 12-20.			X	X	
4. Check for foreign objects and tools; close all inspection holes, and install cowling.	X	X	X	X	
5. Drain any water which may have accumulated in the stall warning system.		X	X	X	
6. Perform general functional test and engine test run.	X	X	X	X	
7. Engine; check for leakage.	X	X	X	X	
8. Tighten oil filter.	X		X	X	
9. Perform check flight, carry out and confirm all items on the form “Check Flight”.				X	
10. Enter inspection in log book.	X	X	X	X	
11. File Inspection Checklist, material tags, Findings Report, Engine Test Run Report, and Check Flight Report in Airplane Maintenance Log.	X	X	X	X	

9. Maintenance Report

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

DA20-A1	
Aircraft Serial Number:	Registration Number:
Check: ___________________ (50 hr., 100 hr., 200 hr., 1000 hr., 6000 hr.)	
REMARKS:	
The aircraft is airworthy with respect to its maintenance condition. Place: ____________________________________ Date: _____________________________________ A.M.E: ________________________________	

10. Maintenance Check Flight Report

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

Diamond AIRCRAFT	MAINTENANCE CHECK FLIGHT (See Maintenance Checklist for Applicability)		DA20-A1 Page 1 of 2		
Registration:	Pilot:	Airdrome:			
Date:	Take-Off:	Landing:			
Functional Check, Flight Behavior			**Findings**		
			N/A	**NO**	**YES**
Fuel quantity indicator					
ACL, Navigation lights					
Warning and Caution lights					
Altimeter, QNH adjustment					
Radio, radio check					
Navigational instruments					
Electrical fuel pump					
Engine starting behavior, cold					
Oil pressure indicator					
Ammeter, generator					
Voltmeter					
RPM indicator					
Cylinder head temperature indicator					
Oil temperature indicator					
Parking brake					
Wing flaps					
Ignition circuits					
Carburetor Heat					

Diamond AIRCRAFT	MAINTENANCE CHECK FLIGHT	DA20-A1		
	(See Maintenance Checklist for Applicability)	Page 2 of 2		
Functional Check, Flight Behavior		Findings		
		N/A	**NO**	**YES**
Taxiing behavior, take-off behavior				
Airspeed indicator				
Vertical speed indicator				
Compass				
Behavior during climb				
Cylinder head temperature				
Oil Temperature				
Cabin heat/cabin air				
Behavior during high speed flight				
Trim/trim range				
Behavior during low speed flight				
Stall warning				
Landing behavior				
Fuel shut-off valve				
Engine starting behavior, warm				
Engine shut down behavior				
Remarks:				
(Pilot)				

11. 6000 Hour Inspection

All inspection items listed in Tables 3.1-3.6 must be performed within 6000 hours of flight time and every 6000 hours thereafter. The inspection must be performed in conjunction with the coincident 1000 hour inspection.

All items performed, the findings, as well as their correction must be recorded in accordance with an approved procedures manual.

Prior to commencing the 6000 hour inspection support the fuselage on jack stands remove the wings, rudder, horizontal stabilizer, and remove the landing gear. Remove the flaps and ailerons from the wings and remove the elevator from the horizontal stabilizer.

A. Types of Inspection

In the inspection checklist, three types of inspection are specified:

V - Visual Inspection

T - Tap Test

F - Functional or Fit Check

(1) Visual Inspection

In composite structures, surface damage, e.g. dents or scratches may be detected by visual inspection. You can see where fiber breakage or matrix cracking has happened. Damage to the core may also be visible. It is easier to see damage on unpainted areas of composite. On painted composite surfaces, damage is often first visible as waviness that shows up when you illuminate the surface with a bright light at a low angle.

To simplify laminating, a paste made of epoxy resin filled with silica powder is sometimes used to smooth abrupt transitions, such as sharp inside corners or at the edges of foam core. Since the cured paste is white, it can be difficult to tell the difference between this paste and a delamination in a glass fibre composite. The areas of paste are whiter and have more sharply defined edges.

In composite structures, small hairline cracks may occur in the surface finish, especially at places where filler putty has been used. If the part has no foam core and the opposite face is accessible and unpainted, you may be able to determine if there is damage to the composite. If not, you must remove the paint and filler from the affected area by careful hand sanding to expose the underlying composite.

The composite structure is protected by paint from exposure to damaging ultraviolet light from the sun. It is important that the paint be in good condition. UV light can also damage the paint. You can inspect for UV damage of the paint as follows:

(a) Clean the painted surface with solvent-based cleaner (BASF Prekleeno 900). Wipe the cleaner off before it dries.

(b) Rub the paint surface with a dark cloth. An excess of white, chalky residue on the cloth indicates oxidation of the paint due to UV damage. If only a small amount of residue is found, the paint can be polished smooth. If a large amount of residue is found, the component should be repainted.

If visual inspection of a metal component indicates possible damage, non-destructive inspection may be used to check for cracks. Alternately, the part may be replaced.

(2) Tap Test for Composites

Each type of structure makes a distinct sound when tapped with a large coin or washer. The thicker and more solid the structure, the higher is the pitch of the sound. Areas of delamination, cracks in overlapping bonds and sandwich panels with underlying damage to the core sound dull or dead when tapped. The best technique is to tap repeatedly while moving slowly around the area of interest, listening for changes in the sound. In this way, it is possible to find the extent of an area of damage.

Tap testing is also useful to find the edges of an area of core, to find underlying bulkheads or ribs and to find steps in the thickness of solid laminates.

Tap testing is done if visual inspection indicates possible damage. For example, if a surface dent is found in a sandwich part, tap testing should be used to determine if there is a disbond between the skin and the core.

(3) Functional or Fit Check

Wear on mating parts can be evaluated by measuring the play between the parts when they are engaged, such as the fit of the main pins in the bushings in the spar bridge.

B. Defect Limits for Composites

Diamond Aircraft has established defect limits for inspection of composite airframe components; refer to Chapter 51-10 for this information.

6000 HOUR INSPECTION CHECKLIST DA20-A1

S/N: ______________________________ Registration: ______________________

Date: ______________________________ Airplane Operating Hours: ______________________

File completed Inspection Checklist and Findings Report in the Airplane Maintenance Log.

NOTE: Where the inspection method indicated in the following tables is followed by the symbol "(T)", perform a tap test, if visual inspection reveals evidence of possible delamination and/or disbond.

Table 3.1 Left Wing	Must be performed in conjunction with coincident 1000 hr inspection.		
	Inspection Items	**Inspection Method**	**Initials**
	Left Wing Root Ribs (in front and behind spar)		
1.	Bonding with the skins	V (T)	
2.	Joints with main spar/spar stump	V	
3.	Condition of laminate (cracks, delamination)	V	
4.	A-bolt bushing and bearing in forward root rib (bond of bushing in rib, tight fit of bearing in bushing, corrosion or wear of bearing)	V, F	
5.	B-bolt bushing and bearing in forward root rib (bond of bushing in rib, tight fit of bearing in bushing, corrosion or wear of bearing)	V, F	
	Left Wing Spar Stump		
1.	Condition of laminate (delamination)	V	
2.	Main bolt bushing in spar web (tight fit of main pin within bushing, corrosion or wear of bushing, bond of bushing in spar stump)	V, F	
	Left Wing Main Spar		
1.	Main spar bonding with wing skins	V (T)	
2.	Main spar flange joint with web outboard from root rib looking through root rib openings (no delamination).	V	
3.	Spar web sandwich structure outboard from root rib looking through root rib openings (condition of laminate, delamination, condition of core)	V	

Table 3.1 Left Wing	Must be performed in conjunction with coincident 1000 hr inspection.		
	Inspection Items	**Inspection Method**	**Initials**
	Left Upper and Lower Wing Skins		
1.	Check for delamination, cracks, dents, scratches	V	
2.	Check condition of paint (chips, scratches, UV damage)	V	
3.	Check for damage to core or disbond between skin and core	V (T)	
4.	Leading edge bond (disbonds, cracks above or below overlap seam)	V, (T)	
5.	Drain holes open	V	
6.	Landing light opening (check for cracks in laminate around fasteners)	V	
7.	Remove tie down ring and check for delamination, cracks, elongation of hole.	V	
	Left Wing Trailing Edge Main Spar		
1.	Condition of laminate	V	
2.	Bond of trailing edge to skins	V (T)	
3.	Bonding of flap and aileron hinges to trailing edge and skin	V (T)	
4.	Condition of flap and aileron hinges (cracks, corrosion, fit of clevis pin in hinge, paint, and separation from trailing edge spar or lower skin ahead of spar face, loose rivet). Refer to Chapter 57.	V, F	
	Left Wing Internal Ribs		
1.	Condition of laminate	V	
2.	Check for cracks and delamination around bellcrank brackets and disbond between bracket and rib.	V	
3.	Condition of bellcrank brackets (cracks, elongation of bellcrank mounting holes, corrosion, paint)	V	

Table 3.2 Right Wing	Must be performed in conjunction with coincident 1000 hr inspection.	
Inspection Items	**Inspection Method**	**Initials**
Right Wing Root Ribs (in front and behind spar)		
1. Bonding with the skins	V (T)	
2. Joints with main spar/spar stump	V	
3. Condition of laminate (cracks, delamination)	V	
4. A-bolt bushing and bearing in forward root rib (bond of bushing in rib, tight fit of bearing in bushing, corrosion or wear of bearing)	V, F	
5. B-bolt bushing and bearing in forward root rib (bond of bushing in rib, tight fit of bearing in bushing, corrosion or wear of bearing)	V, F	
Right Wing Spar Stump		
1. Condition of laminate (delamination)	V	
2. Main bolt bushing in spar web (tight fit of main pin within bushing, corrosion or wear of bushing, bond of bushing in spar stump)	V, F	
Right Wing Main Spar		
1. Main spar bonding with wing skins	V (T)	
2. Main spar flange joint with web outboard from root rib looking through root rib openings (no delamination).	V	
3. Spar web sandwich structure outboard from root rib looking through root rib openings (condition of laminate, delamination, condition of core)	V	
Right Upper and Lower Wing Skins		
1. Check for delamination, cracks, dents, scratches	V	
2. Check condition of paint (chips, scratches, UV damage)	V	

Table 3.2 Right Wing	Must be performed in conjunction with coincident 1000 hr inspection.	
Inspection Items	**Inspection Method**	**Initials**
3. Check for damage to core or disbond between skin and core	V (T)	
4. Leading edge bond (disbonds, cracks above or below overlap seam)	V, (T)	
5. Drain holes open	V	
6. Landing light opening (check for cracks in laminate around fasteners)	V	
7. Remove tie down ring and check for delamination, cracks, elongation of hole.	V	
Right Wing Trailing Edge Main Spar		
1. Condition of laminate	V	
2. Bond of trailing edge to skins	V (T)	
3. Bonding of flap and aileron hinges to trailing edge and skin	V (T)	
4. Condition of flap and aileron hinges (cracks, corrosion, fit of clevis pin in hinge, paint, and separation from trailing edge spar or lower skin ahead of spar face, loose rivet). Refer to Chapter 57.	V, F	
Right Wing Internal Ribs		
1. Condition of laminate	V	
2. Check for cracks and delamination around bellcrank brackets and disbond between bracket and rib.	V	
3. Condition of bellcrank brackets (cracks, elongation of bellcrank mounting holes, corrosion, paint)	V	

Table 3.3 Fuselage	Must be performed in conjunction with coincident 1000 hr inspection.		
	Inspection Items	**Inspection Method**	**Initials**
	Fuselage Skin, including Vertical Stabilizer		
1.	Check for delamination, cracks, dents, scratches	V	
2.	Check condition of paint (chips, scratches, UV damage, condition of fire-proof paint aft of lower cowl outlet)	V	
3.	Inspect for cracks in paint at bonding seam down center line of fuselage, upper and lower surfaces, and disbonding between internal composite components and skin.	V (T)	
4.	Drain holes open	V	
5.	NLG bushings in T-panel on bottom of fuselage (security of bushing in T-panel, play between NLG strut and bushing, condition of laminate, bond of T-panel to floor panel and fuselage skin)	V, (T)	
	Bulkheads, Webs, Ribs in Vertical Stabilizer		
1.	Check for delamination, cracks (particularly around access holes)	V	
2.	Viewing through access holes in vertical stabilizer spar, inspect internal composite components for disbonding with skin, and for delamination and cracks.	V	
3.	Check bushings at aft horizontal stabilizer attachment (corrosion, cracks, delamination or cracks in composite around bushing)	V	
4.	Check forward horizontal stabilizer mounting pin (security of pin in structure, cracks, corrosion, fit of pin in bearing, delamination or cracks in surrounding laminate)	V, F	
5.	Check rudder pivot bearing for corrosion, wear	V, F	
6.	Visually inspect fuselage skin around lower tail fin for cracks. Inspect bond line to vertical stabilizer web for cracks.	V, (T)	
	Spar Bridge and Wing Connection		
1.	Condition of spar bridge laminate (delamination) and bond to fuselage	V	
2.	Check for delamination of fuselage skin outboard of seat fastener through side of spar bridge	V, T	
3.	Main pin, A- and B-bolt bushings (security of bushings in surrounding composite, tightness of fit of pin/bolt, cracks, corrosion)	V	
4.	Main pins and A-bolts (corrosion, wear, distortion)	V, F	

Table 3.3 Fuselage	Must be performed in conjunction with coincident 1000 hr inspection.		
	Inspection Items	**Inspection Method**	**Initials**
5.	Main landing gear and A-bolt attachment brackets (cracks or corrosion of bracket, disbond from or delamination in surrounding laminate)	V	
	Firewall		
1.	Condition of laminate when viewed from cockpit side (cracks and delamination, particularly around engine mount fastener holes, battery box, discoloration)	V	
2.	Condition of paste fillet and fire paint over edge of fire shield on front face of firewall (cracks, damage, disbond from fire shield)	V	
	Cockpit Area		
1.	Seats and attachments (cracks, delamination, damage around fastener holes)	V	
2.	Floor (cracks or delamination around aft rudder pedal bracket, boarding step, and throttle quadrant opening)	V	
3.	B-bulkhead (cracks, delamination, particularly around fuel tank attachments)	V	
4.	Lap belt attachments (general condition, security of metal fitting in surrounding composite)	V	
5.	Flap actuator mounting on LHS of center tunnel (security of bracket on laminate, cracks in surrounding laminate)	V	
6.	Rudder lever mounting (located under B-bulkhead check for security of mounting, elongation of hole, cracks in surrounding laminate)	V	
7.	Drain and replace the brake fluid in the brake reservoirs. (Refer to Chapter 32-40)	V	
	Canopy		
1.	Check frame for delamination, scratches, cracks (particularly around fastener holes)	V	
2.	Check latching components for corrosion, wear, damage	V, F	

Table 3.4 Horizontal Stabilizer	Must be performed in conjunction with coincident 1000 hr inspection.		
	Inspection Items	**Inspection Method**	**Initials**
	HS Skins		
1.	Check for delamination, cracks, dents, scratches	V (T)	
2.	Check condition of paint (chips, scratches, UV damage)	V	
3.	Check for damage to core or disbond between skin and core	V (T)	
4.	Leading edge bond (disbonds, cracks above or below overlap seam)	V (T)	
5.	Drain holes open	V	
	HS Spar		
1.	Bond to skins	V (T)	
	HS Trailing Edges		
1.	Condition of laminate	V	
2.	Bond of trailing edge to skin	V (T)	
3.	Condition of elevator hinges (cracks, corrosion, fit of clevis pin in hinge)	V, T, F	
4.	Condition of inner hinge plates (cracks, corrosion, disbond of trailing edge and skin from stabilizer, damage to elevator stops)	V	
	HS Attachments		
1.	Aft mounting plate (cracks in bond between plate and web, delamination in web around bushings, cracks, corrosion)	V	
2.	Forward mounting bracket (cracks in bond to plate, delamination in rib around fasteners, condition of spherical bearing, fit of pin in bearing)	V, F	

Table 3.5 Control Surfaces	Must be performed in conjunction with coincident 1000 hr inspection.		
	Inspection Items	**Inspection Method**	**Initials**
	Ailerons		
1.	Check for delamination, cracks, dents, scratches	V (T)	
2.	Check condition of paint (chips, scratches, UV damage)	V	
3.	Check for damage to core or disbond between skin and core	V (T)	
4.	Ribs (bonding with skins)	V (T)	
5.	Check laminate around hinges and control horn fasteners for cracks or delamination	V	
6.	Drain holes open	V	
7.	Mass balance attachment (cracks in laminate and bonding paste around fasteners - accessible through access hole on lower surface)	V	
8.	Visually inspect for previous repairs or repainting. If so, check technical records to ensure mass and static moment are within specified limits (Chapter 06-00).	V	
9.	Check hinges and control horns (cracks, corrosion, disbond from skin, condition of plain bearing, fit of clevis pin in bearing). Refer to Chapter 57.	V, F	
	Flaps		
1.	Check skins for delamination, cracks, dents, scratches	V (T)	
2.	Check condition of paint (chips, scratches, UV damage)	V	
3.	Check for damage to core or disbond between skin and core	T	
4.	Ribs (bonding with skins)	V (T)	
5.	Condition of hinges and control horn (cracks, corrosion, disbond from skin, condition of plain bearing, fit of clevis pin in bearing). Refer to Chapter 57.	V	
6.	Drain holes open	V	
7.	Visually inspect for previous repairs or repainting. If so, check technical records to ensure mass and static moment are within specified limits (Chapter 06-00).	V	

Table 3.5 Control Surfaces	Must be performed in conjunction with coincident 1000 hr inspection.		
	Inspection Items	**Inspection Method**	**Initials**
	Elevator and Anti-Servo Tab		
1.	Check skins for delamination, cracks, dents, scratches	V	
2.	Check condition of paint (chips, scratches, UV damage)	V	
3.	Check for damage to core or disbond between skin and core	T	
4.	Condition of hinges (cracks, corrosion, disbond from leading edge, tightness of fasteners, fit of pin, condition of sliding surface on plain bearing)	V, F	
5.	Condition of control horn (cracks, corrosion, disbond from skin, tightness of fasteners, fit of pin, mass balance attachment).	V, F	
6.	Condition of tab hinge and controls (corrosion, play, hinge pin security).	V	
7.	Drain holes open	V	
8.	Visually inspect for previous repairs or repainting. If so, check technical records to ensure mass and static moment are within specified limits (Chapter 06-00).	V	
	Rudder		
1.	Check skins for delamination, cracks, dents, scratches	V (T)	
2.	Check condition of paint (chips, scratches, UV damage)	V	
3.	Check for damage to core or disbond between skin and core	T	
4.	Drain holes open	V	
5.	Condition of hinge pin (cracks, corrosion, loose fit in composite, condition and bonding of spacer bushing, if fitted	V	
6.	Visually inspect for previous repairs or repainting. If so, check technical records to ensure mass and static moment are within specified limits (Chapter 06-00).	V	

Table 3.6 Landing Gear	Must be performed in conjunction with coincident 1000 hr inspection.		
	Inspection Items	**Inspection Method**	**Initials**
	Main Landing Gear		
1.	Check MLG strut condition (distortion, corrosion, condition of paint)	V	
2.	Remove main wheels from axles and check condition of axle (cracks, corrosion)	V	
3.	Check fit of struts and shims in outboard brackets	V, F	
	Nose Landing Gear		
1.	Check NLG strut condition (distortion, corrosion, condition of paint)	V	
2.	Check strut pivots (cracks, corrosion, wear)	V	
3.	Check fork (cracks, corrosion)	V	
4.	Check engine mount around shock strut attachment (distortion, cracks)	V	
5.	Check condition of strut upper attach bolt.	V	

The composite structure is airworthy with respect to its maintenance condition.

Place:____

Date:____

Authorized:____

File this Inspection Checklist and Findings Report in the Airplane Maintenance Log.

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GENERAL INSPECTIONS

1. General

Preflight as well as post flight inspections are part of the general inspection procedure. In general these inspections are performed on a daily base. This inspection is described in the Flight Manual and in general is performed by the pilot.

2. Pre-Flight Inspection

This inspection should be performed before the first flight of the day to determine the general condition of the airplane and its engine.

Specific attention should be given to the preflight inspection, because many accidents have been caused by insufficient preflight inspection. It must be ensured that all switches are in the OFF position (also refer to the Flight Manual) before any inspection is attempted.

3. Post-Flight Inspection

This inspection should be performed after the last flight of the day.

Measures supplementary to those described in the Flight Manual.

Check on-board log book for any open complaints, as well as for correct recording of all landings and flight hours.

If required, moor the airplane (refer to Chapter 10).

4. Fuel Shut off Valve and Check Valve Inspection

This inspection is used to verify the proper operation of both the fuel shut off valve and the check valve (located in the fuel return line).

(1) Turn fuel shut off valve to CLOSED position.

(2) Ensure throttle lever is fully in Idle position.

(3) Turn ignition switch ON, fuel pressure warning light should be illuminated. If not illuminated, crank engine until fuel pressure warning light illuminates.

CAUTION: SWITCH ENGINE OFF IMMEDIATELY, AFTER FUEL WARNING LIGHT ILLUMINATES.

NEVER ALLOW ENGINE TO RUN DRY OF FUEL.

(4) To check that the fuel shut off valve is operating properly, switch electric fuel pump ON, fuel pressure warning light should remain illuminated.

(5) Turn fuel shut off valve to OPEN position, fuel pressure warning light should turn OFF.

(6) Visually verify, through the filler neck, that fuel is flowing through the return line into the fuel tank.

(7) To ensure check valve is operating properly, switch electric fuel pump OFF, fuel pressure warning light should not illuminate for at least one minute, visually verify no fuel is returning to the fuel tank.

NOTE: This step applies only to aircraft equipped with Rotax 912 A3 engines, i.e.: up to and including S/N 10092.

UNSCHEDULED INSPECTIONS

1. General

Unscheduled inspections are only performed in the event that during flight operation of the airplane incidents occur which are not part of a normal flight operation, and which could have caused a defect or interfere with the airworthiness of the airplane.

2. Special Inspections

A. Hard Landing

In the event of an excessively hard landing or any other atypical load on the landing gear, a careful inspection of all involved components and connection points must be performed as follows:

(1) The landing gear fittings should be inspected, using a mirror and flashlight, for defects (e.g. cracks), inspect surrounding structure for delamination.

The landing gear struts must be inspected for deformation and cracks. Measure camber, toe in and track and compare with value shown in adjustment report (refer to subchapter 32-10).

Check tires for cuts in side walls; check brake system for damage.

Check wheel alignment (Refer to Sub Chapter 32-20).

(2) Condition of the complete nose gear assembly must be checked (cracks, deformation). Special attention must be given to the upper cross bar of the engine mount to which the nose wheel assembly is attached. Check for deformation.

(3) The top hat profile in the fuselage bottom should be inspected for white spots and delamination in the area around the bearings for the nose gear assembly.

(4) Check the nose gear assembly in the unloaded condition for excessive play in the bearings due to overloading.

(5) In addition to the landing gear, all control surfaces (hinges, balancing weights), and the complete engine mounting (engine mount, mounting points to the firewall, shock mounts, etc.) should be inspected.

Furthermore wings and stabilizers must be inspected on the leading edge, in the vicinity of the wing spar, around the connecting points to the fuselage, and especially in the area of the mounting fittings.

NOTE: In case of suspicion of damage to any load carrying member, the manufacturer must be consulted for proper repair procedures.

B. Sudden Engine Stoppage (Prop Strike)

Refer to the ROTAX Operator's Manual and perform a Propeller Flange Check as per Sub-Chapter 05-50 of the Line Maintenance Manual, MML-912.

C. Non-Operation of more than 30 Days

With non-operation of more than 30 days, refer to Chapter 10-30 for correct procedure.

D. Replacement of Engine, Ignition, or Instruments

After replacing the engine, parts of the ignition system, or instruments, the compass must be checked for proper and accurate operation.

E. Tail Impact Damage Inspection

An inspection of the structure surrounding the fin area must be accomplished following an impact or any other atypical loading imposed upon the tail ventral fin.

(1) Remove the rudder. Reference chapter 27-20-30.

(2) Examine the areas highlighted in figure 1 for cracking, delamination, dis-bonding or any other damage. Reference figure 1.

Fuselage Skin - Inspect for cracking. If cracks in the paint appear on the outside surface carefully remove the paint in the affected area and inspect the structure for further damage.

Vertical Stabilizer Spar/Bonding Paste Seam - Examine the bonding paste seam for any disbonding.

Vertical Stabilizer Spar - Look for cracking and delamination.

(3) If damage is found to any of the structures contact the manufacturer for repair instructions.

(4) If there is no damage, the aircraft may be re-assembled.

Tail Impact Damage Inspection continued:

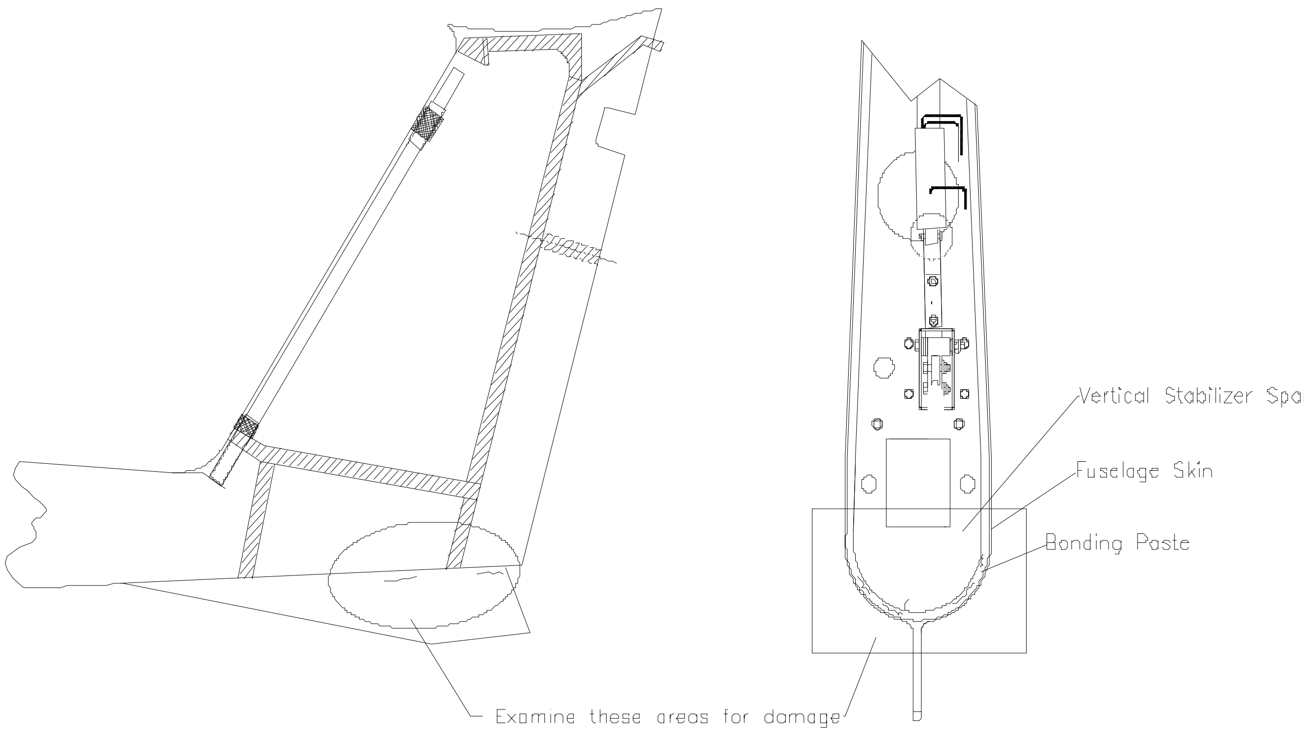

Figure 1 - Tail Impact Damage Inspection

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CHAPTER 06
DIMENSIONS AND AREAS

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DIMENSIONS AND AREAS

1. General

Most dimensions in this chapter are metric. The spans are measured parallel to their respective datum plane if not indicated otherwise.

A. Unit Conversions

Units/Abbreviations	Conversion Factor
Length	
Meter [m] Millimeter [mm] Foot [ft] Inch [in]	[mm] / 25.4 = [in] [cm] / 2.54 = [in] [m] x 0.3048 = [ft]
Mass/Force	
Kilogram [kg] Pound [lb(s)]	[kg] / 0.45359 = [lbs] [daN] / 0.44482 = [lbs]
Moment	
Kilogram centimeter [kg.cm] Inch pound [in.lb(s)]	[kg.cm] / 1.152 = [in.lbs]

2. Dimensions

OVERALL DIMENSIONS

Span without ACL	10.78 m	35.4 ft
Span with ACL	10.84 m	35.6 ft.
Length	7.28 m	23.9 ft.
Height	1.76 m	5.77 ft.

WINGS

Airfoil	Wortmann FX63-137/20-HOAC	
Wing Area	11.6 m^2	125 ft^2
Mean Aerodynamic Chord (MAC)	1.09 m	42.9 in.
Aspect Ratio	10	
Dihedral (Nominal)	4°	
Sweep of Leading Edge	1°	

AILERONS		
Area	0.658 m^2	7.08 ft^2
WING FLAPS		
Area	1.236 m^2	13.30 ft^2
HORIZONTAL TAIL SURFACES		
Area	1.692 m^2	18.21 ft^2
Elevator Area	0.441 m^2	4.75 ft^2
Angle of Incidence	-2.5°	
VERTICAL TAIL SURFACES		
Area	1.134 m^2	12.21 ft^2
Rudder Area	0.426 m^2	4.59 ft^2
LANDING GEAR		
Track	1.90 m	6.2 ft.
Wheel Base	1.75 m	5.7 ft.
Nose Wheel	300*100/4.00-4\	
Main Wheels	380*150/15*6.00-15	

3. Adjustment Values for Control Surfaces and Trim

ADJUSTMENT REPORT (Refer to Figures 1 and 2).

All adjustment values are recorded in the adjustment Report before a DA20-A1 is delivered. The completed report is part of the Airplane Maintenance Log.

When the adjustment values are checked, the report should be used to determine whether any deviations from the recorded measurements have occurred.

NOTE: All static moments given in this chapter are trailing edge heavy.

Diamond Aircraft DA20

S/N: ____________________	Date: ____________________	INSP.: __________________

ITEM	DEFLECTION		WEIGHT					STATIC MOMENTS			
			BEFORE BALANCING		BALANCE WEIGHT [3]	AFTER BALANCING		TRAILING EDGE WEIGHT	ARM	MOMENT	
	LIMITS	ACTUAL	LIMITS	ACTUAL		LIMITS	ACTUAL			LIMITS	ACTUAL
	(degrees)	(degrees)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(cm)	(kg-cm)	(kg-cm)
LEFT AILERON	UP 15° to 17°		(1.6 to 2.1) [1]		(0.65)	2.1 to 2.7 [1]				2.55 to 6.43 [1]	
	DOWN 12° to 14°										
RIGHT AILERON	UP 15° to 17°		(1.6 to 2.1) [1]		(0.65)	2.1 to 2.7 [1]				2.55 to 6.43 [1]	
	DOWN 12° to 14°										
LEFT FLAP	CRUISE -1° to +1°		(2.8 to 3.75) [1]							24.49 to 32.14 [1]	
	T/O 14° to 16°										
	LAND 39° to 42°										
RIGHT FLAP	CRUISE -1° to +1°		(2.8 to 3.75) [1]							24.49 to 32.14 [1]	
	T/O 14° to 16°										
	LAND 39° to 42°										
ELEVATOR	UP 15° to 17°		(2.25 to 2.75) [1]		(0.65 max)					-4.08 to 0.0 [2]	
	DOWN 13° to 15°										
RUDDER	LEFT 29° to 31°		(2.0 to 2.8) [5]		(1.9)	3.3 to 4.7 [4]				13.25 to 18.35 [4]	
	RIGHT 29° to 31°										
ANTI-SERVO TAB	UP +20 to +26		(0.18 to 0.26) [5]							0.61 to 0.82 [5]	
	NEUT -8 to +8										
	DOWN -12 to 20										

() Nominal weight may vary
1 Include hinges and control surface horn
2 Include hinges, control horn, mass balance. Do not include the vertical pushrod.
3. Include mass balance only
4. Include lower mounting bracket
5. Composite part only

Figure 1: Adjustment Report

ITEM		LIMITS	ACTUAL
FLAP PRELOAD (kg)	LEFT RIGHT	3.0 to 5.0 (kg)	
DIHEDRAL (mm)	LEFT RIGHT	2.90 TO 330*	
LEADING EDGE SWEEP BACK (mm)	LEFT RIGHT	20 TO 55*	
SYMMETRY CHECK	LEFT RIGHT	max. diff. 50 mm	
RUDDER CABLE TENSION		13.25 to 17.33 kg	
CANOPY UNLATCHING FORCE		4.5 - 9.0 kg (10 - 20 lbs) No outside handles	
		6.8 - 11.3 kg (15 - 25 lbs) With outside handles	

ITEM	LIMITS	ACTUAL
HORIZONTAL STABILIZER INCIDENCE	1.5° ± 0.5° degrees	
MAIN LANDING	1° to 6°	
GEAR CAMBER	(0º to 2º desirable)	
MAIN LANDING GEAR TOE IN	0.0º to 1.0º Min/Max sum of Toe in 0.5/2.0 degrees	
MAIN LANDING GEAR TRACK	1.9 m NOMINAL	
NOSE GEAR FRICTION	3.06 to 5.10 kg	

Figure 2 - Adjustment Report

4. Control Surface Gaps

The gaps between control surfaces and wings/fins must be at least 3 mm (0.12 in) wide.

5. Weight And Static Moments Of Control Surfaces

WARNING: IF YOU REPAINT (OR DO REPAIRS) TO THE CONTROL SURFACES, MAKE SURE THAT THE WEIGHTS AND STATIC MOMENTS OF THE CONTROL SURFACES ARE NOT MORE THAN THE VALUES IN THE ADJUSTMENT REPORT. THIS WILL PREVENT CONTROL SURFACE FLUTTER.

After re-painting or repair of control surfaces, special attention must be paid to make sure that the weights and static moments of the control surfaces do not exceed the values given in the adjustment report.

For the determination of static moments, the surfaces must be removed from the airplane and supported in their axes of rotation with as little friction as possible. The horns remain attached to the surfaces.

The static moment is: $M = m * r$

Where the value "m" is measured (e.g. with a spring scale) opposite to the balancing weight and "r" is the lever arm (distance between the hinge line and the point where "m" was measured)

If the values are exceeded, the balancing weight must be supplemented. Before repairing or modifying any balancing weight, the manufacturer must be contacted.

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CHAPTER 07
LIFTING AND SHORING

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LIFTING AND SHORING

1. General

The DA20-A1 is a very light airplane and does not have any crane attachment points. Belts are used to lift the airplane.

The wings and horizontal stabilizer are removed and carried by hand.

The DA20-A1 has two jacking points. To perform maintenance operations, the fuselage may be placed on jacks. (The plane is nose heavy when on jacks). The rear fuselage is supported at the junction of fuselage and vertical stabilizer forward of the fin.

2. Required Equipment

Qty	Equipment
2	Jacks with conical depression on support (for forward jacking points)
1	Suspension support frame (for rear fuselage)
2	Lifting belts
1	Rope bridge

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LIFTING

1. General

No lifting equipment is required for installation and removal of the wings and elevator unit.

Belts are used to lift the fuselage. The forward belt should be placed in front of the steps, the rearward belt should be placed in front of the tail fin.

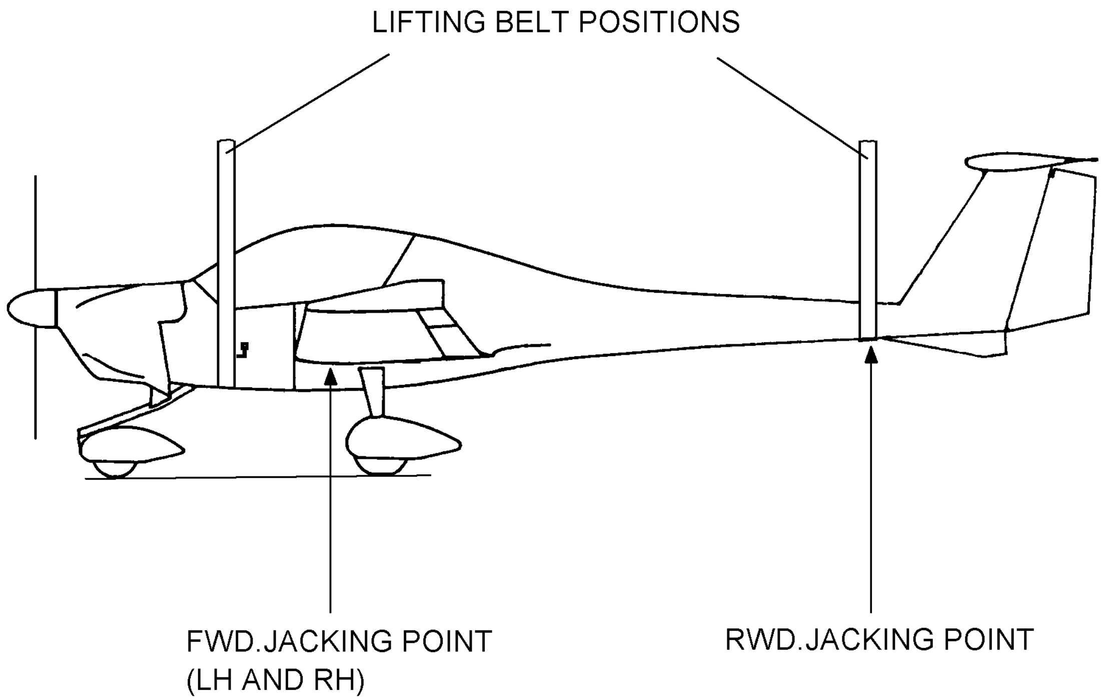

Figure 1 - Lifting Jacking Positions

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JACKING

1. General

Two jacking points are located at the bottom of the fuselage's root ribs. The rear is supported, using the proper support seat, by the third jack in front of the vertical stabilizer. Refer to Figure 1.

CAUTION: THE FRONT JACKS MAY ONLY BE USED IN CONJUNCTION WITH THE JACKING PLATES (PART NUMBER 20-1200-01-01).

2. Jacking the Airplane

The following must be observed when jacking the airplane:

(1) If the airplane is shored outside, it must be pointed into the wind.

CAUTION: DO NOT SHORE THE AIRPLANE IF THE AMBIENT WIND SPEED EXCEEDS 6 KTS.

(2) Position jacks with the proper seats at the correct positions under the fuselage.

(3) Remove chock blocks and release parking brake.

(4) Operate jacks simultaneously maintaining airplane in level position.

3. Lowering the Airplane

(1) Check if the space below and immediately above the airplane is clear.

(2) Lower the airplane evenly, by operating the jacks.

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CHAPTER 08
LEVELING AND WEIGHING

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LEVELING AND WEIGHING

1. General

To obtain the expected flight performance, flight characteristics and flight safety, the airplane must be operated within the permissible load and center of gravity envelope.

Therefore empty weight and corresponding center of gravity must be re-determined every time the airplane or its equipment is modified in a way that might influence its weight or center of gravity position.

Empty weight and corresponding center of gravity and useful load must be recorded in the Weighing Report (see DA20-A1 Flight Manual).

2. Leveling

Prior to weighing the airplane axes must be aligned horizontally and vertically by leveling the airplane.

Alignment of longitudinal axis: Template horizontal on the fuselage tube.

Alignment of lateral axis: Level on back rest of seat.

3. Weighing

The weighing may be performed using mechanical or electrical scales. The scale manufacturers' guide lines must be observed.

Preparations to be made before every weighing:

- Check that the equipment is complete and installed in the correct positions according to the equipment list.
- Clean and dry the airplane, and remove foreign objects such as tools, baggage, etc.
- Drain the fuel tank down to the unusable fuel quantity 2 liters / 0.53 US gal. (This may be done by fully draining the fuel tank first, using the fuel drain, and pouring the unusable fuel back into the tank.)
- Fill engine operating fluids (including coolant) up to the maximum markings.
- Position all control surfaces in neutral positions.

NOTE: The weighing should be performed in a closed room to prevent weighing error due to the influence of wind.

To determine the empty weight and the empty weight CG position, the airplane is to be positioned in the above mentioned pre-weighing condition, with the nose gear and each main gear on a scale. Ensure the aircraft is level longitudinally as illustrated on the weighing report (see Figure 1).

With the airplane correctly positioned, a plumb line is dropped from the leading edge of each wing at the root rib to the floor, join these two points to determine the reference datum (RD). From this line use a suspended plumb line aligned with each landing gear to measure the distances DN (nose gear), DL (left main gear) and DR (right main gear).

The following formulas apply:

Empty Weight: $W_T = W_N + W_L + W_R$ lbs (kg)

Empty Weight Moment: $M - W_N \times D_N + W_L \times D_L + W_R \times D_R =$ in lbs (m kg)

Empty Weight CG Position: $= \dfrac{\text{Empty Weight Moment}}{\text{Empty Weight}} = \dfrac{M}{W_T}$ in (m)

Additional information regarding the center of gravity calculations can be found in the Flight Manual.

NOTE: Items ahead of RD are considered to have a negative lever arm.
Items aft of RD are considered to have a positive lever arm.

4. Weighing Report

Model: DA 20 S/N: ___________________ Registration: ____________________

Data in accordance with TCDS and Flight Manual Reason for Weighing: _____________

Reference Datum: Leading edge of wing at root rib.

Horizontal reference line: 24” Spirit Level placed on Fuselage Canopy Rail (L or R), supported at the front by a 2 1/4” spacer as shown in Figure 1.

Weighing Conditions: including brake fluid, lubricant, coolant and unusable fuel (3.31 lbs/1.5 kg)
Equipment List dated: ___________________.

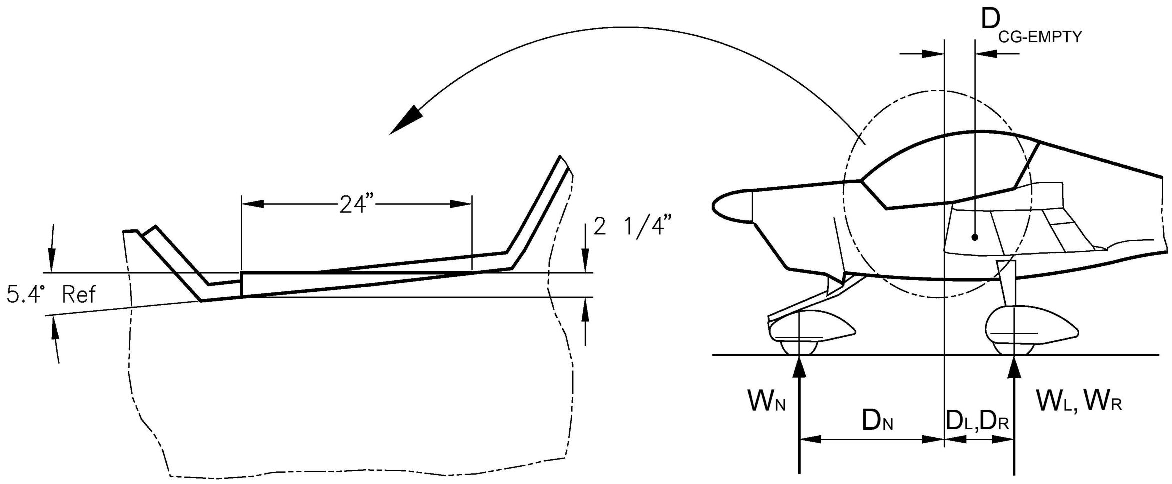

Figure 1 - Weighing Report

Support	Gross [lbs] ([kg])	Tare [lbs] ([kg])	Net Mass [lbs] ([kg])	Lever Arm [in] ([m])
Nose			W_N =	D_N =
Main Left			W_L =	D_L =
Main Right			W_R =	D_R =
Empty Weight $W_T = W_N + W_L + W_R$ = __________lbs (kg)				

Empty Weight Moment M - W_N x D_N + W_L x D_L + W_R x D_R = ____________in lbs (m kg)

Empty Weight CG Position $\dfrac{\text{Empty Weight Moment}}{\text{Empty Weight}} = \dfrac{M}{W_T}$ = ____________in (m)

(Positive results indicate, that CG is located aft of RD)

Maximum Permissible Useful Load:	Maximum Weight [lbs] ([kg]) Empty Weight [lbs] ([kg])	+ -
	Max useful Load [lbs] ([kg])	=

Data to be entered into the Airplane Flight Manual: Weight and Balance Report in Chapter 6.

Empty Weight [lbs] ([kg])	Empty- Weight-Moment [in lbs] ([kg m])

Place / Date:	Inspector’s Stamp:	Inspector’s Signature:

5. Permissible Empty Weight C.G. Range

The empty weight center of gravity must be within the limits listed in the table below.

Empty Weight	Max rearward empty weight CG position (mm/in aft of datum)	Max forward empty weight CG position (mm/in aft of datum)
490	400/15.75	288/11.34
495	400/15.75	288/11.34
500	400/15.75	287/11.3
505	400/15.75	287/11.3
510	400/15.75	287/11.3
515	400/15.75	286/11.26
520	400/15.75	286/11.26
525	400/15.75	286/11.26
530	400/15.75	285/11.22

CHAPTER 09
TOWING AND TAXIING

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TOWING AND TAXIING

1. General

Movement of the airplane on the ground is accomplished either by towing with a tow bar or by taxiing. To prevent damage to the airplane, it is of great importance to familiarize oneself closely with the towing and taxiing procedures.

2. Equipment and Accessories

The DA20-A1 is towed using a tow bar that is part of the standard equipment, and attached to the nose wheel. One person is capable of moving the airplane on a smooth, level surface using this equipment.

The arms of the tow bar can be spread open by hand and held closed with the sliding strap.

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TOWING

1. General

On the ground, the airplane can be moved manually or with a tow vehicle. The towing procedures are described below.

2. Towing Procedure

A. Towing without tow vehicle

Normally the DA20-A1 is moved manually using the tow bar. The following procedure should be followed:

(1) Attach the tow bar to the nose wheel strut and close.

(2) Release parking brake.

(3) Remove chocks.

(4) Move airplane to desired position.

(5) Position chocks in front of main wheels.

(6) Remove tow bar.

(7) Set parking brake.

B. Towing with a tow vehicle

When the airplane is moved with a tow vehicle, the following procedure must be followed:

(1) Attach the tow bar to the nose wheel strut and close.

(2) Attach tow bar to tow vehicle.

(3) Release parking brake.

(4) Remove chocks.

(5) Move airplane to desired position.

(6) Position chocks in front of main wheels.

(7) Remove tow bar from airplane and tow vehicle.

(8) Set parking brake.

NOTE: When towing the airplane with a tow vehicle, one person must always be in the cockpit to operate the brakes in an emergency.

CAUTION: THE NOSE WHEEL CAN BE DEFLECTED 30° TO EITHER SIDE. IF THIS ANGLE IS EXCEEDED, DAMAGE TO THE NOSE WHEEL MAY OCCUR.

WARNING: WHEN TOWING WITH THE TOW BAR ENSURE THAT THE TOW BAR CLAMPS ENGAGE THE NOSE WHEEL STRUT PROPERLY.

WARNING: NEVER MOVE THE AIRCRAFT BACKWARDS USING THE TOW BAR, AS THE NOSE WHEEL HAS A NATURAL TENDENCY TO DEFLECT LEFT OR RIGHT TO ITS FULL TRAVEL (30°) TO EITHER SIDE OF CENTER. TO MOVE THE AIRCRAFT BACKWARDS, PUSH THE TAIL DOWN TO RAISE THE NOSE WHEEL OFF THE GROUND AND HANDLE AS PER “C” BELOW.

C. Moving without Tow Bar

The airplane may be moved without using the tow bar. The DA20-A1 may be pushed at the wing-tips and at the wing-fuselage connection.

CAUTION: NEVER PUSH OR PULL ON THE CONTROL SURFACES

In the case of reduced freedom to maneuver two people can turn the airplane about the main wheels. One person must push down in front of the vertical stabilizer and turn the airplane while the other person is holding on to one wing tip.

CAUTION: EXCESSIVE FORCE ON THE PROPELLER OR CONTROL SURFACES MUST BE AVOIDED UNDER ANY CIRCUMSTANCES. WEIGHTS MAY NEVER BE PLACED ON THE TAIL UNIT TO RAISE THE NOSE WHEEL. IN ADDITION, WHEN THE WHEELS ARE OBSTRUCTED BY SNOW OR MUD, TOWING SHOULD BE AVOIDED.

TAXIING

1. General

The DA20-A1 is controlled with toe operated brakes during taxiing. In order to achieve very tight turning radii, the brake may be applied to individual wheels.

NOTE: The airplane may only be taxied by authorized personnel.

2. Taxiing Procedure

A. Remove all foreign object from the airplane area (tools, tool carts, etc.).

B. Remove chocks, mooring ropes, and tow bar if required.

C. Set parking brake by pulling the parking brake lever and operating the toe brakes.

WARNING: MAKE SURE THAT NO MAINTENANCE PERSONNEL OR OBSTRUCTIONS ARE IN THE IMMEDIATE AREA SURROUNDING THE AIRPLANE.

D. Start engine (see Flight Manual DA20-A1)

E. Release parking brake.

F. Check brake operation during taxiing.

CAUTION: THE AIRPLANE MUST BE TAXIED IN SUCH A WAY THAT A BRAKE FAILURE WILL NOT CAUSE THE AIRPLANE TO COLLIDE WITH ANY OBJECTS OR PERSONNEL.

CAUTION: THE SAFETY AREA FOR TAXIING OPERATIONS MUST BE OBSERVED.

CAUTION: ON UNEVEN GROUND, TAXIING OPERATIONS MUST BE PERFORMED ESPECIALLY CAREFULLY TO AVOID PROPELLER GROUND CONTACT. LOOSE STONES, GRAVEL OR SIMILAR MATERIAL MAY ALSO DAMAGE THE PROPELLER.

G. Taxi the airplane to the desired position.

H. Turn off engine (see Flight Manual DA20-A1).

I. Park the airplane and moor as required (see Chapter 10).

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CHAPTER 10
PARKING AND MOORING

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PARKING, MOORING, STORAGE AND RETURN TO SERVICE

1. General

To avoid possible damage to the airplane, the DA20-A1 should always be parked or moored while not in use. The pilot and maintenance personnel should thoroughly familiarize themselves with the procedures described in Chapters 10-10 and 10-20.

2. Equipment and Accessories

The following table lists the equipment required to park and moor the airplane.

Equipment	Purpose
4 Chocks	To prevent airplane from moving
2 Mooring Rings	Airplane mooring
3 Ropes (Nylon or Hemp)	Airplane mooring

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PARKING

1. General

The following parking procedures must be followed to protect the airplane when it is parked outside. The scope of the procedure depends on the parking time and weather conditions.

2. Short Term Parking

If the airplane is parked for a short period of time, the following procedure should be followed:

(1) Taxi or tow airplane to its parking position

(2) Align airplane into the wind.

CAUTION: DO NOT END THE TAXI OR TOW OPERATION WITH AN ANGLED NOSE WHEEL. THE NOSE WHEEL MUST ALWAYS BE ALIGNED BEFORE THE AIRPLANE COMES TO A STOP IN ORDER TO AVOID EXCESSIVE SIDE FORCES ON THE LANDING GEAR.

(3) In very gusty or stormy weather, moor the airplane (see Chapter 10-20).

(4) If the parking area is covered with packed snow or ice, pour a 5 mm (0.2 in.) layer of sand under the wheels.

CAUTION: DO NOT SET THE PARKING BRAKE WHEN THE BRAKES ARE OVERHEATED, OR THE DANGER OF THE BRAKES SEIZING UP EXISTS.

(5) Set parking brake.

(6) Position chocks before and behind main wheels.

(7) Release parking brake.

(8) Position all control surfaces in neutral position and install control surface lock as described in figure 1.

(9) Retract flaps.

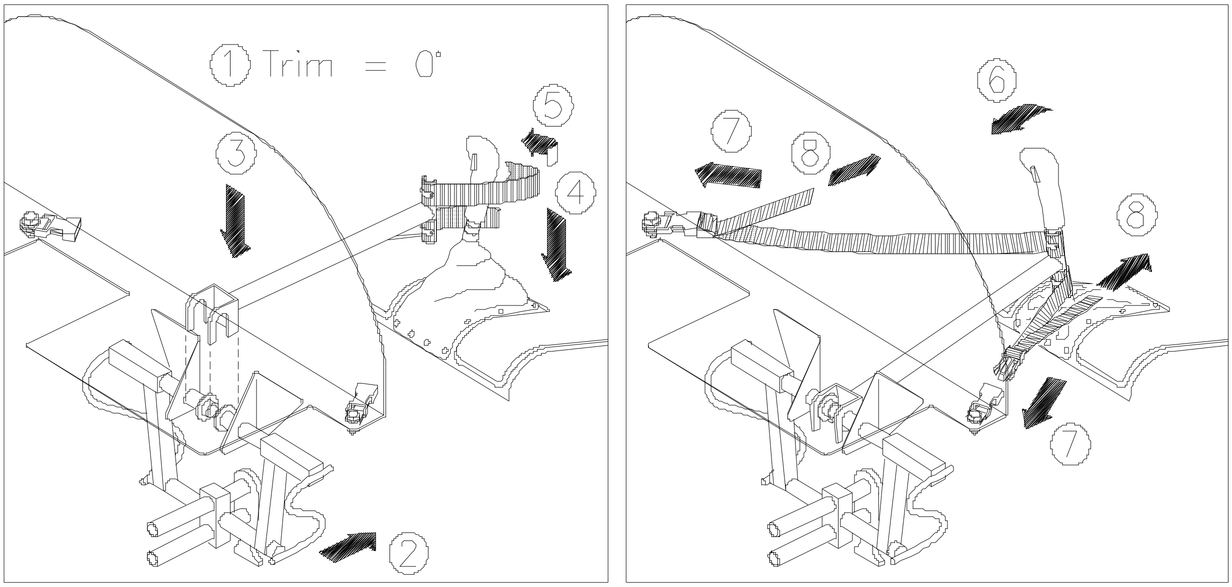
(10) Close and lock canopy.

A. Flight Control Lock Removal and Installation

Effective for aircraft serial number 10120 and up and aircraft with service bulletin DA20-10-01 incorporated.

A flight control lock, P/N 20-1000-01-00, is provided with each aircraft and should be installed whenever the aircraft is parked.

NOTE: Failure to install the flight control lock whenever the aircraft is parked may result in control system damage, due to gusts or turbulence from other aircraft.



(1) Trim aircraft to zero (0) degrees.

(2) Pull the left rudder pedals fully aft and check they are locked in position.

(3) Hook the Control Lock's forks over the rudder pedal tubes as shown above.

(4) Push down the Control Stick's leather boot to expose the Control Stick tube, and push the Control Stick forward against the Control Lock.

(5) Loop the straps around the Control Stick as shown, and push forward on the Control Stick.

(6) Clip the straps into the left and right buckle receptacles located under the instrument panel.

(7) Adjust the straps as required. Straps should be tight to secure the controls properly.

(8) TO REMOVE, push the Control Stick forward (to relieve strap tension). Unclip the straps and remove the Control Lock. Store in the aircraft's baggage compartment.

3. Long Term Parking

If the airplane is parked for long periods of time, danger of wheel bearing corrosion exists. To prevent this, the wheels of the lifted airplane (Chapter 07) should be turned three to four revolutions. Parked airplanes should be moved by pushing or towing.

To prevent flat spots and other deformations which may lead to irregular running or oscillations, the wheels should be positioned at a new position according to the instructions above.

The frequency of the movement depends on the weather conditions. It should be performed daily in cold weather, and weekly in warm weather.

NOTE: Check Chapter 10-30 for procedures required for longer parking durations.

MOORING

1. General

Whenever the airplane is parked outside for extended periods of time, it should be moored. Unexpected strong gusts or heavy winds can cause severe damage to an airplane that is not moored.

2. Mooring

The airplane has three mooring points; one under each wing and one on the skid plate.
Refer to figure 1.

To moor the airplane, proceed as follows:

(1) Park the airplane as described in Chapter 10-10.

(2) Ensure that flaps are retracted.

(3) Screw mooring rings into the adapters below the wings.

(4) Attach ropes.

CAUTION: WHEN USING HEMP ROPES KEEP IN MIND THAT THE ROPES WILL TIGHTEN THEMSELVES UNDER THE INFLUENCE OF MOISTURE. THIS IS OF SPECIAL IMPORTANCE WHEN MOORING THE AIRPLANE TO SECURE GROUND ANCHORS.

CAUTION: DO NOT USE CHAINS OR STEEL CABLE.

CAUTION: MOOR THE AIRPLANE AT THE PROVIDED MOORING POINTS ONLY.

(5) Remove all foreign objects that may damage the airplane

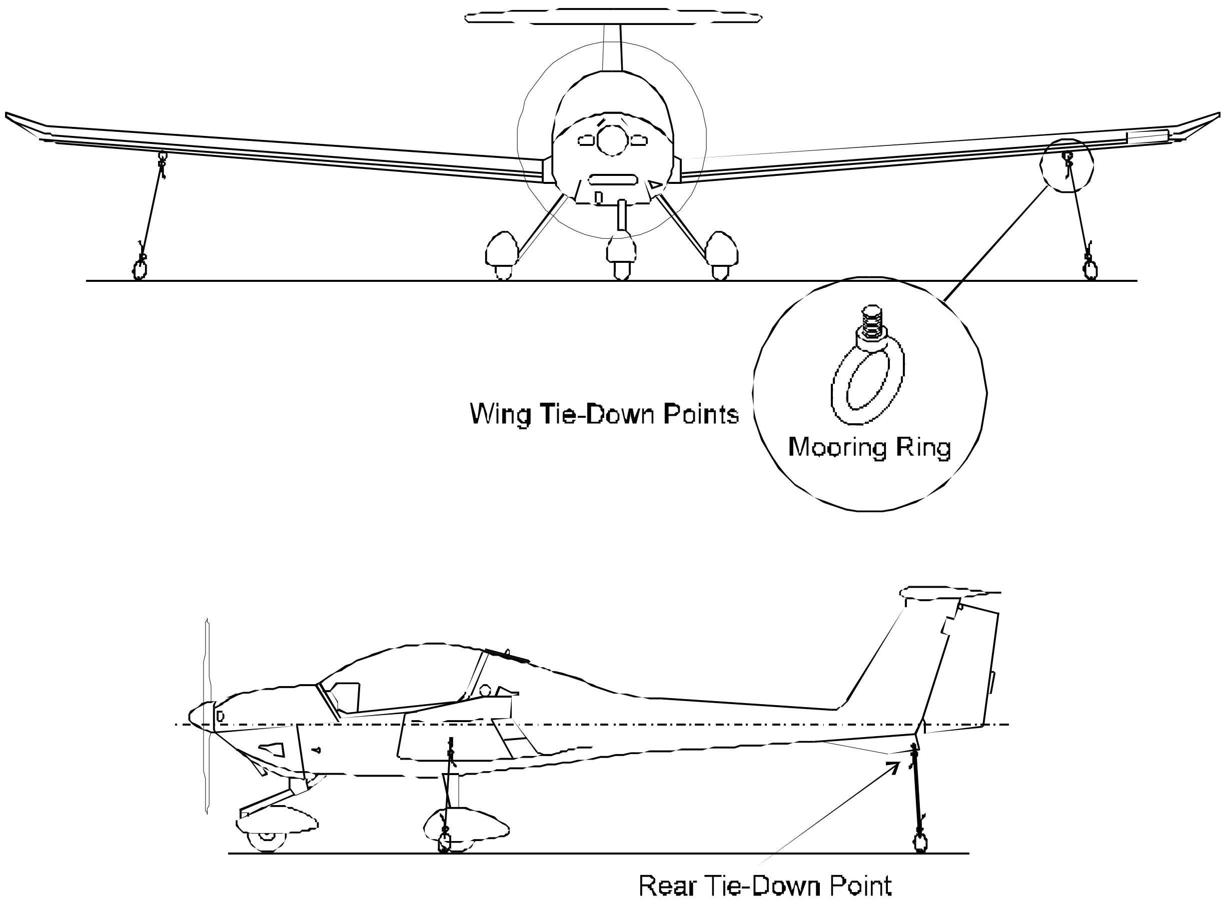


Figure 1 - Location of Mooring Points on the Airplane

PARKING DURATION

1. Parking Over 30 Days

For parking over 30 days the following maintenance work is required:

A. Engine Preservation and De Preservation

See Operator's Manual for the Rotax engine.

B. Fuel Supply

The fuel tank must be filled completely. Check for water in the tank each week.

C. Landing Gear, Wheels and Tires

- Main and Nose Landing Gear

No special procedures are required for the main and nose landing gear.

- Wheels

The wheels should be turned three to four revolutions to prevent corrosion.

- Tires

(1) Wipe tires with dry cloth, and treat with tire protector spray.

(2) Turn wheels. Mark tire position and date with chalk.

(3) Air pressure: daily visual inspection, check weekly or during take off preparations.

D. Electrical System

After 30 days of storage: remove battery and perform maintenance, as per Sub-Chapter 12-10.

E. Lubrication

Before storing the airplane, lubricate according to the Lubrication Schedule in Chapter 12-20.

F. Instruments

Instruments remain installed in the airplane.

G. Loose Equipment

Collect all loose equipment and store.

H. Electronic Equipment

No special procedure required.

I. Airplane Ventilation

Vent the airplane thoroughly before parking.

J. Parking and Mooring

See Chapter 10 20.

CHAPTER 11
REQUIRED PLACARDS

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REQUIRED PLACARDS

1. General

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

This chapter describes the location of the placards on the interior and exterior surfaces of the airplane.

Self adhesive plastic foil is used for all placards except for the metal manufacturers placard, located on the skid plate.

Placards with poor readability or other damage must be replaced.

2. Materials

All placards are made of self adhesive plastic foil.

3. Replace the Plastic Foil Placards

A. Material

Item	Quantity	Part Number
Solvent	A/R	Commercial

B. Replace a Placard

	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.	Do not overheat the surrounding structure.
WARNING: DO NOT GET SOLVENT ON YOUR SKIN. DO NOT BREATH SOLVENT VAPOR. SOLVENT CAN CAUSE DISEASE OR ILLNESS.		
2.	Clean the surface in the area of the placard installation	Use a commercial solvent. There must be no dirt or oil on the surface.
3.	Remove the protective backing from the new placard.	
4.	Install the new placard in the correct position.	

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LOCATION OF PLACARDS

1. General

In addition to the fire proof identification plate, the following placards are installed:

On the instrument panel next to airspeed indicator

NOTE: Ensure correct applicability of placard, depending on national limitations

This airplane is classified as a very light airplane approved for VFR only, in non-icing conditions. All aerobatic manoeuvres, except for intentional spinning which is permitted with flaps UP only, are prohibited. See Flight Manual for other limitations.

OR

This airplane is classified as a very light airplane approved for Visual Meteorological Conditions only, in non-icing conditions. All aerobatic maneuvers, except for intentional spinning which is permitted with flaps UP only, are prohibited. See Flight Manual for other limitations.

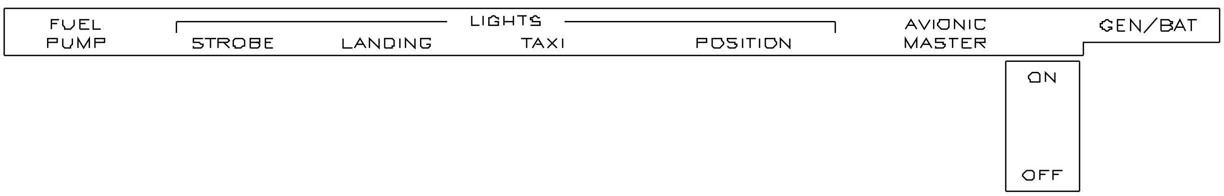
Effective for all aircraft operating strictly under JAR VLA regulations:

This airplane is classified as a very light airplane approved for day VFR only, in non-icing conditions. All aerobatic maneuvers, including intentional spinning, are prohibited. See Flight Manual for other limitations.

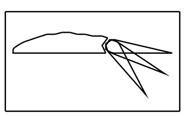
On the instrumentpanel under the airspeed indicator

Maneuvering speed V = 104kts

Next to the Swiches



On the Flap Control



Flaps

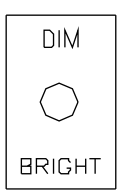
CRUISE

T/O

LDG

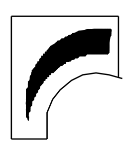
On the Dimming Switch

for trim display, flap control and GPS (if installed)



Next to the Dimming Potentiometer

for cabin and fuel shut off valve light



On the instrument panel next to the individual circuit breakers

CHT/OIL PRESS								
OIL TEMP FUEL QTY OAT	COM/NAV 1							
FUEL PUMP	COM/NAV 2		COM/NAV 1					
LANDING LIGHT	ATC		ATC					
TAXI LIGHT	ICS		ICS					
INTERNAL LIGHTS	AVIONICS MASTER		AVIONICS MASTER					
POSITION LIGHTS	AVIONICS MASTER CONTR.	OR*	AVIONICS MASTER CONTR.					
ACL	HORIZON		HORIZON					
START	D.G.		D.G.	ADF		COM/GPS 2		COM/NAV 2
GEN. CONTROL	TURN & BANK		TURN & BANK	DME	OR*	DME	OR*	DME
GEN.	FLAPS		FLAPS	MARKER		MARKER		MARKER
BATTERY	TRIM		TRIM	GPS		ADF		ADF

* Depending on aircraft specific avionic equipment configuration

On top of the instrument panel under the compass

FOR	N	30	60	E	120	150
STEER						
FOR	S	210	240	W	300	330
STEER						
DATE						Airpath

Around Trim Display on top of the instrument panel

TRIM

NOSE UP

NEUTRAL

NOSE DOWN

On top the instrument panel within pilot's direct line of vision

No smoking!

On DME channeling switch on the RH side of the radio stack (optional)

DME CH
NAV 1

NAV 2

Above RH air vent on the instrument panel (optional)

FAN

OFF

Above the OAT indicator

O.A.T.

Below Microphone jack on the LH of the instrument panel

Mic

On the fuel quantity gauge

Usable
77L/20.3 US gal.

Next to GPS (if installed)

GPS limited for VFR only

Under the instrument panel next to the individual knobs

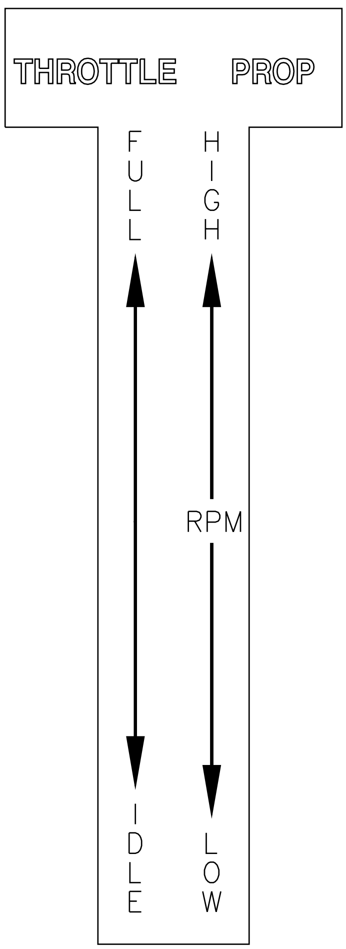
CABIN HEAT
Pull–ON

CHOKE
Pull–ON

CARB HEAT
Pull–ON

PARKING BRAKE
Pull

On the centre consol between throttle and propeller levers

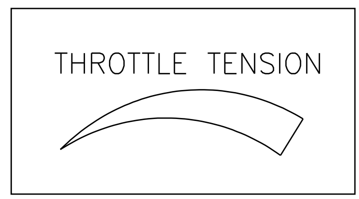


Next to fuel shut-off valve in correct position

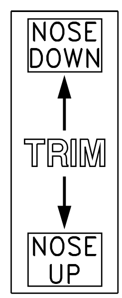
Fuel Valve
CLOSED

Fuel Valve
OPEN

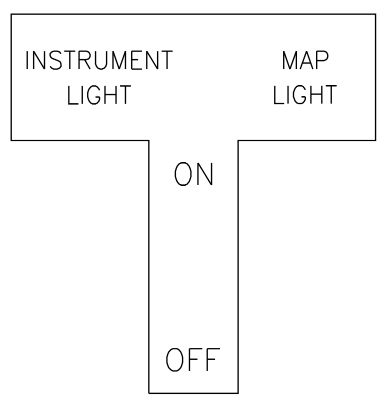
On the side of the throttle quadrant next to tension adjustment knob



Next to trim switch on the centre console



Next to instrument and map light switches on the centre console



Next to canopy release handles

Inside Left (partially coloured red)

TO OPEN CANOPY PULL
BOTH LOCKING HANDLES
BACKWARD
CLOSE OPEN

Inside Right (partially coloured red)

TO OPEN CANOPY PULL
BOTH LOCKING HANDLES
BACKWARD
OPEN CLOSE

Outside Left

TO UNLOCK
SLIDE HANDLE BACKWARD

Outside Right

TO UNLOCK
SLIDE HANDLE BACKWARD

EMERGENCY OPENING
1. SLIDE HANDLE BACKWARD
2. PULL EMERGENCY LEVER FULLY
FORWARD AND LIFT UP CANOPY

EMERGENCY LEVER

Canopy Locked Position Placard inside LH

UNLOCKED LOCKED
(Red Background) (Green Background)

Canopy Locked Position Placard inside RH

LOCKED UNLOCKED
(Green Background) (Red Background)

Next to ELT (if installed) to indicate switch position

for EBC 102A ELT model

ELT
OFF
ON TEST

for EBC 502 ELT model

ELT
ARM
ON OFF

Next to Headset Jacks on the Back Rest

Pilot side (LH)

PILOT
Headphone Mic

Co-pilot side (RH)

CO-PILOT
Mic Headphone

On the LH side of baggage compartment

MAX. BAGGAGE - 44 lbs (20kg)

ONLY WITH BAGGAGE NET

On the brake fluid reservoirs (rudder pedals)

Hydraulic
Fluid 4

On underside of lid of oil access hole cover (colored red)

CAUTION

DO NOT USE AVIATION
GRADE OIL !

On oil filler cap

OIL 3.4 l

SAE 15W-40
OR ACCORDING TO
FLIGHT MANUAL

On coolant equalizing reservoir

COOLANT

On coolant dispatcher vessel

DO NOT
ADD WATER
TO THIS SYSTEM
STOP!
EVANS NPG+
WATERLESS
COOLANT ONLY

Next to fuel filler cap (for aircraft with Rotax 912S engine installed)

DISPATCHER VESSEL
DO NOT OPEN

Next to fuel filler cap (for aircraft with engines other than Rotax 912S installed)

79L/20.9 US gal. AVGAS 100LL
USABLE 77L/20.3 US gal.

TOTAL QTY: 76 Liters/20.1 US Gals.
USABLE QTY: 74 Liters/19.5 US Gals.

- AVGAS 100LL
- AUTOMOTIVE GASOLINE
  UNLEADED, MIN 95 RON/91 AKI

(Any mixtures of the above are permissible
Refer to Flight Manual for Specifications)

On fuselage upper skin behind cockpit (only if ELT is installed), colored yellow

EMERGENCY
LOCATOR TRANSMITTER
INSTALLED HERE
ICI L'ELTHERE
EMPLACEMENT
DE LA RADIOBALISE
DE DETRESSE

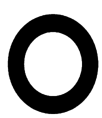
On fuselage underside (belly), by left wing

FUEL DRAIN

Under each wing and tail skid plate

TIE DOWN

Around Stall Warning Hole in left wing



On Nose Landing Gear Strut

1.8 bar
26 psi
180 kPa

On Main Landing Gear Strut

2.3 bar
33 psi
230 kPa

CHAPTER 12

SERVICING

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SERVICING

1. General

This chapter describes the servicing tasks which are performed on the ground.

Servicing on the ground in general includes replenishing and the periodic lubrication of component groups. Other tasks which are performed during ground services are also described in this chapter.

Detailed procedures for preventive and corrective maintenance of the individual systems are described in the respective Chapters of this manual.

Chapter 05 comprises the inspection intervals of all maintenance tasks.

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REPLENISHING

1. Fuel System

A. Refueling

Fuel for the DA20-A1 is supplied from a fuselage mounted fuel tank with a capacity of 20.1 US gal (76 liters). The aluminum welded fuel tank is located between the spar bridge - and B-bulkhead below the baggage compartment floor.

Refueling of the DA20-A1 is performed via a filler neck located on the left side of the airplane, integrated into the fuselage.

During re-fueling, the following must be observed:

- Airplane as well as fuel supply (fuel truck, filling station, etc.) must be grounded (ground connection on engine exhaust pipe).
- Fire extinguisher must be available.
- All ground equipment located in the re-fueling area must be switched off.
- Operation of electrical switches is not permitted.
- Only fuel types in accordance with the Flight Manual, Chapter 2 should be used.

B. De fueling

Fuel is drained via the drain valve located at the lowest point of the tank. Open lid over inspection hole and open drain valve. A sufficient number of canisters should be available for the fuel to be drained. The fuel tank sump is also drained via the drain valve. In principle the same safety procedures as described in A. should be observed.

2. Oil System

CAUTION: DO NOT USE AVIATION GRADE ENGINE OIL.

CAUTION: USE ONLY OIL WITH API CLASSIFICATION SF OR SG OR HIGHER.

CAUTION: DUE TO HIGH STRESSES IN THE REDUCTION GEARS, A 4 STROKE MOTORCYCLE OIL OF A REGISTERED BRAND WITH GEAR ADDITIVES THAT MEETS API CLASSIFICATION SF OR SG ARE HIGHLY RECOMMENDED.

CAUTION: WHEN OPERATING WITH AVGAS100LL FUEL, DO NOT USE SYNTHETIC OIL.

CAUTION: DO NOT USE ANY ADDITIONAL OIL ADDITIVES.

CAUTION: FOR ADDITIONAL INFORMATION ON THE SELECTION OF SUITABLE LUBRICANTS, REFER TO ROTAX SERVICE INFORMATION 18 UL 97 (OR MORE RECENT ISSUE).

The engine installed in the DA20-A1 is equipped with a dry sump pressure lubrication system with a capacity of 3.4 liters (3.6 US quarts), including oil in oil filter. The filler cap of the oil tank is located on the right hand side of the engine behind cylinder No. 3. It can be reached by opening the lid in the upper right engine cowling. A dipstick is located in the tank indicating the oil level with min/max markings. The difference between the markings represents 1 liter (approx. 1 US quart).

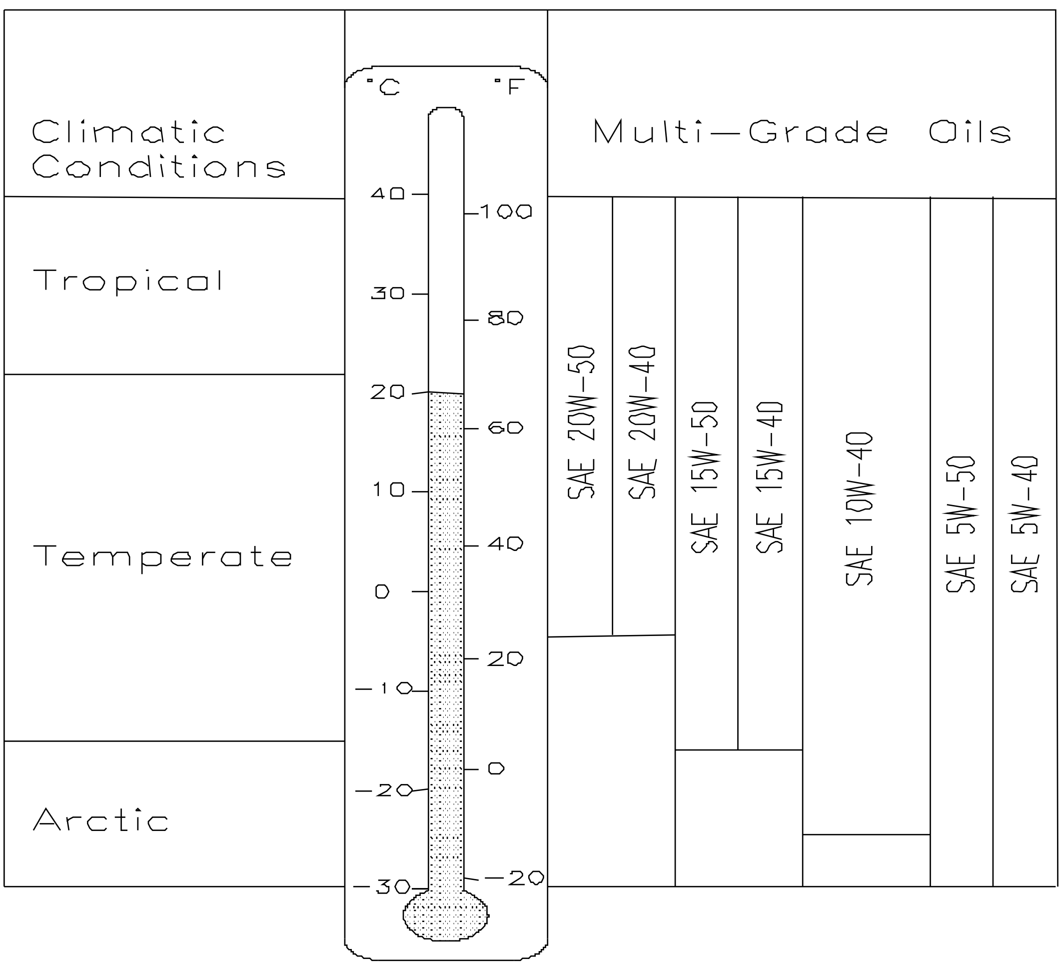

Figure 1 - Oil Viscosity Chart

WARNING: DO NOT TURN THE PROPELLER IN THE OPPOSITE DIRECTION OF NORMAL ROTATION OF OPERATION.

To check the oil level, remove the oil tank cap and turn the propeller by hand in the normal rotation of operation. This is to transfer all the oil from the engine crankcase to the oil tank.

The process is finished when crankcase air can be heard being forced back to the oil tank. The sound will be noticed as a gurgle coming from the oil tank with the oil cap removed. The sound verifies that the crankcase has been purged of residual oil. Remove the oil dip stick, clean and reinsert. Let the oil dip stick sit for a few seconds then remove verifying the oil level is in the middle of the level marks. Refill oil if required.

Pre and post flight inspection includes checking of the oil level using the dipstick described above.

3. Brake System

Servicing of the brake system is limited to checking and refilling of brake fluid. The brake fluid reservoirs are located on the brake cylinders on the co pilot's side.

CAUTION: REMOVE ANY DIRT ON THE BRAKE FLUID RESERVOIR FILLER CAPS BEFORE OPENING.

BRAKE FLUID SPILLED MUST BE REMOVED IMMEDIATELY AS IT DAMAGES PAINT UPON CONTACT.

Remove reservoir filler caps to add fluid. In the event that the fluid level is found to be low, the reason for loss of brake fluid must be determined.

Only brake fluid meeting the MIL H 5606A specification should be used.

4. Tires

The DA20-A1 landing gear is equipped with tires of the size

Main Landing Gear

5.00-5

Nose Landing Gear

5.00-4

The tire pressure on the main landing gear wheels is 33 psi (227 kPa), on the nose wheel 26 psi, (179 kPa). To reduce any damage to the tires due to landing shocks or stones with sharp edges and to increase the life time of the tires, the tire pressure should be checked at regular intervals.

A visual tire inspection should be performed each time the tire pressure is checked including visually checking the red slip markings on the main wheels.

5. Battery

The battery mount holding a 12 Volt battery is installed to the front left hand side of the firewall. The battery provides power for the engine starter. Furthermore it allows the electrical consumers to be operated while the engine is off. The standard battery has a capacity of 20 amp.hr.

CAUTION: THE BATTERY SHOULD ONLY BE REFILLED USING DISTILLED WATER UP TO THE MAXIMUM LEVEL AS MARKED ON THE BATTERY.

Battery charge and fluid level should be visually inspected at regular intervals. This battery inspection is normally included in the 100 hour and 200 hour inspection (refer to Chapter 05 20).

During the above mentioned battery inspection, the battery terminals should be cleaned and lubricated, with suitable compound. In addition the battery cable connector lugs should be inspected.

NOTE: The battery should be removed from the airplane prior to a battery inspection.

Battery and battery mount must be kept clean and dry at all times. For cleaning of both parts, use clear water and wipe dry afterwards. It should also be checked in regular intervals that the breather tube is clean and operative

6. Cooling System

A. Adding Coolant

CAUTION: WATER OR WATER-CONTAINING COOLANT MUST NOT BE ADDED IN ANY CASE TO THE COOLING SYSTEM.

Prior to adding coolant, the reason for the loss of the liquid must be investigated and corrected (e.g. leaky hose connections).

Use only EVANS NPG+ waterless coolant.

NOTE: The coolant manufacturer's data for change/replacement, usage, and operation are to be observed.

When the engine is cold, open the pressure cap on top of the engine and fill the dispatcher vessel up completely. To gain access to the dispatcher vessel, engine cowlings must be removed, refer to chapter 71. The level in the equalizing reservoir must not exceed the maximum marking.

After the first top up, close the pressure cup and let the engine run for approximately 3 minutes at increased idle speed. Then fill up dispatcher vessel completely as described above.

The maximum coolant quantity is 2.5 liters (2.6 US quarts).

Before closing the pressure cap check the condition of the rubber sealing rings.

Draining of the cooling system is performed by opening the hose connection on the radiator on the lower right hand side. Refer to Chapter 75.

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SCHEDULED SERVICING

1. Fuel System

This chapter describes the procedures for lubricating those areas which require lubricating and identifies the items which must not be lubricated. The DA20-A1 is equipped with sealed roller bearings with lifetime lubrication, as well as with friction bearings (Teflon bushings). Lubrication of points requiring service are shown in table 2.2.

2. Lubrication Schedule

Prior to lubrication all lubrication points must be cleaned.

Explanation of the Lubrication Schedule

The complete flight control system and all other mechanical systems are, with a few exceptions, equipped with maintenance free friction bearings and rod end bearings. However, these bearings and joints should be inspected regularly, (especially under tough climatic conditions such as airborne sand, saltwater concentrations in the air etc) and replaced as required.

- Lubrication points listed on the left side of the table are shown in figure 2.1 and 2.2.
- Lubrication intervals are listed on the right hand side of the table.
- Applicable notes and lubricant types referenced in the table are listed following the table.

CAUTION: DO NOT LUBRICATE.

See Table 2.1

CAUTION: DAMAGE MAY BE CAUSED BY LUBRICATION OF THE ITEMS LISTED BELOW.	
Rudder Pedal Sled	DO NOT LUBRICATE
Flap Hinges and Rod End Bearings	DO NOT LUBRICATE
Aileron Hinges and Rod End Bearings	DO NOT LUBRICATE
Elevator Hinges and Rod End Bearings	DO NOT LUBRICATE
Nose Wheel Bearings (8)	DO NOT LUBRICATE

Table 2.1

CAUTION: APPLY LUBRICANTS, GREASES AND CORROSION INHIBITORS TO AREAS SPECIFIED BUT PREVENT UNNECESSARY CONTACT WITH COMPOSITE STRUCTURE.

Lubrication Schedule								
	Location	Type of Lubricant						Interval
No.	See Figure 1 and 2	1	2	3	4	5	6	(Hours) (1), (2)
1.	Brake Pedal Pivot		•					200
2.	Rudder Cable S-tubes			•				200
3.	Flap Actuator Extension Rod			•				200
4.	Upper Rudder Pivot Bearing	•						200
5.	Upper NLG Pivots (Left and Right) (4)	•						1000
6.	NLG Transverse Tube Interior (3) (4)					•		1000
7.	NLG Fork Pivot (4)	•						1000
8.	Main Pin Hook Retainer		•					200
9.	Main Pins		•					1000
10.	Anti-Servo Tab Piano Hinge		•					100
11.	Anti-Servo Tab Horn and Push Rod Ball and Socket ends		•					100
12.	Emergency Canopy Release Cable and Lever		•					1000
13.	Bowden Cables		•					200
14.	Battery Terminals				•			1000
15.	B-bolt Shank and Mid-bar end fitting (5)					•		1000
16.	B-bolt under Spherical Bearing (not threaded) (6)	•						1000
17.	B-bolt Spherical Bearing	•						1000
18.	A-Bolt (not threads) (6)	•						1000
19.	A-bolt Spherical Bearing	•						1000
20.	Brake Pedal pivot shaft interior					•		1000
21.	Flap Actuator universal pivot block	•						1000
22.	Brake Caliper Locating pins						•	1000
23.	Stick Support pivot pins	•						1000
24.	Main Wheel Bearings (7)	•						200
25.	Cable eyes on rudder	•						200

Table 2.2

NOTES:

(1) Lubrication at indicated interval or at every disassembly or assembly.

(2) More frequent lubrication is required in severe climates and operating conditions.

(3) Many aircraft were assembled at the factory with Mastinox 6856K (yellow in colour) in lieu of TYPE 5 corrosion inhibitor in the nose gear transverse tube area only. Remove all Mastinox 6856K residue when applying the TYPE 5 Inhibitor at subsequent intervals. Do not mix products!

(4) At interval or annual.

(5) Many aircraft were assembled at the factory with TYPE I grease on the B-bolt shank and midbar end fitting. Remove all TYPE 1 residue when applying the TYPE 5 inhibitor at subsequent intervals. Do not mix products! Thoroughly clean the assembly before reapplication to avoid erroneous B-bolt torque readings.

(6) Keep threads free of TYPE I grease to avoid degrading locknut performance.

(7) The main wheel bearings are packed with AeroShell Grease 22 by the wheel manufacturer. TYPE 1 grease is completely compatible for this application.

(8) The nose wheel bearings are sealed and maintenance free

.

Specification	Product	Manufacturer
TYPE 1		
MIL-G-3545 (obsolete)	AeroShell Grease 5	Shell Canada Products Limited P O Box 100 Station M Calgary, Alberta, T2P 2H5 Canada Shell Oil Co P O Box 2463, One Shell Plaza Houston, TX 77001, USA
TYPE 2		
MIL-L-7870	Royco 363	Royal Lubricants Co Inc. River Road East Hanover, NJ 07936, USA
	Brayco 363	Bray Oil Company 3344 Medford St Los Angeles, CA 90032, USA
Warm climates only	LPS 2	LPS (Canada) 378 Hersey Crescent Bolton, ON, L7E 4A1, Canada 1-800-241-8334 LPS (Corporate Office) 4647 Hugh Howell Rd Tucker, GA 30084, USA 1-800-543-1563
TYPE 3		
Greaseless Lubricant	LPS 1	LPS (Canada) 378 Hersey Crescent Bolton, ON L7E 4A1, Canada 1-800-241-8334 LPS (Corporate Office) 4647 Hugh Howell Rd Tucker, GA 30084, USA 1-800-543-1563

Specification	Product	Manufacturer
TYPE 4		
VV-P-236 (petrolatum)	Royco 1	Royal Lubricants Co Inc. River Road East Hanover, NJ 07936, USA
	DC 4	Dow Corning S Saginaw Rd Midland, MI 48641, USA
TYPE 5		
MIL-C-16173 (grade 2)	LPS 3	LPS (Canada) 378 Hersey Crescent Bolton, ON L7E 4A1, Canada 1-800-241-8334 LPS (Corporate Office) 4647 Hugh Howell Rd Tucker, GA 30084, USA 1-800-543-1563
TYPE 6		
MIL-A-907	Loctite Antisieze 767	Loctite Canada Inc 270 Britannia Rd East Missisauga, ON L4Z 1S6, Canada (416) 890-6511 Loctite Corp (Industrial Group) 705 North Mountain Rd Newington, CT 06111, USA (203) 278-1280

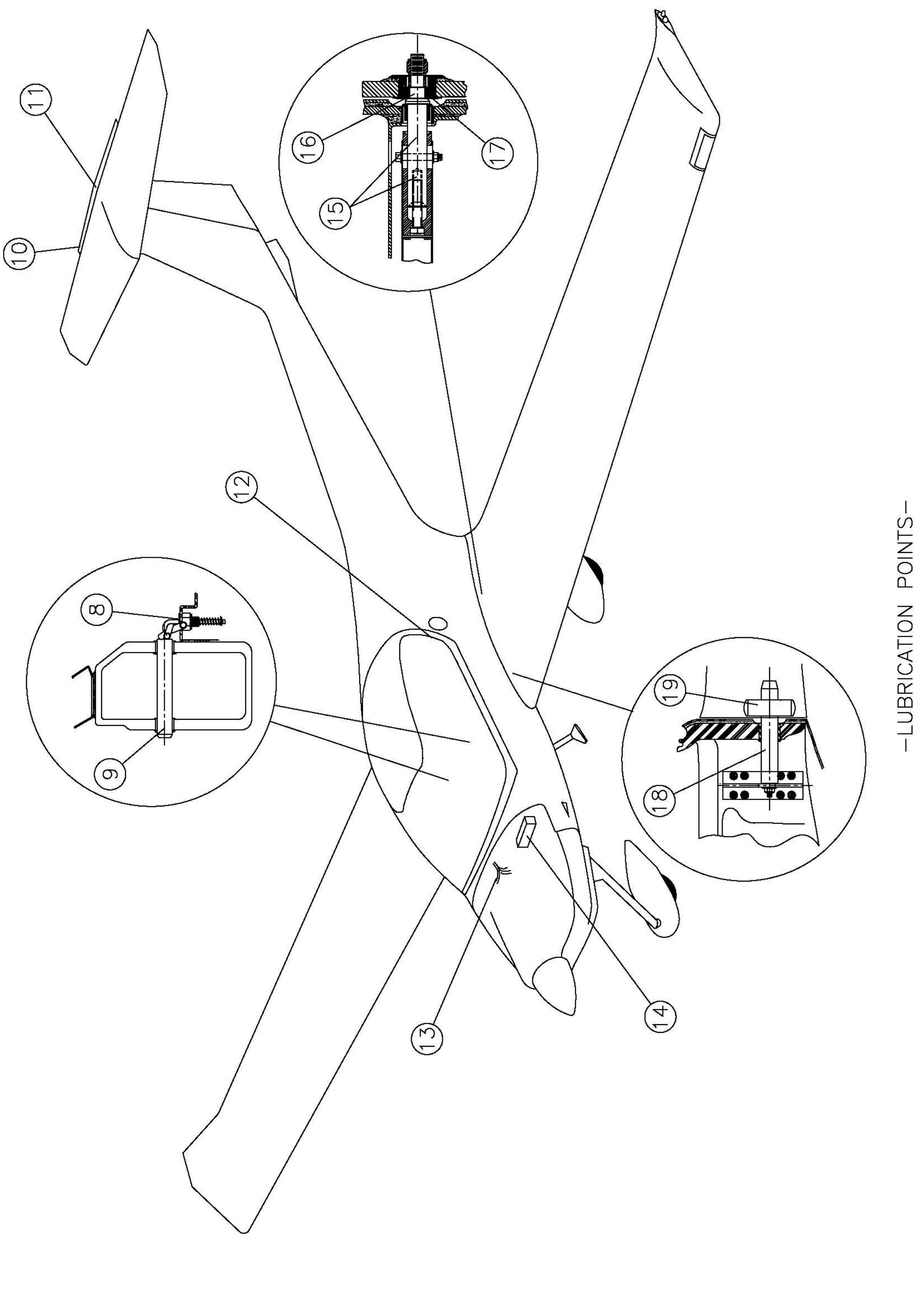

Figure 2.1

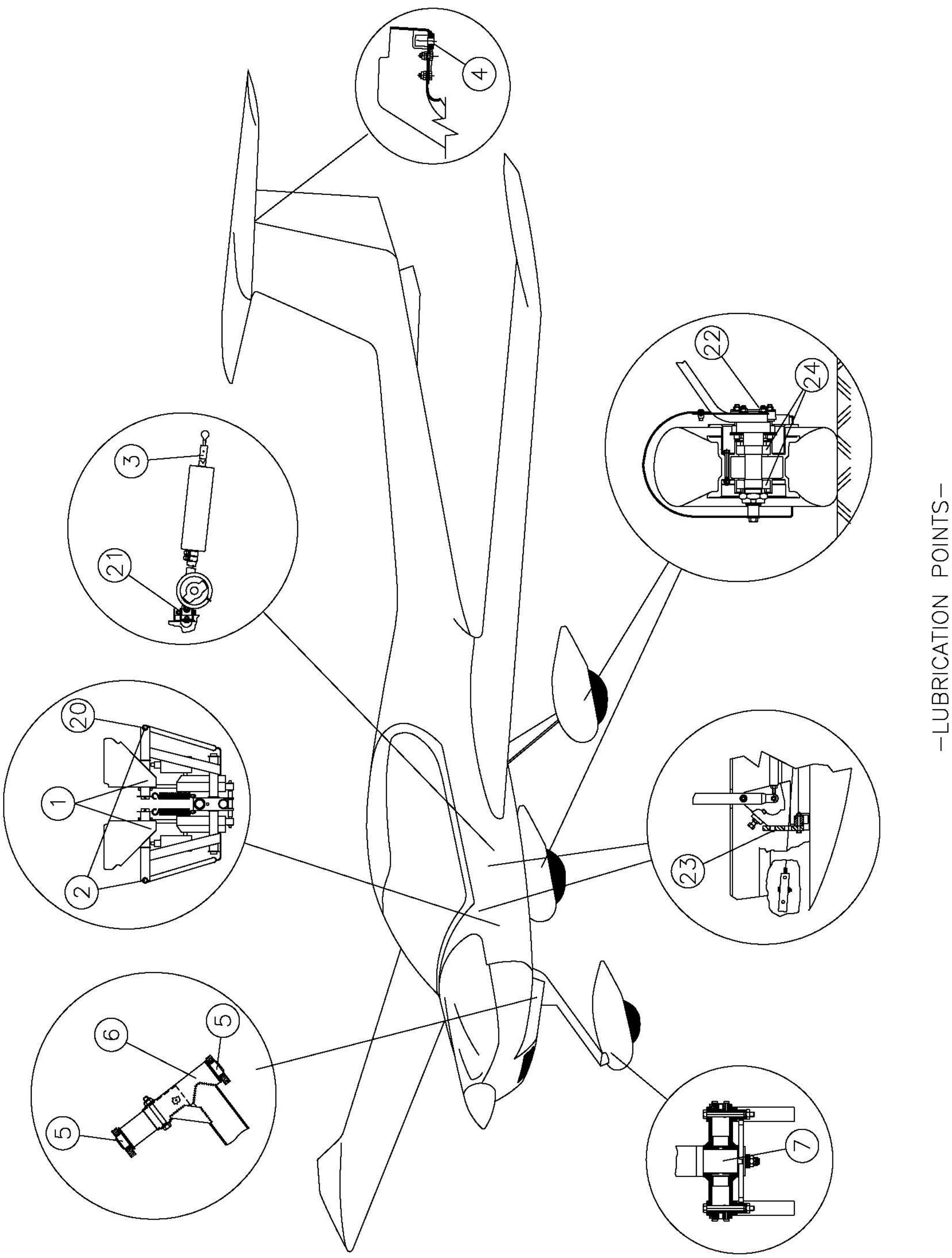

Figure 2.2

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UNSCHEDULED SERVICING

1. Cleaning, Exterior

To achieve the best flight characteristics for the DA20-A1, a clean external surface is most important. For this reason it is highly recommended that the airplane, especially the leading edge of the wings are kept clean at all times.

For best result, the cleaning is performed using a generous amount of water. If necessary, a mild cleaning agent can be added. Excessive dirt such as insects etc. are best cleaned off immediately after flight, because once dried they are difficult to remove.

Approximately once a year, the surface of the airplane should be treated and buffed using a silicon free automotive polish.

CAUTION: DO NOT USE ANY CLEANING AGENTS CONTAINING SILICON BASED MATERIALS.

Cover all lubricated and oiled surfaces prior to the cleaning procedure.

For cleaning the Plexiglas canopy, in principal the same rules should be applied as for the outside surface of the DA20-A1. The cleaning should be performed using plenty of water, and with only clean sponges and chamois. Even the smallest dust particle can cause scratch marks.

CAUTION: NEVER RUB OR POLISH DRY PLEXIGLAS.

Dull or scratched parts of the canopy may be polished using a special Plexiglas polishing paste. Scratches can be removed by using special polishing emery cloth (e.g. micro mesh).

2. Cleaning Interior

Seat covers and floor should be vacuumed at regular intervals.

3. Engine Cleaning

For cleaning of the engine a cold cleaning agent should be used.

CAUTION: MAKE SURE THAT THE ENGINE CLEANING AGENT DOES NOT GET INTO THE INSTRUMENTS AND COMPONENTS: IGNITION SYSTEM, GENERATOR, STARTER, AIR INTAKES.

FURTHERMORE, IT MUST BE ENSURED THAT THE ENGINE IS STARTED ONLY AFTER ALL OF THE CLEANING SOLUTION HAS EVAPORATED.

4. Snow and Ice Removal

After snow has collected on the airplane it should be removed as soon as possible to prevent melted water from refreezing on the surface, or in any gaps.

