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**FAA Approved AIRPLANE FLIGHT MANUAL SUPPLEMENT**

**G1000 NXi Integrated Avionics System and GFC 700 AFCS for Textron  
Aviation Inc. NAV III Series Aircraft**

**Dwg. Number: 190-02128-02 Rev. 4**

This Supplement is Applicable to the Following Manuals:

172SPHBUS-02  
172RPHBUS-02  
182TPHBUS-03  
T182TPHBUS-03  
206HPHBUS-04  
T206HPHBUS-04

This Supplement must be attached to the FAA Approved Airplane Flight Manual when the GARMIN G1000 NXi Integrated Avionics System is installed in accordance with STC **SA01830WI**. The information contained herein supplements the information of the FAA Approved Airplane Flight Manual. For Limitations, Procedures, Performance information not contained in this Supplement, consult the FAA Approved Airplane Flight Manual and the basic Pilot's Operating Manual.

**Airplane Serial Number:** \_\_\_\_\_

**Airplane Registration Number:** \_\_\_\_\_

**FAA Approved By:** Paul Mast

**Paul Mast**  
**ODA STC Unit Administrator**  
**GARMIN International, Inc.**  
**ODA-240087-CE**

**Date:** 1-8-2020

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# GARMIN International, Inc.

## Log of Revisions

Pilot's Operating Handbook and FAA Approved Airplane Flight Manual  
Supplement for

G1000 NXi Integrated Avionics System and GFC 700 AFCS for Textron NAV III

REV NO.	PAGE NO(S)	DESCRIPTION	DATE OF APPROVAL	FAA APPROVED
1	ALL	Original Issue	12/20/2016	Robert G. Murray, ODA STC Unit Administrator GARMIN International, Inc. ODA-240087-CE
2	All	Added Enhanced AFCS, TAWS, ADS-B and QFE Procedures	9/24/18	Paul Mast, ODA STC Unit Administrator GARMIN International, Inc. ODA-240087-CE
3	All	Added Baro-VNAV and Performance-based Navigation information. Clarified optionally equipped features. Added ESP/USP references.	7/26/2019	Paul Mast, ODA STC Unit Administrator GARMIN International, Inc. ODA-240087-CE

REV NO.	PAGE NO(S)	DESCRIPTION	DATE OF APPROVAL	FAA APPROVED
4	All	Updated required software versions. Added changes to ESP activation automatic LVL mode engagement conditions. Added procedure for ESP engagement with failure of airspeed or stall warning system.	See Cover	See Cover

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## GENERAL

The information in this supplement is FAA-approved material and must be attached to the Pilot's Operating Handbook and FAA Approved Airplane Flight Manual (POH/AFM) when the airplane has been modified by installation of the GARMIN G1000 NXi Integrated Avionics System and GFC 700 Digital Automatic Flight Guidance System in accordance with GARMIN International, Inc. approved data, STC SA01830WI

The information in this supplement supersedes or adds to the basic Pilot's Operating Handbook and FAA Approved Airplane Flight Manual only as set forth below. Users of the manual are advised to always refer to the supplement for possibly superseding information and placarding applicable to operation of the airplane.

The GARMIN G1000 NXi system installed in this aircraft provides a fully integrated Display, Communications, Navigation and Flight Control System. Functions provided by the G1000 NXi system include: Primary Flight Information, Powerplant Monitoring, Navigation, Communication, Traffic Surveillance, TAWS Class B, Weather Avoidance, and a two-axis automatic flight control / flight director system.

Use of this supplement requires the installation of Garmin G1000 NXi hardware, and system software version 2501.01, or later, in the aircraft. Pilots are advised to carefully review the contents of this revision before operating the airplane.

The installed ADS-B OUT system has been shown to meet the equipment performance requirements of 14 CFR 91.227.

The Electronic Stability and Protection System (Garmin ESP™) enables several enhancements to the Garmin GFC 700 Automatic Flight Control System (AFCS):

- Electronic Stability & Protection (ESP™)
- Automatic Level Mode (LVL LVL)
- Underspeed Protection (USP)
- Coupled Go-Around



Refer to the Garmin G1000 Cockpit Reference Guide and Garmin G1000 Pilot's Guide for a detailed description of each feature listed above.

## **G1000 NXi GNSS (GPS/SBAS) NAVIGATION SYSTEM EQUIPMENT APPROVALS**

The Garmin G1000 NXi Integrated Avionics GNSS navigation system installed in this aircraft is a GPS system with a Satellite Based Augmentation System (SBAS) comprised of two TSO-C145a Class 3 approved Garmin GIAs, TSO-C146d Class 3 approved Garmin GDU 1054B or 1050 Display Units, Comant CI2580-200 antennas, and GPS software version 5.1 or later approved version. The G1000 NXi GNSS navigation system in this airplane is installed in accordance with AC 20-138D. When all the equipment is operative, the Garmin G1000 NXi system has two independent GNSS long-range navigation systems. Failure of any of the above equipment or the posting indicates only one operational GNSS system.

The Garmin G1000 NXi Integrated Avionics GNSS navigation system as installed in this airplane complies with the requirements of AC 20-138D and 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 operations.

The Garmin G1000 NXi Integrated Avionics GNSS navigation system as installed in this aircraft 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. This table is accurate at the time it was published. However, changes to operational rules, FAA advisory circulars, flight plan formats, etc., are possible. The pilot is responsible to ensure compliance with current operational requirements.

