SUPPLEMENT 4

TO THE AIRPLANE FLIGHT MANUAL (AFM)

DA42 L360

WAAS OPERATIONS

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RECORD OF REVISIONS

Revisions to this Supplement are recorded in the following table.

New or amended text will be indicated by a bold black vertical line in the left hand margin of a revised page. The Revision No. and Date will be shown on the footer of the page.

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CHAPTER 9

SUPPLEMENT 4

WAAS OPERATIONS

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1. GENERAL

This aircraft supplement (Supplement 4) supplies the information necessary for the efficient operation of the DA42 L360 airplane when the optional GIA 63W is installed in order to carry out Wide Area Augmentation System (WAAS) operations.

1.8 G1000 Avionics System

The Garmin GNSS navigation system installed in this airplane is a GPS system with a Satellite Based Augmentation System (SBAS) comprised of two TSO-C145a Class 3 approved Garmin GIA 63Ws, TSO-C146a Class 3 approved Garmin GDU 104X Display Units, Garmin GA36 or GA35 antennas, and GPS/WAAS software version 3.1 or later approved version. The Garmin GNSS navigation system in this airplane is installed in accordance with FAA AC 20-138A.

NOTE

The following listing of the Garmin G1000 operational capabilities does not constitute an operational approval. For the operational approval of the aircraft contact the appropriate governing authority.

The Garmin GNSS navigation system as installed in this airplane complies with the requirements of FAA AC 20-138A and is approved for navigation using GPS and SBAS (within the coverage of a Satellite Based Augmentation System complying with ICAO Annex 10) for IFR en route, terminal area, and non-precision approach operations (including those approaches titled “GPS” and “RNAV (GPS)” approaches). The Garmin GNSS navigation system installed in this airplane is approved for approach procedures with vertical guidance including “LPV”, “LNAV/ VNAV” and LNAV+V.

The Garmin GNSS navigation system as installed in this airplane complies with the equipment requirements of FAA AC 90-105 and meets the equipment performance and functional requirements to conduct RNP terminal departure and arrival procedures and RNP approach procedures without RF (radius to fix) legs. Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval from the governing authority.

The Garmin GNSS navigation system as installed in this airplane complies with the equipment requirements of FAA AC 90-100A for RNAV 2 and RNAV 1 operations. In accordance with AC 90-100A, Part 91 operators (except subpart K) following the aircraft and training guidance in AC 90-100A are authorized to fly RNAV 2 and

RNAV 1 procedures. Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval from the governing authority.

The Garmin GNSS navigation system as installed in this airplane has been found to comply with the requirements for primary means of Class II navigation in oceanic and remote navigation (RNP-10) without time limitations in accordance with FAA AC 20-138A and FAA Order 8400.12A. The Garmin GNSS navigation system can be used without reliance on other long-range navigation systems. This does not constitute an operational approval.

The Garmin GNSS navigation system as installed in this airplane has been found to comply with the navigation requirements for primary means of Class II navigation in oceanic and remote navigation (RNP-4) in accordance with FAA AC 20-138A and FAA Order 8400.33. The Garmin GNSS navigation system can be used without reliance on other long-range navigation systems. Additional equipment may be required to obtain operational approval to utilize RNP-4 performance. This does not constitute an operational approval.

The Garmin GNSS navigation system as installed in this aircraft complies with the accuracy, integrity, and continuity of function, and contains the minimum system functions required for PRNAV operations in accordance with JAA Administrative & Guidance Material Section One: General Part 3: Temporary Guidance Leaflets, Leaflet No 10 (JAA TGL-10 Rev 1).

The Garmin GNSS navigation system as installed in this airplane meets RNP5 airspace (BRNAV) requirements of AC 90-96A and in accordance with AC 20-138A, EASA AMC 20-4 and FAA Order 8110.60. The GNSS navigation system has two TSO-C145a Class 3 approved Garmin GIA 63Ws, and TSO-C146a Class 3 approved Garmin GDU 104X Display Units. This does not constitute an operational approval.