CAUTION: DO NOT USE SHARP OBJECTS TO REMOVE SNOW OR ICE.

If ice has formed, it is recommended that the ice is melted by placing the airplane in a heated hangar.

Commercially available Ethylene Glycol or Propylene Glycol aircraft de-ice solutions prepared and applied according to the product manufacturer instructions may be used to aid in the removal of ice. Collect and dispose of fluid in accordance with applicable laws and regulations.

WARNING: NEITHER OF THESE PRODUCTS PROVIDES "HOLDOVER TIME". HOLDOVER TIME IS THE ESTIMATED AMOUNT OF TIME A FLUID WILL PREVENT ICE AND SNOW FROM REFORMING ON SURFACES UNDER FREEZING PRECIPITATION CONDITIONS.

CHAPTER 20

STANDARD PRACTICES - AIR FRAME

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STANDARD PRACTICES - AIRFRAME

1. General

The design of the structure does not call for a special maintenance procedure. Therefore this chapter only describes the bolts and screws used in the DA20-A1 and give information on prescribed torque values and associated measuring technique details.

2. Bolt and Nut Types Used in the Aircraft

The bolts used in the DA20-A1 are of AN, MS and DIN specifications which can be identified by the markings located on the head of the bolts and by the surface treatment.

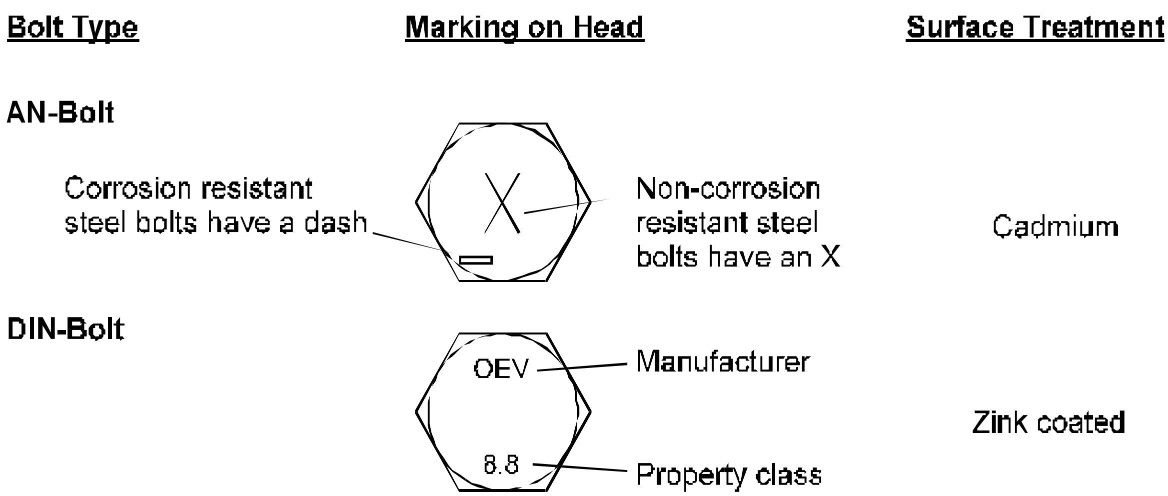

Figure 1: Bolt Types

3. Standard Torques

The nuts used are in general (with the exception of lock nuts) nuts in accordance with AN3 thru AN20, and DIN 985 specifications.

4. 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.

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

5. Standard Torque Values

These tables show the maximum permissible torque values for bolts and nuts in accordance with AN specifications.
Use the listed torque values for all bolts/nuts/screws which meet the specifications unless they are in the list of special torque values in Para 8.

A. AN Fine Thread Series

Bolt Size	Torque (lbf-ft)	Torque (Nm)
10 - 32	1.2	1.7
1/4 - 28	4.6	6.5
5/16 - 24	10.0	13.3
3/8 - 24	15.3	20.5
7/16 - 20	27.8	37.3
1/2 - 20	40.0	54.0
9/16 - 18	66.7	90.0
5/8 - 18	91.7	123.0

B. AN Coarse Thread Series

Bolt Size	Torque (lbf-ft)	Torque (Nm)
10 - 24	1.2	1.7
1/4 - 20	4.2	5.6
5/16 - 18	7.5	10.1
3/8 - 16	15.4	20.8
7/16 - 14	21.3	28.6
1/2 - 13	40.0	54.2
9/16 - 12	58.3	78.7
5/8 - 11	75.0	101.2

C. DIN Specifications

Metric Thread	Torque (lbf-ft)	Torque (Nm)
M4	1.3	1.8
M5	2.7	3.6
M6	4.7	6.4
M8	11.8	16.0
M10	23.6	32.0
M12	44.4	60.0

6. Standard Torques for Fittings

These tables show the standard torque values for fittings.

A. Steel Fittings

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

B. Aluminum Fittings

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

7. 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 (lbf-in)	Torque (Nm)
8 - 12	22.5 ±4.4	2.5 ±0.5
10 - 160	26.5 ±4.4	3.0 ±0.5

B. Clamp width: 12mm or larger

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

8. Special Torques

Part	Torque (Nm)	Torque (lbf-ft)
Propeller flange nuts	80 - 90	59.8 - 67.3
Spark plugs	20	14.8
Bolts attaching the engine mount to the firewall	35	25.8
Nose wheel fork assembly	height of spring washers +0.5 mm -0.0 mm 22	+0.01mm -0.0 mm 0.087
Main landing gear bolt, near center	height of spring washers 4 ± 0.5 mm	0.16 ± 0.02 in
Main landing gear bolts, outside	20	14.8
B-Bolt nut in root rib	20	14.8
Safety belt attachment in center console	Loose fit, NO torque	
Generator belt drive (measured at midpoint)	Deflection = 0.2 inches (5 mm) Force = 6.5 lbs (3 kg)	
M10 Bolt, attaching generator to upper generator mounting bracket	35	26.3
M8 Bolts, attaching generator to lower generator mounting bracket and to engine	22	16.5
Engine	See Engine Operator’s Manual	

NOTE: Observation of the prescribed torque value and installation of the prescribed safetying device must be ensured with each screw connection.

9. Measuring Torque Details

CAUTION: SELF LOCKING NUTS MUST BE REPLACED WITH NEW ITEMS AFTER REMOVAL IN THE EVENT THAT THE FRICTION TORQUE HAS DIMINISHED.

Where self locking nuts are used, the torque value of the safetying mechanism (friction or brake torque) must be added to the value in the table. This value can be read from the torque wrench indicator before seating of the nut has been accomplished.

When the bolts are torqued from their head side, additional torque due to the friction of the barrel may occur. This value can be read from the torque wrench indicator before seating of the screw has been accomplished, and must be added to torque value in the table.

10. 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.

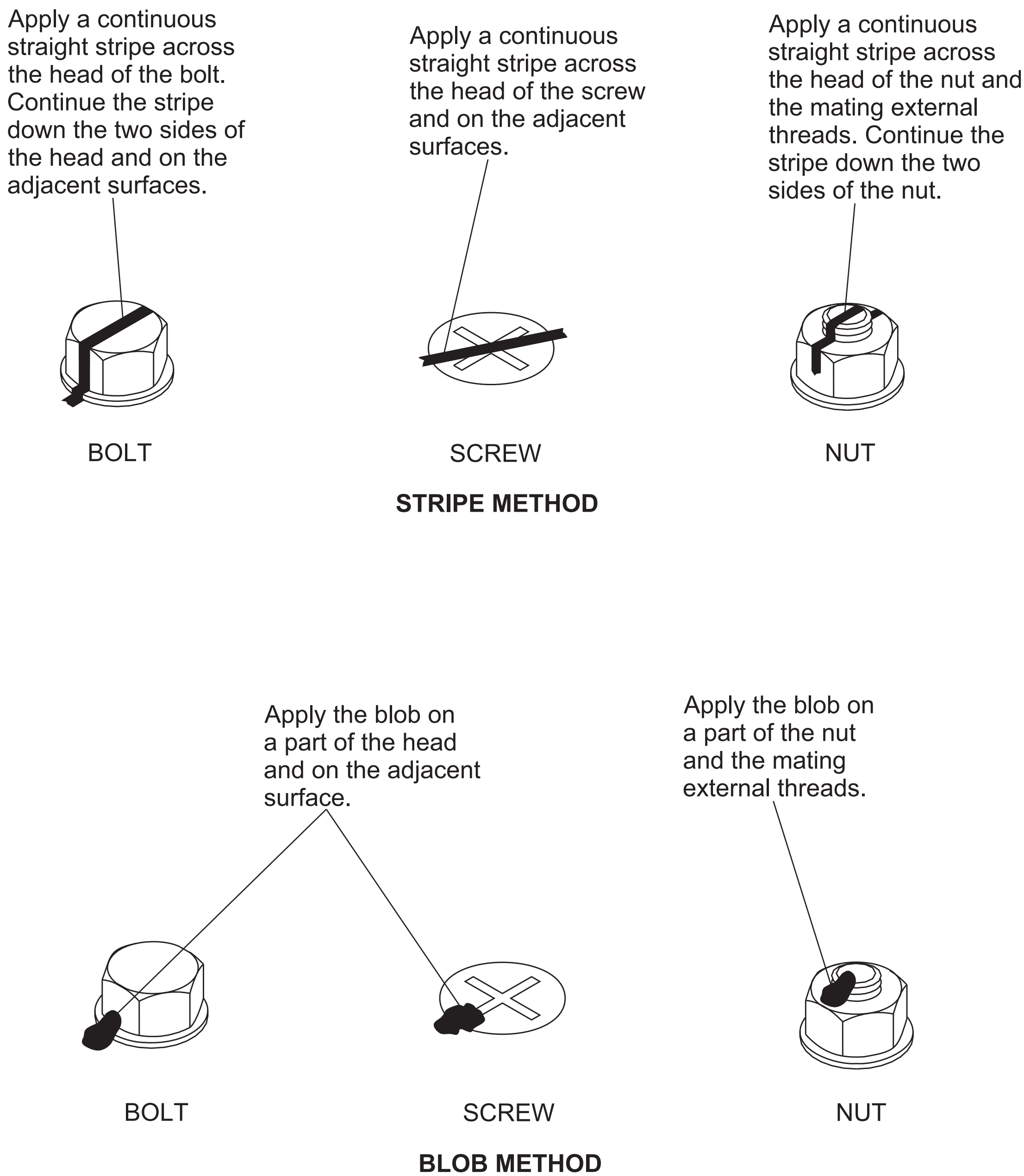

Figure 2 - Identification Marks on Torqued Fasteners

11. Torque Conversion Graphs

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

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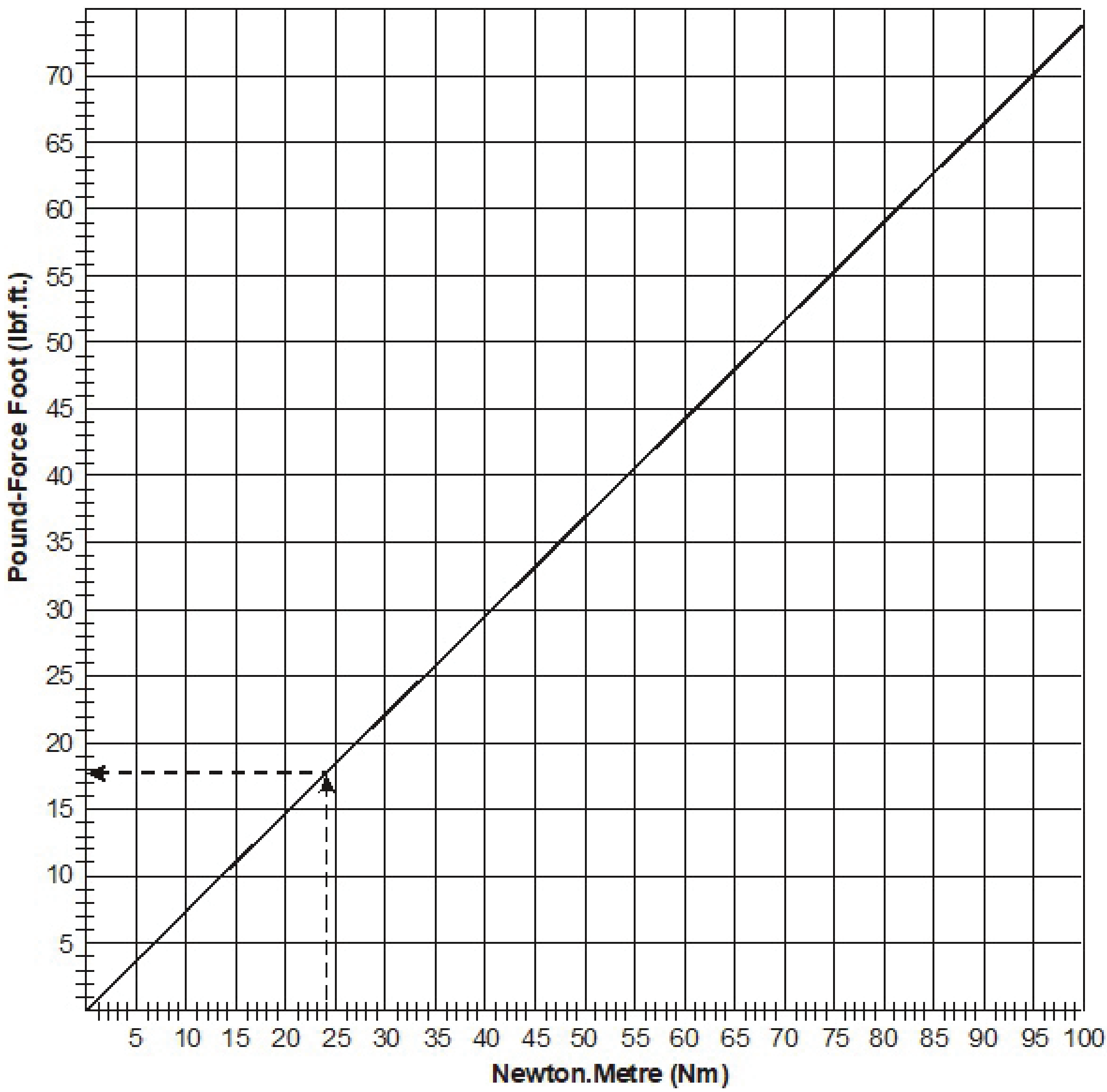
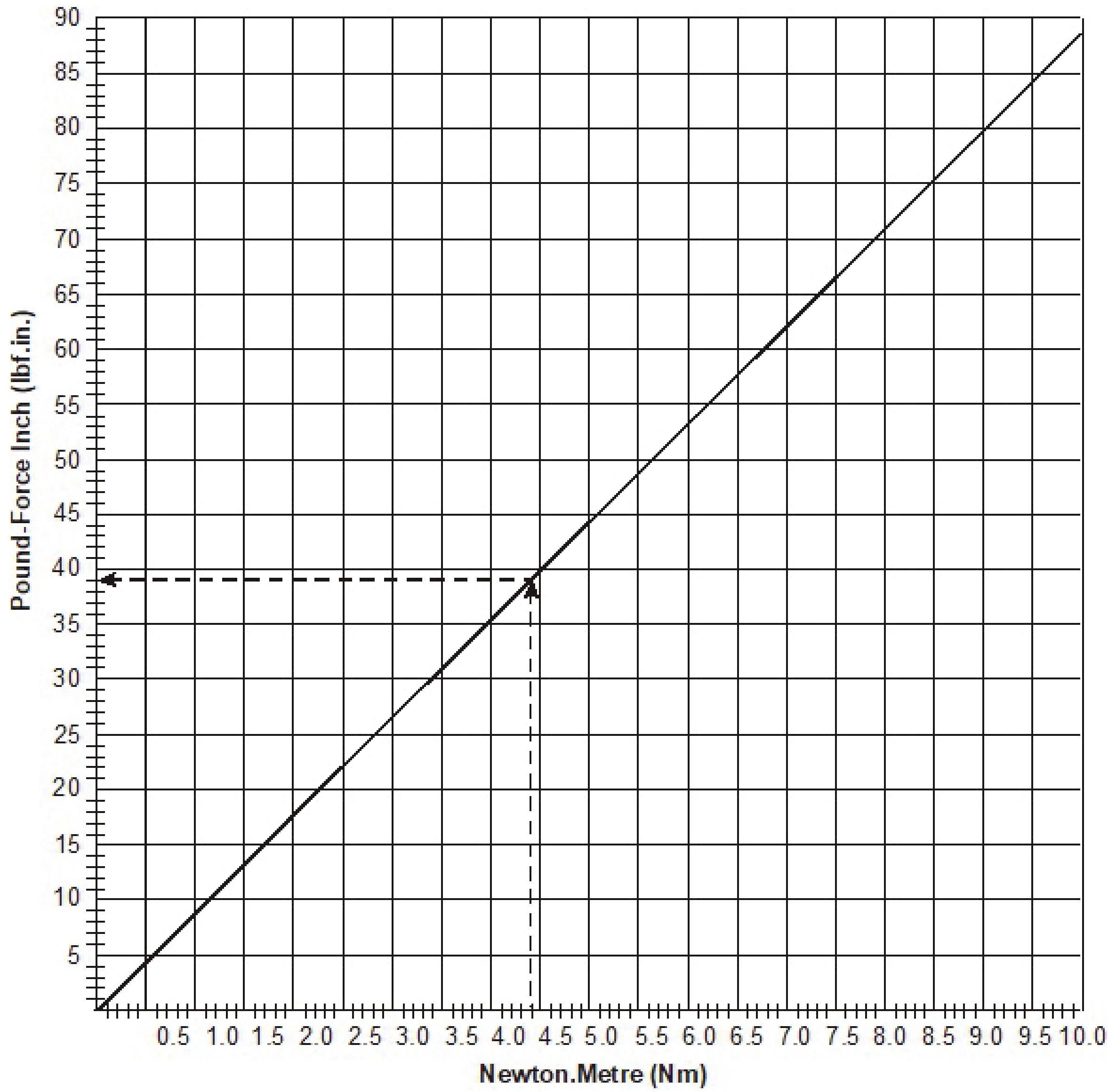


Find the Nm value on the horizontal axis. Move vertically to the solid black diagonal line. Then move horizontally to the vertical axis. Read the value in lbf.ft.

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 - ft.lb



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 - in.lb

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CHAPTER 21
ENVIRONMENTAL SYSTEMS

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ENVIRONMENTAL SYSTEMS

1. General

The heating and ventilation system installed in the DA20-A1 permits the independent supply of cold and warm air as well as the supply of warm air to the floor and the canopy.

Control of the heating system is accomplished using the cabin heat knob, located in the center console below the instrument panel. Fresh air can be supplied and regulated through adjustable air vents located on the left and right side of the instrument panel.

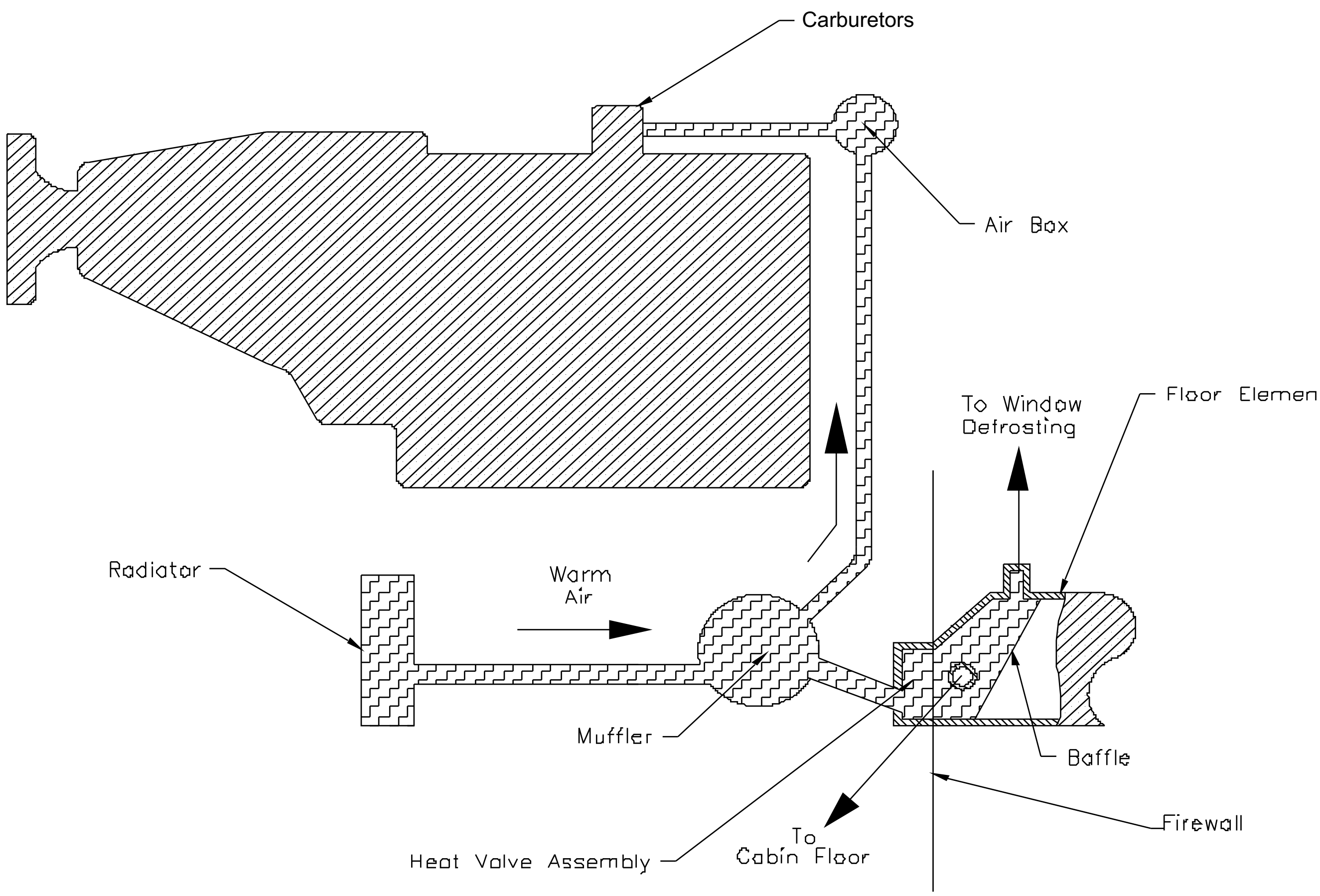

Figure 1 - Heating and Defrosting System

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DISTRIBUTION

1. Functional Description

A. Heating System and Canopy Defroster (Refer to Figure 1)

During flight, ram air is directed to the heat exchanger through an air hose installed behind the radiator. After passing the heat exchanger, the warm air is directed by an air hose to the heat valve assembly, which is mounted to the lower half of the firewall.

After passing through the heat valve assembly, internal baffling located in the floor panel (element) directs the warm air to both the window defrosting vents (via an air vent) and to the cabin floor.

An air regulating flap is located within the heat valve assembly which can be adjusted via a bowden cable. If warm air is required to flow into the cabin, the cabin heat button located in the front part of the center console must be pulled to the stop. To regulate the heat, any position in-between can be used.

B. Ventilation

Fresh air is directed from the air intake openings (NACA type) located on both sides of the forward fuselage to adjustable vents. Amount of fresh air as well as the direction of flow can be individually adjusted.

2. Maintenance Information

A. Inspections

100 HOUR INSPECTION

During each 100 hour inspection, the heat exchanger must be checked for secure mounting, leakage, and condition.

200 HOUR INSPECTION

At each 200 hour inspection, all cold and warm air vents should be inspected for condition, operation, and obstructions. The 200 hour inspection also includes the inspection of all hot air and fresh air hoses for condition, leaks, and secure attachment. Furthermore it should be checked whether the position of the control flap within the distribution box corresponds to the position of the operating button.

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HEATING

1. Heat Exchanger Removal

(1) Remove the engine cowlings.

(2) Loosen hose clamps of air intake and cabin heat hose and remove both hoses from the upper half of the heat exchanger.

(3) Remove the carburetor heat hose in a similar manner.

(4) Remove the three bolts holding the heat exchanger jacket.

(5) Remove the heat exchanger jacket.

2. Heat Exchanger Inspection

In addition, the exhaust muffler should be inspected at each 100 hour inspection. Cracks or holes in the muffler could allow carbon monoxide to enter the heating system causing danger to occupants.

Recommended muffler inspection procedure:

(1) Remove the lower half of the heat exchanger as described in paragraph 1 (above).

(2) Check the muffler for cracks or holes.

(3) If cracks or holes are detected, replace muffler.

(4) If no defects have been found, re-assemble the heat exchanger by reversing the sequence described in paragraph 1 (above).

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CHAPTER 23
COMMUNICATIONS

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COMMUNICATIONS

1. General

The VHF radio system is used for communication between airplane and ground station, and between airplanes. It operates in the frequency band between 118.000 to 136.975 MHz, and has a channel separation of 25 kHz in simplex operation mode.

The system consists of the following components:

1 VHF COMM transceiver

1 VHF antenna (mounted in the rudder fin)

1 Hand held microphone

1 Speaker

2 Headsets (optional)

Power is supplied by the generator and by the battery via the avionics master switch and the COMM breaker.

Figure 1 depicts the location of some of the communication equipment installed.

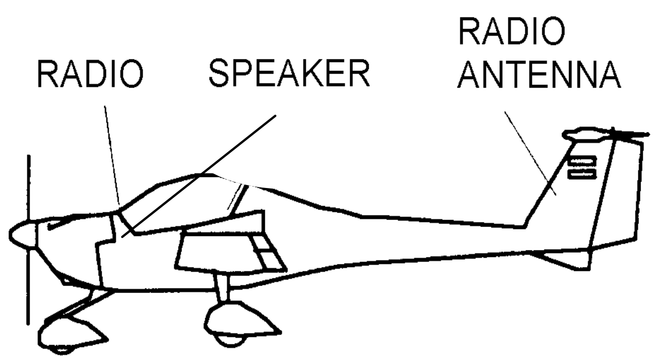

Figure 1 - Radio System Components

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SPEECH COMMUNICATION BENDIX/KING KX125

1. General

Refer to figure 2.

The KX125 radio system is part of the NAV/COMM system used in the DA20-A1. The COMM frequency range of 118.000 MHz to 136.975 MHz includes 760 channels.

The memory can store one frequency.

The unit can be operated using a speaker and a hand held microphone or headsets. It is switched to transmit mode with the transmit button.

The hand held microphone is connected to the microphone plug which is located on the right side under the pilot's instrument panel.

A breaker located in the instrument panel protects the on board network from overloading in the event of any short circuit within the radio system.

For the description of the NAV part of the KX125 refer to Chapter 34.

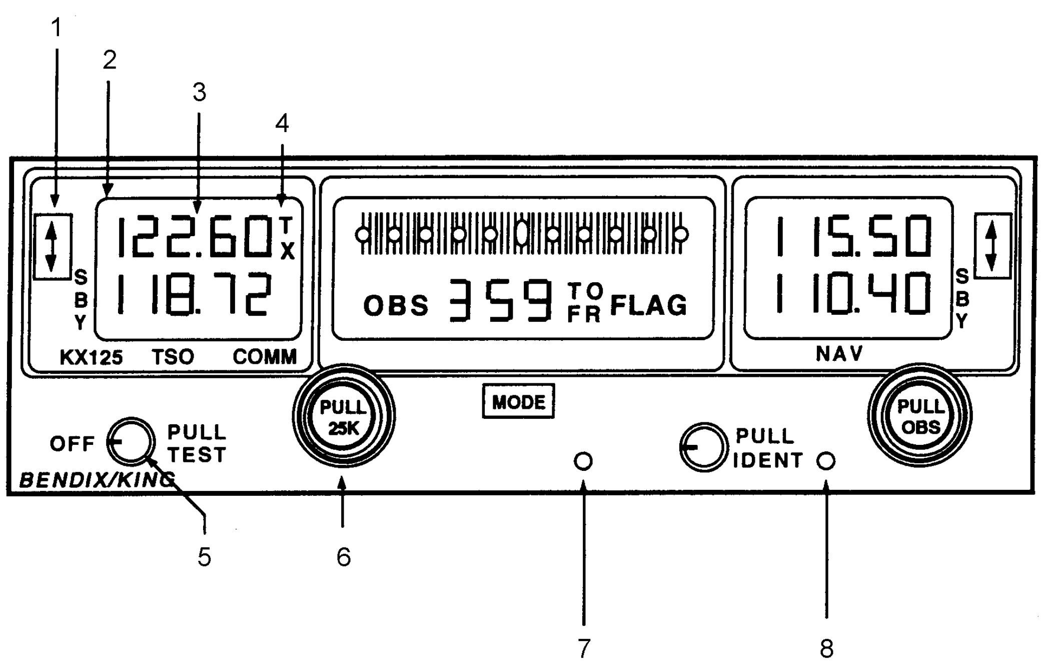

Figure 2 - Bendix/King KX125

Legend

1 COMM transfer switch

2 COMM frequency indicator

3 Active COMM frequency

4 Transmit mode indicator

5 COMM volume, ON/OFF rotational switch, test/squelch control switch

6 COMM frequency selector buttons

7 Unit lock

8 LCD contrast adjustment

2. System Description

For overview of communication system, refer to figure 3.

A. Receiver Description

The high frequency signal received by the antenna arrives via a coaxial cable at the antenna input of the radio unit. It is selected, amplified, demodulated, and fed to the speaker or headphones as a low frequency signal.

The required volume can be adjusted using the volume control.

The automatic squelch control suppresses any signal noise in the speaker or headphone in the event that the HF carrier voltage at the antenna input is not sufficient. It can be deactivated by pulling the PULL TEST switch.

B. Transmitter Description

The radio unit is automatically switched to transmit mode when the transmit button is pressed. The signal received by the microphone is directed to the transmitter unit, amplified, and modulated to a high frequency carrier signal which is then sent by the antenna.

C. Unit Operation

Switch master switch and avionics master switch ON.

(1) Switching ON

The KX125 unit is switched ON by turning the COMM/PULL/TEST rotating switch from the OFF position in clockwise direction. The last selected as well as the pre selected frequencies are displayed on the LC Display. The volume is adjusted by pulling and turning the COMM volume button. After selection the COMM volume button should be pushed back to activate the automatic squelch.

(2) Frequency Selection

The required frequency is selected by rotating of the COMM frequency selection buttons, where the outer button is the MHz control. With the inner knob, the frequency can be adjusted in steps of 50 kHz (pushed position) or 25 kHz (pulled position).

The upper COMM frequency display shows the presently active frequency, while the lower display shows the pre selected frequency. Normally selection of any frequency is performed in the STANDBY window, and then by pressing the COMM transfer button exchanged with the frequency shown in the ACTIVE window. For a direct change of frequency, the COMM transfer button must be pressed for at least two (2) seconds. After that, only the ACTIVE frequency is displayed, and can be changed directly.

Additional pressing of the COMM transfer button will restore the previous state.

(3) Transmit Mode Indicator

In transmit mode the TX indicator is displayed on the LCD. The KX125 is designed for uninterrupted transmission of up to 30 seconds. With exceeding of this time limit the transmitter is switched off and the COMM frequency display will flash. The transmitter is ready for operation immediately after release of the transmit button.

(4) On-Board Intercommunication

The voice activated intercom system enables communication between pilots using the headsets. The radio system is located in the instrument panel and can be operated by both pilots.

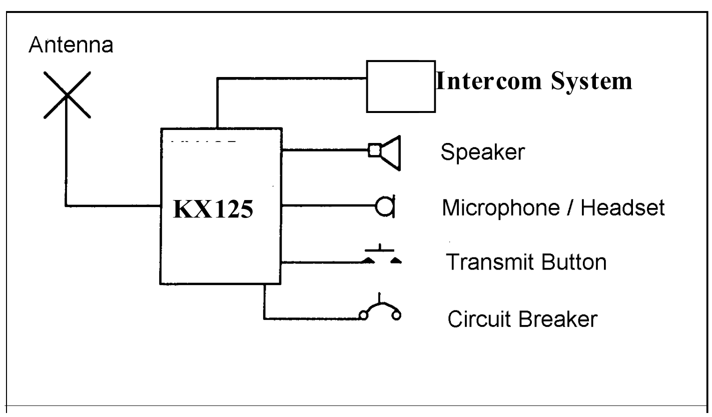

Figure 3 - KX125 Unit, Functional Diagram

3. Troubleshooting

The following table contains procedures for general troubleshooting on the radio and intercom system. For the corresponding wiring diagrams refer to Chapter 92 of the Maintenance Manual.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Unable to transmit or receive, LCD inoperative	Defective power supply Defective COMM breaker If other avionics are also without power: defective avionics master switch Defective radio unit	Repair Replace Replace Repair Repair
Unable to transmit from the pilot's side (missing transmit mode indicator on LCD)	Defective transmit button on pilots' side Defective wiring between pilot's transmit button and radio unit	Replace Repair
Unable to transmit from the co-pilot's side (missing transmit mode indicator on LCD)	Defective transmit button on co-pilots' side Defective wiring between co-pilot's transmit button and radio unit	Replace Repair
No modulation when transmitting from pilot's side	Defective co-pilot's headset Defective wiring	Repair Repair
Short range in transmit mode, reception without problems	Defective radio unit	Repair
Short range in receive mode; signal noise in reception	Defective radio unit	Repair
Short range in transmit and receive mode; signal noise in reception Speaker silent, headsets operation normal Transmit mode indicator on LCD is always visible	COMM antenna, coaxial cable and plug. Defective speaker Defective wiring Defective intercom switch Transmit button stuck	Repair or replace Replace Repair Replace Replace
Intercom system inoperative, transmit mode OK.	Defective intercom switch Defective wiring	Replace Repair

4. Maintenance Information

A. General

The Bendix/King KX125 radio unit requires no regular maintenance.

B. Removal and Installation of the Radio Unit

The KX125 is held in its place by a retaining claw which can be turned with a hexagon socket screw and catches in the rack. The hexagon socket screw is accessible from the front side and is located to the left of the MODE button. A 3/32 inch allen key is required to remove or install the radio unit.

The KX125 is held in its place by a retaining claw which can be turned with a hexagon socket screw and catches in the rack. The hexagon socket screw is accessible from the front side and is located to the left of the MODE button. A 3/32 inch allen key is required to remove or install the radio unit.

(1) Removal

(a) Use wrench to turn hexagon socket screw under opening beside MODE button in anti clockwise direction until fixing device unlocks.

(b) Remove unit from rack.

(2) Installation

(a) For installation reverse the sequence.

(b) Remove unit from the rack.

(3) LCD Contrast Adjustment

The contrast of the LCD can be adjusted with a small screwdriver through an opening in the front panel (located to the right of the PULL/IDENT button)

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CHAPTER 24

ELECTRICAL POWER

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ELECTRICAL POWER

1. General

The DA20-A1 is equipped with a 14 Volt direct current (DC) electrical system, refer to Figure 1. A generator with a self-contained rectifier and regulator is mounted on the engine, supplies DC power to the electrical system.

A 12 Volt, 20 amp/hrs battery is charged by the generator and also supplies power for starting the engine and for equipment while the engine is not running. The battery also supplements the electrical output from the generator when a temporary capacity overload occurs.

The electrical circuits of the system are, with exception of the engine start circuit, protected by automatic circuit breakers. The master switch is used to switch all electrical sources within the system ON or OFF.

An overvoltage sensor protects the electrical system in the event of generator overvoltage.

With the exception of the battery, generators, and starter motor, all electrical components within the engine compartment are mounted to the electrical shelf, which is attached to the engine mount, refer to Figure 2. Connections to the cockpit are established through two terminal strips on the electrical plate and then hardwired through the firewall.

The components of the electrical system are identified in accordance with the ATA 100 specification and can thus easily be assigned to their respective sub-systems.

e.g. OV2430-02

OV: Overvoltage Sensor

24:	Chapter 24	Electrical Power
30:	Sub-Chapter 30	DC Generation
02:	Item Number within the system	

For detailed wiring diagrams refer to Chapter 92 of the Maintenance Manual.

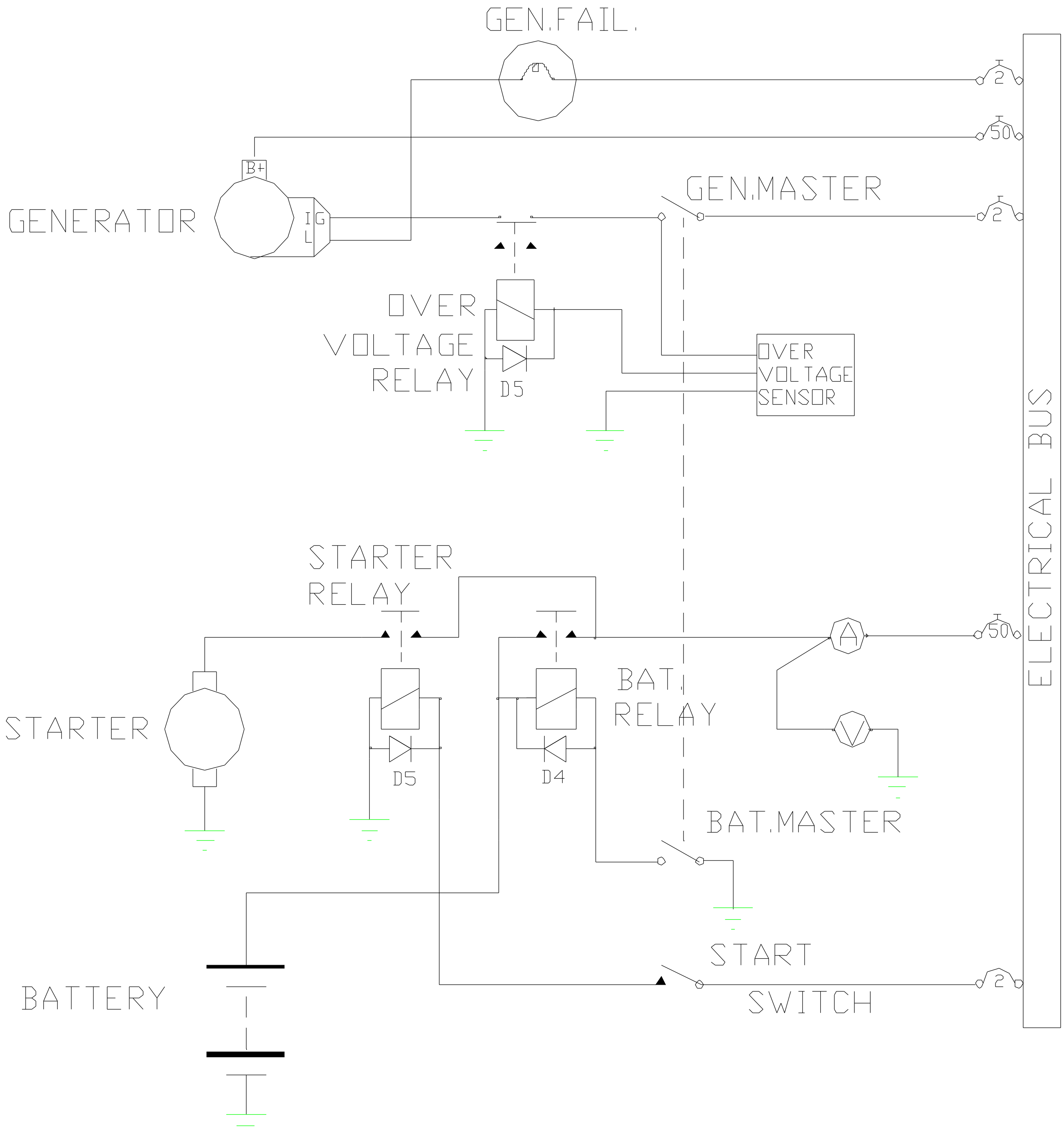


Figure 1 - DA20-A1 Electrical System - Simplified Schematic

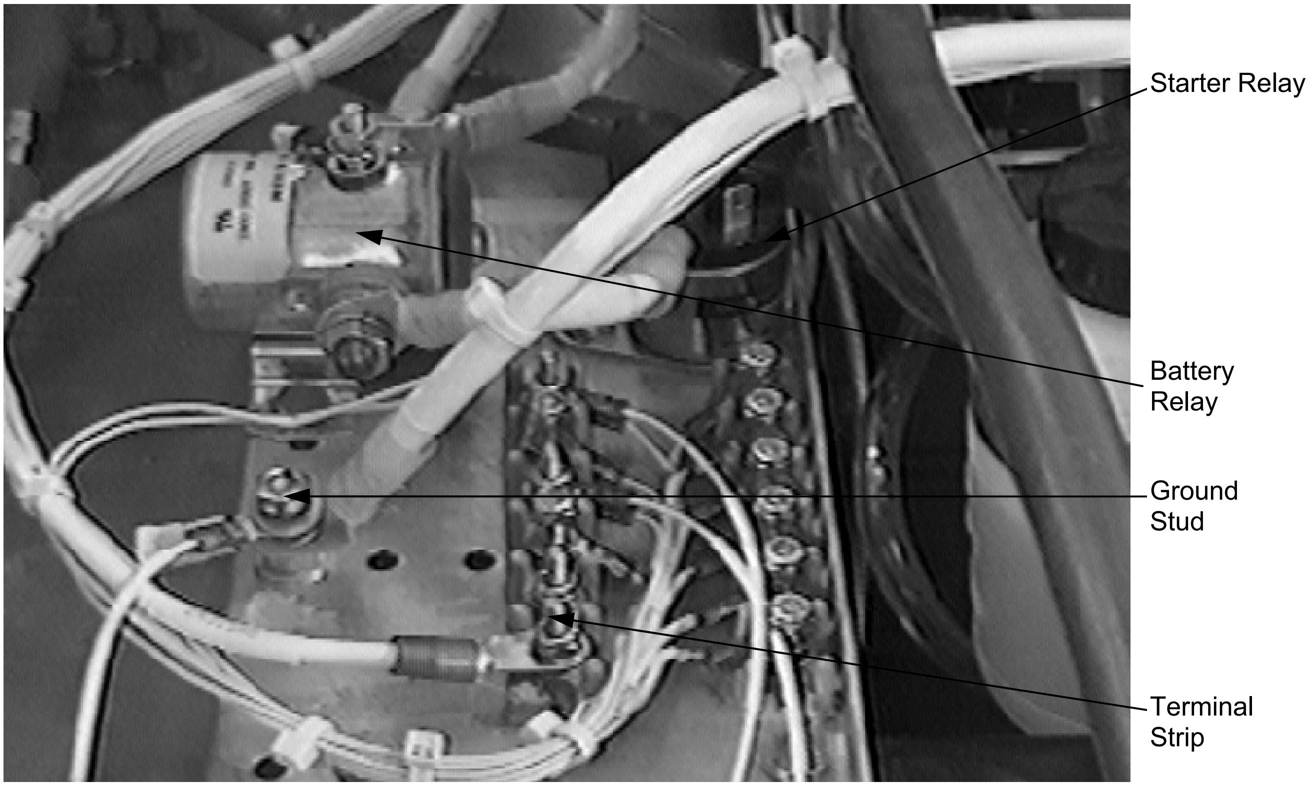


Figure 2 - DA20-A1 Electrical System - Components in Engine Compartment

2. Description

A. Battery

The lead acid battery is located in the engine compartment, it supplies power to the starter and is also used as an emergency electrical supply when the engine is not running.

B. Battery Relay

The battery relay connects the battery to the electrical bus, the starting relay and the avionics bus. The battery relay is controlled by means of the master switch.

C. Master Switch (Split Switch)

The master switch is located on the left side of the instrument panel and is red in color. The master switch is composed of two individual switches, a battery switch and a generator switch. Switching the generator switch ON, automatically turns the battery switch ON. Similarly, turning OFF the battery switch, turns OFF the generator switch.

D. Starting Relay

The starting relay connects the output of the battery relay with the starter motor. The starter can only be operated with the master switch ON, and with the battery relay closed.

E. Generator Warning Light

The generator warning indicator is illuminated in the event of a generator failure.

F. Ammeter

The ammeter is located on the right hand section of the instrument panel and indicates charging (+) and discharging (-) of the battery.

G. Voltmeter

The voltmeter is located next to the ammeter and indicates the status of the electrical system.

H. Electrical Bars

The electrical bus distributes power to the electrical components via automatic circuit breakers. The electrical bus is located on the right hand section of the instrument panel.

I. Avionics Master Switch and Avionics Bus

The avionics bus is connected to the electrical bus via the avionics master relay, which is controlled by the avionics master switch, and supplies electrical power to the avionics through circuit breakers.

3. Troubleshooting

The following table lists defects as they could appear in the electrical system, and their correction. Detailed troubleshooting tables are presented in the respective chapters.

The wiring diagrams are located in Chapter 92.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Starter motor inoperative; warning lights in instrument panel operating normal during starting.	Starting relay	Replace
	Starter cabling; breaker	Replace
	Ignition switch	Replace
	Starting relay diode	Replace
Starter operates for a short time and then stops; warning lamps in instrument panel operating normal before starting and extinguish during start attempt.	Battery	Charge, replace
	Contact interruption between battery and battery relay.	Repair
	Battery relay	Replace
Starter motor turns very slowly, battery fully operational	Starter motor	Replace
	Contact resistance in starter power supply	Repair
	Ground connection between battery and engine block	Repair

4. Maintenance Information

CAUTION: GENERAL SAFETY PRACTICES SHOULD BE OBSERVED DURING MAINTENANCE PERFORMED ON THE ELECTRICAL SYSTEM, AS WELL AS SAFETY INSTRUCTIONS DESCRIBED IN THE FOLLOWING CHAPTERS.

CAUTION: THE BATTERY SHOULD BE DISCONNECTED FOR EXTENSIVE MAINTENANCE OPERATIONS. AFTER COMPLETION OF MAINTENANCE TASKS, AND BEFORE RE-CONNECTION OF THE BATTERY, THE ELECTRICAL SYSTEM SHOULD BE CHECKED USING AN EXTERNAL 14 VOLT POWER SUPPLY WITH ADJUSTABLE OVER CURRENT PROTECTION.

CAUTION: IN THE EVENT THAT DURING MAINTENANCE OR REPAIR WORK, ELECTRIC OR ELECTRONIC COMPONENTS ARE TO BE REPLACED ON THE DA 20, ONLY GENUINE SPARE PARTS APPROVED BY THE AIRPLANE MANUFACTURER SHOULD BE INSTALLED.

DC GENERATION

1. General

The DC generation system has the following components:

Component	Identification
Generator	GO2430-03
Over-voltage Control Relay	OV2430-01
Over-voltage Sensor	OV2430-02
Generator Warning Light	GO2430-01
Generator Circuit-breaker	GO2430-02
Generator Control Circuit-breaker	GC2430-01
Voltmeter	VM2430-01
Ammeter	AM2430-01

The maintenance free generator is mounted on the forward left side of the engine and supplies power to the equipment during normal operation.

The overvoltage sensor is located in the cockpit forward of the right hand instrument panel.

The voltmeter is located next to the ammeter on the right hand section of the instrument panel.

The generator warning light is located in the top section of the instrument panel.

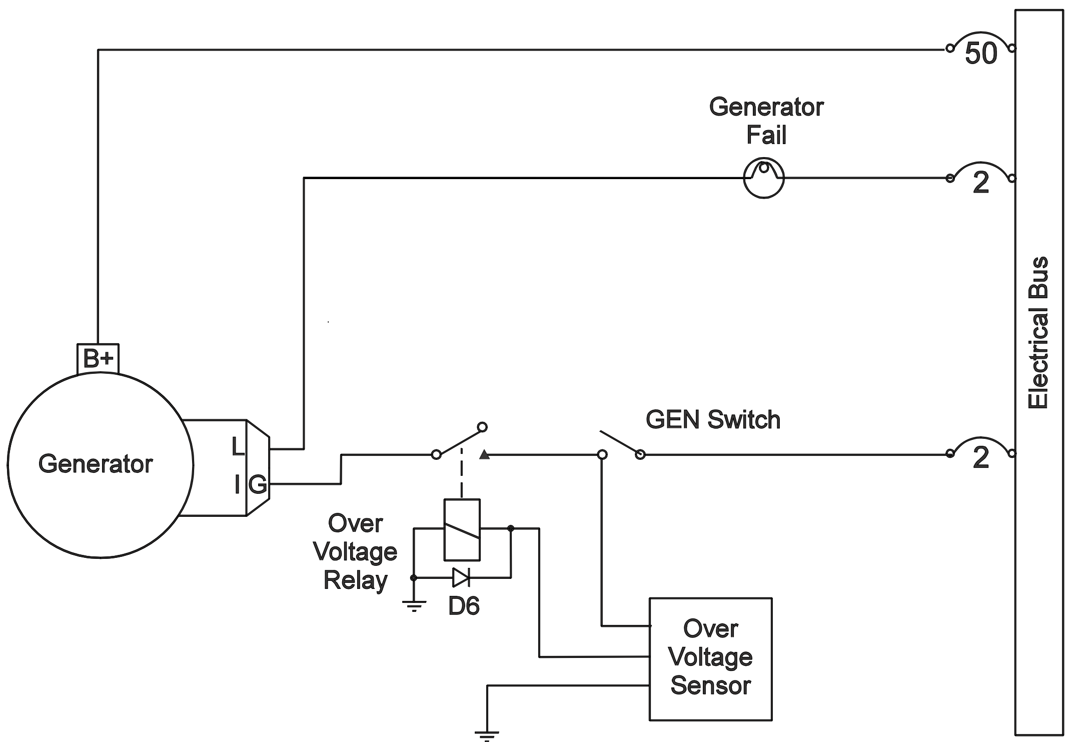
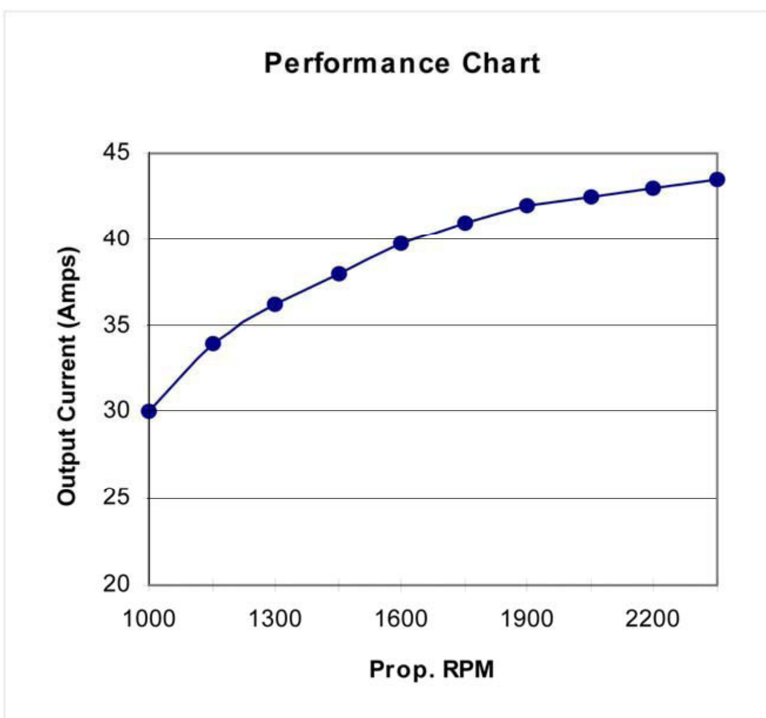


Figure 3 - DA20 Generator System - Simplified Schematic Diagram



2. Description

A 40 amp generator is mounted on the forward left side of the engine. It is mounted on the engine and is belt driven from the propeller hub. The voltage is generated in coils which are arranged in a tangential direction and whose windings are crossed by the magnetic flux lines of the rotor magnet. The generated AC voltage is dependent on the rotor RPM. It is rectified and regulated by the voltage regulator. The voltage regulator is adjusted by the manufacturer to a fixed threshold of 14.0 volts and can not be re-adjusted.

The generator circuit breaker connects the generator to the electrical bus. The electrical bus supplies electrical power to the electrical equipment and recharges the battery.

In addition to its purpose described in Chapter 24-31, the battery is also part of the generator system, and serves to stabilize the on-board electrical voltage.

The generator warning light is illuminated when the generator fails to deliver power.

The voltmeter is subdivided into three sections, green, yellow, and red. If the meter is indicating a reading in the yellow region, this indicates that the current supplied by the generator is not sufficient; e.g. in case of low engine RPM and more electrical consumable ON, than the generator can supply.

In such cases, the system voltage drops below the threshold region and additional power is supplied to the system by the battery. Since such cases are limited in time, it is ensured that the battery is recharged.

The overvoltage protection consists of the overvoltage sensor and the overvoltage control relay.

When switching the generator master switch ON, voltage is supplied to the overvoltage sensor which in turn supplies voltage to the overvoltage control relay via the control output. This relay connects the generator to the voltage regulator, refer to Figure 3.

In the event that the voltage on the sensing input of the overvoltage sensor (on-board voltage) increases above 16.1 Volts, due to a malfunction of the voltage regulator, the control output interrupts the supply to the overvoltage control relay. The control relay opens and disconnects the generator from the voltage regulator. This condition is maintained until the supply to the overvoltage sensor is interrupted (i.e. switching the generator master switch OFF).

3. Troubleshooting

The following table lists defects as they could appear on the generator system, and their correction. The wiring diagrams are located in Chapter 92.

COMPLAINT	POSSIBLE CAUSE	REMEDY
No power supplied by generator with engine running, generator warning light illuminated and voltmeter indicator in yellow region	Generator	Repair
	Cabling, connectors, electrical connections	Repair
No power supplied by generator with engine running, voltmeter indicator in yellow or red region	Voltage regulator	Replace generator
	Overvoltage sensor	Replace
	Overvoltage relay	Replace
	Overvoltage control diode	Replace
	Generator circuit breaker	Replace
	Cabling, electrical connections	Repair
	Generator master switch	Replace
	Generator control circuit breaker	Replace
RPM related noise in speaker or head set	Defective ground connections of generator cable shielding into audio circuit	Repair

4. Removal Installation

A. Generator

(1) Removal

Refer to Figure 4.

(a) Disconnect battery.

(b) Disconnect the electrical terminals to the generator.

(c) Cut lock wire and remove both M8 bolts (3) attached to the lower generator mounting bracket (4).

(d) Supporting generator, cut lock wire and remove M10 bolt (1) (paying specific attention to location of spacer) from upper generator mounting bracket (2).

(e) Remove generator.

(2) Installation

(a) For installation, reverse the sequence.

(b) Refer to Chapter 20 for generator belt tension and bolt torque specification.

NOTE: Make sure that spacer (1) in upper generator mounting bracket (3) is installed between upper generator mounting bracket and generator (2). Refer to Figure 5.

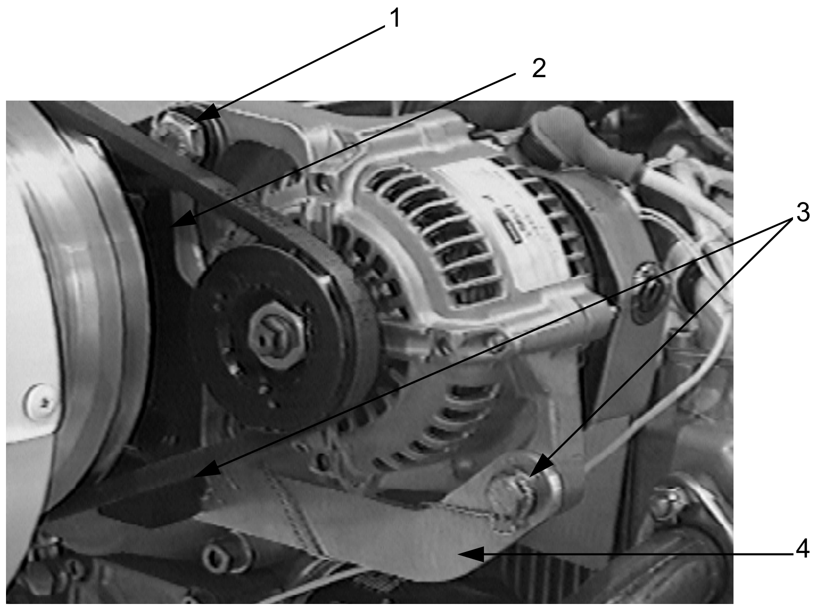


Figure 4 – Generator

Figure 5 – Upper Generator Mounting Bracket

B. Overvoltage Control Relay

(1) Removal

(a) Set the generator master switch to OFF position.

(b) Remove upper engine cowling.

(c) Remove connector from overvoltage control relay.

(d) Remove the front mounting screws on the overvoltage control relay; remove relay.

(2) Installation

(a) For installation, reverse the sequence.

C. Overvoltage Sensor

(1) Removal

(a) Set the generator master switch to OFF position.

(b) Remove top cover from instrument panel.

(c) Remove connector from overvoltage sensor.

(d) Remove mounting screw; remove sensor.

(2) Installation

(a) For installation, reverse the sequence.

5. <u>Maintenance Information</u>

The generator system does not require periodic maintenance. Refer to the Engine Manufacturers documentation.

BATTERY SYSTEM

1. General

The DA20-A1 is equipped with a 12 volt, 20 amp/hrs lead acid battery, which is located in the engine compartment.

The battery is charged by the generator and charging system.

Venting of the battery cells is accomplished through a silicon hose which directs the gas generated by the charging process in a downward direction to the exterior of the airplane.

2. Description

The battery is connected to the electrical bus, and consequently to the on-board network, via the battery relay.

With the battery master switch in the OFF position, the battery voltage is connected to the opened battery relay. By setting the battery switch in the ON position, the master relay is closed, connecting the battery via the ammeter to the electrical bus and to the open starting relay.

The ammeter indicates the charging or discharging of the battery.

The voltmeter indicates the voltage of the bus.

The lead acid battery requires regular maintenance.

3. Troubleshooting

The following table lists defects as they could appear on the generator system, and their correction. The wiring diagrams are located in Chapter 92 of the maintenance manual.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Battery can not be connected to the electrical bus	Discharged battery	Charge
	Master switch	Replace
	Master relay	Replace
	Cabling	Repair
Battery uses too much water	Voltage regulator (charging voltage too high)	Replace generator
Ammeter on constant zero indication	Ammeter	Replace
Battery capacity permanently too low.	Voltage regulator (charging voltage too low)	Replace generator
	Battery	Replace
Starter motor turns too slowly or not at all.	Refer to Chapter 24-00.	

4. Maintenance Information

The battery has an inspection interval of 50 flight hours or 30 days, whichever comes first. At this inspection interval, the fluid level should be checked (level should be approximately at or between the max/min indicators), as well as the charge condition using a hydrometer. The vent tube must be checked for blockage.

CAUTION: THE FLUID LEVEL SHOULD BE FILLED TO THE MAXIMUM MARKING USING DISTILLED WATER ONLY. ACID, CAUSTIC SOLUTION, OR ADDITIVES CAN DESTROY THE BATTERY AND SHOULD NOT BE USED.

WARNING: TO AVOID BURNS OR FIRE DURING MAINTENANCE TASKS PERFORMED IN THE ENGINE COMPARTMENT, NEAR THE BATTERY, OR DIRECTLY ON THE ELECTRICAL SYSTEM (REPLACING OF COMPONENTS, OR WORKING ON THE CABLING), EXERCISE CAUTION. DISCONNECT THE NEGATIVE (-) BATTERY TERMINAL TO AVOID SHORT CIRCUIT.

WARNING: THE BATTERY IS FILLED WITH DILUTED SULFURIC ACID, WHICH CAN CAUSE SEVERE ACID BURNS. WHEN HANDLING THE LEAD ACID BATTERY, RUBBER GLOVES, RUBBER APRON, AND GOGGLES MUST BE WORN.

WARNING: TO NEUTRALIZE ANY ACID BURNS ON THE SKIN, A SOLUTION OF NATRIUM CARBONATE AND WATER SHOULD BE USED AND AFTERWARDS REMOVED WITH AN ABUNDANCE OF WATER. ACID BURNS IN THE AREA OF THE EYES SHOULD BE WASHED OUT IMMEDIATELY WITH PLENTY OF WATER (USING AN EYE WASH STATION).

WARNING: IN CASE OF ACID BURNS, A PHYSICIAN MUST BE CONSULTED IMMEDIATELY.

Charging is recommended anytime water is added to the battery. One half hour is usually sufficient if battery gravities were high enough prior to adding water. After charging, the electrolyte specific gravity should be 1.28 or above.

NOTE: Never use ACID to refill the battery.

5. Removal and Installation

CAUTION: ALWAYS DISCONNECT THE NEGATIVE TERMINAL (-) FIRST, WHEN DISCONNECTING THE BATTERY.

CAUTION: FOR RECONNECTING THE BATTERY, ALWAYS CONNECT THE NEGATIVE TERMINAL (-), LAST.

A. Battery

(1) Removal

(a) Set the battery master switch to the OFF position.

(b) Disconnect the negative battery terminal.

(c) Disconnect the positive battery terminal.

(d) Disconnect the battery vent line.

(e) Loosen the mounting clamp and lift the battery carefully.

(2) Installation

(a) For installation, reverse the sequence.

CAUTION: ENSURE CORRECT RE-CONNECTION OF THE BATTERY TERMINALS. WRONG CONNECTION WILL RESULT IN SEVERE DAMAGE TO THE ELECTRICAL AND ELECTRONICS SYSTEM.

NOTE: To avoid corrosion, DOW CORNING COMPOUND 4 (DC4) should be applied to the battery terminals and the cable lugs.

B. Master Relay

(1) Removal

(a) Set the battery master switch to the OFF position.

(b) Disconnect the negative battery terminal.

(c) Disconnect the cable from the relay.

(d) Remove the relay by loosening the mounting screws.

(2) Installation

(a) For installation, reverse the sequence.

NOTE: To ensure correct polarization of the diode, refer to Chapter 92 for the wiring diagram.

C. Ammeter

(1) Removal

(a) Set the battery master switch to the OFF position.

(b) Disconnect the negative battery terminal.

(c) Remove the instrument panel top cover.

(d) Disconnect the wires attached to the ammeter.

(e) Remove the ammeter.

(2) Installation

(a) For installation, reverse the sequence.

NOTE: To ensure correct polarization of the diode, refer to Chapter 92 for the wiring diagram.

D. Master Switch (Split Switch)

(1) Removal

(a) Set the battery master switch to the OFF position.

(b) Disconnect the negative battery terminal.

(c) Remove the instrument panel top cover.

(d) Disconnect the wires from the master switch.

(e) Remove the master switch.

(2) Installation

(a) For installation, reverse the sequence.

NOTE: To ensure correct polarization of the diode, refer to Chapter 92 for the wiring diagram.

6. Cleaning

In the event that acid has leaked from the battery, the battery must be removed from the airplane and rinsed with water. Also the battery trough should also be cleaned and rinsed with water.

Any acid residue should be neutralized with natrium carbonate solution and rinsed with plenty of water.

ELECTRIC LOAD DISTRIBUTION

1. General

The electrical power from the generator and the battery is supplied via a common bus and the respective circuit breakers to the individual electrical equipment.

All circuit breakers are located on the right hand section of the instrument panel.

All switches are located on the bottom left side of the instrument panel.

2. Description

The DA20-A1's electrical power is distributed via an electrical bus. The avionics master relay is also part of the distribution system and it is connected to the bus by the avionics master switch.
Refer to Figure 6.

The electrical equipment is directly connected to the circuit breakers. The avionics systems are directly connected to the avionics bus.

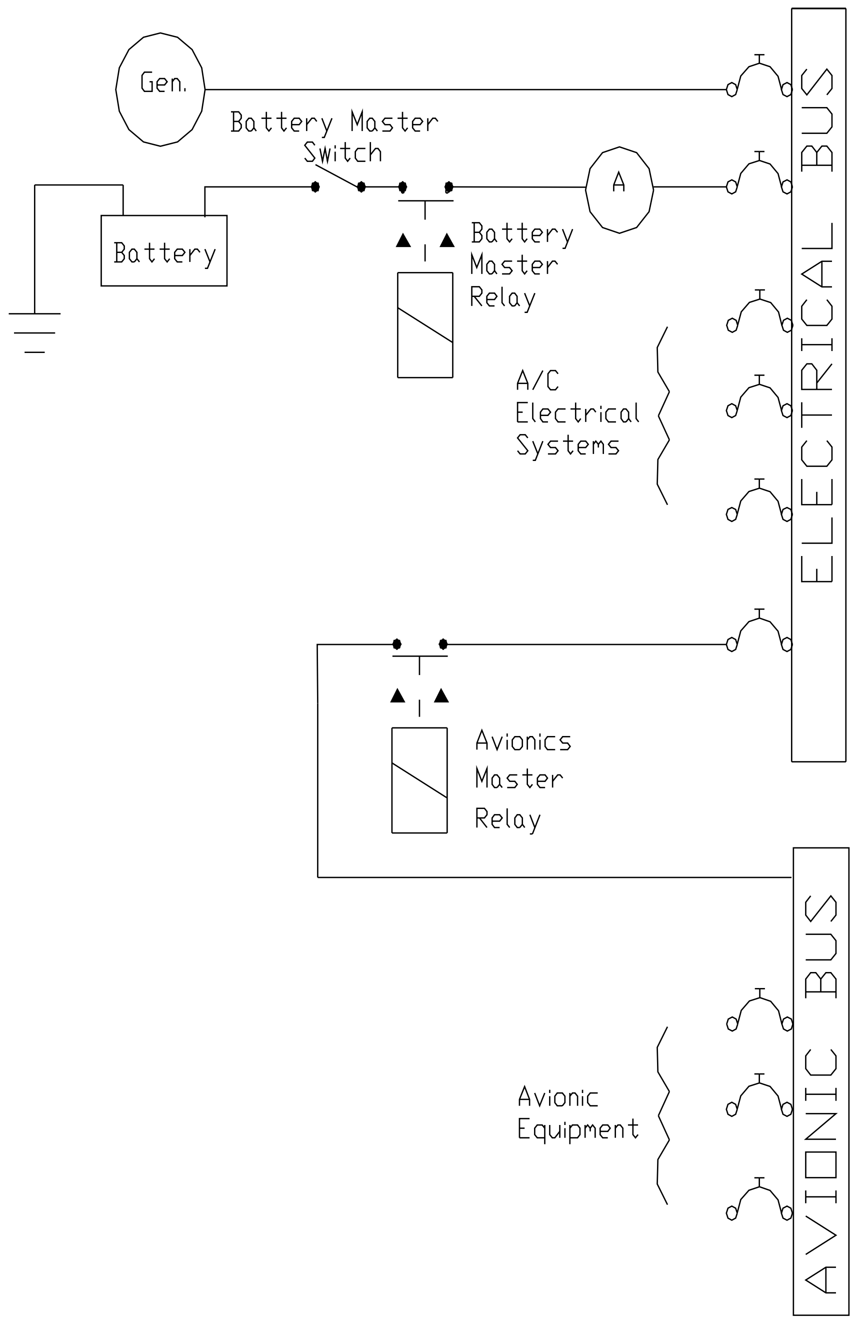


Figure 6 - Electrical Load Power Distribution - Simplified Schematic

3. Troubleshooting

The following table lists defects as they could appear on the generator system, and their correction. The wiring diagrams are located in Chapter 92 of the maintenance manual.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Radio unit and navigational equipment without power.	Defective avionics master switch	Replace
	Defective avionics master switch	Replace
	Defective wiring from bus to the avionics bus	Repair
Intermittent operation of various electrical equipment	Defective wiring (loose connection to circuit breaker and/or on terminal strips)	Repair

4. Maintenance Information

WARNING: TO AVOID BURNS OR FIRE DURING MAINTENANCE TASKS PERFORMED IN THE ENGINE COMPARTMENT, NEAR THE BATTERY, OR DIRECTLY ON THE ELECTRICAL SYSTEM (REPLACING OF COMPONENTS, OR WORKING ON THE CABLING), CAUTION SHOULD ALWAYS BE TAKEN. DISCONNECT THE NEGATIVE (-) BATTERY TERMINAL TO AVOID ANY SHORT CIRCUITS.

During maintenance performed on the power distribution system, check all wires and connectors for looseness and poor condition.

5. Removal and Installation

A. Circuit Breakers

(1) Removal

(a) Set the battery master switch to the OFF position.

(b) Disconnect the negative battery terminal.

(c) Remove the instrumental panel top cover.

(d) Disconnect the wires from the breaker.

(e) Remove the breaker.

(2) Installation

(a) For installation, reverse the sequence.

NOTE: Make sure that the re-connection of the breakers wires is correct. See Chapter 92 for detailed wiring diagrams.

CHAPTER 25
EQUIPMENT/FURNISHINGS

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EQUIPMENT/FURNISHING

1. General

   The cabin equipment is subdivided into the two (2) pilot seats, cabin lining, equipment components, and baggage compartment.

   A description of the individual component groups and equipment can be found in the respective chapters.

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FLIGHT COMPARTMENT

1. Functional Description

This chapter describes the equipment components located in the cabin.

A. Map Packets

A map pockets is installed on the left side of the fuselage interior. They are useful for the storage of items such as airplane documents, flight maps, and other small items required during flight.

B. Fire Extinguisher

The fire extinguisher is located behind the right seat in the baggage compartment. The extinguisher agent is dry chemical and is considered non toxic and leaves no residues.

Refer to Chapter 26 for more information on the fire extinguisher.

C. Emergency Locator Transmitter

The DA20-A1 can be equipped with an Emergency Locator Transmitter. The ELT is installed in a compartment designed for the ELT and located in the B-bulkhead, behind the right seat. The ELT transmits a signal automatically after a crash on the emergency frequencies of 121.5 and 243.0 MHz. The ELT can also be manually operated (e.g. after an emergency landing or for testing).

Maintenance consists of a visual inspection of the housing, the antenna, and the mounting. In addition, an inspection of the battery as well as a functional test should be performed at regular intervals, as per flight manual.

The batteries have life time limitation depending on the battery type and should be replaced upon expiry (see the ID plaque located on the housing) or after one cumulative hour of operation.

To always ensure an operational battery, it is recommended that the ELT is switched OFF if not needed. In case the airplane is not in use for a longer time, it is recommendable to remove the battery from the unit.

(1) ELT Functional Test

Set receiver of the radio unit to frequency 121.5 MHz. Operate ELT manually, check that a signal can be heard. Switch off ELT.

NOTE: The functional test should only be performed within the first five (5) minutes following each full hour to prevent false alarm situations.

D. Lining of Side Panels

The lining of the side panels consists of a fire resistant material and is attached using a spray glue. For cleaning use a vacuum cleaner. Excessive dirt can be removed by using a mild soap solution. After cleaning it must be ensured that the area is sufficiently ventilated to prevent the collection of extra humidity and the possibility of corrosion.

E. Instrument Panel Cover

The instrument panel cover is located above the instrument panel, it is a GFRP part covered with synthetic material (Nextel). Air vents for the avionics are located on the upper side of the panel.

F. Center Console Cover

The center console cover is a GFRP part that can be removed.

G. Seats

The seats consist of a backrest in the shape of a bulkhead and the seat shells whose side parts form the armrests and part of the side cover.

H. Safety Belts

Both seats are equipped with a four (4) point safety belt with central lock. Each safety belt can be adjusted individually to suit the user. The safety belts should be inspected at regular intervals. Should cracks or fraying be detected, the belts must be replaced. Also refer to the operating instructions of the safety belt manufacturer.

2. Removal and Installation

A. ELT

(1) Removal

(a) Loosen wing nuts, remove cover.

(b) Slide unit from mounting, disconnect antenna.

(2) Installation

(a) For installation reverse the sequence.

B. Instrument Panel Cover

(1) Removal

(a) Remove screws around instrument panel cover.

(b) Remove cover by lifting.

(2) Installation

(a) For installation reverse the sequence.

C. Seat Shells

(1) Removal

(a) Remove seat cushions if installed.

(b) Remove boot around control stick.

(c) Remove screws around seat shells.

(d) Remove seat shells by lifting.

(2) Installation

(a) For installation reverse the sequence.

D. Seat Belts

(1) Removal

(a) Remove baggage shelf.

(b) Remove shoulder harness by removing accompanying hardware.

(c) Remove seat shells.

(d) Remove lap belts with central lock by feeding belts through mountings.

(e) Remove lap belts without central lock by loosening mounting screw and pulling belts from the attachment.

(2) Installation

(a) For installation reverse the sequence.

E. Center Console Cover

(1) Removal

(a) Loosen mounting screws around cover.

(b) Remove cover.

(2) Installation

(a) For installation reverse the sequence.

3. Cleaning

A. Seats

The seat and backrest cushions consist of fire resistant material. For cleaning the cushions are vacuumed. For more persistent dirt, the seat covers can be cleaned using a mild soap solution.

B. Safety Belts

Excessive dirt can be removed using a mild soap solution.

BAGGAGE COMPARTMENT

1. General

The baggage compartment is used for storage of small baggage and equipment. It is located within the cabin and is within reach of both seats. The baggage compartment has flame resistant floor covering and is approved for loads of up to 20 kg (44 lbs). The baggage restraining device supplied with the aircraft must be used to secure the baggage.

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CHAPTER 26
FIRE PROTECTION

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FIRE PROTECTION

1. General

This Chapter tells you only about the fire extinguisher installed in the DA20-A1 aircraft. See the fire extinguisher manufacturer's manual for more data about the extinguisher.

NOTE: Equipment which is certified for installation in the DA20-A1 aircraft 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 aircraft. The Amerex 337TS fire extinguisher is located behind the co-pilot seat in the baggage compartment. Bolts attach the mounting bracket for the fire extinguisher to the baggage compartment floor. The fire extinguisher utilizes Halotron BrX (2-BTP) as the extinguishing agent, which is non-toxic and does not leave a residue.

The only on-aircraft maintenance 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 fire extinguisher is correctly held in the mounting.

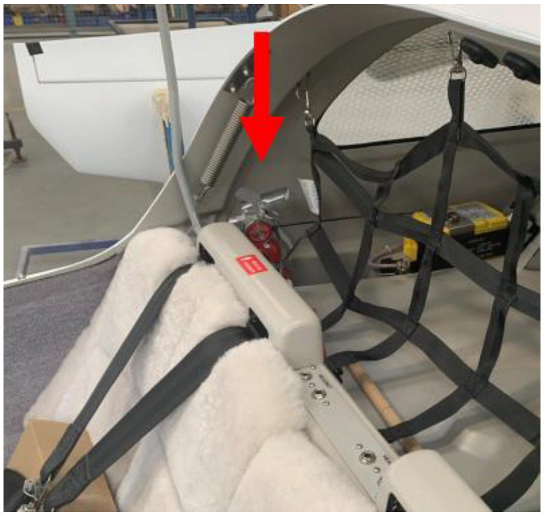
If the plastic protection is broken, remove the extinguisher for weighing. Weight data is given on the extinguisher body.

You must replace the fire extinguisher (or return it to the manufacturer for repair) when:

- The weight is incorrect.
- The pressure is too low.
- The fire extinguisher has been used.
- 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



NOTE:
Installation is not exactly as illustrated.

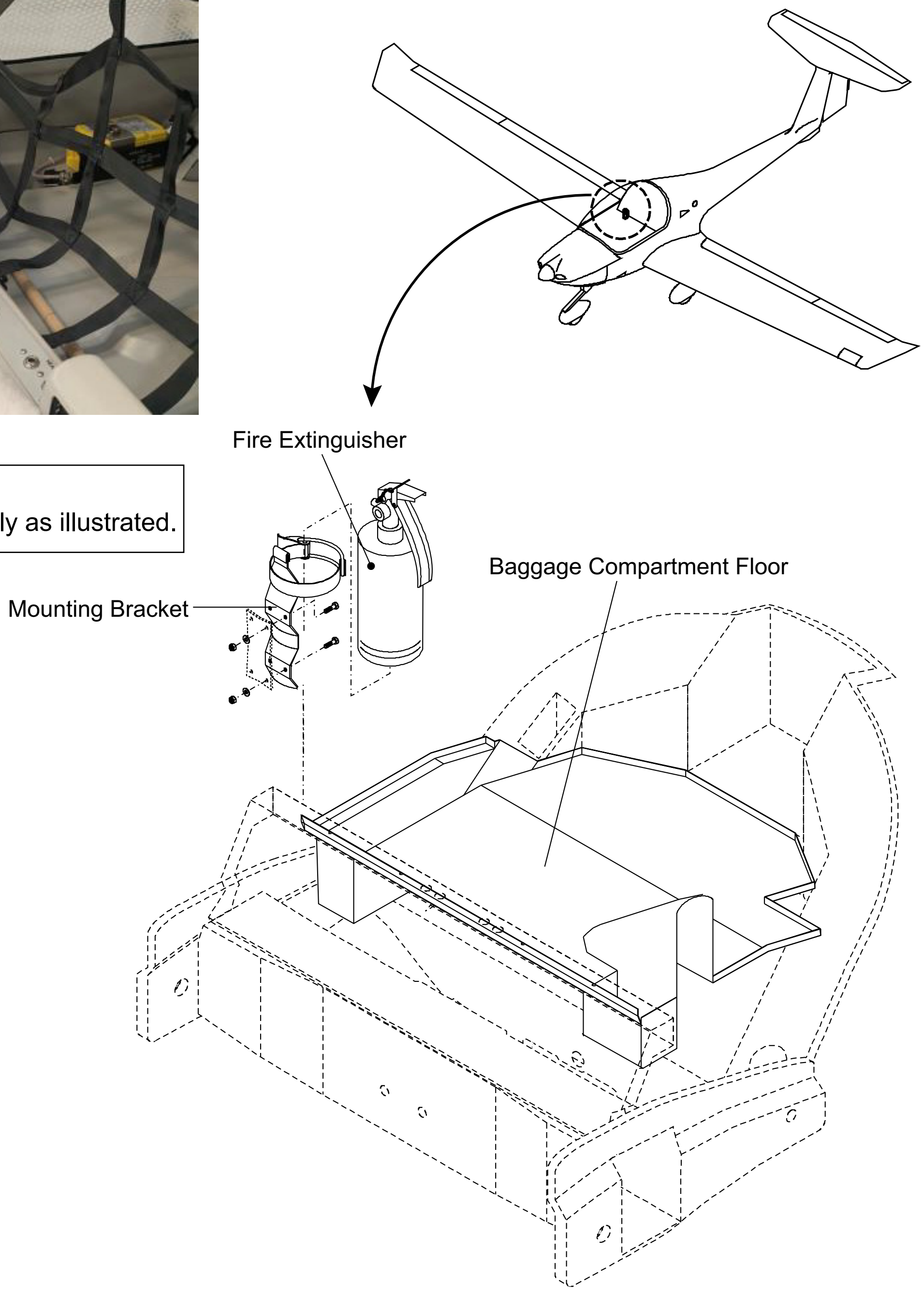


Figure 1 - Fire Extinguisher Installation

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CHAPTER 27
FLIGHT CONTROLS

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FLIGHT CONTROLS

1. General

This chapter describes construction, operation, and adjustment of control surfaces and their operating devices. The DA20-A1 is equipped with dual control systems. Through push rods and bellcranks, the control movements are transmitted to the respective control surfaces.

2. Description

The DA20-A1 is equipped with conventional ailerons, elevator and rudder controls.

Ailerons and elevator are deflected with the control stick via push rods. The rudder is deflected with the rudder pedals via control cables.

The DA20-A1 is equipped with an electric elevator trim system. The trim switch mounted on the center console is used to actuate an electric motor which trims the elevator.

3. Troubleshooting

Defects that may occur within the control system are described in the respective sub-chapters.

4. Maintenance and Inspection Information

If maintenance is carried out on the flight control system, common safety precautions must be taken. After working on the control systems, check for interference and looseness.

100 HOUR INSPECTION

During each 100 hour inspection, the control surface hinge components are to be examined for damage. Use of a 10X magnifying glass is recommended. Cracks and corrosion may be indicated by lifting or bubbling of the paint. If a crack or corrosion is suspected on any of the hinge components, it is recommended that the paint be removed locally for further inspection. Replace damaged components. If paint has been removed and no damage is found, it is recommended that the hinge surface be protected. Use a small paintbrush and apply a polyurethane-based paint to the surfaces.

Refer to figure 1.

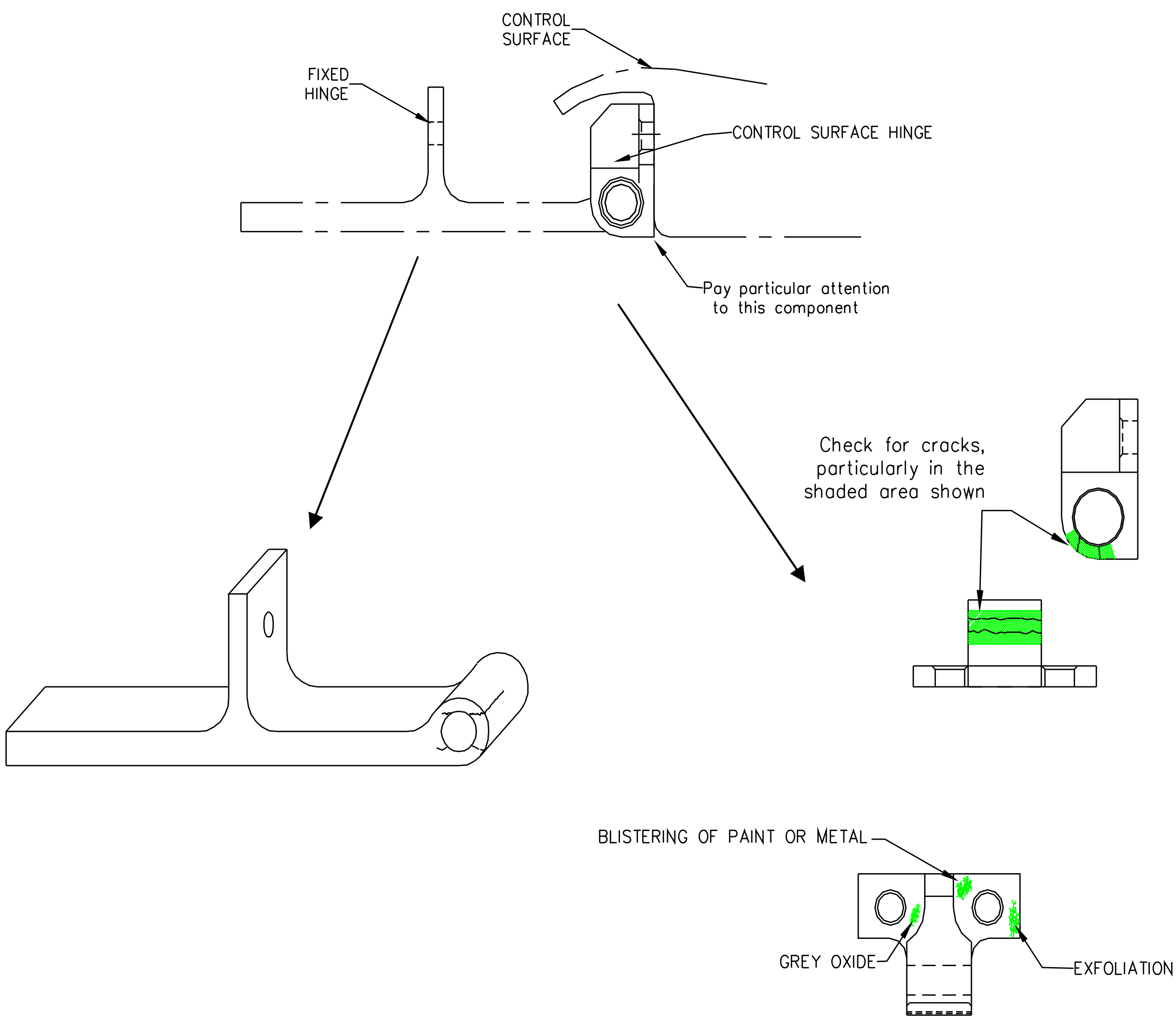


Figure 1 - Control Surface Hinge Components

AILERONS CONTROL SYSTEMS

1. General

The ailerons are used to control the movement of the airplane about its longitudinal axis. Actuating the stick, results in the deflection of one aileron in the upward direction and the other in the downward direction. The ailerons are actuated via push rods and bellcranks. The airplane can be trimmed about its longitudinal axis by means of a fixed trim tab on the left hand aileron.

The aileron mass balance is attached to the outboard end of the aileron.

2. Description

Refer to Figure 1.

The DA20-A1 can be operated from either seat. A roll control movement is transmitted from the control sticks to the ailerons through the following parts:

1. Control sticks
2. Two push rods connecting the control sticks in lateral direction, attached to the bottom end of the control sticks
3. Bellcrank attached to the forward control bulkhead
4. Push rod
5. Bellcrank attached to the aft control bulkhead
6. Push rod in wing
7. Aileron bellcrank
8. Push rod attached to aileron horn
9. Aileron horn

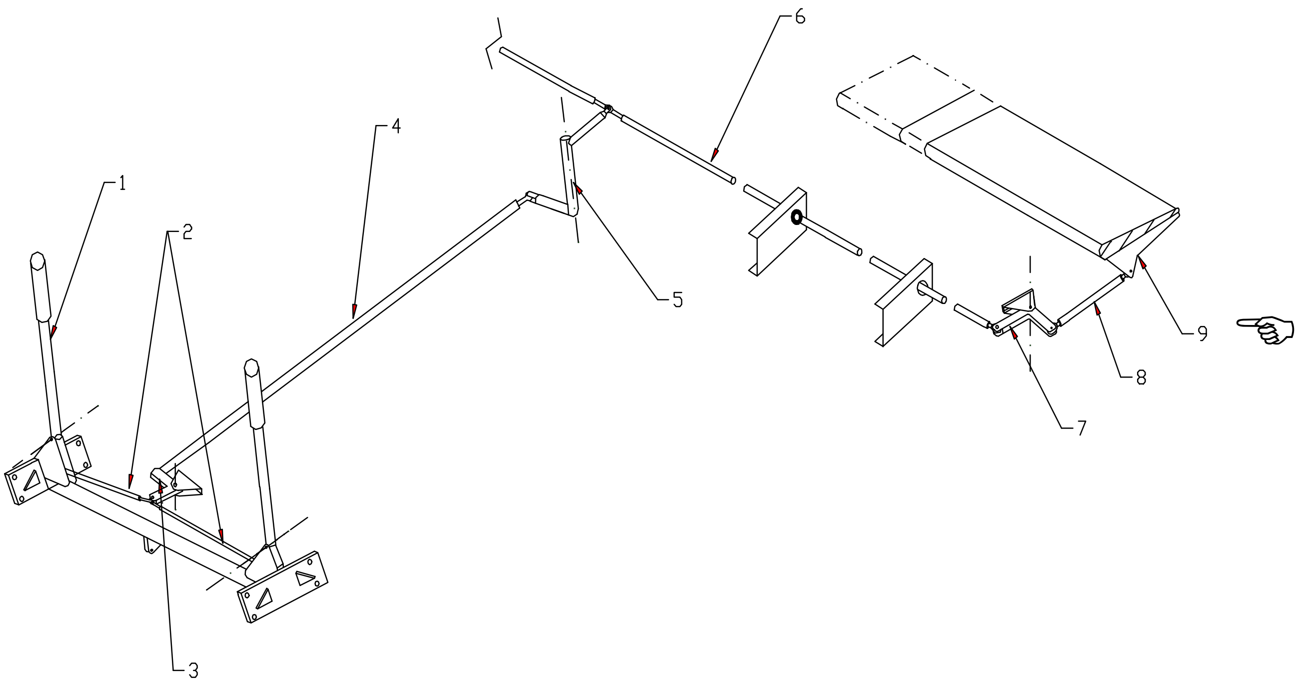


Figure 1 - Aileron Control System

3. Troubleshooting

The following table lists defects as they could appear in the aileron control system and their correction.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Interference	Unclean or defective bearings	Replace
Aircraft moves about longitudinal axis	Aileron push rods adjusted incorrectly	Readjust
	Fixed trim tab adjusted incorrectly	Readjust
	Wing flaps adjusted incorrectly	Readjust

4. Removal and Installation

Refer to Figure 1.

A. Control Sticks

Refer to Sub Chapter 27-11.

B. Aileron Push Rods Connected to Control Sticks

(1) Removal

(a) Remove mounting bolts from the rod end bearings of the respective push rod.

(b) Remove push rod from bellcrank and control stick

(2) Installation

(a) For installation, reverse the sequence.

C. Bellcrank Attached to the Forward Control Bulkhead

Seat shells must be removed.

(1) Removal

(a) Remove the 2 mounting bolts of the aileron push rods.

(b) Remove the mounting bolt from the pedestal.

(c) Remove the bellcrank from the pedestal.

(2) Installation

(a) For installation, reverse the sequence.

D. Push Rod in Center Console

This push rod is located under the center console between the seats. In order to gain access to the push rod, both seat shells and the center console cover must be removed.

(1) Removal

(a) Remove the two mounting bolts of the aileron push rods.

(b) Move push rod in rearward direction until forward end can be lifted through the opening in the center console.

(c) Extract push rod in forward direction.

(2) Installation

(a) For installation, reverse the sequence.

E. Bellcrank attached to the Aft Control Push Rods

Baggage compartment floor and fuel tank must be removed.

(1) Removal

(a) Remove the 2 mounting bolts of the aileron push rods.

(b) Remove the mounting bolt from the bellcrank.

(c) Remove the bellcrank together with guide pushing from the pedestal.

(2) Installation

(a) For installation, reverse the sequence.

F. Push Rod in Wing

(1) Removal

(a) Remove the wing (refer to Chapter 57).

(b) Open the inspection hole on the wing bottom side.

(c) Disconnect the bellcrank in wing from the push rod end bearing.

(d) Remove the rod end bearing.

(e) Remove the push rod from the wing.

(2) Installation

(a) For installation, reverse the sequence.

(b) Verify that the ailerons are properly adjusted. (Refer to Sub Chapter 27-10, page 9 and Sub Chapter 06-00).

G. Aileron Bellcrank in Wing

(1) Removal

(a) Open the inspection hole on the wing bottom side.

(b) Remove the mounting bolts of the push rods.

(c) Remove the mounting bolt of the bellcrank bearing.

(d) Remove the bellcrank.

(2) Installation

(a) For installation, reverse the sequence.

H. Aileron

(1) Removal

(a) Disconnect the push rod from the aileron horn.

(b) Remove the cotter pins.

(c) Remove the pins from the hinges.

(d) Remove the aileron.

(2) Installation

(a) Clean the hinges.

(b) If a crack or corrosion is suspected on the any of the control surface hinge components, it is recommended that the paint be removed locally for further inspection. Replace damaged components. If paint has been removed and no damage is found, it is recommended that the hinge surface be protected. Use a small paintbrush and apply a polyurethane-based paint to the surfaces.

(c) On two part hinges there are two different ways that the cotter pin, pin and hinge are assembled. Install the aileron. Refer to Figure 2a and 2b. Reinstall all of the pins with the head of the pin against the aircraft side hinge part as shown in Figure 2b. On three part hinges the pin can be installed as it was removed.

NOTE: Use only Loctite 222. Subsequent removal of pins may not be possible if any other type of Loctite is used.

(d) Apply Loctite 222 to the pins; refer to Figure 2a and 2b. It is important that the Loctite not contact the pin or hinge area where the bushing is installed. Apply the Loctite 222 to the pin after sliding it part way through the hinge as shown in Figure 2b.

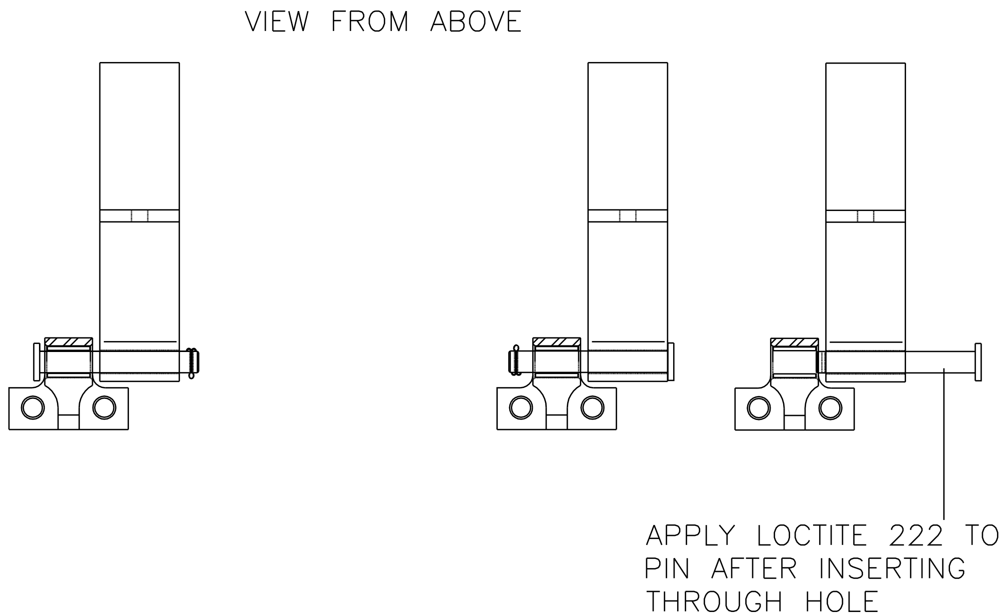


Figure 2a **Figure 2b**.

(e) Rotate the pin several times once it has been installed to evenly distribute the Loctite. Push the head of the pin up against the hinge.

(f) Orient the cotter pin hole so that the cotter pins can easily be installed once the Loctite has cured. Allow 6 hours for the Loctite to cure at 22 degrees Celsius, 72 degrees Fahrenheit. Note that lower cure temperature will increase cure time.

(g) Install the cotter pins and reconnect the aileron push rod.

NOTE: To ease cotter pin installation, bend the cotter pin at a right angle about 1/3 of the way from the bottom. Use needle nose pliers to insert the pin into the hole. Use a 90 degree pick to hold the top of the cotter pin while grabbing the bottom of the pin (sticking out through the hole) with the needle nose pliers. Hold the bottom of the pin while applying pressure with the pick to straighten it. Pull the pin into the hole and bend the ends to secure it in place.

(h) Check the operation of the ailerons.

5. Adjustment

Refer to Figure 1.

The DA20-A1 is an airplane with excellent aerodynamic characteristics; any improper adjustment of the ailerons may have a negative effect on the roll stability. After a repair of the aileron control system, a check of the system to verify the correct aileron deflections given in Sub-Chapter 06-00 must be carried out. To adjust the system, push rod eye-ends must be adjusted so as to obtain the following:

Control Stick (1) / Aileron Push Rods in Main Column (2)

- With control sticks centered, control stick columns must be at right angles to the aileron push rods (seen from the front or rear).

Aileron Push Rods in Main Column (2) / Bellcrank in Forward Control Bulkhead (3)

- Longitudinally oriented arm of bellcrank must be at right angles to aileron push rods in main column.

Bellcrank in Forward Control Bulkhead (3) / Aileron Push Rod in Center Console (4)

- Transversely oriented arm of bellcrank must be at right angles to aileron push rod in center console.

Aileron Push Rod in Center Console (4) / Bellcrank in Aft Control Bulkhead (5)

- Push rod must be at right angles to lower arm of bellcrank.

Bellcrank in Aft Control Bulkhead (5) / Aileron Push Rods (6)

- Upper arm of bellcrank must be at right angles to push rods.

Aileron Push Rod (6) / Aileron bellcrank in Wing (7)

- Push rod must be at right angles to longitudinally oriented arm of bellcrank.

Aileron bellcrank in wing (7) / Aileron Push Rod Connected (8) to Aileron Horn (9)

- Push rod eye-ends must be adjusted to obtain 0 aileron deflection.
- If inadequate roll stability is observed during flight, the left aileron must be fitted with a fixed trim tab 20 centimeters (8 inches) from the inboard edge.
- Verify aileron travel up and down corresponds values in Sub-Chapter 06-00.

Fine Adjustment

The requirements for roll stability and a properly trimmed longitudinal axis must be met in all flight conditions.

The following modifications can be made to achieve correct adjustment:

1. Adjusting the fixed trim tab.

2. Adjusting the wing flaps.

If these components are properly adjusted, the airplane is stable about its roll and yaw axis when evenly loaded, in the entire airspeed range and with all power settings.

MAIN COLUMN

1. General

The main column is located under the seats. It consists of the two control sticks and a torque tube for the transmission of the elevator and aileron control inputs.

2. Description

The ailerons and the elevator are actuated by means of the control sticks.

3. Troubleshooting

The freedom of movement of the main column must be ensured at all times. Interference is in most cases caused by defective bearings. Defective bearings must be replaced under all circumstances.

4. Removal and Installation

A. Control Sticks

(1) Removal

(a) Disconnect the aileron push rod.

(b) Remove the bolt from the stick bearing.

(c) Disconnect the ground strap and wires.

(2) Installation

(a) For installation, reverse the sequence.

B. Elevator Torque Tube Assembly

(1) Removal

(a) Disconnect the elevator push rod.

(b) Remove the LH and RH aluminum mounting rods.

(c) Remove the torque tube assembly.

(2) Installation

(a) For installation, reverse the sequence.

NOTE: Care must be taken to ensure proper ground connections.