Navigation Specification	Operational Requirements/ Authorization	Reference Documents	ICAO Flight Plan Code		Notes
			Item 10a Code	Item 18 PBN/	
RNAV 10 RNP 10 Oceanic and Remote Areas of Operation (Class II Navigation)	<p>GNSS FDE availability must be verified prior to flight. Maximum predicted FDE unavailability is 34 minutes <sup>1</sup>.</p> <p>Two GNSS systems required to be operational, (one GNSS system for those routes requiring only one long range navigation system).</p> <p>No time limit using GNSS as the primary navigation sensor.</p> <p>Part 91, Part 91 subpart K, 121, 125, and 135 operators require operational approval.</p>	FAA AC 20-138D CHG 2 FAA AC 90-105A FAA AC 91-70A EASA AMC 20-12	R	A1	The GPS equipment as installed complies with the requirements for GPS primary means of Class II navigation in oceanic and remote airspace without reliance on other long-range navigation systems, when used in conjunction with an FDE prediction tool that satisfies the guidance of FAA AC 20-138D and AC 90-105A (or later revision). <sup>1</sup>
B-RNAV / RNAV 5 (Europe)	This does not constitute an operational approval.	FAA AC 90-96A CHG 1 EASA AMC 20-4A	R	B2	

<p>RNP 4</p> <p>Oceanic and Remote Areas of Operation (Class II Navigation)</p>	<p>GNSS FDE availability must be verified prior to flight. Maximum predicted FDE unavailability is 25 minutes. <sup>1</sup></p> <p>Two operational long-range nav systems required, (or one navigation system and one GNSS sensor for those routes requiring only one long-range navigation sensor).</p> <p>No time limit using GNSS as the primary navigation sensor.</p> <p>Part 91, Part 91 subpart K, 121, 125, and 135 operators require operational approval.</p>	<p>FAA AC 20-138D CHG 2</p> <p>FAA AC 90-105A</p> <p>FAA AC 91-70A</p>	<p>R</p>	<p>L1</p>	<p>The GPS equipment as installed complies with the requirements for GPS primary means of Class II navigation in oceanic and remote airspace without reliance on other long-range navigation systems, when used in conjunction with an FDE prediction tool that satisfies the guidance of FAA AC 20-138D and AC 90-105A (or later revision).<sup>1</sup></p> <p>Additional equipment may be required to obtain operational approval to utilize RNP-4 performance.</p>
<p>RNP-2 (Oceanic/ Remote)</p>	<p>GNSS FDE availability must be verified prior to oceanic or remote continental flight. Maximum predicted FDE unavailability is 5 minutes.</p>	<p>FAA AC 20-138D CHG 2</p> <p>FAA AC 90-105A</p>	<p>R</p>	<p>TBD</p>	<p>The GPS equipment as installed complies with the requirements for GPS primary means of Class II navigation in oceanic and remote airspace without reliance on other long-range navigation systems, when used in conjunction with an</p>

	<p>(continued)</p> <p>Two operational long-range nav systems required, (or one navigation system and one GNSS sensor for those routes requiring only one long-range navigation sensor).</p> <p>No time limit using GNSS as the primary navigation sensor.</p> <p>Part 91, Part 91 subpart K, 121, 125, and 135 operators require operational approval.</p>				<p>(continued)</p> <p>FDE prediction tool that satisfies the guidance of FAA AC 20-138D and AC 90-105A (or later revision).<sup>1</sup></p> <p>Additional equipment may be required to obtain operational approval to utilize RNP-2 performance.</p> <p>Item 18 PBN flight plan code is still to-be-determined at time of publication of this AFMS.</p>
RNP -2 (Domestic / Offshore En route)	<p>In accordance with AC 90-105A, Part 91 operators (except subpart K) following the aircraft and training guidance in AC 90-105A are authorized to fly RNP-2 domestic and offshore routes.</p> <p>Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval.</p>	<p>FAA AC 20-138D CHG 2</p> <p>FAA AC 90-105A</p>	R	TBD	<p>Includes RNP-2 domestic and offshore routes.</p> <p>Item 18 PBN flight plan code is still to-be-determined at time of publication of this AFMS.</p>

<p>RNAV 2</p>	<p>The GNSS RNAV system is installed and meets the performance and functional requirements of AC 90-100A.</p> <p>In accordance with AC 90-100A, CHG 2, Part 91 operators (except subpart K) following the aircraft and training guidance in AC 90-100A are authorized to fly RNAV 2 procedures.</p> <p>Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval.</p>	<p>FAA AC 20-138D CHG 2</p> <p>FAA AC 90-100A CHG 2</p>	<p>R</p>	<p>C2</p>	<p>Includes RNAV Q and T routes.</p>
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<p>RNAV 1</p>	<p>The GNSS RNAV system is installed and meets the performance and functional requirements of AC 90-100A.</p> <p>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 1 procedures.</p> <p>Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval.</p>	<p>FAA AC 20-138D CHG 2</p> <p>FAA AC 90-100A CHG 2</p>	<p>R</p>	<p>D2</p>	<p>Includes RNAV terminal departure and arrival procedures.</p>
<p>P-RNAV (Europe)</p>	<p>This does not constitute an operational approval.</p>	<p>FAA AC 90-96A CHG 1</p> <p>JAA TGL 10 Rev 1</p>	<p>R</p>	<p>D2</p>	<p>ICAO flight plan code for P-RNAV no longer exist. P-RNAV utilizes RNAV 1 flight plan codes.</p>

<p>RNP 1</p>	<p>When flying a RNP procedure containing a radius-to-fix (RF) leg, the AFCS must be operational.</p> <p>At a minimum, the flight director must be displayed and utilized when conducting procedures containing RF legs. In accordance with AC 90-105, Part 91 operators (except subpart K), following the aircraft and training guidance in AC 90-105A are authorized to fly RNP 1 procedures.</p> <p>Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval.</p>	<p>FAA AC 20-138D CHG 2</p> <p>FAA AC 90-105A</p>	<p>R</p>	<p>O2</p>	<p>Includes RNP terminal departure and arrival procedures. This includes procedures with radius-to-fix (RF) legs.</p>
<p>RNP APCH LNAV minima</p>	<p>When flying a RNP procedure with a radius-to-fix (RF) leg, the AFCS must be operational. At a minimum, the</p>	<p>FAA AC 20-138D CHG 2</p> <p>FAA AC 90-105A</p> <p>EASA AMC 20-27</p>	<p>R</p>	<p>S1</p>	<p>Includes non-precision approaches based on conventional navigation aids with “or GPS” in the title and area navigation approaches</p>