Garmin International holds an FAA Type 2 Letter of Acceptance (LOA) in accordance with FAA AC 20-153 for database Integrity, quality, and database management practices for the Navigation database. Pilots and operators can view the LOA status at www.Garmin.com > Aviation Databases > Type 2 LOA Status.

Navigation information is referenced to WGS-84 reference system.

2. OPERATING LIMITATIONS

2.16 OTHER LIMITATIONS

2.16.7 G1000 GPS NAVIGATION SYSTEM LIMITATIONS

NOTE

The following set of limitations supersedes the limitations addressing the same functions of the G1000 in the basic AFM limitation section. All other Garmin G1000 Avionic System limitations remain effective.

The pilot must confirm at system initialization that the Navigation database is current.

Navigation database is expected to be current for the duration of the flight. If the AIRAC cycle will change during flight, the pilot must ensure the accuracy of navigation data, including suitability of navigation facilities used to define the routes and procedures for flight. If an amended chart affecting navigation data is published for the procedure, the database must not be used to conduct the procedure.

GPS/SBAS based IFR enroute, oceanic, and terminal navigation is prohibited unless the pilot verifies and uses a valid, compatible, and current Navigation database or verifies each waypoint for accuracy by reference to current approved data.

SBAS functionality must be enabled on the G1000 GPS Status page (refer to the G1000 Pilot's Guide for procedure)

Discrepancies that invalidate a procedure must be reported to Garmin International. The affected procedure is prohibited from being flown using data from the Navigation database until a new Navigation database is installed in the aircraft and verified that the discrepancy has been corrected. Contact information to report Navigation database discrepancies can be found at www.garmin.com > Support > Contact Garmin Support > Aviation. Pilots and operators can view navigation data base alerts at www.garmin.com > In the Air > NavData Alerts.

For flight planning purposes, in areas where SBAS coverage is not available, the pilot must check RAIM availability. Within the United States, RAIM availability can be determined using the Garmin WFDE Prediction program, part number 006-A0154-01 (included in G1000 trainer software) version 3.00 or later approved

version or the FAA's en route and terminal RAIM prediction website: www.raimprediction.net, or by contacting a Flight Service Station. Within Europe, RAIM availability can be determined using the Garmin WFDE Prediction program or Europe's AUGER GPS RAIM Prediction Tool at http://augur.ecacnav.com/augur/app/home. For other areas, use the Garmin WFDE Prediction program. This requirement is not necessary if SBAS coverage is confirmed to be available along the entire route of flight. The route planning and WFDE prediction program may be downloaded from the Garmin website on the internet. For information on using the WFDE Prediction Program, refer to Garmin WAAS FDE Prediction Program, part number 190-00643-01, 'WFDE Prediction Program Instructions'.

For flight planning purposes, operations on RNP and RNAV procedures when SBAS signals are not available, the availability of GPS integrity RAIM shall be confirmed for the intended route of flight. In the event of a predicted continuous loss of RAIM of more than five minutes for any part of the intended route of flight, the flight should be delayed, cancelled, or re-routed on a track where RAIM requirements can be met.

For flight planning purposes for operations within European B-RNAV and P-RNAV airspace, if more than one satellite is scheduled to be out of service, then the availability of GPS integrity RAIM shall be confirmed for the intended flight (route and time). In the event of a predicted continuous loss of RAIM of more than five minutes for any part of the intended flight, the flight should be delayed, cancelled, or re-routed on a track where RAIM requirements can be met.

For flight planning purposes, operations where the route requires Class II navigation the airplane's operator or pilot-in-command must use the Garmin WFDE Prediction program to demonstrate that there are no outages on the specified route that would prevent the Garmin GNSS navigation system to provide primary means of Class II navigation in oceanic and remote areas of operation that requires (RNP-10 or RNP-4) capability. If the Garmin WFDE Prediction program indicates fault exclusion (FDE) availability will exceed 34 minutes in accordance with FAA Order 8400.12A for RNP-10 requirements, or 25 minutes in accordance with FAA Order 8400.33 for RNP-4 requirements, then the operation must be rescheduled when WFDE is available.

