

**SUPPLEMENT A33**

**TO THE AIRPLANE FLIGHT MANUAL**

**DA 42**

**Integrated Avionics System Garmin G1000**

**SBAS and P-RNAV Operation**

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**0.1 RECORD OF REVISIONS**

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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 GA36 antennas, and GPS/WAAS software version 3.1 or later approved version. The Garmin G1000 Integrated Avionics GNSS navigation system in this airplane is installed in accordance with FAA AC 20-138A 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 aircraft contact the appropriate governing authority.

The Garmin G1000 Integrated Avionics GNSS navigation system as installed in this airplane is approved for navigation using GPS and GPS/SBAS (within the coverage of a Satellite Based Augmentation System complying with ICAO Annex 10) for IFR en-route, terminal area, non-precision approach, and approach procedures with vertical guidance operation.

The Garmin G1000 Integrated Avionics GNSS navigation system as installed in this airplane complies with the equipment, performance and functional requirements to conduct RNAV and RNP operations in accordance with the applicable requirements of the reference documents listed in the following table.

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| Specification                        | Reference Document  |                               | ICAO Flight Plan Code | Integrated flight deck G1000 with SBAS |
|--------------------------------------|---------------------|-------------------------------|-----------------------|--|
|                                      | FAA                 | EASA or JAA                   |                       |  |
| RNAV 10 (RNP 10) Oceanic             | FAA Order 8400.12B  | -                             | A1                    | Yes                                    |
| B-RNAV/RNAV 5 (operations in Europe) | FAA AC 90-96A CHG 1 | EASA AMC 20-4                 | B2                    | Yes                                    |
| RNAV 2                               | FAA AC 90-100A      | -                             | C2                    | Yes                                    |
| RNAV 1                               | FAA AC 90-100A      | -                             | D2                    | Yes                                    |
| P-RNAV (operations in Europe)        | FAA AC 90-96A CHG 1 | JAA TGL 10 Rev 1              | D2                    | Yes                                    |
| RNP 4 (Oceanic)                      | FAA Order 8400.33   | -                             | L1                    | Yes                                    |
| RNP 1                                | FAA AC 90-105       | -                             | O2                    | No                                     |
| RNP APCH LNAV                        | FAA AC 90-105       | EASA AMC 20-27                | S1                    | Yes                                    |
| RNP APCH LNAV/VNAV                   | FAA AC 90-105       | EASA AMC 20-27 with CM-AS-002 | S2                    | Yes                                    |
| LP                                   | FAA AC 90-107       | -                             | N/A                   | Yes (Note 1)                           |
| LPV                                  | FAA AC 90-107       | EASA AMC 20-28                | N/A                   | Yes                                    |
| RNP AR APCH                          | FAA AC 90-101A      | EASA 20-26                    | T1                    | No                                     |

Note 1: When GDU software version 13.00 or later is installed.



Garmin International holds an FAA Type 2 Letter of Acceptance (LOA) in accordance with RTCA/DO-200A and AC 20-153B for database Integrity, quality, and database management processes for many of its aviation databases. Pilots and operators can view the LOA status and RTCA/DO-200A List of Applicable Avionics (190-01999-00) at [www.FlyGarmin.com](http://www.FlyGarmin.com) > Aviation Databases > Type 2 LOA Status.

Navigation information is referenced to WGS-84 reference system.

## 2. OPERATING LIMITATIONS

### 2.16 OTHER LIMITATIONS

#### 2.16.12 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 following placard is no longer applicable:

|   |
|---|
| GPS NOT APPROVED<br>FOR WAAS OPERATIONS |
|---|

##### **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 or Comant CI 2580-200 antenna selected, or the FAA's en route and terminal RAIM prediction website: <http://sapt.faa.gov>, or by contacting a Flight Service Station.

#### NOTE

Within Europe, RAIM availability can be determined using the Garmin WFDE Prediction program or Europe's AUGUR GPS RAIM Prediction Tool at <http://augur.eurocontrol.int/status>. 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'.

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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.

### **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 <https://fly.garmin.com/fly-garmin/> > Aviation Data Error Report. Pilots and operators can view navigation data base alerts at <https://fly.garmin.com/fly-garmin/> > Aviation Database Alerts.

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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.

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.

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### **3. EMERGENCY PROCEDURES**

No changes.

### **4A. NORMAL OPERATING PROCEDURES**

No changes.

### **4B. ABNORMAL OPERATING PROCEDURES**

#### **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.

## **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.