	<p>(continued)</p> <p>flight director must be displayed and utilized when conducting procedures containing RF legs.</p> <p>In accordance with AC 90-105A, Part 91 operators (except subpart K), following the aircraft and training guidance in AC 90-105A are authorized to fly RNP APCH LNAV minima procedures.</p> <p>Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval.</p>				<p>(continued)</p> <p>titled “GPS”, “RNAV (GPS)”, and “RNAV (GNSS)”. This includes procedures with radius-to-fix (RF) legs.</p>
RNP APCH LNAV/VNAV minima	<p>When flying a RNP procedure with a radius-to-fix (RF) leg, the AFCS must be operational.</p> <p>At a minimum, the flight director must be displayed and utilized when conducting procedures containing RF legs.</p>	<p>FAA AC 20-138D CHG 2</p> <p>FAA AC 90-105A</p> <p>EASA AMC 20-27 with CM-AS-002</p>	R	S2	<p>Includes area navigation approaches titled “RNAV (GPS)” and “RNAV (GNSS).” This includes procedures with radius-to-fix (RF) legs. Vertical guidance is based on GPS/SBAS when within SBAS coverage and on baro</p>



	<p>(continued)</p> <p>In accordance with AC 90-105A, Part 91 operators (except subpart K), following the aircraft and training guidance in AC 90-105A are authorized to fly RNP APCH LNAV/VNAV minima procedures.</p> <p>Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval.</p>				<p>(continued)</p> <p>VNAV when outside SBAS coverage, when SBAS has been disabled by pilot selection, or for approaches with 'WAAS VNAV NA'.</p> <p>The aircraft complies with the criteria of AMC 20-27 for RNP approaches to LNAV/VNAV minima, with the exception that VNAV is based on SBAS/GNSS geometric altitude when SBAS/GNSS is available and authorized.</p>
RNP APCH LP minima	<p>When flying a RNP procedure with a radius-to-fix (RF) leg, the AFCS must be operational. At a minimum, the flight director must be displayed and utilized when conducting procedures containing RF legs.</p>	<p>FAA AC 20-138D CHG 2</p> <p>FAA AC 90-107</p>	N/A	N/A	<p>This includes area navigation approaches titled "RNAV (GPS)" and "RNAV (GNSS)" including procedures with radius-to-fix (RF) legs.</p> <p>LP minima are available only when within SBAS coverage.</p>

	<p>(continued)</p> <p>In accordance with AC 90-107, Part 91 operators (except subpart K) following the operational considerations and training guidance in AC 90-107 are authorized to fly RNP APCH LP minima procedures.</p> <p>Part 91 subpart K, 121, 125, 133, 135, and 137 operators require operational approval.</p>				
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<p>RNP APCH LPV minima</p>	<p>When flying a RNP procedure containing a radius-to-fix (RF) leg, the AFCS must be operational. At a minimum, the flight director must be displayed and utilized when conducting procedures containing RF segments.</p> <p>In accordance with AC 90-107, Part 91 operators (except subpart K), following the aircraft and training guidance in AC 90-107 are authorized to fly RNP APCH LPV minima procedures.</p> <p>Part 91 subpart K, 121, 125, 129, and 135 operators require operational approval.</p>	<p>FAA AC 20-138D CHG 2</p> <p>FAA AC 90-107</p> <p>EASA AMC 20-28</p>	<p>B</p>	<p>N/A</p>	<p>Includes area navigation approaches titled "RNAV (GPS)" and "RNAV (GNSS)." This includes procedures with radius-to-fix (RF) legs. LPV minima are available only when within SBAS coverage.</p>
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<p>Advanced RNP</p> <p>See Notes for specific Advanced RNP functions.</p>	<p>This does not constitute an operational approval.</p>	<p>FAA AC 20-138D CHG 2</p>	<p>N/A</p>	<p>N/A</p>	<ul style="list-style-type: none"> <li>• <u>RNAV Holding</u>: Supported.</li> <li>• <u>Radius-to-Fix (RF) Legs</u>: Supported.</li> <li>• <u>Parallel Offsets</u>: RNP-4 parallel offsets as defined by AC 20-138D Chapter 10 are supported. However, Advanced RNP parallel offsets as defined by AC 20-138D Appendix 3 are not supported.</li> <li>• <u>Higher Continuity</u>: Supported when both GIA GPS/SBAS receivers are operating and providing GPS navigation guidance to their respective PFD.</li> <li>• <u>Scalable RNP</u>: Not supported.</li> <li>• <u>Fixed Radius Transitions (FRT)</u>: Not supported.</li> <li>• <u>Time of Arrival Control (TOAC)</u>: Not supported.</li> </ul>
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Table 1 - G1000 NXi GNSS Operational Requirements

1. FDE/RAIM availability worldwide can be determined via the following:

An FDE prediction tool that satisfies the guidance of FAA AC 20-138D and AC 90-105A (or later revision), such as the Garmin WFDE Prediction program, part number 006-A0154-01 (010-G1000-00) or later approved version with Comant CI2580-200 antennas selected.

Also, within the United States:

Via the FAA's RAIM Service Availability Prediction Tool (SAPT) website:  
<http://sapt.faa.gov>.

Contacting a Flight Service Station (not DUATS) to obtain non-precision approach RAIM.

Also, within Europe,

Via Europe's AUGER GPS RAIM Prediction Tool at  
<http://augur.ecacnav.com/augur/app/home>.

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 G1000 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'.

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. LOA status and RTCA/DO-200A List of Applicable Avionics (190-01999-00) can be viewed at [FlyGarmin.com](http://FlyGarmin.com).

Navigation information is referenced to the WGS-84 reference system.