5. Adjustment

A. Control Sticks

The control sticks must be centered for initial adjustment. The stops, located on the control stick, must be adjusted so that the surface deflections conform to the nominal values given in the Adjustment Report (refer to Sub Chapter 06-00).

RUDDER CONTROL SYSTEM

1. General

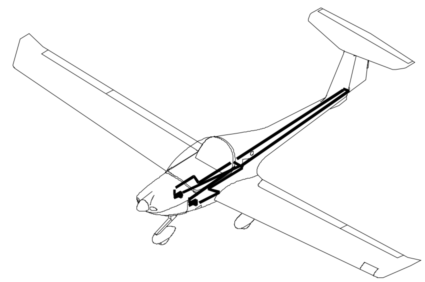
   A deflection of the rudder results in the airplane turning about its vertical axis. The operation of the pedals causes the rudder to be deflected to the left or to the right.

2. Description

   Refer to Figure 3A and 3B.

   The DA20-A1 is equipped with dual control rudder pedals. Any movement of the pedal is transmitted to the rudder through control cables and guide rollers. Both pedal assemblies can be adjusted. Figure 3a shows the location of the T-Grip adjustment on aircraft serial number 10300 and below. Figure 3b shows the location of the T-Grip on aircraft serial number 10301 and above and aircraft with Service Bulletin DA20-27-07 incorporated.

Aircraft serial #300 and below



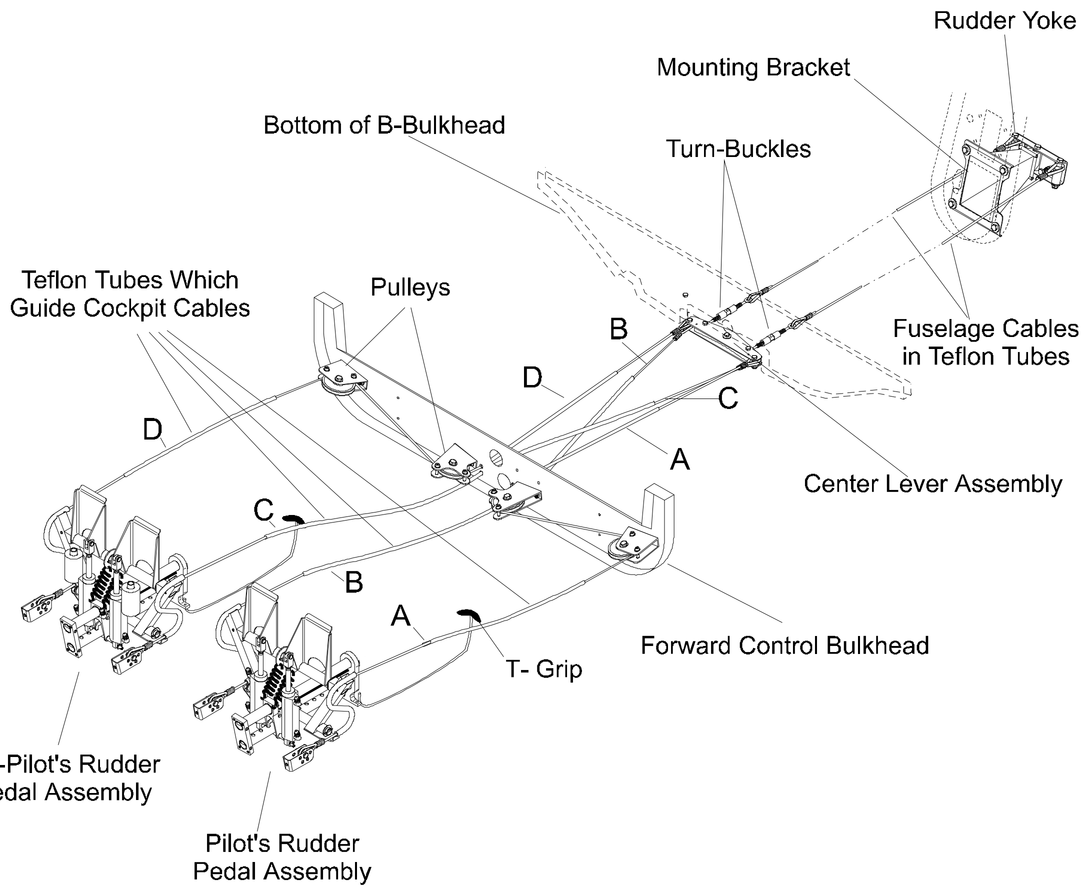
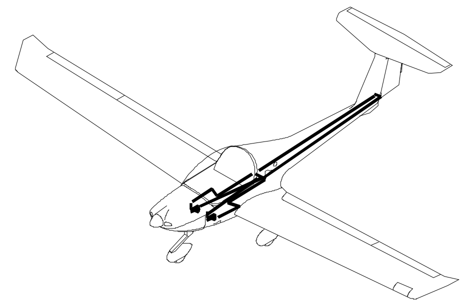


Figure 3A

<u>Aircraft serial #301 and Above and aircraft with service bulletin DA20-27-07 incorporated.</u>



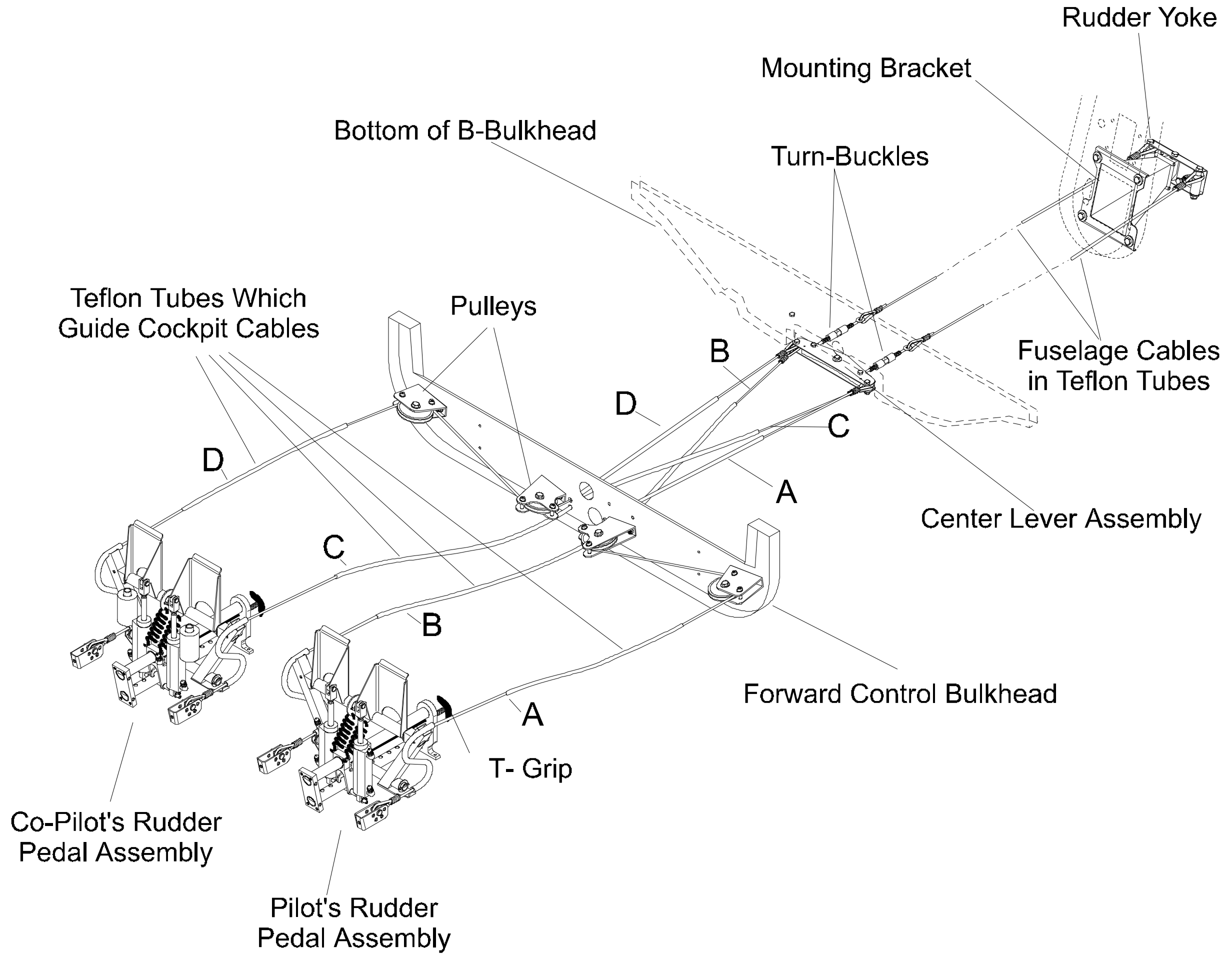


Figure 3B

3. Troubleshooting

The following table lists defects as they could appear in the rudder control system and their correction.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Interference	Unclean or defective bearings	Replace or clean bearings
Aircraft moves about its axis	Rudder adjusted incorrectly Fixed trim tab adjusted incorrectly	Readjust Readjust

RUDDER PEDAL ASSEMBLY

1. General

The DA20-A1 includes complete pedal assemblies on both sides as standard equipment. Refer to Figure 4.

These are mounted on the floor group. In addition to the pedals, each assembly consists of an adjustment mechanism and brake cylinders for the left and right wheel brakes. After loosening the mounting bolts, the complete assembly can be removed from the fuselage

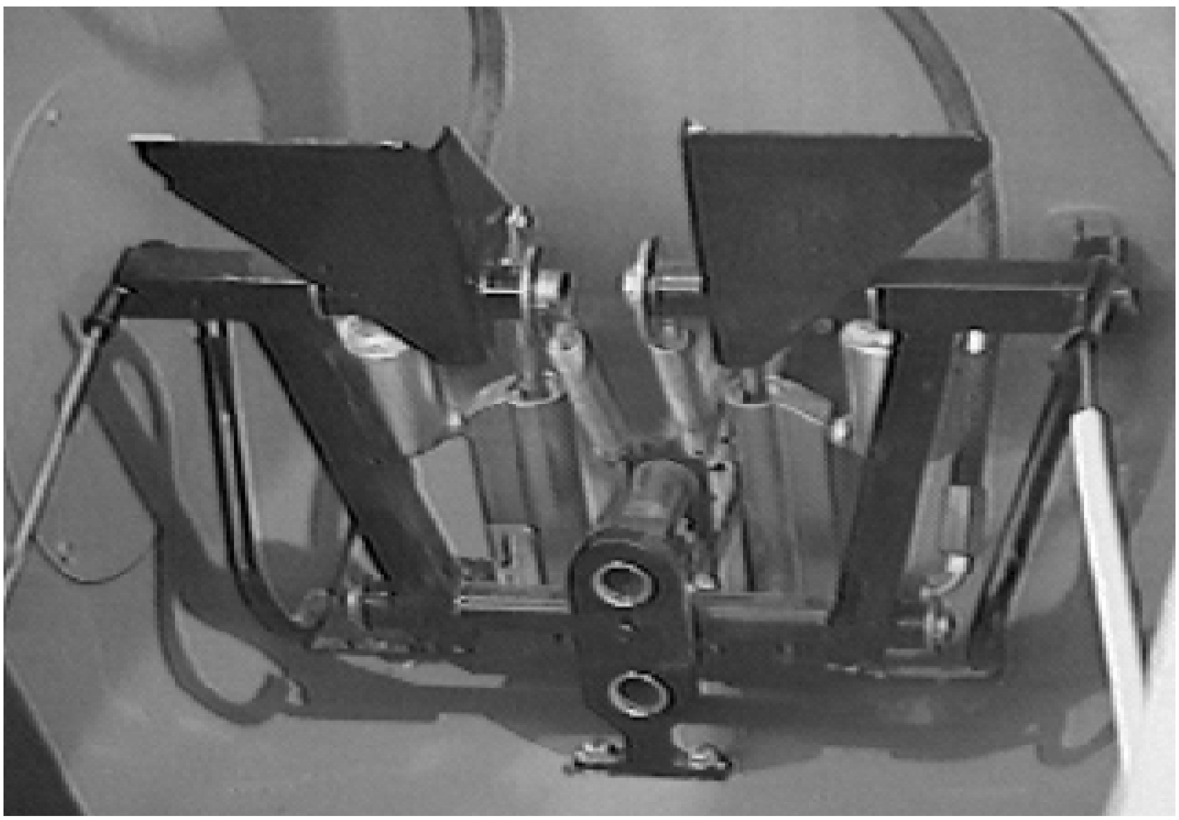


Figure 4 - Rudder Pedal Assembly

2. Description

The movement of the pedals is transmitted to the rudder lower mounting plate through control cables. The pedals can be pushed forward or pulled rearward when the arresting lever is disengaged (black T-grip pulled). See figure 4a for aircraft serial number 10301 and above and aircraft with Service Bulletin DA20-27-07 incorporated. To lock the pedals into place at the desired position, release the arresting grip and push the pedals forward. The pedal axis is attached to the adjustment cradle. Secondary levers are mounted to the top of the pedals to actuate the brake cylinders.

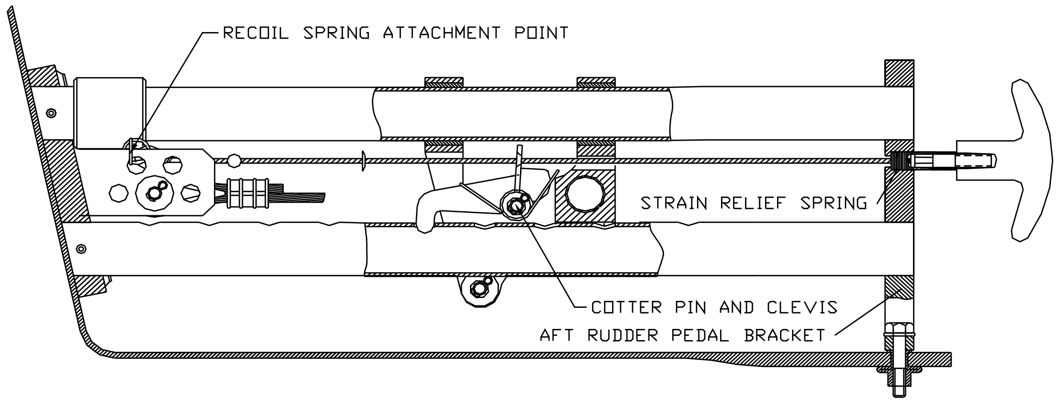


Figure 4A
On Aircraft serial number 10301 and above and aircraft with Service Bulletin DA20-27-07 incorporated.

3. Removal and Installation

A. Pedal Assembly

It is recommended to remove the complete pedal assembly.

(1) Removal

(a) Disconnect the control cables from the firewall.

(b) Remove the mounting bolts of the cradle tube.

(c) Remove the brake cylinders.

(d) Remove the pedal assembly from the cockpit.

(2) Installation

(a) For installation, reverse the sequence.

RUDDER CONTROLS IN FUSELAGE

1. General

Rudder control inputs are transmitted through control cables within the fuselage. Four pulleys under the seats and the rudder lever under the B-bulkhead guide the cables through the fuselage structure.

2. Description

Refer to Figure 3a or 3b.

The movement of the 4 control cables is transferred to the rudder lever via guide pulleys. From there, two cables run back to the rudder lower mounting plate, guided by Teflon tubes.

3. Removal and Installation

Refer to Figure 3a or 3b.

A. Cables between the Firewall and the Rudder Lever

Seats and fuel tank must be removed.

(1) Removal

(a) Disconnect the cable from the fitting on firewall by removing the bolt through the cable eye.

(b) Cut off the cable and pull through the guides. Remove the cable.

(2) Installation

(a) Thread the new cable and install the cable eyes.

(b) Attach cable eyes to the fitting on the firewall and to the rudder lever.

B. Cables between the Rudder Lever and the Rudder Lower Mounting Plate

(1) Removal and Installation

Analogous with removal and installation of forward cables, but with the rudder removed from the airplane.

NOTE: Only original material may be used. The cable ends are crimped using Locoloc thimbles and oval sleeves for 3.2 millimeter diameter steel cables in accordance with MS 51844.

NOTE: Crimping is done using the proper crimping tools and gauges.

4. Adjustment

Refer to Figure 3a or 3b.

After a repair of the rudder control system a check of the system to verify the correct rudder deflections given in Sub-Chapter 06-00 must be carried out.

To adjust the system, the multi-hole fittings on the firewall, the control cable turnbuckles, and the stop bolts (see Sub-Chapter 27-20-30) in the rudder lower mounting plate must be adjusted.

Cables between Firewall and Rudder Lever

Adjustment is performed with the pedals in a vertical position (90°). The cable eyes must be attached to the firewall mounted fitting using the appropriate hole.

Cables between Rudder Lever and Rudder Lower Mounting Plate

These cables must be adjusted to a pre-tension of 15 ± 2 daN (33.7 ± 4.5 lbs.) by means of the turnbuckles. Ensure correct neutral position of the rudder.

Verify rudder travel left and right corresponds to prescribed values (refer to Sub-Chapter 06-00).

NOTE: To gain access to the rudder cables, remove the fuel tank cover. If adjustment is required, the fuel tank must also be removed to gain access the cable turnbuckles.

RUDDER

1. General

The DA20-A1 is equipped with a conventional rudder which allows control of the airplane about its vertical axis.

A fixed trim tab on the rudder allows fine adjustment of the yaw angle. The forward center section of the rudder contains a mass balance. The rudder is supported by two self lubricating bushings at the top and bottom.

2. Description

The lower portion of the rudder is attached to the rudder lower mounting plate. A movement of this fitting causes a deflection of the rudder.

3. Removal and Installation

(1) Removal

(a) Remove the mounting nuts on the rudder lower mounting plate.

(b) Swing rudder rearward and remove in downward direction.

(2) Installation

(a) For installation, reverse the sequence.

NOTE: Crimping is done using the proper crimping tools and gauges.

4. Adjustment

A. Rudder Deflection

The rudder deflections are limited by stop bolts located in the lower mounting plate. The bolts may be adjusted and locked with lock nuts, refer to Figure 4.1. For adjustment values, refer to Chapter 06 00.

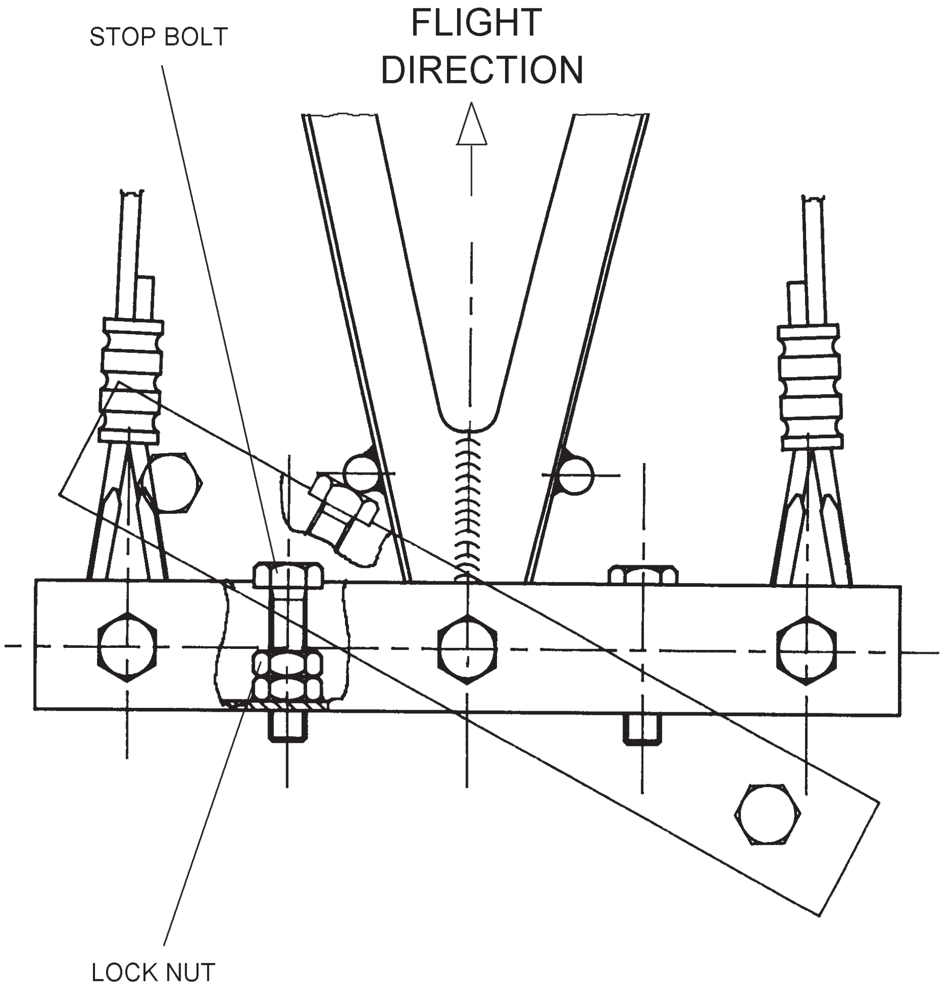


Figure 4.1 - Rudder Stop Bolts

ELEVATOR CONTROL SYSTEM

1. General

The elevator control system provides control of the airplane about its pitch axis. It consists of the control sticks, the elevator torque tube assembly, push rods, and the elevator. The elevator is equipped with an electrically activated trim assembly. Within the vertical stabilizer, a mechanical system connects the elevator control system to the trim assembly.

2. Description

Pulling or pushing the control sticks causes the elevator to deflect upward or downward. (Refer to Figure 5.) The elevator torque tube assembly (2) is mounted to the control sticks (1). It transmits control inputs to the push rod (3) located in the center console and further to the push rod (4) in the fuselage tube. A bellcrank (5) connects this push rod to the vertical push rod (6), located in the vertical stabilizer. The vertical rod is connected to the elevator horn (7). The elevator is attached to the horizontal stabilizer with maintenance free bearings.

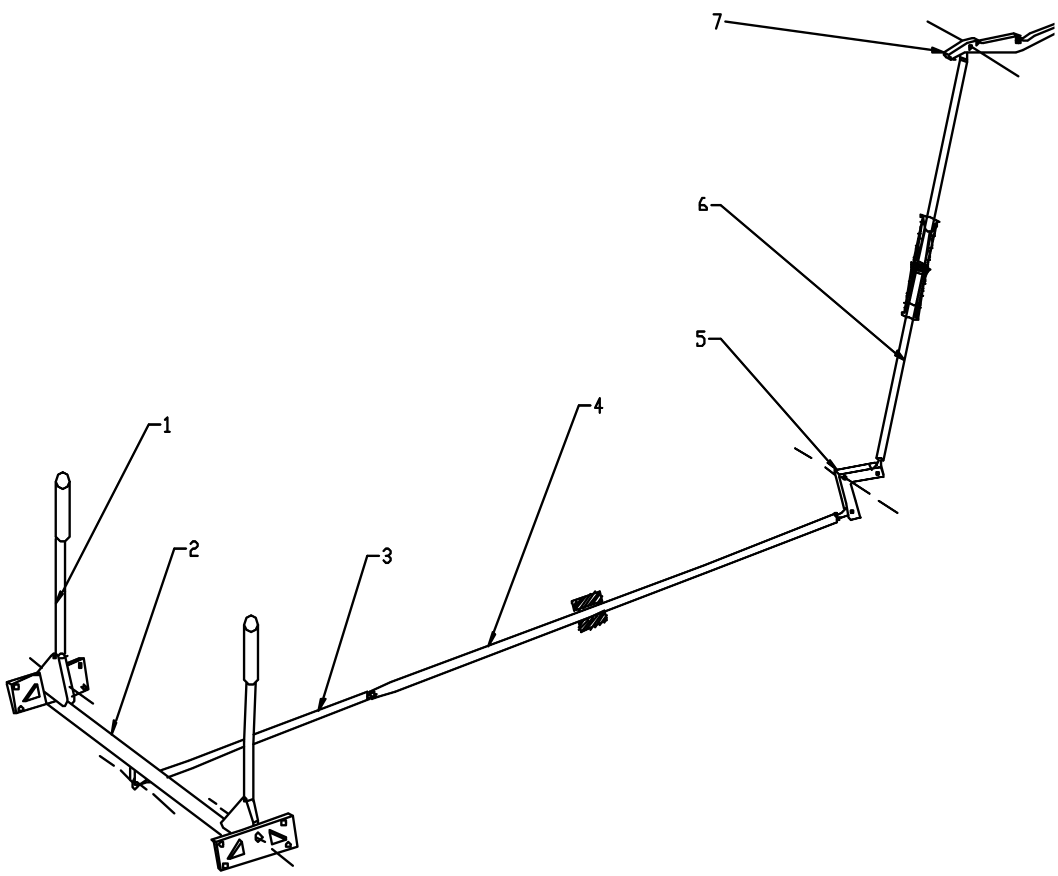


Figure 5 - Elevator Control System

3. Troubleshooting

The following table lists defects as they could appear in the elevator control system, and their correction.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Interference	Unclean or defective bearings	Replace or clean bearings
Excessive play	Bearing or bolt worn	Replace

4. Removal and Installation

Refer to Figure 5.

A. Items (1) and (2): Control Sticks and Torque Tube Assembly

Refer to Sub Chapter 27-11-00.

B. Item (3): Elevator Push Rod in Control Console

Seats must be removed.

(1) Removal

(a) Remove the mounting bolts.

(b) Remove the push rod in rearward direction.

(2) Installation

(a) For installation, reverse the sequence.

C. Item (4): Elevator Push Rod in Fuselage Tube

Rudder must be removed.

(1) Removal

(a) Remove the mounting bolts.

(b) Remove the push rod in rearward direction.

(2) Installation

(a) For installation, reverse the sequence.

D. Item (6): Elevator Push Rod in Vertical Stabilizer

Rudder must be removed. Refer to Sub Chapter 27-30-30.

(1) Removal

Refer to Figure 5.1

(a) Disconnect elevator push rod from lower bellcrank (1).

(b) Disconnect horizontal stabilizer mounting bolts. (2).

(c) Disconnect NAV antenna.

(d) Remove the horizontal stabilizer from the forward fitting (3) by pulling to rear and simultaneously lifting slightly.

(e) Remove horizontal stabilizer assembly (4).

(f) Place assembly on suitable work bench.

(g) Remove Anti Servo trim connecting rod (5).

(h) Remove hinge pins (five) securing elevator to the horizontal stabilizer.

(i) Separate elevator from horizontal stabilizer slightly, in order to gain access to bolt attaching elevator push rod to elevator horn, remove bolt.

(j) Remove elevator from horizontal stabilizer.

(k) Remove elevator push rod (6).

(2) Installation

(a) For installation, reverse the sequence.

CAUTION: CARE MUST BE TAKEN TO ENSURE THE 1.3 OFFSET ON THE ELEVATOR PUSH ROD IS POSITIONED SUCH THAT IT IS POINTING TO THE LEFT (VIEWED FROM THE REAR OF THE AIRPLANE). REFER TO FIGURE 5.2.

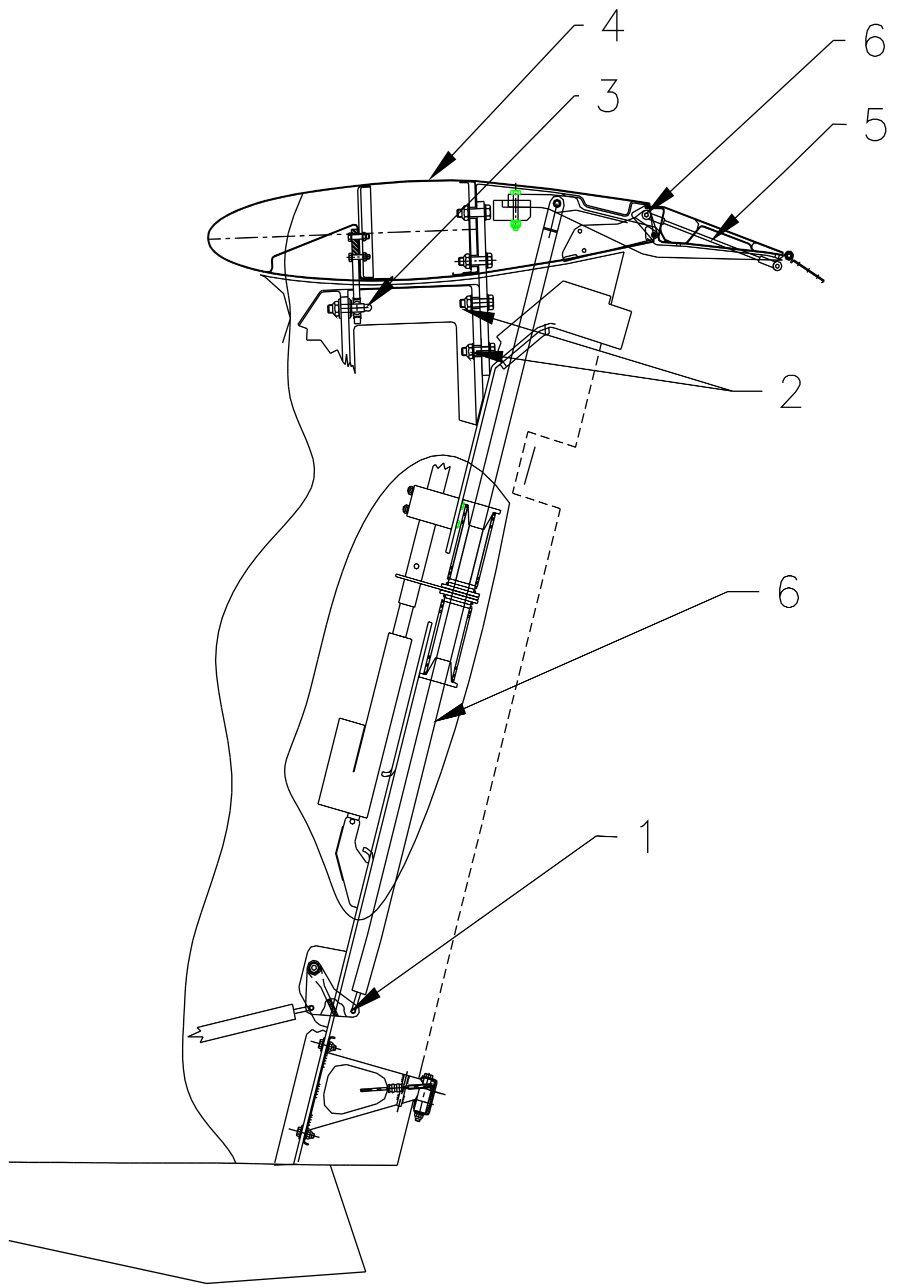


Figure 5.1 - Elevator Structure

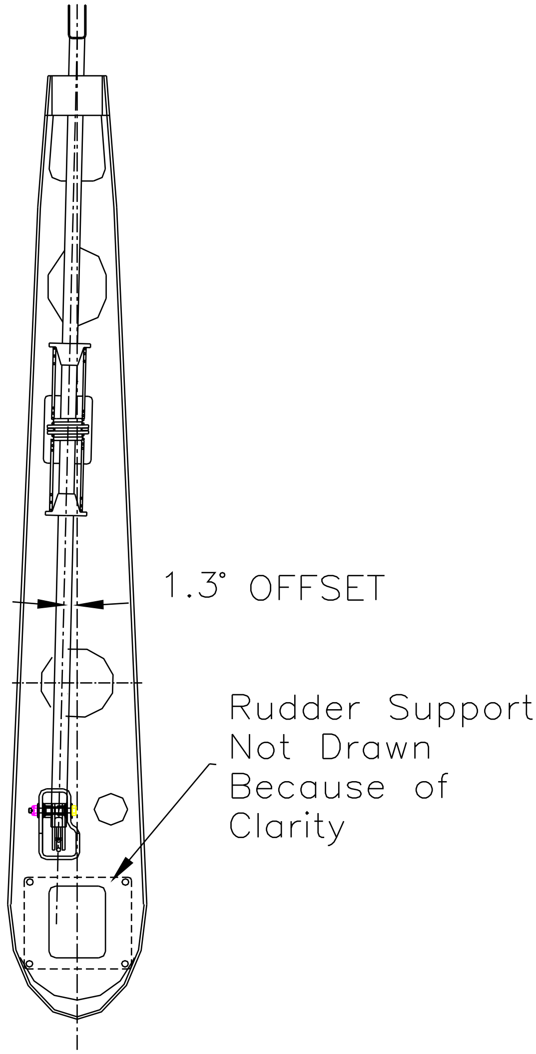


Figure 5.2 - Elevator Pushrod in Vertical Stabilizer

E. Elevator

(1) Removal

(a) Disconnect the elevator push-rod from the elevator horn.

(b) Remove the cotters pins.

(c) Remove the pins from the hinges.

(d) Remove the elevator.

(2) Installation

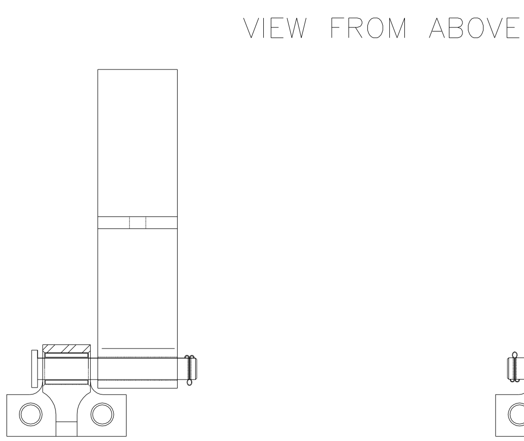
(a) Clean the hinges.

(b) If a crack or corrosion is suspected on the any of the control surface hinge components, it is recommended that the paint be removed locally for further inspection. Replace damaged components. If paint has been removed and no damage is found, it is recommended that the hinge surface be protected. Use a small paintbrush and apply a polyurethane-based paint to the surfaces.

(c) On two part hinges there are two different ways that the cotter pin, pin and hinge are assembled. Install the elevator. Refer to figure 5.3 and 5.4. Reinstall all of the pins with the head of the pin against the aircraft side hinge part as shown in figure 5.4. On three part hinges the pin can be installed as it was removed.

<u>NOTE:</u> Use only Loctite 222. Subsequent removal of pins may not be possible if any other type of Loctite is used.

(d) Apply Loctite 222 to the pins, refer to figure 5.4. It is important that the Loctite not contact the pin or hinge area where the bushing is installed. Apply the Loctite 222 to the pin after sliding it part way through the hinge as shown in figure 5.4.



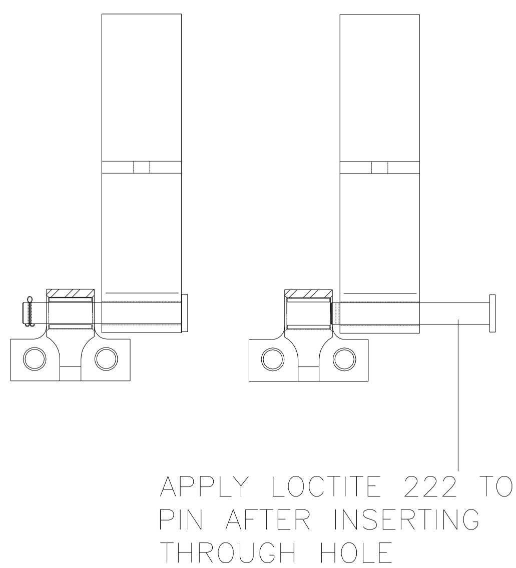


Figure 5.3

Figure 5.4

(e) Rotate the pin several times once it has been installed to evenly distribute the Loctite. Push the head of the pin up against the hinge.

(f) Orient the cotter pinhole so that the cotter pins can easily be installed once the Loctite has cured. Allow 6 hours for the Loctite to cure at 22 degrees Celsius, 72 degrees Fahrenheit. Note that lower cure temperature will increase cure time.

(g) Install the cotter pins and reconnect the elevator push rod, ensure all of the correct hardware and safety devices are installed.

NOTE: To ease cotter pin installation, bend the cotter pin at a right angle about 1/3 of the way from the bottom. Use needle nose pliers to insert the pin into the hole. Use a 90 degree pick to hold the top of the cotter pin while grabbing the bottom of the pin (sticking out through the hole) with the needle nose pliers. Hold the bottom of the pin while applying pressure with the pick to straighten it. Pull the pin into the hole and bend the ends to secure it in place.

(h) Check the operation of the Elevator

5. Adjustment

Refer to Figure 5.

Upon completing a repair of the elevator control system, a check of the system is necessary, in order to verify the correct elevator deflections (refer to Sub-Chapter 06-00). To adjust the system, the push rod eye-ends must be adjusted to obtain the following:

A. Items (1) + (2): Control Sticks and Torque Tube Assembly

Control sticks must be centered.

B. Item (3) + (4): Push Rods in Control Console and Fuselage Tube

Adjust push rod eye-ends so that the bellcrank is at right angles to the Lower tail fin rib.

C. Item (6): Push Rod in Vertical Stabilizer

Adjust the push rod eye-ends so that the elevator is in a neutral position.

D. Elevator Stops

The stop for the pull direction is located in the floor element (in front of the stick). It cannot be adjusted. The adjustable stop for the push direction is located on the LH mounting rib for the main column. If the elevator stops located at the control sticks malfunction, backup stops are installed on the elevator horn. The total travel is adjusted on the vertical push rod in the vertical stabilizer. Verify that the elevator travel corresponds to the prescribed values in Sub-Chapter 06-00.

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ELEVATOR TRIM SYSTEM

1. General

The DA20-A1 is equipped with an electric elevator trim system which allows the trimming of the airplane for different center of gravity positions. The elevator is adjusted using a rocker switch, located on the center console. A signal is transmitted to an electric motor which adjusts the position of the elevator assembly.

The tab located on the rear of the elevator acts as an anti-servo tab and increases the elevator control forces.

2. Description

Refer to Figure 6. The elevator trim system used in the DA20-A1 is electrically operated. A rocker switch mounted in the center console controls an electric actuator which is connected to the vertical elevator push pull rod via a spring mount assembly. Depressing the rocker switch causes the actuator to increase the pre-load in the spring assembly and trim the elevator.

An elevator trim position indicator mounted on the instrument panel, receives a feedback signal from a potentiometer in the actuator and displays the trim position of the elevator.

Aircraft Serial No. 003 to 005 have externally mounted potentiometers with their trim actuator all other aircraft have internally mounted potentiometers.

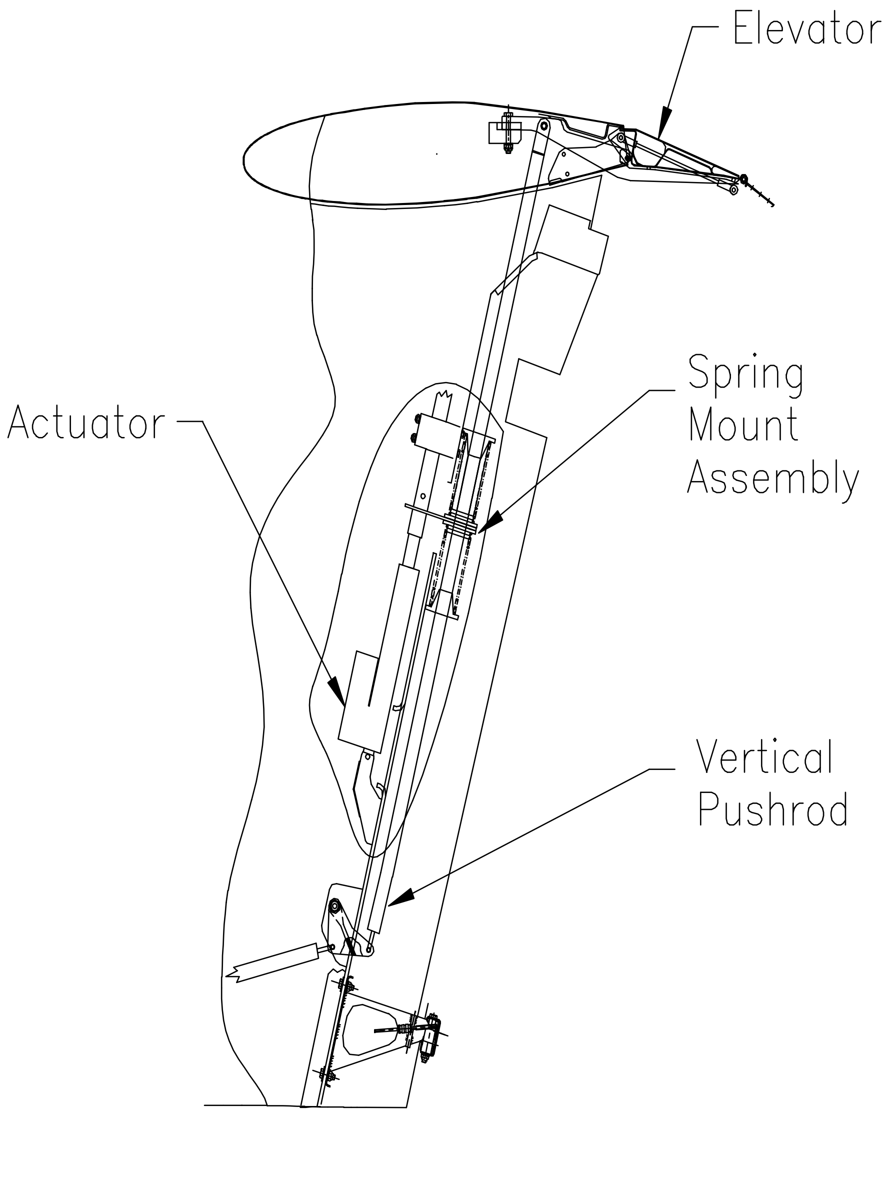

Figure 6 - Elevator Trim System

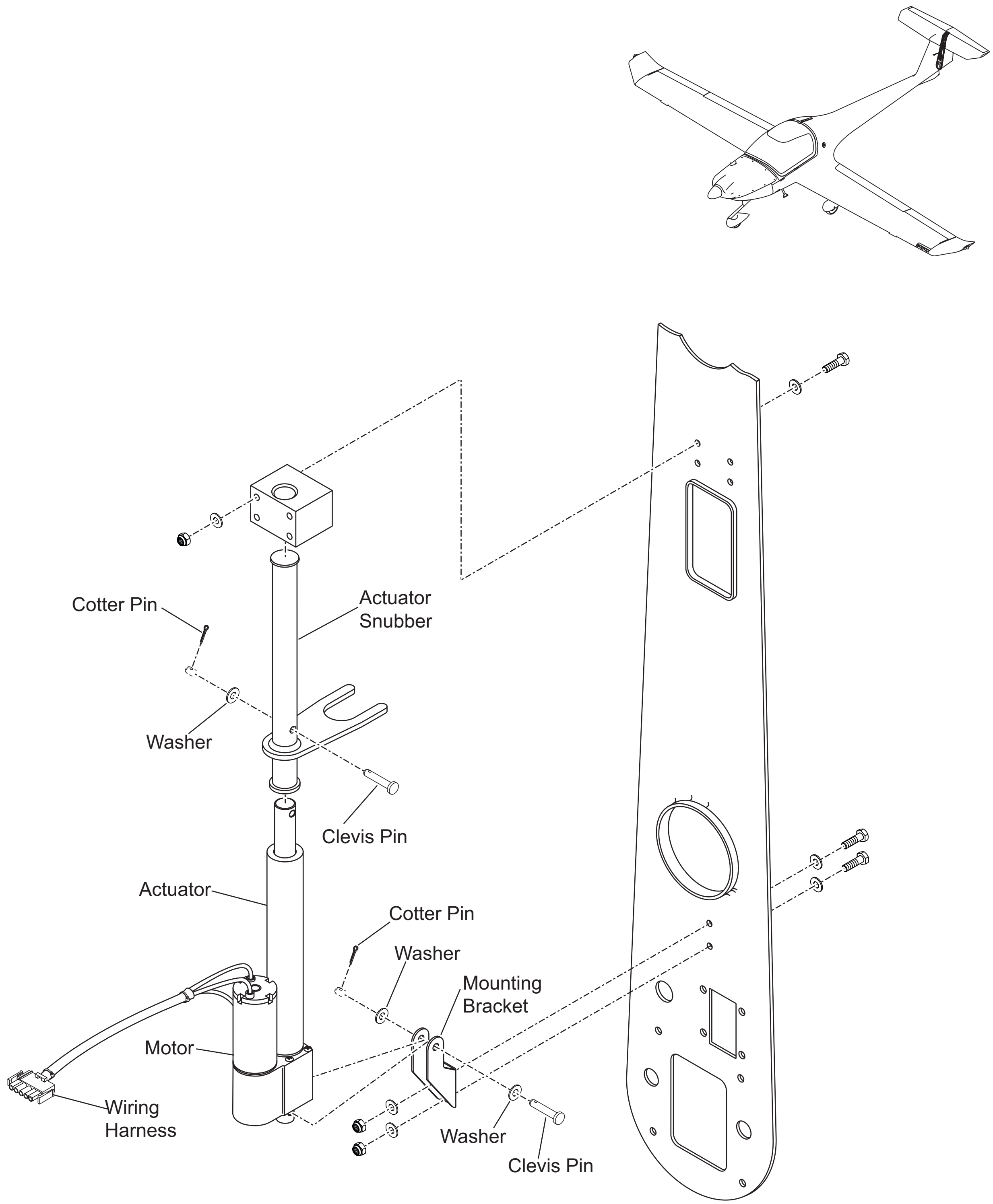

Figure 7 - Elevator Trim Actuator and Actuator Motor

3. Troubleshooting

The following table lists defects as they could appear in the elevator trim system, and their correction.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Trim system inoperative	Defective circuit breaker	Replace
	On-board voltage too low	Check battery and alternator
	Defective trim switch	Check switch
	Defective or loose connector on actuator	Check connector
	Defective spring mount assembly	Check spring mount assembly
	Defective electric actuator	Check actuator
Elevator Trim moving too slowly. (When operating properly, full travel of elevator takes 11 sec.)	Insufficient actuator power	Check electrical system
	Defective electric actuator	Check actuator
No or incorrect position indication	Elevator trim position indicator defective	Replace
	Position feedback circuit in actuator defective	Check actuator
Loss of stick centering	Disconnected actuator	Reconnect
	Spring mount assembly defective	Replace

NOTE: In case of a defect in the electric actuator, it is recommended to replace the entire actuator.

4. Removal and Installation

A. Rocker Switch

(1) Removal

(a) Using access hole in center console, squeeze retaining clips on rocker switch and pull upwards slightly.

(b) Disconnect wiring harness.

(c) Remove switch.

(2) Installation

(a) For installation, reverse the sequence.

B. Elevator Trim Actuator and Actuator Motor (Refer to Figure 7)

(1) Removal

(a) Remove the rudder. Refer to sub-chapter 27-30-30.

(b) Disconnect the wiring harness to the actuator motor.

(c) Remove the clevis pin from the lower mounting bracket.

(d) Remove the clevis pin which connects the actuator snubber and actuator.

(e) Slowly pull the actuator and actuator motor from the actuator snubber.

(e) Remove the actuator and actuator motor from the aircraft.

(2) Installation

(a) Place the actuator and actuator motor in place to have the actuator fit in the actuator snubber.

(b) Install the clevis pin which connects the actuator snubber and actuator.

(c) Move the actuator and actuator motor to fit into the lower mounting bracket.

(d) Install the clevis pin at the lower mounting bracket.

(e) Connect the wiring harness to the actuator motor.

C. Spring Mount Assembly (Refer to Figure 6)

(1) Removal

(a) Remove the rudder. Refer to Sub-Chapter 27-30-30.

(b) Disconnect elevator pushrod from lower bellcrank.

(c) Remove rod end bearing from elevator push pull rod.

(d) Remove the upper and lower roll pins from the spring mount assembly.

(e) Remove the spring mount assembly.

(2) Installation

(a) For installation, reverse the sequence.

D. Anti-Servo Tab Assembly

(1) Removal

(a) Remove trim connecting rods.

(b) Remove hinge pins connecting elevator to tab assembly.

(c) Remove tab assembly.

(2) Installation

(a) For installation, reverse the sequence.

5. Adjustment

The trim system used on the DA20-A1 is designed to be maintenance free and therefore is non-adjustable.

The following check can be used to verify the trim system is properly adjusted:

With the trim indicator in the neutral position, the elevator and anti-servo tabs must be aligned with the trailing edge of the horizontal stabilizer. If this is not the case, the trim position indicator should be checked and replaced as necessary. If misalignment still occurs, the entire trim system should be checked for damaged or worn parts. Damaged or worn parts must be replaced. Full deflection of trim system should take 11 seconds.

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WING - FLAPS

1. General

The DA20-A1 is equipped with electrically operated wing flaps.

The flaps are operated by means of a 3 position toggle switch located in the center section of the instrument panel.

The flap position indicator is located next to the flap toggle switch. It has LED's for the CRUISE, T/O, and LDG positions.

2. Description

Refer to Figure 8A. The wing flaps are driven by an (1) electric motor located under the left seat. When operating properly, Full Flap deflection (From LDG to CRUISE) takes 5 seconds.

For aircraft serial number 10039 and above and aircraft with service bulletin DA20-27-01 (formerly SB95-05) incorporated: A current limiter is connected to the motor. The current limiter is located on the aft face of the forward control bulkhead underneath the pilot's seat. When extending the flaps from CRUISE to LDG it takes approximately 7 seconds. When retracting the flaps from LDG to CRUISE it take approximately 10 seconds.

A reduction gear with a spindle and a push rod is fitted to the motor. The push rod transmits the actuator movement to a (2) bellcrank.

A cam attached to the push rod actuates 5 micro switches which are part of the flaps electronic control circuit.

The bellcrank is mounted to the aft control bulkhead. From here, (3) two push rods run to the (4) flap bellcranks. A stop on the bellcranks protects the end positions from overload, in the event of an electrical malfunction.

The wing flaps are mounted to the wings with hinges.

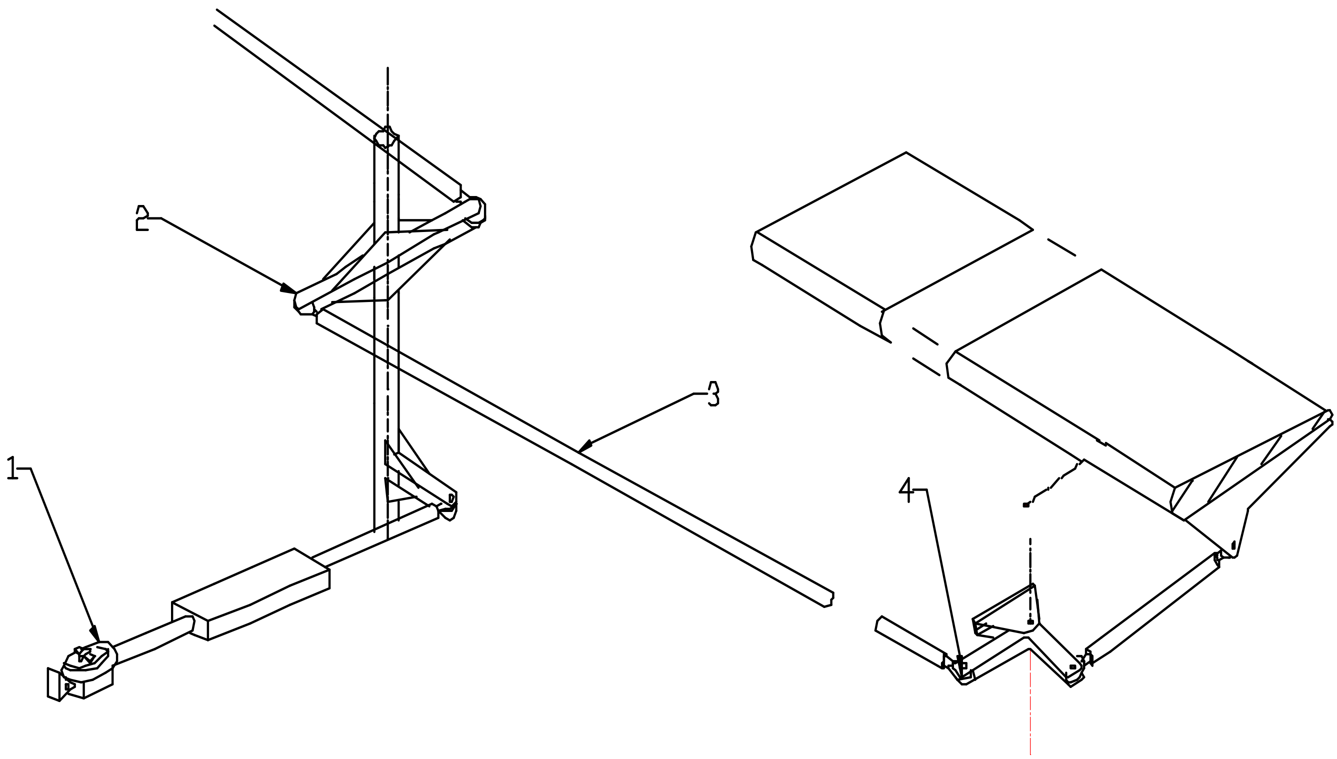


Figure 8A - Wing Flaps

3. Troubleshooting

The following table lists defects as they could appear in the flap system, and their correction. For aircraft serial number 10039 and above and aircraft with service bulletin DA20-27-01 (formerly SB95-05) incorporated additional troubleshooting is identified by indicating the service bulletin number in the table e.g. (DA20-27-01).

COMPLAINT	POSSIBLE CAUSE	REMEDY
Flap immovable	Defective circuit breaker	Replace
	Defective flap switch	Check switch
	Defective or loose connector on motor	Check connector
	Defective limit switch	Check limit switch
	Defective electric motor	Check motor
	Defective current limiter (DA20-27-01)	Check current limiter

COMPLAINT	POSSIBLE CAUSE	REMEDY
Flaps moving too slowly or at the wrong speed	Defective flap motor	Replace motor
	Binding actuator	Check actuator for binding at guide grom-met.
	Defective current limiter (DA20-27-01)	Check current limiter
No or incorrect position indication	Limit switch defective or adjusted improperly.	Check limit switch assembly
Flap damage from aerodynamic load	Flaps extended at too high air speed.	Check entire flap system

4. Removal and Installation

A. Wing Flaps

(1) Removal

(a) Lower the flaps to LDG.

(b) Disconnect the battery.

(c) Disconnect the push-rod from flap horn.

(d) Remove the cotters pins.

(e) Remove the pins from the hinges.

(f) Remove the flap.

(2) Installation

(a) Clean the hinges.

(b) If a crack or corrosion is suspected on the any of the control surface hinge components, it is recommended that the paint be removed locally for further inspection. Replace damaged components. If paint has been removed and no damage is found, it is recommended that the hinge surface be protected. Use a small paintbrush and apply a polyurethane-based paint to the surfaces.

(c) On two part hinges there are two different ways that the cotter pin, pin and hinge are assembled. Install the flap. Refer to figure 8b and 8c. Reinstall all of the pins with the head of the pin against the aircraft side hinge part as shown in figure 8c. On three part hinges the pin can be installed as it was removed.

NOTE: Use only Loctite 222. Subsequent removal of pins may not be possible if any other type of Loctite is used.

(d) Apply Loctite 222 to the pins. Refer to figure 8b and 8c. It is important that the Loctite not contact the pin or hinge area where the bushing is installed. Apply the Loctite 222 to the pin after sliding it part way through the hinge as shown in figure 8c.

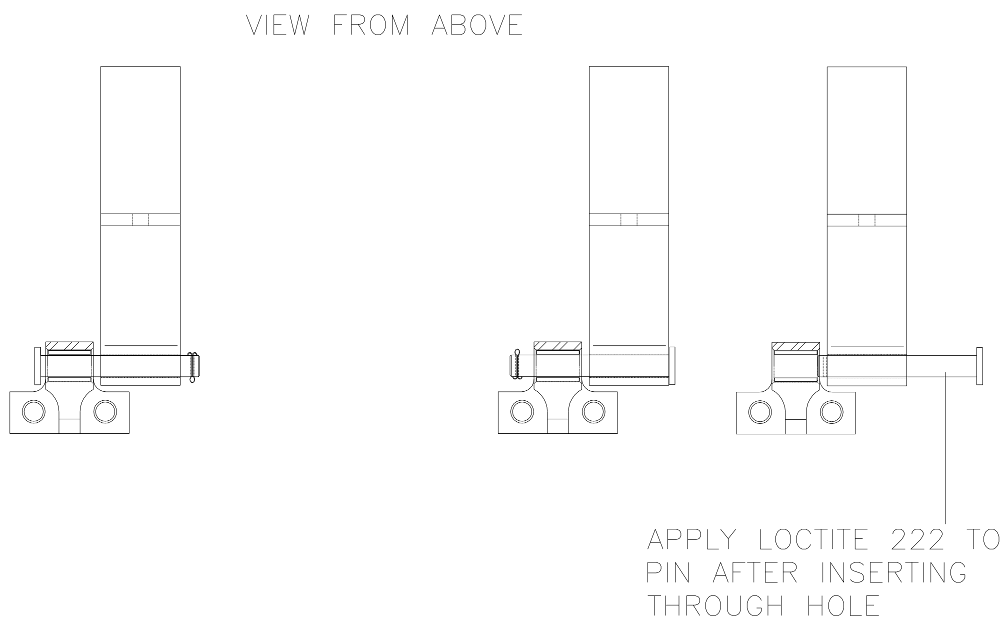


Figure 8b **Figure 8c**

(e) Rotate the pin several times once it has been installed to evenly distribute the Loctite. Push the head of the pin up against the hinge.

(f) Orient the cotter pin holes so that the cotter pins can easily be installed once the Loctite has cured. Allow 6 hours for the Loctite to cure at 22 °C (72 °F). Note that lower cure temperature will increase cure time.

(g) Install the cotter pins and reconnect the flap push rod, ensure all of the correct hardware and safety devices are installed.

NOTE: To ease cotter pin installation, bend the cotter pin at a right angle about 1/3 of the way from the bottom. Use needle nose pliers to insert the pin into the hole. Use a 90 degree pick to hold the top of the cotter pin while grabbing the bottom of the pin (sticking out through the hole) with the needle nose pliers. Hold the bottom of the pin while applying pressure with the pick to straighten it. Pull the pin into the hole and bend the ends to secure it in place.

(h) Connect the battery and check the operation of the flaps.

B. Bellcrank in Fuselage

Fuel tank must be removed.

(1) Removal

(a) Disconnect flap push rods.

(b) Disconnect actuator push rod.

(c) Remove mounting bolts of bellcrank.

(d) Remove bellcrank from fuselage.

(2) Installation

(a) For installation, reverse the sequence.

C. Bellcrank in Wing

(1) Removal

(a) Open inspection hole on wing bottom side.

(b) Remove mounting bolts of push rods.

(c) Remove mounting bolt of bellcrank.

(d) Remove bellcrank.

(2) Installation

(a) For installation, reverse the sequence.

D. Push-Rod

The wing must be removed (refer to Chapter 57).

(1) Removal

(a) Disconnect push-rod from bellcrank in wing.

(b) Remove rod end bearing from push-rod.

(c) Remove push-rod from wing.

(2) Installation

(a) For installation, reverse the sequence.

E. Flap Actuator

The left seat shell must be removed.

(1) Removal

Refer to Figure 9.

(a) Disconnect push-rod from bellcrank.

(b) Disconnect electric wires from motor and limit switch unit.

(c) Remove pedestal mounting bolts.

(d) Remove motor from fuselage.

NOTE: In case a defect in the motor, it is recommended to replace the entire actuator.

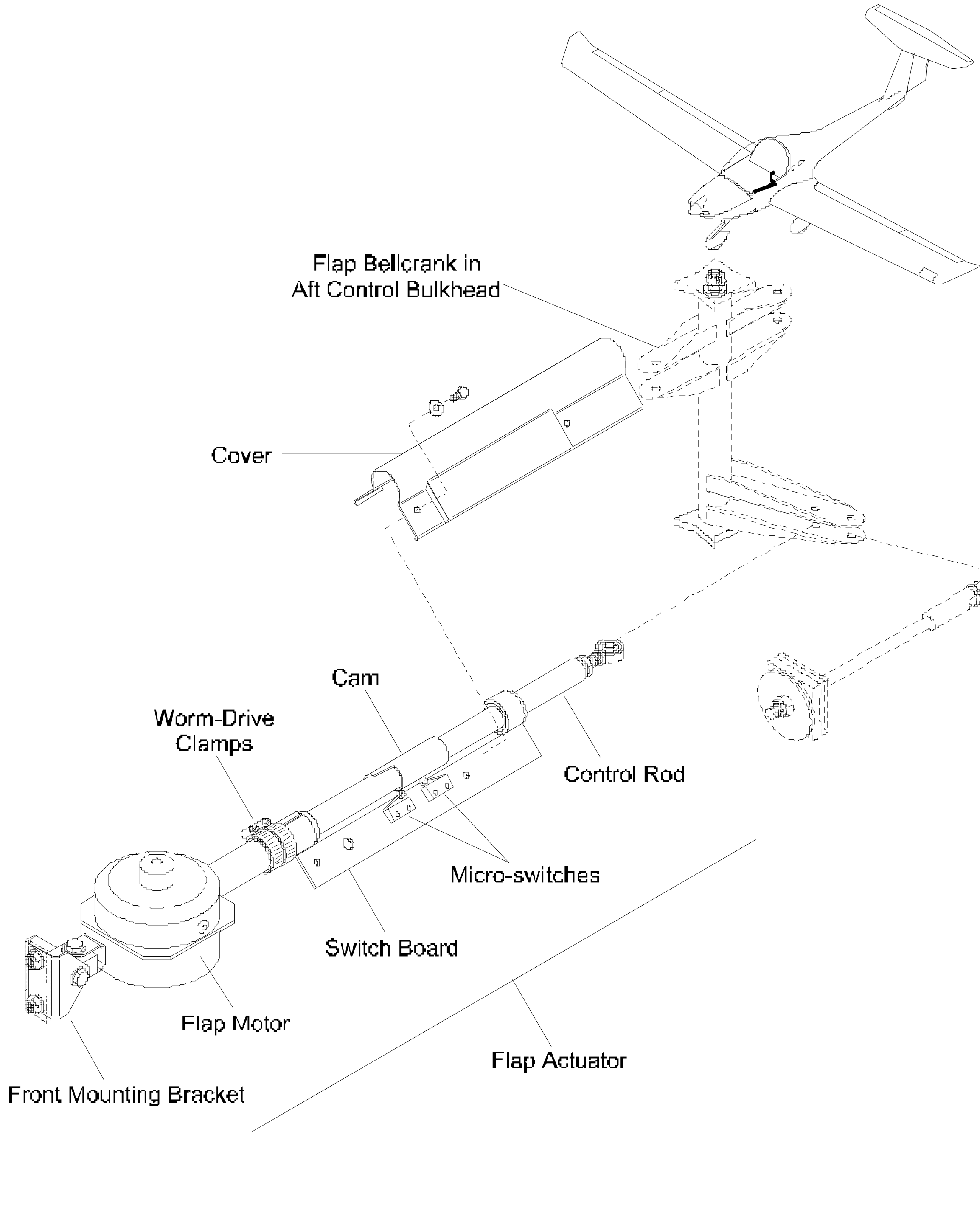


Figure 9 - Flap Actuator

F. Current Limiter

Refer to Figure 10. For aircraft serial number 10039 and above and aircraft with service bulletin DA20-27-01 (formerly SB95-05) incorporated.

(1) Removal

(a) Remove the left seat shell.

(b) Disconnect the wires from the terminal block to the flap motor.

(c) Disconnect the wiring harness plug.

(d) Remove the mounting screws.

(e) Remove the Current Limiter.

(2) Installation

(a) Install the Current Limiter using the same mounting screws. Replace the lock nuts.

(b) Connect the wiring harness connector.

(c) Connect the Flap motor wires to the terminal block using new lock nuts.

(3) Test

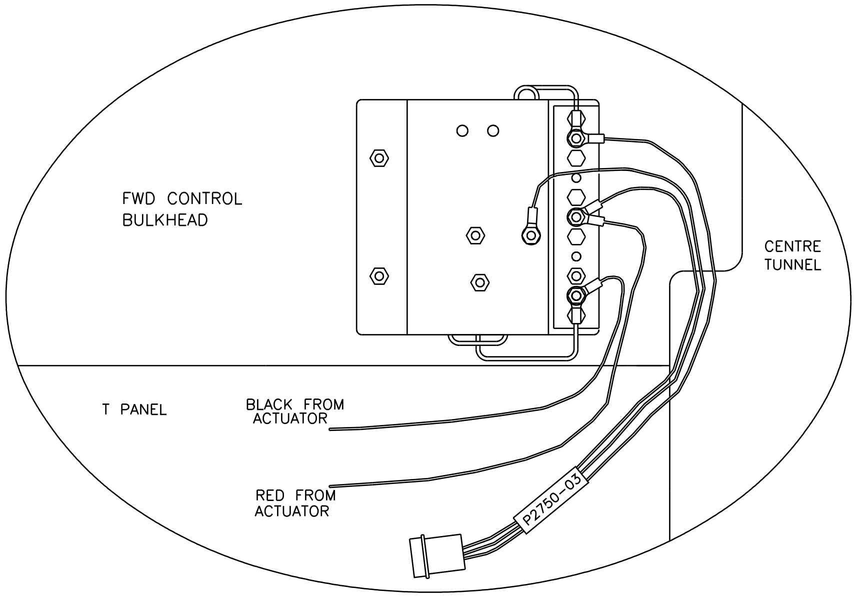
(a) Cycle the flaps

(b) The flaps should take approximately 7 seconds to extend from CRUISE to LDG.

(c) The flaps should take approximately 10 seconds to retract from LDG to CRUISE.

(d) During extension the voltage measured between terminals 1 and 5 should be 0.6 to 0.8 volts DC.

(e) During retraction the voltage between terminals 1 and 5 should be 2 to 4 volts DC.



VIEW LOOKING FORWARD

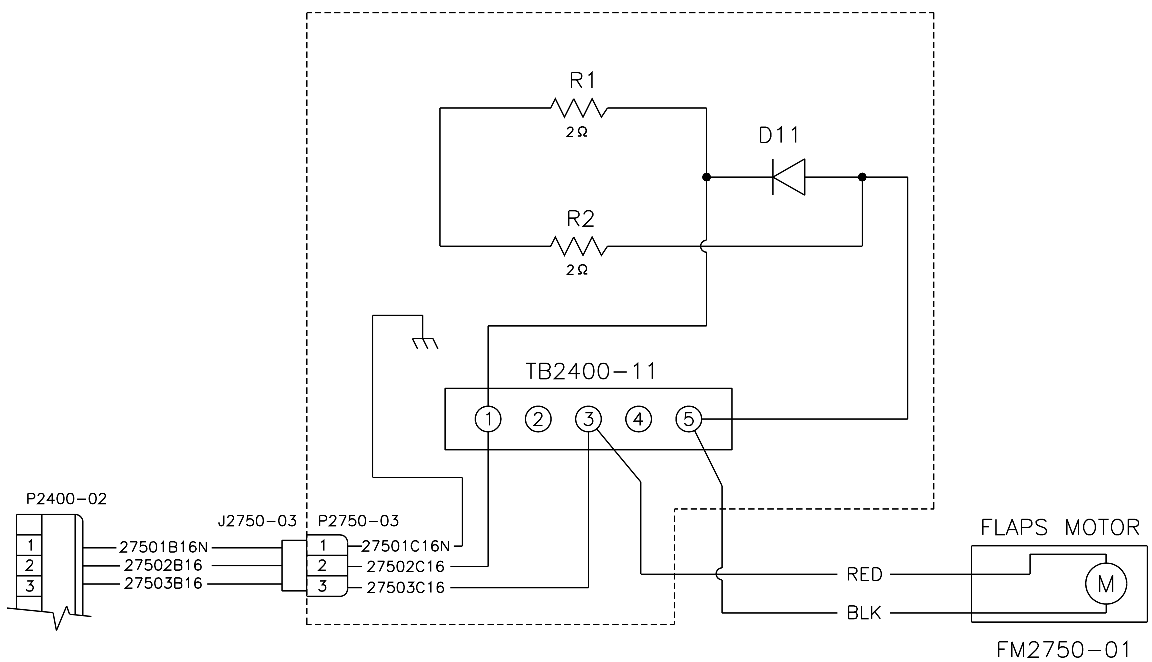


Figure 10

5. Adjustment

After a repair of the flap system, a check of the system to verify the correct flap travel given in Sub-Chapter 06-00 must be carried out.

The end positions of the flaps are adjusted with limit switches. Refer to Drawing No 20-2400-00-00 in Chapter 92 and to Figure 11.

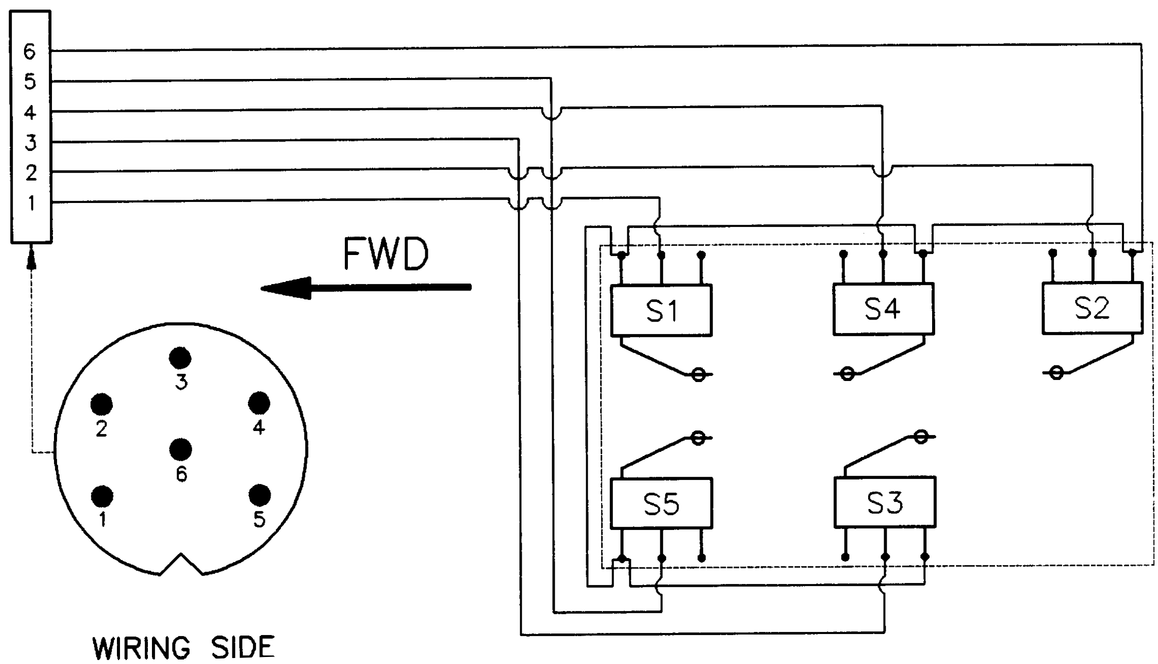


Figure 11 - Micro Switch Designation

To move the switches, first release the mounting screws. After moving the switches to the desired position, re-tighten screws.

Initial Adjustment of Wing Mounted Parts

- Adjust bellcrank in root rib at right angles to root rib; adjust outboard bellcrank at right angles.
- With the control parts in the above position, adjust flap to 25 degrees.

Initial Adjustment of Fuselage Mounted Parts

- Align flap pockets horizontally; align bellcrank parallel to fuselage.
- Install actuator.

- With the flap control switch in UP position, adjust pockets to 17 degrees with the limit stop switches.

- Install stop, adjust to 1 to 2 mm (0.04 to 0.08 in.) free play in the UP and LDG positions.

Complete Adjustment

- Install wings.

- Disconnect push rod connected to flap for safety reasons.

- With push rod disconnected, throw switch in UP position, check for 1 to 2 mm (0.04 to 0.08 in.) pre-tension at flap, corresponding to 3 to 5 daN (6.7 to 11.2 lbs).

Connect push rod, measure flap positions, ensure all of the correct hardware and safety devices are installed.

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CHAPTER 28
FUEL

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FUEL

1. General

The fuel system of the DA20-A1 consists of an aluminum fuel tank with a capacity of 20.1 US gal (76 liters) a fuel shut off valve, an electrical and a mechanical fuel pump, the carburetors, ball valve, a check valve (912 A3 equipped aircraft only) and the fuel lines. A sensor is used to monitor the fuel pressure.

A direct reading fuel level dipstick (pipette, ref. P/N 20-1200-02-00) is available for verifying fuel quantity prior to flight.

2. Description

A. Fuel System Description (S/N 10002 through S/N 10092) (Refer to Fig 1).

The fuel tank is located behind the seats and is vented to the atmosphere.

A fuel line runs from the fuel tank, through a ball valve, to the electrical fuel pump, located under the tank, and further to the fuel shut off valve which is located in the center console. The fuel shut off valve has two positions, OPEN and CLOSED. The fuel line continues to the firewall breach from where it runs to the mechanical fuel pump which is mounted on the engine. From the pump output port the fuel line continues to a cross shaped fitting on the firewall. The pressure sensor is attached to this fitting. From here the fuel is finally directed to the carburetors.

A return line runs from the cross shaped fitting through a check valve to the fuel tank. If vapor bubbles occur, they will be removed via the return line.

B. Fuel System Description (S/N 10093 and subsequent) (Refer to Fig 2)

The fuel tank is located behind the seats and is vented to the atmosphere.

A fuel line runs from the fuel tank, through a ball valve, to the electrical fuel pump, located under the tank, and further to the fuel shut off valve which is located in the center console. The fuel shut off valve has two positions, OPEN and CLOSED. The fuel line continues to the firewall breach from where it runs to the mechanical fuel pump which is mounted on the engine.

From the pump outlet, fuel is pumped to the fuel distribution manifold which is mounted on the intake manifold equalizing tube. This fuel distribution manifold distributes fuel to both carburetors and allows return of excess fuel and possible vapor bubbles to the tank via the fuel return line. The fuel return line banjo bolt incorporates a resistor orifice to maintain the required carburetor fuel inlet pressure. The fuel distribution manifold also incorporates the low fuel pressure switch which activates the instrument panel mounted low fuel pressure annunciator.

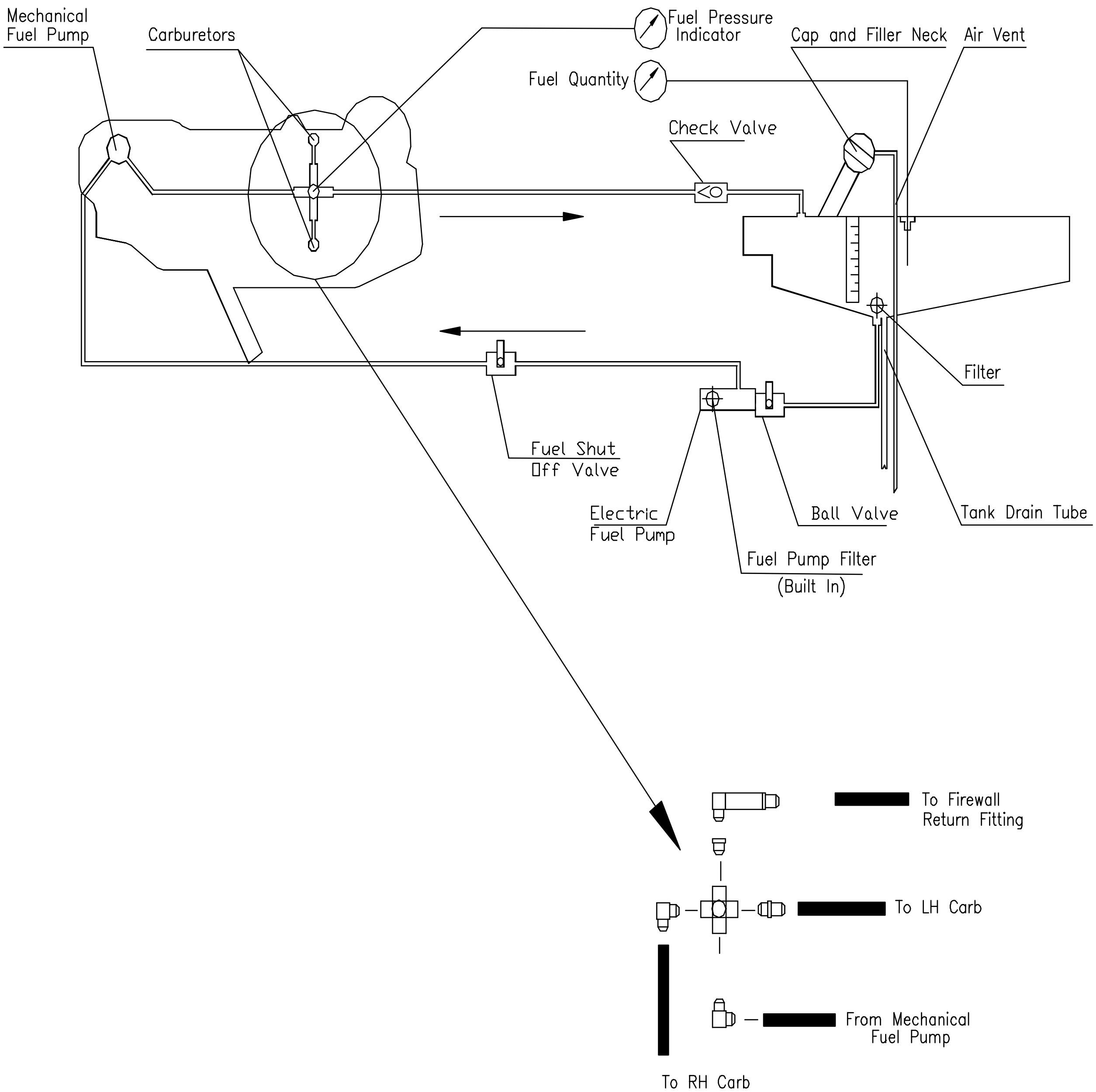

Figure 1 - Fuel System (S/N 10002 through 10092)

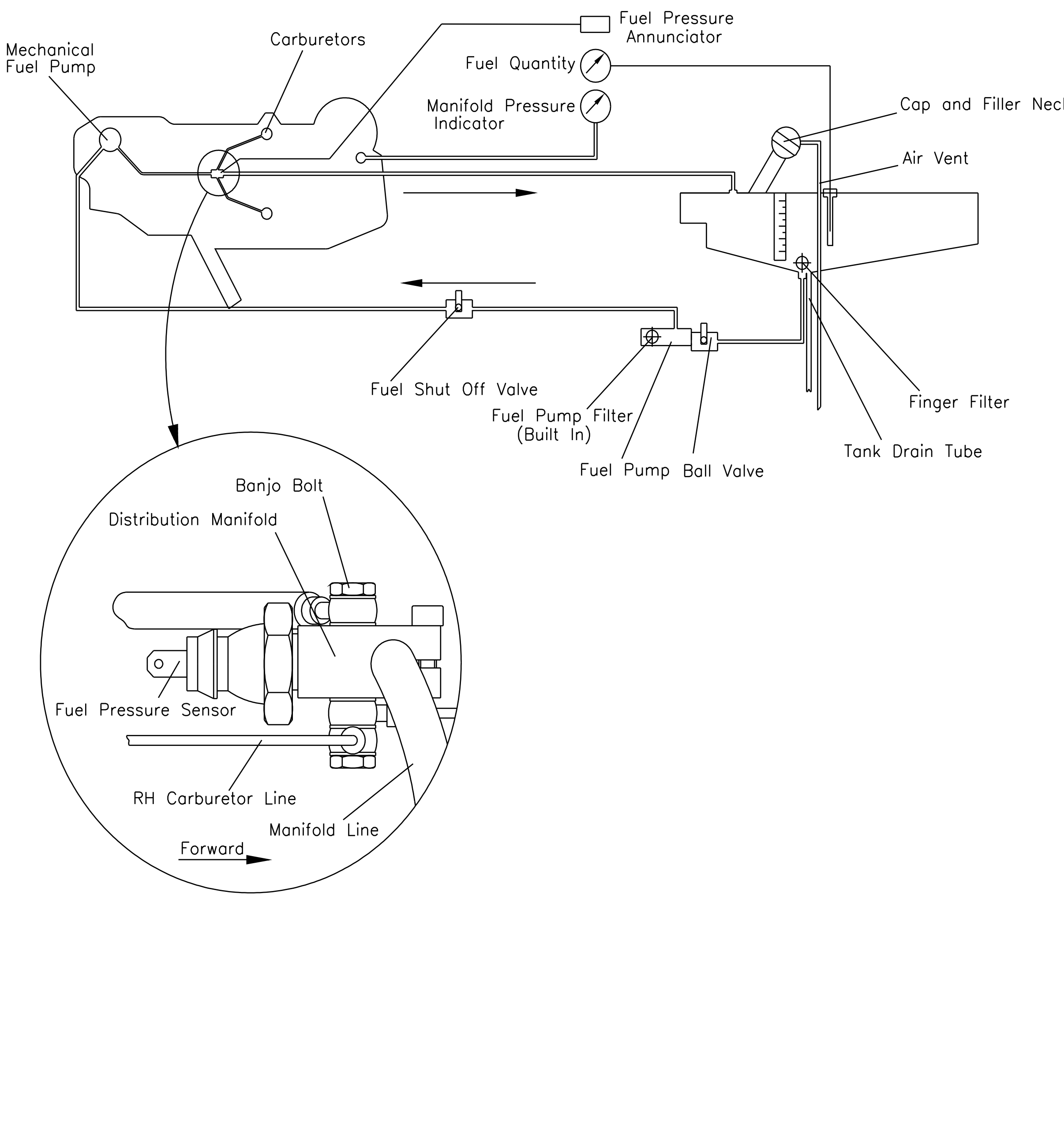

Figure 2 - Fuel System (S/N 10093 and subsequent and aircraft serial number 10002 to 10092 with service bulletin DA20-73-01 or DA20-73-03 incorporated)

3. Fuel Shut Off Valve And Check Valve Inspection

This inspection is used to verify the proper operation of both the fuel shut off valve and the check valve (located in the fuel return line).

1. Turn fuel shut off valve to CLOSED position.
2. Ensure throttle lever is fully in Idle position.
3. Turn master switch ON, fuel pressure warning light should be illuminated. If not illuminated, crank engine until fuel pressure warning light illuminates.

   CAUTION: SWITCH ENGINE OFF IMMEDIATELY, AFTER FUEL WARNING LIGHT ILLUMINATES.

   DO NOT ALLOW ENGINE TO RUN DRY OF FUEL DURING THIS PROCEDURE.

4. To check that the fuel shut off valve is operating properly, switch electric fuel pump ON, fuel pressure warning light should remain illuminated.
5. Turn fuel shut off valve to OPEN position, fuel pressure warning light should turn OFF.
6. Visually verify, through the filler neck, that fuel is flowing through the return line into the fuel tank.
7. To ensure check valve is operating properly, switch electric fuel pump OFF, fuel pressure warning light should not illuminate for at least one minute, visually verify no fuel is returning to the fuel tank

   (Note: This step applies only to aircraft equipped with Rotax 912 A3 engines, i.e.: up to and including S/N 10092 but not those aircraft with service bulletin DA20-73-01 or DA20-73-03).

STORAGE (TANK)

1. General

Fuel in the DA20-A1 is supplied from a fuselage mounted tank. The welded aluminum fuel tank is located between the spar bridge and the B-bulkhead beneath the baggage compartment.

The fuel filler cap is located on the left hand side behind the canopy and is connected to the fuel tank via a Military Specification hose. The vent line runs from the filler cap through the fuselage floor to the exterior of the airplane.

A drain valve, installed at the lowest point of the fuel tank, allows draining of condensed water, and can be activated using a fuel sampler cup.

2. Description

Fuel is taken from the tank through a hollow screw with integrated fuel screen located in the bottom of the tank. When all the fuel is used, approximately 1 to 2 liters (approximately 1 to 2 US quarts) of fuel remain in the tank.

Located next to the fuel feed line is the connection port for the drain line which is connected to the outside via a hose and a spacer tube. Through this line the fuel tank can be drained completely. The fuel tank is located in the fuselage and placed between the spar bridge and the B bulkhead which are covered with rubber pads for protection. These ensure a proper fit and prevent the tank from sliding. In addition, a steel clamping band is used to secure the tank to the B-bulkhead.

3. Troubleshooting

The following table lists defects which could appear on the fuel tank and corrective measures.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Smell of fuel in the airplane	Loose fuel line connectors Cracks in the fuel tank welding seams	Tighten connectors Weld or replace the tank
Leaky tank filler cap	Defective filler cap seal Defective thread	Replace seal Replace tank
Contaminated fuel	Contamination in fuel tank	Clean fuel tank

4. Removal and Installation of the Fuel Tank

WARNING: EXTINGUISH ANY SOURCE OF HEAT OR OPEN FLAME, BEFORE WORKING ON FUEL SYSTEM.

A. Removal

(a) Drain the tank completely using the drain valve; disconnect fuel feed line.

(b) Remove the baggage compartment floor.

(c) Disconnect the rubber hose by loosening both hose clamps and pulling hose from connection sleeve.

(d) Remove the steel band holding the tank.

(e) Disconnect all electric wires.

(f) Remove the tank.

B. Installation

(a) For installation reverse the sequence.

5. Leakage Test

If leakage is suspected, or if a repair has included such tasks as welding on the tank, the tank should be filled with non-flammable fluid (e.g. water), all openings should be closed, and the tank should be checked for leaks. Welding seams can be checked for leakage using a soap solution.

WARNING: THE LEAK TEST MUST BE PERFORMED WITH THE TANK REMOVED FROM THE AIRPLANE.

6. Repair

Repair of fuel tank must be performed in accordance with local Airworthiness Regulations.

DISTRIBUTION

1. General

Refer to Figure 1 or Figure 2 as applicable.

The fuel distribution system consists of an electrical and a mechanical fuel pump, fuel filters, the fuel shut off valve, and a fuel pump switch. The fuel lines are made out of shielded Teflon hoses with screw type connectors.

The fuel is drawn through a screen filter (located in the fuel tank) and a ball valve by the electrical fuel pump (with integrated filter). From there the fuel flows to the fuel shut off valve which allows the fuel flow to the engine compartment to be shut off in an emergency situation. From the fuel shut off valve the fuel line is directed through the firewall to the mechanical fuel pump which also has an integrated fuel filter. The output port of the mechanical fuel pump is connected to the fuel distribution manifold which is mounted to the firewall (S/N 10002 through 10092) or to the intake manifold equalizing tube (S/N 10093 and subsequent). The required carburetor fuel inlet pressure is maintained by a check valve (S/N 10002 through 10092) or a resistor orifice (S/N 10093 and subsequent). Two of the four ports of the fuel distribution manifold are used to supply fuel to the carburetors, one is for the mechanical fuel pump, and one is connected to the return line running back to the tank.

2. System Description

Refer to Figure 1 or Figure 2 as applicable.

A. Fuel Shut Off Valve

The fuel shut off valve is operated with the red lever located on the LH side of the center console. The fuel shut off valve consists of a ball which has an opening, and a Viton seal. The valve either permits or prevents fuel flow, depending on the position of the operating lever.

B. Electrical Fuel Pump

The electrical pump is used as auxiliary or emergency pump which should be switched on for start, takeoff, and or landing as well as in certain emergency situations.

The pump function is based on the vibrating motion of a diaphragm in a cylinder. This motion is controlled by an electromagnet. With the pump piston being pushed upward by the force of the piston spring it creates suction as well as pressure. At this point the valve in the piston is closed and the inlet valve in the valve cage is open, which results in the fuel located above the piston valve being lifted and via the check valve pumped to the mechanical fuel pump. An additional removable fuel filter is installed within the pump.

C. Mechanical Fuel Pump

The mechanical fuel pump is a diaphragm type pump driven directly by the engine. With the engine running, the pump sucks fuel via the electric fuel pump to deliver it to the carburetors with a pressure of approximately 0.15 to 0.4 bar (2.2 to 5.8 psi).

The pump is driven by a cam via a push rod. The motion of the push rod is transferred against the pressure of a spring to the diaphragm, which creates suction as well as pressure. The two valves located in the upper part of the pump are opened or closed depending on the working cycle of the diaphragm.

During the suction period the output valve is closed. With increasing pressure in the upper part of the pump created through the motion of the diaphragm the input valve will be closed and the output valve opened.

3. Troubleshooting

The following table lists defects which could appear on the fuel tank and corrective measures.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Smell of fuel in the airplane	Loose fuel line connections Leaky fuel lines	Tighten the fuel line connections Check fuel lines
Insufficient fuel pressure	Clogged filter Defective mechanical fuel pump Defective fuel pressure sensor	Clean filter Replace fuel pump Replace the fuel pressure sensor.

4. Removal and Installation

A. Fuel Shut-Off Valve

(1) Removal

Prior to removal, the fuel tank must be drained.

(a) Remove the hand hole cover on the right side of the center console.

(b) Disconnect both the hose lines.

(c) Remove the operating lever.

(d) Remove the mounting screws.

(e) Remove the fuel shut off valve from airplane.

(2) Installation

(a) For installation reverse the sequence.

B. Electrical Fuel Pump

(1) Removal

Prior to removal the fuel tank must be drained.

(a) Close the fuel shut off valve.

(b) Disconnect the fuel lines (see below).

(c) Loosen the mounting screws.

(2) Installation

(a) For installation reverse the sequence.

C. Maintenance of the Filter Element

Refer to Figure 3.

(a) Remove the locking wire (6 and 7).

(b) Slide back the locking ring (1).

(c) Remove the hose connector (2).

(d) Remove the lower cap (3).

(e) Remove the filter element (4) and clean by washing.

(f) Check the disk magnet (5) for metal particles.

(g) Reassemble the filter and cap (3 and 4).

(h) Install the hose connector (2).

(i) Slide on the locking ring (1).

(j) Secure the cap using locking wire (6).

(k) Secure the locking ring against movement by wrapping locking wire around three times.

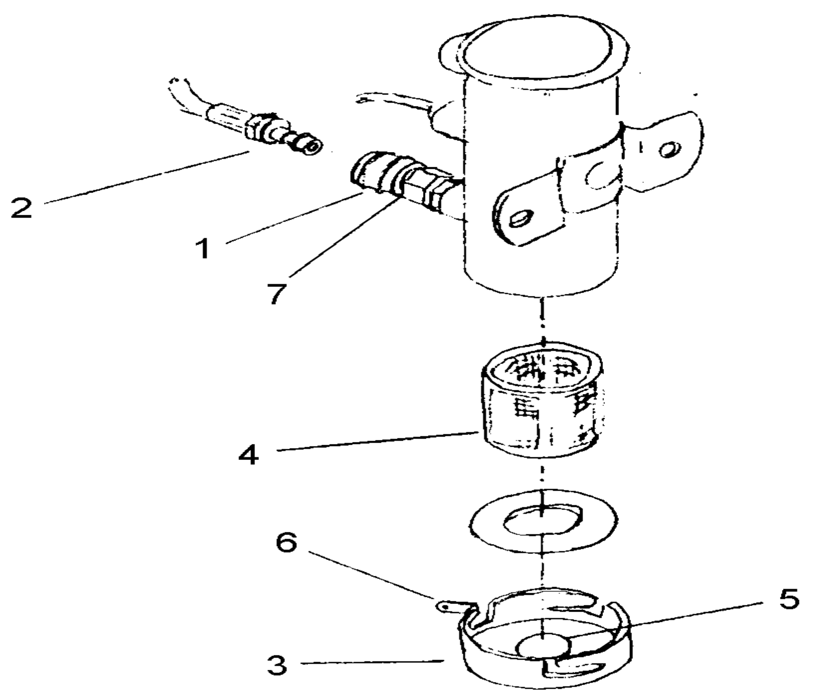

Figure 3 - Electrical Fuel Pump

D. Mechanical Fuel Pump

(1) Removal and Installation

(a) Refer to applicable Engine Operator's and Maintenance Manuals.

INDICATING

1. General

A submerged tube sensor is installed in the top side of the fuel tank from which the fuel level is electrically sensed. This signal is sent to the fuel quantity indicator. The airplane is also equipped with a fuel pressure sensor which illuminates a warning light, located in the instrument panel, when the fuel pressure is low.

2. System Description

A. Fuel Quantity Indicating System

The float located in the submerged tube is connected to a resistance wire. The changing fuel level changes the resistance, which is indicated by the fuel quantity indicator. The indicator is calibrated to the highest and lowest position of the float.

B. Fuel Pressure Sensor

Refer to Figure 2.

The fuel pressure is measured using the pressure sensor mounted to the fuel distribution manifold. The sensor is connected to the output port of the mechanical fuel pump. For operation the sensor requires a supply of 12 Volts. The sensor is activated as soon as the fuel pressure drops below 0.15 bar (2.2 psi).

3. Troubleshooting

The following table lists defects which could appear in the fuel tank indicating system and corrective measures.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Insufficient fuel pressure	Defective pressure sensor	Check pressure sensor
	Voltage supplied to pressure too low	Check electrical supply
Fuel quantity indication incorrect	Defective fuel quantity sensor	Replace fuel quantity sensor
	Fuel quantity indicating system adjusted incorrectly	Adjust the fuel quantity indicating system

4. Removal and Installation

A. Fuel Pressure Sensor

The fuel pressure sensor and fuel distribution manifold are supplied as one unit.

B. Fuel Quantity Sensor

Refer to Figure 4.

(1) Removal

(a) Remove baggage compartment floor.

(b) Disconnect electrical connectors.

(c) Remove mounting screws around sensor.

(d) Remove sensor from tank.

(2) Installation

(a) For installation reverse the sequence.

NOTE: Prior to the installation of a new sensor, the tape and the pin on the bottom part must be removed (transportation protection). The sensor can only be installed in one position, as the mounting holes are not centered. Apply liquid seal to screws before installing.

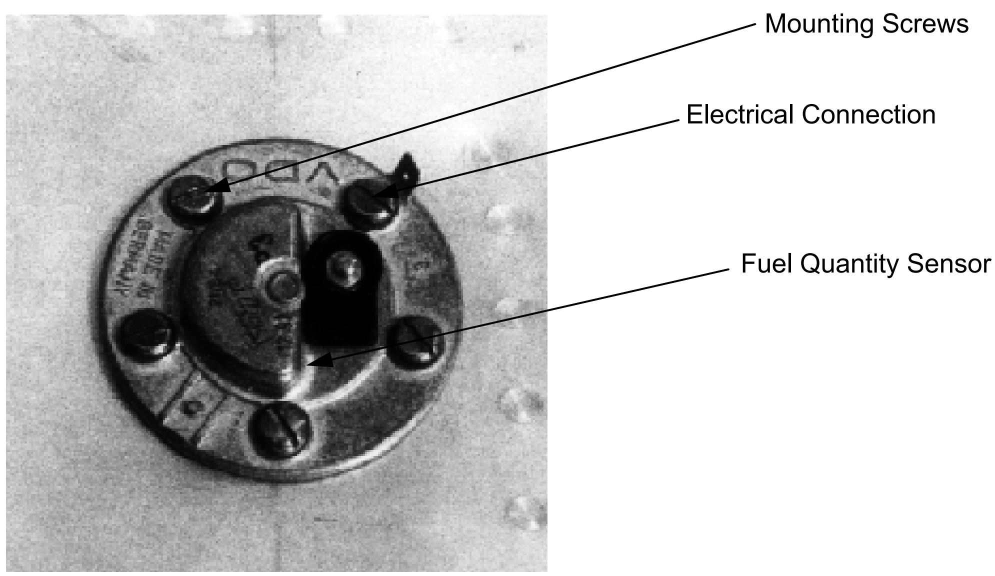

Figure 4 - Fuel Quantity Sensor

5. Calibration

After replacement of the fuel quantity sensor or indicator, or as required by the checklist in Sub-Chapter 05-20 the gauge has to be checked for accurate indication.

The fuel quantity indicator is calibrated as follows:

(a) Drain tank completely.

(b) Level aircraft.

(c) Partially fill tank with 2 liters of fuel.

(d) The indicator should indicate zero fuel (right side of needle should be in line with left edge of zero mark). Adjust if necessary.

(e) Fill tank to bottom of filler tube.

(f) Verify that indicator reads full.

A. Fuel Quantity indicator Adjustment

For calibration of the fuel quantity indicator, the potentiometer can be adjusted which can reached through a hole in the fuel quantity indicator housing. By adjusting the potentiometer, the indication on the front of the instrument is altered. Refer to Figure 5.