Both Garmin GPS navigation receivers must be operating and providing GPS navigation guidance to their respective PFD for operations requiring RNP-4 performance.

North Atlantic (NAT) Minimum Navigational Performance Specifications (MNPS) Airspace operations per AC 91-49 and AC 120-33 require both GPS/SBAS receivers to be operating and receiving usable signals except for routes requiring only one Long Range Navigation sensor. Each display computes an independent

navigation solution based on the on-side GPS sensor. However, either display will automatically revert to the cross-side sensor if the on-side sensor fails or if the cross-side sensor is determined to be more accurate. On G1000 installations a “BOTH ON GPS1” or “BOTH ON GPS2” message does not necessarily mean that one GPS has failed. Refer to the MFD AUX-GPS STATUS page to determine the state of the unused GPS.

Whenever possible, RNP and RNAV routes including Standard Instrument Departures (SIDs) and Obstacle Departure Procedures (ODPs), Standard Terminal Arrival (STAR), and enroute RNAV “Q” and RNAV “T” routes should be loaded into the flight plan from the database in their entirety, rather than loading route waypoints from the database into the flight plan individually. Selecting and inserting individual named fixes from the database is permitted, provided all fixes along the published route to be flown are inserted. Manual entry of waypoints using latitude/longitude or place/bearing is prohibited.

“GPS”, “or GPS”, and “RNAV (GPS)” instrument approaches using the Garmin navigation systems are prohibited unless the pilot verifies and uses the current Navigation database.GPS based instrument approaches must be flown in accordance with an approved instrument approach procedure that is loaded from the Navigation database.

Not all published Instrument Approach Procedures (IAP) are in the Navigation database. Pilots planning on flying an RNAV instrument approach must ensure that the Navigation database contains the planned RNAV Instrument Approach Procedure and that approach procedure must be loaded from the Navigation database into the FMS flight plan by its name.

IFR non-precision approach approval using the GPS/SBAS sensor is limited to published approaches authorized by the appropriate governing authority.

The navigation equipment required to join and fly an instrument approach procedure is indicated by the title of the procedure and notes on the IAP chart. Use of the Garmin GPS/SBAS receivers to provide navigation guidance during the final approach segment of an ILS, LOC, LOC-BC, LDA, SDF, MLS or any other type of approach not approved for “or GPS” navigation is prohibited. When using the Garmin VOR/LOC/GS receivers to fly the final approach segment, VOR/LOC/GS navigation data must be selected and presented on the CDI of the pilot flying.

Navigation information is referenced to WGS-84 reference system, and should only be used where the Aeronautical Information Publication (including electronic data and aeronautical charts) conform to WGS-84 or equivalent.

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3. EMERGENCY PROCEDURES

There is no change to the airplane emergency procedures.

4A. NORMAL OPERATING PROCEDURES

4A.6 CHECKLIST FOR NORMAL OPERATING PROCEDURES

4A.6.14 APPROACH AND LANDING

KAP 140 Operation During Approach and Landing:

(a) GPS

(1) Navigation Source..... Select GPS using CDI button on PFD

(2) Approach..... Load and Activate

(3) Intercept heading ..... Establish in appropriate nav mode

(4) Mode Controller ..... Select APR and verify autopilot captures

CAUTION

WHEN TURNING ONTO FINAL APPROACH THE AUTOPILOT WILL REVERT TO ROL AND AN ALERT MESSAGE ("NAV SOURCE CHANGED, ETC.") APPEARS ON THE PFD THE FOLLOWING STEPS MUST BE TAKEN:

NOTE

Refer to the Garmin Cockpit Reference Guide and the Pilots Guide for the DA 42 L360 for a full description of the WAAS system

(5) Mode Controller ..... Select APR button twice and verify autopilot captures glidepath (GS on KAP 140 display)

NOTE

A steady “APR” annunciation confirms lateral track capture.