## **USE OF THE AFMS**

The following definitions apply to WARNINGS, CAUTIONS and NOTES found throughout the AFMS:

### **WARNING**

**OPERATING PROCEDURES, TECHNIQUES, ETC., WHICH COULD RESULT IN PERSONAL INJURY OR LOSS OF LIFE IF NOT CAREFULLY FOLLOWED.**

### **CAUTION**

**OPERATING PROCEDURES, TECHNIQUES, ETC., WHICH COULD RESULT IN DAMAGE TO EQUIPMENT IF NOT CAREFULLY FOLLOWED.**

### **NOTE**

Operating procedures, techniques, etc., which is considered essential to emphasize.

## **ELECTRONIC FLIGHT BAG**

Electronic aeronautical charts displayed on this system have been shown to meet the guidance in AC 120-76D as a Type B Electronic Flight Bag (EFB) for FliteCharts and ChartView. Additional requirements may make a secondary source of aeronautical charts necessary on the aircraft and available to the pilot, such as traditional paper charts or an additional portable electronic device. If the secondary source of aeronautical charts is a Portable Electronic Device (PED), its use must be consistent with the guidance in AC 120-76D.

For operations under 14 CFR Part 91, it is suggested that a secondary or back up source of aeronautical information necessary for the flight be available to the pilot in the airplane. If the source of aeronautical information is in electronic format, operators must determine non-interference with the G1000 NXi system and existing aircraft systems for all flight phases.

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. LOA status and RTCA/DO-200A List of Applicable Avionics (190-01999-00) can be viewed at [FlyGarmin.com](http://FlyGarmin.com).

# SYMBOLS, ABBREVIATIONS AND TERMINOLOGY

The following glossary is applicable within the airplane flight manual supplement

<b>AC</b>	Advisory Circular
<b>ADC</b>	Air Data Computer
<b>ADF</b>	Automatic Direction Finder
<b>ADS-B</b>	Automatic Dependent Surveillance - Broadcast
<b>AFCS</b>	Automatic Flight Control System
<b>AFM</b>	Airplane Flight Manual
<b>AFMS</b>	Airplane Flight Manual Supplement
<b>AHRS</b>	Attitude and Heading Reference System
<b>ALT</b>	Altitude, or AFCS altitude hold mode, or ALT button on the GDU.
<b>AMMD</b>	Airport Moving Map Display
<b>AP</b>	Autopilot
<b>ATC</b>	Air Traffic Control
<b>AUX</b>	Auxiliary
<b>BARO</b>	Barometric Setting
<b>BC</b>	Back Course
<b>CDI</b>	Course Deviation Indicator
<b>COM</b>	Communication radio
<b>CWS</b>	Control Wheel Steering
<b>DME</b>	Distance Measuring Equipment
<b>DR</b>	Dead Reckoning
<b>EIS</b>	Engine Indication System
<b>ESP</b>	Electronic Stability and Protection
<b>FD</b>	Flight Director



<b>FIS-B</b>	Flight Information Service-Broadcast
<b>FLC</b>	AFCS Flight Level Change mode, or FLC button on the GDU.
<b>FLTA</b>	Forward Looking Terrain Awareness
<b>FMS</b>	Flight Management System
<b>FPL</b>	Flight Plan
<b>GA</b>	Go-around or Garmin Antenna
<b>GDU</b>	Garmin Display Unit
<b>GEA</b>	Garmin Engine/Airframe Unit
<b>GFC</b>	Garmin Flight Control
<b>GNSS</b>	Global Navigation Satellite System
<b>GP</b>	GPS Glide Path
<b>GPS</b>	Global Positioning System
<b>GPWS</b>	Ground Proximity Warning System
<b>GS</b>	Glide Slope
<b>HDG</b>	AFCS heading mode or the HDG button on the GDU.
<b>HSI</b>	Horizontal Situation Indicator
<b>IFR</b>	Instrument Flight Rules
<b>ILS</b>	Instrument Landing System
<b>INH</b>	Inhibit
<b>LNAV</b>	Lateral Navigation
<b>LNAV + V</b>	Lateral Navigation with Advisory Vertical Guidance
<b>LNAV/VNAV</b>	Lateral Navigation / Vertical Navigation
<b>LOC</b>	Localizer
<b>LOI</b>	Loss of Integrity (GPS)
<b>LP</b>	Localizer Performance
<b>LPV</b>	Localizer Performance with Vertical Guidance
<b>MAXSPD</b>	Maximum Speed, AFCS Overspeed Protection mode

<b>MFD</b>	Multi Function Display
<b>MPS</b>	Meters per second
<b>MSL</b>	Mean Sea Level
<b>MT</b>	Meters
<b>NAV</b>	Navigation, or AFCS navigation mode, or NAV button on the GDU.
<b>NEXRAD</b>	Next Generation Radar (XM/FIS-B Weather Product)
<b>NM</b>	Nautical Mile
<b>OAT</b>	Outside Air Temperature
<b>ODA</b>	Organization Designation Authorization
<b>OPT</b>	Option
<b>PDA</b>	Premature Descent Alert
<b>PFD</b>	Primary Flight Display
<b>PFT</b>	Pre-Flight Test
<b>PIT</b>	AFCS Pitch Mode
<b>POH</b>	Pilot's Operating Handbook
<b>PROC</b>	Procedure Button on the GDU
<b>PTCH</b>	Pitch
<b>QFE</b>	Atmospheric pressure at airport elevation (field elevation equals zero feet)
<b>ROL</b>	AFCS roll mode
<b>SBAS</b>	Satellite Based Augmentation System
<b>STC</b>	Supplemental Type Certificate
<b>SVT</b>	Synthetic Vision Technology
<b>TAWS</b>	Terrain Awareness and Warning System
<b>TWY</b>	Taxiway
<b>USP</b>	Autopilot Underspeed Protection
<b>VAPP</b>	AFCS VOR Approach Mode

<b>VFR</b>	Visual Flight Rules
<b>VMC</b>	Visual Meteorological Conditions
<b>VNAV</b>	Vertical Navigation
<b>VNV</b>	Vertical Navigation Button on the GDU
<b>VOR</b>	VHF Omni-directional Range
<b>VPTH</b>	Vertical Path
<b>VS</b>	Vertical Speed
<b>WAAS</b>	Wide Area Augmentation System
<b>WFDE</b>	WAAS Fault Detection/Exclusion
<b>WGS-84</b>	World Geodetic System – 1984
<b>XM LTNG</b>	XM Satellite System Lighting

## LIMITATIONS

## INTRODUCTION

This AFMS is applicable to the System Software Version 2501.01, or later. The System Software Version number is displayed at the top right side of the MFD Power-up page.