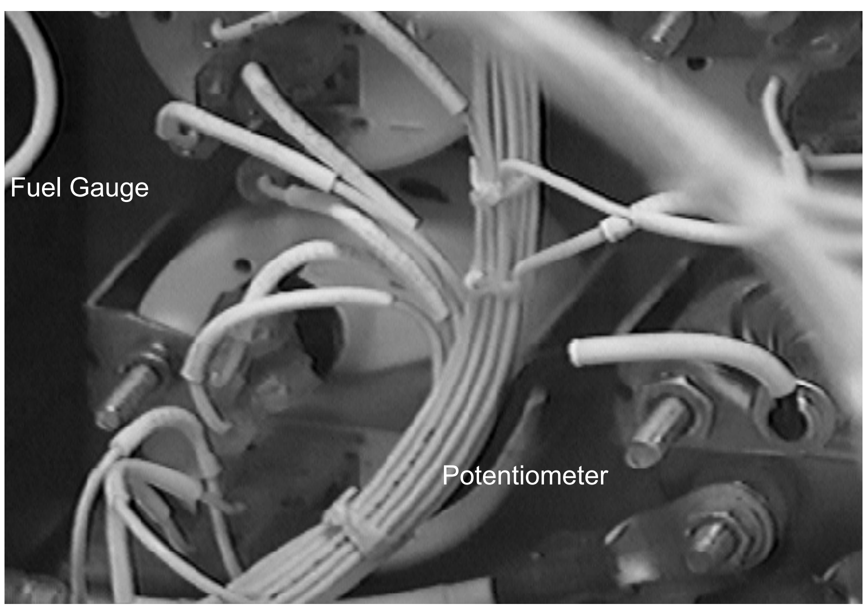

Figure 5 - Fuel Gauge Potentiometer

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CHAPTER 31

INDICATING/RECORDING SYSTEMS

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INDICATING/RECORDING SYSTEMS

1. General

In Chapter 31-10-00, Figure 1 illustrates the location of each instrument in the Cockpit on aircraft serial numbers 10002 to 10020 and Figure 2 illustrates the location of each instrument on panels installed in aircraft serial number 10021 and subsequent and aircraft with service bulletin DA20-33-01 incorporated. System and functional description of each instrument as well as the removal and installation procedures can be found in the corresponding chapters.

Minimum Equipment

Refer to the aircraft Flight Manual (Section 2.13) for the minimum equipment required to operate the aircraft.

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INSTRUMENT PANEL

1. General

The instrument panel is divided into five (5) sections: the LH, RH and center section, the instrument panel cover, and the panel on the center console.

2. Description

Refer to Figure 1 and Figure 2.

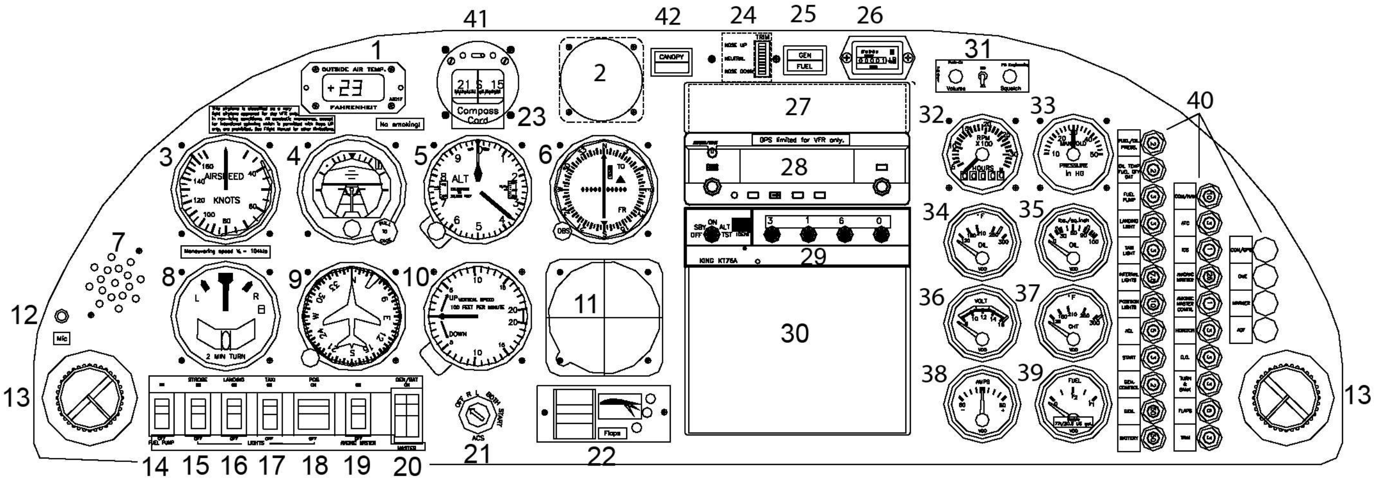
The LH section of the instrument panel holds the flight and navigational instruments, stall warning horn, master switch and ignition switch.

The engine instruments and the circuit breakers are located in the RH section of the instrument panel.

The center section holds the avionics equipment, flap control unit, and trim position indicator.

On the center quadrant, below the instrument panel there is a panel accommodating the control knobs for the operation of parking brake, choke, carburetor heat, and cabin heating.

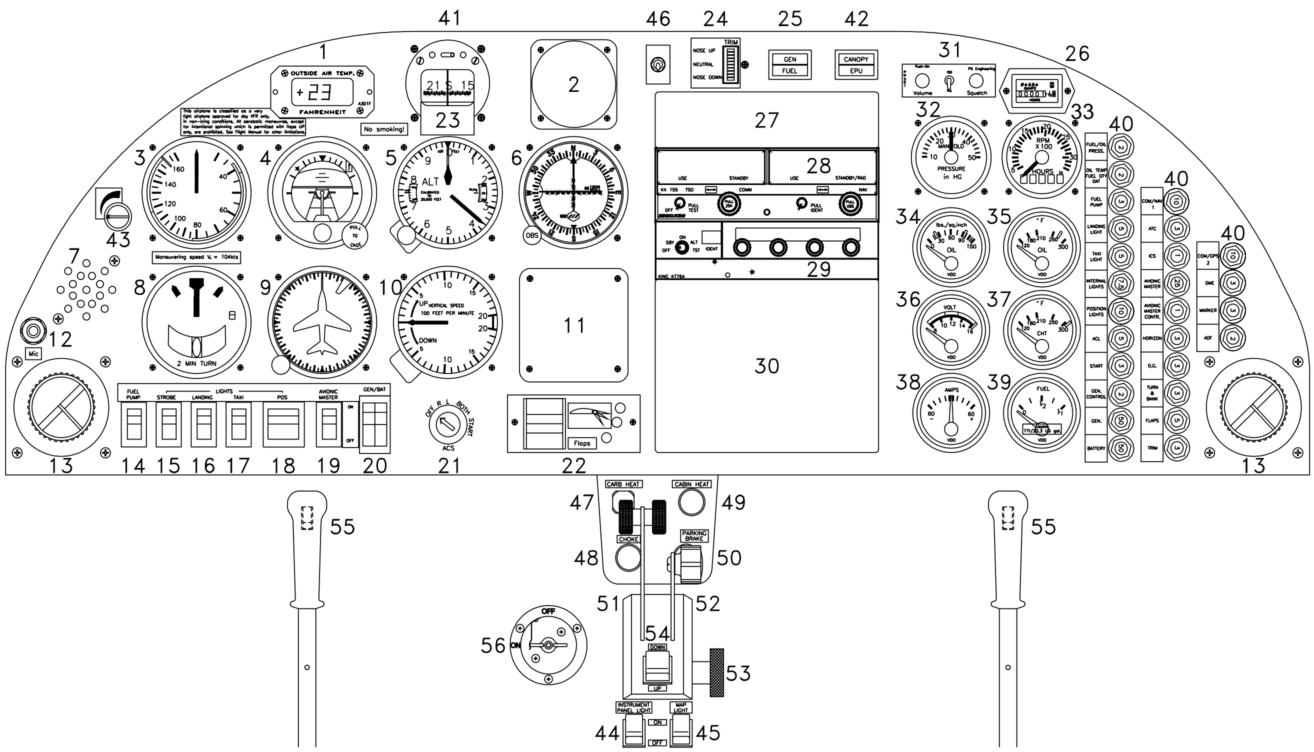
The throttle quadrant consists of a throttle lever, propeller pitch control lever, and trim switch. The knob on the RH side of the center console is connected to a friction brake which allows adjustment of the force required to move these levers.



ITEM #	Description	ITEM #	Description	ITEM #	Description	ITEM #	Description
1.	Outside Air Temp. Ind.	12.	Microphone Jack	23.	Compass Card	34.	Oil Temp Ind.
2.	Not Used	13.	Air Vent	24.	Trim Indicator	35.	Oil Pressure Ind.
3.	Air Speed Indicator	14.	Fuel Pump Switch	25.	Annunciator Lights	36.	Voltmeter
4.	Artificial Horizon Ind.	15.	Strobe Light Switch	26.	Hobbs Meter	37.	Cylinder Head Temp. Ind.
5.	Altimeter	16.	Landing Light Switch	27.	Not Used		
6.	CDI	17.	Taxi Light Switch	28.	Radio	38.	Ammeter
7.	Stall Warning Horn	18.	Nav. Lights Switch	29.	Transponder	39.	Fuel Indicator
8.	Turn and Bank Ind.	19.	Avionics Master	30.	Not Used	40.	Circuit Breakers
9.	Directional Gyro	20.	Master Switch	31.	Intercom	41.	Compass
10.	Vertical Speed Ind.	21.	Ignition Switch	32.	Tachometer	42.	Canopy Locking Warning Light
11.	Not Used	22.	Flap Control	33.	Manifold Pressure		

Figure 1 - Instrument Panel

Effective for Serial # 10002 through 10020 without compliance to Service Bulletin DA20-33-01 (Formerly SB95-01).



Item	Description	Item	Description	Item	Description	Item	Description
1.	Outside Air Temp. Ind.	16.	Landing Light Switch	31.	Intercom	44.	I-Panel Light Switch
2.	Not Used	17.	Taxi Light Switch	32.	Manifold Pressure	45.	Map Light Switch
3.	Air Speed Indicator	18.	Nav. Lights Switch	33.	Tachometer	46.	Trim Ind. Dimmer
4.	Artificial Horizon Ind.	19.	Avionics Master	34.	Oil Pressure Ind.	47.	Carb Heat Knob
5.	Altimeter	20.	Master Switch	35.	Oil Temp. Ind.	48.	Choke Knob
6.	CDI	21.	Ignition Switch	36.	Voltmeter	49.	Cabin Heat Knob
7.	Stall Warning Horn	22.	Flap Control	37.	Cylinder Head Temp. Indicator	50.	Parking Brake Knob
8.	Turn and Bank Ind.	23.	Compass Card			51.	Power Lever
9.	Directional Gyro	24.	Trim Indicator	38.	Ammeter	52.	Propeller RPM Lever
10.	Vertical Speed Ind.	25.	Annunciator Lights	39.	Fuel Indicator	53.	Lever Tension Knob
11.	Not Used	26.	Hobbs Meter	40.	Circuit Breakers	54.	Trim Switch
12.	Microphone Jack	27.	Not Used	41.	Compass	55.	Microphone Switch
13.	Air Vent	28.	Radio	42.	Canopy Locking Warning Light	56.	Fuel Shut-Off Valve
14.	Fuel Pump Switch	29.	Transponder				
15.	Strobe Light Switch	30.	Not Used	43.	I-Panel Rheostat		

Figure 2 - Instrument Panel

Effective only for S/N 10021 and subsequent and for S/N 10002 through S/N 10020 if Service Bulletin DA20-33-01 (Formerly SB95-01) has been incorporated.

3. Removal and Installation

The DA20-A1 was designed with accessibility of the equipment in mind. Consequently, the instruments are easy to reach after removal of the instrument panel cover.

A. Removal

(a) Remove the engine cowlings.

(b) Disconnect the instrument wiring at terminal strip.

(c) Remove the instrument panel cover.

(d) Carefully pull the instrument wiring through firewall.

(e) Disconnect the wiring harnesses.

(f) Remove the four nuts securing instrument panel to fuselage.

(g) Remove the instrument panel, in an upward direction.

B. Installation

(a) For installation reverse the sequence.

CHAPTER 32
LANDING GEAR

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LANDING GEAR

1. General

The DA20-A1 is equipped with a fixed tricycle landing gear, including a castering nose wheel. The two main landing gear struts are connected to the spar bridge using two mounting brackets each.

The nose gear is attached to the engine mount and to the bottom side of the fuselage. Shock absorbing is achieved with an elastomer package located between engine mount and steel leg.

Nose and main gear are equipped with single wheels with low pressure tires. Disk brakes are installed on the inside of each of the main wheels. The disk brakes can be individually operated by the left or right toe-brake pedal.

2. Troubleshooting

Malfunctions which can occur on the landing gear system are described in the individual sub chapters.

3. Maintenance Information

Removal and installation of each assembly as well as the required adjustments are described in the respective sub chapters. The general safety precautions must be observed at all times for any repair or maintenance work performed.

CAUTION: IN THE EVENT THAT MAINTENANCE WORK HAS TO BE PERFORMED ON THE UN LOADED MAIN LANDING GEAR, THE AIRPLANE MUST BE JACKED UP USING THE DESIGNATED JACKING POINTS.

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MAIN LANDING GEAR

Effective for aircraft serial numbers 10002 to 10234

1. General

The main landing gear system consists of two leaf spring steel struts, wheels with disk brakes, and the wheel fairings which are part of the standard equipment.

The struts absorb the landing shocks and are made of quenched and tempered steel. Brake disks are installed on the aluminum wheels. The disk brakes of the DA20-A1 are part of the standard equipment.

2. Description

Refer to Figure 1.

Each strut is mounted to the inner bracket by means of one bolt which must be secured against loosening. The outer mounting bracket encloses the strut, thereby clamping it. As a buffer, UHMW inserts are installed between the contact surfaces. The wheel axle is attached with four bolts to the lower end of the landing gear strut.

Mounting brackets for the wheel fairings are attached between the wheel axle and the strut. Toe in and camber can be adjusted by adding shims between strut and axle.

3. Troubleshooting

The following table lists defects as they could appear on the main landing gear system, and their correction.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Strut bent	Hard landing	Replace strut
Negative camber	Strut bent	Replace strut
Excessive tire wear	Improper toe	Adjust toe

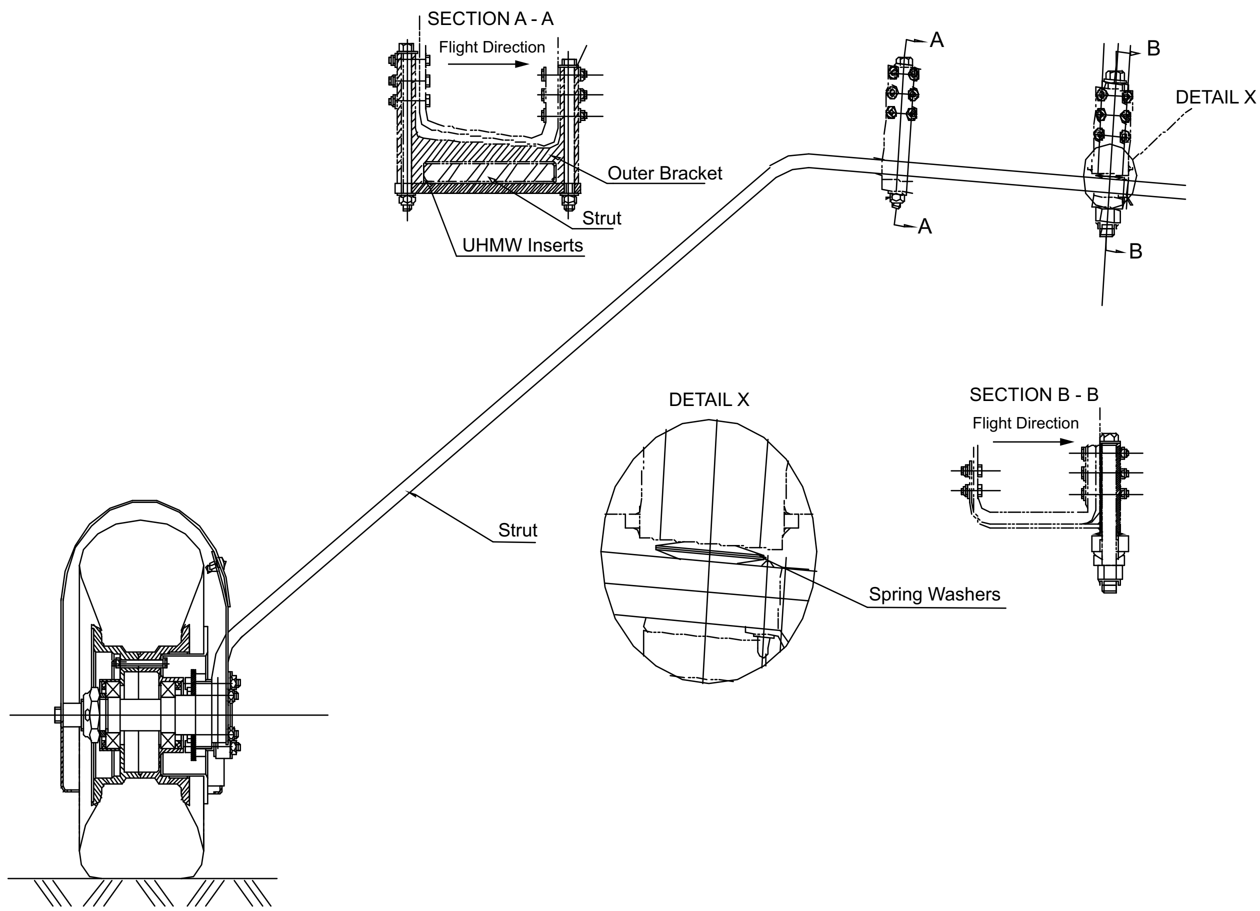


Figure 1 - Landing Gear Strut

4. Removal and Installation

A. Main Landing Gear

Refer to Figure 2.

(1) Removal

(a) Lift the airplane or unload wheel (see Chapter 7).

(b) Remove the wheel fairing by loosening the outer securing bolt and by removing the two screws on the inside.

(c) Remove the back pressure plate from the caliper.

(d) Remove the wheel axle nut and remove the caliper.

(e) Remove the wheel.

(f) Remove the brake line from the strut.

(g) Remove the axle from the strut by removing the four attachment bolts.

(h) Remove the nut and the bolt at the inner mounting bracket.

(i) Support the strut; remove the nuts and the bolts from the inner bracket; and remove the lower plate.

(j) Remove the strut in outboard direction.

(2) Installation

(a) For installation reverse the sequence.

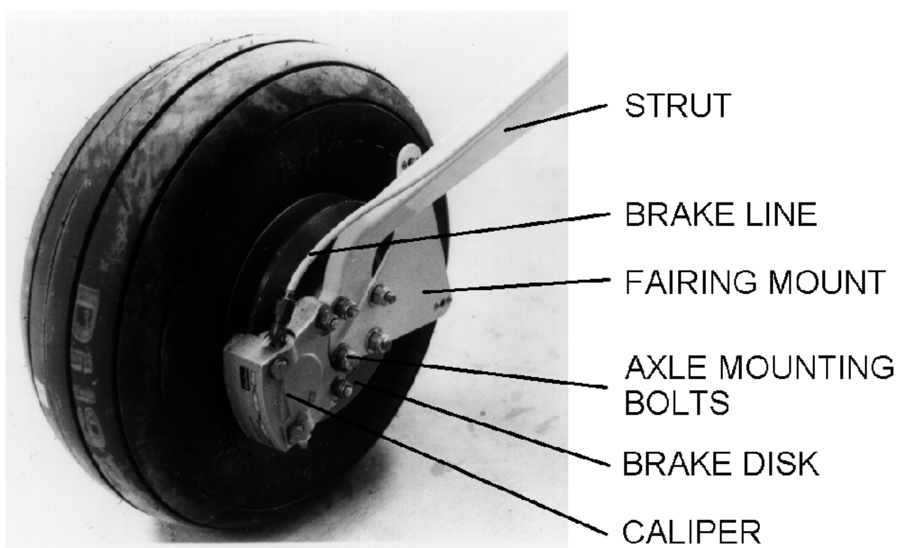


Figure 2 - Main Wheel

5. Adjustment

A. Play in Wheel Bearing

(a) Install the wheel and install the axle nut with the spacer washer.

(b) Torque the nut to 40 Nm (29.5 lbf-ft)

(c) Loosen the nut again and tighten to next pinhole with the force of hand.

(d) Secure the nut with the split-pin.

B. Toe in, Camber, and Track

At each 1000 hours inspection, or after each hard landing as well as after any repair on the strut or the spar bridge, the wheel alignment has to be checked. For this, the DA20-A1 is placed onto slide sheets and alignment checked at empty weight against the data in the Adjustment Report (refer to Chapter 06).

In the event a deviation is found, shims should be placed between the strut and the axle. These change the angle between wheel axle and fuselage centerline.

In addition the wheel track can be checked at this time. The track is measured from the most outboard point of one wheel axle to the same point on the other axle. This inspection must also be performed at empty weight and with the airplane placed on slide sheets.

MAIN LANDING GEAR

Effective for aircraft serial number 10235 and all subsequent aircraft

1. General

This Section gives you the data for the main landing gear. It gives you the trouble-shooting and maintenance practices. See Chapter 32-40 for data for the main wheels and the brakes.

2. Description

Refer to Figure 3A.

Each main gear strut is an aluminum alloy leaf spring. Two strong mounts attach each spring to the spar bridge in the fuselage. Small panels with flexible centers seal the gap 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 a U-shaped bracket. The bracket goes under and around the spar bridge. Spring washers separate the top face of the spring from the block. A castle-nut pre-loads the spring washers.

The outer mount is an H-shaped bracket. The top arms of the H go fore and aft of the spar bridge. The leaf spring goes between the bottom arms of the H. A retaining bar holds the leaf spring in position. Ultra-high molecular-weight inserts go above and below the leaf spring to prevent chafing damage. Brass strips go on each side of the leaf spring.

Four bolts at the outer end of each strut attach these components:

- An aluminum axle
- A brake torque-plate
- A mount 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.

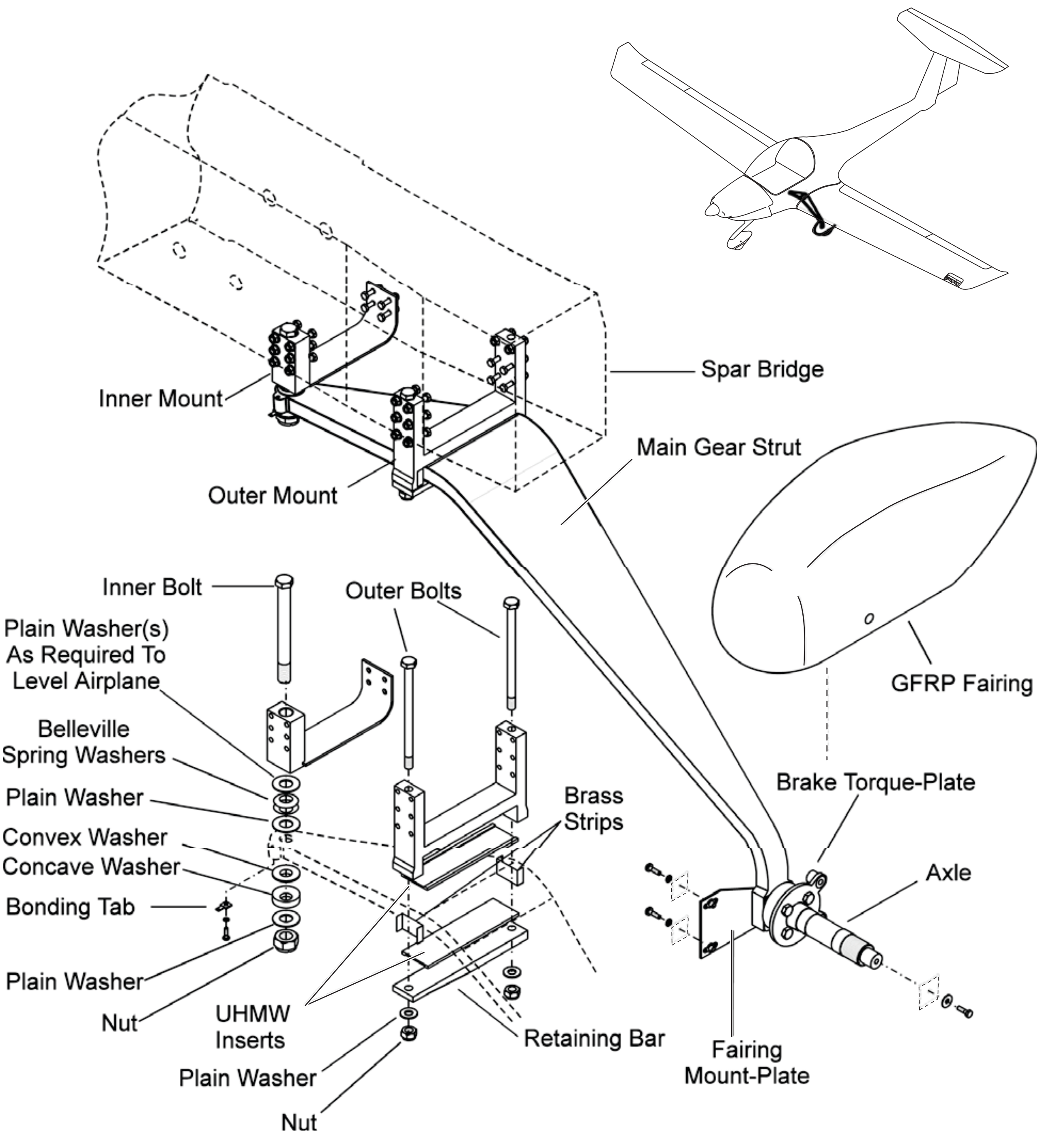


Figure 3A - Aluminum Main Landing Gear

3. Troubleshooting

Use the data below to trouble-shoot the main landing gear.

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.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Strut bent	Hard landing	Do a hard landing check. See Chapter 05-40.
Negative camber	Strut bent. Hard landing	Do a hard landing check. See Chapter 05-40.
Too much tire wear	Improper toe-in.	Adjust toe-in.

4. Removal and Installation

A. General

These maintenance practices tell you how to remove, install and adjust the main landing gear. Refer to the manufacturer for further data.

B. Removal

(a) Lift the airplane on jacks. Refer to Chapter 07

(b) Remove the wheel fairing. Remove the outer bolt. Remove the two screws on the inner side.

(c) Remove the back-plate from the brake caliper. Reference Chapter 32-40.

(d) Remove the wheel. Reference Chapter 32-40.

(e) Release the brake caliper.

(f) Release the brake pipe from the strut. Tie the brake caliper back. Do not stress the brake pipe.

(g) If you install a different strut, remove the four bolts which attach the axle. Remove the axle, torque-plate and the fairing mount.

(h) Disconnect the bonding cable from the strut.

(i) Remove the nut and bolt at the inner attachment bracket

(j) Remove the nuts which hold the retaining bar to the outer mounting bracket.

(k) Remove the strut.

C. Installation

(a) Examine the spar bridge in the area of the main gear mountings. Look specially for damage to the GFRP structure. See Chapter 51-10 for GFRP inspection procedures.

(b) Put the new strut in position.

(c) Put the inserts in position above and below the strut at the outer mounting. Choose inserts to give 0.5 mm (0.02 in) compression when tight.

(d) Apply grease to the brass shims and the bolts. Use MIL-G-3545 grease.

(e) Install the retaining bar. Torque the mounting nut to 20 Nm (14.8 lbf-ft)

(f) At the inner mount location, install the parts in the following order: Inner bolt, inner mount, 2 belleville spring washers, plain washer, strut, convex washer, concave washer, plain washer and nut.

NOTE: Install the 2 belleville spring washers with the concave sides facing each other. If necessary, install up to 2 plain washers between the belleville spring washers and the inner mount to make the airplane level. Apply grease to the inner mounting bolt prior to installation. Use MIL-G-3545 grease.

(g) Tighten the nut on the inner mounting bolt until the belleville washers are compressed to a height of 4.0mm (+0.5 mm, -0mm) (0.16in (+0.02in, -0 in)).

(h) Connect the bonding cable to the strut. If you install a bonding terminal on a new strut, remove the surface protection where the terminal will attach. Then varnish the area with NYCOTE 7-11.

(i) If you install a different strut, install the axle, torque-plate and fairing mount. Install the 4 bolts that attach the axle. Torque to 13.6 - 15.8 Nm (120 - 140 lbf-in).

(j) Attach the brake pipe to the strut.

(k) Install the brake caliper. Reference Chapter 32-40.

(l) Install the wheel. Reference Chapter 32-40.

(m) Install the back-plate to the brake caliper.

(n) Install the wheel fairing: Install the outer bolt. Install 2 screws on the inner side.

(o) Lower the aircraft with the jacks.

(p) Do a test for correct adjustment of the landing gear.

5. Adjustment

Do this work at the following times:

- At each 1000 hour check.
- After a hard landing.
- After any repair to the main landing gear strut.

A. Equipment

Slide sheets - 2 per side

B. Procedure

(a) Make sure that the airplane is at the empty weight.

(b) Roll the main wheels onto the slide sheets.

(c) Measure the Toe-in. Figure 3B.

(d) Measure the camber. Figure 3B.

WARNING: USE ONLY THE SHIMS LISTED IN THE AIRPLANE ILLUSTRATED PARTS CATALOG FOR THIS PURPOSE. OTHER SHIMS COULD CAUSE LANDING GEAR FAILURE.

(e) If necessary, adjust the toe-in and/or camber.

Maximum 2° of shim for camber and 2° of shim for toe-in.

See the illustrated parts catalog for the correct shims.

Put shims between the strut and the axle.

These change the angle between the wheel axle and the airplane longitudinal axis.

(f) Measure the wheel track across the airplane from the outermost point on one axle to the outermost point on the other axle.

(g) Roll the main wheels off the slide sheets.

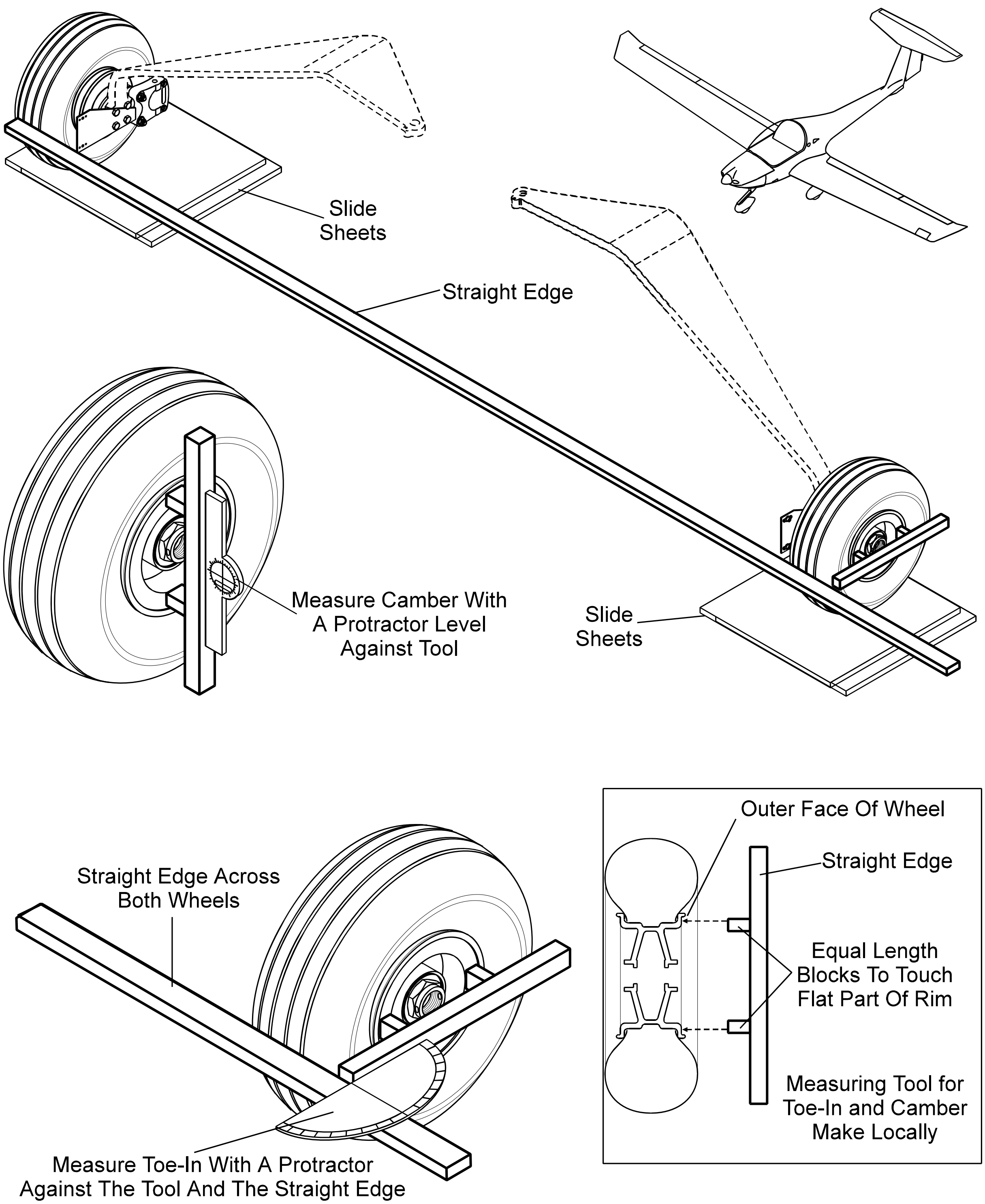


Figure 3B - Measure Toe-In and Camber

NOSE LANDING GEAR

1. General

The DA20-A1 is equipped with a fixed nose landing gear with a castoring wheel. On its rear mount, the leg is attached to the fuselage bottom using a special fitting. The forward mount is attached to the engine mount using a shock absorber assembly.

2. Description

Refer to Figure 4.

The nose landing gear has attachment points at the engine mount and in the fuselage bottom.

A stop on the nose wheel fork limits the deflection of the nose wheel to ± 30 degrees. Steering friction (preventing shimmy) is adjusted by tightening the nose wheel fork mounting screw.

When the airplane is on the ground, the shock absorber assembly pushes up against the engine mount. The journal-bearing pulls down against the front fuselage. When the aircraft is flying, the shock absorber assembly pulls down against the engine mount and the journal-bearing pushes up against the front fuselage.

The journal bearing keeps the nose gear strut aligned fore and aft. A side load on the nose wheel causes it to caster. 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.

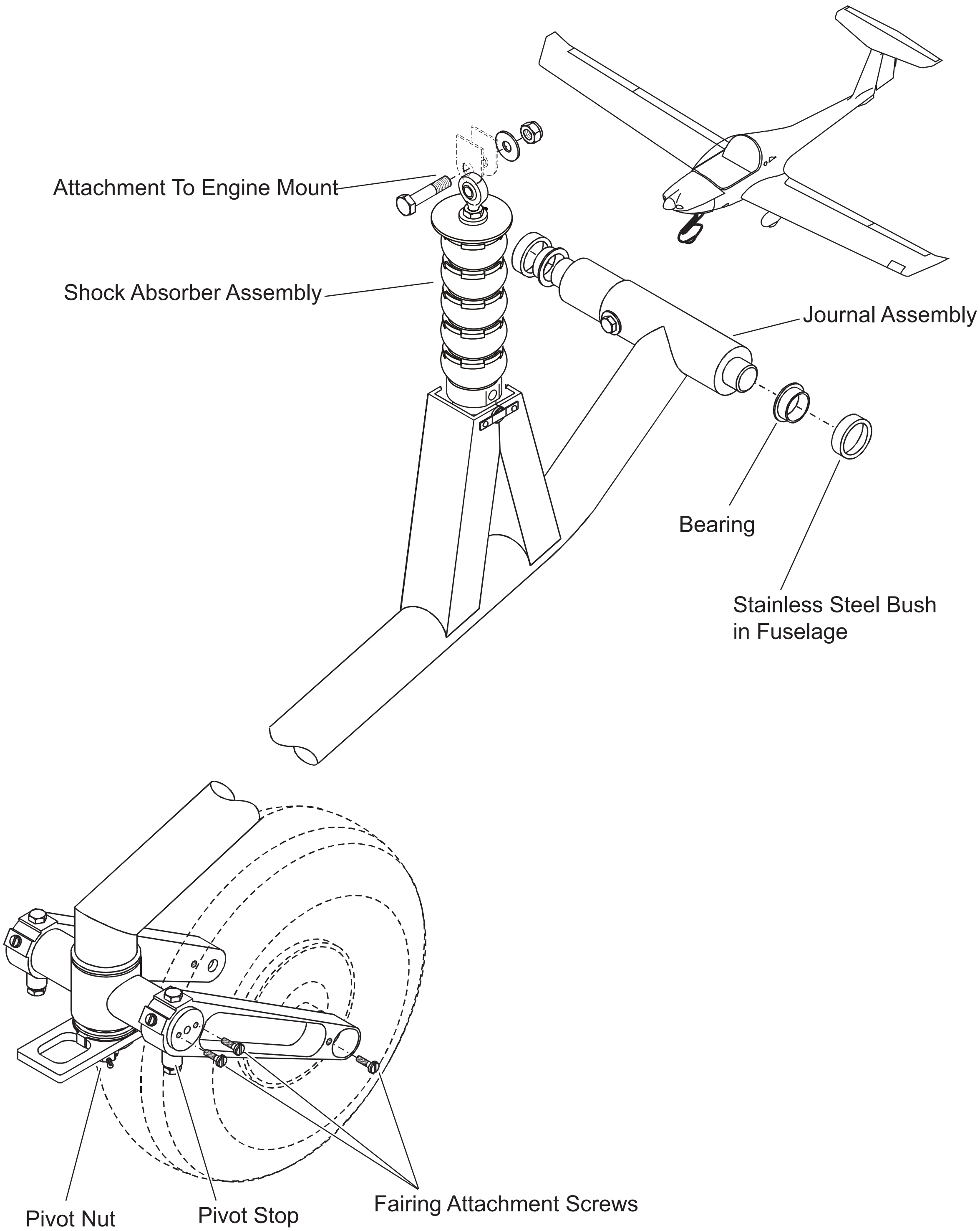


Figure 4 - Nose Landing Gear

3. Removal and Installation

A. Nose Landing Gear Strut

(1) Removal

(a) Jack the aircraft. Refer to Chapter 07-20-00.

(b) Remove the engine cowling. Refer to Chapter 71-10-00.

(c) Disconnect the shock absorber assembly from the nose landing gear strut as follows:

- Remove and discard the rivets.

- Remove the two retainer clips.

- Remove the two strut pins with the use of a slide hammer.

(d) Remove the lock bolt (1) from leg bearing journal assembly. Refer to Figure 5.

(e) Provide adequate support to the NLG strut and slide the large pivot of the journal assembly inwards. Refer to Figure 6.

WARNING: DO NOT POSITION YOURSELF UNDER THE NOSE LANDING GEAR STRUT. THE ASSEMBLY IS HEAVY AND CAN CAUSE INJURY TO PERSONNEL.

(f) Release the journal assembly unit from the fuselage bearings.

(g) Carefully remove the nose gear strut from the aircraft in a downward direction.

(2) Installation

WARNING: USE PROPER PERSONAL PROTECTIVE EQUIPMENT (PPE) WHEN HANDLING CORROSION PROTECTION AND GREASE. THESE CHEMICALS CAN IRRITATE OR CAUSE DAMAGE TO THE SKIN WHEN CONTACTED.

NOTE: If installing a new NLG Strut, Step (2) (a) must be completed first. If installing the original NLG Strut, proceed to Step (2) (b).

(a) Preparation of a new NLG Strut assembly:

- Install the strut pivot into the strut journal. Use Loctite 680. Refer to Figure 6.

- Install the large pivot into the strut journal.

NOTE: A new large pivot must be used when a new NLG Strut is installed.

- Put the NLG strut into position on the aircraft from below.

- Slide out the large pivot from the journal to engage the bearings in the fuselage.

  NOTE: No lateral free play is allowed.

- Drill a 2 mm (+/- 0.015 mm) hole in the large pivot through the pilot hole in the strut journal (one side only).

- Slide the large pivot inwards and remove the NLG strut.

- Secure the large pivot in the NLG Strut with a MS171466/468 spring pin inserted into the drilled hole.

- Drill a 7.9 mm hole through the strut journal and large pivot in order to install the lock bolt.

- Hole location is 17mm (+/- 0.5 mm) from the edge of the strut journal and angled 50 degrees (+/- 1degree) from the center axis of the strut tube. Refer to Figure 7a.

- Remove and discard the spring pin. Remove the large pivot.

- Remove burrs and sharp edges from the holes.

- Clean up the strut journal and large pivot from foreign objects and any contaminates.

(b) Lubrication prior to final installation:

Liberally apply corrosion protection to the following items:

NOTE: Use Type 5 lubricant. Refer to Chapter 12-20-00.

- The inside of the journal assembly.

- The shank of the lock bolt. Clean corrosion protection from the threads.

- Apply a light coat of grease to the Teflon bearings and strut pivots. Use Type 1 lubricant. Refer to Chapter 12-20-00

(c) Install the large pivot into the strut journal. Put the nose gear strut in position on the aircraft from below.

(d) Slide out the large pivot of the unit to engage the bearings in the fuselage.
Refer to Figure 6.

(e) Install the lock bolt (1) in the journal bearing unit. Refer to Figure 5.

(f) Install the shock absorber assembly to the nose landing gear strut as follows: Refer to Figure 6.

- Apply a light corrosion protection on strut pins and clip retainers. Use Mastinox (6856K). Clean off any excess corrosion protection.

- Install the shock absorber assembly using the strut pins. Use a vinyl hammer to secure the strut pins.

- Install the clip retainers and secure them with rivets.

(g) Adjust the nose wheel steering friction. Refer to Paragraph 4.A.

(h) Remove the aircraft from jacks. Refer to Chapter 07-20-00

(i) Install the engine cowling. Refer to Chapter 71-10-00.

B. Nose landing Gear Fork Assembly

(1) Removal

Refer to Figure 7b.

(a) Jack the aircraft. Refer to Chapter 07-20-00.

(b) If installed, remove the fairing.

(c) Remove the cotter pin and castellated nut. Discard the cotter pin.

(d) Remove the washers, belleville springs spacer, stop plate and thrust washer. Inspect all parts and replace if necessary.

(e) Remove the assembly from the fork pivot.

(2) Installation

Refer to Figure 7b.

(a) Lubricate the fork pivot and pivot bushings. Cover all bare metal and clean excess from the threads. Refer to Chapter 12-20-00.

(b) Install the fork assembly on the fork pivot.

(c) Apply corrosion protection to the non-painted area at the stud end of the NLG strut axle. Use CRC SP-400 or CRC Corrosion shell. Do not apply to surfaces with the lubricant and do not contaminate the tire or fiberglass. Refer to Chapter 12-20-00.

(d) Install the thrust plate, stop plate and spacer.

(e) Install the belleville springs and washers. Make sure that the belleville springs are installed with the open side facing up.

(f) Install the castellated nut.

(g) Apply corrosion protection to the nut and the washers only on the stud end of the NLG strut axle. Use CRC SP-400 or CRC Corrosion shell. Do not apply to surfaces with the lubricant and do not contaminate the tire or fiberglass. Refer to Chapter 12-20-00.

(h) Adjust the NLG steering friction. Refer paragraph 4.A.

(i) Install the fairing if desired.

C. Shock Absorber Assembly

(1) Removal

Refer to Figure 6..

(a) Jack the aircraft. Refer to Chapter 07-20-00.

(b) Remove the engine cowling. Refer to Chapter 71-10-00.

WARNING: SUPPORT THE NOSE LANDING GEAR PRIOR TO REMOVAL OF THE UNIT. FAILURE TO SUPPORT THE ASSEMBLY WILL DAMAGE THE EQUIPMENT AND MAY CAUSE HARM OR INJURY TO PERSONNEL.

(c) Disconnect the rod end bearing from the engine mount as follows:

- Remove and discard the lockwire.
- Remove the bolt, washer and the nut.

(d) Remove the shock absorber assembly from the nose landing gear strut as follows:

- Remove and discard the rivets.
- Remove the LH and RH retainer clips.
- Remove the strut pins using a 10-32 pulling screw. Heat application may be required to break glue contact.

(2) Installation

Refer to Figure 6.

WARNING: USE PROPER PERSONAL PROTECTIVE EQUIPMENT (PPE) WHEN HANDLING CORROSION PROTECTION AND GREASE. THESE CHEMICALS CAN IRRITATE OR CAUSE DAMAGE TO THE SKIN WHEN CONTACTED.

(a) Install the shock absorber assembly to the nose landing gear strut as follows:

- Apply a light corrosion protection on strut pins and clip retainers. Use Mastinox (6856K). Clean off any excess corrosion protection.

- Install the shock absorber assembly using the strut pins. Use a vinyl hammer to secure the strut pins.

- Install the clip retainers and secure with rivets.

(b) Connect the shock absorber assembly to the engine mount as follows:

- Apply corrosion protection to the bolt shank. Clean corrosion protection from the threads. Use Type 5 lubricant. Refer to Chapter 12-20-00.

- Install the bolt, the washer, and the nut.

- Install the lock-wire.

(c) Remove the aircraft from jacks. Refer to Chapter 07-20-00

(d) Install the engine cowling. Refer to Chapter 71-10-00.

D. Shock Absorber Assembly Elements

The shock-absorber assembly elements (rubber dampers, spacers or retainer) must be replaced when cracks are found.

(1) Removal

Refer to Figure 6.

(a) Remove the shock absorber assembly from the aircraft. Refer to Paragraph 3.C.(1).

WARNING: DO NOT STAND IN THE LINE OF THE SHOCK ABSORBER ASSEMBLY WHEN YOU REMOVE THE NUT. THE ASSEMBLY MAY EXPAND WITH A LOT OF FORCE. AND CAN CAUSE INJURY TO PERSONNEL.

(b) Remove the adjusting nut from the shock absorber assembly.

(c) Remove the washer, rubber damper and the retainer.

(d) Replace the defective elements.

(2) Installation

Refer to Figures 6.

(a) Assemble the shock absorber assembly in the reverse order removed.

(b) Install the retainer, rubber damper and washer.

(c) Install the adjusting nut.

NOTE: The distance between the center of the rod end bearing and the center of shock absorber retainer should be 245 mm / 9.65 in. (Refer to Fig. 6).

(d) Install the shock absorber assembly on the aircraft. Refer to Paragraph 3.C.(2).

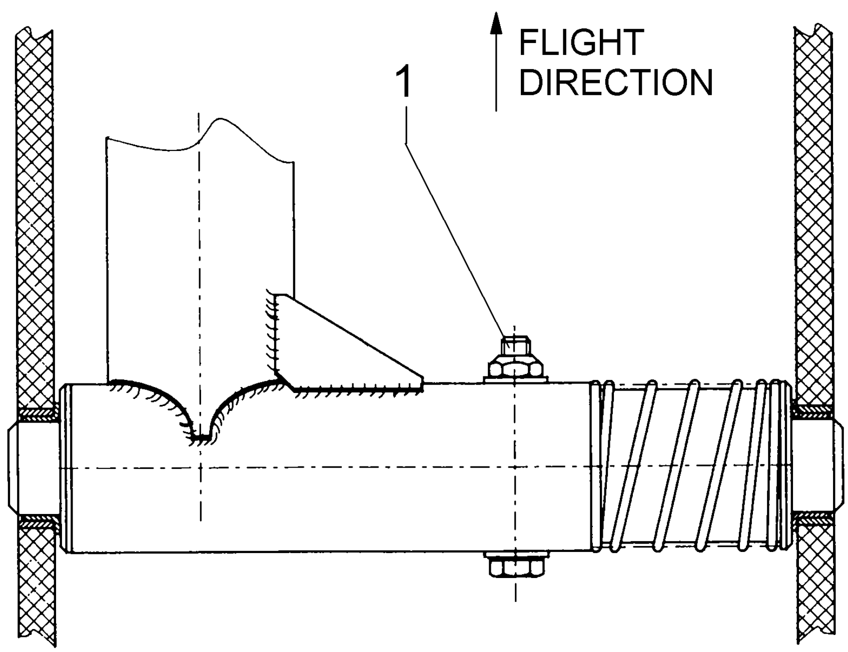


Figure 5 - Journal Bearing Unit

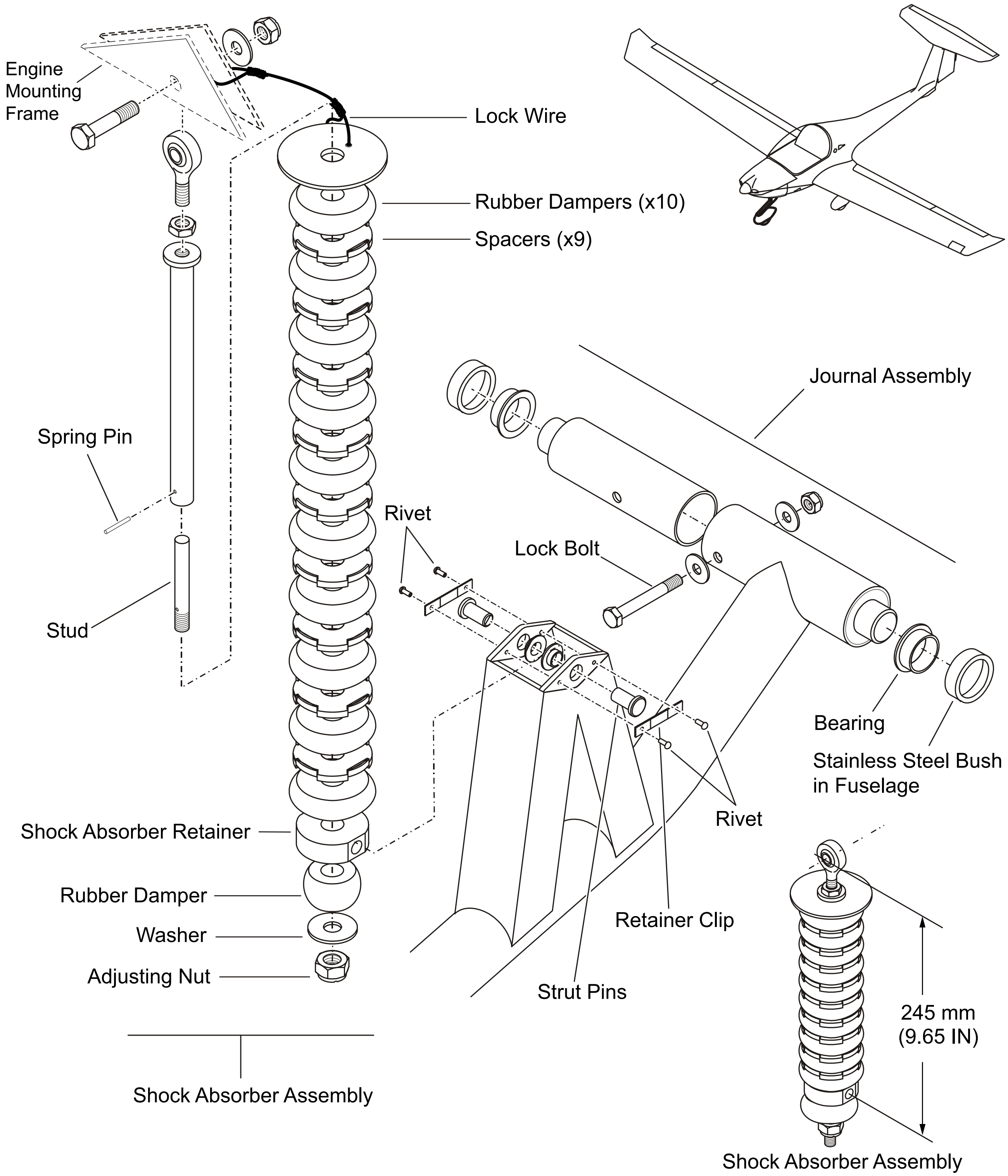


Figure 6 - Shock Absorber Assembly and Journal Assembly

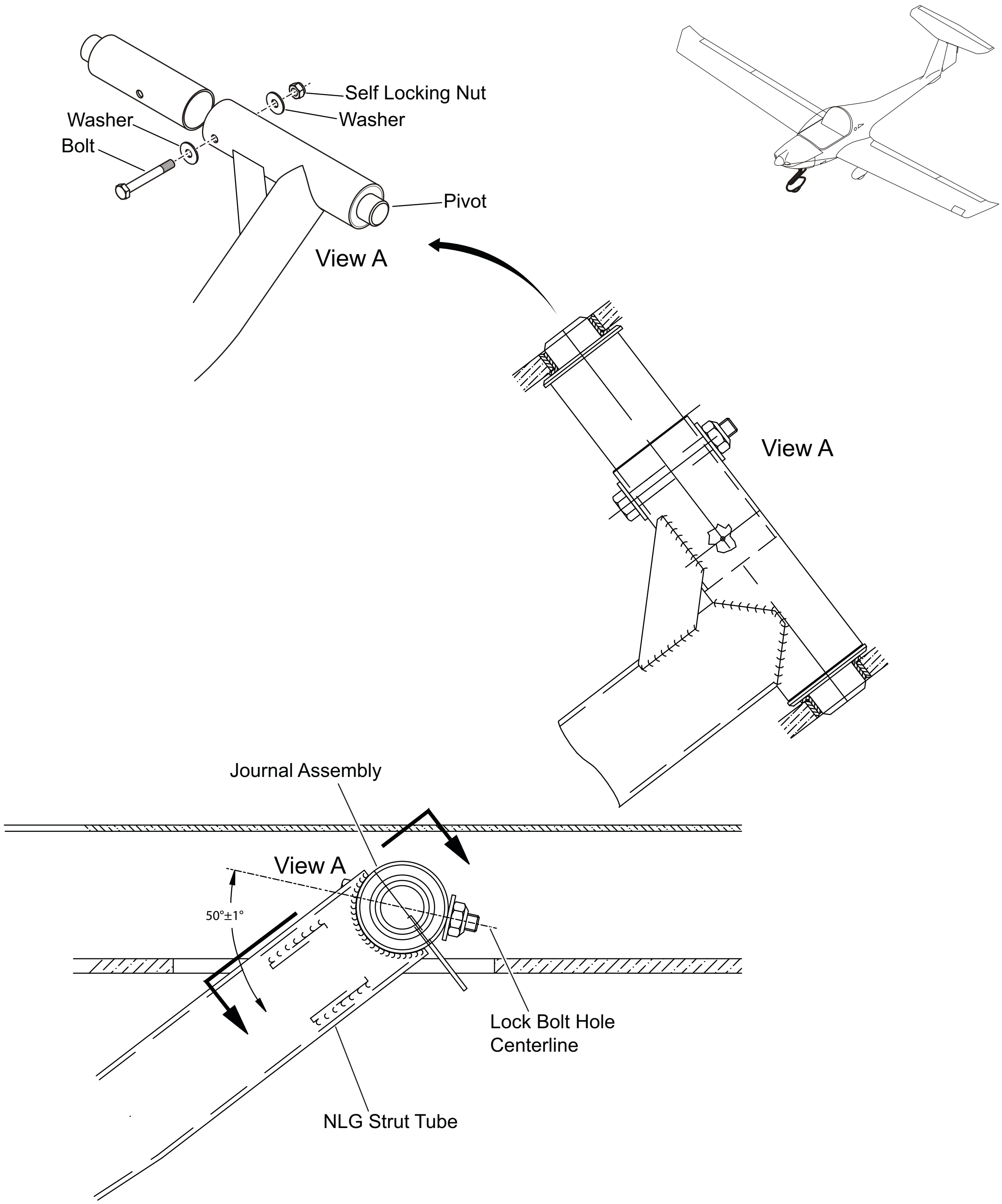


Figure 7a - Lock Bolt Hole - Center line Position

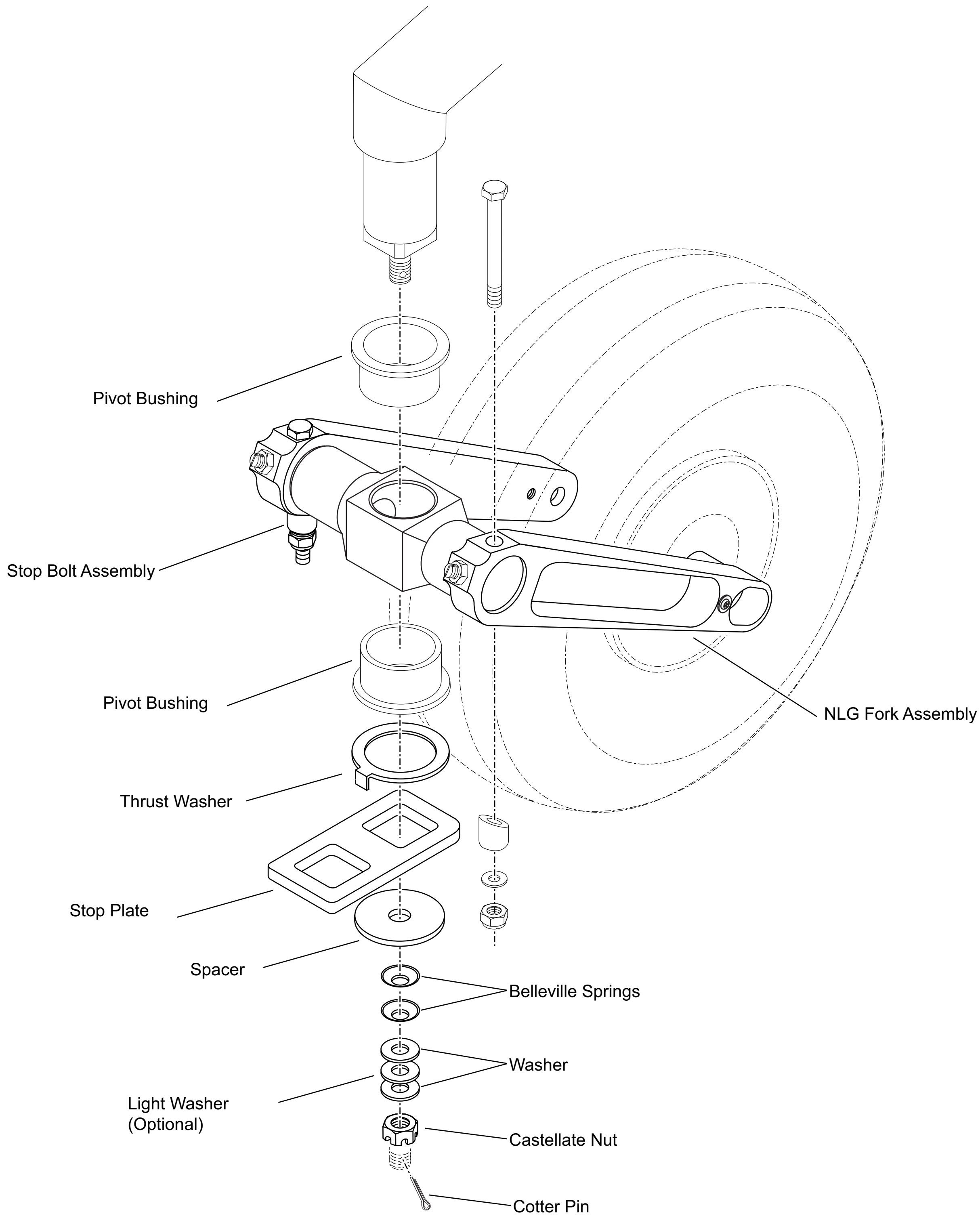


Figure 7b - NLG Fork Assembly

4. Adjustment

A. Nose Wheel Steering Friction

Refer to Figure 7c.

Steering friction prevents nose wheel shimmy and is adjusted with the nose-wheel fork pivot nut.

(1) Jack the aircraft. Refer to Chapter 07-20-00.

(2) Remove the nose-wheel fairing.

(3) Inspect the condition of the belleville springs, washers, spacer and stop plate. Replace defective parts as required.

(4) Adjust the nose-wheel fork pivot nut.

- Remove and discard the cotter pin (if required).

- Adjust the nut.

- Install a new cotter pin.

The friction should be adjusted to withstand a force of 30 to 50 N (6.75 to 11.25 lbs.) measured laterally at the nose wheel axle with wheel lifted from the ground.

(5) Apply corrosion protection to the stud, nut and washers only. Use CRC SP-400 or CRC Corrosion shell. Do not contaminate the tire or fiberglass.

(6) Install the nose-wheel fairing.

(7) Remove the aircraft from jacks. Refer to Chapter 07-20-00.

B. Nose Wheel Balancing

To reduce nose wheel shimmy, new nose wheels may require balancing prior to installation.

C. Nose Landing Gear Leg Lateral Free Play

NLG Leg free play should not exceed 1.58 mm (1/16 in). Refer to Figure 7d.

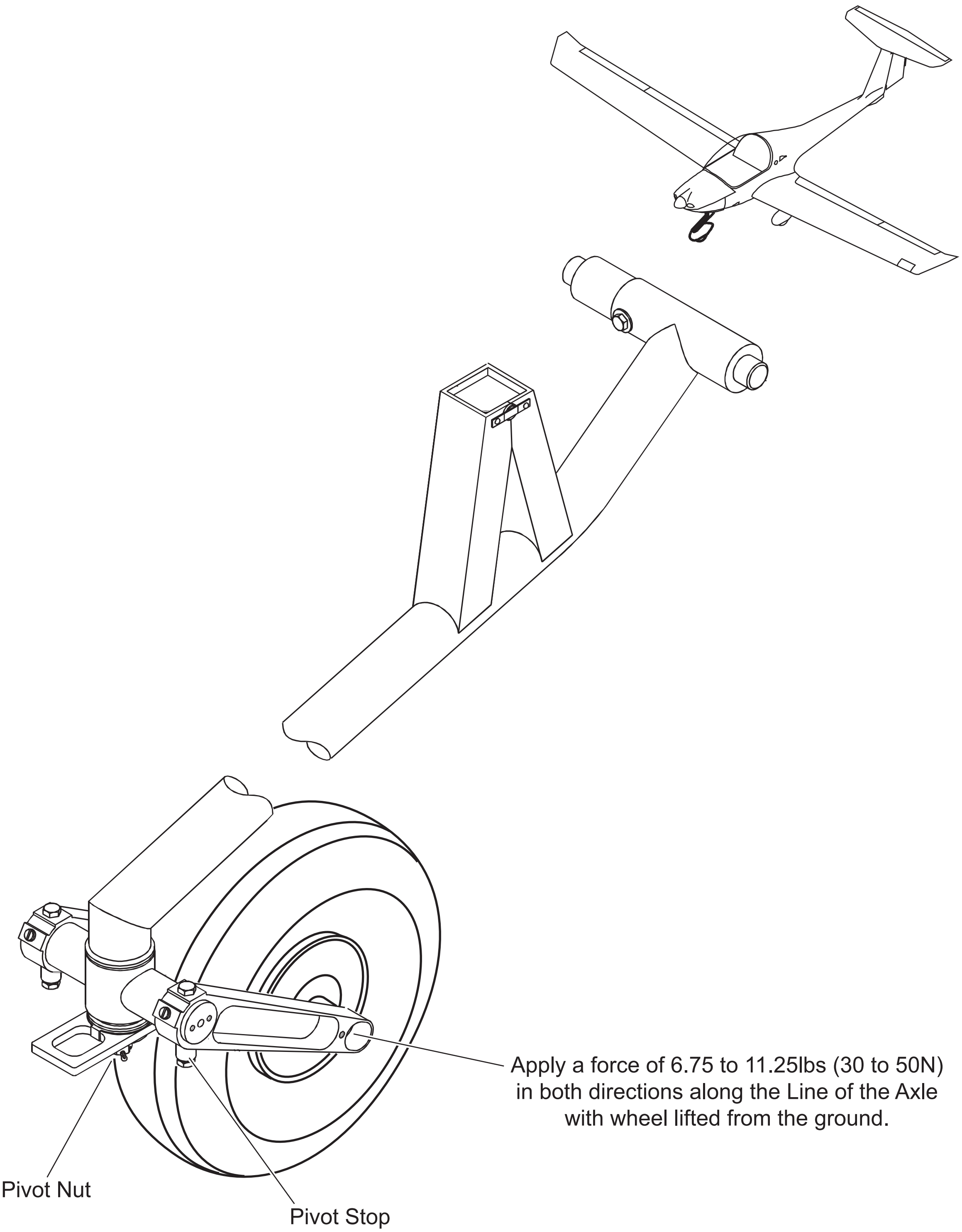


Figure 7c - Adjust the Nose Wheel Steering Friction

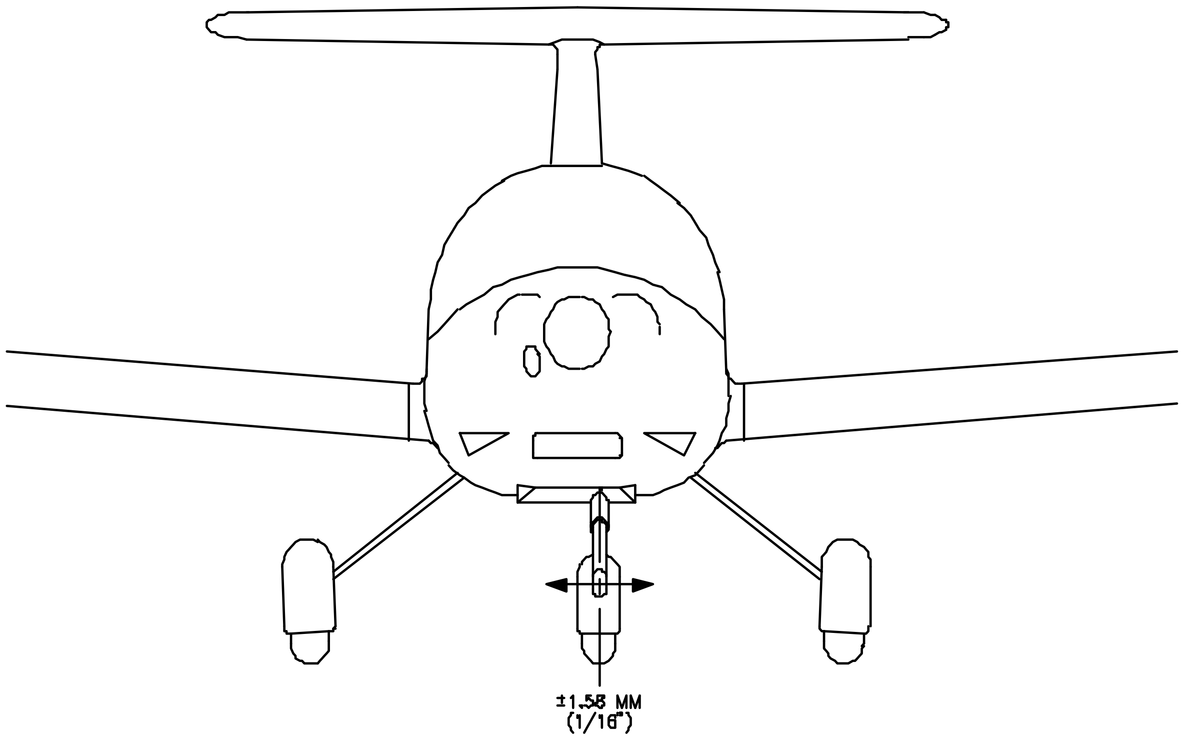


Figure 7d - Allowable Free Play in NLG

WHEELS AND BRAKES

1. General

The nose gear and main landing gear are each equipped with single wheels and low pressure tires. The wheels of the main landing gear are equipped with hydraulically operated disk brakes.

2. Description

Refer to Figure 8.

The main landing gear wheels consist of two wheel halves, the inner tube, and the tire. Disks brakes are attached to the inner half of each wheel. The valve stem is located on the outside of the wheel. Angular roller bearings are installed in each wheel half.

The brake system consists of the brake fluid reservoirs, the master cylinders, the brake lines, calipers, and brake disks.

The brake cylinders on the pilot's side work independently from those on the co-pilot's side.

The brake is applied by pressing the brake pedal, which is located on the rudder pedal, with the tip of the foot. The pressure on the pedal is directed to the master cylinder. The master cylinders are connected via hose lines to the parking brake valve. Brake lines made of steel connect the valve output with the brake cylinders located on both wheels.

The parking brake of the DA20-A1 is standard equipment. The parking brake valve is located on the left hand aft side of the firewall for aircraft S/N 10002 to 10287 and is operated via a bowden cable. The parking brake valve is located under the right seat shell for aircraft S/N 10288 and subsequent (and aircraft with service bulletin DA20-32-01 incorporated) and is operated via a bowden cable. The operating knobs are located next to the cabin heat and choke knobs. The parking brake is set by operating the brake pedals and pulling the parking brake control knob. The brake lines are shut, and fluid pressure is maintained.

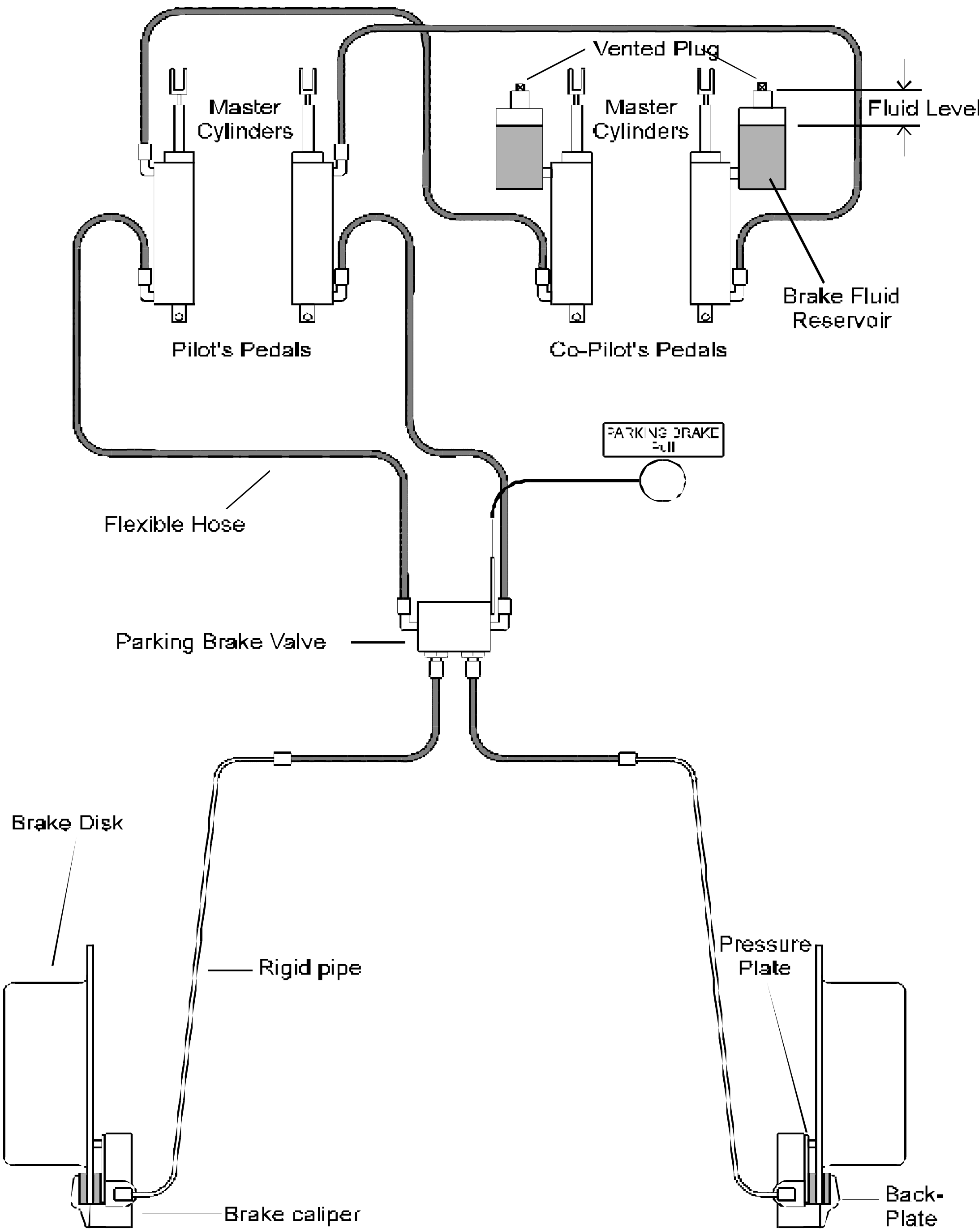


Figure 8 - Brake System Schematic

3. Troubleshooting

The following table lists defects as they could appear on the wheels and brakes, and their correction.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Excessive tire wear	Track adjusted improperly	Adjust (see Chapter 32-10).
Excessive axial play of wheel	Defective wheel bearing	Adjust play in bearing or replace bearing
Brake disks warped	Brake applied too hard	Replace
	Hard landing	Replace
Brakes inoperative	Brake fluid level low	Refill with brake fluid
	Air in brake system	Bleed brake system
	Defective master cylinder	Replace
	Defective Caliper	Replace
	Worm brake linings	Replace
	Leaky brake line connections	Tighten or replace connectors

4. Removal and Installation

Refer to Figure 9 - Main Wheel on the next page and to Figure 2 - Main Wheel in 32-10-00.

A. Main Wheels

(1) Removal

(a) Jack up the airplane or unload wheel and remove the wheel fairing.

(b) Remove the locking wire on the caliper and remove the back pressure plate from the caliper.

(c) Remove the wheel nut from the axle.

(d) Pull the wheel from the axle.

(2) Installation

(a) For installation reverse the sequence.

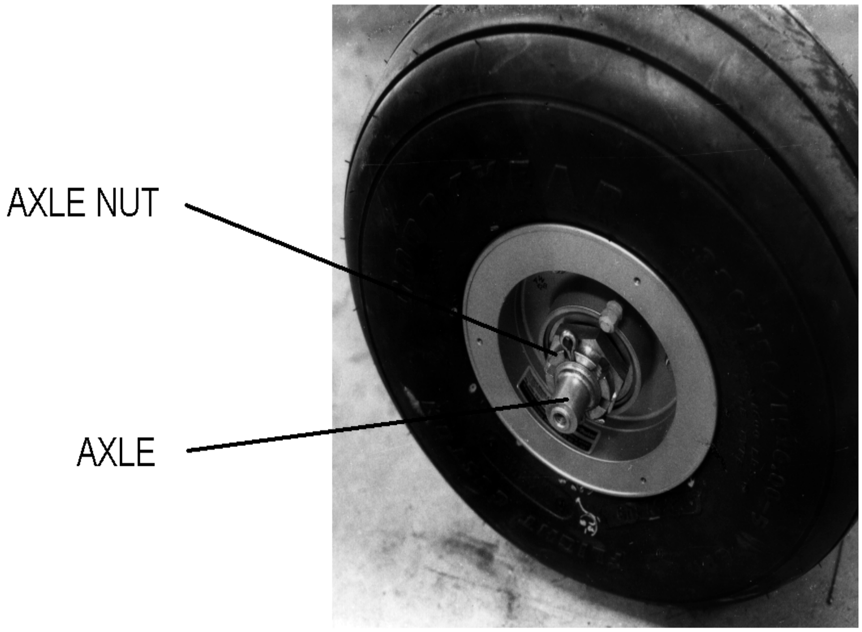


Figure 9 - Main Wheel

(3) Main Wheel Disassembly

CAUTION: PRIOR TO DISASSEMBLY OF THE WHEEL THE TIRE MUST BE COMPLETELY DEFLATED BY REMOVING THE VALVE INSERT.

(a) Remove the bolts on the rim.

(b) Remove the brake disk and the rim halves from the tire.

(c) Remove the inner tube.

(d) The wheel bearing can be removed, if required (remove the locking rings).

(4) Assembly

(a) For assembly reverse the sequence.

NOTE: Talcum powder should be applied to the inner tube prior to installation.

B. Nose Wheel

(1) Removal

(a) Remove the six allen screws securing the fairing halves to each other.

(b) Remove the LH and RH fairing mounting screw.

(c) Remove the fairing.

(d) Unload the nose wheel.

(e) Remove the M10 nut and the bolt (serving as axle) and remove the nose wheel.

(2) Installation

(a) For installation reverse the sequence.

(3) Disassembly

(a) Deflate the tire.

(b) Remove the bolts.

(c) Split the rim and remove the inner tube.

(4) Assembly

(a) For assembly reverse the sequence. Use only specified bolts.

C. Brake Master Cylinder

NOTE: As a significant amount of brake fluid will flow out. Make sure that a container is available for the collection of the brake fluid, or the brake line must be quickly capped off after disconnection. For repair of the master cylinder refer to the manufacturer's documentation.

(1) Removal

Refer to Figure 10.

(a) Remove the brake lines on the master cylinder.

(b) Remove the connecting bolt attaching the cylinder to the pedal.

(c) Remove the cylinder lower mounting bolt.

(d) Remove the master cylinder from the airplane.

(2) Installation

(a) For installation reverse the sequence.

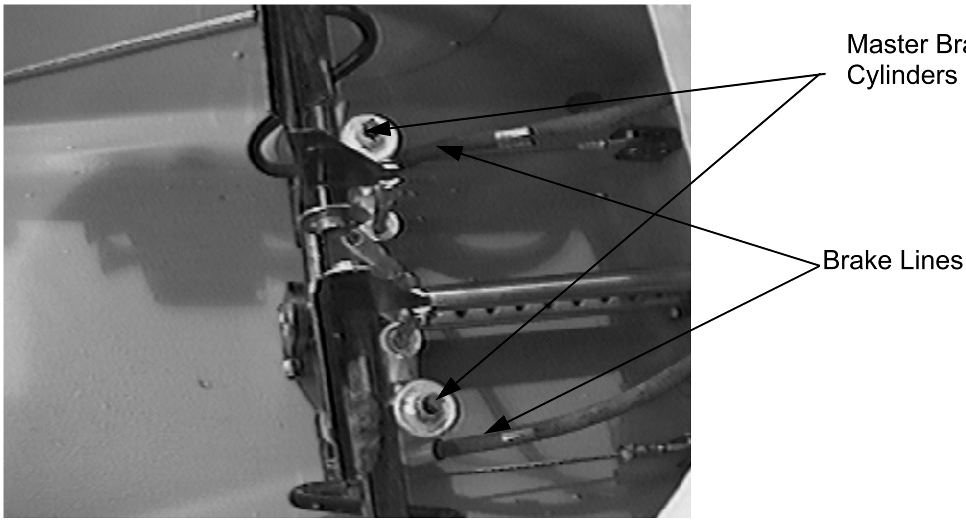


Figure 10 - Master Brake Cylinders

D. Caliper

NOTE: After maintenance tasks which involved opening or disconnecting of the brake line system, the brake system should be bled and checked for proper operation.

(1) Removal

Refer to Figure 11.

(a) Disconnect the brake line from the caliper (1).

(b) Disconnect the back pressure plate (2) from the cylinder.

(c) Remove the caliper and the guide assembly (3) from the mount.

(2) Installation

(a) For installation reverse the sequence.

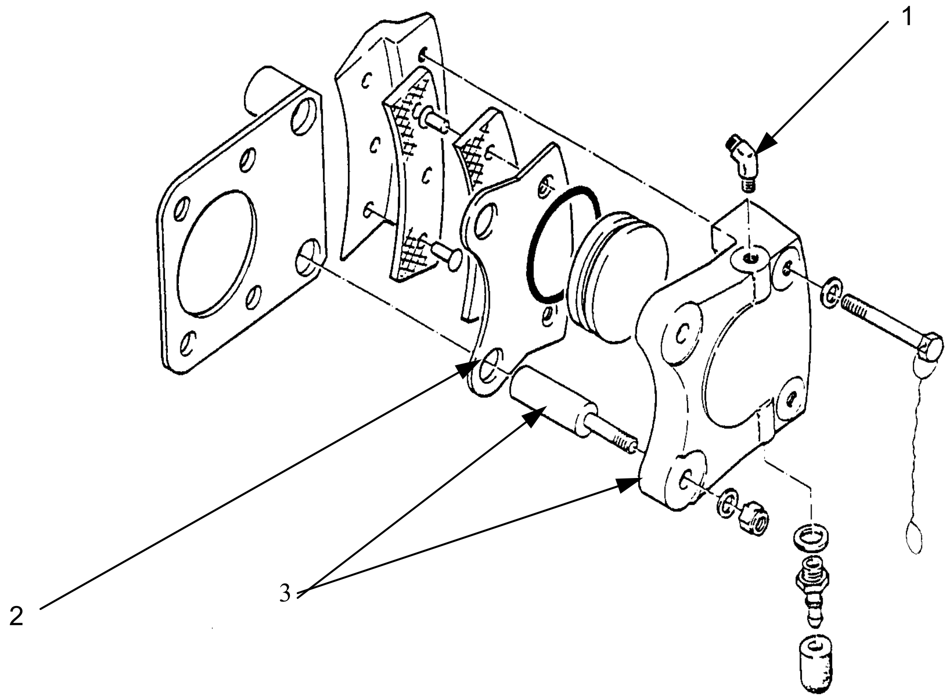


Figure 11 - Caliper

E. Disc Brake

Brake disks should be replaced when their thickness is less than 4.242 mm (0.167 in).

(1) Removal

(a) Remove the wheel and the caliper.

(b) Disassemble the wheel.

(c) Remove the brake disk.

(2) Installation

(a) For installation reverse the sequence. Prior to installation of the brake disk, check condition of disk. The disk must not be warped, and any grooves on the disk surface should not be greater than 0.5 mm (0.02 in) in depth.

F. Brake Linings

Brake linings should be replaced when their thickness is less than 3 mm (0.12 in).

(1) Removal

(a) Remove the back pressure plate from the caliper.

(b) Remove the pressure plate from the caliper.

(c) Remove the brake linings using appropriate tool.

(d) Rivet the new brake lining to brake shoe using proper tool. Make sure tight and proper fit.

(2) Installation

(a) For installation reverse the sequence.

G. Parking Brake Valve

Effective

Aircraft Serial # 10287 and below

NOTE: For repair of the valve refer to the documentation of the manufacturer (Parker).

(1) Removal

Refer to Figure 12.

(a) Disconnect the brake lines.

(b) Disconnect the bowden cable.

(c) Remove the mounting bolts.

(2) Installation

(a) For installation reverse the sequence.

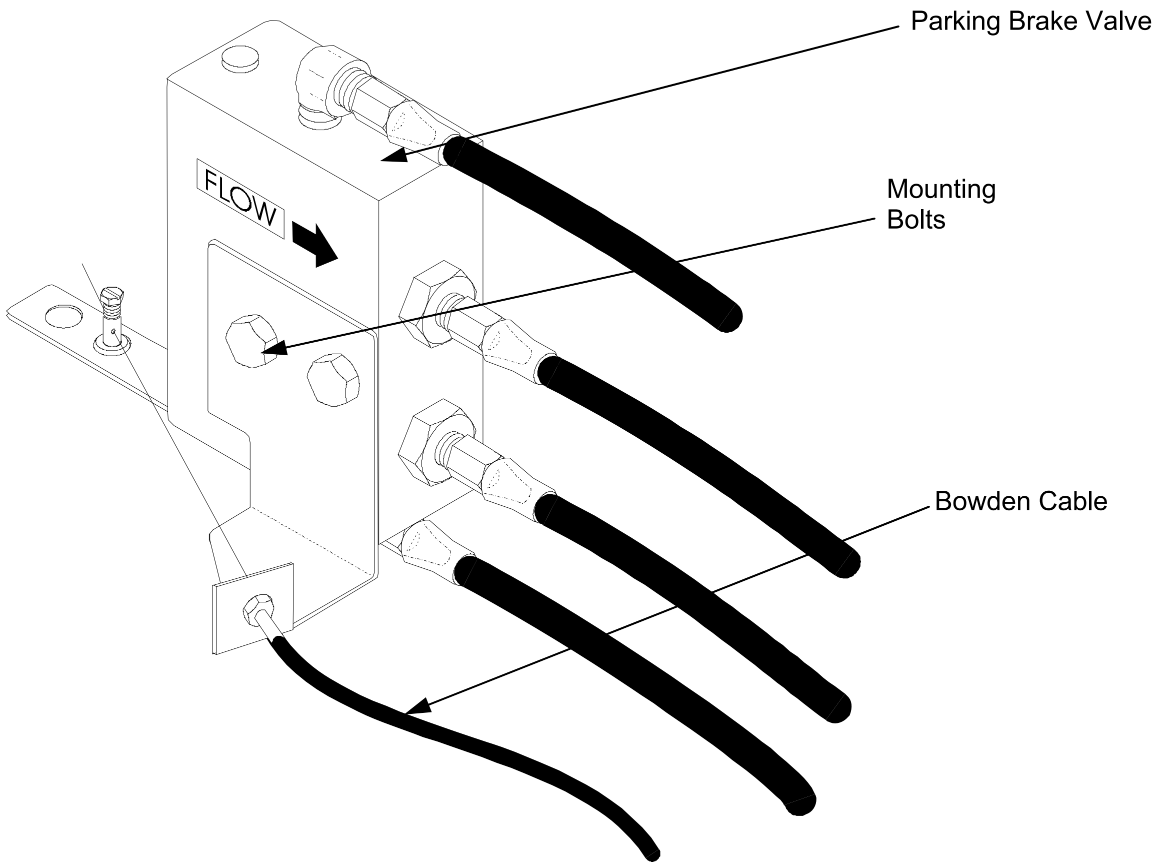


Figure 12 - Parking Brake Valve

H. Parking Brake Valve

Effective

Aircraft Serial # 10288 and subsequent and aircraft with that have Service Bulletin DA20-32-01 incorporated.

I. Remove the Parking Brake Valve.

Refer to Figure 12A.

(a) Remove the right Pilot's seat.

(b) Disconnect the bowden cable. Loosen the bolt in the end fitting and pull the center wire from the end fitting.

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.

(c) Disconnect the four brake pipes from the parking brake valve. Put the caps on the connections.

(d) Remove the nuts and the bolts that attach the parking brake valve.

J. Install the Parking Brake Valve

Refer to Figure 12A.

(a) Put the parking brake valve in position. Make sure that the vibration mount is in position.

(b) Install the nuts and the bolts that attach the parking brake valve. Make sure that the bracket for the bowden cable is in position.

(c) Connect the four brake pipes to the parking brake valve.

(d) Put the center wire of the bowden cable through the end fitting on the parking brake lever. Tighten the bolt. With the brake lever in the center console set to OFF, the lever on the parking brake valve must be fully forward.

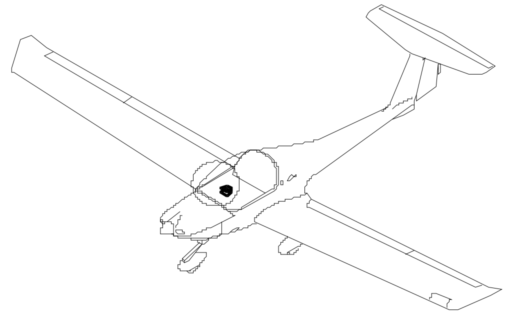
(e) Bleed the brake system.

(f) Do an operational test of the parking brake:

Set the parking brake to ON. Pump the foot brake pedals.

The brakes must stay on.

(g) Install the right pilot's seat.



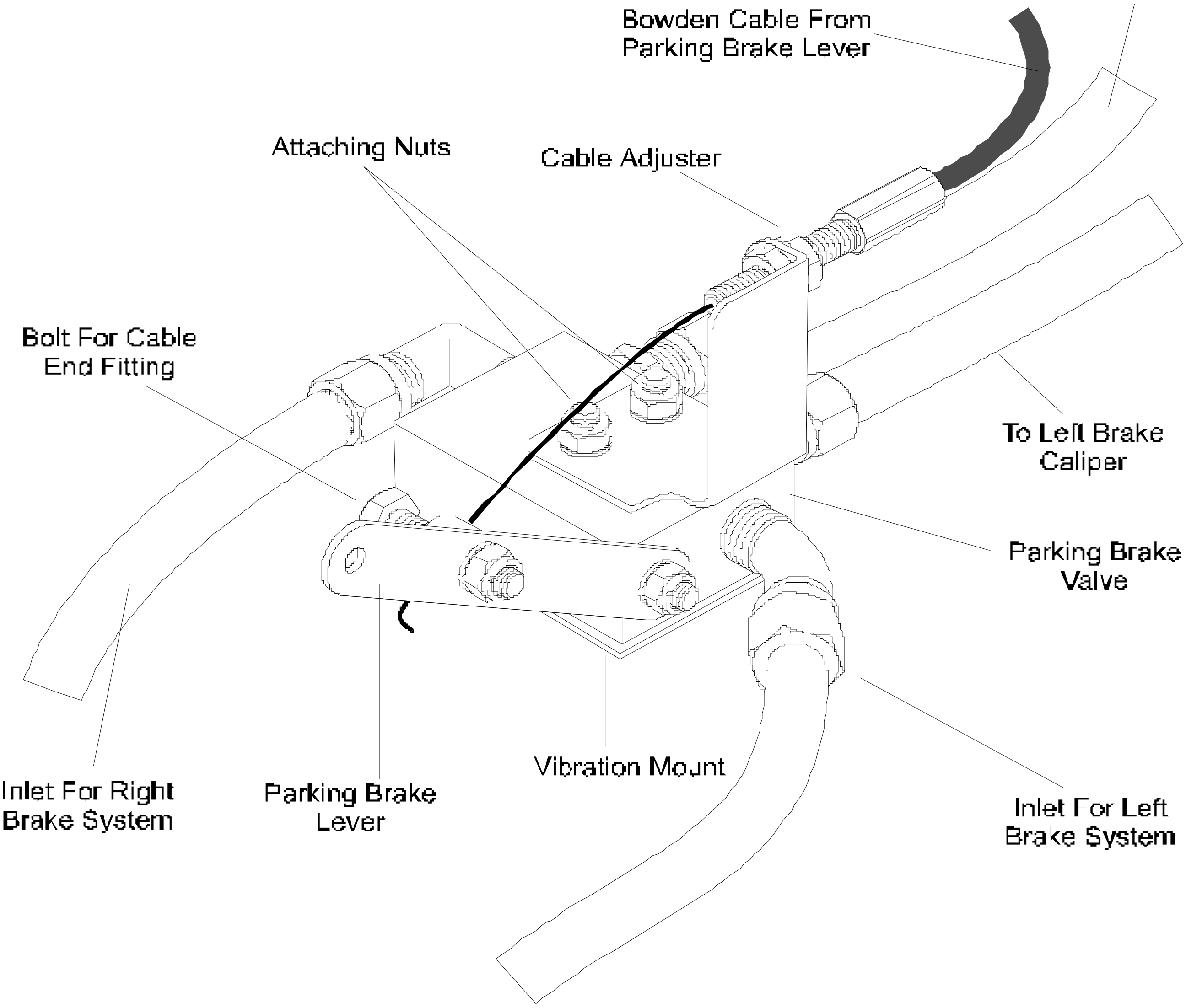


Figure 12A - Parking Brake Valve Installation under Right Seat

5. Bleeding of Brake System

Bleeding of the brake system requires a pressure pump which pumps brake fluid into the brake line system.

(a) Remove the brake fluid reservoir cap and remove brake fluid down to approximately 1/3 of the normal level.

(b) Release the parking brake.

(c) Connect the pressure pump to bleeding nipple on the brake cylinder. Refer to Figure 13.

(d) Open the bleeding nipple by turning 1/2 to 1 turns.

(e) Using the pressure pump fill the brake system with brake fluid.

(f) Check the reservoir to prevent overflow.

(g) Fill the system until no more air bubbles occur in reservoir.

(h) Close the bleeding nipple and remove the pressure pump.

(i) Fill the reservoir with brake fluid to the maximum level.

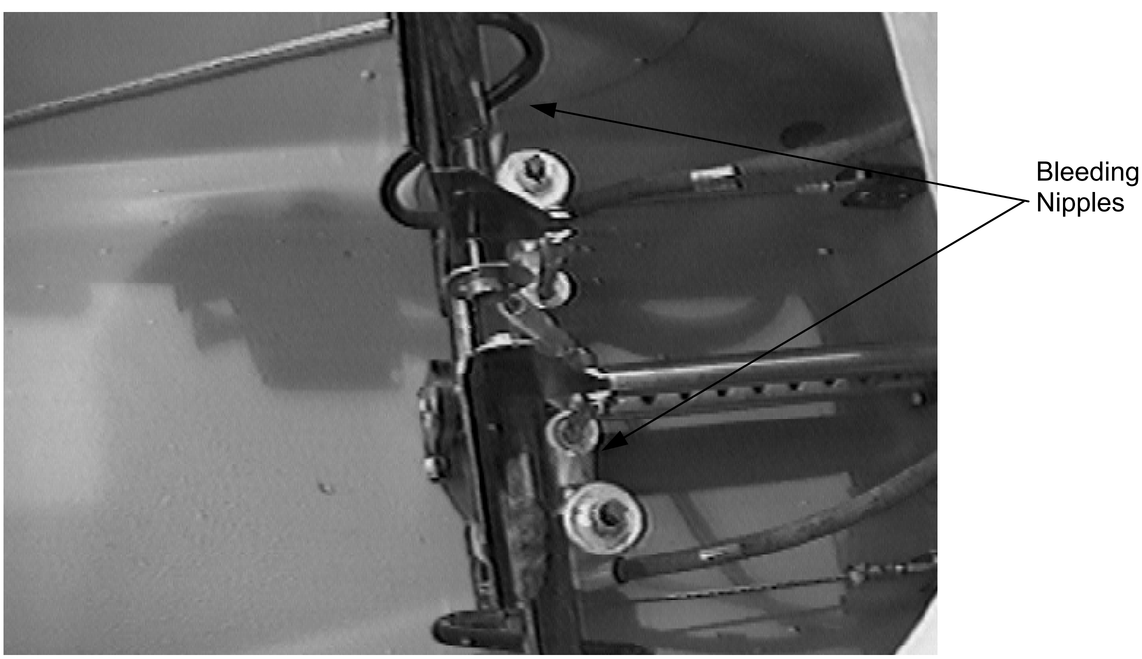


Figure 13 - Bleeding Nipple

6. Adjustment

The brakes installed on the DA20-A1 are self adjusting. After installation of the calipers or after the brake line replacement, make sure that the wheels turn freely.

If a wheel does not turn freely, the cause must be investigated and corrected.

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CHAPTER 33
LIGHTS

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INTERIOR

1. General

Effective: Serial #10021 and subsequent, and aircraft with Service Bulletin DA20-30-01(formerly SB95-01, Night VFR.)

The DA20-A1 is equipped with the following interior lighting:

(a) Map Lighting

(b) Instrument Panel Lighting

2. Description

The internal lighting of the DA20-A1 is provided by a lighting module located aft of the Pilot's head and on the center line of the aircraft. Included in this module are two panel illumination lights and one map light. The controls for the lights are located on the center console aft of the trim control switch. There is a dimming control located on the left side of the instrument panel for adjusting the intensity of the panel lighting. A red LED, located underneath the instrument panel, on the pilot's side, is used to illuminate the Fuel Shutoff Valve.

3. Troubleshooting

COMPLAINT	POSSIBLE CAUSE	REMEDY
Map Lighting inoperative.	Defective lamps	Replace the lighting module.
	Defective switch	Replace
	Defective breaker	Replace
	Defective wiring in the forward cockpit area	Repair. Refer to Chapter 92.
Instrument Panel Lighting inoperative	Defective lamps	Replace the lighting module.
	Defective switch	Replace
	Defective breaker	Replace
	Defective wiring in the forward cockpit area	Repair. Refer to Chapter 92.
Panel illumination poor	Improper aiming of lights	Adjust

4. Removal and Installation

A. Lighting Module

(1) Removal

(a) Switch off the battery master switch.

(b) Remove the nuts fastening the module to the fuselage.

(c) Disconnect the wiring harness.

(2) Installation

(a) Connect the wire harness to the light assembly. Observe the connector numbering codes.

(b) Re-install the mounting hardware.

(3) Adjustment/Test

(a) Select the battery master to on and check that the Instrument and Taxi light circuit breakers are closed.

(b) Check that the center light illuminates when the Map switch is selected to on.

(c) Check that the two outboard lights illuminate when the instrument switch is selected to on. Check that the dimming control operates normally.

(d) Check the alignment of the lights as shown in figure 1 and adjust as required.

NOTE: Cover the canopy with a dark soft clean blanket to block light while adjusting the lights.

