

SUPPLEMENT
TO THE AIRPLANE FLIGHT MANUAL

DA 40 D

**Integrated Avionics System Garmin G1000,
SBAS and P-RNAV Operation**

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The information contained in this document supplements or supersedes the aircraft flight manual only in those areas listed herein.

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1. GENERAL

1.5 DEFINITIONS AND ABBREVIATIONS

(i) Miscellaneous

AC:	Advisory Circular
AMC:	Acceptable Means of Compliance
AIRAC:	Aeronautical Information Regulation and Control
SBAS:	Satellite Based Augmentation System
WAAS:	Wide Area Augmentation System
EGNOS:	European Geostationary Navigation Overlay Service
MSAS:	Multi-functional Satellite Augmentation System
RNAV:	Area Navigation
P-RNAV:	Precision Area Navigation
B-RNAV:	Basic Area Navigation
LPV:	Localizer Performance with Vertical Guidance
LNAV/VNAV:	Lateral Navigation / Vertical Navigation
LNAV+V:	Lateral Navigation with Advisory Vertical Guidance
RNP:	Required Navigation Performance
GNSS:	Global Navigation Satellite System
STAR:	Standard Terminal Arrival Route
SID:	Standard Instrument Departure
ETSO:	European Technical Standard Order
RAIM:	Receiver Autonomous Integrity Monitoring
WFDE:	WAAS Fault Detection/Exclusion

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 GA 35 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 20-138B, EASA AMC 20-27 and EASA AMC 20-28.

NOTE

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

The Garmin GNSS navigation system as installed in this airplane complies with the requirements of FAA AC 20-138B, EASA AMC 20-27 and EASA AMC 20-28 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 enroute, 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, within the European Airspace System. 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.

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.

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 20-138B and FAA Order 8400.12A. The Garmin GNSS navigation system can be used without reliance on other long-range navigation systems.

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 20-138B 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.

The Garmin GNSS navigation system as installed in this airplane 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 GNSS navigation system has two ETSO-145 / TSO-C145a Class 3 approved Garmin GIA 63Ws, and ETSO-146 / TSO-C146a Class 3 approved Garmin GDU 104X Display Units. The Garmin GNSS navigation system as installed in this airplane complies with the equipment requirements for PRNAV and BRNAV operations in accordance with FAA AC 90-96A and JAA TGL-10 Rev 1 and AMC 20-4.

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

2.16.8 GARMIN G1000 AVIONIC SYSTEM

NOTE

The following set of limitations supersedes the limitations addressing the same functions of the G1000 in the Diamond Aircraft AFM Supplement A32. All other Garmin G1000 Avionic System limitations remain effective.

Flight Preparation Phase

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) unavailability 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 FDE is available.

NOTE

Within the United States, RAIM availability can be determined using the Garmin WFDE Prediction program 3.00 or later approved version with Garmin GA36 antennas selected, or the FAA's enroute and terminal RAIM prediction website: www.raimprediction.net, or by contacting a Flight Service Station.

NOTE

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'.

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.

For flight planning purposes, it is not acceptable to plan a RNAV (GPS) LPV or LNAV/VNAV approach on the destination and alternate airport. The alternate airport must be planned using a LNAV approach or available ground-based aid.

Preflight Phase

SBAS functionality must be enabled on the G1000 GPS Status page (refer to the G1000 Pilot's Guide for procedure). The pilot must confirm at system initialization that the Navigation database is current. 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.

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.

NOTE

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 airplane 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.

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

North Atlantic (NAT) Minimum Navigational Performance Specifications (MNPS) Airspace operations per FAA AC 91-49 and FAA 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.

In Flight Phase

Manual entry of waypoints using latitude/longitude or place/bearing is prohibited.

NOTE

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.

Approach Phase

GPS based instrument approaches must be flown in accordance with an approved instrument approach procedure that is loaded from the Navigation database.

NOTE

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.