## COCKPIT REFERENCE GUIDE

The G1000 NXi Cockpit Reference Guide for Textron NAVIII series aircraft must be immediately available to the pilot during all phases of flight. Use the following G1000 NXi Cockpit Reference Guides when the following system software versions are installed:

<u>Software Version</u>	<u>Cockpit Reference Guide</u>
2501.01 or 2501.02	190-02178-00
2501.03 or 2501.04	190-02178-01
2501.07 or 2501.08	190-02178-01
2501.09 or later	190-02178-02

## G1000 NXI LIMITATIONS

### GROUND MANEUVERING

Do not use SafeTaxi, FliteCharts, ChartView, or SurfaceWatch functions as the basis for ground maneuvering. These functions do not comply with the requirements of AC 20-159 and are not qualified to be used as an airport moving map display (AMMD). These functions are to be used by the flight crew to orient themselves on the airport surface to improve pilot situational awareness during ground operations

## **IFR/VFR CHARTS**

Do not use the IFR/VFR CHARTS page for pilotage navigation. The IFR/VFR CHARTS are intended only to improve pilot situational awareness.

## **TAWS, GPWS, AND TERRAIN SYSTEM LIMITS**

Pilots are authorized to deviate from their current ATC clearance to the extent necessary to comply with TAWS or GPWS warnings.

The TAWS databases have an area of coverage as detailed below:

- a) The terrain database has an area of coverage from North 90° Latitude to South 90° Latitude in all Longitudes.
- b) The obstacle database has an area of coverage that includes the United States and Europe.

Use of the TAWS for navigation or terrain and/or obstacle avoidance is prohibited.

### **NOTE**

The area of coverage may be modified, as additional terrain data sources become available.

### **NOTE**

The TAWS page and terrain display is intended to serve as a situational awareness tool only. It may not provide the accuracy, fidelity, or both, on which to solely base decisions and plan maneuvers to avoid terrain or obstacles.

To avoid unwanted alerts, inhibit TAWS and/or GPWS when landing at an airport that is not included in the airport database.

Garmin International holds an FAA Type 2 Letter of Acceptance (LOA) in accordance with AC 20-153B for database integrity, quality, and database management practices for the Terrain and Obstacle databases. Flight crews and operators can view the LOA statuses and areas of degraded terrain performance by selecting the Type 2 LOA status quick link at [www.FlyGarmin.com](http://www.FlyGarmin.com).

When responding to a TAWS “Pull Up” warning, the autopilot must be immediately disconnected and the evasive maneuver hand flown by the pilot.

## **TRAFFIC AVOIDANCE SYSTEM LIMITS**

Use of the MAP - TRAFFIC MAP, Inset Map traffic display, or the SVT display to maneuver the airplane for traffic avoidance without outside visual reference is prohibited. The Traffic Information System (TIS) or optional Skywatch TAS, Skywatch HP, Honeywell KTA-870, and Garmin GTS 820/850/800 Traffic Systems are intended as an aid for the pilot to visually locate traffic. It is the responsibility of the pilot to see and manually maneuver the airplane to avoid other traffic.

Maneuvers based solely on a traffic advisory (TA) or on information displayed on a traffic display are not authorized. Pilots are authorized to deviate from their current ATC clearance to comply with a TCAS II resolution advisory (RA). When responding to a TCAS RA warning, the autopilot must be immediately disconnected and the evasive maneuver hand flown by the pilot.

## **DATA LINK WEATHER (XM, CONNEXT, OR FIS-B WEATHER)**

Datalink weather information displayed by the G1000 NXi system is limited to supplemental use only. XM, Garmin Connex, or FIS-B weather data is not a source of official weather information. Use of the NEXRAD, PRECIP, XM LTNG and DL LTNG (Datalink Lightning) data on the MAP – NAVIGATION MAP, MAP – WEATHER DATA LINK (XM), MAP – WEATHER DATA LINK (CNXT), and MAP – WEATHER DATA LINK (FIS-B) pages for hazardous weather, e.g., thunderstorm penetration, is prohibited.

NEXRAD, PRECIP, XM LTNG and DL LTNG information on the MAP – NAVIGATION MAP, MAP – WEATHER DATA LINK (XM), MAP – WEATHER DATA LINK (CNXT), and MAP – WEATHER DATA LINK (FIS-B) pages is intended only as an aid to enhance situational awareness of hazardous weather, not penetration. It is the pilot's responsibility to avoid hazardous weather using official weather data sources and the airplane's in-flight weather radar.

## **FMS FLIGHT PLAN**

Do not delete the arrival airport or runway waypoint within a loaded arrival procedure. Arrival procedures loaded into the G1000 NXi FMS must be associated with the destination airport.

## **BARO VNAV**

The barometric altimeter must be used as the primary altitude reference for all baro VNAV operations, including instrument approach procedure step-down fixes. Use of baro VNAV to a DA is not authorized with a remote altimeter setting. A current altimeter setting for the landing airport is required. When using remote altimeter minima, the baro VNAV function may be used to the published LNAV MDA.

## **RNP APPROACHES**

When a flight is predicated on flying a RNP approach with an RF leg at the destination and/or alternate, the pilot must determine that the AFCS is operational. At a minimum, the flight director must be displayed and utilized when conducting procedures containing Radius-to-Fix (RF) segments.

## **G1000 NXI GNSS (GPS/SBAS) NAVIGATION SYSTEM**

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

If the navigation database 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 flight crew verifies and uses a valid, compatible, and current Navigation database or verifies each waypoint for accuracy by reference to current approved data.