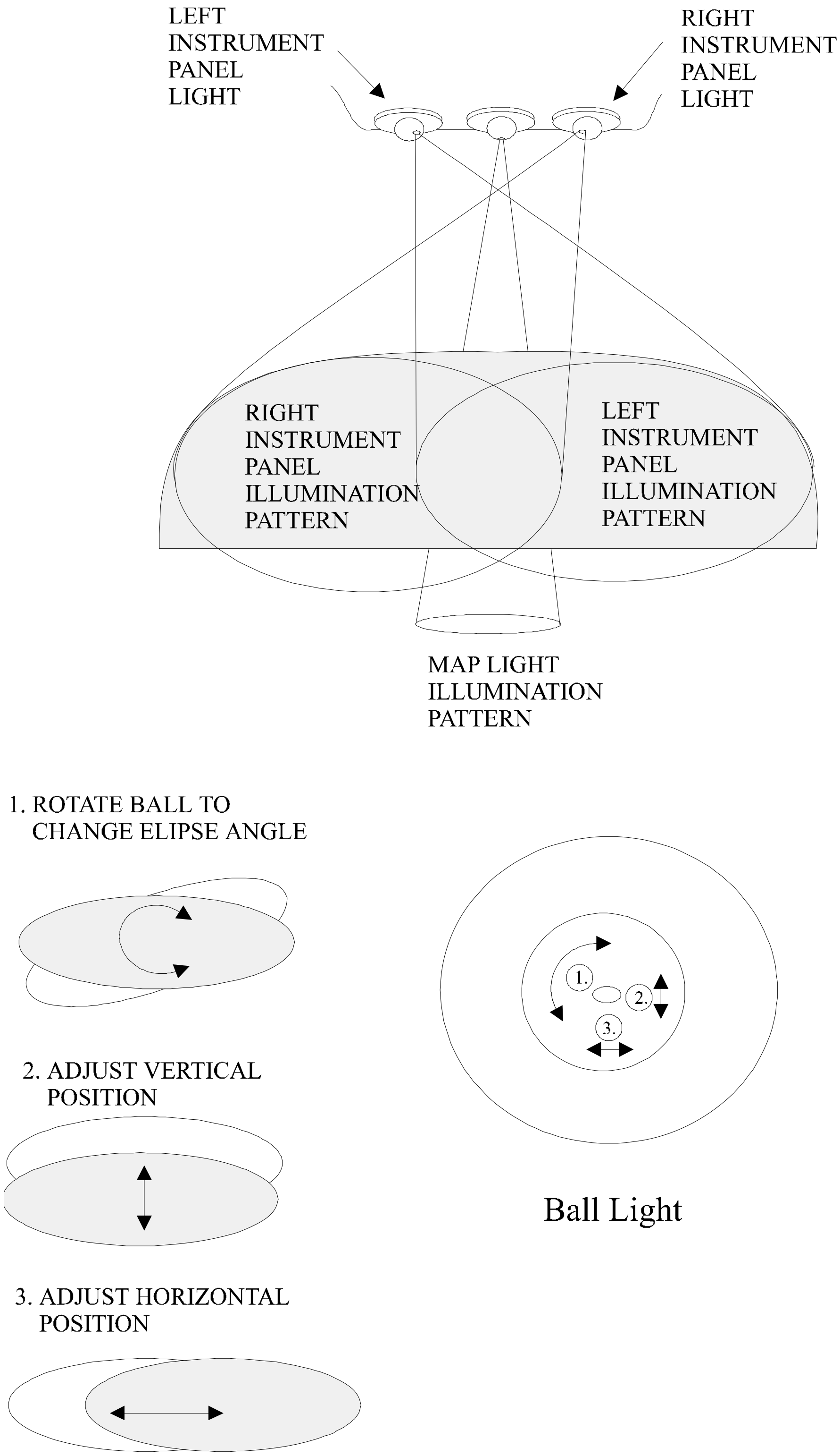

Figure 1 - Light Alignment

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EXTERIOR

1. General

The DA20-A1 can be equipped with the following exterior lighting:

(a) Anti Collision Lights (ACL)

(b) Position Lights

(c) Navigation light

(d) Taxiing Light.

2. Description

The anti collision and position lights are combined in one unit and are located at each wing tip. The anti collision strobe light power supply is installed under the pilots seat. The landing and taxiing light are installed in the left wing.

Each system can be individually operated using a rocker switch located on the instrument panel.

The anti collision strobe lights (ACL) are powered by a high voltage power supply (approximately 600 Volts). The ignition pulse ionizes the gas in the lamp, and the capacitors located in the power supply are discharged through the lamp generating a light flash. Immediately after the first discharge a second lower flash is generated increasing the visibility (dual flashing principle). This procedure is repeated approximately 50 times per minute. The anti collision strobe lights are not synchronized.

The position lights consist of two lights each. One light is equipped, depending on the place of installation (LH or RH side) with a red or green lens, while the second light has a white lens and is aimed to the rear (tail light).

The two white lights directed to the rear allow the airplane to be easily visible from the rear. Furthermore the pilot of the following airplane has a better judgment of where the airplane in front of him might turn.

The landing light consists of a mirror type 100 W lamp with an optic lens. The taxing light is of similar design, but uses a clear lens

3. Troubleshooting

The following table lists defects as they could appear on the exterior lighting system, and their correction.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Both ACL’s inoperative.	Defective switch	Replace
	Defective breaker	Replace
	Defective wiring in the forward cockpit area	Repair
	Defective power supply	Replace
Left ACL inoperative	Defective power supply	Replace
	Defective ACL lamp	Replace
	Defective wiring	Repair
Right ACL inoperative		See left ACL
Both position lights inoperative	Defective switch	Replace
	Defective breaker	Replace
	Defective wiring in the forward cockpit area	Repair
Left position light inoperative	Defective lamp	Replace
	Defective wiring	Repair
Right position light inoperative	See left position light	See left position light
ACL and position light inoperative on one side	Connector at wiring root not plugged in	Reconnect
Navigation light or taxiing light inoperative	Defective lamp	Replace
	Defective switch	Replace
	Defective breaker	Replace
	Defective wiring	Repair
	Loose connector next to light	Reconnect

4. Removal and Installation

WARNING: THE POWER SUPPLIES OF THE ANTI COLLISION STROBE LIGHTS GENERATE HIGH VOLTAGE WHICH IS CONNECTED DIRECTLY TO THE STROBE LIGHTS. PRIOR TO PERFORMING ANY MAINTENANCE ON THE WIRING OR ON THE LIGHT ITSELF, A MINIMUM OF FIVE (5) MINUTES WAITING TIME MUST BE OBSERVED AFTER SWITCHING OFF THE SYSTEM TO ALLOW THE CAPACITORS TO DISCHARGE. THIS WARNING ALSO APPLIES TO THE POSITION LIGHTS AS THESE ARE INSTALLED UNDER THE SAME CAP.

CAUTION: NEVER TOUCH THE GLASS OF A BULB WITH BARE FINGERS.

A. Position Light Bulb

(1) Removal

(a) Switch off the battery master switch.

(b) Wait for approximately five (5) minutes to discharge the strobe light capacitors.

(c) Remove the lens (make sure that the parts cannot fall down).

(d) Replace the bulb.

(2) Installation

(a) For installation reverse the sequence.

B. ACL bulb

(1) Removal

(a) Switch off the battery master switch.

(b) Wait for five (5) minutes to allow discharge of strobe light capacitors.

(c) Disconnect the power lines and the ground connection.

(d) Replace the light unit.

(2) Installation

(a) For installation reverse the sequence.

C. ACL Power Supply

(1) Removal

(a) Remove the pilot's seat.

(b) Disconnect the wiring harness.

(c) Remove the four nuts securing the power supply to the fuselage.

(2) Installation

(a) For installation reverse the sequence.

D. Navigation light

(1) Removal

(a) Remove the screws securing the light cover to the wing.

(b) Disconnect the wiring harness attached to the navigation light.

(c) Remove the mounting hardware securing the navigation light to the wing.

(d) Remove the navigation light.

(2) Installation

(a) For installation reverse the sequence.

E. Taxiing Light

(1) Removal

(a) Similar procedure as in the navigation light.

(2) Installation

(a) For installation reverse the sequence.

CHAPTER 34
NAVIGATION AND PITOT STATIC

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NAVIGATION AND PITOT STATIC

1. General

The navigation systems include the instruments that operate on dynamic and static pressure, and electrically powered gyros. They include the airspeed, altitude, attitude, and direction indicators.

The equipment supplied with dynamic and static pressure includes the altimeter, airspeed indicator, and vertical speed indicator. Refer to Chapter 31, Figure 1.

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PITOT STATIC

1. General

The Pitot static system is used to measure and deliver dynamic and static pressure to the airspeed indicator, altimeter, and vertical speed indicator. Refer to Figure 1.

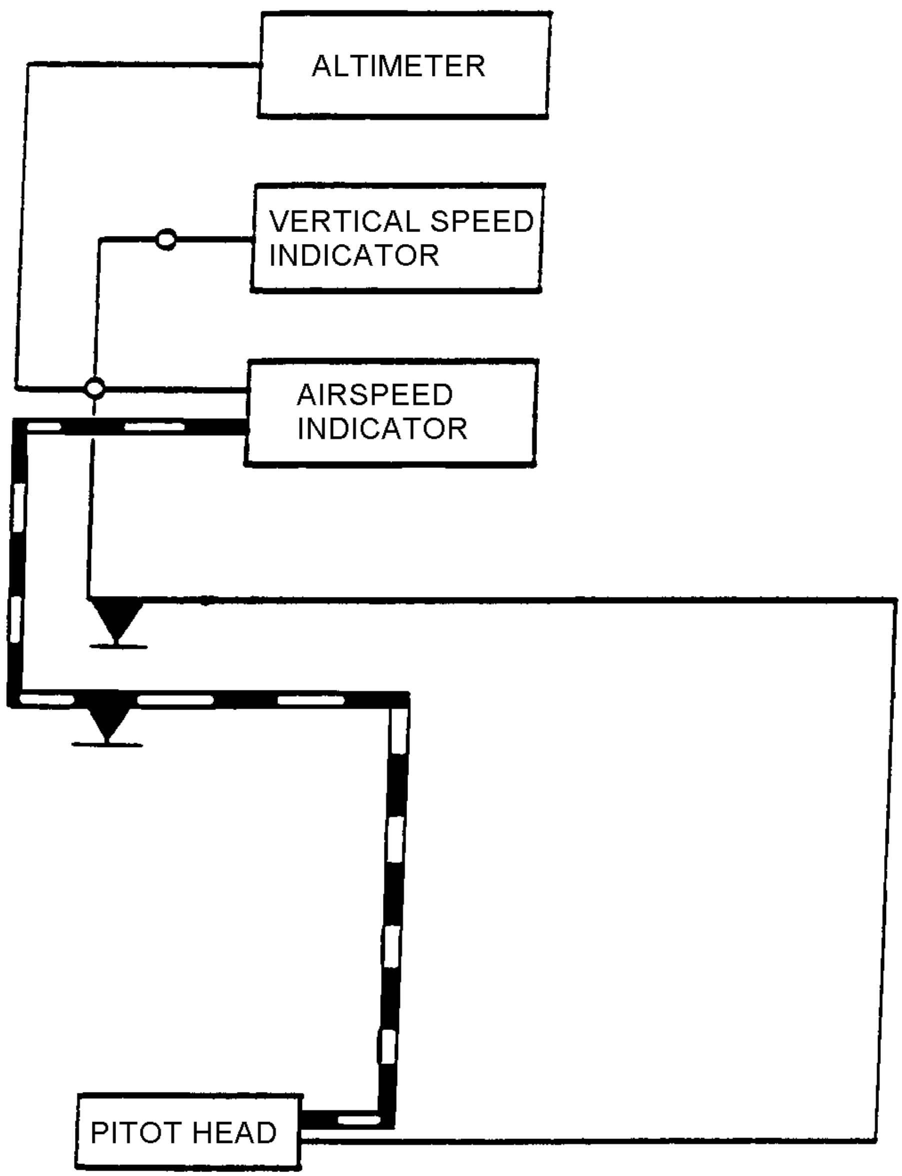

Figure 1 - Pitot Static System Schematic

2. Description

A. Pitot Head/Lines

Refer to Figure 2.

The Pitot head of the DA20-A1 is designed to measure pitot and static pressure. The Pitot head is located below the left wing. Lines running through the left wing and the fuselage connect the Pitot head to the instruments. The lines for pitot are green, and the lines for static pressure are blue, or are labeled accordingly.

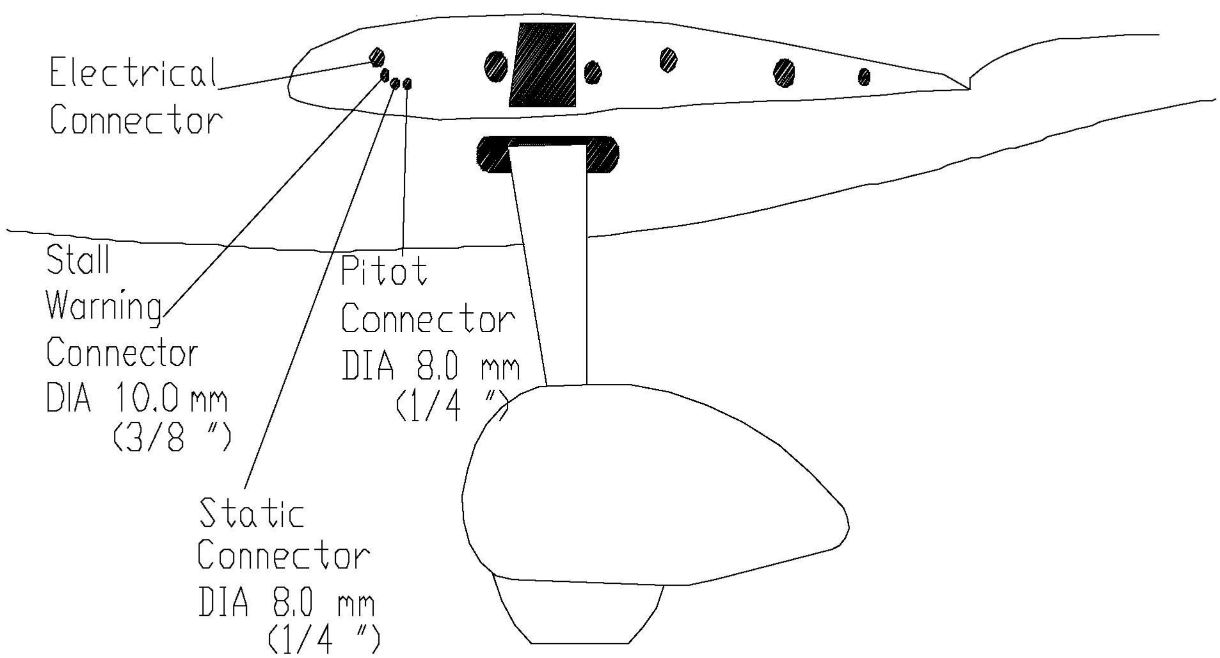

Figure 2 - Pitot Head/Lines

B. Drain System

Refer to Figure 3.

A drain system allows for removal of water from the pressure lines.

The pressure line has a bypass hose forming a water sump. Water can be removed from the pressure line after removing the left seat shell.

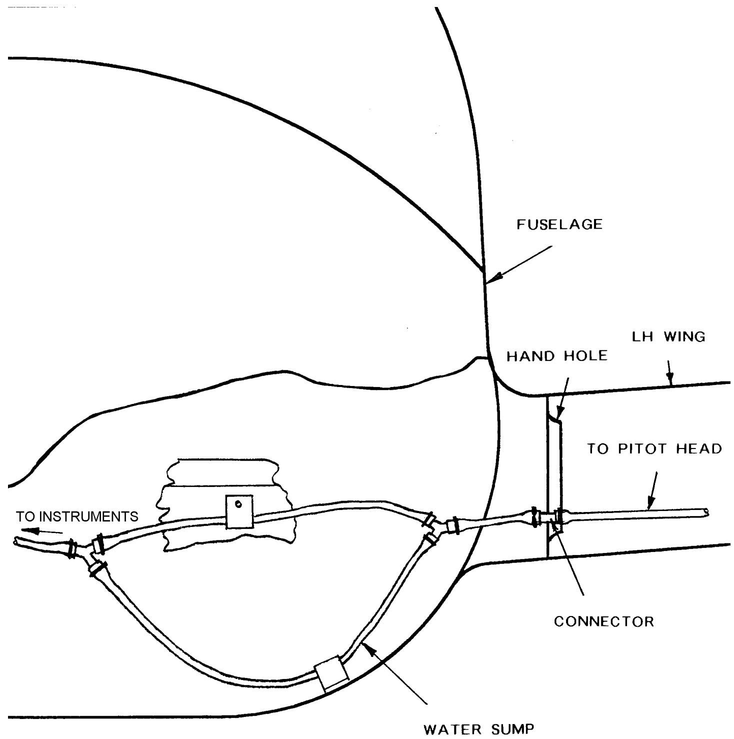

Figure 3 - Water Sump Type Drain System

C. Altimeter

The altimeter measures the change in atmospheric pressure using aneroid chambers. The changes in pressure correspond to changes in altitude. A special mechanism converts the movement of the aneroid chambers into deflections of the pointers. The altimeter is equipped with a scale calibrated in feet (ft). Three pointers indicate the current altitude. The longest pointer shows 10,000 feet per revolution, the intermediate pointer shows 100 feet per revolution, and the short pointer makes one revolution for every 1,000 feet. The barometric scale shows inches of mercury and may be adjusted using the adjustment knob in the lower left corner.

D. Airspeed Indicator

The airspeed indicator shows the velocity of the airplane relative to the surrounding air.

The operation of the airspeed indicator is based on the measurement of the difference between pitot and static pressure. Both pressures are picked up by the pitot head and fed to the airspeed indicator through hoses.

The measuring equipment of the airspeed indicator is an open membrane chamber. The pressure acts on the inside, while the static pressure acts on the outside. The differential pressure increases with increasing airspeed. This results in a deformation of the membrane which is transferred to the indicator needle via levers and gears. The airspeed is indicated in knots and km/h. Information regarding the range markings is presented in the Flight Manual.

E. Vertical Speed Indicator

The vertical speed indicator is connected to the static pressure line. It indicates the vertical speed in feet per minute. The measuring range reaches from 2000 ft/min rate of climb to 2000 ft/min rate of descent. The scale is divided into 100 ft/min increments. A change in altitude causes a differential pressure between membrane and housing, resulting in a movement of the membrane which is transferred to the pointer. The differential pressure equalizes through a capillary hole, allowing the indicator to return to the zero position.

F. Outside Air Temperature Indicator

The DA20-A1 can be equipped with an outside air temperature indicator.

The temperature sensor is located in the left NACA type air inlet. The system operates on onboard power.

The temperature of the outside air is shown in a display located in the instrument panel.

3. <u>Troubleshooting</u>

The following table lists defects as they could appear on the Pitot static system, and their correction.

COMPLAINT	POSSIBLE CAUSE	REMEDY
No or incorrect instrument readings	Leaky pressure lines	Seal
	Water in the lines	Disconnect lines, drain out the water
	Defective instrument	Replace

4. Maintenance Information

With the exception of the drain system the Pitot and static system is maintenance free. The Pitot head should be covered when the airplane is parked outside.

After working on the Pitot static system, it must be checked in accordance with the table below.

CAUTION: NEVER BLOW COMPRESSED AIR INTO THE PITOT HEAD. THIS MAY CAUSE DAMAGE TO THE INSTRUMENTS.

5. Removal and Installation

A. Pitot head

(1) Removal

(a) Loosen the screws from below.

(b) Remove the pitot head in downward direction.

(c) Disconnect the pressure lines.

(2) Installation

(a) For installation reverse the sequence.

B. Instruments

Removal and installation of all air data instruments is performed in the same way.

(1) Removal

(a) Pull off the hoses connected to the instrument.

(b) Remove the fasteners.

(c) Remove the instrument.

(2) Installation

(a) For installation reverse the sequence.

C. Pitot Static Test

D. Airspeed Indicator

Leakage : At 150 kts max. loss off pressure 10 kts/min.

Indication Error : At 150 kts max. tolerance = 4.5 kts.
At 45 kts max. tolerance = 1.5 kts.

E. Altimeter

Leakage : Generate partial vacuum in the system until 1000 ft above current elevation are indicated. System loss max. 100 ft/min.

Indication Error : Adjust altimeter to current elevation. Determine error at 10,000 ft. Max. tolerance 80 ft.

Adjust altimeter to QNH. Max. tolerance ± 57 ft.

Adjust altimeter to QFE. Max. tolerance ± 30 ft.

If tolerances are exceeded, the instrument must be replaced.

F. Safety Precautions during the Test

The following safety precautions must be observed during leakage testing of the Pitot static system.

(a) Perform all other work and inspections before performing the leakage test.

(b) The pressure in the pitot system must be equal or greater than the pressure in the static system. Incorrect connection of the pressure lines to the airspeed indicator may cause damage to it.

(c) Rate of change and applied pressure must never exceed the maximum design values of an instrument connected to the Pitot or static pressure system.

(d) After performing the leakage test, ensure that the system is returned to its normal operating condition.

STALL WARNING SYSTEM

1. Description

The airplane is equipped with a stall warning system as part of the standard equipment. The sensor works pneumatically and is located in the left wing. The stall warning system should warn the pilot acoustically using a horn, shortly before reaching the maximum angle of attack. The horn is located in the left hand section of the instrument panel.

A hose connects the horn to the sealed chamber and bore in the left wing. The system is maintenance free and can be checked by applying slight negative pressure to the sensor.

The stall warning system is designed to warn the pilot approximately 5 to 10 knots before the stall. If this value is not reached, check the system for leaks, using a pitot static tester.

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ATTITUDE AND DIRECTION

1. General

This section describes the equipment indicating attitude and flight direction. All equipment is gyro driven, with the exception of the magnetic compass.

2. Description

A. Magnetic Compass

The magnetic compass indicates the heading of the airplane relative to magnetic north. It is installed at the top of the instrument panel. The measuring range is 360 degrees with markings in increments of 5 degree. The housing is filled with silicon oil as damping agent.

The deviation table is located to the right of the compass. After replacing the engine, parts of the ignition system, radios, or instruments, and at least once a year, the compass must be checked.

B. Turn and Slip Indicator

The turn indicator shows the speed of rotation of the airplane about its vertical axis.

It consists of an electrically powered gyro which is suspended in a frame and whose axis is parallel to the airplane's pitch axis. The frame is connected to the indicator needle via a system of levers. The needle indicates the rotational speed of the airplane. In addition, a ball in a bent glass tube filled with a dampening agent is placed in the instrument. This indicator shows if the airplane is slipping.

C. Directional Gyro

The directional gyro indicates the heading relative to a previously selected heading. This instrument is equipped with an electrically powered gyro whose axis is parallel to the surface of the earth.

The gyro axis remains stable due to gyroscopic forces. The movement between gyro and instrument housing is transferred to the instrument scale which is similar to a compass rose. The directional gyro provides dependable information regarding flight direction as long as the deviation is taken into account, and it has been adjusted according to the magnetic compass.

The directional gyro should be adjusted to match the magnetic compass every 15 minutes, due to friction in the bearings and imperfections in the axis suspension.

D. Attitude Gyro

The attitude gyro shows the airplane's attitude in relation to the earth's surface. Any movement about the pitch axis and the roll axis is displayed.

The attitude gyro consists of an electrically powered, gimbal mounted gyro. The gyro axis is perpendicular to the earth's surface. The gyro is equipped with a display disk symbolizing the horizon. Due to the gyroscopic forces, the display disk connected to the gyro remains level at all times, regardless of the flight attitude.

During steep turns or extreme climbs and descents, the attitude gyro may be blocked by the gimbal due to its design, and display wrong information.

The upper half of the instrument displays the bank angle of the airplane. The airplane pitch angle is displayed simultaneously. The airplane symbol may be adjusted for climb and descent or for changes in pitch caused by configuration changes, by turning the knob on the bottom.

3. Troubleshooting

The following table lists defects as they could appear on the attitude and direction indicating system, and their correction.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Compass leaking fluid	Defective seal or membrane	Replace parts. See Note below.
Deviation exceeding 10 degrees	Improperly adjusted compass	Adjust
	Defective compass	Replace
Turn indicator inoperative	Insufficient power	Determine cause
	Defective instrument	Replace
Attitude gyro does not raise	Defective instrument	Replace

NOTE: On U.S. registered airplanes, the compass may only be serviced by authorized personnel.

4. Removal and Installation

A. Magnetic Compass

(1) Removal

(a) Remove bolts and nuts from support.

(b) Remove compass from support.

(2) Installation

(a) For installation reverse the sequence.

NOTE: Only brass or other non magnetic bolts and nuts may be used to attach the compass.

B. Turn and Slip Indicator, Directional Gyro, Attitude Gyro

(1) Removal

(a) Pull off connectors at rear of instrument.

(b) Remove screws on instrument panel.

(c) Pull out instrument.

(2) Installation

(a) For installation reverse the sequence.

5. Compass Compensation

If the compass does not display accurate information, compensation may eliminate or reduce the error.

The compass compensation is performed as follows:

(a) Move the airplane to a location away from steel constructions, underground pipes and cables, as well as reinforced concrete and other airplanes.

(b) Align the airplane to horizontal flight attitude.

(c) Check compass housing for fluid level and cleanliness. Missing compass fluid indicates that the compass is probably defective.

(d) Remove compensation magnets, or place built in magnets in neutral position before performing compensation.

(e) Check friction of movable indicator by approaching the instrument with a small magnet. The indicator must move freely in the display plane.

(f) Start engine and switch radio ON.

(g) Align the airplane with magnetic north and equalize deviations with compensation magnets. Repeat the procedure for magnetic east. Then, position the airplane to magnetic south and west, and equalize half of the indication error using the compensation magnets. The engine must be running during this procedure.

(h) Rotate the airplane 360 degrees in 30 degree increments. Prepare a compass deviation table that indicates the corrections that must be applied to the individual headings. If significant additional deviations occur during the operation of electrical or electronic equipment or systems, the deviation table must be amended to include the necessary corrections at each 30° heading that must be applied during the operation or activation of such systems.

POSITION DETERMINING SYSTEMS

1. General

The factory installed navigation system of the DA20-A1 includes the following systems. Refer to Figure 4.

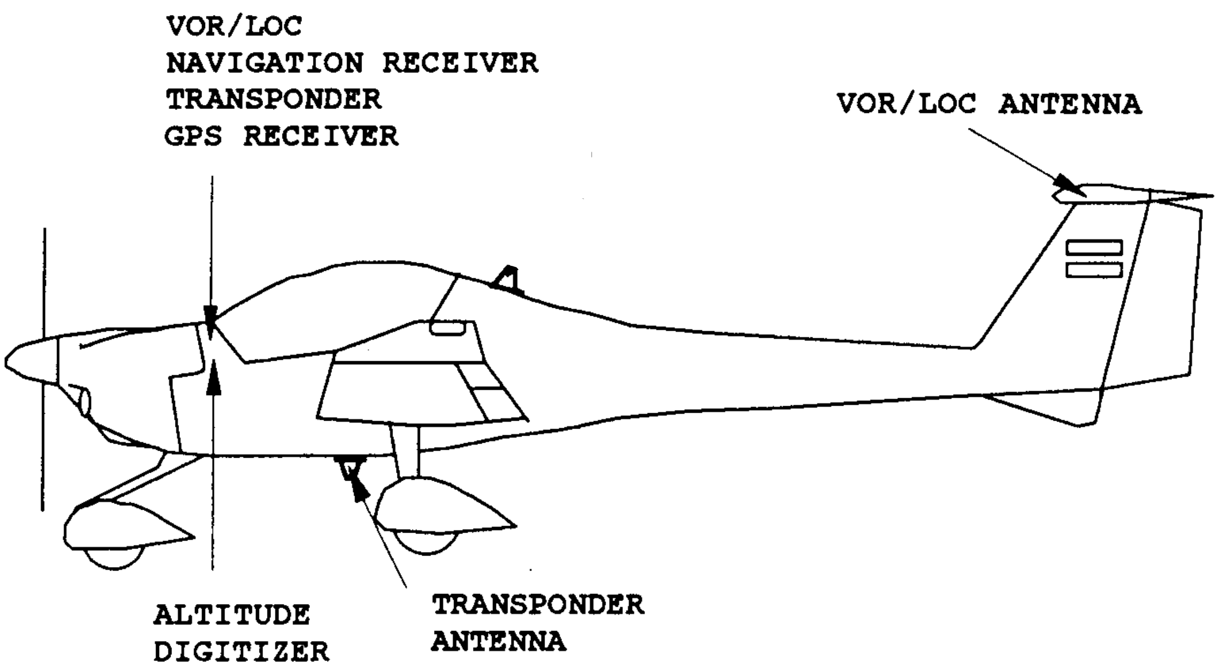

Figure 4 - VHF NAV Equipment Positions

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CHAPTER 51
STRUCTURES

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STANDARD PRACTICES - STRUCTURES

1. General

The DA20-A1 is a low wing airplane in full composite construction. The fuselage consists of a self supporting glass fiber skin in semi monocoque construction with bulkheads and stiffeners.

The single engine cantilever type monoplane is equipped with a T tail. The DA20-A1 has a fixed tricycle landing gear with trailing nose wheel.

The trapezoidal cantilever wing has an I-spar with caps made of carbon fiber rovings. The wing skin is of sandwich construction. Each wing is attached to the fuselage with three bolts.

The DA20-A1 is equipped with FRP ailerons and wing flaps.

The rudder fin is integrated into the fuselage and consists of a stiffener near the rudder hinge line and a full laminate skin. The horizontal stabilizer, elevator, ailerons, and rudder are constructed similar to the wings.

The acrylic canopy has a frame made from glass fiber laminate and rovings.

The entire airframe is covered with acrylic filler and finished with an acrylic paint to protect it against moisture and ultraviolet rays.

2. Identification of Primary Structure

The primary structure of the DA20-A1 consists of the following members:

Wing

- spar
- ribs
- web at hinge line
- skin
- wing-fuselage connection
- ailerons
- wing flaps

Fuselage

- skin
- bulkheads & stiffeners
- rudder fin
- rudder

Horizontal Stabilizer

- horizontal stabilizer
- elevator

3. Inspection Techniques

There are different methods of inspecting a damaged composite area. The following gives the procedures for inspecting a damaged Fiber Reinforced Plastic (FRP) area.

A. Examine Visually

Look carefully at the outer surface of an area or component. If the paint has cracks or bubbles, then the composite may be damaged. Surface damage, e.g. dents or scratches may be detected by visual inspection. Look especially in the areas where stones can hit the airplane below the fuselage and wings. By visual inspection, you can see where fiber breakage or matrix cracking has happened. Damage to the core may also be visible.

A bright light can be used to visually examine the inside of a component. Glass Fiber Reinforced Plastic (GFRP) must be green or brown. If the GFRP has white areas, then it may be damaged. Look especially at areas where components bond to the GFRP.

Carbon Fiber Reinforced Plastic (CFRP) must be black or black/brown. If the CFRP has white areas, then it may be damaged. Look especially at areas where components bond to the CFRP.

B. Light Test

A light test can be used to find delamination 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 bright light at the surface of the composite and look at the other side of the surface. Damage shows as a dark area. You can point the light from the inside or from the outside of a component.

NOTE: You can use the light test on thick GFRP, but it is difficult to use the light test on CFRP.

C. Coin Tap Test

Damage to the laminate can be detected by tapping a coin on the laminate. The sound of tapping will change its frequency as you move over the damaged area in relation to the sound of other areas of corresponding thickness. By performing a tap test, you can detect disbonds (the separation of one component which is bonded to another component) and delaminations (the separation of individual layers of the glass cloth).

Pay special attention to the area surrounding the damage, because there could be secondary damage, which can remain undetected.

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REPAIR OF COMPOSITE PARTS

1. Approved Material, Suppliers

A. Resin and Hardner

Supplier: Scheufler, D-70327 Stuttgart

Resin: L160 (100 parts by weight) Hardener: H163 (28 parts by weight)

Resin: L285 (100 parts by weight) Hardener: H286 (40 parts by weight)

B. Glass Fiber Cloth

Supplier: Interglas Textil Gmbh
Interglas Technologies AG
BenzstraBe 14. D-89155 Erbach
Germany

Cloth	Mass per Area grams/m^2	Interglass No.
Double Twil 2/2	161	92110
Double Twil 2/2	276	92125
Double Twil 2/2	390	92140
Warp reinforced	220	92145
Warp reinforced	433	92146

All cloth is made from alkali free E glass with Volan A Finish or Finish I 550, and complies with LN 9169.

C. Carbon Fiber Cloth

Supplier: Interglas Textil Gmbh
Interglas Technologies AG
BenzstraBe 14. D-89155 Erbach
Germany

Cloth	Mass per Area grams/m^2	Interglass No.
Double Twil 2/2	200	Interglass 98141 Cramer 452T

Product	Part Number/Description	Manufacturer	Supplier
PVC Rigid Foam	H060	Divinycell	Divinycell
Aerosil	Aerosil 200	3M	Stochem 106 Summerlea Road Brampton, ON, L6T 4X3, Canada
Microbaloons	K20	3M	Ashland Chemical Canada 10515 Rue Notre-Dame Motreal, PQ H1B 2V1
Cotton Flocks		Quarry Hill Foundry	Quarry Hill Foundry Supplies 1262 Mcdougall Street Windsor, ON N8X 3M7
Epoxy Primer	Primer EP689 White Hardener PA897 Reducer speed dependant on Application Climate	BASF	
Primer/Surfacer (High Build)	Primer DP20 Hardener DH46	BASF	
Exterior Topcoat UNO-HD	Paint HS82004 Hardener DH46 DR40 Reducer speed dependant on Application Climate	BASF	
Interior Topcoat UNO-HD	Beige #1501A Hardener DH46 Reducer speed dependant on Application Climate	BASF	
Interior Texture Material	Paint 1109-1240/4	Glasurit	
Instrument Panel Flat Black UNO-HD	Paint SC80 Hardener DH46 Reducer type dependant on Application Climate	BASF	
Fire Retardant Paint	Hensotherm 2 KS (White) Hensotop 84 AF	Hensel	Rudolf Hensel GmbH Lack - und Farbenfabrik SuderstraBe 235 D-20537 Hamburg, Germany Phone: +49-40-214093 Fax: +49-40-214783

Product	Part Number/Description	Manufacturer	Supplier
Fire Retardant Paint	Paint Steel Guard FM 585	PPG Aerospace	PRC-Desoto International Hein-Sass-Weg 29 D-21129 Hamburg-Finkenwerder
	Clear Coat 432-0303		
	Hardener N39/1327 (use for clear coat only)		
	Desothane HS Buffable Clear Coat 9008B900D		
	Hardner 9008B		
	Desothane HS Matt Clear Coat CA8720M0900C		
	Hardner CA8000B		
Interior Baggage Compartment Speckled Paint	Multispec Color MS86-3076 Nightspots	Multicolor Specialties	Multicolor Specialties 2101 South 54th Avenue Cicero, IL 60804-2209

2. Damage Classifications

Damages are classified into four categories as follows.

Damage Category 1

Damage to large areas requiring partial reconstruction of the part or repair of large areas.

Repairs may only be performed by the manufacturer or an aeronautical firm authorized by the manufacturer.

In case of U.S. registered airplanes, repairs may be performed by an authorized certified repair station or an authorized certified mechanic.

Damage Category 2

Damage to primary and secondary structures to the following extent:

Holes and breaks through a sandwich part.

Repairs may be performed by any qualified aeronautical firm.

In case of U.S. registered airplanes, repairs may be performed by a certified repair station or a certified mechanic.

Damage Category 3

Damage to primary and secondary structures to the following extent:

Small holes or breaks in the outer cover layers, with no damage to the matrix or internal cover layers.

Repairs may be performed by any qualified aeronautical firm.

In case of U.S. registered airplanes, repairs may be performed by a certified repair station or a certified mechanic.

Damage Category 4

Erosion, scratches, and grooves that are not connected to a break or hole. This damage category includes damage to covers.

No special qualifications are required to carry out repairs.

NOTE: The primary structure can be identified using the list in Chapter 51-00.

NOTE: If there is any doubt regarding the damage classification, if it is not possible to clearly asses the damage, or if there are any questions regarding the proper repair of the damage, despite considering the manufacturer's documentation, contact the airplane manufacturer.

3. Defect Limits for Composites

Diamond Aircraft has established defect limits for inspection of composite airframe components. Defects meeting these limits are not expected to propagate significantly beyond these limits prior to the next scheduled inspection.

A. Cracks:

- No cracks are allowed.

B. Surface scratches

- No broken or exposed fibers allowed

C. Delamination and disbond from core:

- No delamination or disbond from core greater than 15 mm in diameter.
- No 2 delaminations or disbonds from core larger than 10 mm diameter within 100 mm of each other.
- No delaminations or disbonds from core in the following critical areas:
    1. Spar bridge
    2. Spars and webs
    3. Root ribs

D. Surface Dents:

- No surface dents larger than 25 mm in diameter in sandwich parts.
- No 2 surface dents larger than 15 mm in diameter within 100 mm of each other in sandwich parts
- No surface dents are allowed in non-sandwich parts.

4. Fuselage Layup

For any repair on the fuselage structure, the layups and work sections should be taken from the following pages and illustrations refer to figures 1 thru 5.

In any case, the appropriate manufacturer's documentation should be obtained when repairing composite parts.

NOTE: During the repairs, pay special attention to accuracy and cleanliness.

ITEM	QTY	DESCRIPTION	PART NO./SUPPLIER	DIMENSIONS (mm)
1		Gelcoat	T35	All Over
2		Filled Resin		
3		Bleed Cloth		RH side only
4		Peel Ply		50 Wide - RH side only
5	1	1 x 92110 0^o /90^o	Interglas	All Over
6	1	1 x 92145 0^o	Interglas	
7	1	3x92125 or 3501/290 45^o	Interglas or Saertek	

ITEM	QTY	DESCRIPTION	PART NO./SUPPLIER	DIMENSIONS (mm)
8	1	Core, Fuselage	20-5360-04-01	
8a		Core, Cabin Lower-RH	20-5360-04-02	
8b		Core, Cabin Upper-RH	20-5360-04-03	
8c	1	Core, Cabin Lower-LH	20-5360-03-02	
8d	1	Core, Cabin Upper-LH	20-5360-03-03	
9	1	1 x 92145 0^o	Interglas	
10	1	1 x 92125 ± 45^o	Interglas	
11	1	1 x 92125 ± 45^o	Interglas	
12	1	1 x 92125 0^o /90^o	Interglas	
13	1	1 x 92125 0^o /90^o	Interglas	
14	1	2 x 92146 0^o	Interglas	4100 Long x 100 Wide
15	1	4 x 92146 0^o	Interglas	700 Long x 100 Wide
15a	1	4 x 92146 0^o	Interglas	700 Long x 100 Wide
16	1	6 x 92146 0^o	Interglas	1200 Long x 100 Wide
17	1	2 x 92146 0^o	Interglas	4100 Long x 100 Wide
18	1	1 x 92125 ± 45^o	Interglas	
19	1	1 x 92125 0^o /90^o	Interglas	
20	1	4 x 92146 0^o	Interglas	700 x 100
21		1 x 92146 0^o	Interglas	100 Wide - RH side only
22	1	2 x 92125 0^o /90^o	Interglas	250 x 250
23		Peel Ply		LH & RH - 100 Wide
24		Peel Ply		LH & RH

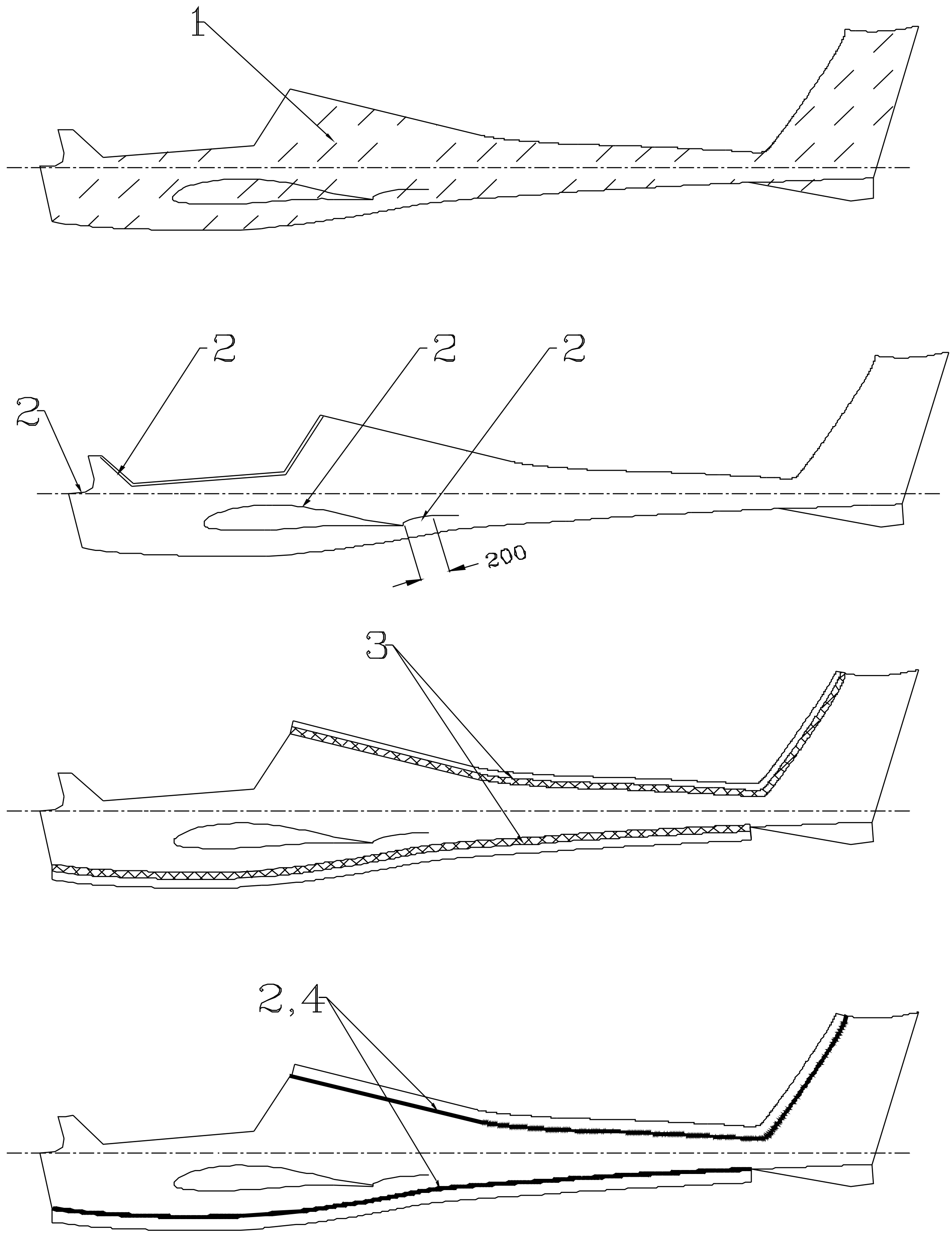

Figure 1 - Fuselage Layup

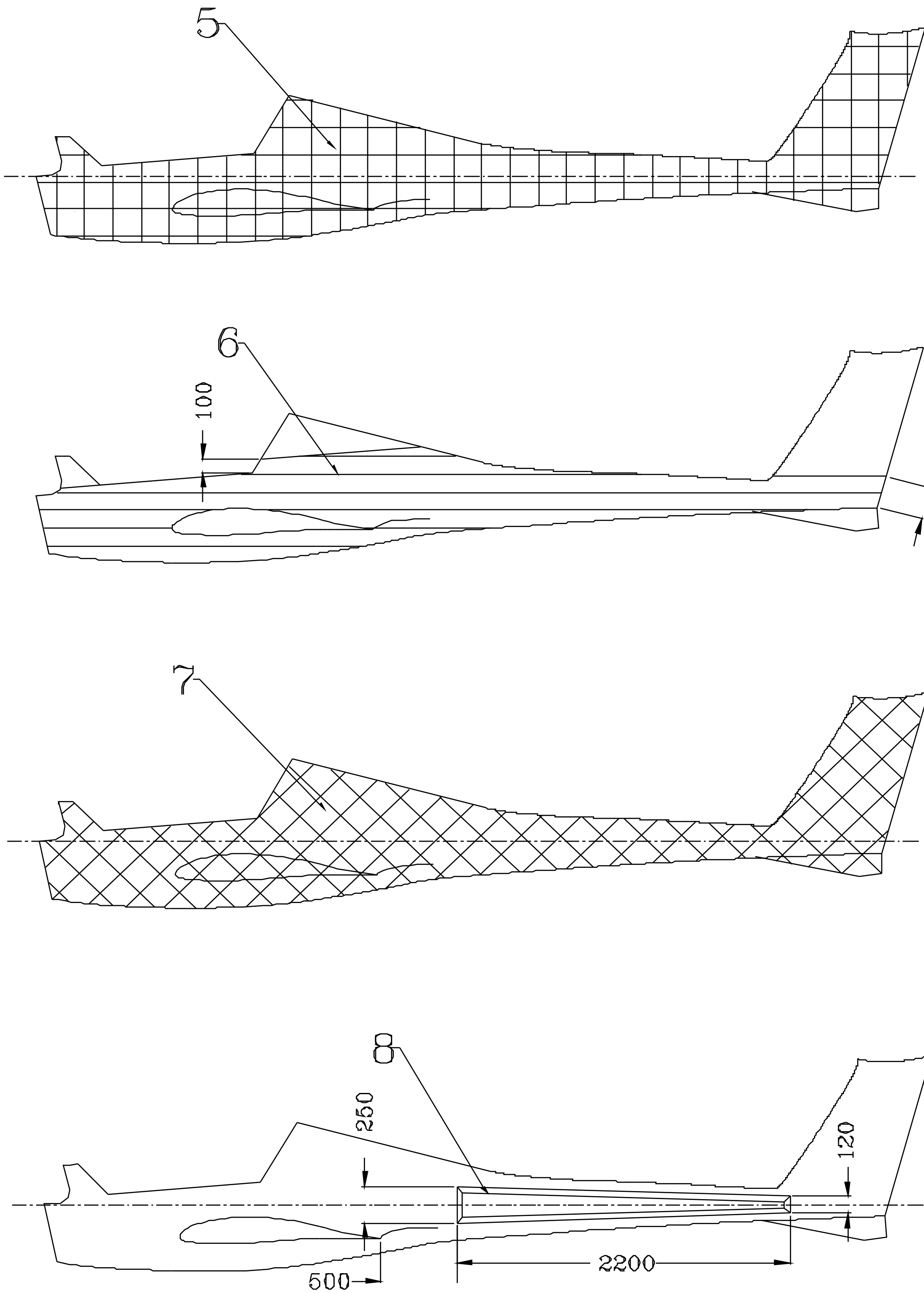

Figure 2 - Fuselage Layup

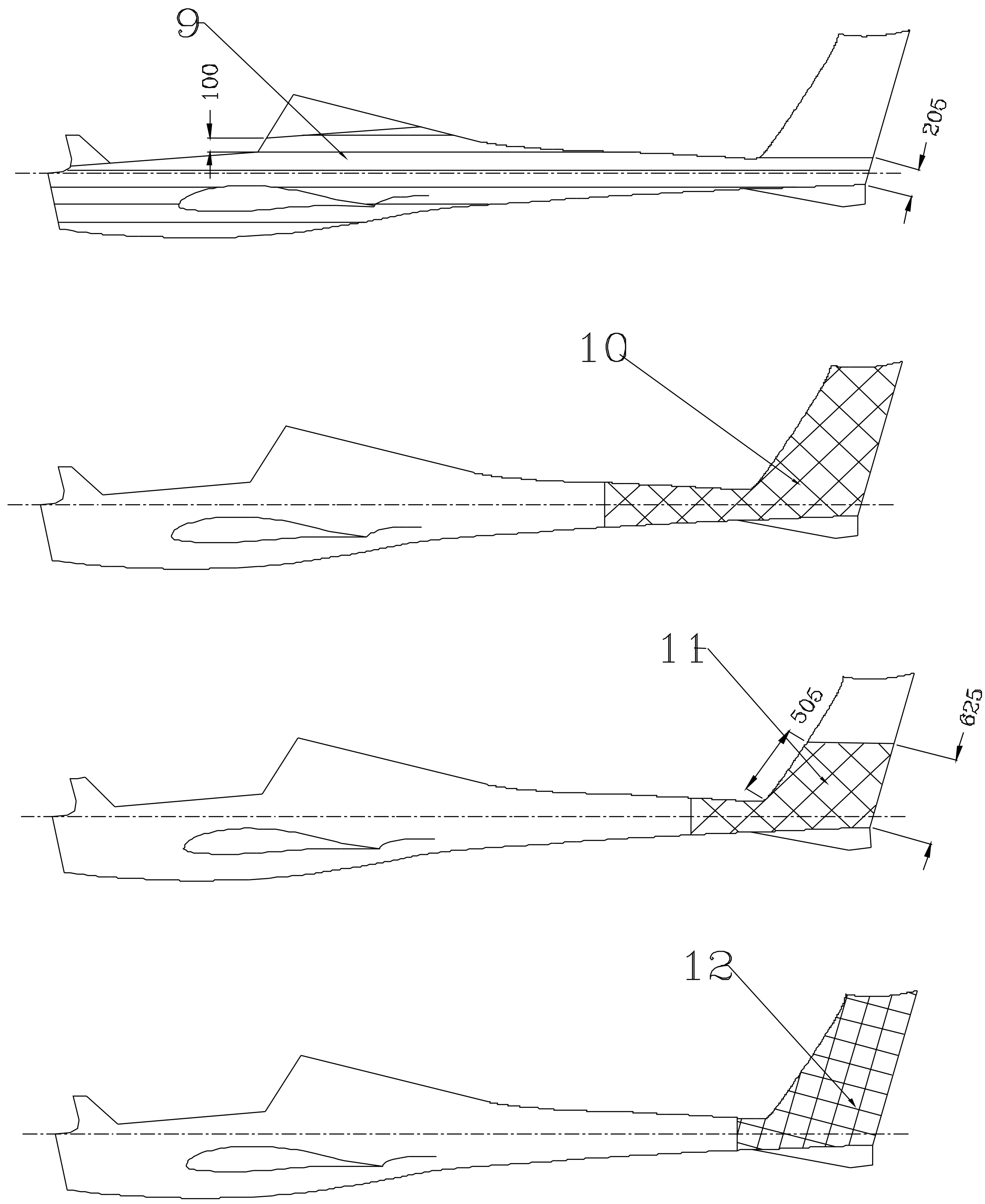

Figure 3 - Fuselage Layup

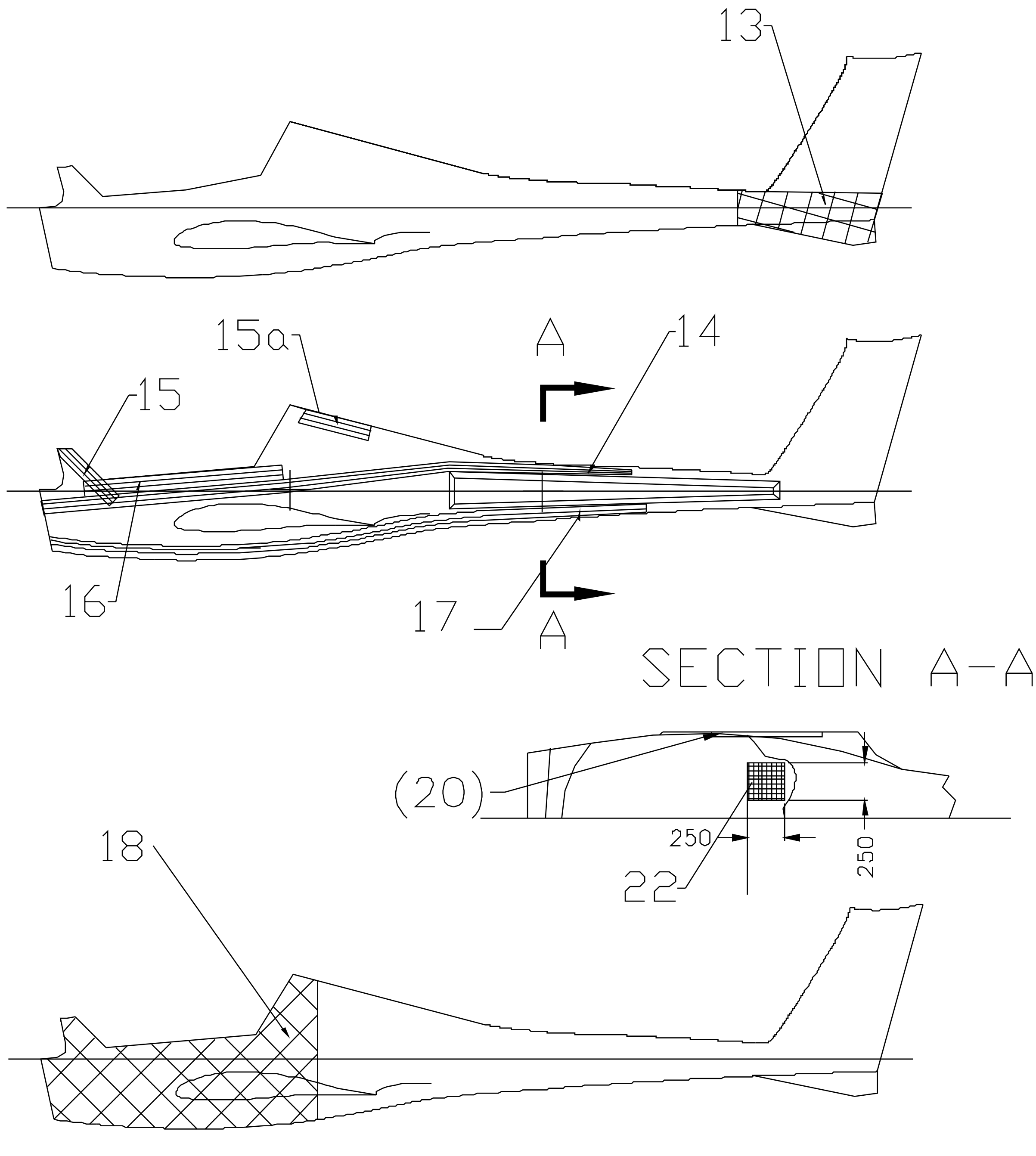

Figure 4 - Fuselage Layup

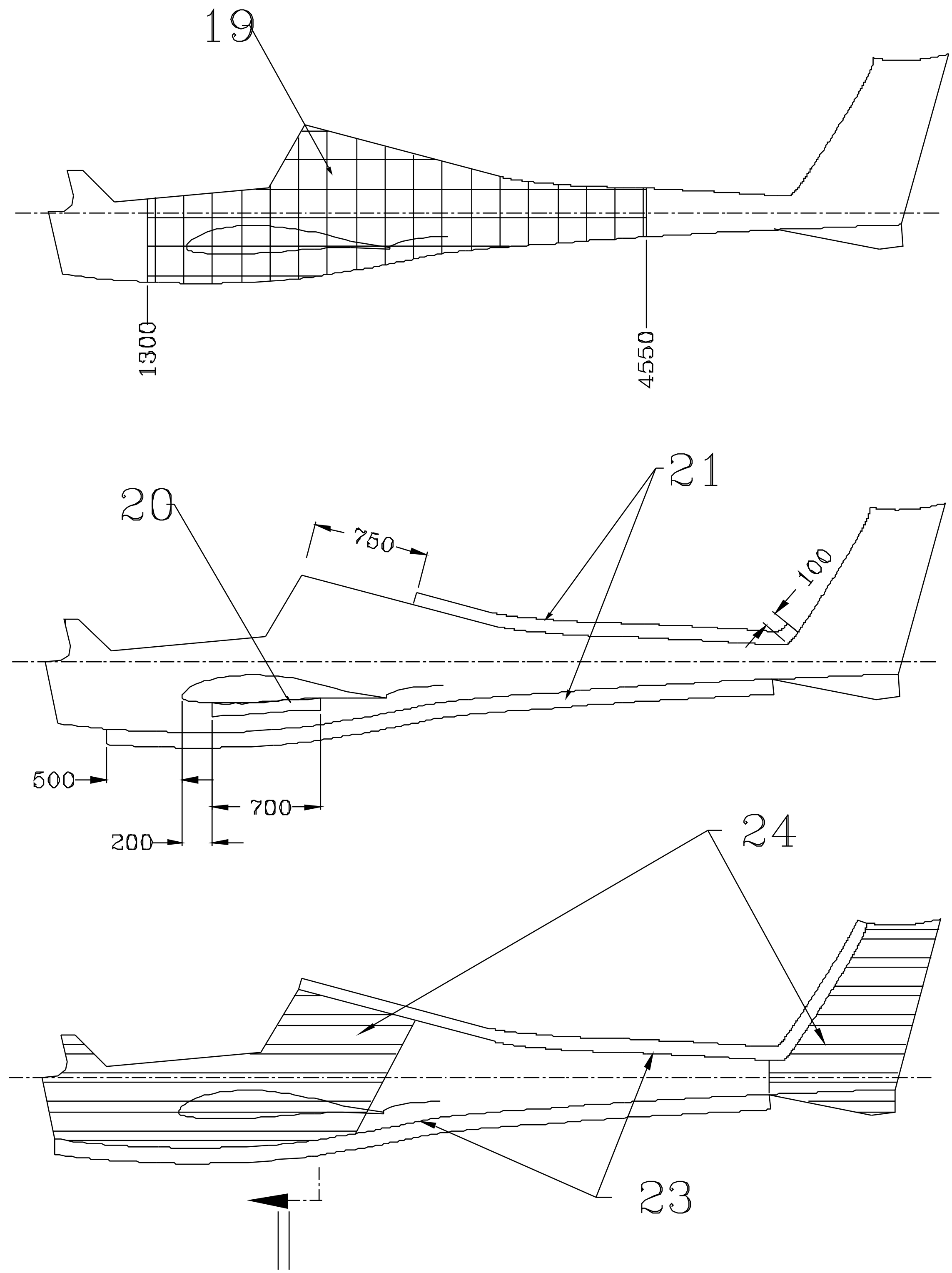

Figure 5 - Fuselage Layup

5. GFRP Repair

When the airplane is damaged, proceed as follows: Carefully visually inspect the surface and damaged area, then classify the damage as per section two of this subchapter. Often other parts are affected as well. Occasionally the crack continues invisibly under the surface.

All repairs must be carried out with care and precision. The exterior surfaces of composite airplanes are load carrying members. A failure of this structure can lead to a plane crash.

The resin hardener mixture ratio must be adhered to exactly (± 0.5%), and clean containers must be used. The ratio between the weight of the glass fiber cloth and the weight of the resin should be approximately 50:50. The damaged area must be sanded immediately before applying the wet laminate to prevent dirt from entering that might inhibit a strong bond.

The orientation of the individual cloth fibers (lengthwise or diagonal) is of great importance for the strength of the structure. The number of layers required to rebuild the strength of the damaged area can be determined from the layup drawings. It is necessary to determine the remaining number of layers in the damaged area in order to arrive at the original number of layers.

In any case, the thickness of the damaged laminate must be measured. If a small piece is broken off the damaged area and set on fire, the resin burns, and the remaining layers can be counted and their type determined.

Even though chamfering is time-consuming, the area must be sanded down far enough to ensure that the new cloth layers are flush with the existing contour.

To reduce the hardening time, a fan heater may be used to raise the surrounding air temperature.

CAUTION: EXCESSIVELY HIGH TEMPERATURES CAUSES THE FORMATION OF LARGE AIR BUBBLES IN THE CLOTH. LOCAL EXCESSIVE TEMPERATURE CAN BE AVOIDED BY USING A FOIL TENT GUIDING THE FLOW OF THE HOT AIR. THE HEAT SOURCE SHOULD NOT BE DIRECTED DIRECTLY TO THE REPAIR. THE INDICATED CURING CYCLE MUST ALWAYS BE ADHERED TO. THE PRESCRIBED TEMPERATURES ARE TO BE UNDERSTOOD AS MATERIAL TEMPERATURES. A THERMOCOUPLE MUST BE USED TO MONITOR THE TEMPERATURE. AFTER REPAIR WORK ON THE CONTROL SURFACES, THE MASS BALANCING MUST BE CHECKED.

6. Sandwich Repair

A. Minor Surface Damage

The laminate may have unbonded from the rigid foam around the area of a crack. The affected area is determined by tap testing. Remove the loose laminate using a sanding disk, a sanding block, or a sharp knife. Chamfer the cloth around the damaged area. The proper chamfer length per cloth layer is approx. 20 mm (0.8 inch). The ratio between laminate thickness and chamfer length should be approximately 1:50.

After chamfering, the damaged area must be thoroughly cleaned as follows:

(a) Remove sanding dust with vacuum and avoid the use of pressurized air.

(b) Wash the chamfered area with carbon tetrachloride or acetone if dirt or grease has emerged during chamfering. Do not allow to dry on the surface, but use a wipe on wet wipe off dry method.

Fill grooves with resin and microballoons. Apply resin to repair area and laminate with the required cloth layers. Pay attention to the orientation of the cloth fibers.

CAUTION: THE REPAIR AREA MUST BE FREE OF DIRT AND GREASE.

The required number of layers should be laid out on a plastic foil and impregnated with resin before applying them to the damaged area. The foil must be removed after the cloth has been applied to the damaged area.

After initial hardening at room temperature, the damaged area must be cured in accordance with the prescribed temperature cycle (15 hrs. at 60 °C / 140 °F).

CAUTION: ONLY SAND THE EDGES.

Sand the repair area after hardening is complete.

B. Damage to the Entire Sandwich

If the interior laminate is destroyed as well, the exterior laminate that has unbonded from the rigid foam must be removed first. The hole must be enlarged until the exterior laminate is securely bonded to the foam. To be able to repair the interior laminate, enough foam must be removed to provide an edge of at least 20 mm. A filling piece of foam with the same shape and size as the hole, and with layers conforming to the interior laminate must be constructed.

The laminate edges must be covered with the thickened resin (microballoons or cotton flakes).

After the laminate is pre hardened at room temperature and has been chamfered, the protruding rigid foam is sanded down so it is flush with the exterior contour. The repair area must then be cleaned as follows:

(a) Remove sanding dust with vacuum and avoid the use of pressurized air.

(b) Wash the chamfered area with carbon tetrachloride or acetone if dirt or grease has emerged during chamfering. Do not allow to dry on the laminate, but use a wipe on wet wipe off dry method.

Cover the entire damaged area with resin. Laminate damaged area according to layup drawing. Pay special attention to the direction of the fibers.

CAUTION: THE REPAIR AREA MUST BE FREE OF DIRT AND GREASE.

The required number of layers should be laid out on a plastic foil and impregnated with resin before applying them to the damaged area. The foil must be removed after the cloth has been applied to the damaged area.

After initial hardening at room temperature, the damaged area must be suctioned off, and cured in accordance with the prescribed temperature cycle (15 hrs. at 60 °C / 140 °F).

After the area is completely hardened, it may be sanded and painted.

7. Laminate Repair

A. Minor Damage (Damage Category 3)

The damaged area must be chamfered with sanding paper. The proper chamfering length per cloth layer is approx. 20 mm (0.8 in.). The ratio between laminate thickness and chamfering length should be approximately 1:50.

After chamfering, the area must be cleaned as follows:

(a) Remove sanding dust with pressurized air.

(b) Wash the chamfered area with carbon tetrachloride or acetone if dirt or grease has emerged during chamfering.

The damaged area must be covered with resin. Place the cloth layers, and impregnate with resin. Pay special attention to correct orientation of the fibers.

CAUTION: THE REPAIR AREA MUST BE FREE OF DIRT AND GREASE.

The required number of layers should be laid out on a plastic foil and impregnated with resin before applying them to the damaged area. The foil must be removed after the cloth has been applied to the damaged area.

After initial hardening at room temperature, the damaged area must be cured in accordance with the prescribed temperature cycle (15 hrs. at 60 °C / 140 °F).

After the area is completely hardened, it may be sanded and painted.

CAUTION: ONLY SAND THE EDGES OF THE REPAIRED AREA.

B. Major Damage (Damage Category 2)

The damaged area must be uncovered down to the basic laminate. A counterpart made of two layers of glass fiber cloth must be constructed. The counterpiece should be approximately 20 mm (0.8 inches) larger than the area to be repaired. The counterpiece should be placed on the inside with thickened resin, and aligned to the contour with self tapping screws. Allow the piece to harden at room temperature for 8 hours.

The damaged area must be chamfered with sanding paper. The proper chamfering length per cloth layer is approx. 20 mm (0.8 in.). The ratio between laminate thickness and chamfering length should be approximately 1:50.

After chamfering, the area must be cleaned as follows:

(a) Remove sanding dust with pressurized air.

(b) Wash the chamfered area with carbon tetrachloride or acetone if dirt or grease has emerged during chamfering.

CAUTION: THE REPAIR AREA MUST BE FREE OF DIRT AND GREASE.

The damaged area must be covered with resin. Place the cloth layers, and impregnate with resin. Pay special attention to the correct orientation of the fibers. The cloth must be impregnated with resin using a brush or roller. The most outward layer must be covered with a peel ply.

After initial hardening at room temperature, the damaged area must be cured in accordance with the prescribed temperature cycle (15 hrs. at 60 °C / 140 °F). Then the peel ply must be removed.

CAUTION: ONLY SAND THE EDGES OF THE REPAIRED AREA.

After the area is completely hardened, it may be sanded and painted.

8. Spar Repair

The upper and lower cap of the wing spars consist of carbon fiber rovings. In any case, the repair of a spar is considered to be a major repair. Spar repairs, if at all possible, may only be carried out by the manufacturer.

9. Painting

When the laminate in the repair area is hardened and cured, sand the area with number 80 sanding paper to remove the major unevenness. Smaller unevenness are primed. Then use number 150 or 320 sanding paper to create a uniform rough surface. Clear the repair area from dust, parting compounds, and other foreign substances. Apply primary coat and paint according to the paint manufacturer's instructions.

REPAIR OF METAL PARTS

1. General

   A. Steel Fittings

      Repairs of metal fittings should only be performed after consulting the manufacturer.

      If welding is required, it must be performed with a TIG (Tungsten Inert Gas) welder, 1.7734.2 (for 1.7734.4) and 1.7324.0 (for St 35 BK or combinations of 1.7734.4 and St 35 BK) must be used as welding additives.

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CHAPTER 52
DOORS

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CANOPY

1. General

Refer to Figure 1.

The DA20-A1 is equipped with a single piece lifting canopy with a frame fabricated of glass fiber laminate and rovings. To provide a generous all around view, an acrylic glass window is installed. It is held by screws and a bonding. The canopy is equipped with two emergency windows.

On both sides of the canopy, stabilizing rods equipped with springs are installed to counterbalance the weight of the canopy. To guide the swiveling motion, a third suspension point is provided in the upper rear area.

The closed canopy is locked with two locking rods and two locking shoes which move in plastic rod guides. Push forward on the two locking handles on the left and right side of the frame to lock the closed canopy.

A canopy locking warning light, located in the upper centre section of the instrument panel, indicates the status of the canopy's locking mechanism.

An emergency release lever is located on the outside LH side of the canopy frame. It can be used with the left exterior locking handle to open the canopy from the pilot's side in case of an emergency.

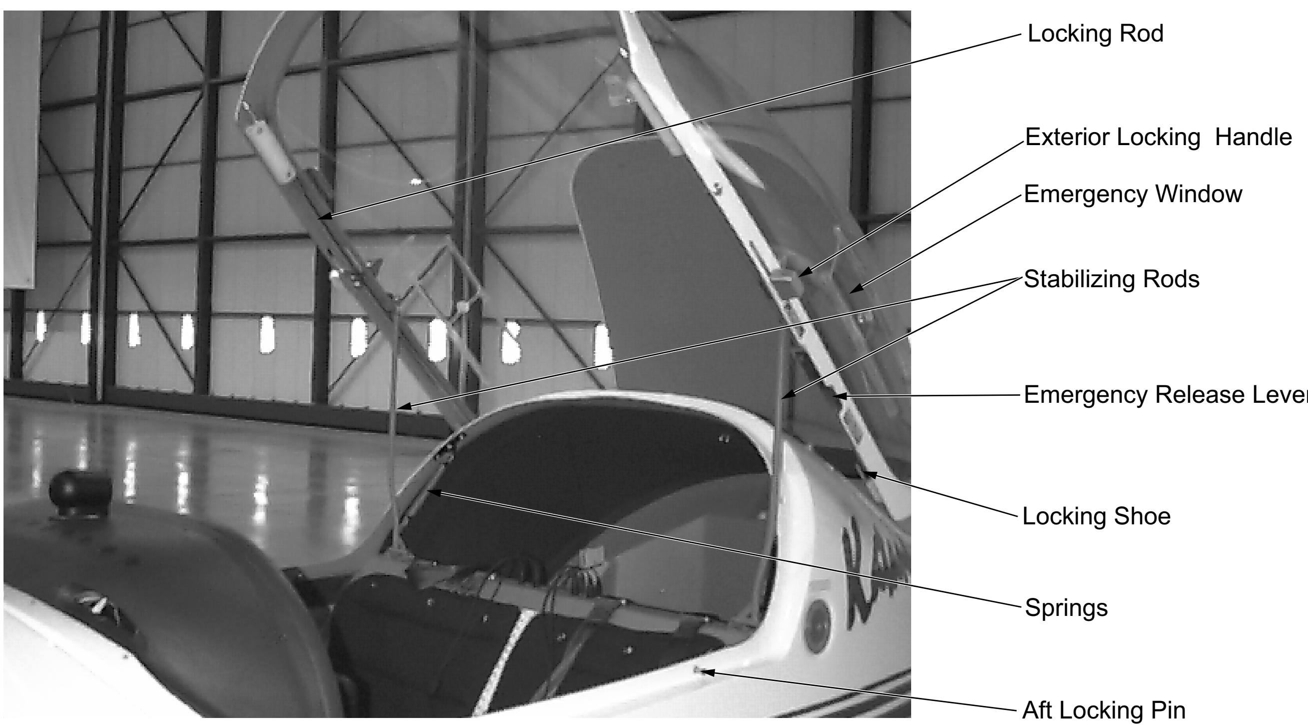

Figure 1 - Canopy

2. Troubleshooting

The following table lists defects as they could appear on the canopy system, and their correction.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Canopy jams	Misaligned locking shoes or locking rod	Realign
Emergency window is hard to open	Unclean or defective guides	Clean or replace
Operating handles loose	Loose mounting hardware	Tighten

3. Maintenance Information

The canopy's locking mechanism must be adjusted so that the unlatching force is 58-80 N (13-18 lbf).

If the force required to unlatch the release handles does not lie between the above stated limits, the following items should be cleaned, tightened, or replaced:

(1) Make sure that the canopy seal is in good condition.

(2) Check the mounting hardware for looseness.

(3) Check the brass bushings on the aft locking pins for wear.

(4) Check the locking shoe for wear.

(5) Check the plastic rod guides for debris.

If the above procedures fail to produce the necessary unlatching force, the brass bushings on the aft locking pins can be replaced with different size bushings.

4. Remove/Install the Canopy

CAUTION: TWO PEOPLE WILL BE NEEDED TO REMOVE/INSTALL THE CANOPY. THE CANOPY WILL BE DAMAGED IF YOU DROP IT.

A. Remove the Canopy

	Detail Steps/Work Items	Key Items/References
1.	Open the canopy.	
2.	Remove the screw located on the upper guide lever.	Hold the canopy.
3.	Disconnect the stabilizing rods from the canopy frame.	
4.	Lift the canopy clear and remove it from the aircraft.	

B. Install the Canopy

	Detail Steps/Work Items	Key Items/References
1.	Place the canopy into position on the aircraft and hold the canopy open.	
2.	Connect the stabilizing rods to the canopy frame.	
3.	Install the screw on the upper guide lever	
4.	Close the canopy and operate both canopy latches.	Make sure the canopy latch mechanism pulls the canopy fully closed.
5.	Do a test of the canopy locking mechanism and the door warning annunciation as per 52-00-00, Para 6 (The Canopy Unlatch Force Test) and Para 7 (Door Warning Annunciation Check).	

5. Remove/Install the Emergency Windows

C. Remove the Emergency Window

	Detail Steps/Work Items	Key Items/References
1.	Remove the upper window guide.	
2.	Lift window from the lower window guide.	

D. Install the Emergency Window

	Detail Steps/Work Items	Key Items/References
1.	Place the window to the lower window guide.	
2.	Install the upper window guide.	
	NOTE: For installation of the window guides, ACRYFIX should be used. The screws should be torqued very carefully.	

6. The Canopy Unlatch Force Test

Refer to Figure 2.

NOTE: Do the test of the locking mechanism when the canopy and/or canopy components which can affect the adjustment are removed or installed.

A. Equipment

Item	Quantity	Part Number
Spring Scale	1	Commercial

B. The Canopy Unlatch Force Test

	Detail Steps/Work Items	Key Items/References
1.	Close the canopy and latch both sides.	
2.	Measure the force required to unlatch the LH locking mechanism using a calibrated spring scale on the LH external grip, pulling directly aft.	Make sure that the unlatching force is 58-80 N (13-18 lbf).
	NOTE: During the unlatching movement of the handle, there should be a distinct increase in unlatching force when the aft locking pin passes the cam on the canopy locking shoe. NOTE: If the canopy seal has been replaced recently, it is recommended to adjust the unlatching force to near the upper end of the tolerance.	
3.	Repeat Steps 1 and 2 for the RH side.	
4.	If the unlatching force does not meet the required criteria, do the inspection that follows.	Do steps 5 through 11.
5.	Operate the LH and RH locking mechanism with the canopy in the open position and check for smooth operation.	Make sure that the main locking pins and forward guide blocks are clean and are aligned.
6.	Remove the aft locking pin on the LH side.	
7.	Close the canopy and latch the canopy on both sides.	
8.	Operate the LH locking mechanism and check for smooth operation (i.e. without a significant increase in unlatching force).	Make sure that the fuselage canopy guide is clean and is aligned with the main locking pin.
9.	If required, adjust the rod ends on the canopy stabilizing rods to align the main locking pins with the fuselage canopy guides.	Recommend one turn of rod ends at a time.

	Detail Steps/Work Items	Key Items/References
10.	Install the aft locking pin on the LH side.	
11.	Repeat Steps 5 through 10 for the RH side.	Make sure that the Emergency Lever is in the closed position during this operation and that the travel of the RH locking mechanism is not restricted by the Emergency Cable.
	NOTE: If the adjustment of the rod ends on the canopy stabilizing rods was performed during the testing of the RH locking mechanism, repeat Steps 6 through 10 for the LH side	
12.	Close the canopy and latch the canopy on both sides.	
13.	Measure the force required to unlatch the LH locking mechanism using a calibrated spring scale on the LH external grip, pulling directly aft.	Make sure that the unlatching force is 58-80 N (13-18 lbf).
	NOTE: During the unlatching movement of the handle, there should be a distinct increase in unlatching force when the aft locking pin passes the cam on the canopy locking shoe. NOTE: If the canopy seal has been replaced recently, it is recommended to adjust the unlatching force to near the upper end of the tolerance.	
14.	If necessary, replace the bushing on the aft locking pin with an oversized pin Ø10.2mm or pin Ø12.2mm to achieve the required unlatching force.	
15.	Repeat Steps 12 through 14 for the RH side.	

7. Door Warning Annunciation Check

NOTE: Do the check of the door warning annunciator when the canopy and/or canopy components which can affect the adjustment are removed or installed.

	Detail Steps/Work Items	Key Items/References
1.	With the canopy locking mechanism in the unlocked position turn the Master Switch (GEN/BAT) to ON.	Refer to the DA20-A1 Airplane Flight Manual (AFM). Make sure that the Door Warning annunciator is ON.
2.	Close and lock the canopy.	Check the Door Warning Annunciator. The annunciator should go off after the LH and RH grips are moved into the locked position.
3.	Slowly move the LH grip aft and observe the Door Warning Annunciator.	The annunciator must illuminate before the bushing on the aft locking pin passes the top of the cam on the locking shoe (defined by the increase in unlatching force).
4.	If required, do rework per Repair Instruction R20-56-006 (latest revision).	
	NOTE: Contact Diamond Aircraft Industries, Customer Support for the latest revision of Repair Instruction R20-56-006.	
6.	Repeat Steps 2 and 3 for the RH side.	
7.	Turn the Master Switch (GEN/BAT) to OFF.	Refer to the DA20-A1 AFM.

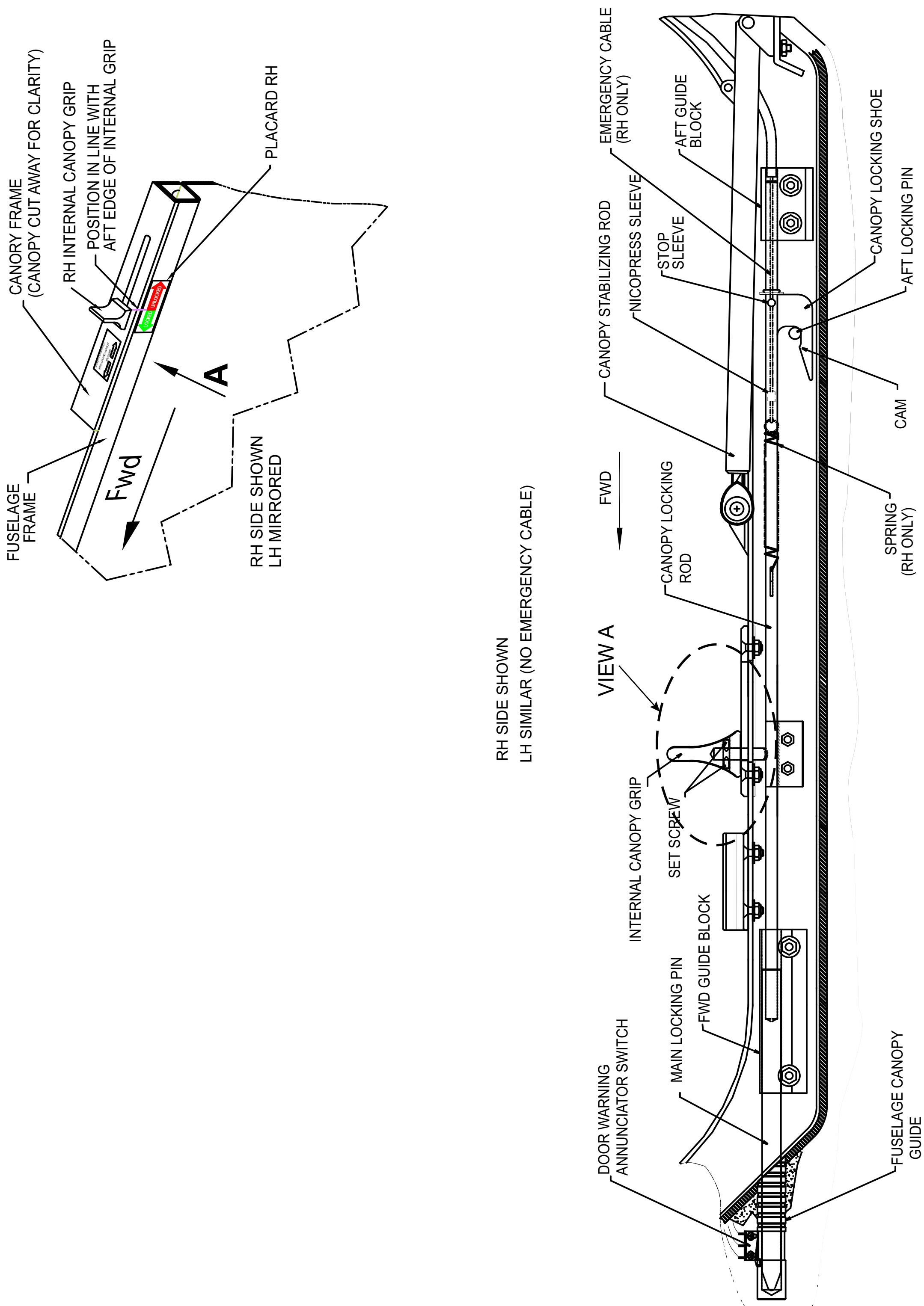

Figure 2 - Canopy Locking Mechanism

CHAPTER 53
FUSELAGE

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FUSELAGE

1. General

The DA20-A1 fuselage is of semi-monocoque construction. The self supporting GFRP-fuselage is reinforced with bulkheads and stiffeners. The number of orientation of the layers corresponds to the loads in the individual sections. Therefore the fuselage skin has different thickness and fiber orientations.

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MAIN FRAME

1. General

The DA20-A1 consists of a fuselage structure containing bulkheads and stiffeners. Refer to Chapter 3, Figure 3.

2. Bulkheads And Stiffeners

The bulkheads and stiffeners are of different shape. They are fabricated from glass fiber laminate.

A. Firewall

The firewall of the DA20-A1 separates the engine compartment from the rest of the fuselage. It is fabricated from glass fiber laminate. For fire protection, the front side of the firewall is covered with heat resistant protective texture as well as with stainless sheet steel. The heat resistant texture and sheet steel are attached using a special adhesive. In addition, they are secured by the different components attached to the firewall. The firewall is attached to the fuselage with a thickened resin mixture.

B. Floor Element

The floor element is located in the forward cockpit area. It consists of GFRP and is bonded to the fuselage lower skin. The rudder pedal assemblies on both sides are mounted to the floor element.

C. Top Hat Profile

The top hat profile is fabricated using GFRP and is located in the forward cockpit area, beneath the floor element, bonded to the fuselage lower skin. It is subjected to loads from the nose landing gear and the flap actuator.

D. Forward Control Bulkhead

The forward control bulkhead is attached to the fuselage and the floor element. Attached to the forward control bulkhead is the control stick mounting ribs as well as the guide rollers for the rudder control cables.

E. Spar Bridge

The spar bridge has a box-shaped cross section with carbon fiber layers on top and bottom. It is connected to the fuselage sidewalls and to the aft control bulkhead through bonding. The wing spar stumps are connected to the spar bridge through the main bolts. The landing gear structure is attached to the lower half of the spar bridge with bolts and additionally secured by bonding. The bulkhead transition structure on each side contains the A-bolt for the wing connection within the front area.

F. Aft Control Bulkhead

The aft control bulkhead is bonded to the fuselage lower skin and the spar bridge. The aft control bulkhead is fabricated of glass fiber laminate. In its center area it is formed into a U-profile, where further fittings and bellcranks for the aileron and wing flap controls are attached.

G. B-Bulkhead

The B-bulkhead is also fabricated of glass fiber laminate and is, in the rear cabin area, attached to the fuselage skin with resin. Its Z-profile is used to mount the fuel tank. On both sides of the B-bulkhead, the B-bolts for the wing connection are installed. The rudder lever is located in the lower part of the B-bulkhead.

H. Vertical Bulkhead

For reinforcement of the fuselage tube, a vertical bulkhead is installed into the rear fuselage structure. The vertical bulkhead stretches from the B-bulkhead to the lower tail fin bulkhead.

I. Lower Tail fin Bulkhead

The lower tail fin bulkhead is also a GFRP part. It is located in the rearward fuselage tube.

J. Tail fin Web and Lower Tail fin Rib

These components fabricated from glass fiber laminate are installed using thickened resin. An auxiliary bulkhead is attached below the tail fin web for reinforcement. The elevator mount, as well as the rudder mounting hardware are installed to the lower tail fin rib.

K. Anti Flutter Bracket

The anti flutter bracket is fabricated using GFRP and is located in the vertical stabilizer. It is used to add rigidity to the vertical stabilizers' outer skin.

3. Paint Application Procedure for the Aircraft Belly

The following maintenance practices describe how to do a high temperature paint repair of the area underside of the aircraft flight compartment, aft of the engine.

4. High Temperature Paint Repair of the Fuselage - with Steel Guard FM 585

	Detail Steps/Work Items	Key Items/References
1.	Remove the cowling.	Refer to the AMM, Section 71-10.
2.	Carefully examine the fuselage and identify the area(s) that require(s) repair.	At each step of the repair, complete all areas of the fuselage in need of repair for that sequence.
3.	Make an estimate of the repair(s) required, and then get the materials and safety equipment satisfactory for the job.	For approved materials and suppliers, refer to AMM Chapter 51-00.
WARNING: OBEY THE SAFETY PRECAUTIONS THAT FOLLOW WHEN YOU DO WORK WITH COMPOSITE MATERIALS: - DO THE WORK IN AN AREA THAT HAS A GOOD FLOW OF CLEAN AIR - USE APPROVED EYE, MOUTH, AND BODY PROTECTION. SMALL PARTICLES CAN GO THROUGH USUAL CLOTHING - DO NOT LET THE MATERIALS TOUCH YOUR EYES, MOUTH, OR SKIN - IF IRRITATION OCCURS, GET MEDICAL AID IMMEDIATELY - OBEY THE MANUFACTURER'S INSTRUCTIONS - DO NOT USE CHEMICAL PAINT REMOVERS. TO REMOVE PAINT FROM COMPOSITES THAT HAVE RESIN, USE ABRASIVE MATERIALS - DO NOT USE POWER TOOLS TO MAKE A SURFACE ROUGH.		
WARNING: YOU CAN CAUSE INJURY TO PERSONS AND/OR DAMAGE TO EQUIPMENT IF ABOVE SAFETY PRECAUTIONS ARE NOT OBEYED.		

	Detail Steps/Work Items	Key Items/References
4.	Prepare the area(s) of the fuselage for the application of the high temperature paint, as follows:	For approved materials and suppliers, refer to Chapter 51-00.
	- If dirt or grease is present, wash the area with clean carbon tetrachloride or acetone. Wipe the area off immediately	
	- Abrade the surface with 280 grit sandpaper	Make sure that you do not damage the laminate. Only remove the transparent top coat and the fire resistant paint.
	- Remove the dust with a fully opened tack cloth	
	- Cover the area(s) of the fuselage that will not be painted. Use masking tape to hold the cover(s) in place.	

WARNING: OBEY THE SAFETY PRECAUTIONS THAT FOLLOW WHEN YOU USE PAINTS:

- USE SAFETY GOGGLES
- USE SAFETY CLOTHING
- DO NOT LET PAINTS TOUCH YOUR SKIN, EYES, OR MOUTH
- PAINTS ARE POISONOUS
- IF IRRITATION OCCURS, GET MEDICAL AID
- DO THE WORK IN AN AREA THAT HAS A GOOD FLOW OF AIR
- DO THE WORK IN AN AREA THAT DOES NOT HAVE SPARKS, FLAME, OR HOT SURFACES.
- OBEY THE MANUFACTURER'S INSTRUCTIONS.
- THE TEMPERATURE MUST BE BETWEEN 65 AND 120 ^{o}F (18 AND 49 ^{o}C).
- THE RELATIVE HUMIDITY MUST BE BETWEEN 25 AND 80 PERCENT.

WARNING: YOU CAN CAUSE INJURY TO PERSONS AND/OR DAMAGE TO EQUIPMENT IF ABOVE SAFETY PRECAUTIONS ARE NOT OBEYED

	Detail Steps/Work Items	Key Items/References
5.	Apply the first coat of fire resistant paint with a splatter spray gun, a brush or a roller to a minimum thickness of 0.010 in (250 microns).	For approved materials and suppliers, refer to Chapter 51-00. Make sure that the painting is done in a dust free area.
6.	Let the fire resistant paint dry, in a dust free area, for a minimum of four hours.	The following drying times refer to a normal climate of 23 ºC and 50% humidity: - Dust-free - after 2 hours minimum - Maskable - after 8 hours minimum - Recoatable - after 4 hours minimum (no maximum) - Transparent Top Coat Application - after 24 hours minimum - Transportable - after 8 hours minimum - Full Cure - after 7 days. - Force Dry - Not applicable
7.	Remove any dust that has collected with a fully opened tack cloth.	
8.	After a minimum of four hours, apply the second coat of fire resistant paint with a splatter spray gun, a brush or a roller to a minimum thickness of 0.010 in (250 microns).	Make sure that the painting is done in a dust free area.
9.	Let the fire resistant paint dry, in a dust free area, for a minimum of 24 hours.	
10.	Before the transparent top coat is applied, remove any dust that has collected with a fully opened tack cloth.	
11.	Apply the first coat of transparent top coat with a high pressure sprayer as an even cross coat as follows:	For approved materials and suppliers, refer to Chapter 51-00. Make sure that the painting is done in a dust free area.
	For product 9008B0900D:	- Spray viscosity - (ISO 4) - Orifice - 0.060 in (1.5 mm) - Pressure - 3 to 5 bar (40 to 70 PSI).
	For product CA8720M0900C:	- Spray viscosity - (ISO 4) 27 - 40 sec. - Orifice - 0.060 in (1.5 mm) - Pressure - 3 to 4 bar (40 to 58 PSI).
12.	Allow it to dry for 30 to 45 minutes and apply the second coat.	

	Detail Steps/Work Items	Key Items/References
13.	Apply the two cross coats to achieve the required thickness.	Film thickness: For the first coat: 25 microns For the second coat: 35 microns. Total thickness: 60 microns (0.002 in or 2.3 mil)
14.	Let the transparent top coat dry, in a dust free area as follows: For product 9008B0900D: For product CA8720M0900C:	The following drying times refer to a normal climate of 23 ºC and 50% humidity: - Dry to Tape: 10 to 14 hours - Full cure: 7days - Dry to Tape: 3 to 4 hours - Full cure: 7days
15.	Remove and discard the cover(s) and masking tape from the fuselage Remove any dust that has collected with a fully opened tack cloth.	
16.	Visually inspect the completed high temperature paint repair(s). Make sure that there are no defects, such as bubbles, pinholes, craters, chips, scratches or abrasions.	
17.	Install the cowling.	Refer to the AMM, Section 71-10.

5. High Temperature Paint Repair of the Fuselage - with Hensotherm 2 KS

	Detail Steps/Work Items	Key Items/References
1.	Remove the cowling.	Refer to the AMM, Section 71-10.
2.	Carefully examine the fuselage and identify the area(s) that require(s) repair.	At each step of the repair, complete all areas of the fuselage in need of repair for that sequence.
3.	Make an estimate of the repair(s) required, and then get the materials and safety equipment satisfactory for the job.	For approved materials and suppliers, refer to AMM Chapter 51-00.

WARNING: OBEY THE SAFETY PRECAUTIONS THAT FOLLOW WHEN YOU DO WORK WITH COMPOSITE MATERIALS:

- DO THE WORK IN AN AREA THAT HAS A GOOD FLOW OF CLEAN AIR
- USE APPROVED EYE, MOUTH, AND BODY PROTECTION. SMALL PARTICLES CAN GO THROUGH USUAL CLOTHING
- DO NOT LET THE MATERIALS TOUCH YOUR EYES, MOUTH, OR SKIN
- IF IRRITATION OCCURS, GET MEDICAL AID IMMEDIATELY
- OBEY THE MANUFACTURER'S INSTRUCTIONS
- DO NOT USE CHEMICAL PAINT REMOVERS. TO REMOVE PAINT FROM COMPOSITES THAT HAVE RESIN, USE ABRASIVE MATERIALS
- DO NOT USE POWER TOOLS TO MAKE A SURFACE ROUGH.

YOU CAN CAUSE INJURY TO PERSONS AND/OR DAMAGE TO EQUIPMENT IF THESE SAFETY PRECAUTIONS ARE NOT OBEYED.

WARNING: YOU CAN CAUSE INJURY TO PERSONS AND/OR DAMAGE TO EQUIPMENT IF ABOVE SAFETY PRECAUTIONS ARE NOT OBEYED.

<table>
<tr><th></th><th>Detail Steps/Work Items</th><th>Key Items/References</th></tr>
<tr><td>4.</td><td>Prepare the area(s) of the fuselage for the application of the high temperature paint, as follows:

- If dirt or grease is present, wash the area with clean carbon tetrachloride or acetone. Wipe the area off immediately

- Abrade the surface with 280 grit sandpaper

- Remove the dust with a fully opened tack cloth

- Cover the area(s) of the fuselage that will not be painted. Use masking tape to hold the cover(s) in place.</td><td>For approved materials and suppliers, refer to Chapter 51-00.

Make sure that you do not damage the laminate. Only remove the transparent top coat and the fire resistant paint.</td></tr>
<tr><td colspan="3">WARNING: OBEY THE SAFETY PRECAUTIONS THAT FOLLOW WHEN YOU USE PAINTS:

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- IF IRRITATION OCCURS, GET MEDICAL AID
- DO THE WORK IN AN AREA THAT HAS A GOOD FLOW OF AIR
- DO THE WORK IN AN AREA THAT DOES NOT HAVE SPARKS, FLAME, OR HOT SURFACES.
- OBEY THE MANUFACTURER'S INSTRUCTIONS.
- THE TEMPERATURE MUST BE BETWEEN 63 AND 73 ^{o}F (17 AND 23^{o}C).
- THE RELATIVE HUMIDITY MUST BE BETWEEN 25 AND 80 PERCENT.

WARNING: YOU CAN CAUSE INJURY TO PERSONS AND/OR DAMAGE TO EQUIPMENT IF THESE SAFETY PRECAUTIONS ARE NOT OBEYED</td></tr>
</table>

	Detail Steps/Work Items	Key Items/References
5.	Mix the paint by agitating before use. Apply the first coat of paint with a splatter spray gun (preferred), brush, or roller to a weight of 250 g/m² (0.822 oz/ft²).	For approved materials and suppliers, refer to Chapter 51-00. Make sure that the painting is done in a dust free area.
6.	Let the fire resistant paint dry, in a dust free area, for a minimum of six hours.	The following drying times refer to a normal climate of 20 ºC: - Recoatable - after six hours minimum (no maximum). - Transparent Top Coat Application - after 24 hours minimum - Transportable - after eight hours minimum - Full Cure - after seven days. - Force Dry - Not applicable.
7.	Remove any dust that has collected with a fully opened tack cloth.	
8.	After a minimum of six hours, apply the second coat of fire resistant paint with a splatter spray gun (preferred), brush, or roller to a weight of 250 g/m² (0.822 oz/ft²)	Make sure that the painting is done in a dust free area.
9.	Let the fire resistant paint dry, in a dust free area, for a minimum of 24 hours.	
10.	Before the transparent top coat is applied, remove any dust that has collected with a fully opened tack cloth.	
11.	Apply the first coat of top coat with a brush, roller, or airless spraying equipment.	For approved materials and suppliers, refer to Chapter 51-00. Make sure that the painting is done in a dust free area. Tip size 0.28mm (0.011in.)
12.	Allow the first coat to dry for 30 to 45 minutes and before the second coat is applied.	
13.	Apply the two cross coats to achieve the required coverage.	Coverage: For the first coat: 25 g/m² For the second coat: 25 g/m² Total thickness: 50- 60 g/m² (0.164 - 0.197 oz/ft²)

	Detail Steps/Work Items	Key Items/References
14.	Let the top coat dry, in a dust free area.	The following drying times refer to a normal climate of 23 ºC and 50% humidity: - Full cure: 24 hours. NOTE: A minimum of 48 hrs cure is recommended before flying.
15.	Remove and discard the cover(s) and masking tape from the fuselage. Remove any dust that has collected with a fully opened tack cloth.	
16.	Visually inspect the completed high temperature paint repair(s). Make sure that there are no defects, such as bubbles, pinholes, craters, chips, scratches or abrasions.	
17.	Install the cowling.	Refer to the AMM, Section 71-10.

INSPECTION HOLES

1. General

   The DA20-A1 fuselage has four inspection holes. Their covers are fitted to the surface of the fuselage and are installed either with self-tapping screw or quick lock fasteners. The openings enable visual inspection and access to components and connections.

2. Description

   Refer to Chapter 3, Figure 2.

   The covers are made of aluminum or GFRP material. The covers are located on the fuselage bottom side, front and rear, and two in the middle. The forward cover enables access to the nose wheel mounting area; the covers in the middle enable access to the electrical fuel pump and the fuel drain valve. The rear cover enables access to the control gear in the vertical tail area.

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CHAPTER 55
STABILIZERS

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STABILIZERS

1. General

The tail plane of the DA20-A1 consists of the horizontal stabilizer, elevator including Anti Servo Tab, vertical stabilizer, and rudder. This chapter describes only the horizontal stabilizer, elevator and rudder.

The structural design is described in this chapter, while Chapter 27 describes removal and installation of the control surfaces.

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HORIZONTAL STABILIZER

1. General

Attached to the horizontal stabilizer is the elevator with the Anti Servo Tab located in the middle.

2. Description

The horizontal stabilizer is attached to the lower tail fin rib with a metal fitting and four bolts. A second mounting point is located near the leading edge of the horizontal stabilizer. Here a pin engages in the eye of the forward horizontal stabilizer fitting. Refer to Figure 5.1, Chapter 27.

The upper and lower halves of the horizontal stabilizer are of GFRP sandwich construction using PVC rigid foam. The continuous spar and the web at the hinge line are also made of GFRP. The fittings are attached with bolts and thickened resin. The tips are attached to the horizontal stabilizer with screws.

3. Removal and Installation

A. Horizontal Stabilizer

Rudder and rearward Anti Servo Tab controls must be removed (refer to Chapter 27).

(1) Removal

(a) Similar to the removal of the Elevator push rod in the vertical stabilizer.

(b) Refer to sub-chapter 27-30.

(2) Installation

(a) For installation reverse the sequence. For torque values of the mounting nuts and bolts refer to Chapter 20.

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ELEVATOR

1. General

The elevator control system provides control of the aircraft's pitch axis. For maintenance information, refer to sub-chapter 27-30. This chapter describes only the elevator structure.

2. Description

The half shells of the elevator are constructed using PVC rigid foam, which is sandwiched between layers of GFRP. Metal fittings are attached with bolts and thickened resin. The anti-servo tab is attached to the leading edge of the elevator using fastening hardware and a hinge.

3. Remove/Install the Elevator

Figure 1 shows the elevator structure.

A. Remove the Elevator

NOTE: Use two persons to remove the elevator. Or use control clamps to hold the elevator in position while you remove/install the attaching bolts.

	Detail Steps/Work Items	Key Items/References
1.	Remove the horizontal stabilizer fairing. - Remove the four screws.	
2.	Remove the bolt that connects the elevator vertical control rod to the elevator horn.	
3.	Remove the five elevator hinge bolts.	Hold the elevator. There are two bolts outboard at each side and one center bolt through the control horn.
5.	Lift the elevator clear of the aircraft.	