(6) PFD Indications ..... Monitor lateral and vertical guidance

(b) Missed Approach

NOTE

If LOI annunciation is displayed and GPS based navigation is aborted while on the final approach segment, the missed approach procedure must be executed.

(1) AP DISC Switch..... PRESS to disengage AP.

(2) MISSED APPROACH.....EXECUTE.

(3) AP Button.....After airplane is in trim, PRESS for autopilot operation if desired.

(c) Before Landing

(4) AP DISC Switch.....PRESS to disengage AP.

4B. ABNORMAL OPERATING PROCEDURES

No changes

5. PERFORMANCE

No changes

6. MASS AND BALANCE

6.5 EQUIPMENT LIST AND EQUIPMENT INVENTORY

All equipment that is approved for installation of the WAAS equipment in the DA42 L360 is shown in the Equipment List that follows.

The items of equipment installed in your particular airplane are indicated in the appropriate column. The set of items marked as “installed” constitutes the Equipment Inventory.

Airplane Serial No.:	Registration:		Date:	Mass		Lever Arm	
Description	**Type**	**Manufacturer**	**Installed**	**lb**	**kg**	**in**	**m**
Integrated Avionics #1	GIA 63W	Garmin		5.29	2.4	154.9	3.935
Integrated Avionics #2	GIA 63W	Garmin		5.29	2.4	154.9	3.935
GPS/WAAS #1 antenna	GA 35	Garmin		0.47	0.21	104.1	2.645
GPS/WAAS #2 antenna	GA 35	Garmin		0.47	0.21	104.1	2.645
GPS/WAAS #1 antenna (optional)	GA 36	Garmin		0.47	0.21	104.1	2.645
GPS/WAAS #2 antenna (optional)	GA 36	Garmin		0.47	0.21	104.1	2.645

Place:_____ Date: _____ Signature _____

7. DECRIPTION OF THE AIRPLANE AND ITS SYSTEMS

7.13 GARMIN G1000 INTEGRATED AVIONICS SYSTEM

7.13.7 GPS/WAAS AND AUTOPILOT INTEGRATION

The Garmin GNSS navigation system installed in this airplane is a GPS system with a Satellite Based Augmentation System (SBAS). There are two GIA 63W units installed that provided the hardware and software for the navigation system.

The navigation system is coupled to the KAP 140 autopilot and information related to nav inputs and other information is displayed on the PFD/MFD.The Garmin system provides the navigation inputs to the KAP 140 and does not change the function of autopilot. The KAP 140 system does show information related to the navigation source other than the active pitch and roll modes.

With the installation of the GIA63W the aircraft can now use the approved approaches for LNAV/VNAV, LNAV+V and LPV

NOTE

Refer to the Garmin Cockpit Reference Guide, Garmin Pilots Guide and AFMS# A13 (Autopilot System KAP 140) for more detailed information in regards to the autopilot and navigation system functions.

Change to roll mode

When the autopilot is following navigational guidance from the G1000, some selections on the G1000 can cause the autopilot to automatically revert to roll mode. The G1000 will display the advisory message “NAV Source Changed – Select Desired Autopilot Mode” and the lateral mode the autopilot was in prior to the change (NAV or APPR) will flash. Pressing the lateral mode button (NAV or APPR) once on the autopilot will change the lateral mode indication to ROL. The autopilot can then be re-engaged in the desired mode.

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NOTE

The G1000 may display the advisory message even when the autopilot is not engaged, or engaged in a mode without G1000 navigational guidance (example HDG mode). The G1000 message is advisory that the autopilot mode may have changed; the KAP 140 autopilot display should be checked for a flashing lateral mode annunciation which indicates that the autopilot has reverted to operating in roll mode.

The following conditions will cause the autopilot to automatically revert to roll mode.

(a) Changing the navigation source displayed on the HSI

(b) Activating vectors to final while the autopilot is already engaged in APR mode

(c) Activating the missed approach

(d) When sequencing to the final approach course on an LNAV+V or LPV approach.

8. AIRPLANE HANDLING, CARE AND MAINTENANCE

No Changes