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.

For flight planning purposes:

- In areas where SBAS coverage is not available, the pilot must check RAIM availability.
- Operations within the U.S. National Airspace System on RNP and RNAV procedures when SBAS signals are not available, the availability of GPS integrity RAIM must 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, canceled, or re-routed on a track where RAIM requirements can be met.
- 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 must 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, canceled, or re-routed on a track where RAIM requirements can be met.
- For operations where the route requires Class II navigation, the aircraft's operator or flight crew must use an FDE Prediction program that satisfies the guidance of AC 20-138D and AC 90-105A (or later revision) to demonstrate that there are no outages on the specified route that would prevent the G1000 NXi from providing primary means of Class II navigation in oceanic and remote areas of operation that requires RNP-2 oceanic/remote, RNP-4, or RNP-10 capability. In accordance with FAA AC 90-105A requirements, if the Garmin WFDE Prediction program indicates fault exclusion (FDE) will be unavailable for more than 5 minutes for RNP-2 oceanic/remote, 25 minutes for RNP-4, or 34 minutes for RNP-10, then the operation must be rescheduled when FDE is available.

The GIA GPS navigation receiver must be operating and providing GPS navigation guidance to the PFD for operations requiring RNP-2 oceanic/remote, RNP-4, and RNP-10 performance.

Manual entry of waypoints using latitude/longitude or place/bearing is prohibited for published RNP and RNAV routes.

“GPS”, “or GPS”, “RNAV (GPS)”, and “RNAV (GNSS)” instrument approaches using the G1000 NXi System 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.

When conducting instrument approaches referenced to true North, the NAV Angle on the AUX-Units/Position (AUX - System Status) page must be set to True (T°).

Pilots planning to fly 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 within the U.S. National Airspace System. Approaches to airports in other airspace are not approved unless authorized by the appropriate governing authority.

It is prohibited to flight plan to an alternate airport based on minima for which SBAS is required (RNAV(GPS) LP/LPV).

Use of the Garmin G1000 NXi 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 G1000 NXi 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.

Do not delete the arrival airport or runway waypoint within a loaded arrival procedure. Arrival procedures loaded into the G1000 NXi FMS must be associated with the destination airport.

# EMERGENCY PROCEDURES

## UNDERSPEED PROTECTION ACTIVATION AND RECOVERY (IF EQUIPPED)

(Red **USP ACTIVE** Warning Annunciator on the PFD on ESP-equipped aircraft)

May also be accompanied by an amber **MINSPD** annunciator above the airspeed tape display and aural "AIRSPEED" alert)

1. **Throttle Control.....INCREASE POWER AS REQUIRED TO CORRECT UNDERSPEED CONDITION**
2. **Aircraft Attitude and Altitude ..... MONITOR**

*After underspeed condition is corrected:*

3. Autopilot .....RESELECT VERTICAL AND LATERAL MODES (if necessary)
4. Throttle Control.....ADJUST AS NECESSARY

### WARNING

**AN ABRUPT POWER INCREASE WITH UNDERSPEED PROTECTION ACTIVE MAY RESULT IN A NOSE-UP MISTRIM CONDITION.**

### NOTE

Autopilot Underspeed Protection mode provides a pitch down command to maintain sufficient airspeed. When power is applied to correct the underspeed condition the resulting nose up attitude may be high to climb back to the programmed vertical path. Underspeed Protection Mode recovery is not available below 200 feet AGL (61 meters), except in go-around (GA) mode.

## ESP ACTIVATION (IF EQUIPPED)

1. Power..... AS REQUIRED
2. Aircraft Attitude ..... MAINTAIN/REGAIN CONTROL

### NOTE

If ESP is active due to pitch, roll or high airspeed limits for at least 50% of the last 20 seconds, the autopilot will automatically engage in LVL mode, an aural 'ENGAGING AUTOPILOT' alert will be played, and the autopilot will roll the wings level and fly at zero-vertical speed.

### NOTE

If ESP is active due to a low airspeed/stall warning condition above 200 feet AGL, the system will apply pitch-down forces but the autopilot will not automatically engage in LVL mode.

3. Autopilot Modes..... AS DESIRED

## ESP ACTIVATION WITH FAILURE OF AIRSPEED OR STALL WARNING SYSTEM (IF EQUIPPED)

1. Power..... AS REQUIRED
2. Aircraft Attitude ..... MAINTAIN/REGAIN CONTROL
3. A/P DISC Button..... PRESS AND HOLD  
TO REMOVE ESP SERVO FORCES
4. Autopilot Circuit Breaker .....PULL

## TAWS (IF EQUIPPED)

(Red **PULL UP** on PFD and aural “PULL UP” or “[Whoop, Whoop], PULL UP”)

1. AP/ TRIM DISC Button ..... **PRESS and RELEASE**  
(To disconnect the autopilot)
2. Aircraft Attitude ..... **PULL BACK ON CONTROL WHEEL**
3. Power ..... **MAXIMUM ALLOWABLE**
4. Airspeed ..... **BEST ANGLE OF CLIMB SPEED**

*After Warning Ceases:*

1. Power ..... **MAXIMUM CONTINUOUS**
2. Altitude ..... **CLIMB AND MAINTAIN SAFE ALTITUDE**
3. Advise ATC of Altitude Deviation, if appropriate.

### NOTE

Only vertical maneuvers are recommended, unless either operating in visual meteorological conditions (VMC), or the pilot determines, based on all available information, that turning in addition to the escape maneuver is the safest course of action, or both.