B. Install the Elevator

	Detail Steps/Work Items	Key Items/References
1.	Put the elevator in position on the horizontal stabilizer.	Use 2 persons.
2.	Install the five hinge bolts.	There are two bolts outboard at each side and one center bolt through the control horn. Refer to Chapter 20 for standard torque values.
3.	Install the bolt which connects the elevator vertical control rod to the elevator horn.	Make sure that the fork of the elevator trim actuator engages the spring mount on the control rod.
4.	Do a test for correct, full and free movement of the elevator control. If necessary, adjust the elevator control.	Refer to Chapter 27-30.
5.	Install the horizontal stabilizer fairing. - Install the four screws.	

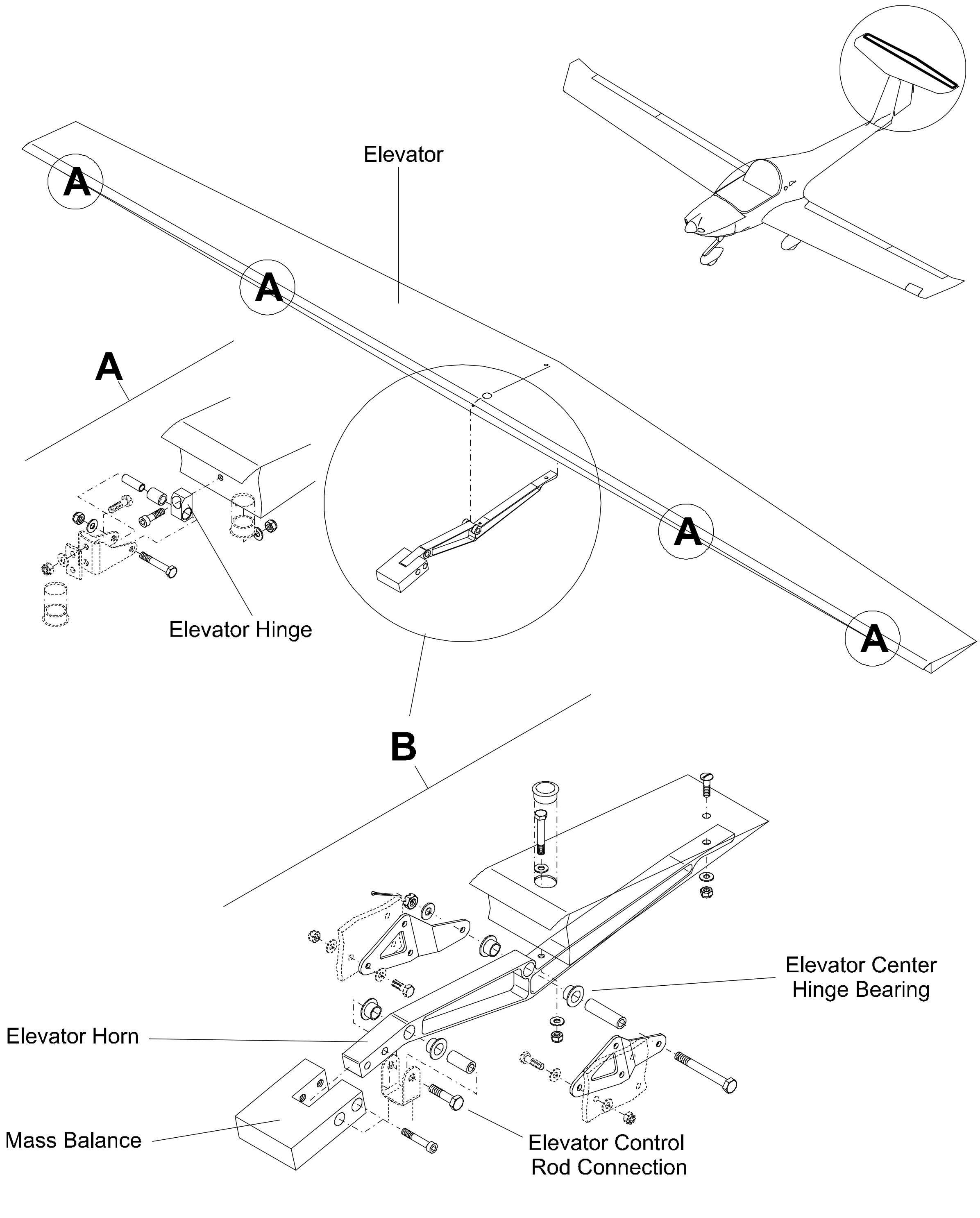

Figure 1 - Elevator Structure

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RUDDER

1. General

The conventionally designed DA20-A1 rudder allows flight control of the airplane about the vertical axis. For maintenance information, refer to Chapter 27-20-30.

This chapter describes only the rudder structure.

2. Description

The symmetrical half shells of the rudder are manufactured of PVC rigid foam covered on both sides. The upper pivot is installed using thickened resin. The balancing mass consists of a lead weight attached to the nose in the upper half of the rudder.

3. Removal and Installation

For removal and installation of the rudder refer to Chapter 27-20-30.

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CHAPTER 57
WINGS

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WINGS

1. General

The wing assembly of the DA20-A1 is a low wing monoplane design, and consists of two cantilever wings with ailerons and wing flaps. The wings are of semi monocoque sandwich construction. For removal and installation of the wing flaps refer to Chapter 27. The structure is described in this chapter.

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WING STRUCTURE

1. General

The DA20-A1 is a low wing monoplane design, using conventional ailerons and wing flaps.

2. Description

The cantilever wings of the DA20-A1 are of semi monocoque sandwich construction.

An I-spar with caps constructed of carbon fiber is the base of the wing construction. The spar stumps reach to the middle of the fuselage.

Each wing is attached to the fuselage using three bolts. The A- and the B-bolts are fixed to the fuselage's root rib and are oriented in cross direction. The A-bolt is placed in front of the spar bridge, while the B-bolt lies near the trailing edge. The main bolt secures the wing spar to the spar bridge.

The two main bolts are oriented in flight direction and are placed in the middle of the spar bridge. They are accessible behind the backrests and can be removed.

The web at the hinge line stiffens the wing structure. Furthermore it holds the aileron and flap hinges.

Anti-vortex tips are incorporated into the wing. A hand hole is located on the upper wing surface which enables access to the B bolt for removal of the wing. Two inspection windows fabricated of acrylic glass are located on the lower wing surface. They allow visual inspection of the aileron and flap bellcranks. The lower side of each vortex tip incorporates an inspection cover for access to the wing tip lights.

3. Removal and Installation

A. WING

(1) Removal

(a) Remove access hole lid on the upper surface of wing and remove B-bolt self locking nut. Refer to Figure 2

(b) Remove seats.

(c) Disconnect Rod end bearings from flap and aileron bellcranks.

(d) Remove locking device from main bolt, support wing. Refer to figure 3.

(e) Extract main bolt.

(f) Carefully remove the wing from the spar bridge, observing and disconnecting the electrical harness located at the root for the lights installed at the wing tips. When removing the left wing, observe and disconnect the Pitot, static, and stall warning system lines. Refer to Figure 1.

(2) Installation

(a) For installation reverse the sequence. Before installing, clean and lubricate the mounting bolts.

<u>CAUTION:</u> ENSURE PROPER CONNECTION OF MOUNTING BOLTS, FLAP AND AILERON CONTROLS, ELECTRICAL CONNECTOR, AND, ON THE LEFT SIDE, OF THE PITOT STATIC AND STALL WARNING LINES (SEE FIGURES 1 THROUGH 3).

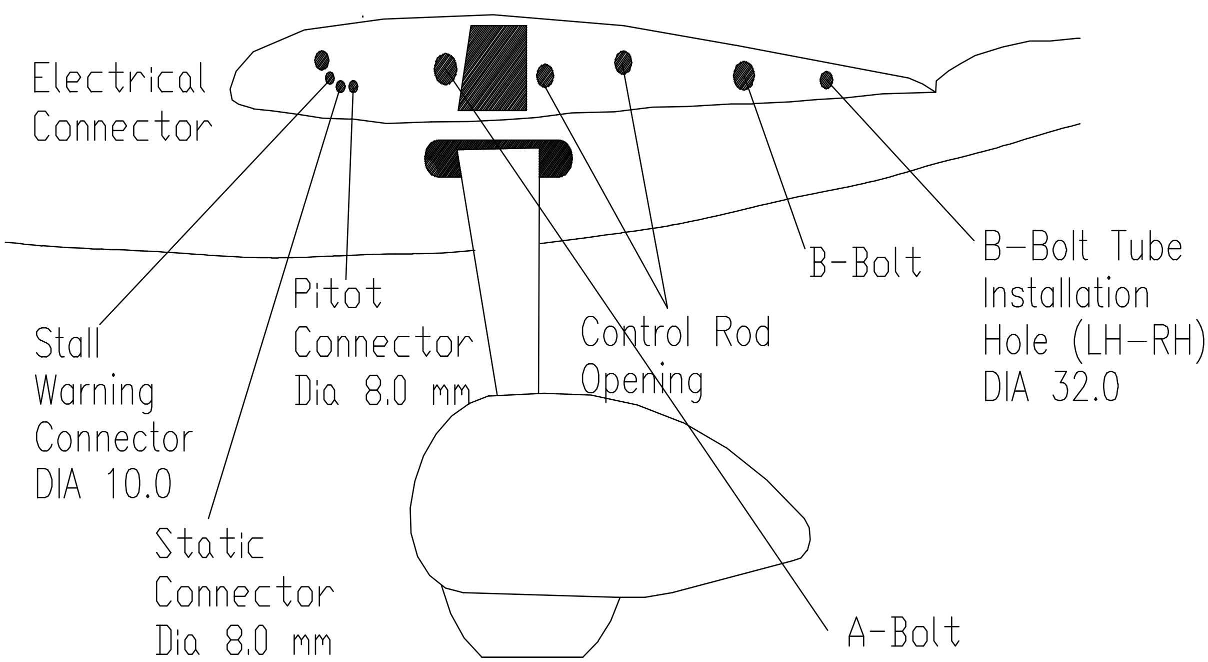

Figure 1 - Connectors and Bolts on LH Wing Fuselage

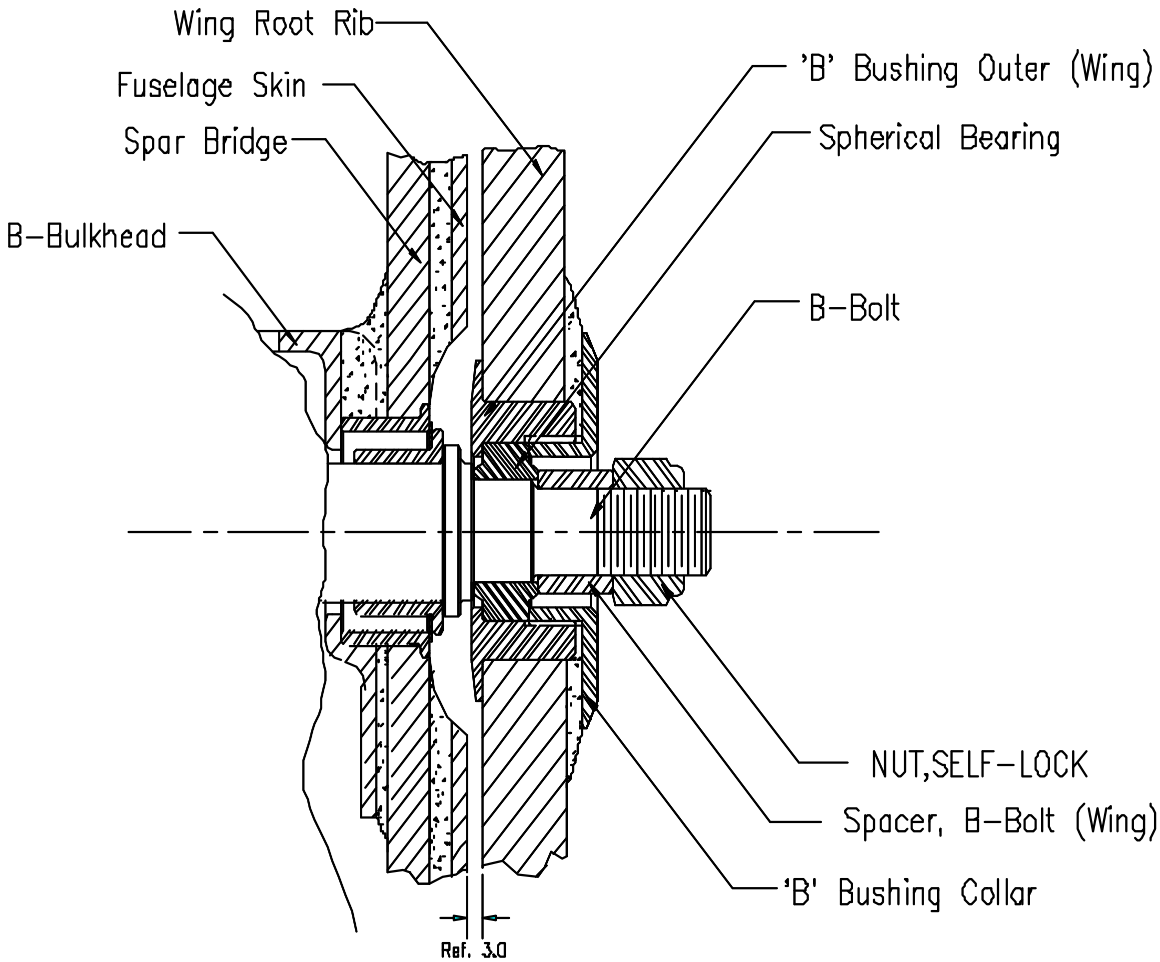

Figure 2 - Properly Secured Bolt

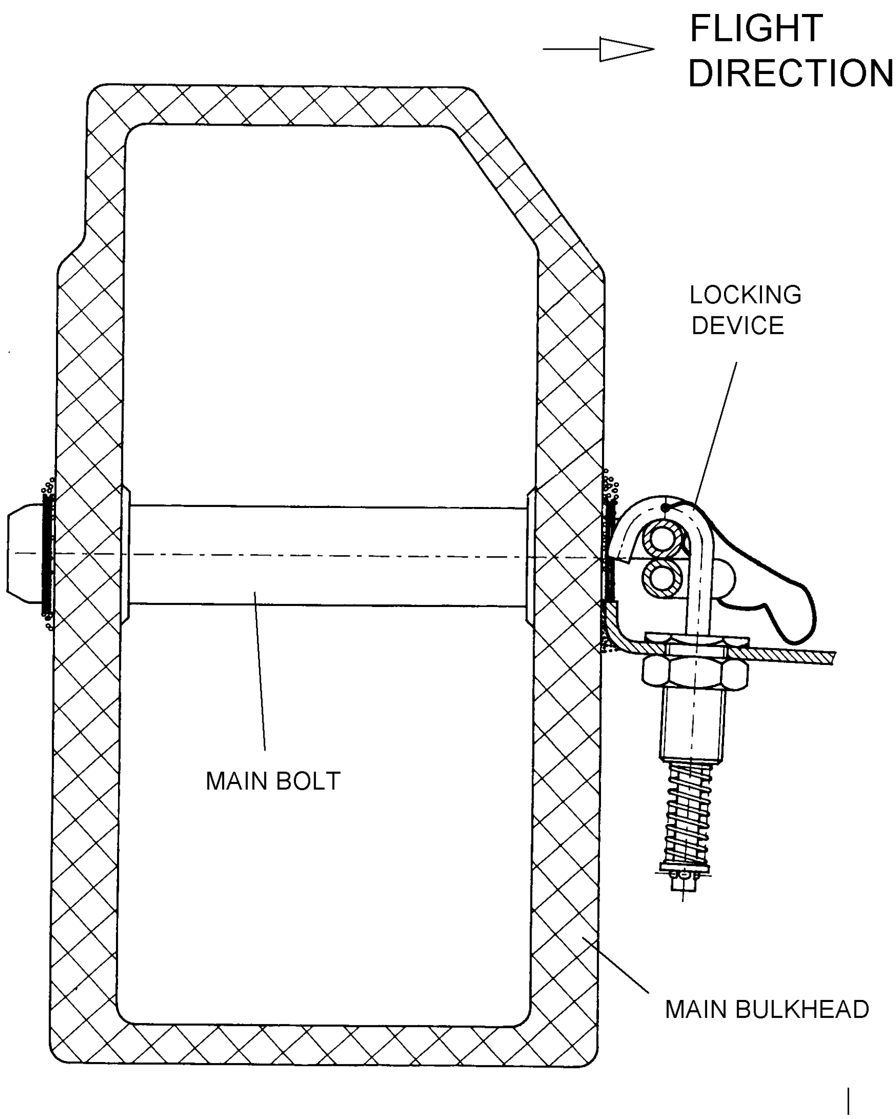

Figure 3 - Properly Secured Main Bolts

4. Bolt Play

A. Radial Play

The wing connection bolts are not sensitive to axial or radial play. However, values given in the table below should not be exceeded.

A-bolt in spherical bearing	0.08 mm	0.003"
B-bolt in spherical bearing	0.08 mm	0.003"
Main bolt in spar stump bushing	0.125 mm	0.005"
Main bolt in spar bridge bushing	0.08 mm	0.003"

To measure radial play, measure the diameter of the appropriate bolt and bearing/bushing. The difference between diameters should not exceed values given in the above table.

B. Axial Play

Maximum admissible values:

Spherical bearing for B-bolt	0.5 mm	0.02"

To measure axial play, the wing tip is to move forward, then back, the corresponding change in the gap between the fuselage and wing root rib (directly above the B-Bolt), should not exceed the values stated in the above table.

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WING FLAPS

1. General

The DA20-A1 is equipped with electrically operated wing flaps which are attached to the wings with hinges.

This sub-chapter only describes the structure.

For removal and installation refer to Chapter 27 50.

2. Description

The wing flaps are of semi monocoque sandwich construction consisting of PVC rigid foam and glass and carbon fiber layers.

The flap has ribs on its inboard and outboard edges. The flap horn is installed in the middle of the flap. Each flap is attached to the wing using four hinges and the flap horn. The hinges are secured with screws to the flaps.

3. Removal and Installation

For removal and installation of the wing flaps refer to Chapter 27 50, which also describes all required adjustments.

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AILERONS

1. General

The DA20-A1 is equipped with one aileron on each wing, operated by push rods.

This sub-chapter only describes the structure and the removal and installation of the ailerons. For a systems description as well as for removal and installation procedures of the aileron controls refer to Chapter 27 10.

2. Description

The ailerons are of semi monocoque sandwich construction consisting of PVC rigid foam and glass and carbon fiber layers. They have ribs on either side. The ribs are attached to the ailerons by use of thickened resin.

Each aileron is attached to the wing by four hinges and the aileron horn. The aileron horns are secured with bolts to the aileron.

3. Removal and Installation

Aileron push rod must be removed (refer to Chapter 27 10).

(1) Removal

(a) Remove the dowel pins, extract bearing journals.

NOTE: Secure the aileron from falling down! To ensure easy re-installation, mark location and direction of the bearing journals.

(b) Remove aileron.

(2) Installation

(a) For installation reverse the sequence.

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CHAPTER 61
PROPELLER

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PROPELLER

1. General

The HO-V352F Hoffmann Propeller is used for the DA20-A1. It has a hydraulic infinitely variable pitch adjustment controlled by a propeller governor. When the desired propeller speed is preselected, the governor automatically keeps the speed at a constant value, regardless of manifold pressure and airspeed.

Detailed information on the propeller can be found in the propeller manufacturer's documentation (refer to Chapter 03).

2. Description

The Hoffmann constant speed propeller consists of three main units: hub assembly, blade assembly, and spinner assembly.

A. Hub Assembly

The hub is constructed from forged aluminum and mounted to the engine flange by bolts. The hub extension on the flange side is designed as a cylinder in which a piston moves.

Axial movement of the piston is transferred by a fork and pitch change blocks to the pitch change knob, which is part of the blade assembly. Through this knob the blade pitch angle is adjusted.

The pitch range is limited by mechanical stops. The corresponding blade angles can be adjusted when the propeller is installed to the aircraft.

B. Blade Assembly

The Hoffmann Composite blade is a joint construction. Totally compressed hardwood (veneers) is used in the root section, scarfed in the body of the blade to a lightweight structure of smooth wood (e.g. spruce). Blades may also be totally manufactured from compressed wood.

Special anchor screws connect the compressed wood of the blade with a metal ferrule. To improve torsional stiffness and provide surface protection, the blade is covered with fiber reinforced epoxy. The leading edge incorporates an aluminum erosion bar.

The entire blade is protected against weather by a polyurethane coating. This ensures high resistance, impact dampening characteristics, and provides the necessary elasticity.

The blade ferrules are forged from aluminum alloy. The blades are secured to the hub with blade retention nuts manufactured from aluminum alloy. The blade bearing preload is adjusted by the torque of the retention nuts. A lip seal seals the shaft. The blade nuts are sealed with silicone to prevent water from entering the blade attachment area.

C. Spinner Assembly

The spinner assembly consists of a spinner mount and a spinner dome, which are connected with screws. The spinner dome is supported in front of the propeller by a guide plate.

3. Troubleshooting

NOTE: Any maintenance performed on the propeller, MUST be performed in accordance to the propeller manufacturers documentation. All repairs MUST be performed by the propeller manufacturer.

The following table lists defects as they could appear on the propeller, and their correction.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Blade shake	Loose blade bearing	Torque retention nut to 25 - 30 Nm (18.4 to 22.1 lbf-ft). Use new safety plate and sealing.
Sluggish RPM	Cold oil	Allow engine to warm up sufficiently
	Friction in pitch change mechanism	Move the pitch change mechanism by turning blades by hand. If excessive friction is revealed, repair.
Differences in RPM during climb, cruise, and descent without propeller speed control lever movement.	Up to ± 50 RPM are system inherent. If this value is exceeded:	Repair
	- Friction in propeller or governor	Repair
	- Defective RPM indicator	Replace
Surging RPM	Trapped air in propeller position	Move the propeller pitch control at least 3 times over the entire pitch range to release air.
	Oil sludge in the system	Clean oil lines in engine, cylinder, propeller, and governor.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Surging RPM	Wrong speeder spring in the governor	Check governor designation with Airplane Type Certification Data Sheet.
	Speeder spring in the governor too weak	Periods of surging with low amplitude are acceptable. If governor does not stabilize then repair.
	Improper pitch setting in the propeller	Check whether pitch setting conforms to data given in the Airplane Type Certification Data Sheet. Check static RPM.
	Abrupt movement of prop control or throttle lever	Move levers slowly and smoothly.
	Improper carburetor adjustment	Adjust
	Oscillation of tachometer drive	Repair
Increasing RPM during normal operation without movement of propeller speed control lever	Oil leakage which is visible from outside	Replace seals.
	Pitch change due to leakage in internal oil system between governor and propeller	Oil transfer rings on propeller shaft may be defective, or supply of engine oil to governor may be insufficient. Repair
	Internal leakage in the propeller	Repair
	Malfunction of governor drive or governor relieve valve	Replace governor.
RPM drop during normal operation without movement of propeller speed control lever	Failure of governor speeder spring, or plunger stuck in governor	Replace governor.
	Defective propeller speed control bowden cable	Repair or replace.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Pitch change extremely sluggish after movement of propeller speed control lever and/or RPM changes with airspeed and manifold pressure as in case of a fixed pitch propeller.	Clogged oil lines between governor and propeller	Clean lines. NOTE: This kind of malfunction does not appear abruptly. The quality of the prop speed control function deteriorates slowly over a period of time. This condition should be detected during preflight inspections.
	Oil sludge in cylinder of propeller pitch change mechanism	Clean. NOTE: see NOTE above
	Defective pitch change mechanism in the propeller	Repair. NOTE: This failure may occur suddenly.
Oil leakage (may either be visible from outside or not)	Defective seals.	Replace.

4. Installation Procedure

NOTE: Propeller installation may only be carried out by authorized personnel and must be checked immediately after completion. Any maintenance must be performed in accordance with the propeller manufacturer's documentation.

(a) Clean the propeller and engine flange with suitable cleaning agent. The torque is transmitted through friction; therefore the flange surfaces must be clean.

(b) Confirm only two O-rings are installed in the centering ring. Install centering rings to the hub.

(c) Install propeller to centering ring on engine flange. Be careful not to damage the O-ring in the centering ring.

(d) Tighten nuts on flange uniformly in crosswise order.

For proper torque, refer to Chapter 20 (prerequisite: threads not lubricated but easy turning)

(e) Check track of propeller blades approximately 10 cm (4 in) from the blade tips at the trailing edge. Maximum allowable value: 3 mm (0.12 in). For this check, the propeller should be turned opposite to its direction of rotation in order to avoid inadvertent engine firing.

(f) Install spinner in accordance with the markings. Ensure sufficient guidance on guiding plate. Apply a light coat of motor oil to rubber before installing spinner.

Torque of spinner mounting screws: 2.5 to 3.0 Nm (1.84 to 2.21 lbf-ft.)

5. Minor Repairs

Minor repairs (small paint cracks etc.) may be performed without special authorization. Ensure that the wood core and the glass fiber coating are not damaged. The damaged area is cleared from grease with common solvents and sanded with no. 220 sanding paper. If necessary, the repair area should be treated with adequate nitro surfacer. Be careful not to apply a too thick coat. After the surfacer has hardened, generate an even surface with no. 220 sanding paper. Paint damaged area. Only original paint should be used, since the durability of other products cannot be guaranteed. In the event that several paint layers are applied, observe drying time.

If the propeller seems to be expanded or swollen, moisture has entered the wood core, the propeller must be sent to the manufacturer for repair.

In case of major damage, the propeller must also be removed from the airplane and sent to the manufacturer.

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CHAPTER 71
POWER PLANT (ENGINE)

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POWER PLANT

1. General

Refer to Figure 1.

This chapter describes the engine installed in the DA20-A1, its external units, removal and installation, as well as troubleshooting procedures.

For maintenance or overhaul of the engine refer to the engine manufacturer's documentation. For operation refer to the Operator's Manual.

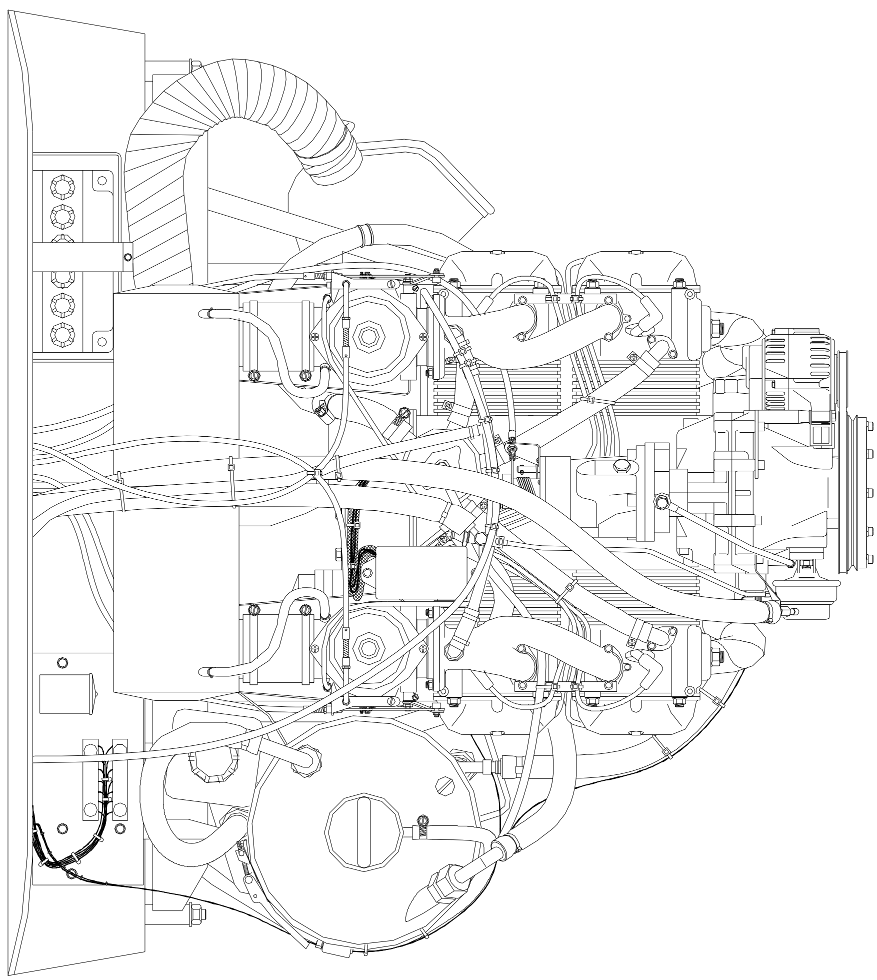

Figure 1 - Engine (Top View)

2. Description

The engine installed in the DA20-A1 is a ROTAX 912 A3 (S/N 10002through 10092) or 912 F3 (S/N 10093 and subsequent and aircraft with Service Bulletin DA20-73-01 incorporated) with a take-off performance of 80 hp at 5800 RPM. (engine speed). The engine installed in the DA20/100-A1 is a ROTAX 912 S3 with a take-off performance of 100 hp at 5800 RPM (engine speed). The 4 cylinder, 4 stroke horizontally opposed type engine has a dry sump forced lubrication system. It has air-cooled cylinders and liquid cooled cylinder heads.

The propeller rotates in clockwise direction. Due to the reduction gear, the engine turns in opposite direction. The engine is equipped with self adjusting valves which are maintenance free. The trigger coils of the breakerless capacitor discharge type dual ignition are integrated into the engine.

Attached to the integrated reduction gear is a hydraulic type propeller governor. The reduction gear is equipped with an overload clutch and a mechanical vibration damper. Attached to the engine are the electric starter, a mechanical fuel pump, two carburetors, an air distribution box, an air intake filter, and a belt driven generator.

The engine is operated via bowden and wire cables.

A. Engine Specifications

RPMs are propeller speeds, crankshaft speeds in parentheses.

ROTAX Model A3 and F3.

ITEM	DATA
Take off performance	59.6 kW (80 hp)
Take off RPM	2550 RPM (5800 RPM)
Max. continuous power	56 kW (78 hp)
Idle RPM	950 RPM
Bore:	79.5 mm
Stroke:	61.0 mm
Displacement	1211 cm^3
Compression Ratio:	9.0:1
Firing Order:	1-4-2-3
Ignition Timing	26° B.T.D.C
Min. oil pressure	1.5 bar (22 psi) @ 1250 RPM (2800 RPM)
Max. oil pressure	5 bar (73 psi)
Max. short-term oil pressure in case of cold start	7 bar (102 psi)
Max. oil temperature	140 °C (284 °F)
Max. cylinder head temperature	150 °C (302 °F)
Mass (Weight)	62.8 kg (138 lbs)

RPMs are propeller speeds, crankshaft speeds in parentheses.

ROTAX Model S3.

ITEM	DATA
Take off performance	73.5 kW (100 hp)
Take off RPM	2385 RPM (5800 RPM)
Max. continuous power	69 kW (92 hp)
Idle RPM minimum, DA20/100	600 RPM (1400)
Idle RPM nominal, DA20/100	950 RPM (2300)
Bore:	84.0 mm
Stroke:	61.0 mm
Displacement	1352 cm^3
Compression Ratio:	10.5:1
Firing Order:	1-4-2-3
Ignition Timing	26° B.T.D.C
Min. oil pressure	0.8 bar (12 psi) below 1440 RPM (3500 RPM)
Normal oil pressure	2.0-5.0 bar (29-73 psi) above 1440 RPM (3500 RPM)
Max. oil pressure	5.0 bar (73 psi)
Max. short-term oil pressure in case of cold start	7.0 bar (102 psi)
Max. oil temperature	130 °C (266 °F)
Max. cylinder head temperature	135 °C (275 °F)
Mass (Weight)	66.7 kg (146.7 lbs)

B. Starter

The starter is attached to the engine and is located on the right hand side, at the rear of the engine. The starter pinion is pushed forward during the start phase to engage into the ring gear. With the engine running, the starter pinion is retracted by centrifugal force.

C. Generator

A 40 amp generator is mounted on the forward left side of the engine. Its output power is 560 watts, which is regulated and rectified to 14 volts DC. The generator is belt driven from a hub mounted on the propeller.

D. Ignition System

The engine is equipped with a breakerless capacitor discharge type dual ignition system which operates totally independent from the electrical on board network. Shielded wires are used to connect the spark plugs to the ignition magnetos.

E. Air Distribution Box

The air distribution box is of welded aluminum design which has a built in carburetor heat flap. With operation of this flap, pre heated air is directed to the carburetors to prevent carburetor icing. At maintenance, it must be ensured that the adjustment of the carburetor heat bowden cable enables proper closing of the flap.

F. Carburetors

The BING 64/32 is an equal pressure or constant speed carburetor. The engine suction produces a partial vacuum depending on the position of the throttle valve. The vacuum propagates to the vacuum chamber in the upper part of the dome. The differential pressure between the vacuum chamber and the atmosphere increases, thus lifting the piston (diaphragm) and the attached fuel needle.

This device provides an almost constant pressure drop and an almost constant velocity of air flow in the Venturi tube.

For a detailed description of the carburetor and its adjustment, refer to the engine manufacturer's documentation.

G. Reduction Gear

The step-down ratio between crankshaft and propeller for the Rotax A3 and F3 model is 2.2727:1 while the gear ratio of the S3 model is 2.43:1. The reduction gear contains a dampening unit to reduce torsional vibration. This unit consists of a progressive torsional spring system using contour clamps with spring washers acting in axial direction. The clamp mechanism has a friction dampened backlash which is necessary to achieve a smooth idling.

Through this backlash a noticeable rotary shock is created during engine start and shut off and in case of sudden load changes. This effect is harmless due to the built in overload clutch.

The overload clutch also protects the crankshaft from overload in case of propeller shock load.

H. Spark plugs

The approved spark plug for A3 and F3 model is type is NGK 12 DCPR7E.

The approved spark plug for the S3 model is type NGK 12. DCPR8E.

3. Troubleshooting

The following table lists defects as they could appear on the engine, and their correction.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Engine does not start	Spark plug gap too wide	Adjust gap to 0.5 mm (0.02°) or replace plugs.
	Closed fuel shut off valve	Open
	Clogged fuel filter	Clean or replace
	Leaky fuel system	Repair
	No fuel in tank	Refill airplane
	Ignition wires interchanged	Replace in correct order, observe firing order 1-4-2-3
	Starter RPM too low, defective or empty battery	Recharge or replace battery
	Loose or defective ignition wire	Check wire connections, replace if required.
	Ignition box wet inside	Dry thoroughly
	Spark plugs wet from condensation	Thoroughly dry the plugs inside and outside
	Spark plugs wet from fuel due to excessive actuation of choke or overflow of carburetor	Dry spark plugs, check for faults in the fuel system
	Unclean or jammed fuel needle	Clean or replace
	Clogged carburetor jets	Clean
	Water in the carburetor	Drain and clean the carburetor, fuel lines, and separator
	Insufficient compression	Check for loss of pressure, carry out repair if necessary

COMPLAINT	POSSIBLE CAUSE	REMEDY
Engine does not start (continued)	Internal engine damage	Inspect magnetic plugs and oil filter for metal particles; in case of presence, repair engine. refer to the engine manufacturer's documentation.
Engine idles unsteadily after warm up, black exhaust gas	Choke activated	Deactivate
	Carburetors synchronized inadequately	Adjust carburetors
	Fuel needle unclean, jammed, or worn	Clean or replace
	Intake manifold leaky	Tighten all connectors, replace the defective parts.
Engine runs irregularly or misfires occasionally	Spark plugs do not fire	Check plugs, clean inside and outside, adjust electrode gap. Replace plugs if necessary.
	Spark discharge over ignition wires	Dry wet wires Replace defective wires
	Defective ignition box	Have box repaired, or replace
	Clogged fuel filter	Clean
Engine runs too hot, oil temperature exceeds 140 °C	Too much oil remaining in the crankcase	Check oil return lines for clogging, check engine for gas mixture leakage
	Insufficient air stream to oil radiator	Check for free air passage, clean
	Insufficient oil supply	Check oil level, replenish if necessary
	Poor oil quality	Change oil, use approved oil
	Clogged oil filter	Replace
	Excessive piston blow-by	Usual reason: worn or seized piston rings, overhaul required.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Engine runs too hot, oil temperature exceeds 140 °C (continued)	Defective bearings	If there are metal particles on the magnetic engine plugs or in oil filter, overhaul engine. Refer to the engine manufacturer's documentation.
	Defective oil temperature indicator	Replace
Engine performance unsatisfactory	Defective ignition system	Check ignition circuits; if defect evident, check ignition wires and trigger coil; have ignition box repaired
	Too much oil in the crankcase	Check return line to oil tank for clogging (seals, covers etc.)
	Insufficient fuel supply	Check fuel system
	Non-approved fuel	Refuel using approved fuel
	Incorrect throttle lever adjustment	Adjust
	Leaky air intake	Tighten connectors, check carburetor connecting piece
	Defective carburetor dia-phragm	Replace
Low oil pressure	Insufficient oil level	Check oil level, replenish if necessary
	Oil remain in the engine and does not return to the tank	Check oil return line for clogging
	Defective oil seal	Replace
	High oil temperature	see "Engine runs too hot"
	Defective pressure control valve	Check for foreign matter, check spring
	No oil pressure, air in the oil line	Bleed oil line
	Defective oil pressure indicator	Check sensor instrument and wiring
	Defective crank shaft bearings	Engine overhaul required

COMPLAINT	POSSIBLE CAUSE	REMEDY
Post ignition	Idle speed too high	Adjust to 950 RPM
	Defective ignition switch	Check ground connections, overhaul switch
	Overheated engine	Allow engine to cool off at 950 RPM
Excessive oil consumption	Worn, broken, or improperly installed piston rings	Engine overhaul required
	Poor oil quality	Change oil, use approved oil type
	Worn valve guides, poor condition of valve shaft seal	Cylinder head repair required
	Oil leaks	Seal
Knocking under load	Octane rating of fuel too low	Use fuel with higher octane rating
	Spark plugs installed without sealing ring	Ensure that there is one sealing ring on each spark plug
	Excessive residue in the combustion chamber	Remove cylinder heads, remove combustion residue, check oil consumption
	Excessive spark advance	Only possible when flywheel has been twisted on crank-shaft; check dead center posi-tion
Engine hard to start at low temperatures	Starting RPM too low	Preheat engine
	Low battery charge	Recharge or replace
	High oil pressure	In case of cold-start, a reading of up to 7 bar does not indicate malfunction
	Too low oil pressure after cold start	Too much resistance in oil line at low temperatures; shut off engine, pre-heat motor oil

4. Removal and Installation

A. Engine

(1) Removal

NOTE: In many cases it is better to remove the engine together with the engine mount from the firewall. The following is a description of such task.

WARNING: BEFORE REMOVING THE ENGINE, DISCONNECT THE BATTERY AND CONNECT THE MAGNETOS TO GROUND (CONNECT MAGNETO CONNECTOR WITH GROUND SCREW USING WIRE), OR REMOVE ALL IGNITION CABLES FROM THE SPARK PLUGS. IF THIS IS NOT DONE PERSONNEL CAN BE INJURED.

WARNING: ALL SOURCES OF HEAT AND OPEN FLAME MUST BE EXTINGUISHED BEFORE STARTING ANY WORK ON THE FUEL SYSTEM. IF THIS IS NOT DONE PERSONNEL CAN BE INJURED.

(a) Install a tail support (refer to Chapter 7).

(b) Remove the upper and lower cowlings, refer to sub-chapter 71-10.

(c) Disconnect the battery (negative terminal first), remove battery.

(d) Disconnect the nose wheel elastomer package assembly from engine mount.

(e) Disconnect ignition wires.

(f) Remove the propeller.

(g) Disconnect the fuel lines.

(h) Disconnect the electrical connector on the firewall.

(i) Disconnect bowden cables for the throttle, choke, and carburetor heat.

(j) Remove the heating hose on the exhaust heat exchanger.

(k) Disconnect the manifold pressure line from firewall fitting.

(l) Lift engine until the engine mount is without load. Remove lower and then upper engine mount attachment bolts and move airplane rearward.

(m) Remove exhaust, radiators, oil tank, ignition box, engine mount, and auxiliary engine mounts.

(2) Installation

(a) For installation reverse the sequence.

(b) Prime lubrication system, follow Rotax Service Instruction SI-912-005.

CAUTION: TO PREVENT ENGINE DAMAGE, BEFORE THE INITIAL STARTING OF THE ENGINE, ENSURE THE OIL RADIATOR AND OIL LINES ARE FILLED WITH THE APPROPRIATE GRADE OF MOTOR OIL.

B. Carburetor

(1) Removal

(a) Remove fuel line from carburetor.

(b) Disconnect bowden cables from air distribution box and carburetor.

(c) Remove the air distribution box by loosening the hose clamps and moving in rearward direction.

(d) Loosen clamp on carburetor connector, remove carburetor in rearward direction.

(2) Installation

(a) For installation reverse the sequence.

5. Maintenance Information

A. Carburetor Synchronization

The throttle valves must open simultaneously for a regular operation of all cylinders. For a complete re-adjustment, both stop screws are turned back until the throttle valves close completely (check by disconnecting bowden cables). Turn stop screws in again towards the stops on the levers; use a thickness gauge or light source to check the adjustment. From this position, adjust both stop screws equally until the correct idle speed (950 RPM) is reached.

Alternative method: use of a synchro tester. The mixture screws are set to the same open position (initial setting: 1¼ turns open).

With a suitable synchro tester, both carburetors are adjusted to equal flow rates at idling speed.

The mixture screws can be fine-adjusted to achieve equal response to throttle movements on both carburetors.

Adjustment of the main jet is done on an engine test stand at an elevation of 300 meters (984 ft.) above MSL. Depending on the elevation of the home airfield, it might be necessary to re adjust the main jet. Such an adjustment may only be performed by authorized personnel in accordance with the manufacturer's instructions.

NOTE: Check carburetor operating mechanism and lubricate using motor oil.

B. Reduction Gear Checks

(1) Backlash

The propeller can be turned easily by hand by approximately 30°. While turning there should not be any abnormal noises or resistance.

(2) GEARBOX FRICTION CHECK (Refer to Figure 2)

To be performed every 100 hrs. There should be a friction of 15 to 45 Nm (130 in.lbs to 400 in.lbs) within the range of the backlash, which should be checked using a spring scale attached to the propeller. The crankshaft must be prevented from turning during the check. If the friction is not within limits the gearbox must be removed and shimmed immediately. Refer to the engine manufacturer's maintenance manual for the shimming procedure.

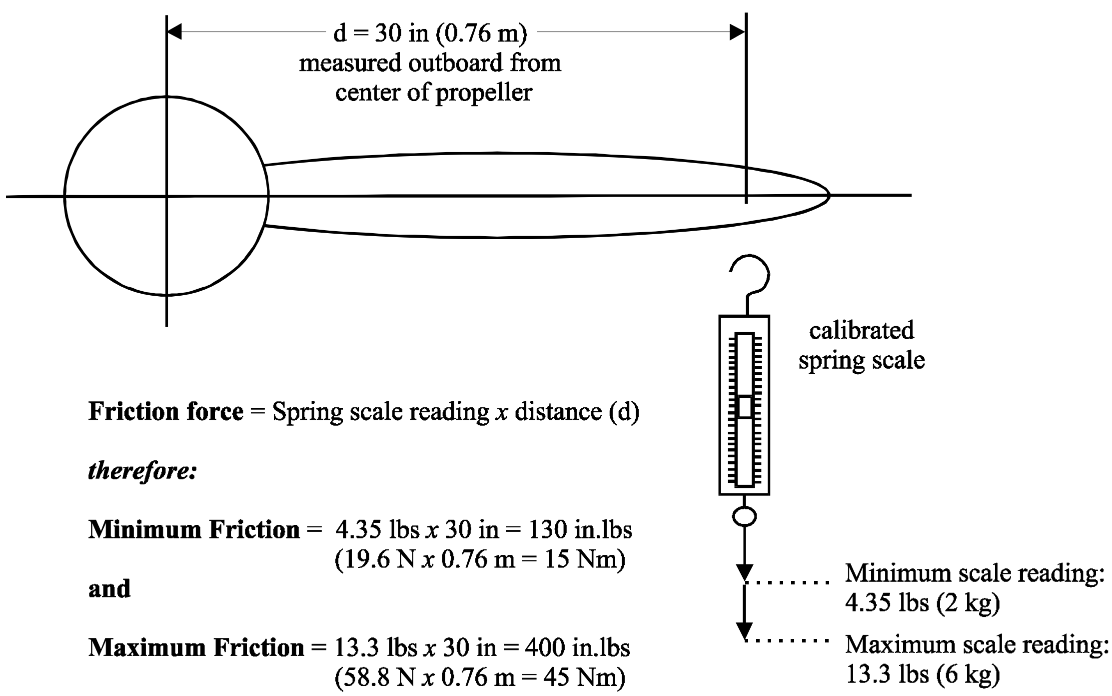

Figure 2 - Gearbox Friction Check

(3) Overload Clutch

The overload clutch should only be checked if there is suspicion of clutch malfunction. The overload clutch is adjusted to a torque of 400 to 500 Nm (295 to 369 lbs.ft.) by the manufacturer. This adjustment can be checked using an appropriate lever on the propeller flange. The torque must be at least 400 Nm (295 lbs.ft.). An alternate check with a special testing device and with the reduction gear removed from the engine can be done. (Refer to Repair Manual).

C. Propeller Flange Check

The propeller shaft must be removed for this check. Refer to Engine operation manual.

This check should be carried out after a propeller strike. The warping of the flange must not exceed 0.0024 in (0.06 mm) for a 4.9 in (125 mm) diameter flange or 0.0020 in (0.05 mm) for a 3.8 in (96 mm) diameter flange. Refer to engine operation manual.

After a propeller strike the engine crankshaft and reduction gear must be checked in accordance with the engine manufacturer's maintenance manual. The propeller shaft must be removed and inspected. Checking of the out-of-true of the propeller shaft in the assembled condition is inaccurate and therefore not permissible.

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COWLING

1. General

The DA20-A1 aircraft has two cowlings. It has a top cowling and a bottom cowling. The two halves attach to the airframe with camlock fasteners. The top cowling has a left and a right air intake. It also has an inspection panel to give you access to the engine oil dipstick. The bottom cowling has one large air intake.

2. Description

GFRP or CFRP moldings make the power plant top and bottom cowlings. A strip of carbon fiber bonded to the edges of the cowlings makes them strong. Camlock fasteners installed around the edge of the cowlings attach them to the airframe. A hinge attaches the oil filler access panel to the top cowling and a rotary lock holds it closed. Polyurethane paint protects the outside skin from ultraviolet rays and humidity. The insides of the cowlings have a layer of fire resistant paint applied for protection.

Two holes at the front of the top cowling supply ram air to cool the engine. The one hole at the front of the bottom cowling supplies ram air to the air intake.

The following describes how to remove and install the cowlings and how to do a high temperature paint repair of a cowling with Steel Guard FM 585 or with Hensotherm 2 KS.

3. Remove/Install the Cowlings

A. Remove the Cowlings

	Detail Steps/Work Items	Key Items/References
1.	Unlock the camlock fasteners from the top cowling.	
2.	Remove the top cowling from the aircraft.	
3.	Unlock the camlock fasteners from the bottom cowling.	Hold the cowling.
4.	Keep the propeller in the horizontal position.	
5.	Remove the bottom cowling from the aircraft in the forward direction.	

B. Install the Cowlings

	Detail Steps/Work Items	Key Items/References
1.	Inspect the cowlings for damage. Look especially for damage to the camlock fasteners	
2.	Put the bottom cowling in position on the bottom of the aircraft. - Lock the camlock fasteners.	Lightly tap all the fasteners to make sure they are locked correctly.
3.	Put the top cowling in position on the top of the aircraft. - Lock the camlock fasteners.	Lightly tap all the fasteners to make sure they are locked correctly.

4. High Temperature Paint Repair of a Cowling - with Steel Guard FM 585

NOTE: An equivalent procedure can be used to repair damage in the area underside of the aircraft flight compartment, aft of the engine. This area is a fixed part of the aircraft structure.

	Detail Steps/Work Items	Key Items/References
1.	Remove the cowling that requires repair.	Refer to paragraph 3.A.
2.	Put the cowling on a satisfactory work stand to permit clear access to the area that requires repair.	Make sure that the outside of the cowling is on a protective surface so that it will not be damaged.
3.	Carefully examine the cowling and identify the area(s) that require(s) repair.	At each step of the repair, complete all areas of the cowling in need of repair for that sequence.
4.	Make an estimate of the repair(s) required, and then get the materials and safety equipment satisfactory for the job.	For approved materials and suppliers, refer to AMM Chapter 51-00.

WARNING: OBEY THE SAFETY PRECAUTIONS THAT FOLLOW WHEN YOU DO WORK WITH COMPOSITE MATERIALS:

- DO THE WORK IN AN AREA THAT HAS A GOOD FLOW OF CLEAN AIR
- USE APPROVED EYE, MOUTH, AND BODY PROTECTION. SMALL PARTICLES CAN GO THROUGH USUAL CLOTHING
- DO NOT LET THE MATERIALS TOUCH YOUR EYES, MOUTH, OR SKIN
- IF IRRITATION OCCURS, GET MEDICAL AID IMMEDIATELY
- OBEY THE MANUFACTURER'S INSTRUCTIONS
- DO NOT USE CHEMICAL PAINT REMOVERS. TO REMOVE PAINT FROM COMPOSITES THAT HAVE RESIN, USE ABRASIVE MATERIALS
- DO NOT USE POWER TOOLS TO MAKE A SURFACE ROUGH.

YOU CAN CAUSE INJURY TO PERSONS AND/OR DAMAGE TO EQUIPMENT IF THESE SAFETY PRECAUTIONS ARE NOT OBEYED.

	Detail Steps/Work Items	Key Items/References
5.	Prepare the area(s) of the cowling for the application of the high temperature paint, as follows:	For approved materials and suppliers, refer to Chapter 51-00.
	- If dirt or grease is present, wash the area with clean carbon tetrachloride or acetone. Wipe the area off immediately	
	- Abrade the surface with 280 grit sandpaper	Make sure that you do not damage the laminate. Only remove the transparent top coat and the fire resistant paint.
	- Remove the dust with a fully opened tack cloth	
	- Cover the area(s) of the cowling that will not be painted. Use masking tape to hold the cover(s) in place.	

WARNING: OBEY THE SAFETY PRECAUTIONS THAT FOLLOW WHEN YOU USE PAINTS:

- USE SAFETY GOGGLES
- USE SAFETY CLOTHING
- DO NOT LET PAINTS TOUCH YOUR SKIN, EYES, OR MOUTH
- PAINTS ARE POISONOUS
- IF IRRITATION OCCURS, GET MEDICAL AID
- DO THE WORK IN AN AREA THAT HAS A GOOD FLOW OF AIR
- DO THE WORK IN AN AREA THAT DOES NOT HAVE SPARKS, FLAME, OR HOT SURFACES.
- OBEY THE MANUFACTURER'S INSTRUCTIONS.
- THE TEMPERATURE MUST BE BETWEEN 65 AND 120 ^{o}F (18 AND 49 ^{o}C).
- THE RELATIVE HUMIDITY MUST BE BETWEEN 25 AND 80 PERCENT.

YOU CAN CAUSE INJURY TO PERSONS AND/OR DAMAGE TO EQUIPMENT IF THESE SAFETY PRECAUTIONS ARE NOT OBEYED

	Detail Steps/Work Items	Key Items/References
6.	Apply the first coat of fire resistant paint with a splatter spray gun, a brush or a roller to a minimum thickness of 0.010 in (250 microns).	For approved materials and suppliers, refer to Chapter 51-00. Make sure that the painting is done in a dust free area.
7.	Let the fire resistant paint dry, in a dust free area, for a minimum of four hours.	The following drying times refer to a normal climate of 23 ºC and 50% humidity: - Dust-free - after two hours minimum - Maskable - after eight hours minimum - Recoatable - after four hours minimum (no maximum) - Transparent Top Coat Application - after 24 hours minimum - Transportable - after eight hours minimum - Full Cure - after seven days.
8.	Remove any dust that has collected with a fully opened tack cloth.	
9.	After a minimum of four hours, apply the second coat of fire resistant paint with a splatter spray gun, a brush or a roller to a minimum thickness of 0.010 in (250 microns).	Make sure that the painting is done in a dust free area.
10.	Let the fire resistant paint dry, in a dust free area, for a minimum of 24 hours.	
11.	Before the transparent top coat is applied, remove any dust that has collected with a fully opened tack cloth.	
12.	Apply the first coat of transparent top coat with a high pressure sprayer as follows:	For approved materials and suppliers, refer to Chapter 51-00. Make sure that the painting is done in a dust free area.
	For product 9008B0900D:	- Spray viscosity - (ISO 4) - Orifice - 0.060 in (1.5 mm) - Pressure - 3 to 5 bar (40 to 70 PSI).
	For product CA8720M0900C:	- Spray viscosity - (ISO 4) 27 - 40 sec. - Orifice - 0.060 in (1.5 mm) - Pressure - 3 to 4 bar (40 to 58 PSI).

	Detail Steps/Work Items	Key Items/References
13.	Allow it to dry for 30 to 45 minutes and apply the second coat.	
14.	Apply the two cross coats to achieve the required thickness.	Film thickness: For the first coat: 25 microns For the second coat: 35 microns. Total thickness: 60 microns (0.002 in or 2.3 mil)
15.	Let the transparent top coat dry, in a dust free area as follows: For product 9008B0900D: For product CA8720M0900C:	The following drying times refer to a normal climate of 23 ºC and 50% humidity: - Dry to Tape: 10 to 14 hours - Full cure: seven days - Dry to Tape: three to four hours - Full cure: seven days
16.	Remove and discard the cover(s) and masking tape from the cowling. Remove any dust that has collected with a fully opened tack cloth.	
17.	Visually inspect the completed high temperature paint repair(s). Make sure that there are no defects, such as bubbles, pinholes, craters, chips, scratches or abrasions.	
18.	Install the cowling.	Refer to paragraph 3.B.

5. High Temperature Paint Repair of a Cowling - with Hensotherm 2 KS

NOTE: An equivalent procedure can be used to repair damage in the area underside of the aircraft flight compartment, aft of the engine. This area is a fixed part of the aircraft structure.

	Detail Steps/Work Items	Key Items/References
1.	Remove the cowling that requires repair.	Refer to paragraph 3.A.
2.	Put the cowling on a satisfactory work stand to permit clear access to the area that requires repair.	Make sure that the outside of the cowling is on a protective surface so that it will not be damaged.
3.	Carefully examine the cowling and identify the area(s) that require(s) repair.	At each step of the repair, complete all areas of the cowling in need of repair for that sequence.
4.	Make an estimate of the repair(s) required, and then get the materials and safety equipment satisfactory for the job.	For approved materials and suppliers, refer to AMM Chapter 51-00.

WARNING: OBEY THE SAFETY PRECAUTIONS THAT FOLLOW WHEN YOU DO WORK WITH COMPOSITE MATERIALS:

- DO THE WORK IN AN AREA THAT HAS A GOOD FLOW OF CLEAN AIR
- USE APPROVED EYE, MOUTH, AND BODY PROTECTION. SMALL PARTICLES CAN GO THROUGH USUAL CLOTHING
- DO NOT LET THE MATERIALS TOUCH YOUR EYES, MOUTH, OR SKIN
- IF IRRITATION OCCURS, GET MEDICAL AID IMMEDIATELY
- OBEY THE MANUFACTURER'S INSTRUCTIONS
- DO NOT USE CHEMICAL PAINT REMOVERS. TO REMOVE PAINT FROM COMPOSITES THAT HAVE RESIN, USE ABRASIVE MATERIALS
- DO NOT USE POWER TOOLS TO MAKE A SURFACE ROUGH.

YOU CAN CAUSE INJURY TO PERSONS AND/OR DAMAGE TO EQUIPMENT IF THESE SAFETY PRECAUTIONS ARE NOT OBEYED.

	Detail Steps/Work Items	Key Items/References
5.	Prepare the area(s) of the cowling for the application of the high temperature paint, as follows: - If dirt or grease is present, wash the area with clean carbon tetrachloride or acetone. Wipe the area off immediately - Abrade the surface with 280 grit sandpaper - Remove the dust with a fully opened tack cloth - Cover the area(s) of the cowling that will not be painted. Use masking tape to hold the cover(s) in place.	For approved materials and suppliers, refer to Chapter 51-00. Make sure that you do not damage the laminate. Only remove the transparent top coat and the fire resistant paint.

WARNING: OBEY THE SAFETY PRECAUTIONS THAT FOLLOW WHEN YOU USE PAINTS:

- USE SAFETY GOGGLES
- USE SAFETY CLOTHING
- DO NOT LET PAINTS TOUCH YOUR SKIN, EYES, OR MOUTH
- PAINTS ARE POISONOUS
- IF IRRITATION OCCURS, GET MEDICAL AID
- DO THE WORK IN AN AREA THAT HAS A GOOD FLOW OF AIR
- DO THE WORK IN AN AREA THAT DOES NOT HAVE SPARKS, FLAME, OR HOT SURFACES.
- OBEY THE MANUFACTURER'S INSTRUCTIONS.
- THE TEMPERATURE MUST BE BETWEEN 63 AND 73 ^{o}F (17 AND 23^{o}C).
- THE RELATIVE HUMIDITY MUST BE BETWEEN 25 AND 80 PERCENT.

YOU CAN CAUSE INJURY TO PERSONS AND/OR DAMAGE TO EQUIPMENT IF THESE SAFETY PRECAUTIONS ARE NOT OBEYED

	Detail Steps/Work Items	Key Items/References
6.	Mix the paint by agitating before use. Apply the first coat of paint with a splatter spray gun (preferred), brush, or roller to a weight of 250 g/m² (0.822 oz/ft²).	For approved materials and suppliers, refer to Chapter 51-00. Make sure that the painting is done in a dust free area.
7.	Let the fire resistant paint dry, in a dust free area, for a minimum of six hours.	The following drying times refer to a normal climate of 20 ºC: - Recoatable - after six hours minimum (no maximum). - Transparent Top Coat Application - after 24 hours minimum - Transportable - after eight hours minimum - Full Cure - after seven days. - Force Dry - Not applicable.
8.	Remove any dust that has collected with a fully opened tack cloth.	
9.	After a minimum of six hours, apply the second coat of fire resistant paint with a splatter spray gun (preferred), brush, or roller to a weight of 250 g/m² (0.822 oz/ft²)	Make sure that the painting is done in a dust free area.
10.	Let the fire resistant paint dry, in a dust free area, for a minimum of 24 hours.	
11.	Before the transparent top coat is applied, remove any dust that has collected with a fully opened tack cloth.	
12.	Apply the first coat of top coat with a brush, roller, or airless spraying equipment.	For approved materials and suppliers, refer to Chapter 51-00. Make sure that the painting is done in a dust free area. Tip size 0.28mm (0.011in.)
13.	Allow the first coat to dry for 30 to 45 minutes and before the second coat is applied.	
14.	Apply the two cross coats to achieve the required coverage.	Coverage: For the first coat: 25 g/m² For the second coat: 25 g/m² Total thickness: 50- 60 g/m² (0.164 - 0.197 oz/ft²)

	Detail Steps/Work Items	Key Items/References
15.	Let the top coat dry, in a dust free area.	The following drying times refer to a normal climate of 23 ºC and 50% humidity: - Full cure: 24 hours. NOTE: A minimum of 48 hrs cure is recommended before flying.
16.	Remove and discard the cover(s) and masking tape from the cowling. Remove any dust that has collected with a fully opened tack cloth.	
17.	Visually inspect the completed high temperature paint repair(s). Make sure that there are no defects, such as bubbles, pinholes, craters, chips, scratches or abrasions.	
18.	Install the cowling.	Refer to paragraph 3.B.

MOUNTS

1. General

Refer to Figure 3.

The engine is mounted to the airframe via the engine mount and the shock mounts. The engine mount consists of a welded steel bar frame which is mounted to the firewall using bolts and self locking nuts.

The shock mounts attached between the engine and the auxiliary engine mounts reduce the vibration transmission from the engine to the airframe.

2. Description

The engine mount is electrically grounded to the firewall by a ground strap. The engine is attached to the engine mount with shock mounts, which consist of a rubber element and a spacer tube. The rubber elements are secured against twisting by the pre tension within the bushings.

Attached to the engine mount are different mounting brackets for oil and coolant radiators, oil tank, as well as mounting provisions for various cables and hoses for the engine.

3. Removal and Installation

A. Removal from the Firewall

(a) Remove bolts holding the engine mount and engine to the firewall.

(b) Remove the engine and the engine mount from firewall.

(c) Remove the engine from the engine mount.

B. Installation

(a) For installation reverse the sequence.

NOTE: For Engine Mount torque values, refer to Chapter 20.

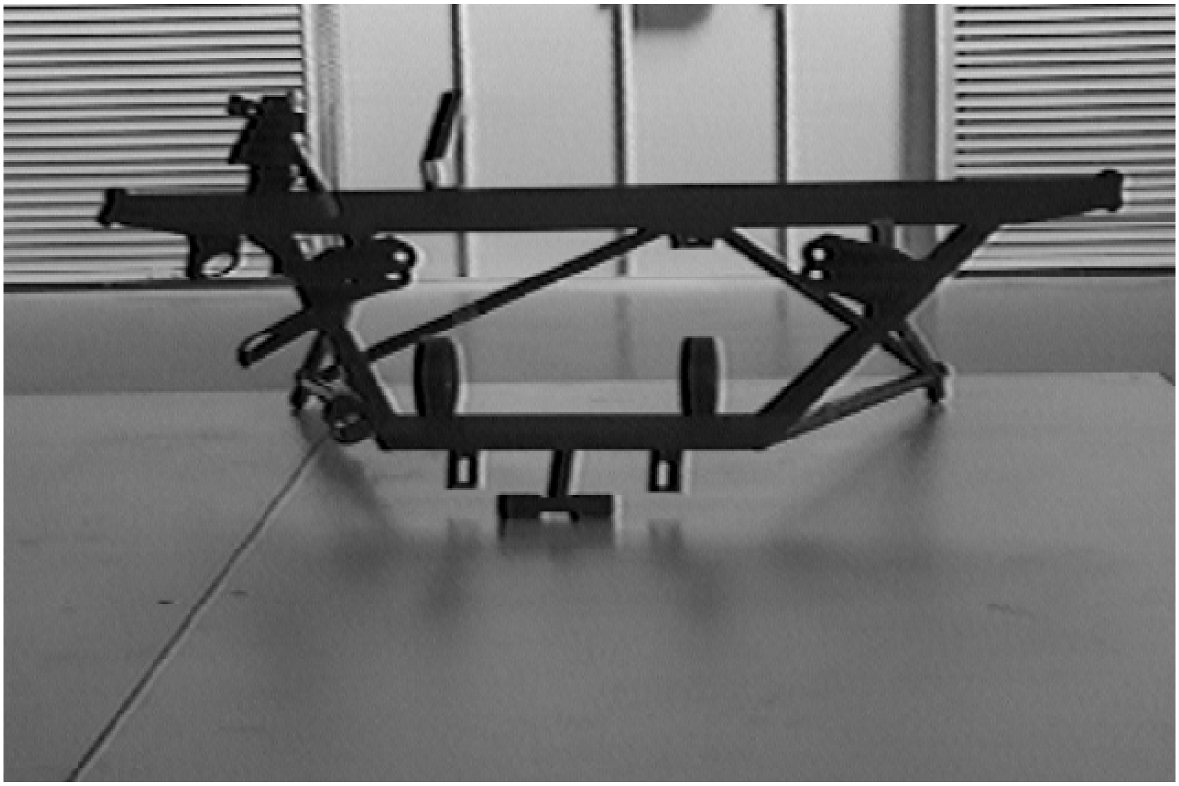

Figure 3 - Engine Mount

AIR INTAKES AND GUIDES

1. General

A ram air guide made of GFRP is installed on the engine to ensure optimal engine cooling.

2. Description

The air guide is designed to follow the contours of the engine block and cylinders. The exact fitting makes attachment screws unnecessary. The crossed over coolant hoses installed on the upper side of the engine secure the air guide.

3. Removal and Installation

A. Removal

(a) Disconnect coolant hoses from cylinder heads (upper side); remove.

(b) Remove auxiliary units on engine upper side.

(c) Disconnect fuel lines from fuel pump; remove.

(d) Remove air guide.

B. Installation

(a) For installation reverse the sequence.

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ENGINE COOLING

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ENGINE COOLING

1. General

The engine cooling is performed using two different systems. Ram air guided by a duct is used to cool the cylinders, while the cylinder heads are liquid cooled.

The cylinder head cooling system consists of a coolant pump, radiator, dispatcher vessel, and an equalizing reservoir. Refer to Figures 1 thru 3.

The coolant radiator is attached to the engine mount in front of the engine.

The system components are interconnected by rubber hoses which have a life time of five (5) years.

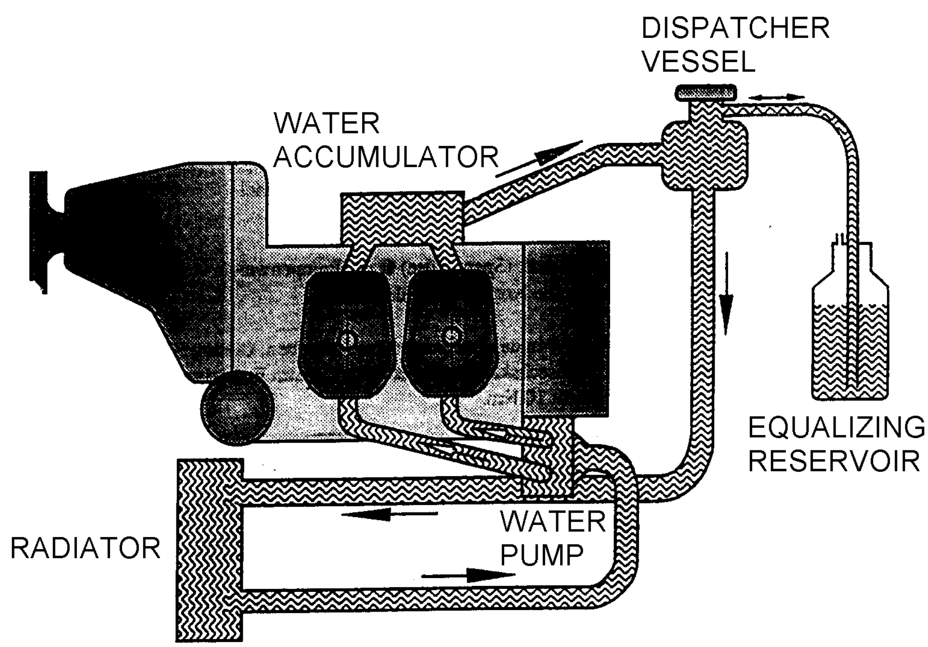

Figure 1 - Coolant Circuit

Dispatcher Vessel

Figure 2 - Dispatcher Vessel

Equalizing Reservoir

Clamps

Figure 3 - Equalizing Reservoir

2. Replenishing

For replenishing, refer to Sub-Chapter 12-10.

3. Removal and Installation

A. Dispatcher Vessel

Refer to Figure 2.

(1) Removal

(a) Remove all hoses connected to dispatch vessel.

(b) Remove dispatcher vessel.

(2) Installation

(a) For installation, reverse the sequence.

B. Radiator

(1) Removal

NOTE: Disconnecting the hoses to the radiator will cause coolant to leak out. An appropriate container should be used to store all coolant.

(a) Remove all hoses connected to radiator.

(b) Remove the 4 bolts connecting radiator to engine mount

(c) Remove radiator.

(2) Installation

(a) For installation, reverse the sequence.

C. Equalizing Reservoir

Refer to Figure 3.

(1) Removal

(a) Remove all hoses connected to reservoir.

(b) Remove clamps securing reservoir, and remove.

(2) Installation

(a) For installation, reverse the sequence.

D. Water Pump

(1) Removal and Installation

Refer to Engine Manufacturers documentation.

CHAPTER 76
ENGINE CONTROLS

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ENGINE CONTROLS

1. General

The engine is controlled with:

1) throttle and the choke control levers

2) carburetor heat lever and

3) propeller speed control lever.

Bowden cables are used for the transmission of control movements. The bowden cables are sealed with a fire resistant compound as they pass through the firewall. For aircraft serial number 301 and above and aircraft with service bulletin number DA20-76-01A incorporated the throttle cables have been replaced with stranded wire cables.

2. Description

A. Throttle

Operation of the throttle valve is controlled by the throttle control which is located in the center console. The bowden cables are attached to a lever under the instrument panel by clamps. The lever is connected to the throttle control via a rod with ball joints. The bowden cables are attached on the other end to the two carburetors using clamps. The bowden cable jackets are attached on both ends to a bracket and are adjustable on the carburetor side. The stop is located on the carburetor. In case of a malfunctioning of the throttle valve operating mechanism, a spring will position the throttle valve in the fully open position. For aircraft serial number 301 and above and aircraft with service bulletin number DA20-76-01A incorporated the throttle cables have been replaced with stranded wire cables. An additional spring is also installed on each of the throttle arms of the carburetors.

B. Choke

Operation of the rotary slider valve that is found in the carburetors starting circuit is controlled by the choke control knob. The choke control knob is located on the center quadrant, which is located between the instrument panel and the center console.

The motion of the knob is transferred to the carburetor by a bowden cable. The bowden cable jacket is attached to the control quadrant by a clamp. Next to the carburetor, the bowden cable is held by an adjustable casing screw. The stop is located on the carburetor.

C. Carburetor Heat

By actuating the carburetor heat lever, a flap in the air distribution box is operated, and pre heated air is directed to the carburetors to prevent icing. The carburetor heat knob is located in the center quadrant. The motion of the knob is transferred to the flap by a bowden cable.

D. Propeller Speed Control

To adjust the propeller RPM, the propeller speed control lever located in the center console must be set. The movement of the lever is transferred to the control lever on the propeller governor via a bowden cable. This lever defines the control point by means of a slide valve. Refer to figure 5.

E. Throttle Quadrant Friction Control

In the DA20-A1, the lever motion for throttle and propeller speed can be arrested by turning the black knob on the left hand side of the center console in a clockwise direction. The arresting is performed by clamping the friction washers installed on the lever axis. Refer to Figure 5.

3. <u>Troubleshooting</u>

The following table lists defects as they could appear on the engine controls, and their correction.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Engine is not controllable	Broken bowden cable Loose bowden cable connections	Replace Tighten
Engine does not reach take off RPM	Throttle valve does not reach stop Propeller governor does not reach stop	Adjust the bowden cable Adjust stop screw
Poor action of friction in the throttle quadrant	Worn friction washers	Replace

4. Removal and Installation, Adjustment

A. Throttle Control Bowden Cables

Effective for aircraft serial # 10002 to 10300

(1) Removal

(a) Remove engine cowlings. Refer to Sub Chapter 71-10

(b) Remove instrument panel cover. Refer to sub-Chapter 31-10

(c) Disconnect bowden cable clamps on carburetors.

(d) Disconnect bowden cable clamps on shift lever below instrument panel.

(e) Disconnect bowden cable jackets from brackets below instrument panel.

(f) Remove the bowden cables by pulling rearward.

(2) Installation

(a) For installation reverse the sequence.

B. Throttle Control Cables

Effective for aircraft serial # 10301 and above and aircraft with service bulletin DA20-76-01A, Rev 5 incorporated.

(1) Removal

(a) Remove the throttle-quadrant friction-knob and temporarily install a 5/16 - 24 nut to prevent loss of any parts.

(b) Remove the screws holding the throttle quadrant. Pull the throttle quadrant up enough to gain access to the throttle cables and remove the inner-wire retaining-hardware. Discard the bolt, washers and nut. Keep the bushings.

(c) Loosen the nut on the swivel on the throttle lever arms and pull the cables forward out of the throttle-control conduit.

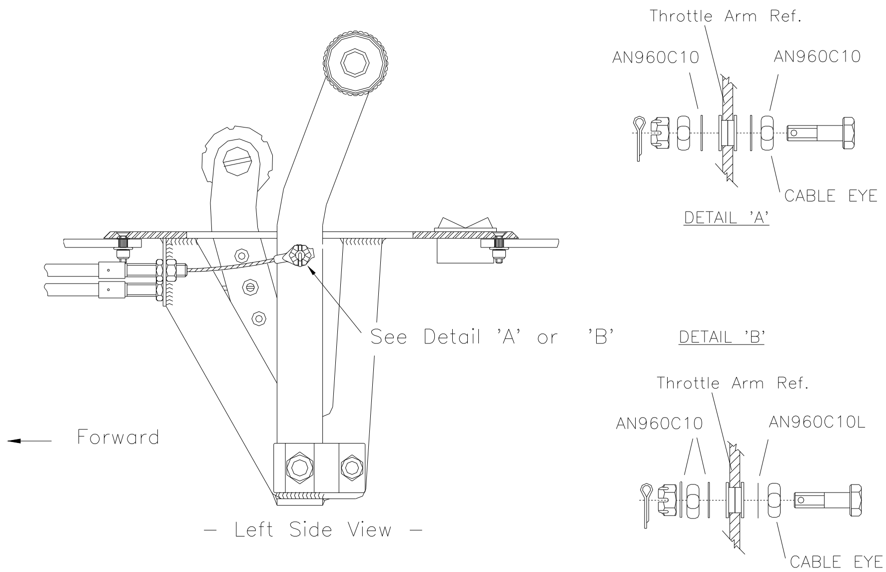

Figure 1a

(2) Installation

(a) Insert the new inner cables from the throttle quadrant end.

(b) Tighten the throttle cable retaining hardware until the cable eyelets do not rotate independently of each other. Back off the nut by 3/4 of a turn. The Cable eyelets should rotate freely and independently of each other. Check that there is no possibility of interference between the bolt head and the throttle-quadrant center-frame due to excessive side play. If the bolt head interferes with the center frame install the washers as shown in Figure 1a 'Detail B'.

(c) Insert the cotter pin and bend it to obtain the lowest possible profile. Check for interference between the cotter pin and the structure through the full travel of the throttle lever. Check for interference between the cotter pin and the throttle-quadrant top-plate through the full travel of the throttle lever.

(d) Reinstall the throttle quadrant leaving the friction knob, spacer and washer off.

(e) Pull throttle lever to idle stop.

(f) Thread the inner wire through the hole in the swivel. Check that the position of the washers is correct (Figure 1b).

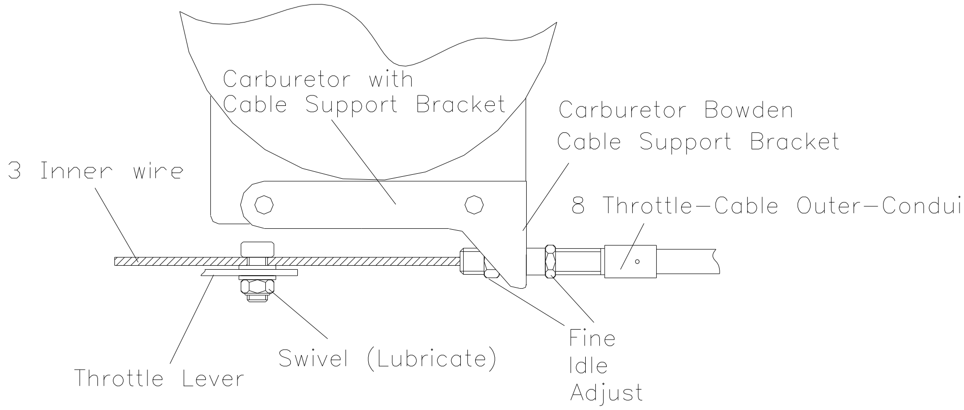

Figure 1b

(g) Move the throttle arm on the carburetor to the idle stop (it may be easier to remove the spring on the throttle arm). While gently pulling the inner throttle cable forward and holding the throttle lever to idle stop, tighten the throttle arm swivel. Lubricate the swivel with Aeroshell Grease 5. Ensure that the swivel can rotate freely.

(h) Refer to figure 1c. With throttles rigged (ie. all springs installed) adjust the self locking nut so that a pre-load force of 4.5 lbs min (2 Kg) is required to pull the throttle lever aft when it is a point 0.25" (6 mm) before the end of travel.

(i) Install the spacer, DS-50 washer and friction knob.

(j) Conduct a test run. If idle to 1500 rpm is rough, carburetor synchronization must be carried out as per Maintenance Manual Chapter 71-00.

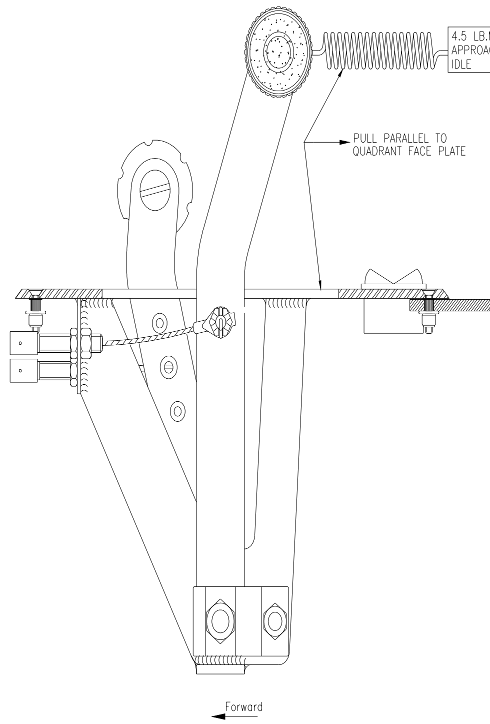

Figure 1c

(3) Adjustment

Refer to Figure 2a and Figure 2b.

To perform the initial idle speed adjustment, the idle speed adjustment screws must be turned back until the throttle valves have reached their limit position within the carburetors. Then the adjustment screws should be turned clockwise until a clearance of 0.004 in (0.1 mm) has been reached. Following that, both adjustment screws should be turned clockwise by 1½ turns.

For carburetor synchronization refer to Chapter 71 00.

For adjustment of the bowden cables, move the throttle lever to the idle position. Move both levers located on the carburetors to idle position and tighten the bowden cable clamps.

For fine adjustment, the lock nuts located on the throttle/choke bowden cable bracket are adjusted. It must be ensured that when the throttle lever is in idle position, the levers on the carburetors are also in idle position without deforming the stop.

To verify the synchronous operation of both carburetors, the throttle lever should be moved to the full throttle position. When the throttle valve lever on one carburetor reaches the stop, the clearance between lever and stop on the other side should not exceed 1 mm (0.04 in).

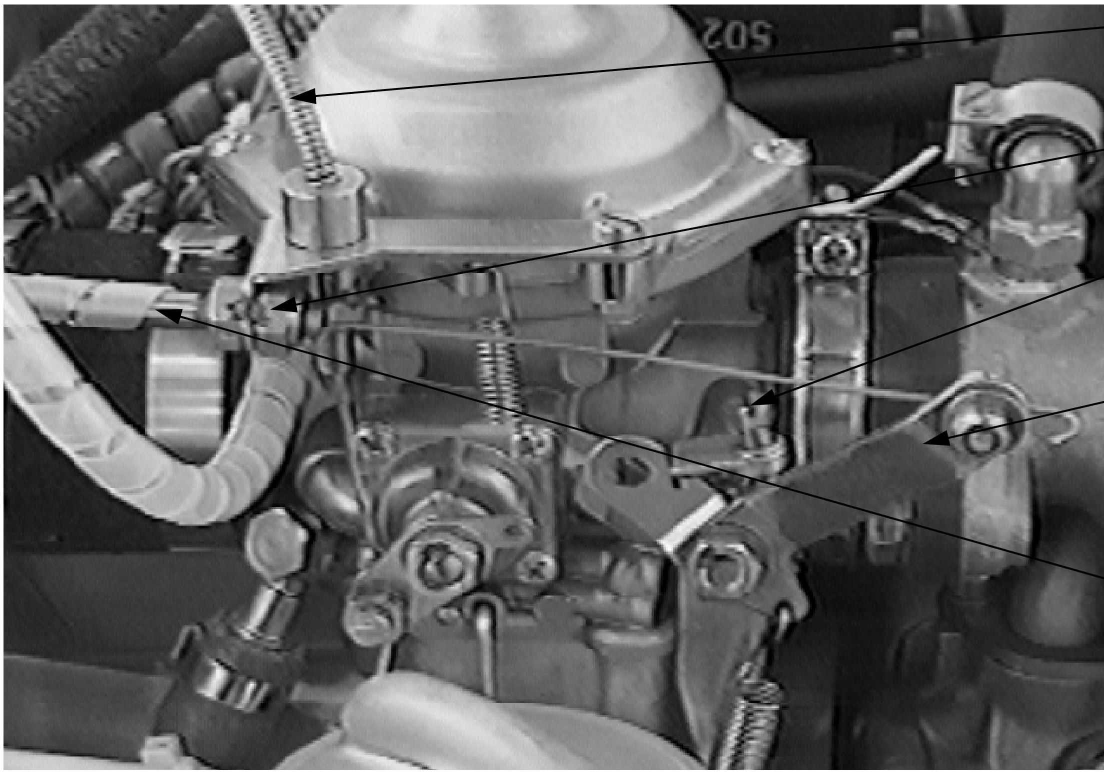

Figure 2a - Throttle Valve Adjustment Items

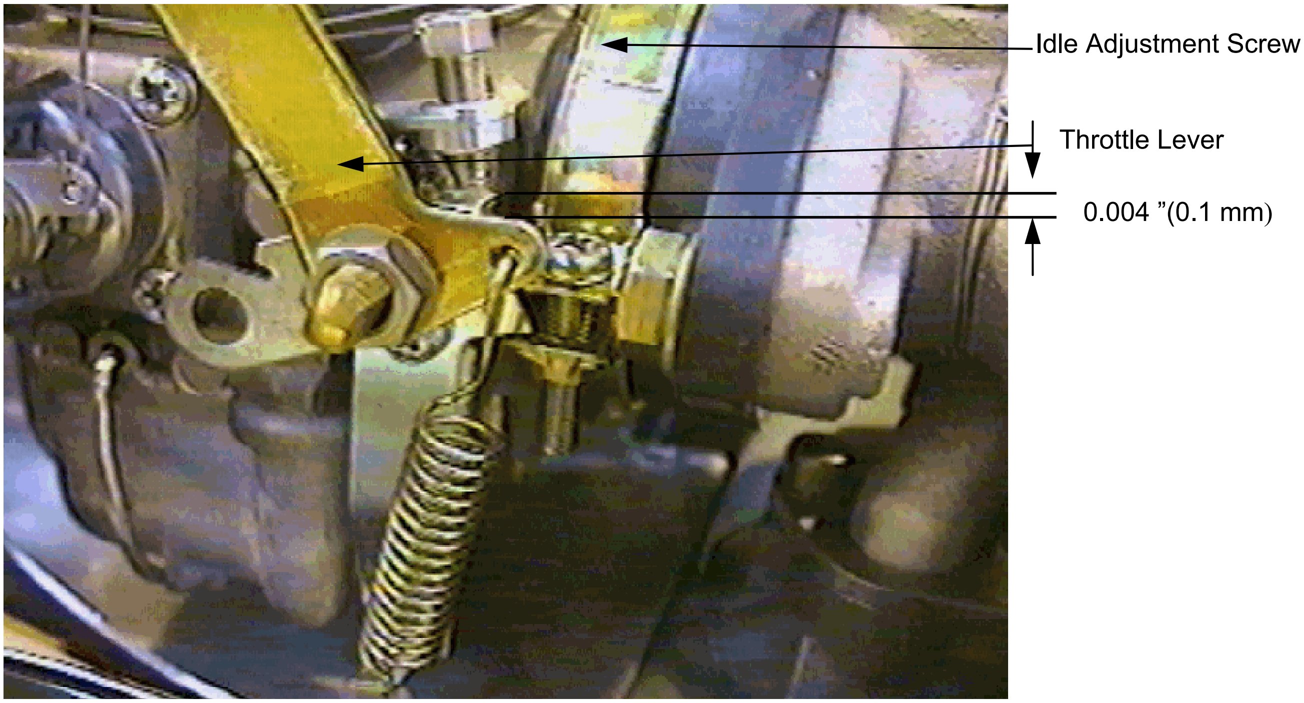

Figure 2b - Throttle Valve Adjustment Item

C. Choke Bowden Cables

(1) Removal

(a) Remove engine cowling.

(b) Remove instrument panel cover.

(c) Disconnect bowden cables from carburetors.

(d) Disconnect bowden cables from parallel guide on center console.

(e) Remove the bowden cables by pulling rearward.

(2) Installation

(a) For installation reverse the sequence.

(3) Adjustment

With the choke knob not pulled, it must be ensured that the levers on both starting carburetor housings reach their lower stop. Refer to figure 2.

D. Carburetor Heat Bowden Cable

(1) Removal

(a) Remove engine cowling.

(b) Disconnect bowden cable from flap actuating lever on air distribution box. Refer to Figure 3.

(c) Remove instrument panel cover.

(d) Disconnect bowden cable from carburetor heat knob.

(e) Remove the bowden cable by pulling rearward.

(2) Installation

(a) For installation reverse the sequence.

(3) Adjustment

Ensure that the flap for hot air in the air distribution box is closed (lower end of flap actuating lever on box full fwd.) when the carburetor heat control lever is in its full forward position.

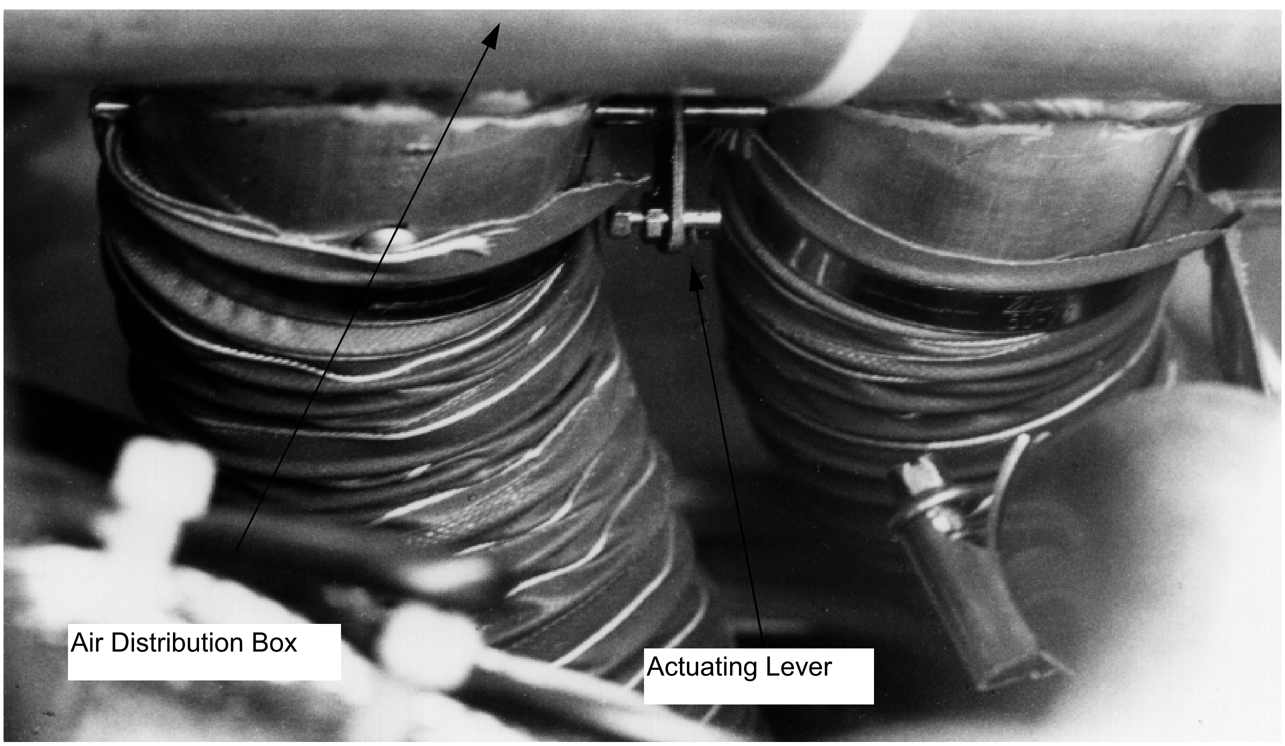

Figure 3 - Flap Actuating Lever on Air Distribution Box

E. Propeller Speed Control Bowden Cable

(1) Removal

(a) Remove engine cowling.

(b) Disconnect bowden cable from propeller governor.

(c) Loosen mounting hardware of throttle quadrant on the center console, and remove RH rotary knob.

(d) Remove throttle quadrant from center console in upward direction.

(e) Disconnect bowden cable from propeller speed control lever.

(f) Remove the bowden cable by pulling rearward.

(2) Installation

(a) For installation reverse the sequence.

(3) Adjustment

Refer to Figure 4.

Ensure that the lever on the governor reaches its stop in pull-direction when the propeller speed control lever is in full forward position.

Figure 4 - Lever on Propeller Governor

F. Throttle Quadrant Friction Control

(1) Removal

(a) Remove rotary knob on RH side of center console.

(b) Remove washer springs and replace if required.

(2) Installation

(a) For installation reverse the sequence.

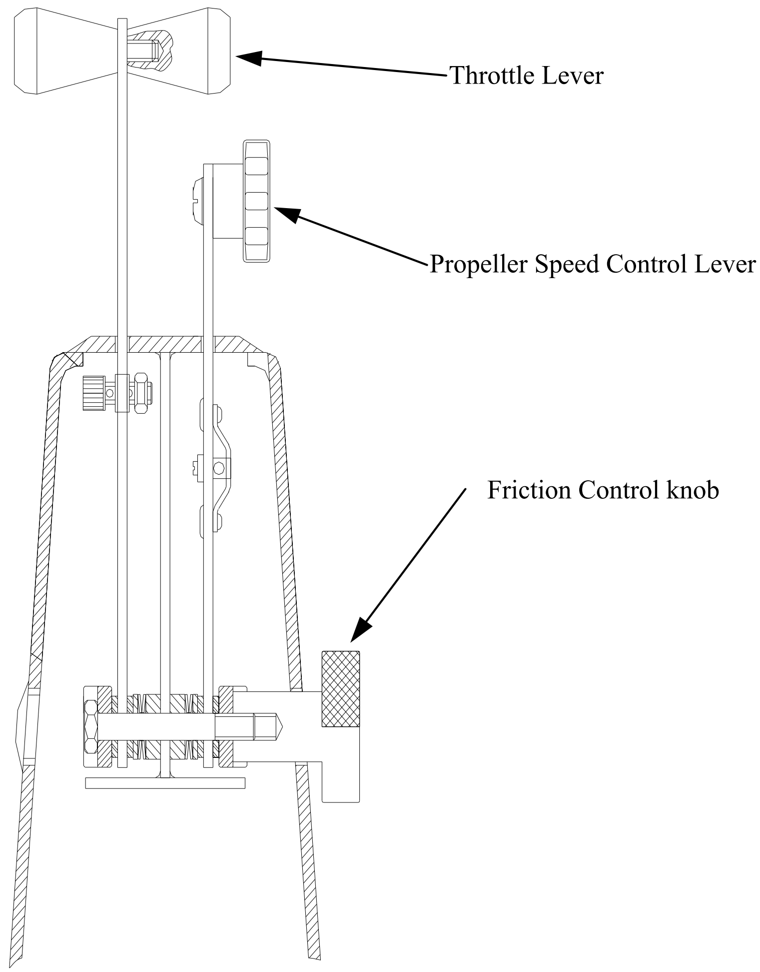

Figure 5 - Throttle Quadrant

CHAPTER 77
ENGINE INDICATING

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ENGINE INDICATING

1. General

The engine indicating system includes the RPM indicator, the oil pressure and temperature indicators, the fuel quantity indicator, the cylinder head temperature indicator and the manifold pressure indicator. The engine monitoring data is transmitted to the cockpit instrumentation partly electrically and partly mechanically. Refer to Figures 1 and 2, in 31-10-00 for the locations of the instruments.

2. Description

A. RPM Indicator

In the DA20-A1 the RPM indication is done by a mechanical system. The RPM indicated on the cockpit instrument is that of the propeller and NOT that of the engine.

B. Fuel Pressure Warning Light

The fuel pressure warning light is located in the center section of the instrument panel, and is activated by a pressure sensor located on the firewall. The pressure sensor operates on a piezoelectric crystal element which changes its resistance with pressure.

C. Oil Pressure Indicator

The oil pressure indicator is located in the right hand section of the instrument panel and receives its data from a pressure sensor located at the front of the engine. The sensor consists of a metal membrane whose movement is transferred to a resistor.

D. Oil Temperature Indicator

The oil temperature indicator is also located on the right hand section of the instrument panel and receives its data from a sensor which is located on the engine next to the oil filter. The temperature sensor transmits a voltage to the indicator.

E. Cylinder Head Temperature Indicator

The CHT indicator is located in the right hand section of the instrument panel. The temperature sensor is installed on cylinder No. 3 (right rear).

The sensor consists of an iron copper nickel element which generates a voltage which is transmitted to the indicator.

F. Manifold Pressure Indicator

The indicator is located in the right hand section of the instrument panel. A hose is attached to the equalizing pipe connecting the intake manifolds. This hose transmits the pressure value from the intake manifolds to the indicator.

3. Troubleshooting

The following table lists defects as they could appear on the engine indicating system, and their correction.

COMPLAINT	POSSIBLE CAUSE	REMEDY
No RPM indication	Defective flexible shaft Defective RPM indicator	Replace Replace
Incorrect RPM indication	Defective RPM indicator	Replace
No oil pressure indication	Defective sensor Defective indicator	Replace Replace
Low oil pressure indication	Low oil pressure Clogged bore in sensor	Check oil pressure using calibrated equipment Replace sensor
Fuel pressure warning light inoperative	Defective sensor Defective warning lamp No fuel in the system	Replace Replace Refuel airplane, check fuel system
High oil temperature indication	Defective sensor Defective wiring Defective indicator Use of non-approved motor oil	Replace Repair Replace Change motor oil
No cylinder head temperature indication	Defective wiring Defective indicator	Repair Replace
No or high manifold pressure indication	Defective or leaky manifold pressure line Defective indicator	Tighten clamps, replace line if necessary Replace

4. Removal and Installation

NOTE: In order to gain access to the instruments, the instrument panel cover must first be removed.

A. RPM Indicator

(1) Removal

(a) Disconnect flexible shaft from rear of instrument.

(b) Remove nuts from mounting bracket.

(c) Remove instrument from panel.

(2) Installation

(a) For installation reverse the sequence.

B. Fuel Pressure Warning Light

(1) Removal

(a) Pull off connectors from rear of warning light.

(b) Remove mounting nut.

(c) Remove warning light from instrument panel.

(2) Installation

(a) For installation reverse the sequence.

C. Oil Pressure Indicator

(1) Removal

(a) Pull off connectors from rear of instrument.

(b) Remove nuts from mounting bracket.

(c) Remove instrument from panel.

(2) Installation

(a) For installation reverse the sequence.

D. Oil Temperature Indicator

(1) Removal

(a) Pull off connectors from rear of instrument.

(b) Remove nuts from mounting bracket.

(c) Remove instrument from panel.

(2) Installation

(a) For installation reverse the sequence.

E. Cylinder Head Temperature Indicator

(1) Removal

(a) Pull off connectors from rear of instrument.

(b) Remove nuts from mounting bracket.

(c) Remove instrument from panel.

(2) Installation

(a) For installation reverse the sequence.

F. Manifold Pressure Indicator

(1) Removal

(a) Disconnect hose from rear of instrument.

(b) Remove mounting bolts and nuts.

(c) Remove instrument from panel.

(2) Installation

(a) For installation reverse the sequence.

CHAPTER 78
EXHAUST

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EXHAUST

1. General

Each of the engine cylinders is equipped with its own exhaust pipe leading to the underside of the engine, where they are attached to the muffler.

To enable heat expansion of the exhaust system, the connections between muffler and pipes are movable and secured with two springs each. The end pipe runs to the exterior of the airplane through the lower engine cowling on the right hand side. A jacket around the muffler serves as a heat exchanger. It provides hot air for cabin heat and carburetor heat.