Advisory vertical guidance deviation information is only an aid to help pilots comply with altitude restrictions. When using advisory vertical guidance, the pilot must use the primary barometric altimeter to ensure compliance with all altitude restrictions, particularly during instrument approach operations.

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.

3. EMERGENCY PROCEDURES

No changes.

4A. NORMAL OPERATING PROCEDURES

4A.6 CHECKLISTS FOR NORMAL OPERATING PROCEDURES

4A.6.11 APPROACH & LANDING

c) RNAV (GPS)

Loading an approach into the active flight plan using the PROC Key:

1) Press the **PROC** Key. The Procedures Window is displayed.

2) Highlight 'SELECT APPROACH', and press the **ENT** Key.

The Approach Loading Page is displayed.

3) Use the **FMS** Knob to select an airport and press the **ENT** Key.

4) Select an approach from the list and press the **ENT** Key.

5) Select a transition (if required) and press the **ENT** Key.

6) Minimums

a) To set 'MINIMUMS', turn the small **FMS** Knob to select 'BARO', and press the **ENT** Key. Turn the small **FMS** Knob to select the altitude, and press the **ENT** Key.

Or:

b) To skip setting minimums, press the **ENT** Key.

7) Press the **ENT** Key with 'LOAD?' highlighted to load the approach procedure; or turn the large **FMS** Knob to highlight 'ACTIVATE' and press the **ENT** Key to load and activate the approach procedure.

Activating a missed approach in the active flight plan:

- 1) Press the **PROC** Key.
- 2) Turn the **FMS** Knob to highlight 'ACTIVATE MISSED APPROACH'.
- 3) Press the **ENT** Key. The aircraft automatically sequences to the MAHP.

4B. ABNORMAL OPERATING PROCEDURES

When both GPS/SBAS receivers are inoperative or GPS navigation information is not available or invalid, the G1000 system will enter one of two modes:

Dead Reckoning mode (DR) or Loss Of Integrity mode (LOI).

The mode is indicated on the HSI by an amber "DR" or "LOI".

Which mode is active depends on the distance from the destination airport in the active flight plan.

If the LOI annunciation is displayed, revert to an alternate means of navigation appropriate to the route and phase of flight. In Dead Reckoning mode, the MAP – NAVIGATION MAP will continue to be displayed with a ghosted aircraft icon in the center and an amber 'DR' overwriting the icon.

Aircraft position will be based upon the last valid GPS position, then estimated by Dead Reckoning methods. Changes in true airspeed, altitude, or winds aloft can affect the estimated position substantially. Dead Reckoning is only available in Enroute mode; Terminal and Approach modes do not support DR. Course deviation information will be displayed as an amber CDI on the PFD and will remain for up to 20 minutes after GPS position data has been lost. Revert to an alternate means of navigation appropriate to the route and phase of flight. During a GPS LPV, LNAV/VNAV, or LNAV+V approach, if the Horizontal or Vertical alarm limits are exceeded, the G1000 System will downgrade the approach. This will be annunciated in the ALERTS window and by an annunciation change on the HSI

from LPV, L/VNAV, or LNAV+V to LNAV. GPS glide path vertical guidance will be removed from the PFD. The approach may be continued using the LNAV only minimums.

During any GPS approach in which both precision and non-precision alarm limits are exceeded, the G1000 System will flag the lateral guidance and display a system message "ABORT APPROACH loss of navigation". Immediately upon viewing the message, the unit will revert to Terminal navigation mode alarm limits. If the position integrity is within these limits lateral guidance will be restored and the GPS may be used to execute the missed approach, otherwise alternate means of navigation must be utilized.

5. PERFORMANCE

No changes.

6. MASS AND BALANCE

No changes.

7. DESCRIPTION OF THE AIRPLANE AND ITS SYSTEMS

No changes.

8. AIRPLANE HANDLING, CARE AND MAINTENANCE

No changes.