## WIRE OBSTACLE (IF EQUIPPED)

(Red **WIRE AHEAD – PULL UP** annunciator Is Displayed and Aural “WIRE AHEAD PULL UP” Message)

1. **AP/TRIM DISC Button** ..... **PRESS and RELEASE**  
(To disconnect the autopilot)
2. **Aircraft Attitude** ..... **PULL BACK ON CONTROL WHEEL**
3. **Power** ..... **MAXIMUM ALLOWABLE**
4. **Airspeed** ..... **BEST ANGLE OF CLIMB SPEED**

*After Warning Ceases:*

1. **Power** ..... **MAXIMUM CONTINUOUS**
2. **Altitude** ..... **CLIMB AND MAINTAIN SAFE ALTITUDE**
3. **Advise ATC of Altitude Deviation, if appropriate.**

### NOTE

Only vertical maneuvers are recommended, unless either operating in visual meteorological conditions (VMC), or the pilot determines, based on all available information, that turning in addition to the escape maneuver is the safest course of action, or both.

# SURFACEWATCH WARNING (IF EQUIPPED)

## TAXIWAY TAKEOFF

(Red **TWY TAKEOFF** annunciator Is Displayed and Aural “Taxiway” Message)

1. Takeoff..... **ABORT**
2. Throttle Control.....**IDLE**
3. Brakes ..... **APPLY**
4. Aircraft Position and Runway Assignment ..... CONFIRM

*If Aircraft Position and Runway Assignment are Correct:*

1. SurfaceWatch Alerts .....OFF
  - From the MFD AUX – System Setup page, set SurfaceWatch alerts OFF

### NOTE

SurfaceWatch Alerts should be turned ON as soon as practical after takeoff to restore functionality for remainder of flight.



# TAXIWAY LANDING

(Red **TWY LANDING** annunciator Is Displayed and Aural “Taxiway” Message)

- 1. **BALKED LANDING Procedure** ..... **EXECUTE**
- 2. Aircraft Position and Runway Assignment ..... **CONFIRM**

*If Aircraft Position and Runway Assignment are Correct:*

- 1. SurfaceWatch Alerts ..... **OFF**
  - From the MFD AUX – System Setup page, set SurfaceWatch alerts OFF

## NOTE

SurfaceWatch Alerts should be turned ON as soon as practical after landing to restore functionality for ground operations.

# RUNWAY TOO SHORT DURING TAKEOFF

(Red **RWY TOO SHORT** annunciator Is Displayed and Aural “Runway Too Short” Message)

- 1. **Takeoff**..... **ABORT**
- 2. **Throttle Control**..... **IDLE**
- 3. **Brakes** ..... **APPLY**
- 4. Aircraft Position and Runway Assignment ..... **Confirm**
- 5. Ensure correct origin, runway, and required takeoff distance have been entered into the G1000 system from the FPL – SurfaceWatch Setup page.

# RUNWAY TOO SHORT DURING LANDING

(Red **RWY TOO SHORT** annunciator Is Displayed and Aural “Runway Too Short” Message)

1. **BALKED LANDING Procedure** ..... **EXECUTE**
2. Aircraft Position and Runway Assignment ..... **CONFIRM**
3. Ensure correct destination, runway, and required landing distance have been entered into the G1000 NXi system from the FPL – SurfaceWatch Setup page.

# ABNORMAL PROCEDURES

## TERRAIN AWARENESS AND WARNING SYSTEM (TAWS) OR WIRE OBSTACLE CAUTION (IF EQUIPPED)

(Amber **TERRAIN** or **CAUTION - WIRE** annunciator is displayed with aural message)

1. When a TAWS or WIRE OBSTACLE CAUTION occurs, take positive corrective action until the alert ceases. Stop descending or initiate either a climb or a turn, or both, as necessary, based on analysis of all available instruments and information.

## ESP FUNCTION WITH LOSS OF GPS NAVIGATION (DR OR GPS LOI ANNUNCIATION IS DISPLAYED) (IF EQUIPPED)

1. Stability & Protection .....VERIFY DISABLED PRIOR TO TAKEOFF OR LANDING

## LOSS OF TEMPERATURE INPUT ON BARO VNAV APPROACHES

Airplanes that have system software 2501.03, or later installed have the capability of flying an automatically generated and temperature compensated glidepath on certain GPS approaches when SBAS is not available. This automatically generated glidepath depends upon temperature input from the air data computer to function properly. In the event that the temperature input fails during an approach, the following will be observed:

- If the AFCS is coupled in APR mode, “GP” will be displayed in flashing black text over amber background for 5 seconds, then revert to PIT mode. The AFCS will remain coupled in GPS Mode (lateral).
- The VDI is flagged with “NO GP” displayed in the VDI.
- The “L/VNAV” indication on the CDI remains.

If the air data temperature inputs are failed, the VDI will be flagged and no glidepath will be generated. The approach may be continued to LNAV minima.

*If Air Data Temperature Input has Failed:*

1. AFCS Vertical Mode ..... RE-SELECT AS DESIRED
2. Continue the approach using LNAV only minima.

## **GPS APPROACH INTEGRITY LIMITS EXCEEDED**

During a GPS LP, LPV, LNAV/VNAV, or LNAV+V approach using SBAS, if the Horizontal or Vertical integrity limits are exceeded, the G1000 System will downgrade the approach. This will be annunciated in the ALERTS window and may also be accompanied by a change in the indicated approach type on the HSI. GPS glide path vertical guidance will be removed from the PFD unless the minimum can still be supported using Baro VNAV. The approach may be continued as annunciated.

During any GPS approach in which both precision and non-precision integrity 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 integrity 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.

## **SURFACEWATCH CAUTION MESSAGES (IF EQUIPPED)**

### **CHECK RUNWAY DURING TAKEOFF**

(Amber **CHECK RUNWAY** annunciator displayed on PFD and aural “CHECK RUNWAY”)

This caution alert is issued when the aircraft is taking off from a runway different than that entered in the FPL – SurfaceWatch Setup Page on the MFD.

1. Aircraft Position/Runway Assignment ..... CONFIRM

*If Aircraft Position and Runway Assignment are Correct:*

1. Takeoff ..... CONTINUE AS DESIRED

*If Aircraft Position and Runway Assignment are Not Correct or Cannot be Determined:*

1. Takeoff .....ABORT
2. Throttle Control ... ..IDLE (pull full out)
3. Brakes ..... APPLY
4. Enter correct origin, runway, and required takeoff distance into the G1000 NXi system from the FPL – SurfaceWatch Setup page on the MFD

## CHECK RUNWAY DURING LANDING

(Amber **CHECK RUNWAY** annunciator displayed on PFD and aural “CHECK RUNWAY”)

This caution alert is issued when the aircraft is landing on a runway different than that entered on the MFD FPL – SurfaceWatch Setup Page.