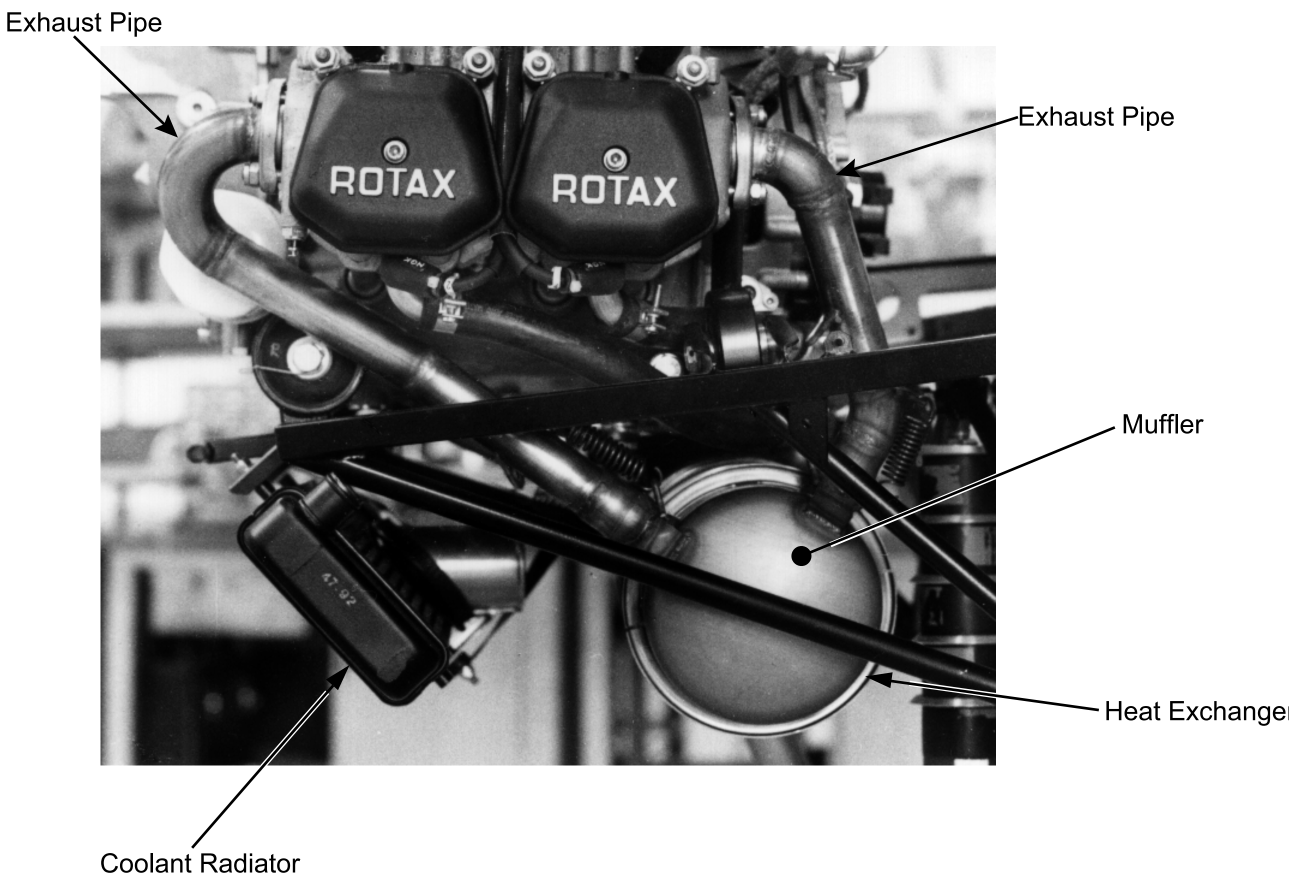

Figure 1 - Exhaust System

2. Description

Refer to Figure 1, Exhaust System and to Chapter 21-00-00, Figure 1 - Heating and Defrosting System.

The exhaust pipes are fabricated of welded high-grade steel. They run from the cylinders to the underside of the engine where they are connected to the muffler. A heat exchanger surrounds the muffler. It heats fresh air collected from behind the coolant radiator. The heated air is directed to the cockpit by a hose. Another section of the heat exchanger provides hot air that is guided to the air distribution box.

3. Troubleshooting

The following table lists defects as they could appear on the exhaust system, and their correction.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Excessive engine noise	Defective muffler	Replace
Cracks in the muffler	Locked up stress in the muffler	Weld or replace the muffler
Exhaust gas in the cockpit	Cracks in the muffler	Weld or replace the muffler
Traces of exhaust gas on the cylinder	Defective gasket on the cylinder or exhaust pipe Bent flange	Replace Replace pipe

4. Removal and Installation of the Exhaust System

The following maintenance practices describe how to remove and install the exhaust system.

WARNING: **MAKE SURE THAT THE EXHAUST SYSTEM IS COOL BEFORE YOU DO WORK ON THE SYSTEM. THE EXHAUST SYSTEM CAN BE HOT. THIS MAY CAUSE INJURY.**

A. Remove the Exhaust System

	Detail Steps/Work Items	Key Items/References
WARNING: **MAKE SURE THE ENGINE IS SAFE BEFORE DOING ANY WORK ON THE EXHAUST SYSTEM. IF THE ENGINE STARTS THE PROPELLER CAN CAUSE DEATH OR INJURY.**		
1.	Make sure that the engine is safe: - The ignition switch is set to OFF - The ALT/BAT switch is set to OFF - Throttle is set to IDLE - The mixture control is set to IDLE CUT-OFF	
2.	Remove the engine cowlings.	Refer to Chapter 71-10.
3.	Disconnect all ducting from the muffler shroud such as the air intake, carb heat, and heat box.	
4.	Remove the exhaust system from the engine exhaust cylinder ports. - Remove and discard the eight nuts from the cylinder head studs - Remove the eight spring washers	 Ensure while removing the nuts not to allow loading on an individual exhaust riser. Hold the exhaust system.
5.	Remove the exhaust system.	

B. Install the Exhaust System

	Detail Steps/Work Items	Key Items/References
	WARNING: **DO NOT STAND WITHIN THE DANGER AREA OF THE PROPELLER. A DAMAGED COMPONENT CAN CAUSE THE ENGINE TO START. THIS CAN CAUSE DEATH OR INJURY TO PERSONS.** **WARNING:** **YOU MUST DO A THOROUGH EXAMINATION OF THE EXHAUST MUFFLER. A DEFECTIVE MUFFLER MAY ALLOW EXHAUST GAS INTO THE COCKPIT. THIS CAN LEAD TO DEATH OR INJURY.** CAUTION: DO NOT REUSE THE NUTS THAT ATTACH THE EXHAUST PIPE ONTO THE CYLINDER HEAD FLANGE.	
1.	Assemble the exhaust pipes to the muffler. - Apply loctite anti-seize compount to ball end of each exhaust pipe - Use the tension springs to attach the exhaust manifold pipes to their respective positons on the muffler assembly	Lay muffler on a flat surface.
2.	Apply loctite anti-seize compound to all four exhaust pipe ends.	
3.	Attach the exhaust system to the engine. - Install the eight nuts - Tighten the eight nuts in sequence across engine in cross pattern. Tighten nuts progressively in at least two steps.	 Make sure to use new nuts. Refer to ROTAX 912 Maintenance Manual for torque values.
6.	Re-install all ducting connections to the muffler shroud such as the air intake, carb heat, and heat box.	
7.	Double check all connections and clearances to ensure adequate clearance against rub from pipes to nearby components	
8.	Perform an Engine Run-up - Do an exhaust system leak check.	Refer to DA20-A1 Airplane Flight Manual.
9.	Install the cowlings.	Refer to Chapter 71-10.

5. Inspection of Exhaust System

The exhaust system should be inspected for leaks every 100 hours. The weld seams are especially susceptible to cracks through which dangerous carbon monoxide can enter the cabin.

If there is suspicion of leakage, the cabin should be checked for contamination using a gas-detector apparatus. The maximum permissible level of carbon monoxide contamination is 50 PPM (parts per million). In the event that there is no gas-detector apparatus available, the muffler should be closed off and checked by application of compressed air. The outside surface of the muffler should be coated with a soap solution, which will show bubbles where cracks exist. Small cracks can be repaired by welding, while in the event that major damage has been found, the muffler should be replaced.

6. Inspection of Heat Exchanger

For inspection instructions, refer to Chapter 21-40-00.

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CHAPTER 79
OIL SYSTEMS

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OIL SYSTEMS

1. General

This chapter describes the lubrication system which is located outside of the engine.

The DA20-A1 is equipped with an oil radiator attached to the engine mount on the right hand engine side and connected to the engine with oil lines. An opening in the lower engine cowling supplies ram air to the oil radiator.

The oil tank is attached to the engine mount on the right hand side of the engine. Hot oil from the crankcase is directed to the oil tank. The output port of the oil tank is connected to the oil radiator. The oil tank is accessible through an inspection hole, in the cowling. This arrangement enables easy checking of the oil level.

2. Description

Refer to Figure 1.

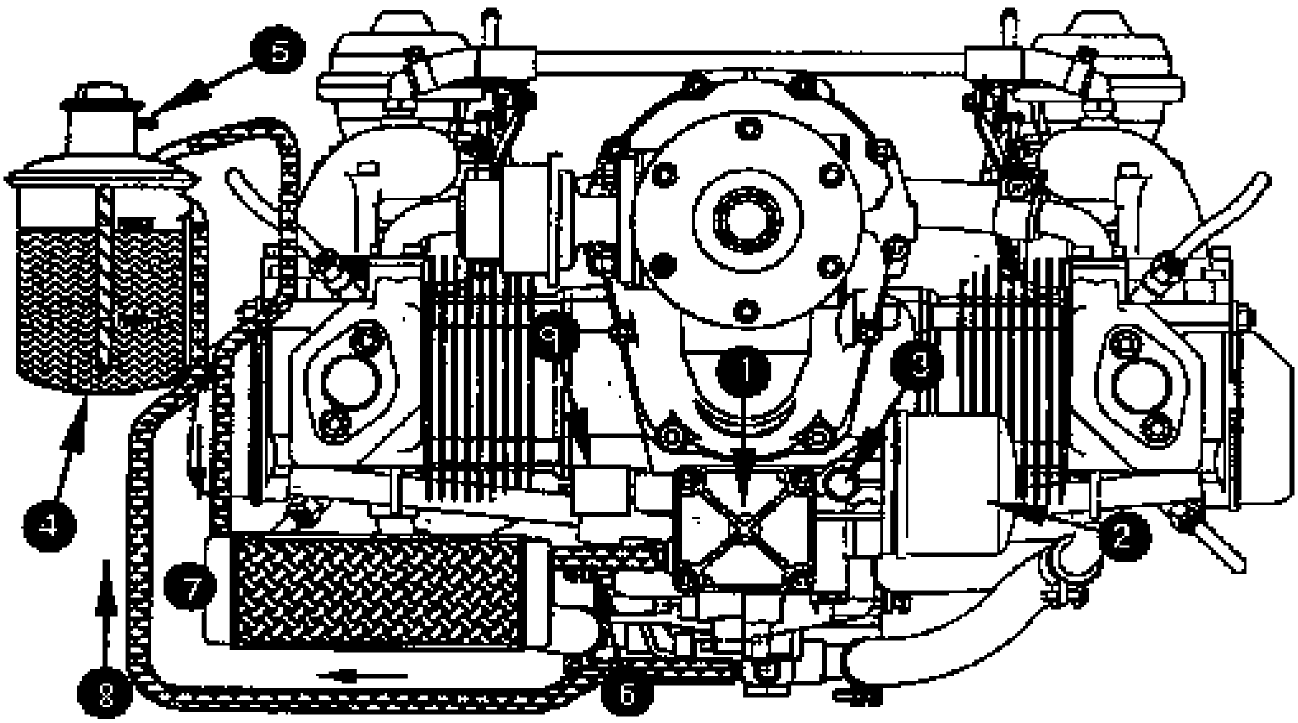
The hot oil is directed from the crankcase to the oil tank from where it flows to the oil radiator and on to the oil pump.

A temperature sensor is installed next to the oil filter. This sensor is connected to the oil temperature indicator.

An oil pressure sensor is installed opposite to the oil filter. It is connected to the oil pressure indicator.

On aircraft serial number 10145 and subsequent and aircraft with service bulletin DA20-79-01 incorporated the oil pressure sensor has been relocated to a bracket installed on the electrical shelf

CAUTION: SHARP BENDS OR TWISTED OIL LINES MAY RESULT IN A RESTRICTED OIL FLOW CONDITION. THIS WILL CAUSE DAMAGE TO THE ENGINE.



LEGEND

1. Oil Pump
2. Oil Filter
3. Oil Temp. Sensor
4. Oil Tank
5. Oil Tank Venting
6. Oil Feed Line
7. Oil Radiator
8. Oil Return Line
9. Oil Pressure Sensor

Figure 1 - Oil Circuit

OIL RADIATOR

1. General

The oil radiator is located on the lower right side of the engine, attached to the engine mount. The oil radiator has two threaded connection sleeves to which the oil lines are attached. The sleeves are also used to secure the radiator to the engine mount. Attached to the radiator is an air guide whose opening ends in the opening of the engine cowling.

2. Troubleshooting

The following table lists defects as they could appear on the oil cooling system, and their correction.

COMPLAINT	POSSIBLE CAUSE	REMEDY
Excessive oil temperature	Damaged radiator fins Inhibited air flow	Replace radiator Check for foreign objects
Leaks in the oil cooling system	Defective hose connections or radiator	Check connections and radiator

3. Removal and Installation

A. Oil Radiator

(1) Removal

Refer to Figure 2.

(a) Disconnect hose lines from radiator ports.

(b) Straighten locking plates on hose connectors.

(c) Remove mounting nuts.

(d) Remove oil radiator.

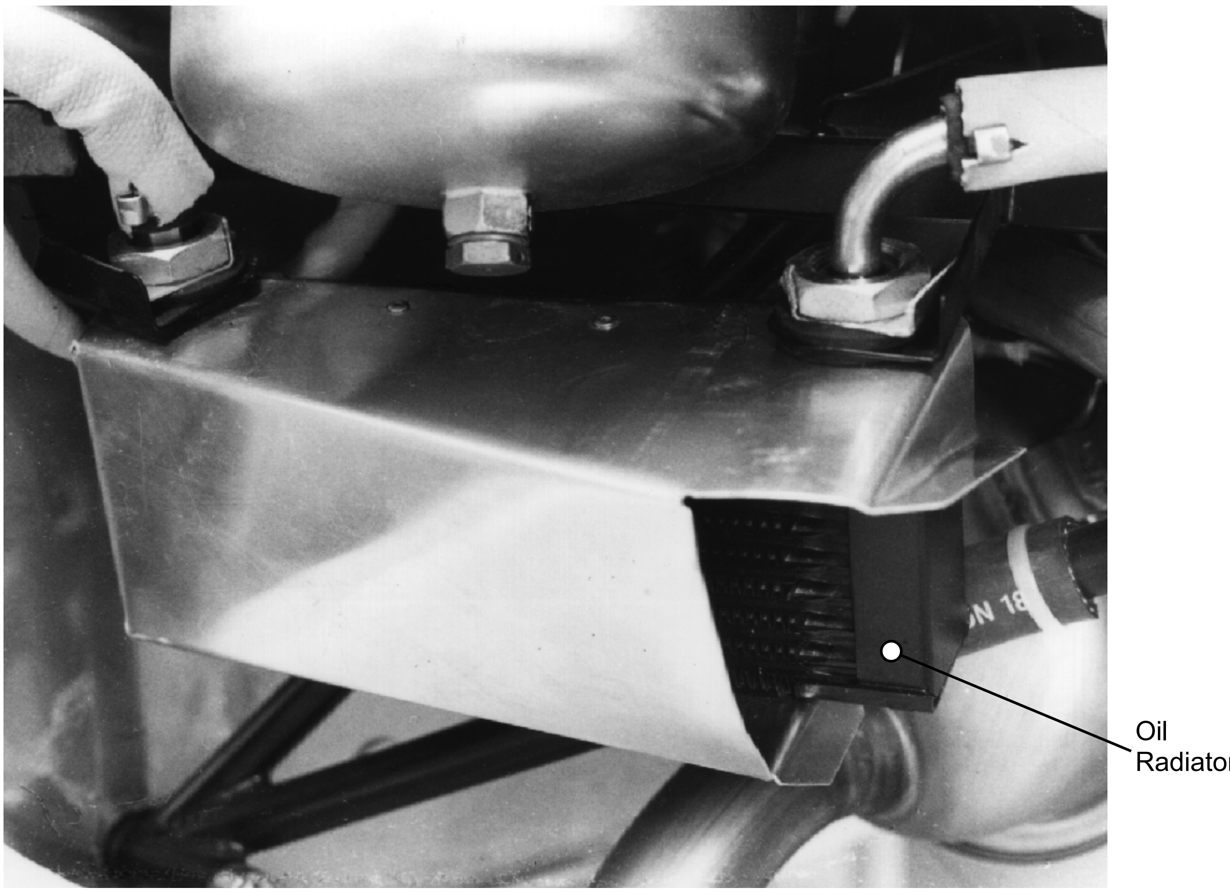


Figure 2 - Oil Radiator

(2) Installation

(a) For installation reverse the sequence.

<u>NOTE:</u> Use new locking plates.

<u>NOTE:</u> In the event that the engine has to be disassembled due to metal particles detected during an oil filter change, the oil radiator must be flushed or replaced.

INDICATING

1. General

The DA20-A1 is equipped with an oil pressure and an oil temperature sensor for monitoring the lubrication system.

The oil temperature sensor is attached next to the oil filter, while the oil pressure sensor is located opposite of the oil filter.

Both sensors operate electrically and transmit their data to the instruments located in the instrument panel. Refer to Figure 1, for location of sensors.

A. Oil Temperature Sensor

Refer to Figure 3.

The oil temperature sensor uses a resistor element and is supplied with onboard power.

B. Oil Pressure Sensor

Refer to Figure 4.

The oil pressure sensor is a membrane type sensor with integrated potentiometer. The sensor is supplied with onboard power.

The built in membrane consists of a metal which is resistant to aging. Located on the top side of the sensor is a vent bore which is protected by a plastic cap.

2. Troubleshooting

The following table lists defects as they could appear on the oil circuit indicating system, and their correction.

COMPLAINT	POSSIBLE CAUSE	REMEDY
No oil temperature indication	Defective wiring or connector	Check wiring and connector
	Defective sensor	Replace
No oil pressure indication	Defective wiring or connector	Check wiring and connector
	Clogged bore on sensor	Replace sensor
	Clogged vent bore on sensor	Replace sensor
	Defective sensor	Replace sensor

3. Removal and Installation

A. Oil Temperature Sensor

(1) Removal

(a) Disconnect wiring.

(b) Remove sensor using suitable tool.

(2) Installation

(a) For installation reverse the sequence. When installing a new seal, the sensor is to be turned until the torque increases perceptibly, and then by another 135° (3/8 revolutions). The proper torque for the cable connector is 1 Nm (0.74 lbf-ft).

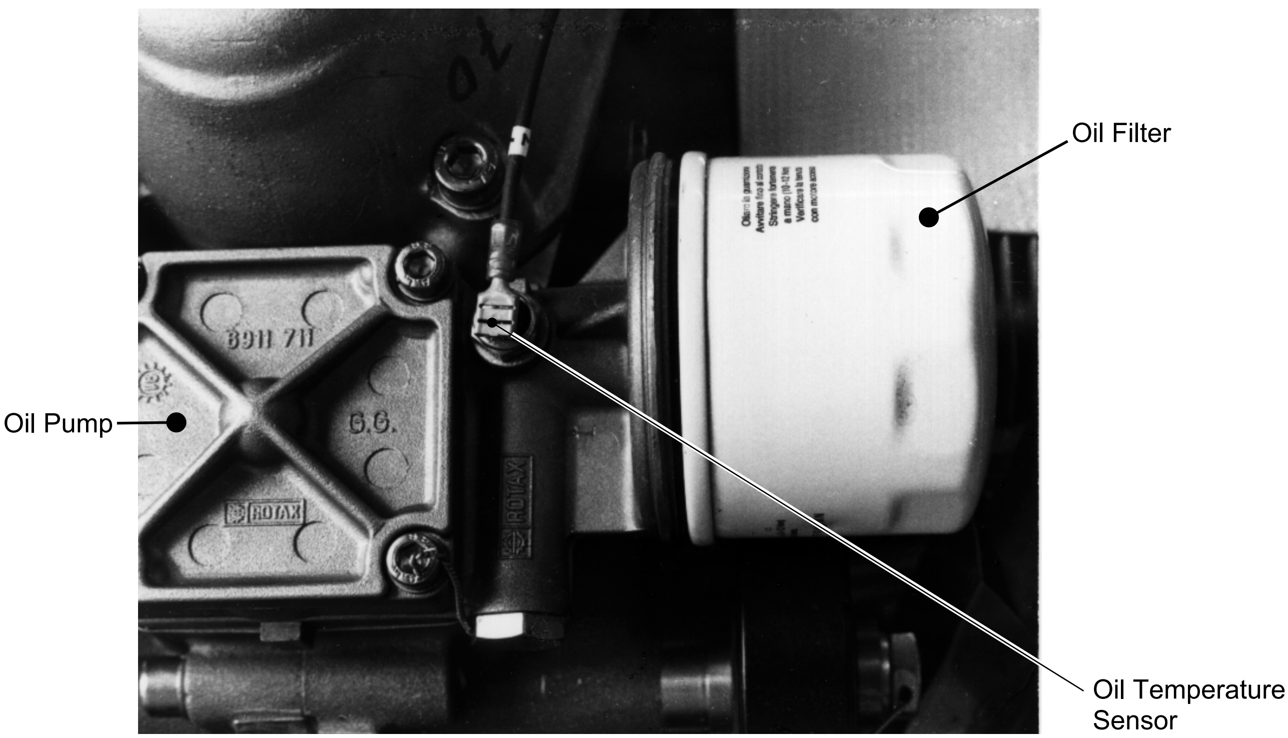


Figure 3 - Oil temperature Sensor and Oil Filter

B. Oil Pressure Sensor

Effective for aircraft serial number 10002 to 10144.

(1) Removal

(a) Disconnect wiring.

(b) Remove sensor.

(2) Installation

(a) For installation reverse the sequence. When installing the sensor, a suitable sealing compound must be used (e.g. Crane pac Plastic Lead Seal No. 2).

Maximum torque of sensor in engine block:

Refer to ROTAX Maintenance Manual, MMH-912, latest revision for the torque value.

Proper torque of cable connector:

1 Nm (0.74 lbf-ft)

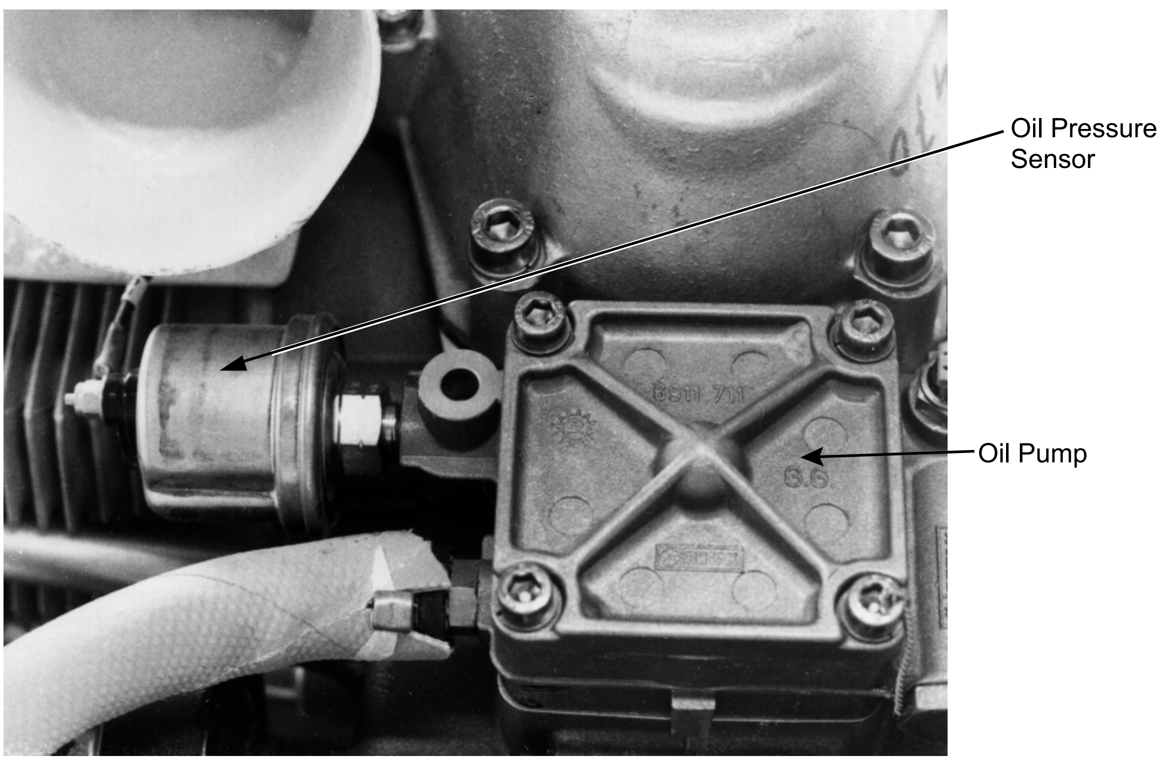


Figure 4 - Oil Pressure Sensor

C. Oil Pressure Sensor

Effective for aircraft serial number 10145 and subsequent and aircraft with service bulletin DA20-79-01 incorporated.

(1) Removal

Refer to Figure 5.

(a) Disconnect wiring.

(b) Remove the sensor.

(2) Installation

(a) Install the sensor. Use thread locker Loctite 592 or Sealube. Apply to male threads, keep holes clear.

(b) Max. torque of sensor in fitting 30 Nm (22.1 lbf-ft).

(c) Re-connect electrical wire to relocated oil pressure sending unit.

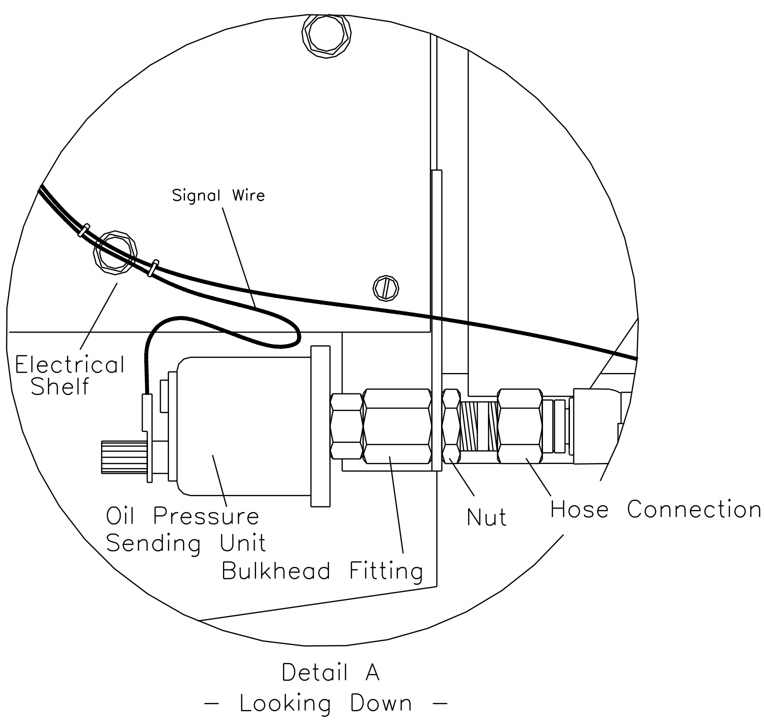


Figure 5 - Oil Pressure Sensor (Sending Unit)

(3) Testing

The oil pressure sensor changes its resistance with increase of pressure. It can be checked using the following table.

Pressure [bar]	Pressure [psi]	Resistance
0	0	5 13
2	29	52 ± 4
4	58	88 ± 4
6	87	124 ± 5
8	116	155 ± 5

In the event that the sensor fails to reach these values, it must be replaced.

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CHAPTER 92
WIRING DIAGRAMS

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WIRING DIAGRAMS

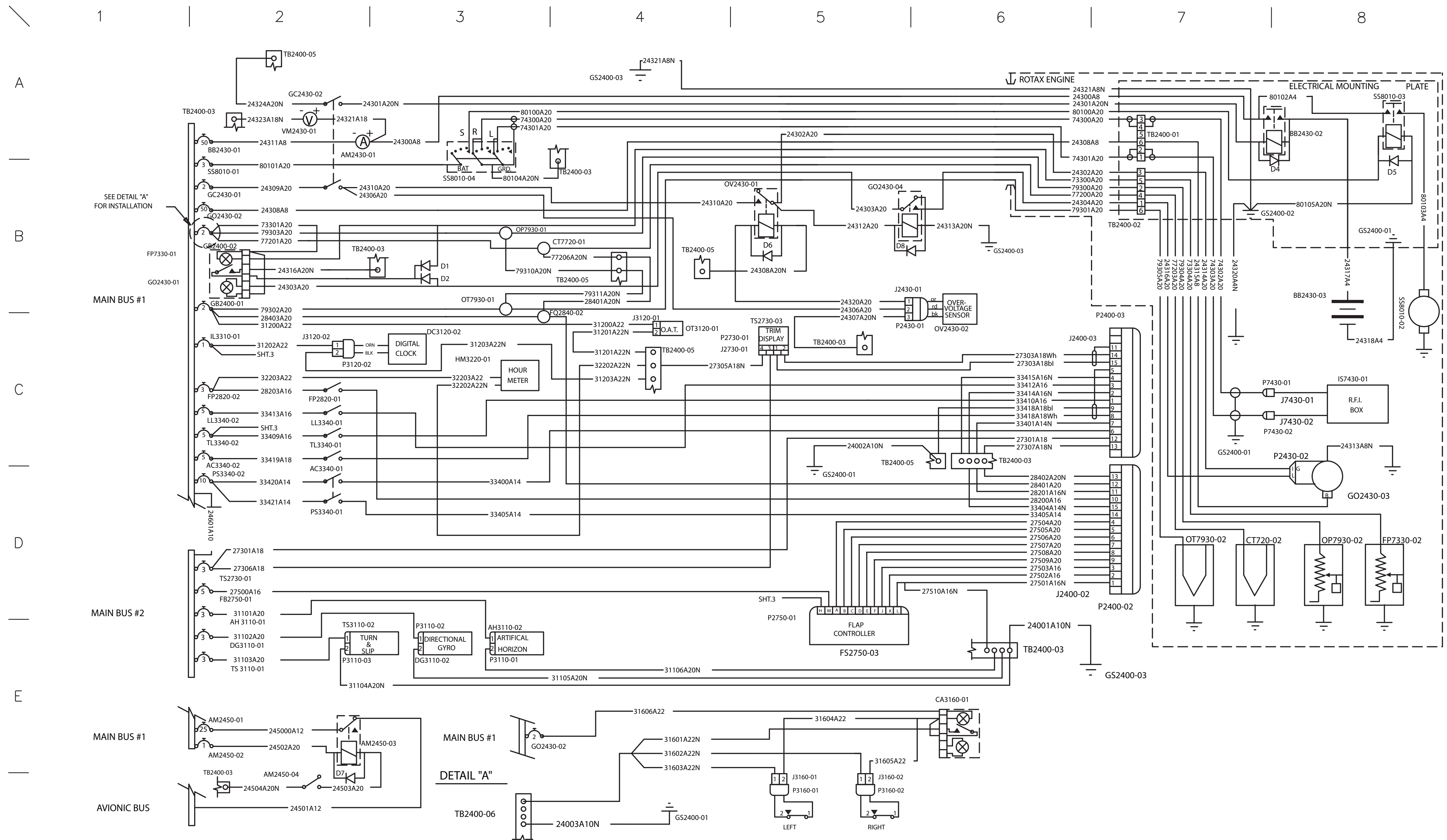
1. General

This Subject describes the Wiring Diagram/Schematic for each system installed on the DA20-A1 aircraft. The Wiring Diagrams/Schematics use the ATA Chapter/Section/Subject numbering system.

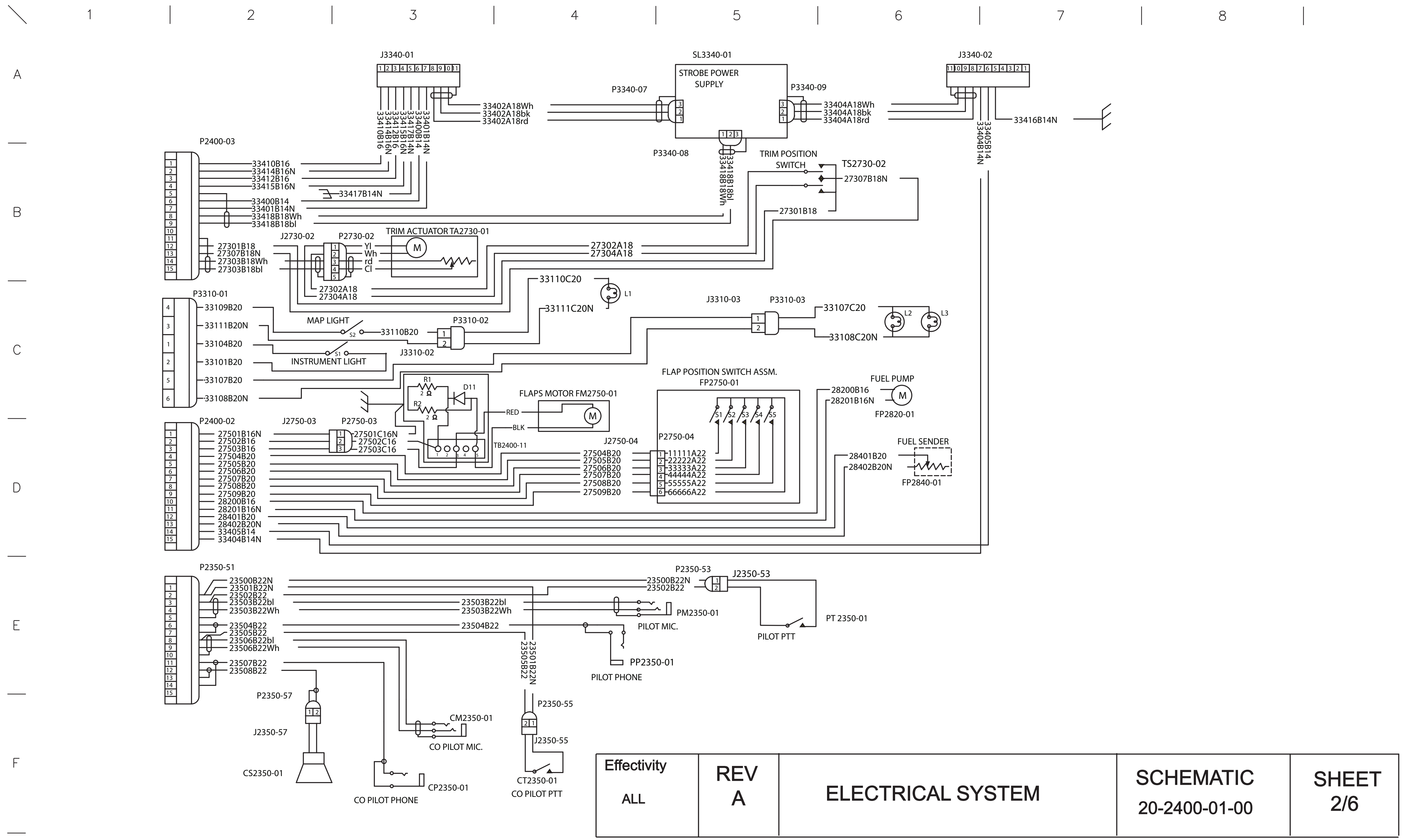
2. List of Wiring Diagrams/Schematics.

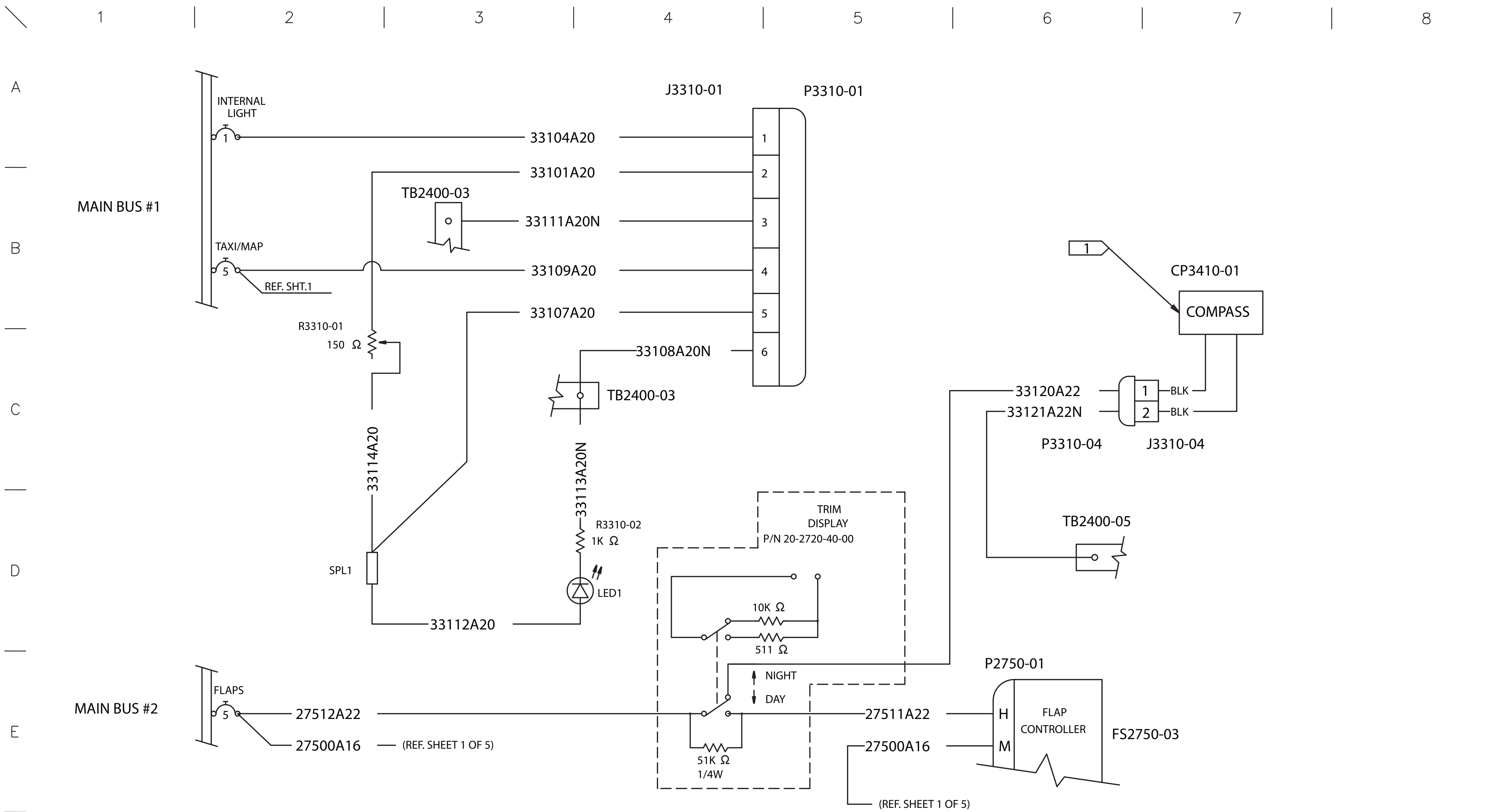
CH-SE-SU	Title	Drawing No.	Rev. #	No. of Sheets
92-10-00	ELECTRICAL SYSTEM	20-2400-01-00	A	6
92-10-00	ELECTRICAL SYSTEM - with SB DA20-79-08 installed	20-2400-01-00	A	1
92-10-00	HOURMETER	20-2400-07-02	D	1
92-10-00	ADVANCED STARTING SYSTEM - with SB DA20-74-01 installed	20-9274-00-00	A	1
92-10-00	CABIN VENTILATION, OPTIONAL	20-2121-04-00	B	1
92-10-00	TRIM DISPLAY SCHEMATIC	20-2720-10-00	C	1
92-30-00	GPS/COM KLX 135	20-2310-00-00	B	1
92-30-00	KX 125, VARIANT 01, 02	20-2310-00-01	C	1
92-30-00	NAV/COMM, KX125	20-2310-00-02	A	1
92-30-00	GPS/COM, KLX 135A	20-2310-00-03	A	1
92-30-00	KX 155	20-2310-02-00	A	1
92-30-00	KX 155, ISO	20-2310-05-00	A	1
92-30-00	VHF TRANSCEIVER, AR 4201	20-2310-06-00	A	1
92-30-00	NAV/COMM, KX 125	20-2310-07-00	A	1
92-30-00	NAV/COM, KX 155	20-2310-08-00	A	1
92-30-00	GPS/COMM, KLX 135A	20-2310-09-00	A	1
92-30-00	NAV/COMM, KX 155	20-2310-10-00	A	1
92-30-00	KX 125, PACKAGE 01	20-2310-11-00	A	1
92-30-00	INTERCOM	20-2350-00-00	A	1
92-30-00	INTERCOM, PM501 - With KX 125	20-2350-01-00	C	1

CH-SE-SU	Title	Drawing No.	Rev. #	No. of Sheets
92-30-00	AUDIO PANEL, KA 134	20-2350-02-00	C	1
92-30-00	INTERCOM, PM501 - With KLX 135A	20-2350-04-00	A	1
92-30-00	INTERCOM, PM2000	20-2350-06-00	A	1
92-30-00	AUDIO PANEL, KA 134	20-2350-08-00	A	1
92-30-00	AUDIO PANEL, KMA 24	20-2350-09-00	A	1
92-30-00	AUDIO PANEL, KMA 24	20-2350-10-00	A	1
92-30-00	TRANSPONDER, KT 76A, VARIANT 01, 02	20-3450-00-00	C	1
92-30-00	TRANSPONDER, KT 76A	20-3450-02-00	A	1
92-30-00	ADF, KR 87	20-3450-03-00	A	1
92-30-00	GPS RECEIVER, KLN 35N	20-3450-04-00	C	1
92-30-00	TRANSPONDER, GPS RECEIVER, KT 76A, KLN 35A, OPTIONAL	20-3450-05-00	A	1
92-30-00	DME, KN 64	20-3450-06-00	A	1
92-30-00	TRANSPONDER, ATC 2000	20-3450-07-00	A	1
92-30-00	GPS RECEIVER, KLN 35A	20-3450-08-00	A	1
92-30-00	TRANSPONDER, KT 76A	20-3450-09-00	A	1
92-30-00	GPS 150	20-3470-00-00	B	1



Effectivity	REV		SCHEMATIC	SHEET
ALL	A	ELECTRICAL SYSTEM	20-2400-01-00	1/6

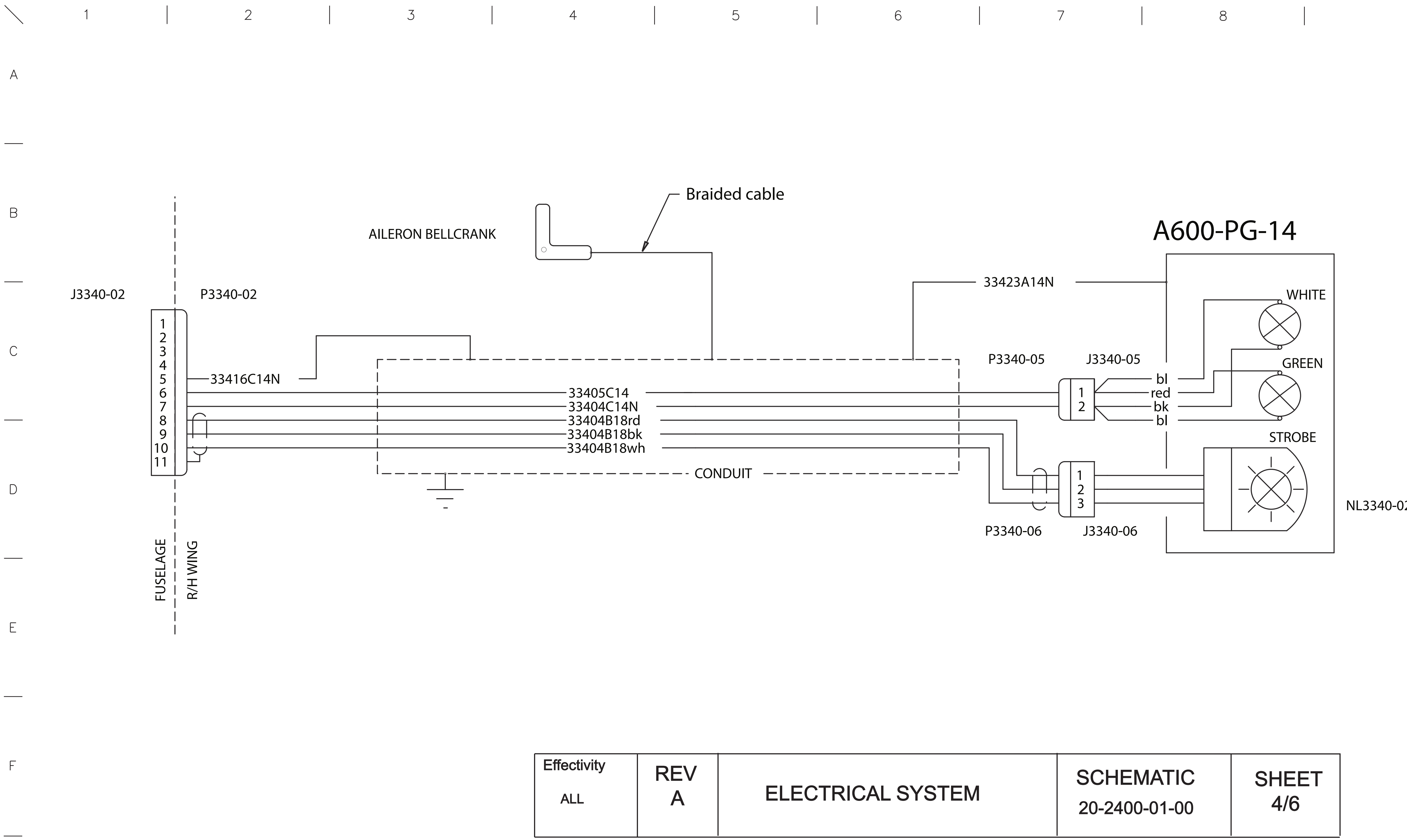

1
2
3
4
5
6
7
8
A
B
C
D
E
F
J3340-01
SL3340-01
STROBE POWER SUPPLY
P3340-07
P3340-09
P3340-08
J3340-02
33402A18Wh
33402A18bk
33402A18rd
33404A18Wh
33404A18bk
33404A18rd
33416B14N
33405B14
33404B14N
33418B18bl
33418B18Wh
P2400-03
33410B16
33414B16N
33412B16
33415B16N
33417B14N
33400B14
33401B14N
33418B18Wh
33418B18bl
TRIM POSITION SWITCH
TS2730-02
27307B18N
27301B18
J2730-02
P2730-02
TRIM ACTUATOR TA2730-01
27301B18
27307B18N
27303B18Wh
27303B18bl
27302A18
27304A18
Yl
Wh
rd
Cl
33110C20
L1
P3310-01
33109B20
33111B20N
33104B20
33101B20
33107B20
33108B20N
MAP LIGHT
33110B20
P3310-02
J3310-02
INSTRUMENT LIGHT
33111C20N
J3310-03
P3310-03
33107C20
33108C20N
L2
L3
R1
R2
D11
FLAPS MOTOR FM2750-01
RED
BLK
TB2400-11
FLAP POSITION SWITCH ASSM.
FP2750-01
P2750-04
J2750-04
11111A22
22222A22
33333A22
44444A22
55555A22
66666A22
FUEL PUMP
28200B16
28201B16N
FP2820-01
FUEL SENDER
28401B20
28402B20N
FP2840-01
P2400-02
J2750-03
P2750-03
27501B16N
27502B16
27503B16
27504B20
27505B20
27506B20
27507B20
27508B20
27509B20
28200B16
28201B16N
28401B20
28402B20N
33405B14
33404B14N
27501C16N
27502C16
27503C16
P2350-51
23500B22N
23501B22N
23502B22
23503B22bl
23503B22Wh
23504B22
23505B22
23506B22bl
23506B22Wh
23507B22
23508B22
P2350-53
J2350-53
PM2350-01
PILOT MIC.
PT 2350-01
PILOT PTT
PP2350-01
PILOT PHONE
23501B22N
23505B22
P2350-55
J2350-55
CT2350-01
CO PILOT PTT
P2350-57
J2350-57
CS2350-01
CM2350-01
CO PILOT MIC.
CP2350-01
CO PILOT PHONE
Effectivity
ALL
REV
A
ELECTRICAL SYSTEM
SCHEMATIC
20-2400-01-00
SHEET
2/6



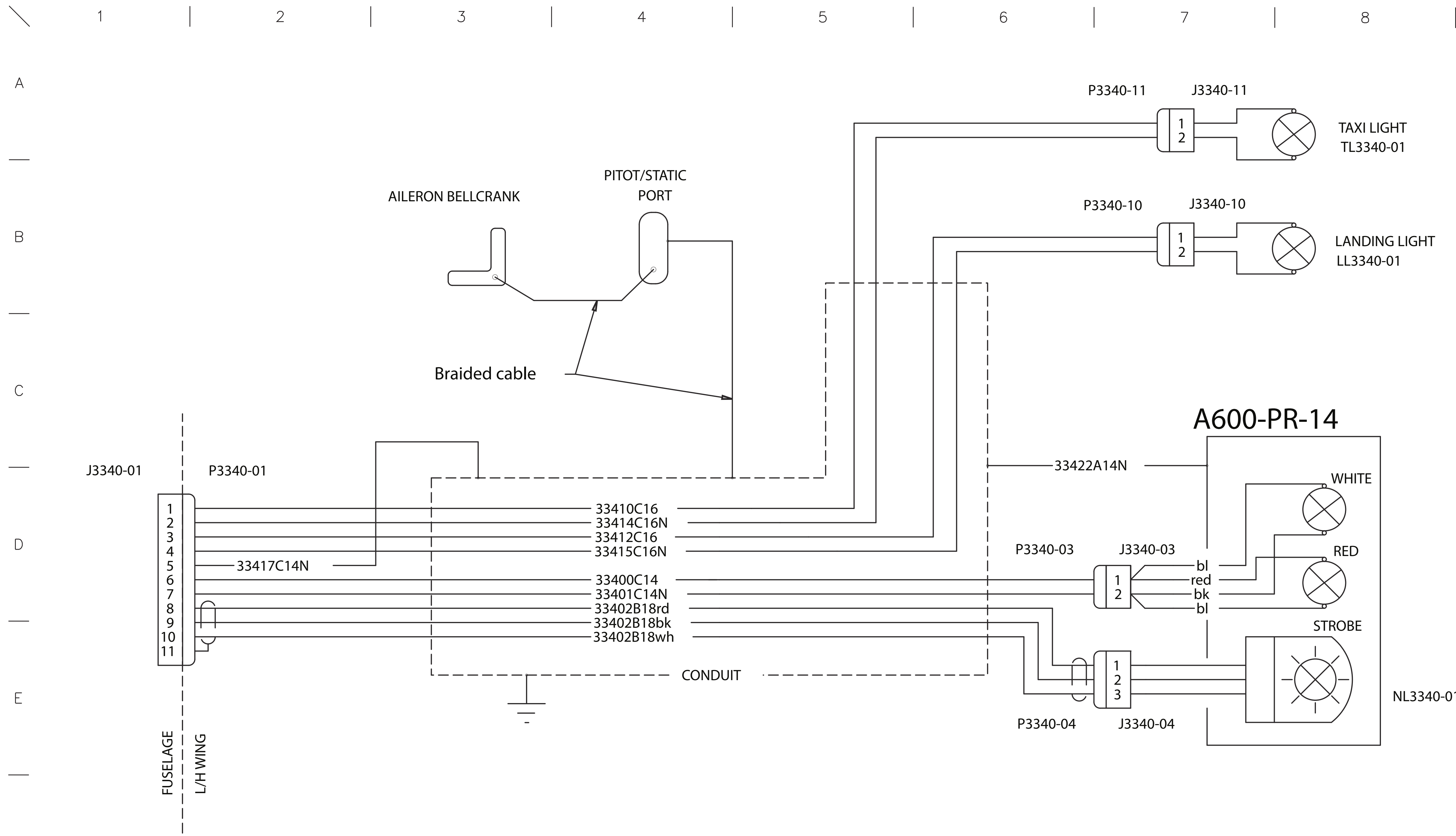
NOTE:

1 REF. COMPASS LAMP MUST BE P/N 382.

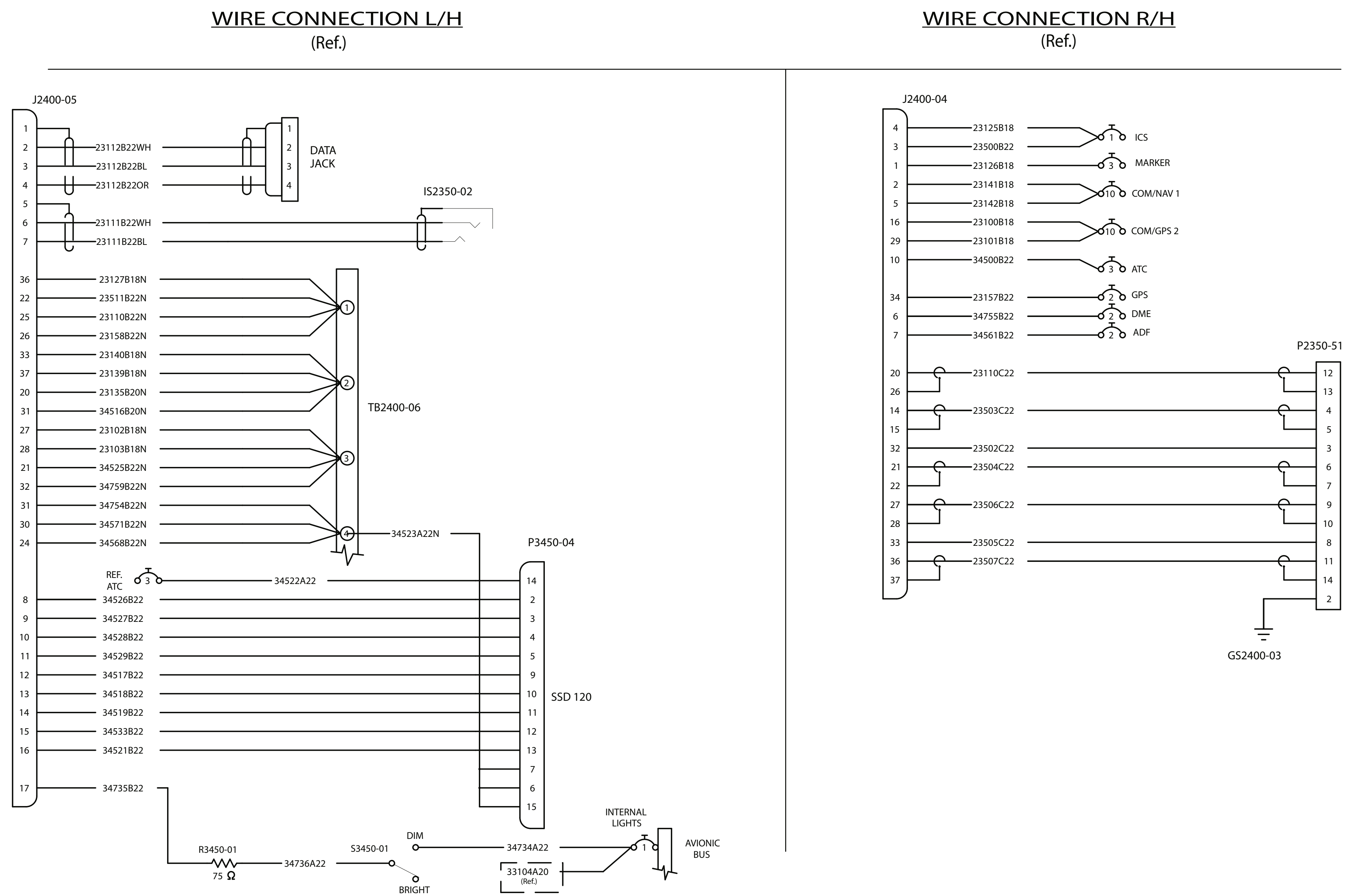
Effectivity	REV		SCHEMATIC	SHEET
ALL	A	ELECTRICAL SYSTEM	20-2400-01-00	3/6



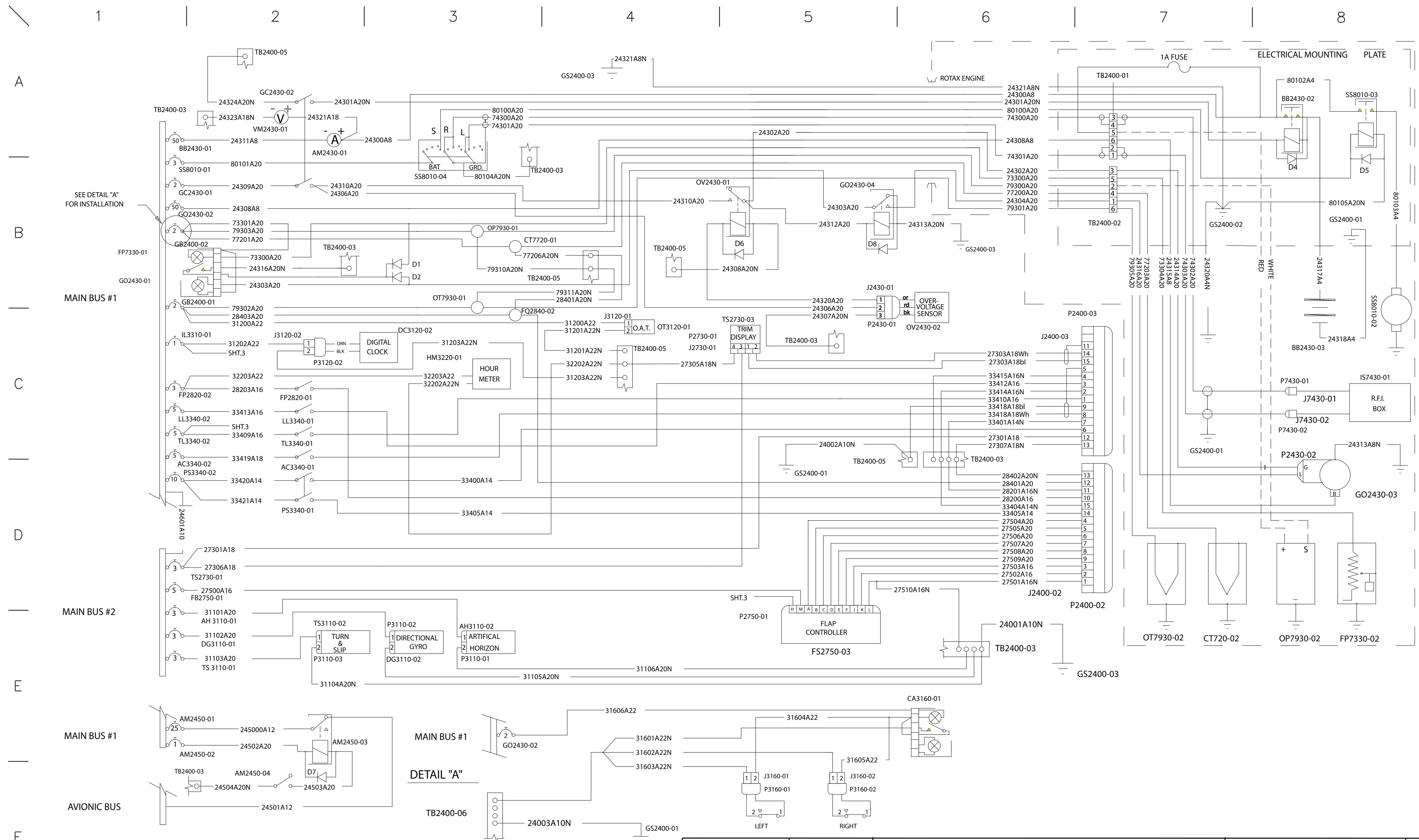
Effectivity ALL	REV A	ELECTRICAL SYSTEM	SCHEMATIC 20-2400-01-00	SHEET 4/6



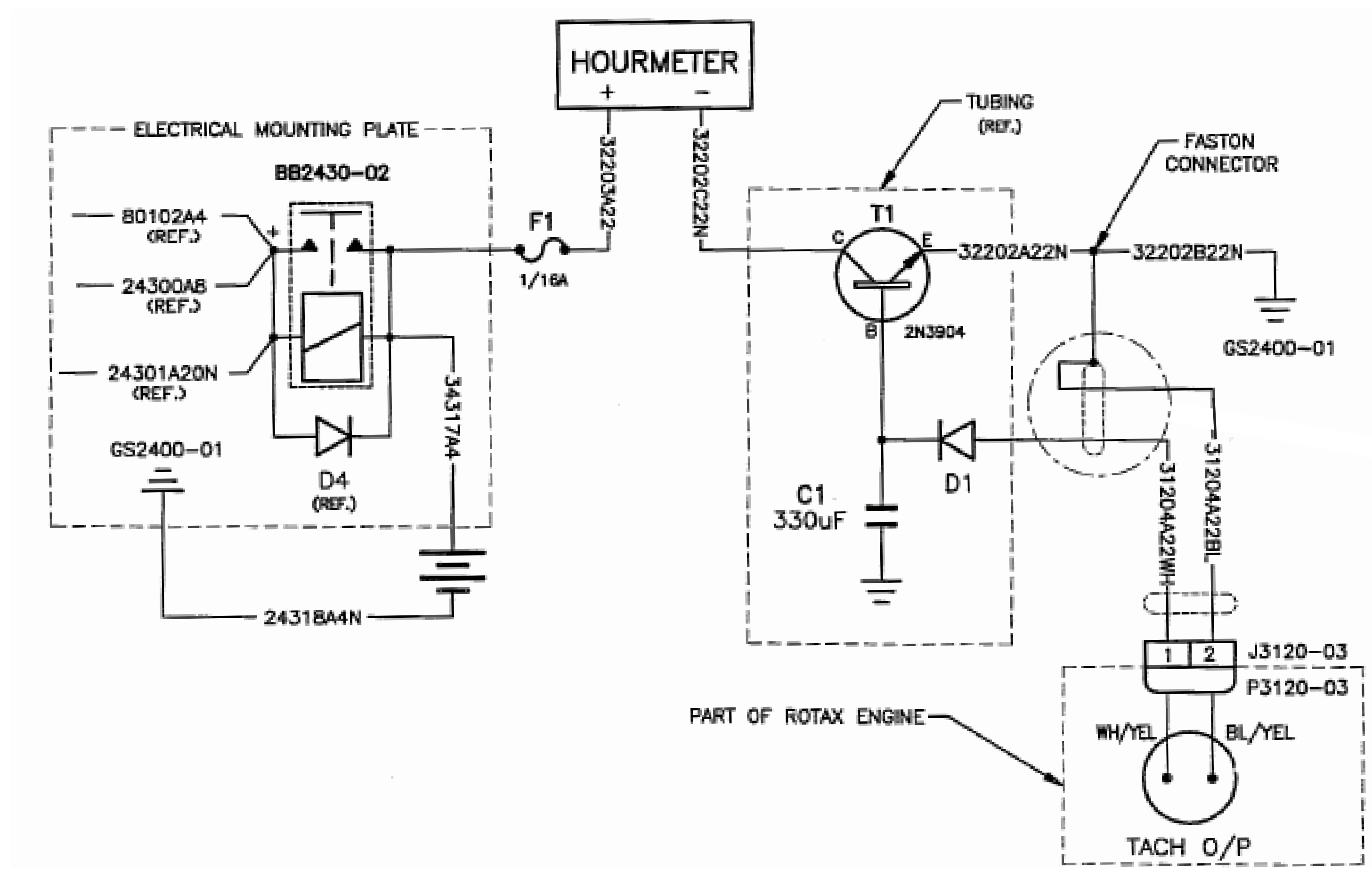
Effectivity	REV		SCHEMATIC	SHEET
ALL	A	ELECTRICAL SYSTEM	20-2400-01-00	5/6



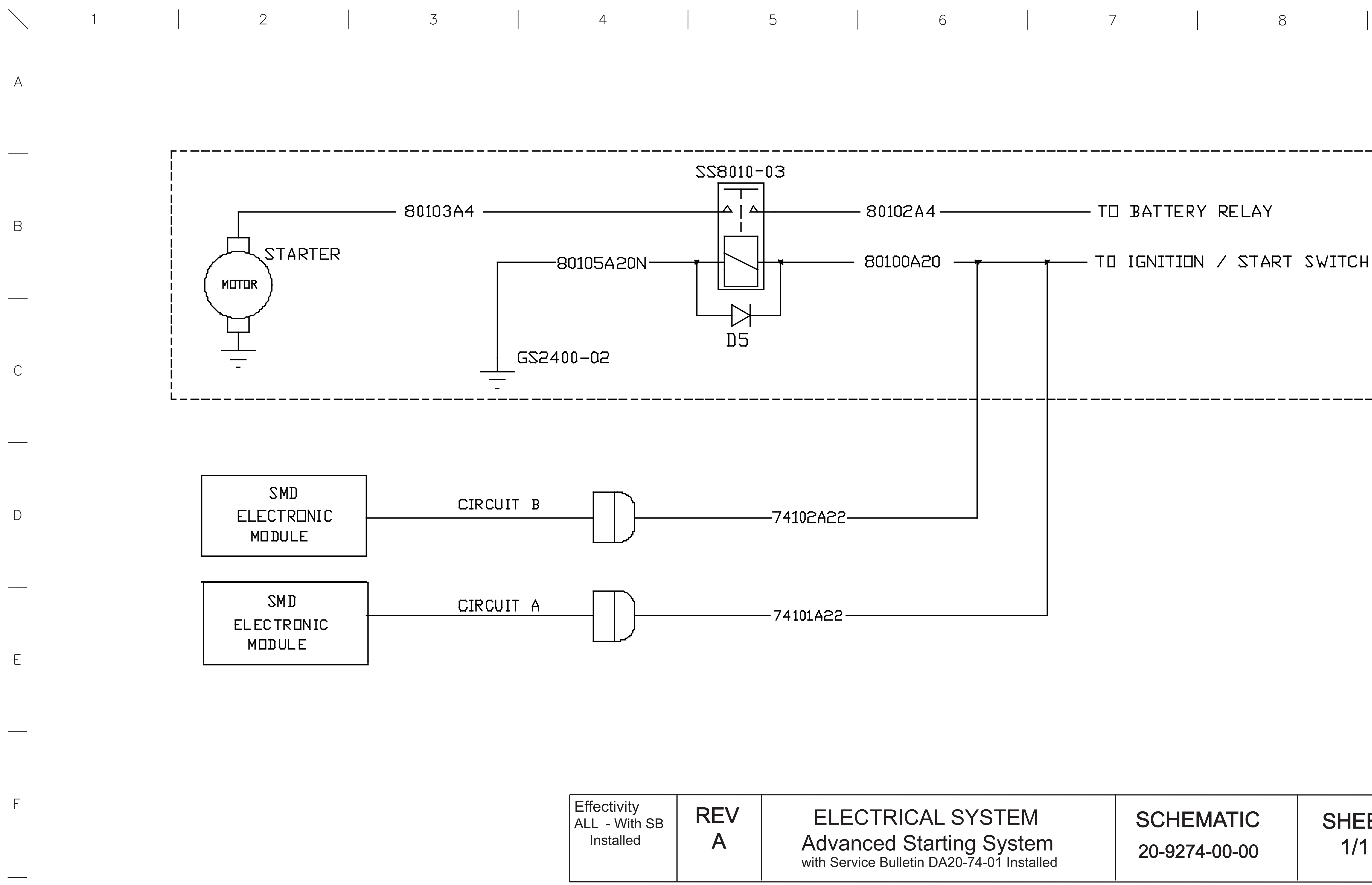
Effectivity ALL	REV A	ELECTRICAL SYSTEM	SCHEMATIC 20-2400-01-00	SHEET 6/6



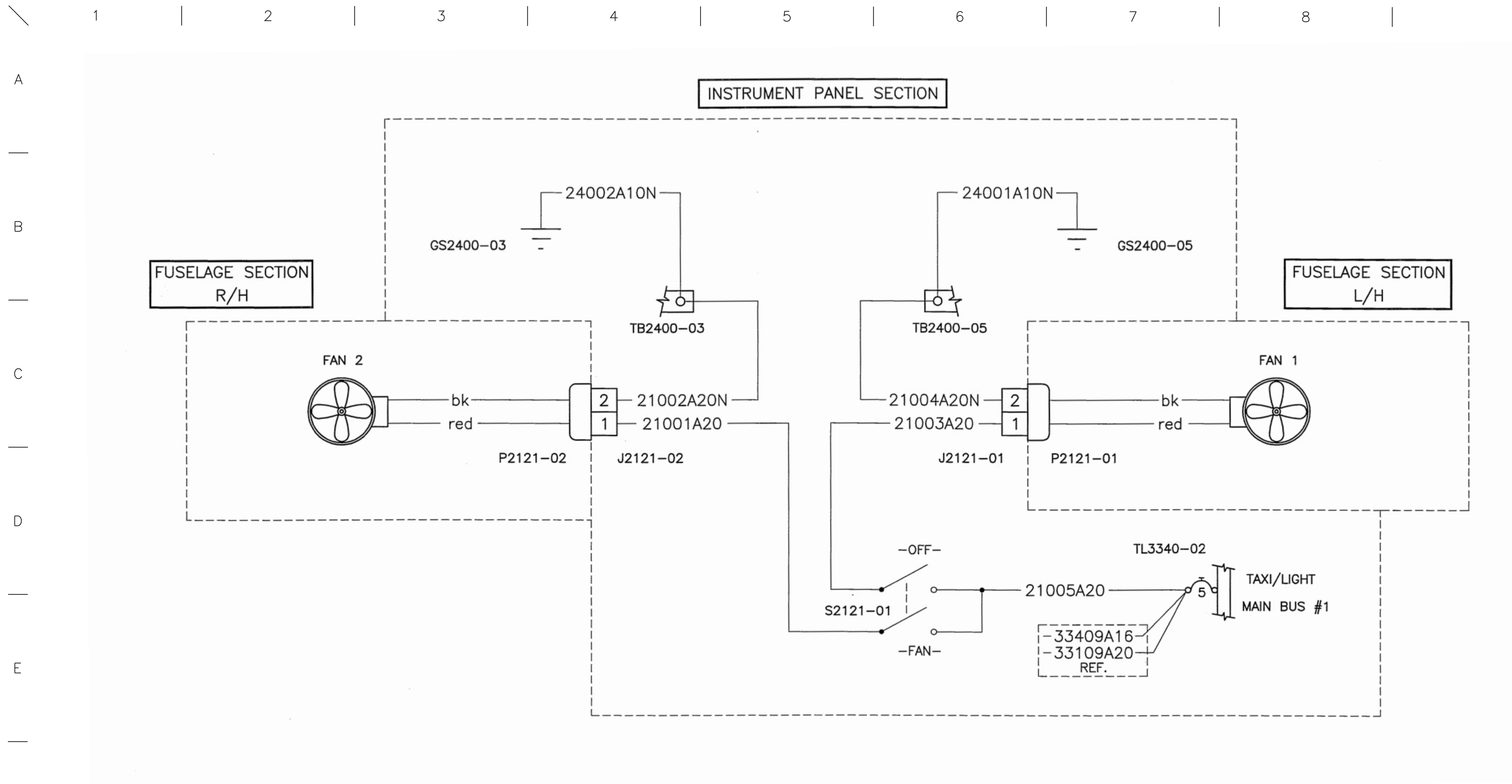
Effectivity 10093 thru 10331	REV A	ELECTRICAL SYSTEM with Service Bulletin DA20-79-08 Installed	SCHEMATIC 20-2400-01-00	SHEET 1/1



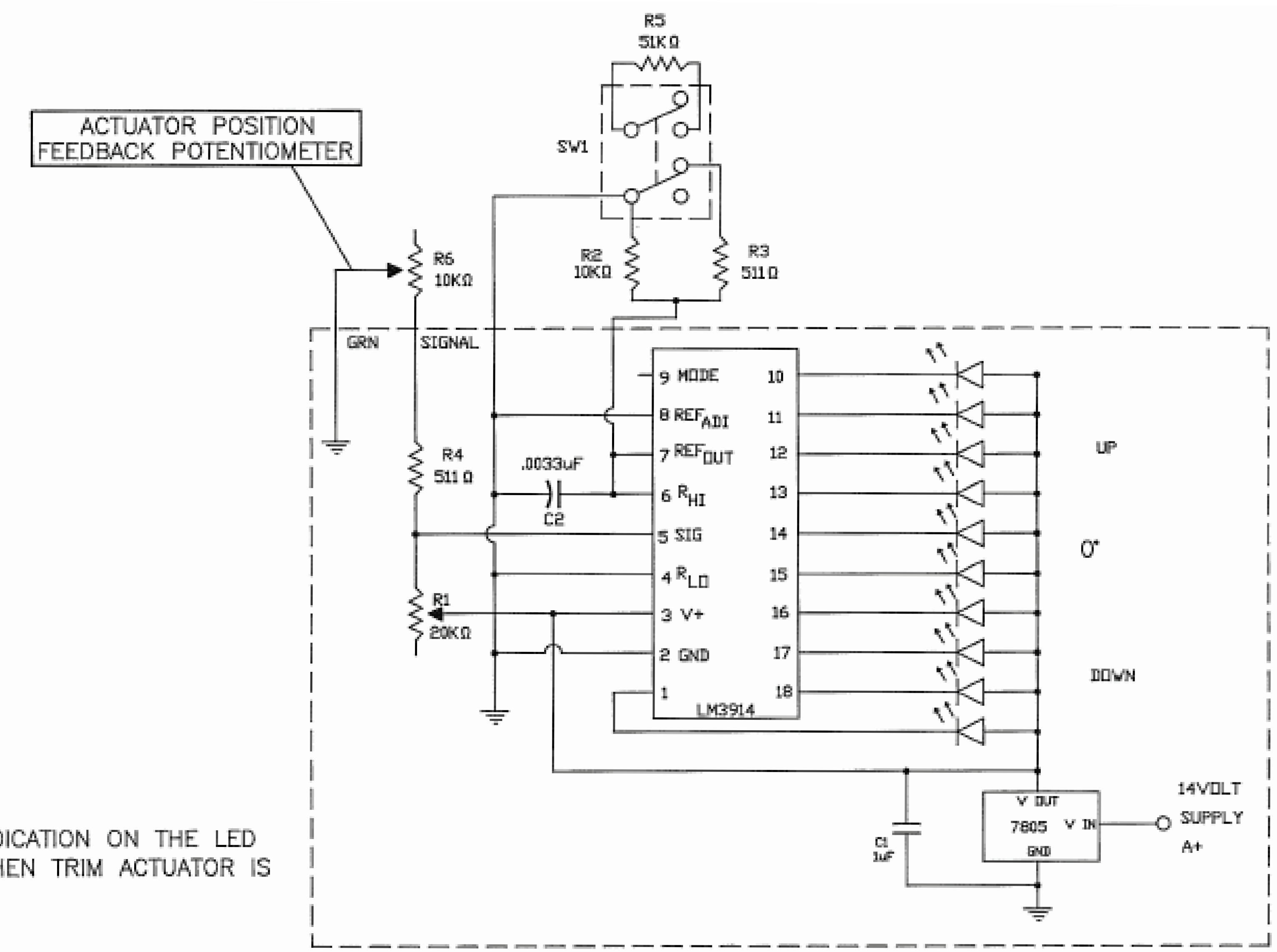
Effectivity	REV		SCHEMATIC	SHEET
ALL	D	HOURMETER	20-2400-07-02	1/1



Effectivity ALL - With SB Installed	REV A	ELECTRICAL SYSTEM Advanced Starting System with Service Bulletin DA20-74-01 Installed	SCHEMATIC 20-9274-00-00	SHEET 1/1



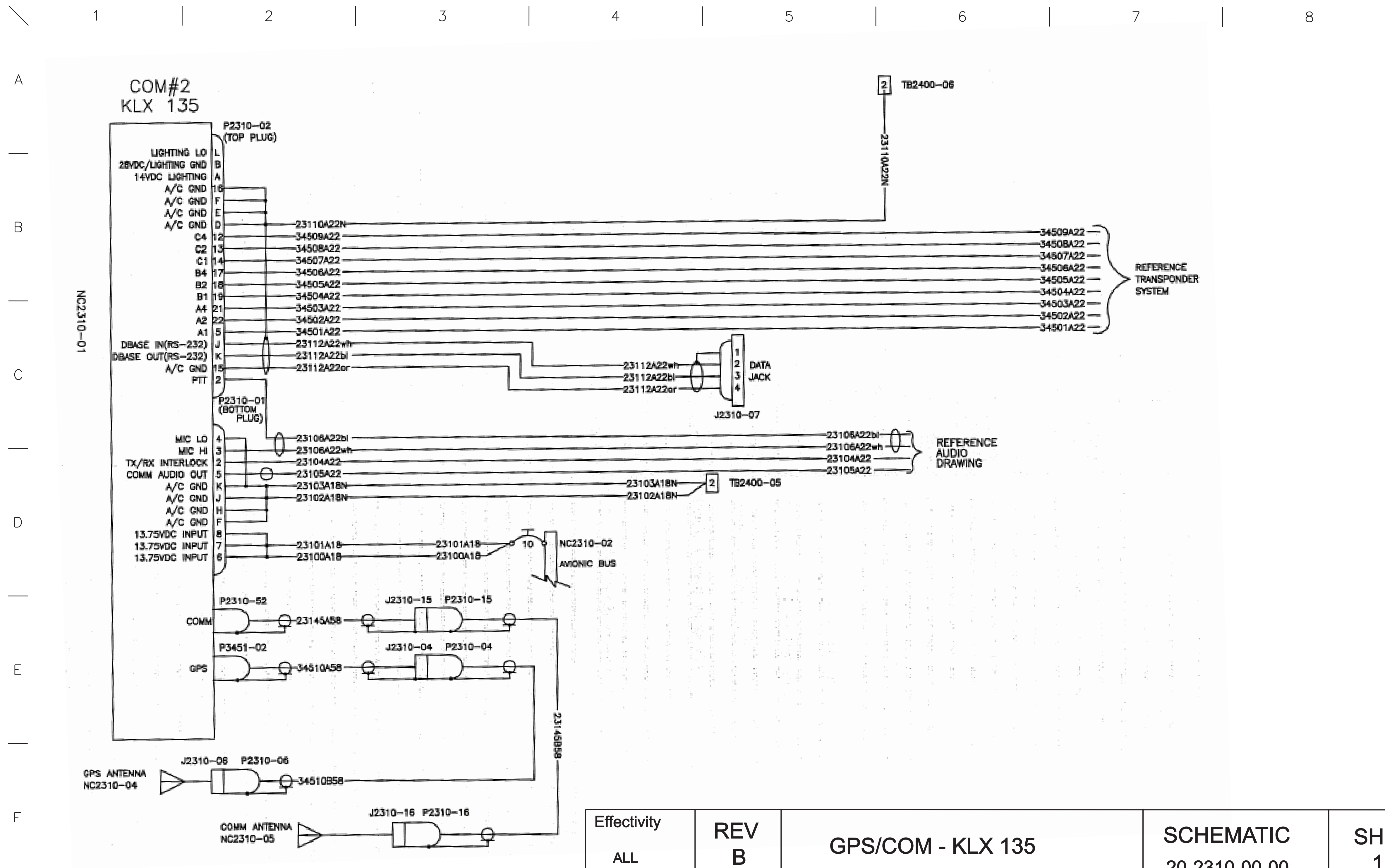
Effectivity ALL	REV B	CABIN VENTILATION (OPTIONAL)	SCHEMATIC 20-2121-04-00	SHEET 1/1



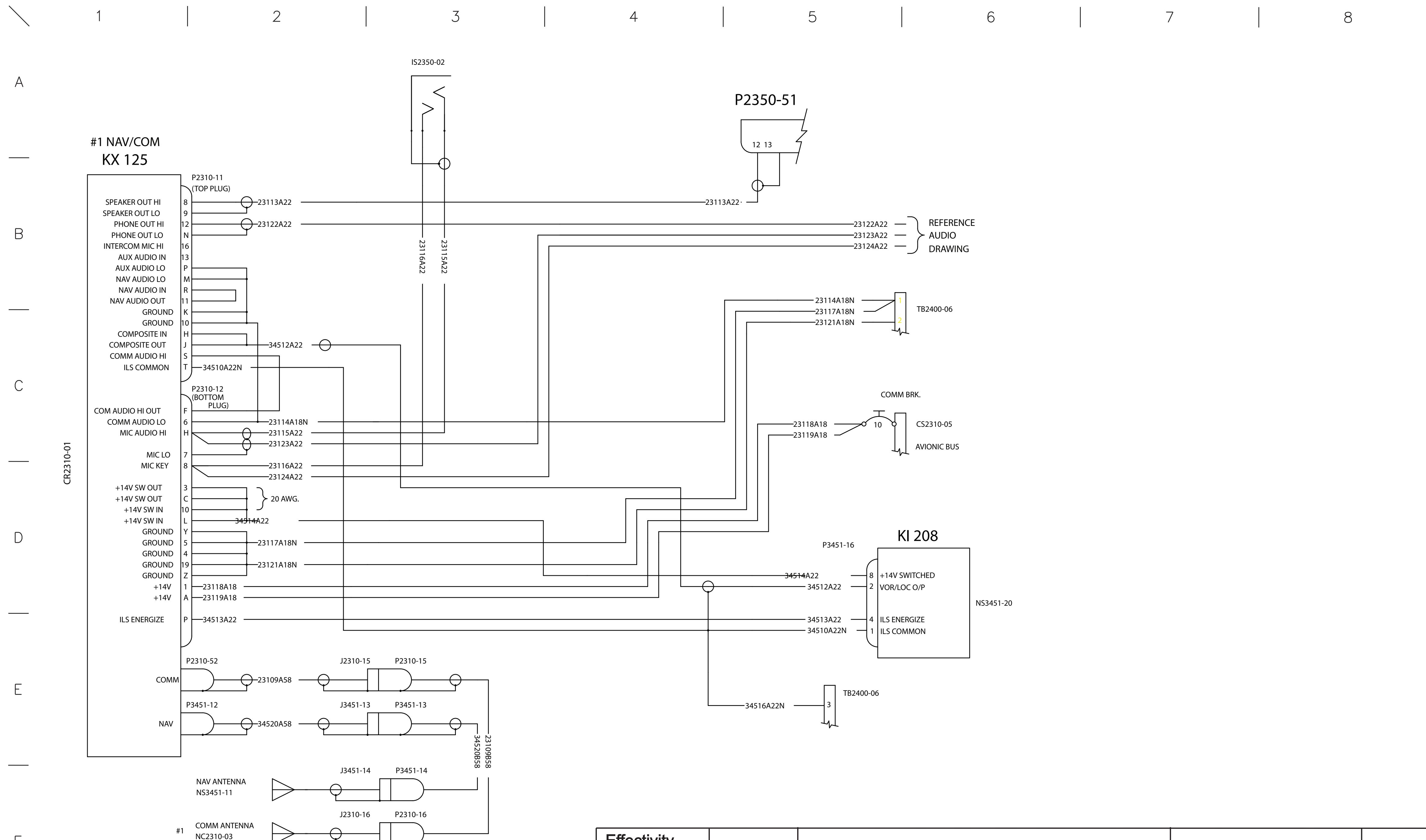
NOTE:

TO ACHIEVE CENTRE INDICATION ON THE LED DISPLAY, ADJUST R1 WHEN TRIM ACTUATOR IS CENTERED.

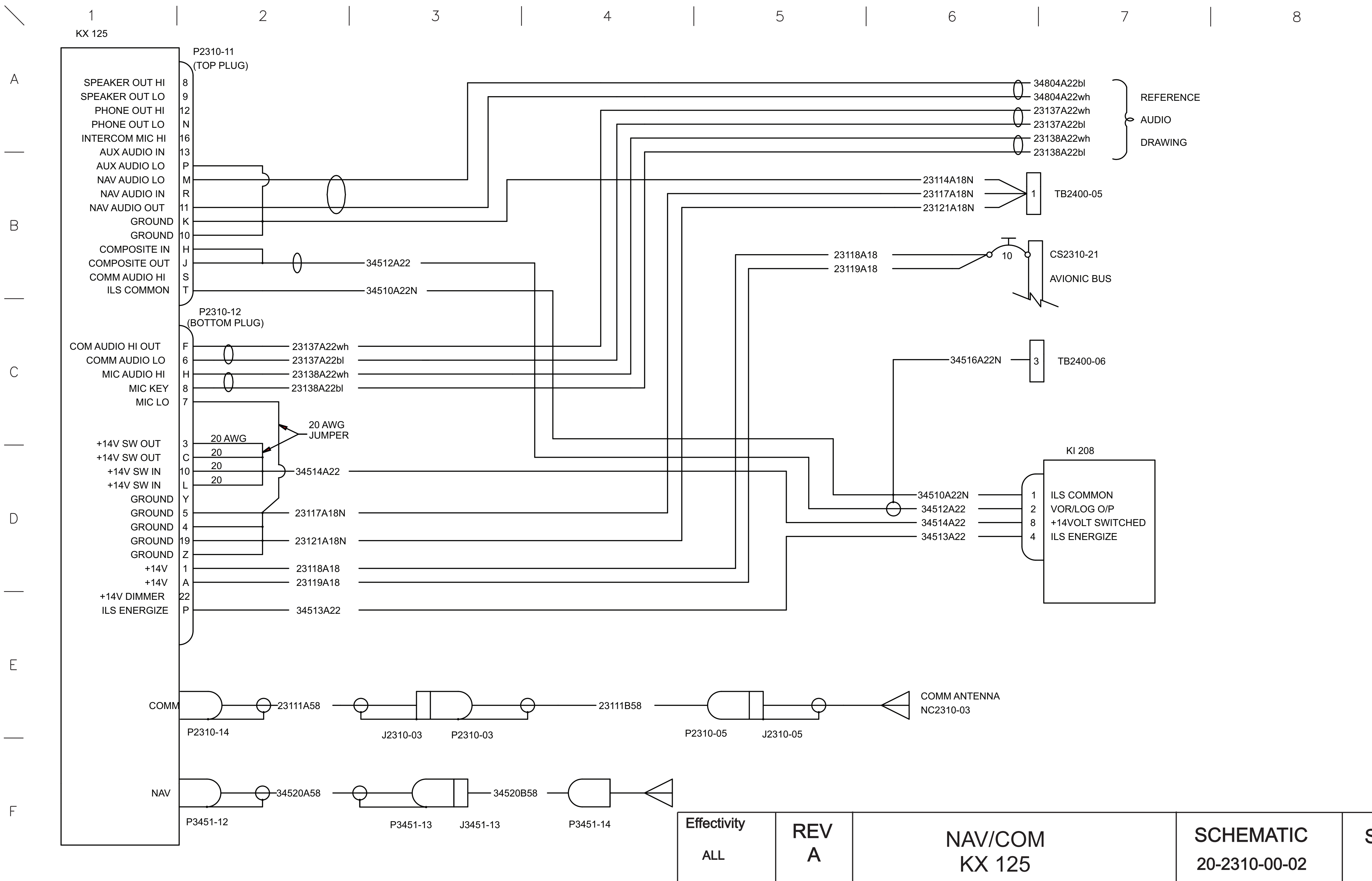
Effectivity	REV		SCHEMATIC	SHEET
ALL	C	TRIM DISPLAY	20-2720-10-00	1/1



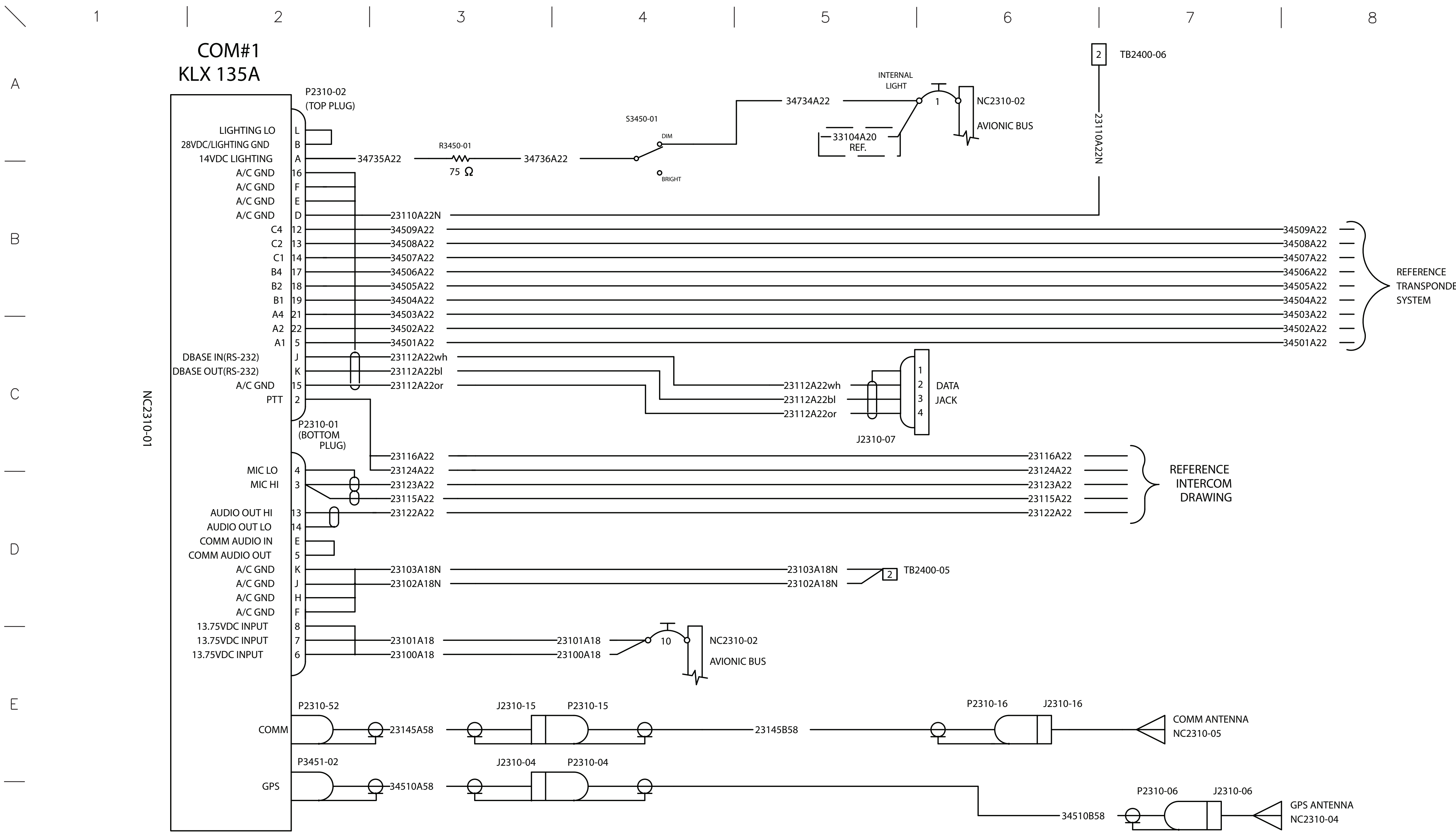
Effectivity	REV	GPS/COM - KLX 135	SCHEMATIC	SHEET
ALL	B		20-2310-00-00	1/1



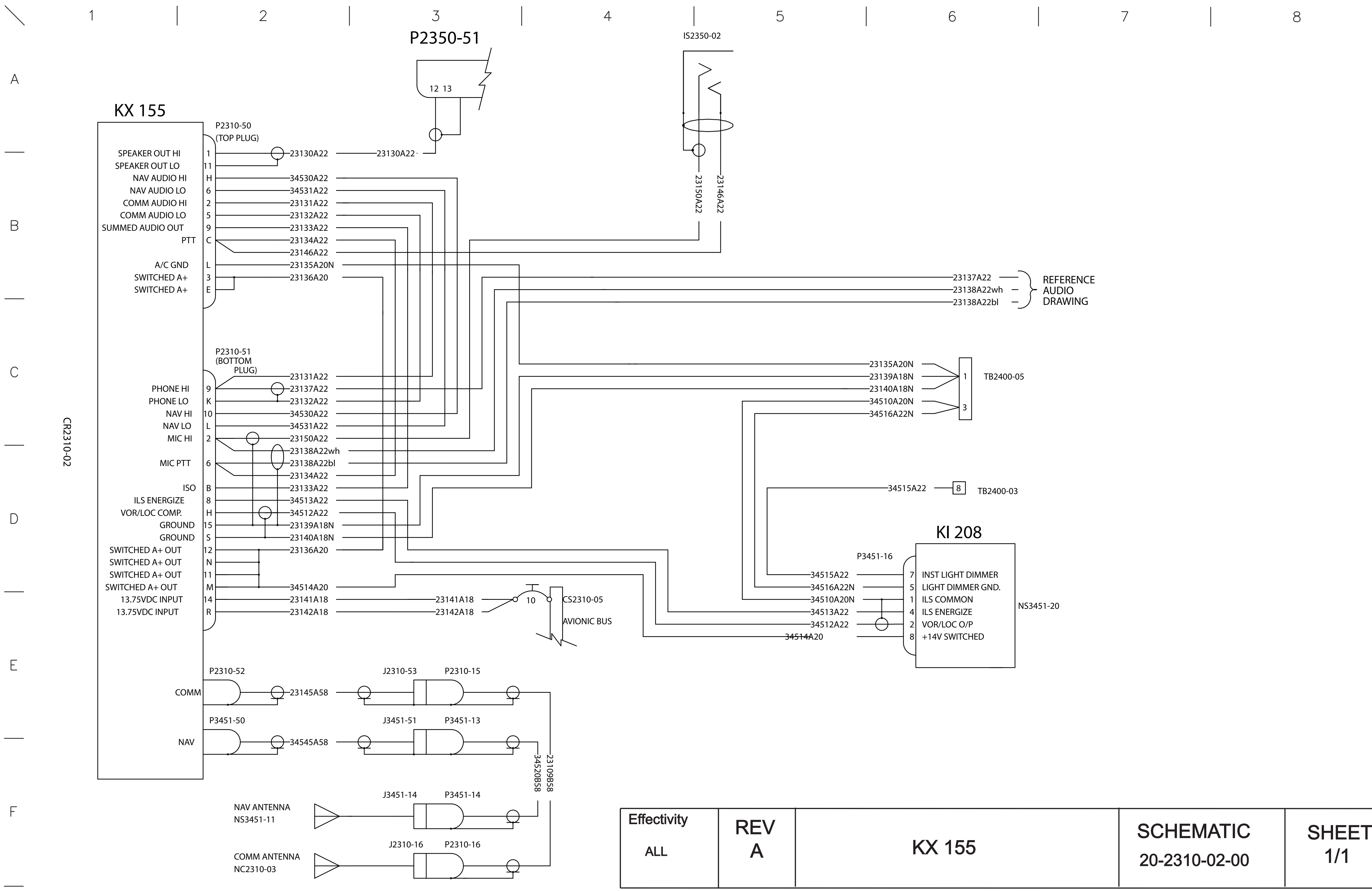
Effectivity	REV		SCHEMATIC	SHEET
ALL	C	KX 125 - Variant 01 / 02	20-2310-00-01	1/1



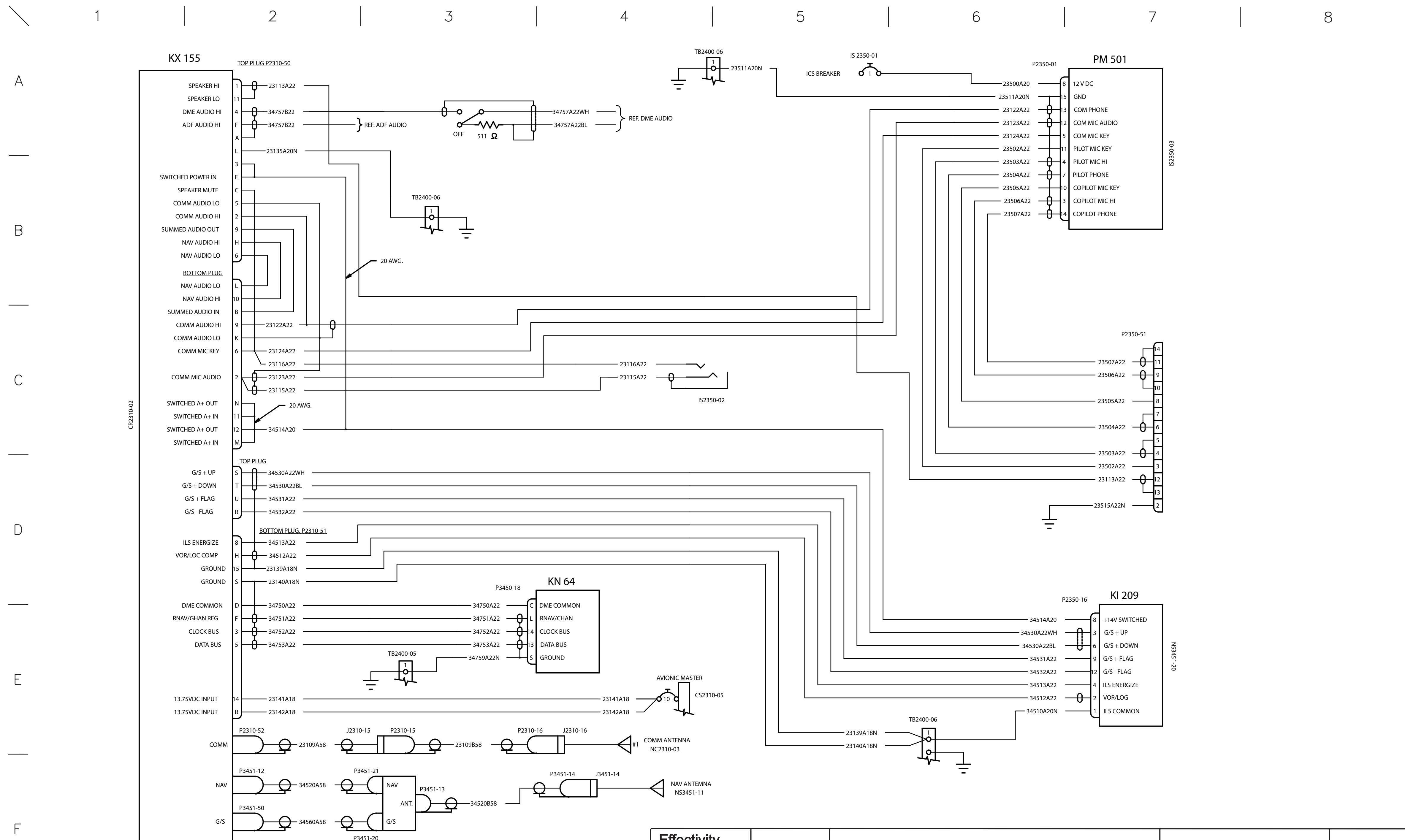
Effectivity	REV	NAV/COM	SCHEMATIC	SHEET
ALL	A	KX 125	20-2310-00-02	1/1



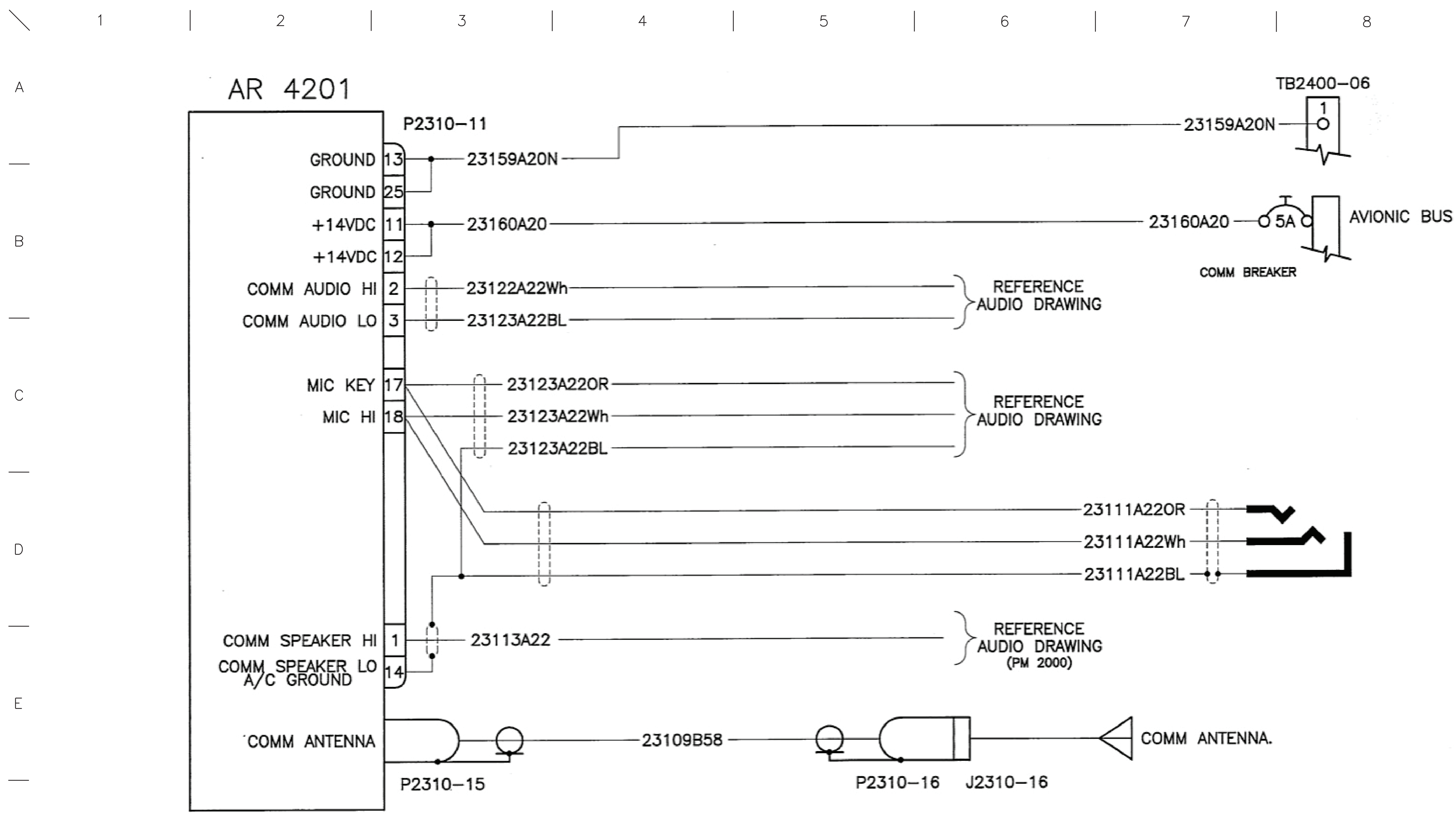
Effectivity ALL	REV A	GPS/COM KLX 135A (With Internal Lighting)	SCHEMATIC 20-2310-00-03	SHEET 1/1



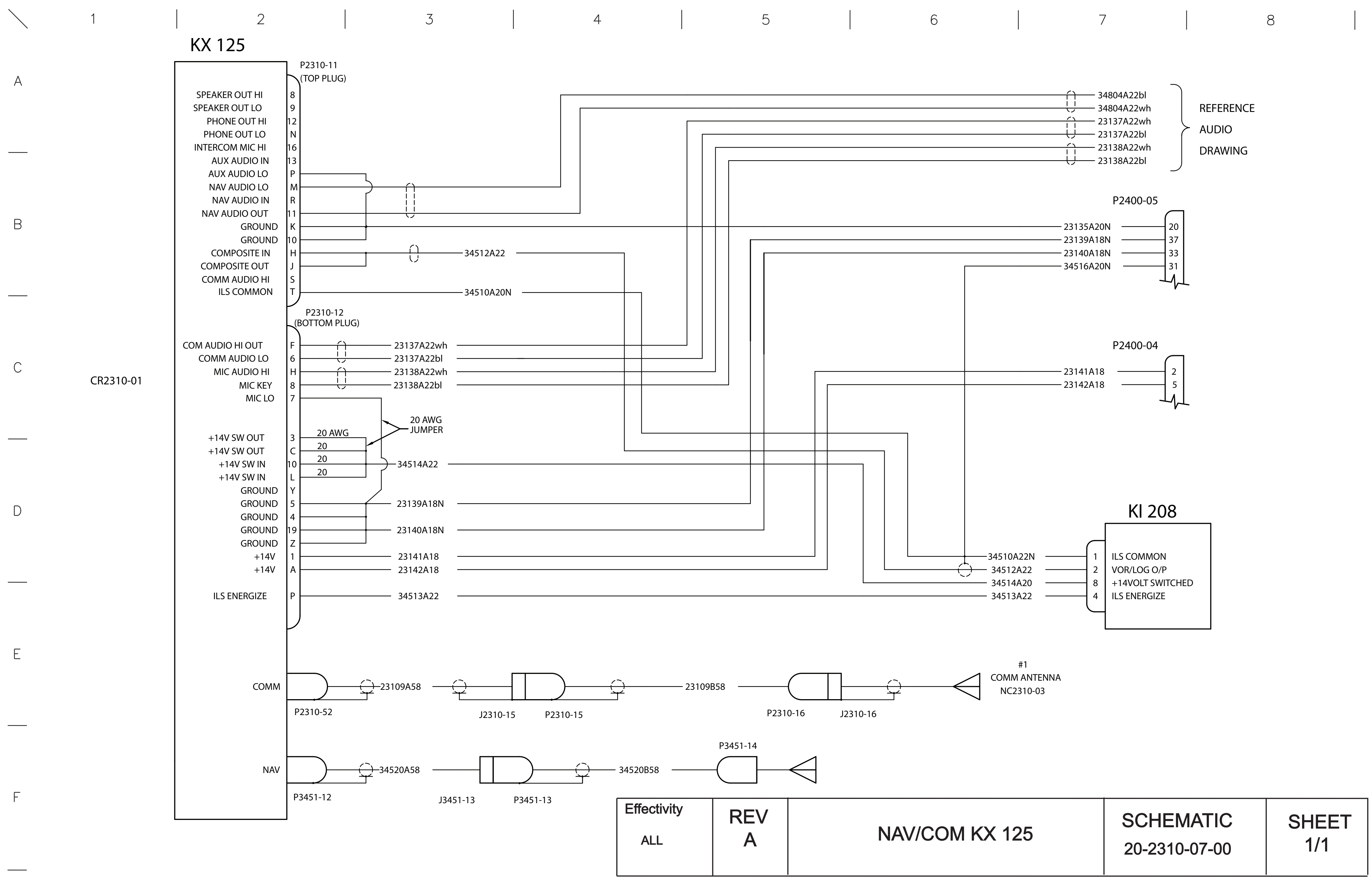
Effectivity	REV		SCHEMATIC	SHEET
ALL	A	KX 155	20-2310-02-00	1/1

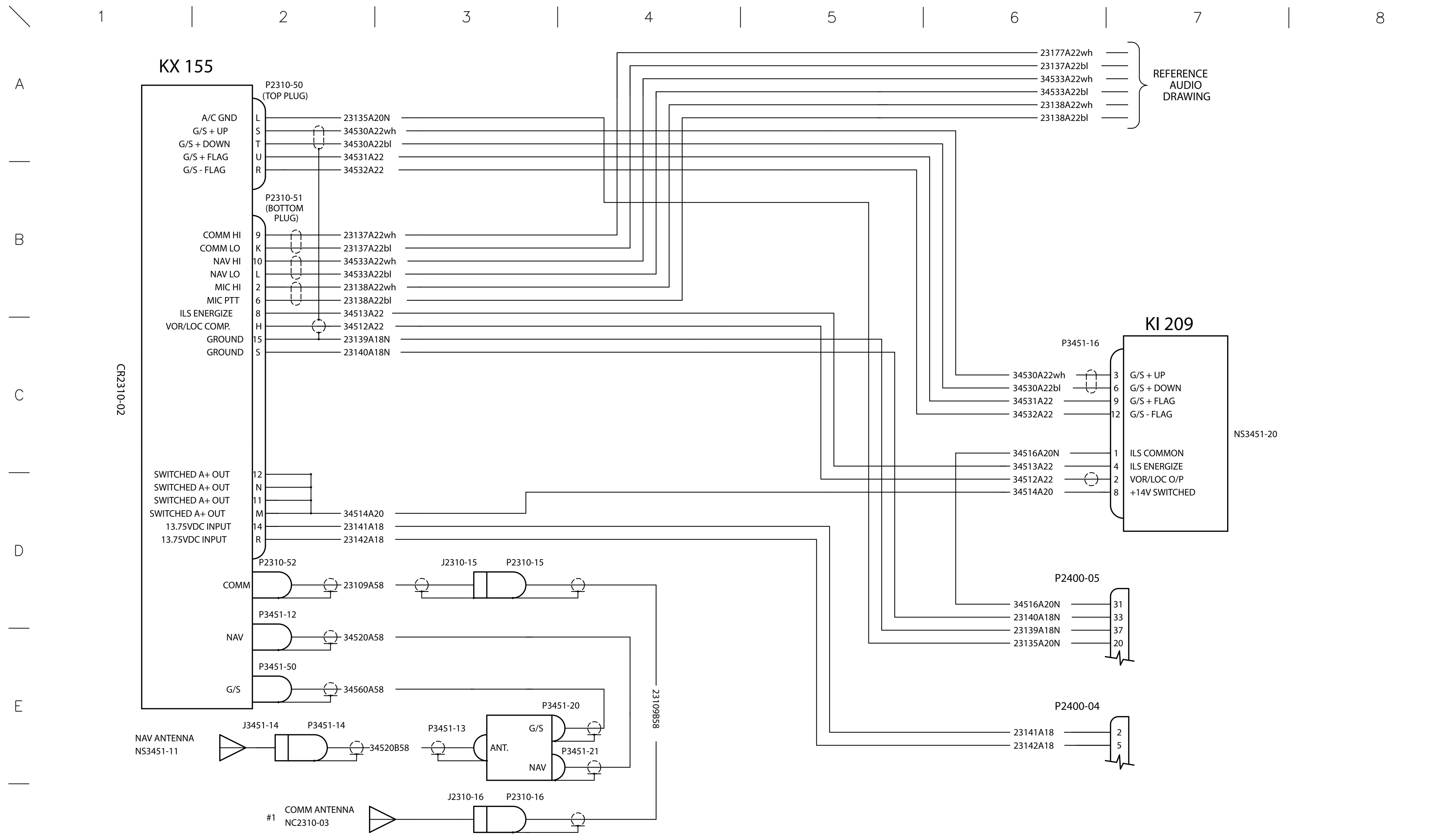


Effectivity	REV	KX 155/ISO	SCHEMATIC	SHEET
ALL	A		20-2310-05-00	1/1



Effectivity	REV		SCHEMATIC	SHEET
ALL	A	VHF TRANSCEIVER AR 4201	20-2310-06-00	1/1


KX 125
P2310-11
(TOP PLUG)
SPEAKER OUT HI 8
SPEAKER OUT LO 9
PHONE OUT HI 12
PHONE OUT LO N
INTERCOM MIC HI 16
AUX AUDIO IN 13
AUX AUDIO LO P
NAV AUDIO LO M
NAV AUDIO IN R
NAV AUDIO OUT 11
GROUND K
GROUND 10
COMPOSITE IN H
COMPOSITE OUT J
COMM AUDIO HI S
ILS COMMON T
34512A22
34510A20N
34804A22bl
34804A22wh
23137A22wh
23137A22bl
23138A22wh
23138A22bl
REFERENCE
AUDIO
DRAWING
P2400-05
23135A20N 20
23139A18N 37
23140A18N 33
34516A20N 31
P2310-12
(BOTTOM PLUG)
CR2310-01
COM AUDIO HI OUT F
COMM AUDIO LO 6
MIC AUDIO HI H
MIC KEY 8
MIC LO 7
23137A22wh
23137A22bl
23138A22wh
23138A22bl
P2400-04
23141A18 2
23142A18 5
20 AWG
JUMPER
+14V SW OUT 3
+14V SW OUT C
+14V SW IN 10
+14V SW IN L
20 AWG
20
20
20
34514A22
GROUND Y
GROUND 5
GROUND 4
GROUND 19
GROUND Z
+14V 1
+14V A
ILS ENERGIZE P
23139A18N
23140A18N
23141A18
23142A18
34513A22
KI 208
34510A22N 1 ILS COMMON
34512A22 2 VOR/LOG O/P
34514A20 8 +14VOLT SWITCHED
34513A22 4 ILS ENERGIZE
COMM
23109A58
P2310-52
J2310-15
P2310-15
23109B58
P2310-16
J2310-16
#1
COMM ANTENNA
NC2310-03
NAV
34520A58
P3451-12
J3451-13
P3451-13
34520B58
P3451-14
Effectivity
ALL
REV
A
NAV/COM KX 125
SCHEMATIC
20-2310-07-00
SHEET
1/1



Effectivity	REV		SCHEMATIC	SHEET
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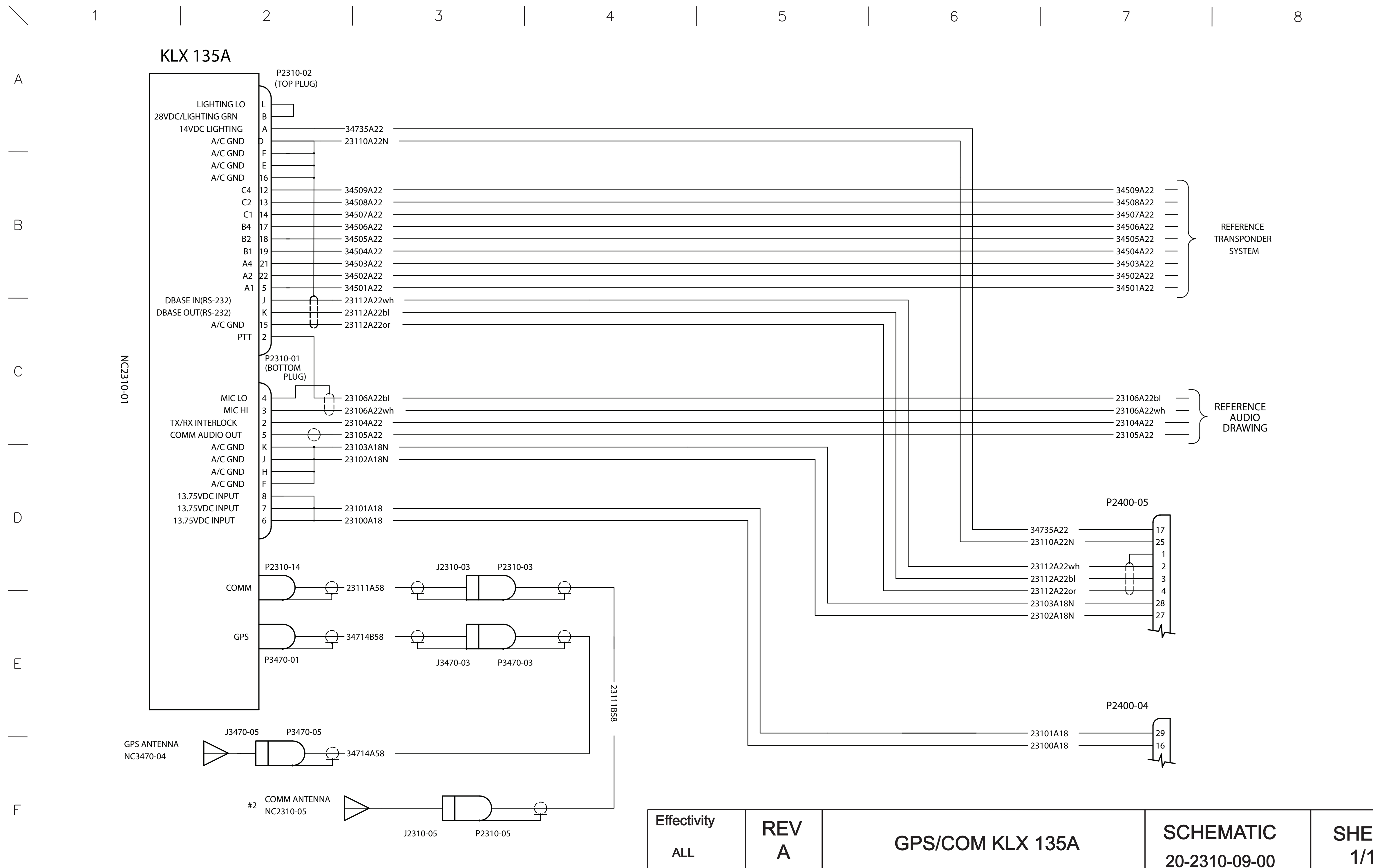

Effectivity	REV	GPS/COM KLX 135A	SCHEMATIC	SHEET
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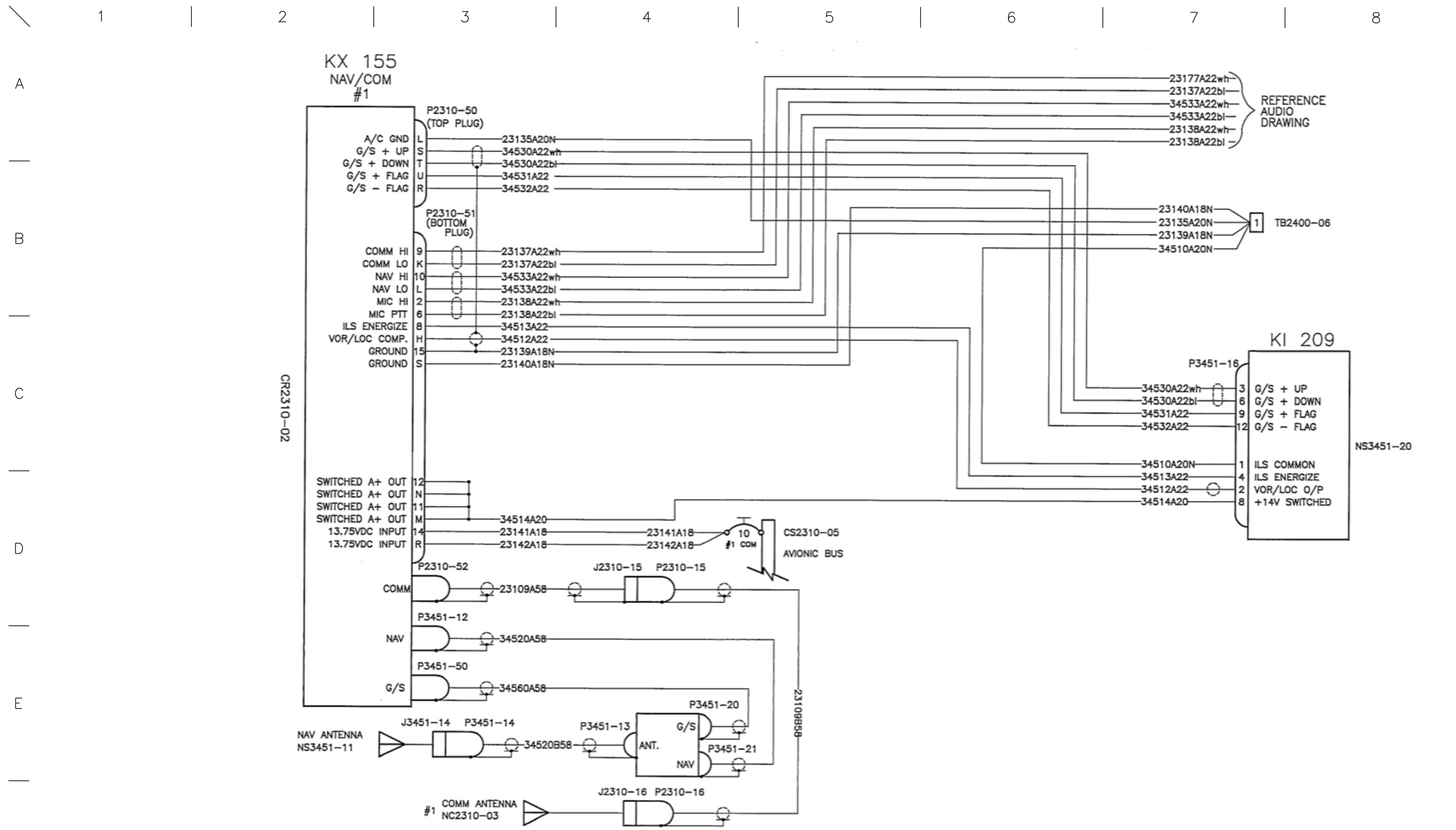
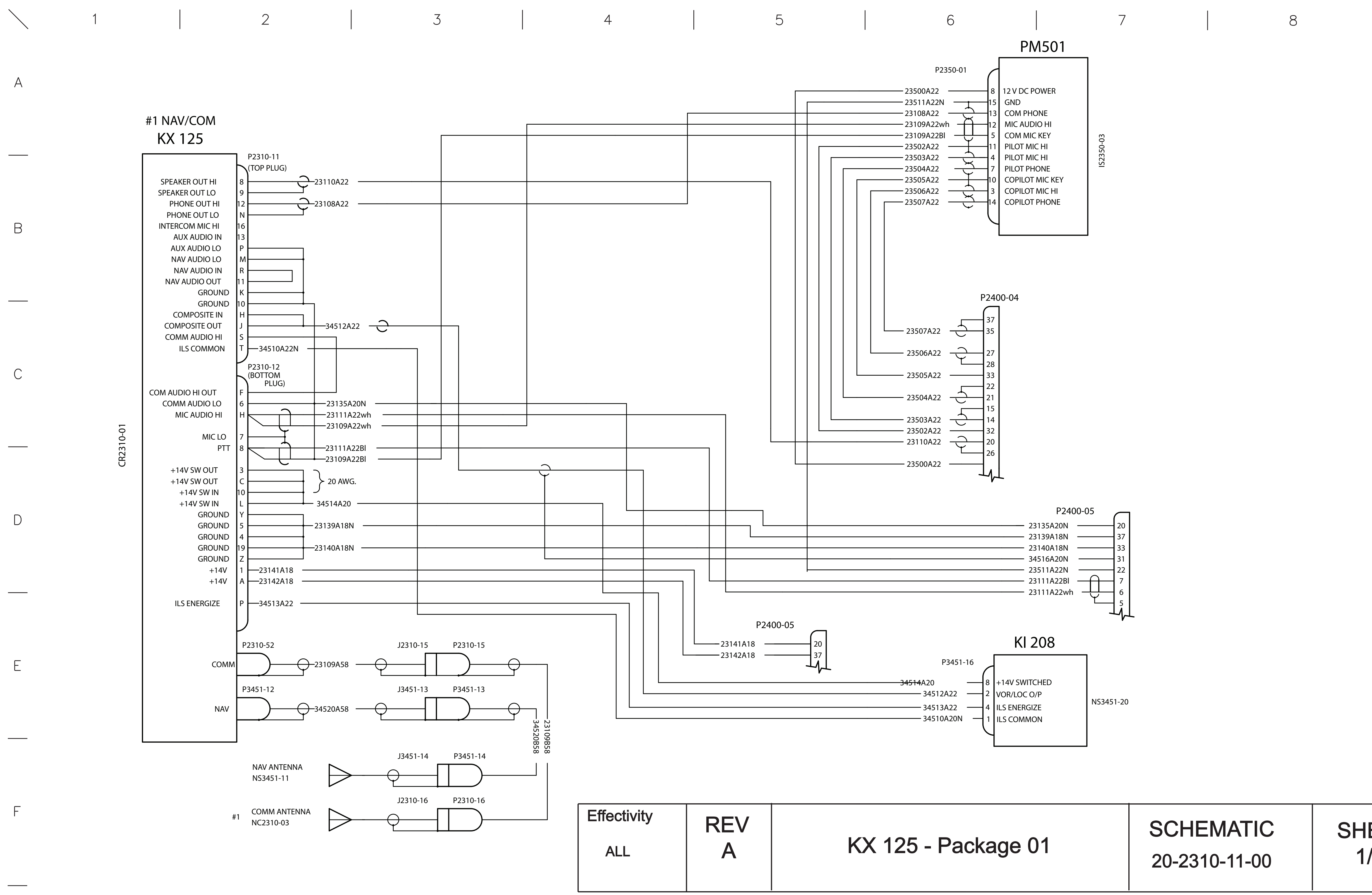
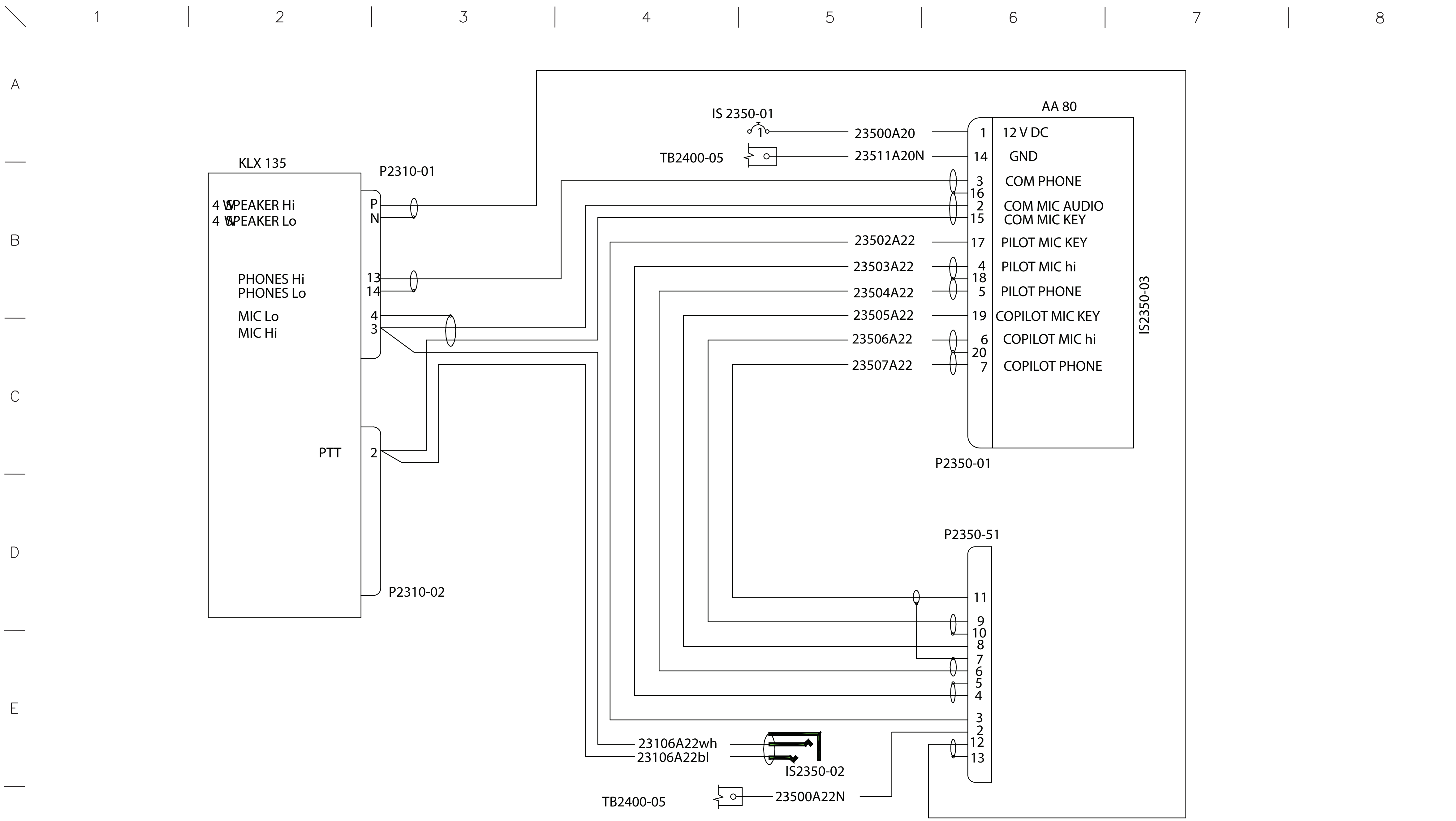


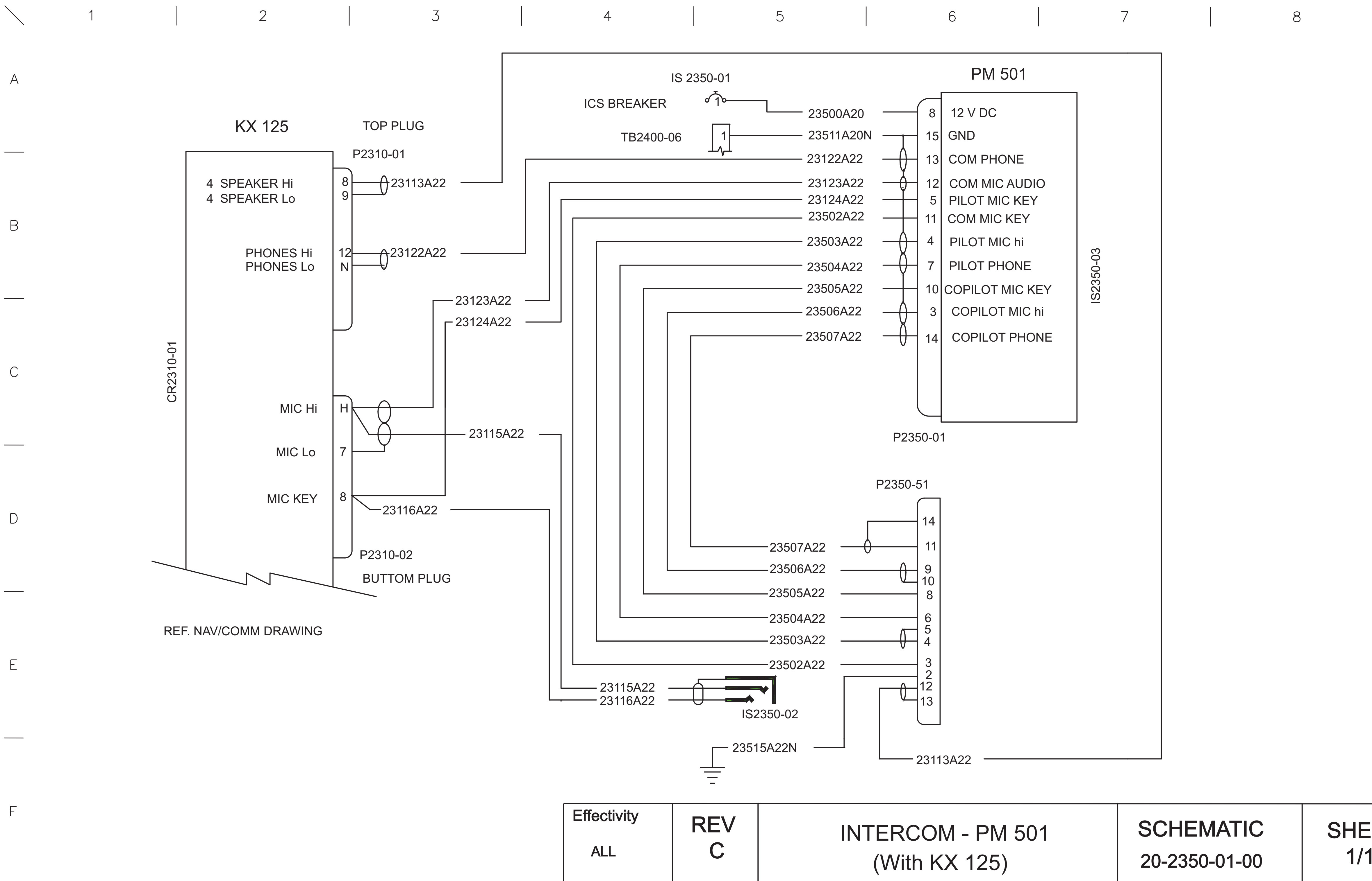
Effectivity	REV		SCHEMATIC	SHEET
ALL	A	NAV/COM, KX 155	20-2310-10-00	1/1



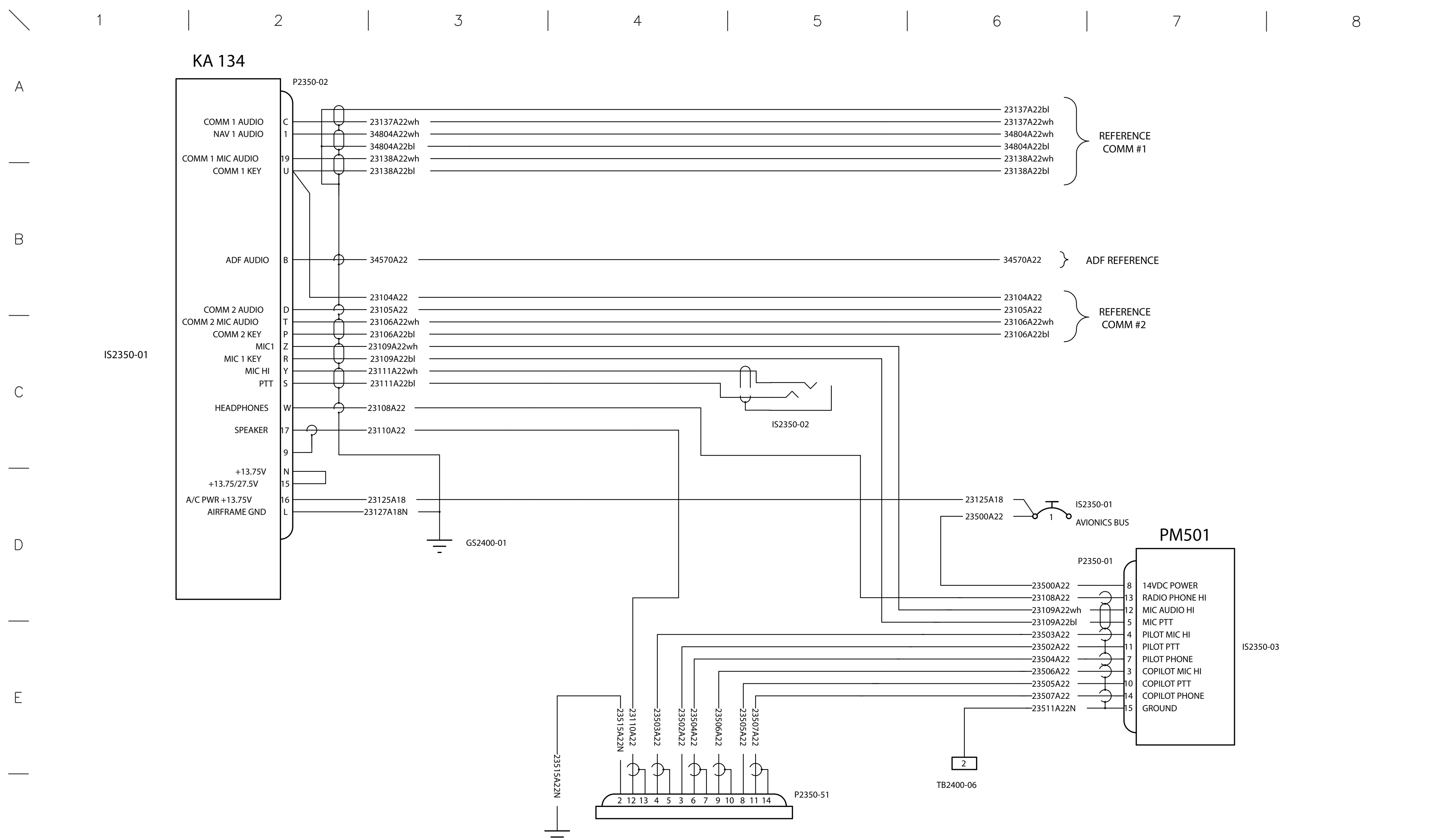
Effectivity	REV		SCHEMATIC	SHEET
ALL	A	KX 125 - Package 01	20-2310-11-00	1/1



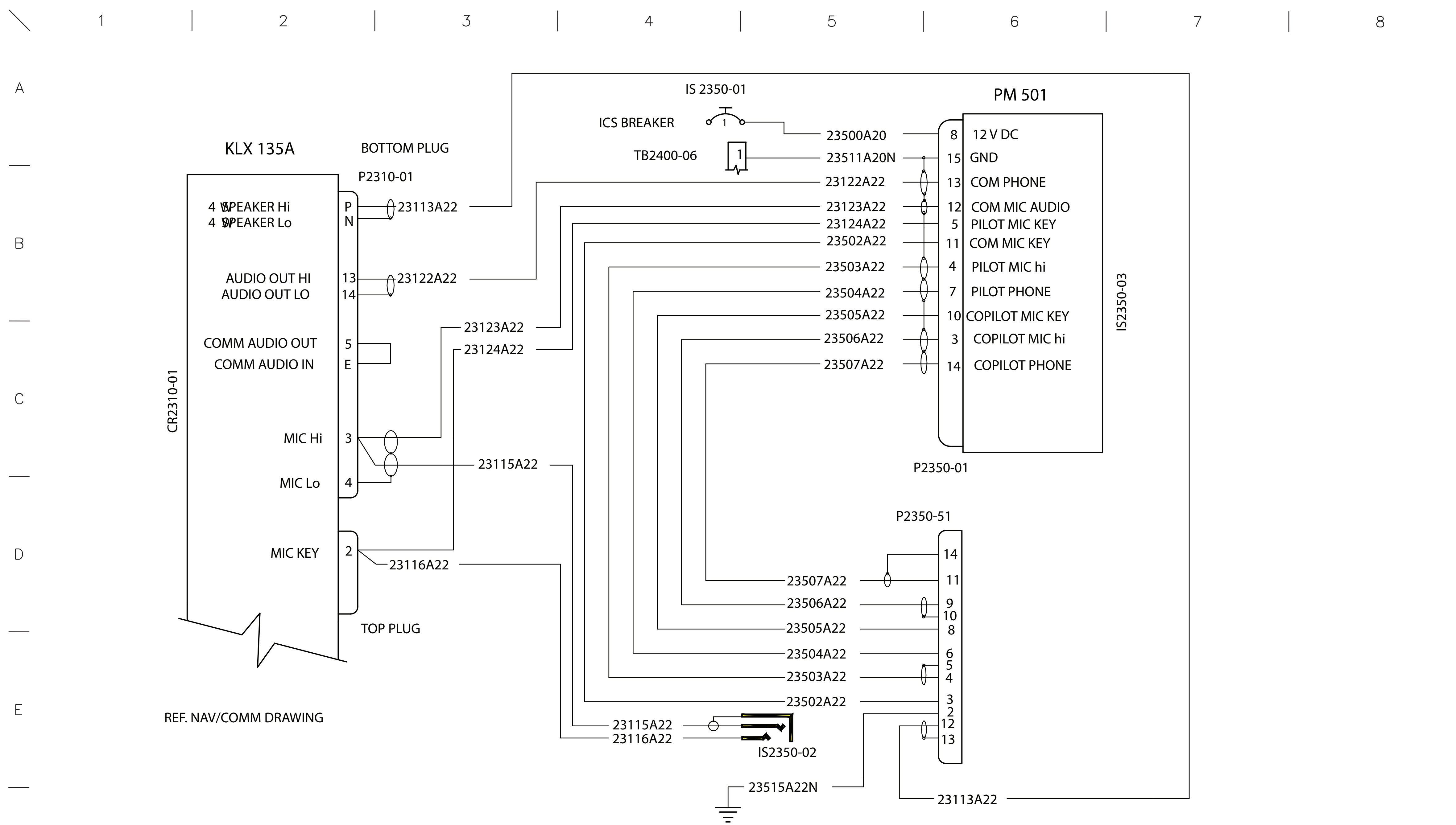
Effectivity	REV	INTERCOM	SCHEMATIC	SHEET
ALL	A		20-2350-00-00	1/1



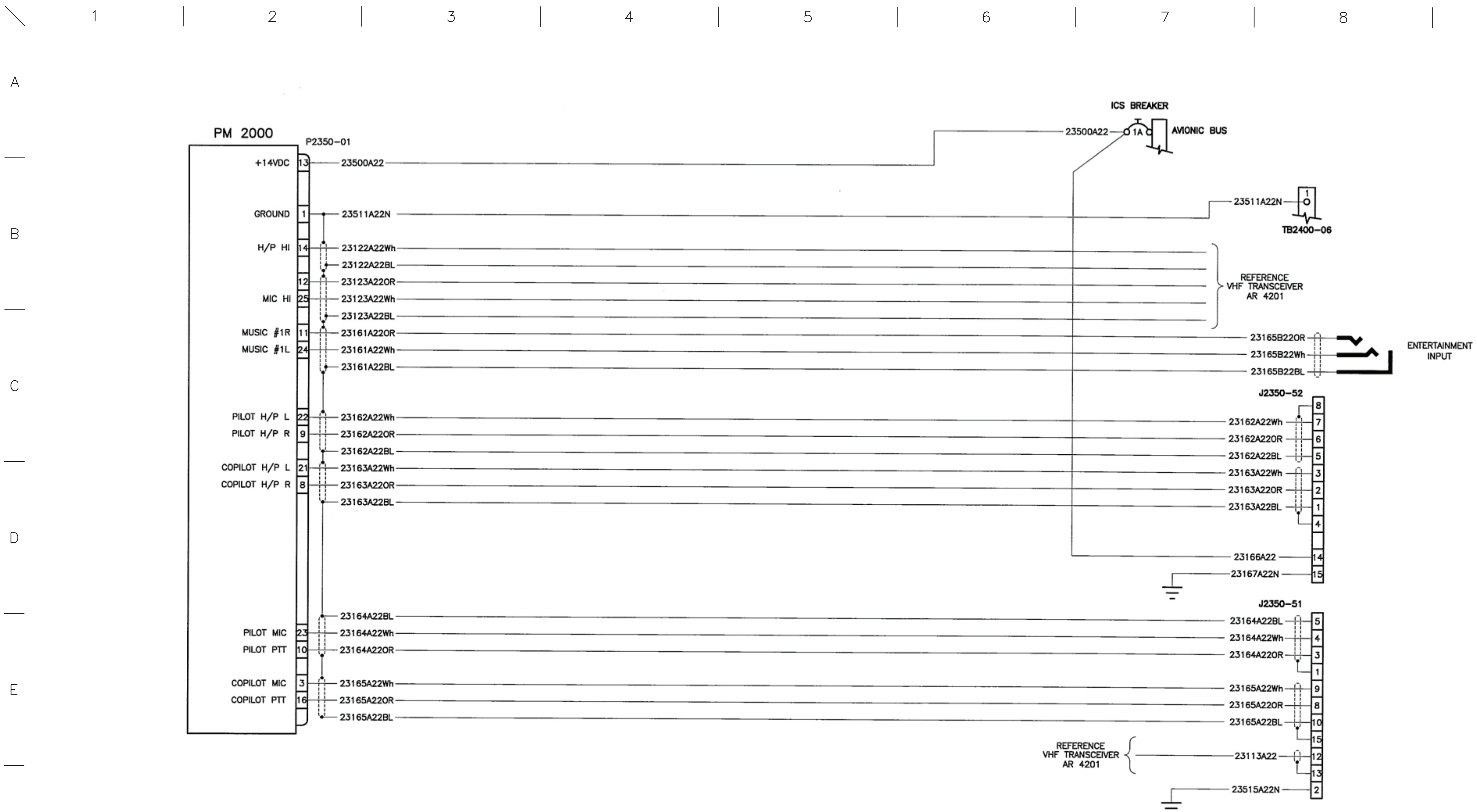
Effectivity	REV		SCHEMATIC	SHEET
ALL	C	INTERCOM - PM 501 (With KX 125)	20-2350-01-00	1/1



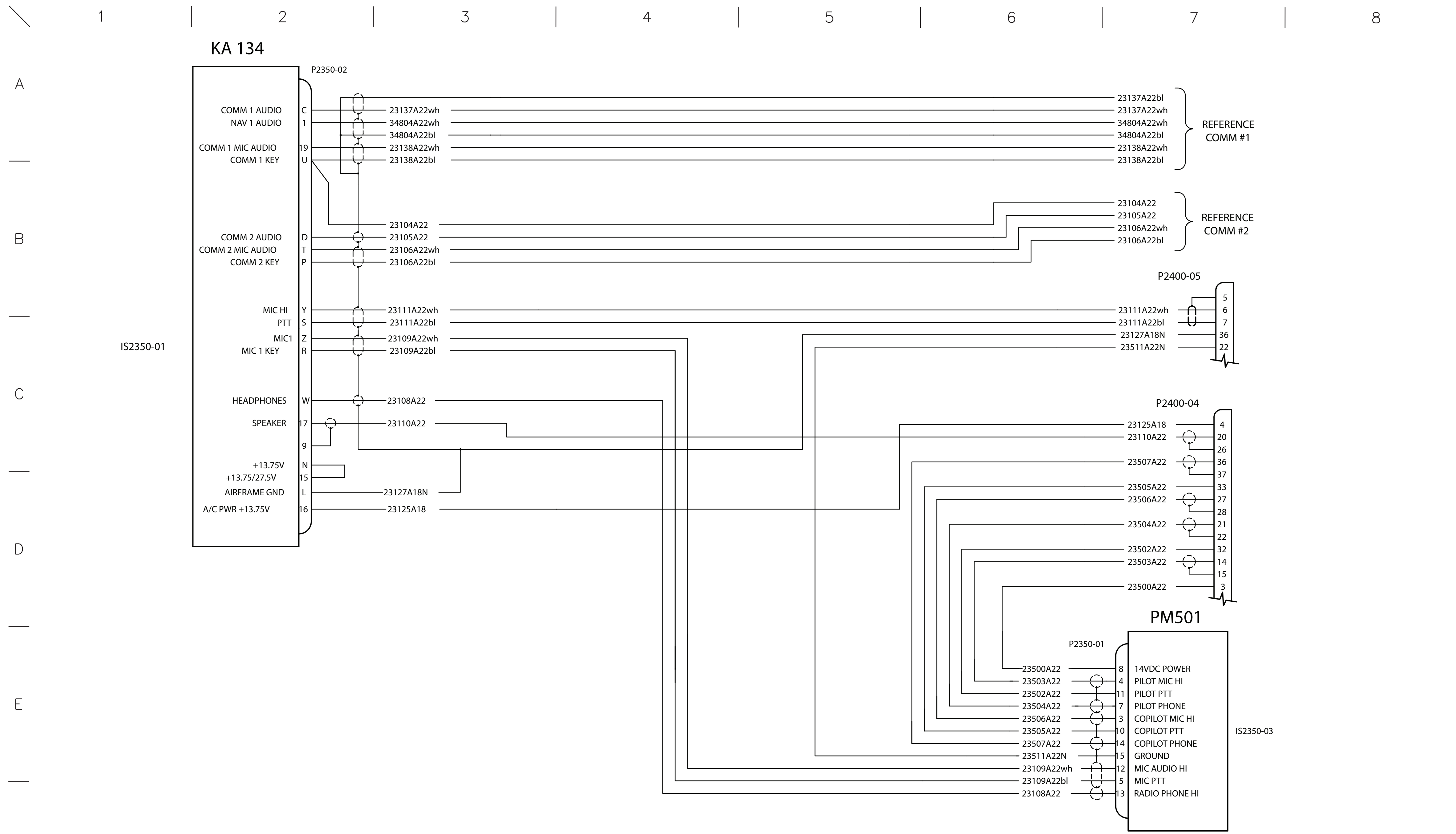
Effectivity	REV			
ALL	C	AUDIO PANEL - KA 134 (With ADF)	SCHEMATIC 20-2350-02-00	SHEET 1/1



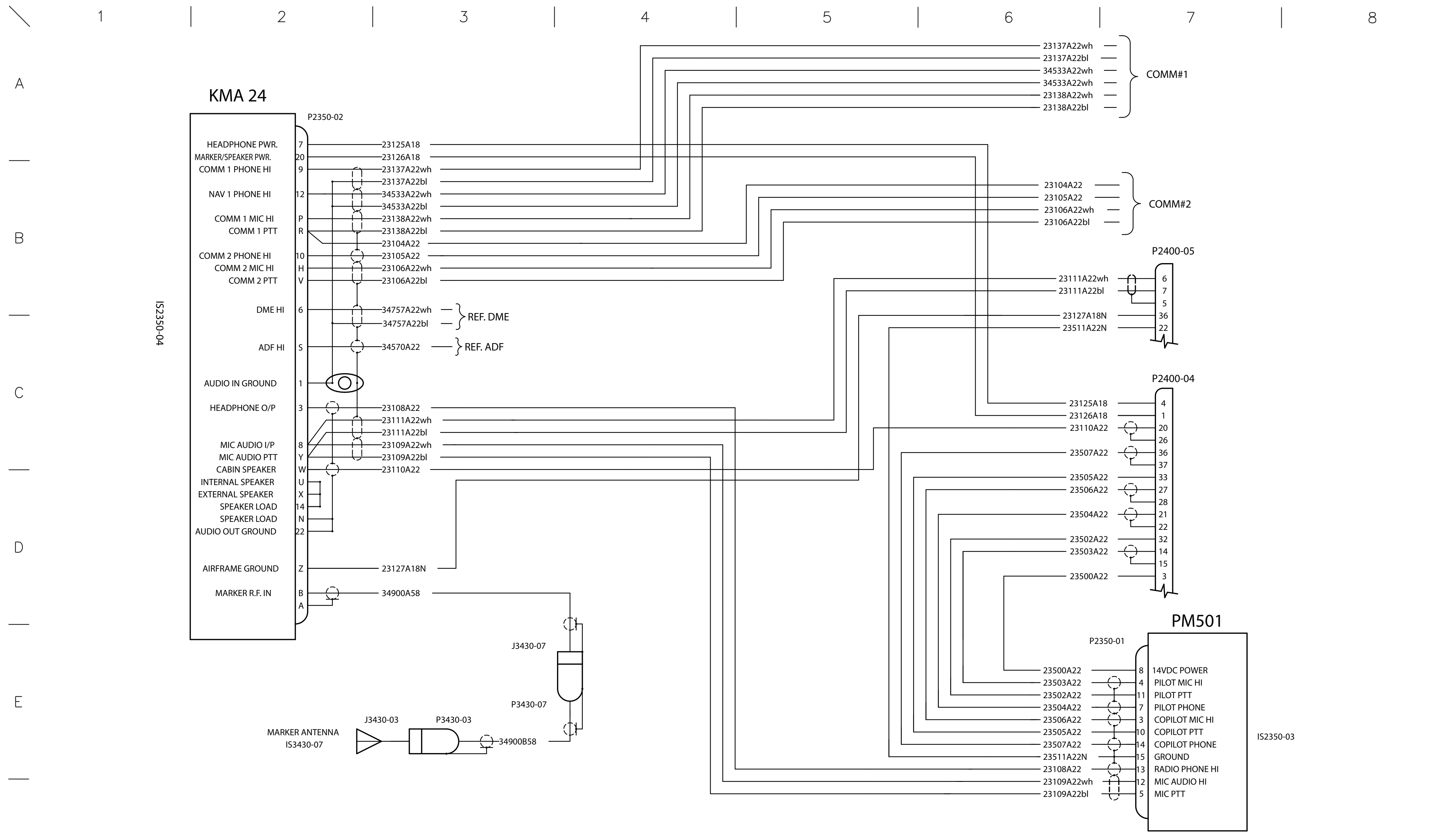
Effectivity	REV		SCHEMATIC	SHEET
ALL	A	INTERCOM - PM 501 (With KLX 135A)	20-2350-04-00	1/1



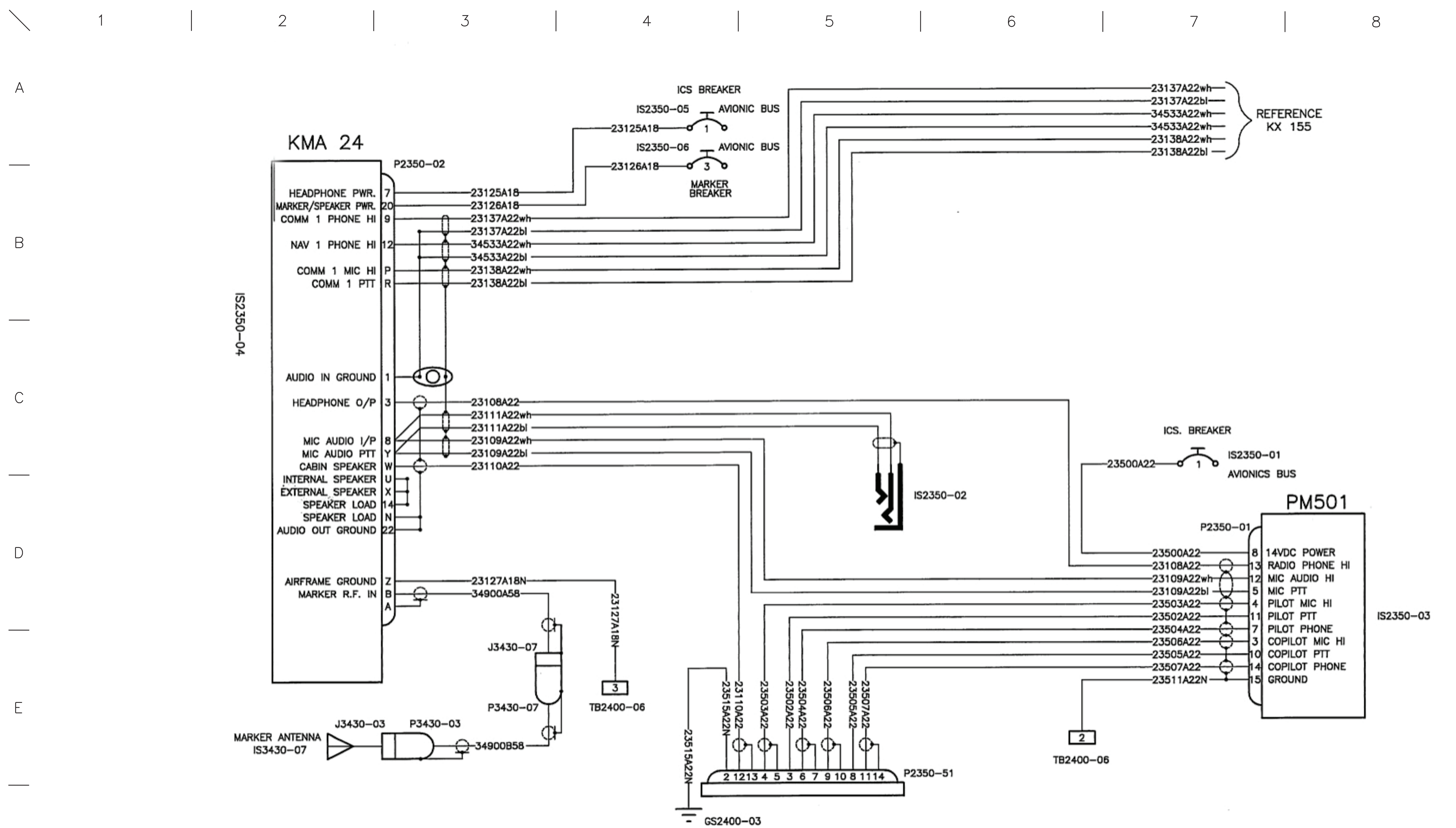
Effectivity	REV		SCHEMATIC	SHEET
ALL	A	INTERCOM, PM 2000	20-2350-06-00	1/1



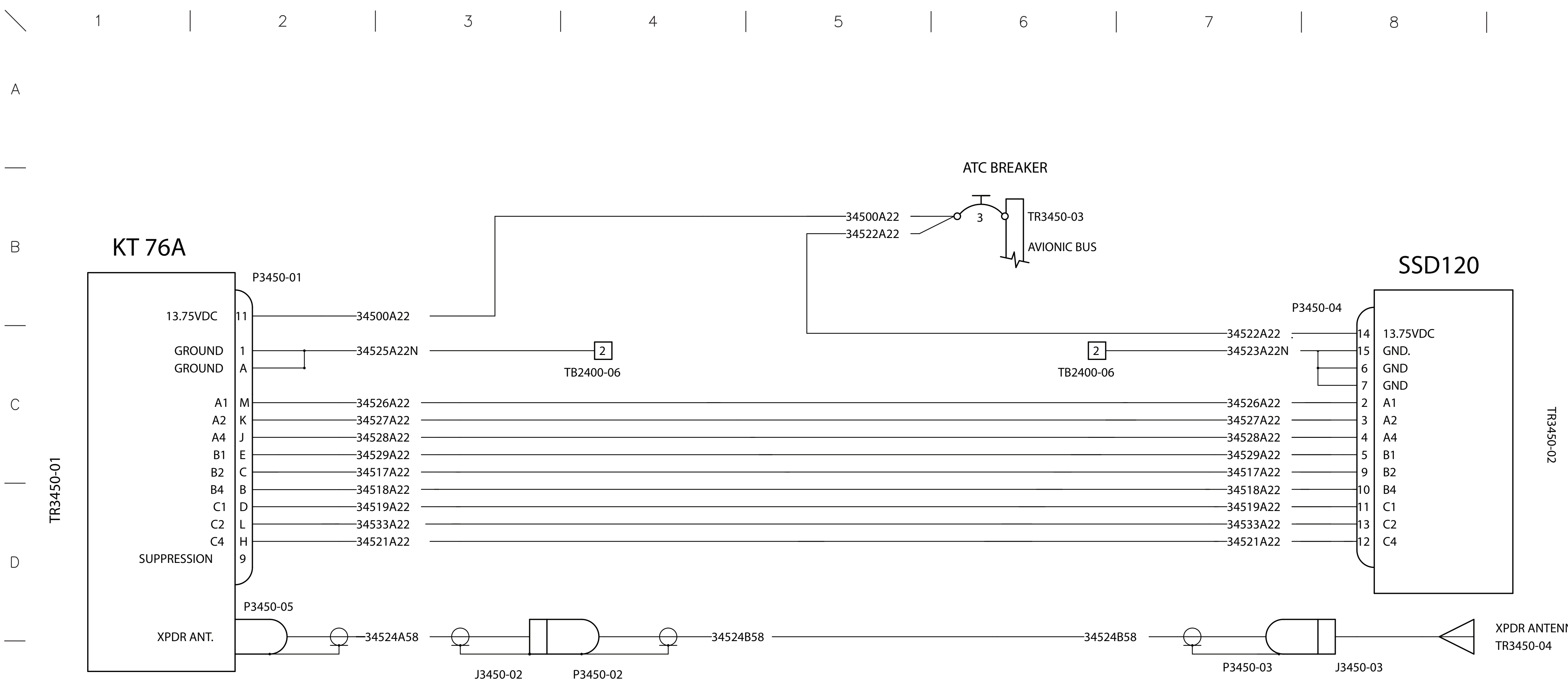
Effectivity	REV	AUDIO PANEL - KA 134	SCHEMATIC	SHEET
ALL	A		20-2350-08-00	1/1



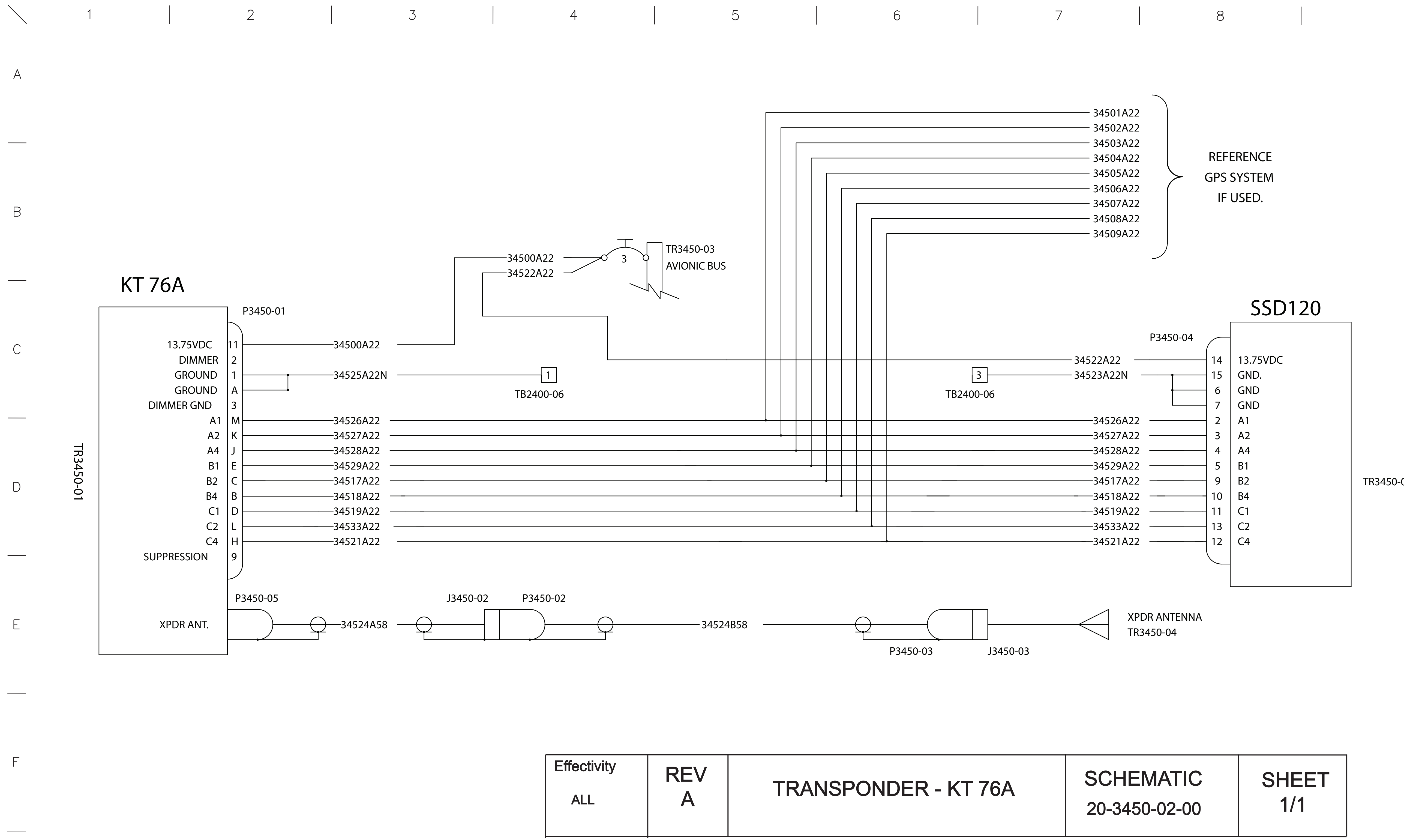
Effectivity	REV		SCHEMATIC	SHEET
ALL	A	AUDIO PANEL - KMA 24	20-2350-09-00	1/1



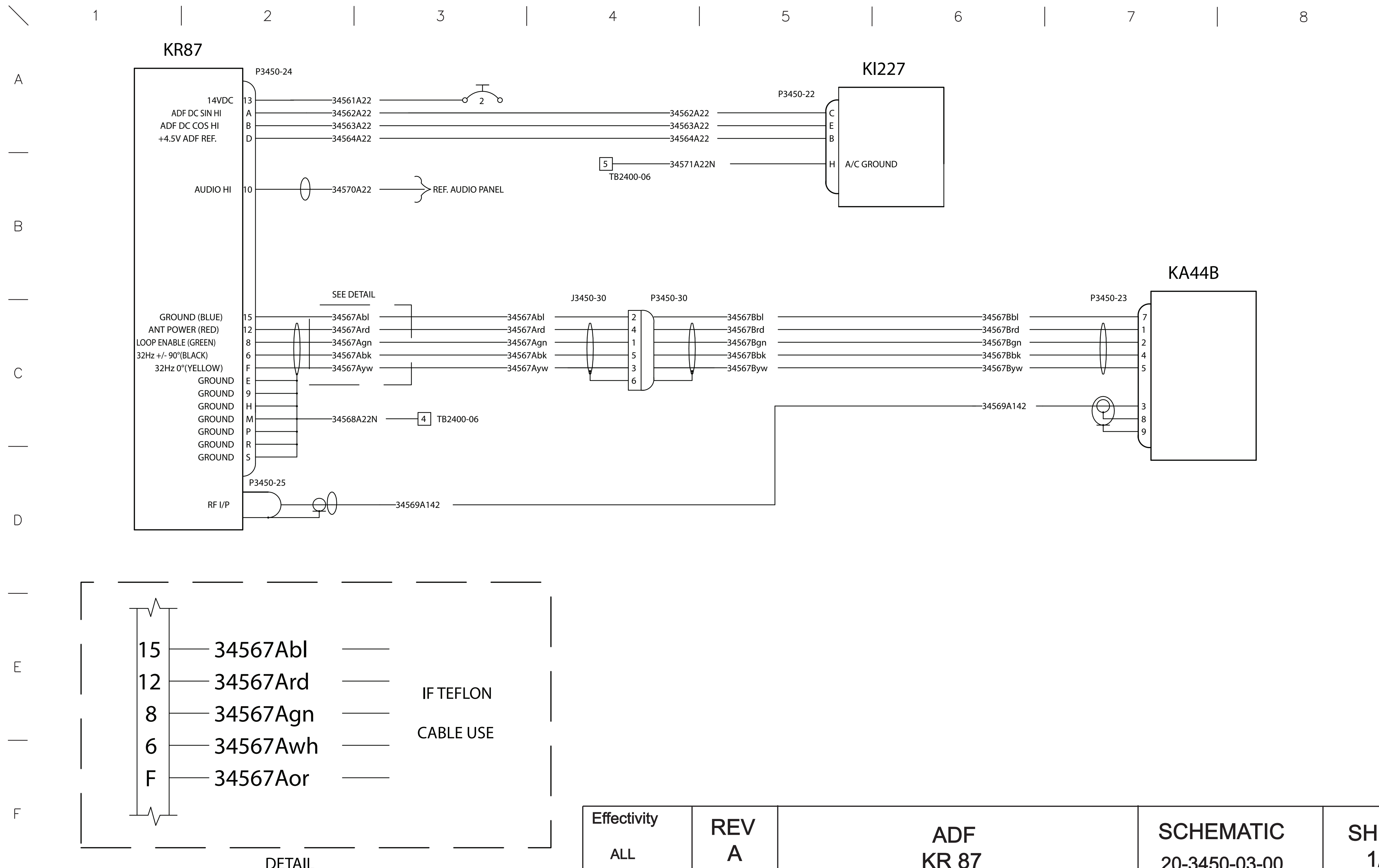
Effectivity	REV		SCHEMATIC	SHEET
ALL	A	AUDIO PANEL - KMA 24	20-2350-10-00	1/1



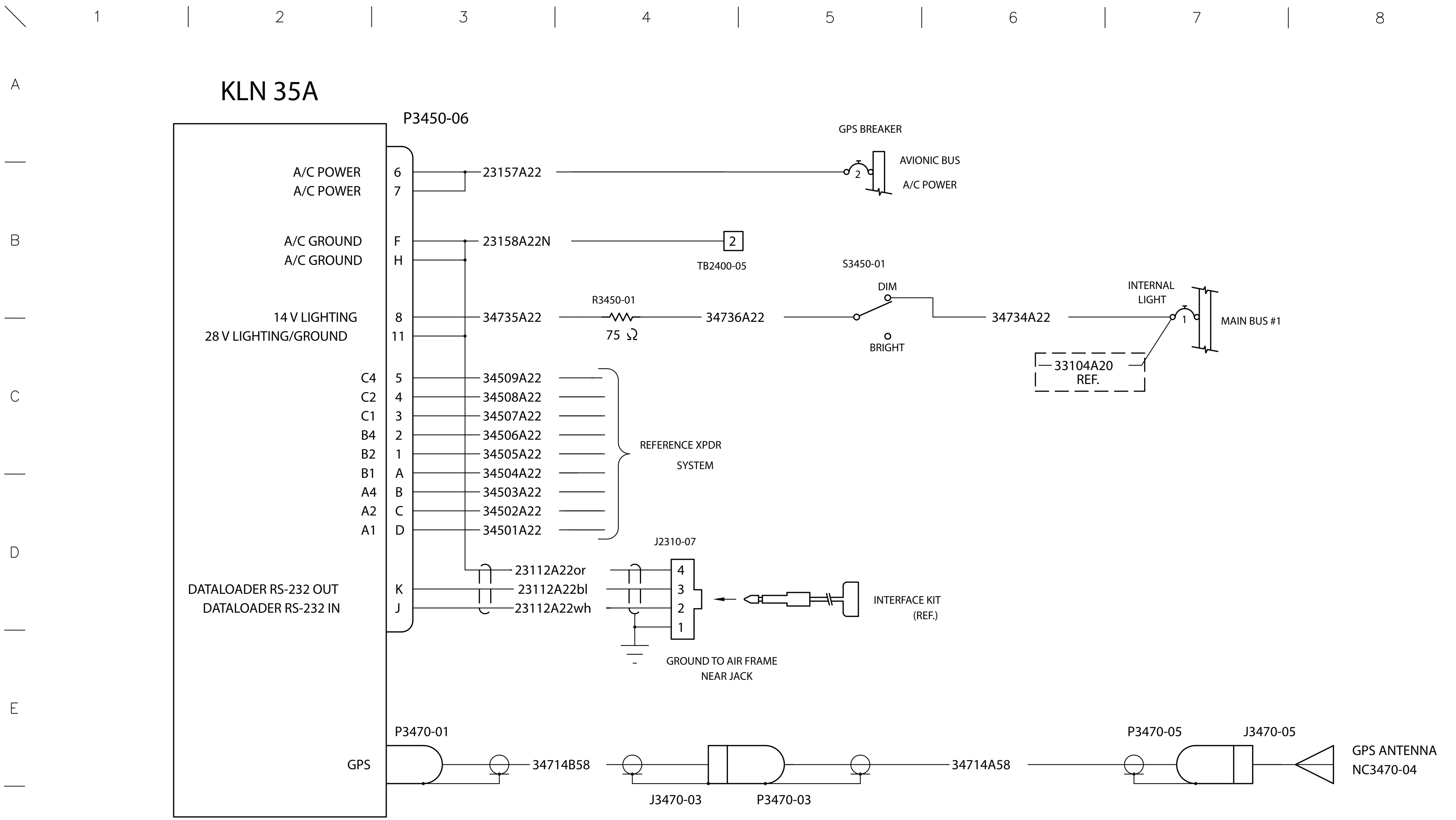
Effectivity	REV		SCHEMATIC	SHEET
ALL	C	TRANSPONDER - KT 76A (VARIANT 01/02)	20-3450-00-00	1/1



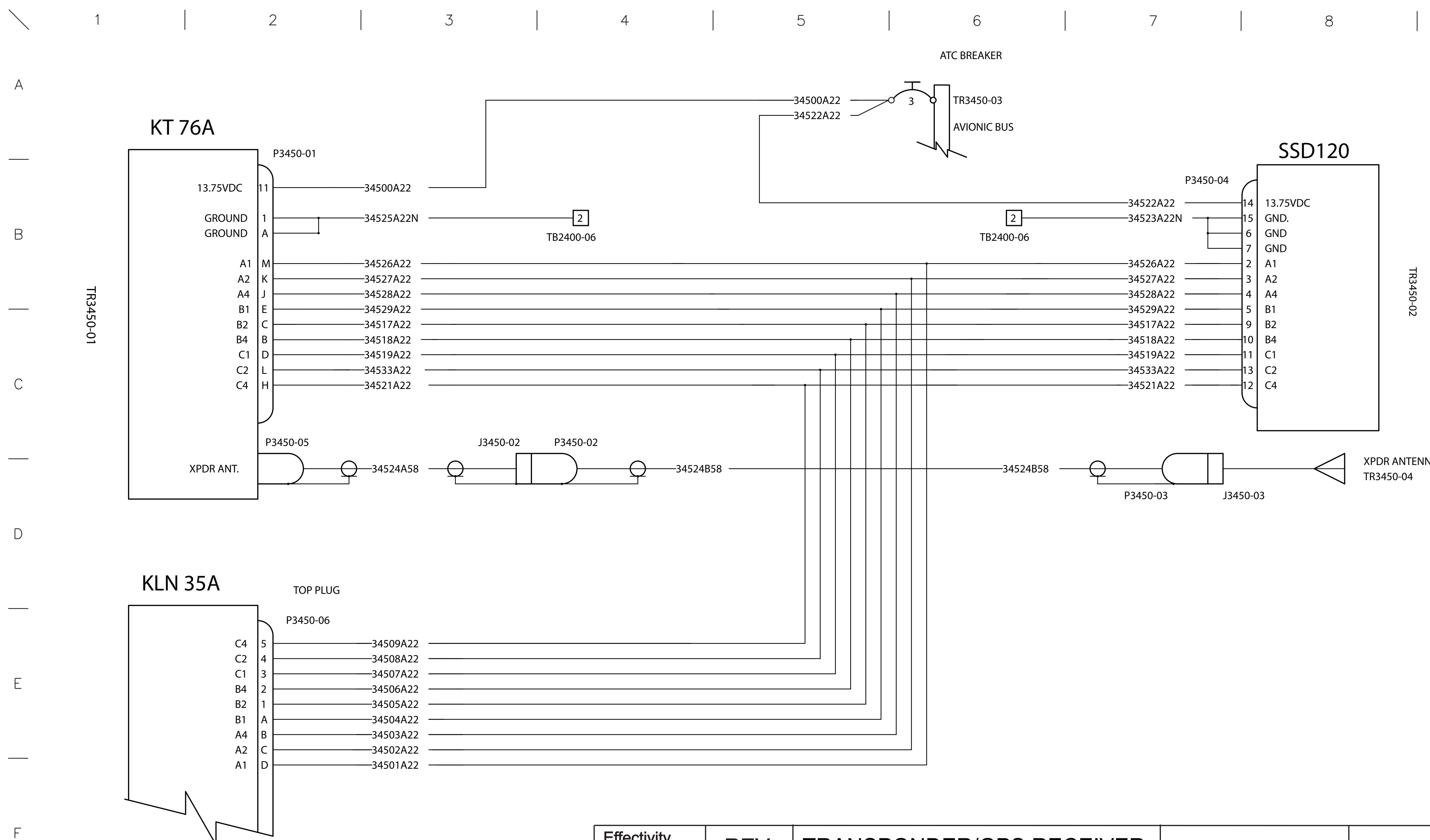
Effectivity	REV	TRANSPONDER - KT 76A	SCHEMATIC	SHEET
ALL	A		20-3450-02-00	1/1



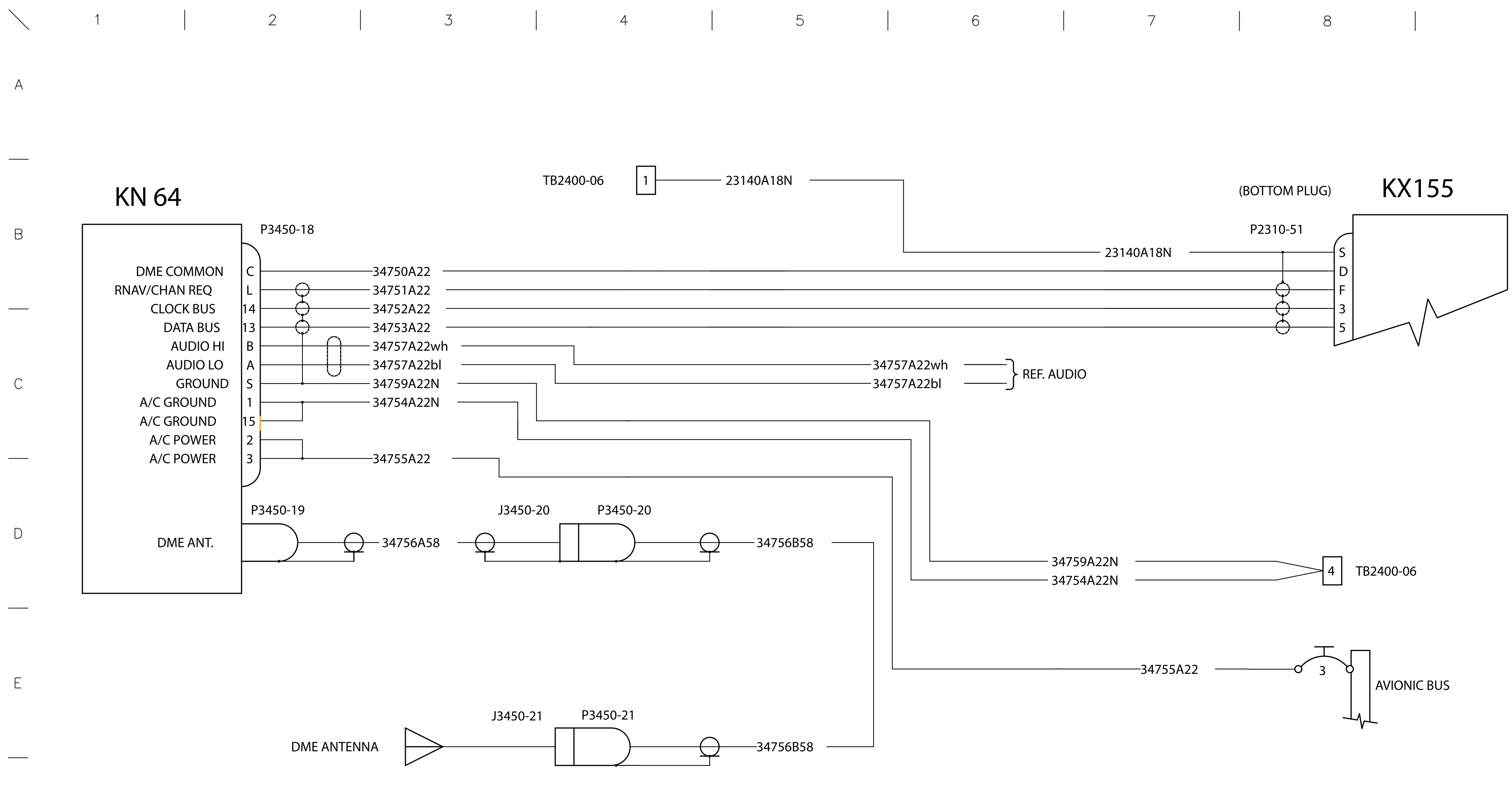
Effectivity	REV			
ALL	A	ADF KR 87	SCHEMATIC 20-3450-03-00	SHEET 1/1



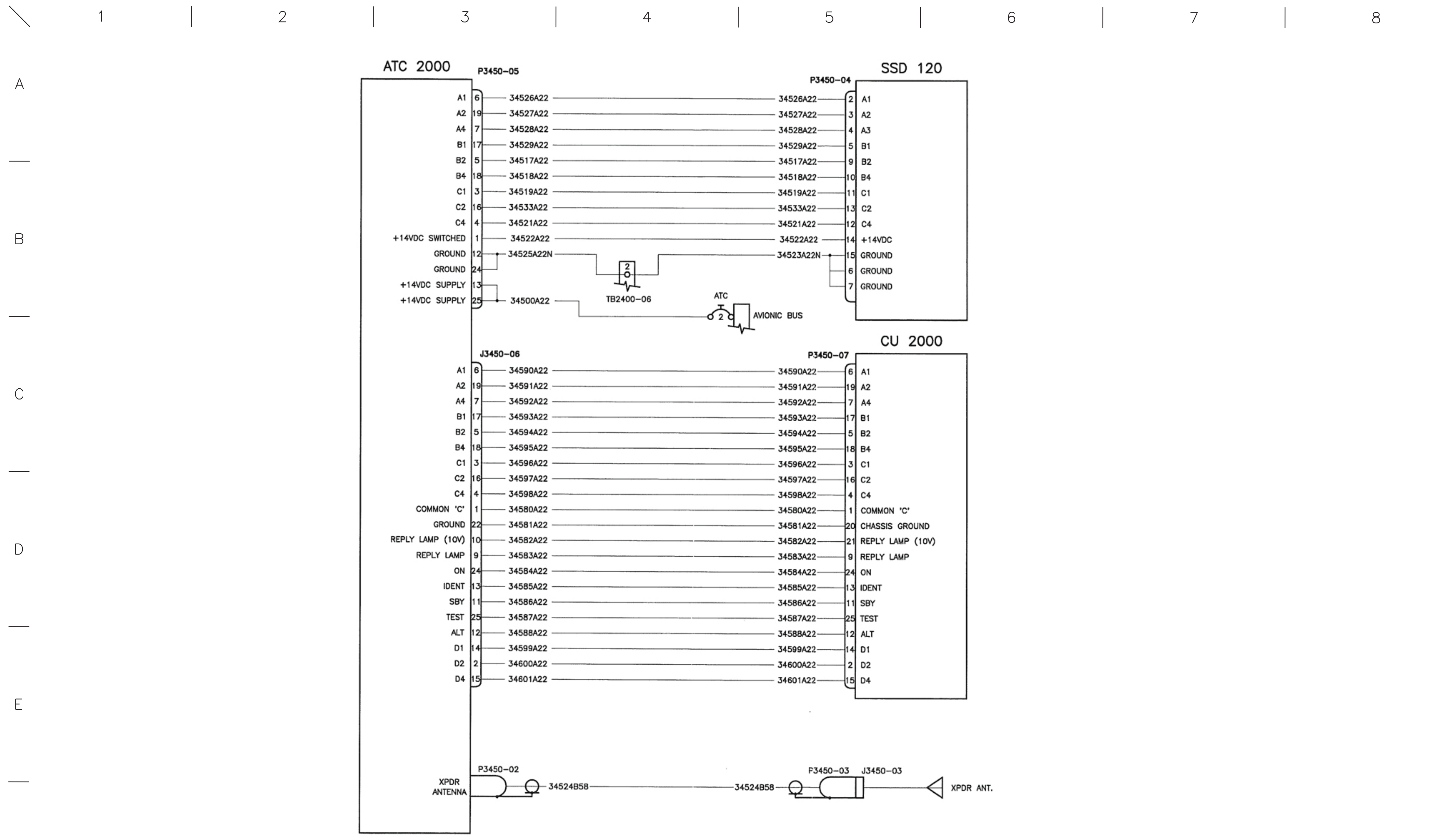
Effectivity	REV	GPS RECEIVER	SCHEMATIC	SHEET
ALL	C	KLN 35N (night) (With Internal Lighting)	20-3450-04-00	1/1



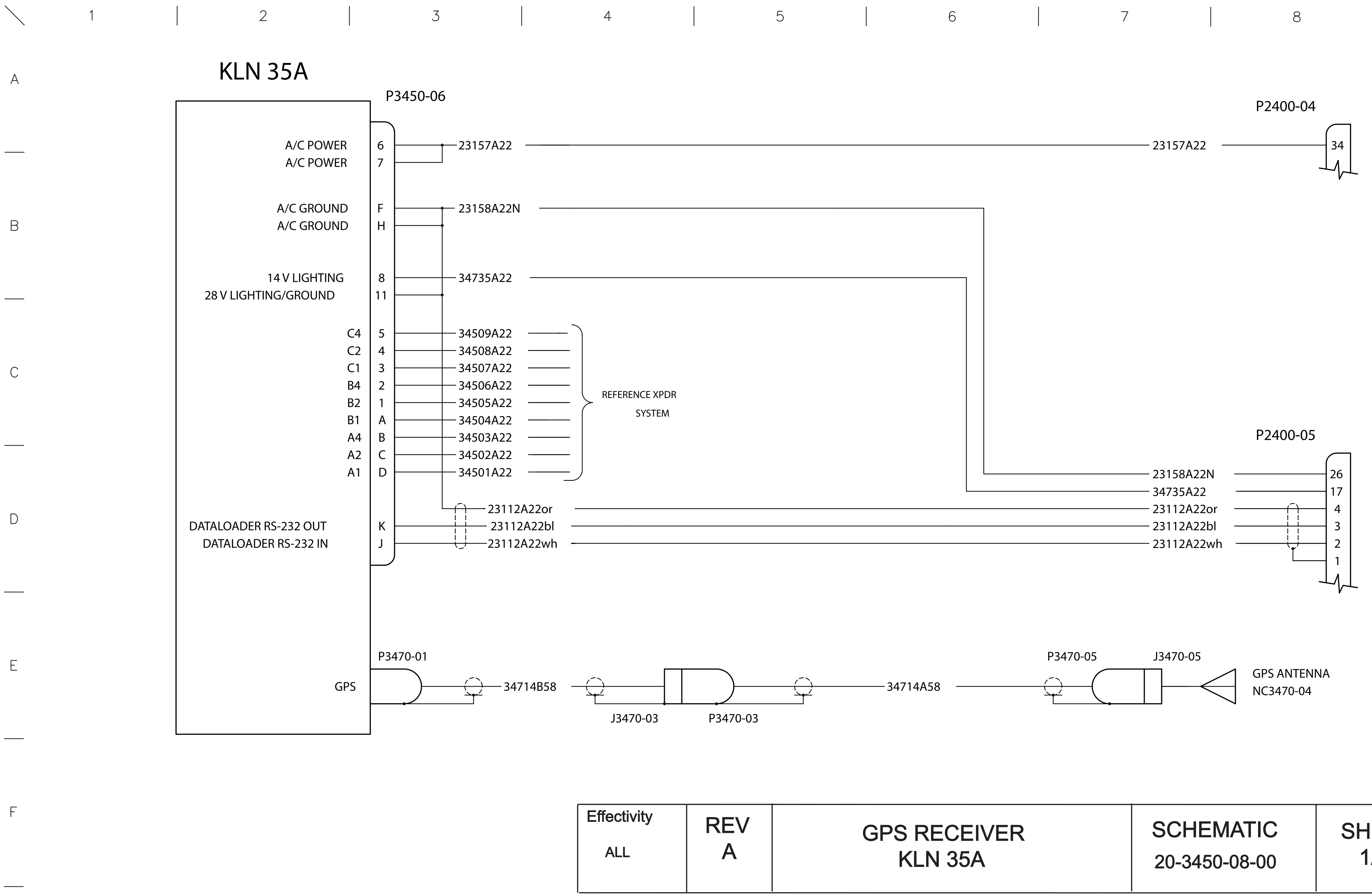
Effectivity	REV	TRANSPONDER/GPS RECEIVER	SCHEMATIC	SHEET
ALL	A	KT 76A/KLN 35A (OPTIONAL)	20-3450-05-00	1/1



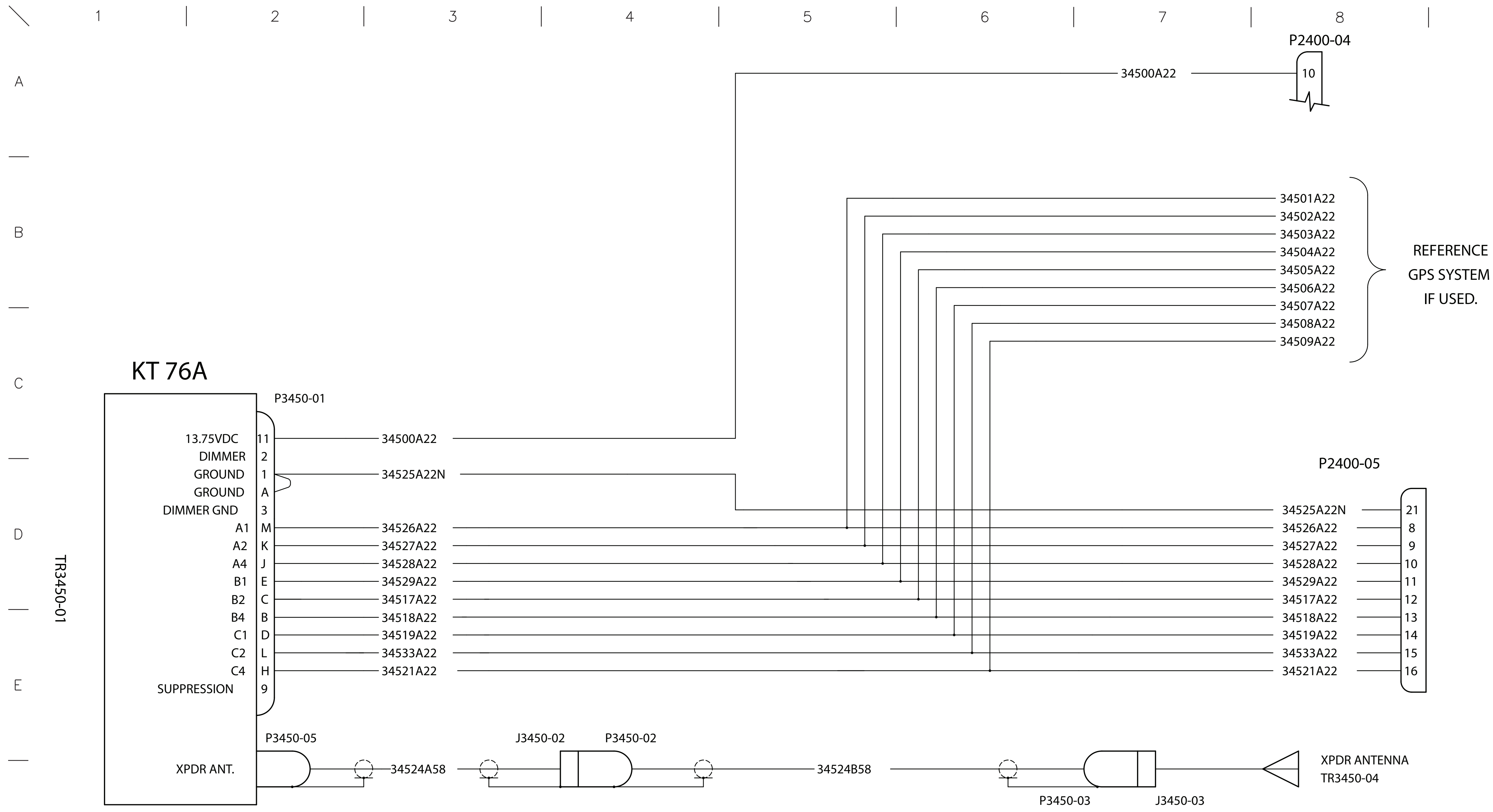
Effectivity	REV		SCHEMATIC	SHEET
ALL	A	DME, KN 64	20-3450-06-00	1/1



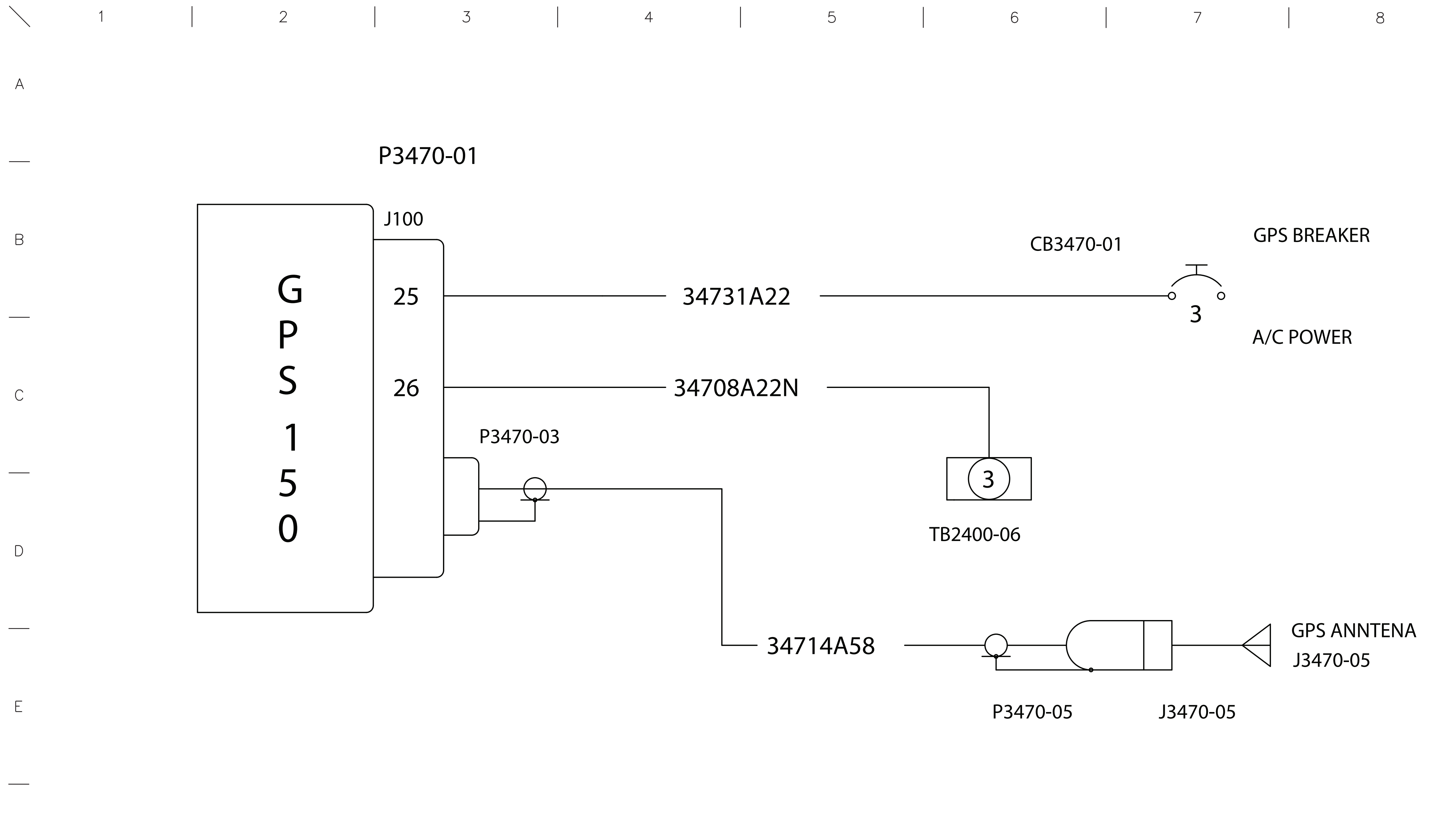
Effectivity	REV		SCHEMATIC	SHEET
ALL	A	TRANSPONDER - ATC 2000	20-3450-07-00	1/1



Effectivity	REV	GPS RECEIVER	SCHEMATIC	SHEET
ALL	A	KLN 35A	20-3450-08-00	1/1



Effectivity	REV		SCHEMATIC	SHEET
ALL	A	TRANSPONDER - KT 76A	20-3450-09-00	1/1



Effectivity	REV		SCHEMATIC	SHEET
ALL	B	GPS 150	20-3470-00-00	1/1