1. Aircraft Position/Runway Assignment ..... CONFIRM

*If Aircraft Position and Runway Assignment are Correct:*

2. Approach and Landing..... CONTINUE AS DESIRED

*If Aircraft Position and Runway Assignment are Not Correct or Cannot be Determined:*

3. BALKED LANDING Procedure ..... EXECUTE
4. Enter correct destination, runway, and required landing distance into the G1000 NXi system from the FPL – SurfaceWatch Setup page on the MFD.

# **SURFACEWATCH SYSTEM MESSAGES (IF EQUIPPED)**

## **SURFACEWATCH INHIBITED**

During certain flight operations, there may be a desire by the crew to inhibit the SurfaceWatch system, although it is considered abnormal to do so. Use the following procedures to inhibit the SurfaceWatch system:

1. MFD AUX – System Setup Page .....VIEW
2. SurfaceWatch Alerts ..... SELECT OFF

### **NOTE**

After inhibiting SurfaceWatch, the following will post as an alert on the PFD, in the Alerts window:

“SURFACEWATCH INHIBITED SurfaceWatch Inhibited.”

SurfaceWatch Alerts will remain inhibited until manually uninhibited by the pilot, or a power-cycle of the system. After a shutdown of the G1000 NXi system, SurfaceWatch will return to its normal state of operation and will not be inhibited.

## **SURFACEWATCH FAIL**

If any of the required inputs for SurfaceWatch operation are failed, invalid, or unavailable (such as GPS position), SurfaceWatch will be inoperative until the required parameters are restored. If SurfaceWatch has failed, the following will post as a message on the PFD, in the Alerts window:

“SURFACEWATCH FAIL One or more inputs invalid.”

SurfaceWatch will automatically return to its normal state of operation without crew action once the required inputs are restored.

## **NO SURFACEWATCH RUNWAY POSITION DATA**

There are certain runways at various worldwide airports that do not have valid position data for the SurfaceWatch system to use. If such a runway is entered into the system for either takeoff or landing via the FPL – SurfaceWatch Setup Page on the MFD, the following will post as a message on the PFD, in the alerts window:

“NO RUNWAY POSITION DATA Inhibit SurfaceWatch. No runway position data.”

SurfaceWatch should then be inhibited according to the SURFACEWATCH INHIBIT procedures outlined above. Failure to do so will result in nuisance TWY TAKEOFF or TWY LANDING warnings as applicable. After performing the takeoff or landing with SurfaceWatch inhibited, the system should be uninhibited as soon as practical so that functionality will be restored for the remainder of the flight.

# NORMAL PROCEDURES

## DISABLING ESP (IF EQUIPPED)

(**ESP OFF** message on PFD)

ESP may be disabled in the Aux – System Setup 2 page on the MFD. In the Stability & Protection group, highlight Enabled. Change Enabled to Disabled.

## COUPLED GO-AROUND (IF EQUIPPED)

1. GO AROUND button..... PRESS - Verify GA/GA in AP mode selection window on PFD  
**autopilot will not disengage**
2. Power .....APPLY Go Around power
3. MFD Bezel..... PRESS **NAV** to couple to selected navigation source  
OR;  
PRESS **HDG** to Fly ATC Assigned Missed Approach Heading
4. Altitude Preselect.....VERIFY Set to appropriate altitude
5. Aircraft Attitude ..... MONITOR

### NOTE

The pilot is responsible for initial missed approach guidance in accordance with published procedure. When the GA button is pressed the Flight Director command bars will command go-around pitch attitude and wings-level. The pilot must select the CDI to the appropriate navigation source and select the desired lateral and vertical flight director modes.



## **PERFORMANCE**

No Change. Refer to Pilot's Operating Handbook and FAA Approved Airplane Flight Manual or appropriate supplement.

## **WEIGHT AND BALANCE/EQUIPMENT LIST**

No Change. Refer to Pilot's Operating Handbook and FAA Approved Airplane Flight Manual or appropriate supplement.

## **AIRPLANE AND SYSTEMS DESCRIPTIONS**

Refer to the Garmin G1000 Cockpit Reference Guide and Garmin G1000 Pilots Guide for further information regarding Electronic Stability & Protection (ESP™), Automatic Level Mode (LVL LVL), Underspeed Protection (USP) and Coupled Go-Around.

## **APPROACH BARO VNAV**

### **General**

All G1000 NXi equipped NAV III aircraft have enroute and terminal VNAV capability. Airplanes that have system software 2501.03, or later installed have additional ability to conduct barometric based VNAV operations while conducting certain GPS approaches using an automatically generated temperature compensated glidepath. It should be noted that the Approach Baro VNAV functionality is separate and distinct from enroute and terminal descent VNAV functions.

For GPS-based LPV, LNAV/VNAV, LNAV+V, and RNP approaches, glidepath vertical guidance is normally provided via the Satellite Based Augmentation System (SBAS) system. If SBAS is unavailable or disabled, the G1000 NXi will provide automatic temperature compensated glidepath vertical guidance on approaches that have LNAV/VNAV minima published, or on some approaches that are not authorized for SBAS. No pilot action is required to receive the temperature compensated glidepath when SBAS is not available or allowed.

Refer to the applicable G1000 NXi Pilot's Guide and Cockpit Reference Guide (see Table 1 in Section 1) for complete detailed descriptions of the Garmin G1000 NXi Approach Baro VNAV function and operating instructions.

### **Temperature Compensation**

#### **Final Approach Segment (FAS)**

Altimeter systems assume an ISA temperature model of 15°C at sea level and a standard lapse rate of -6.5°C/km (1.98°C/1000 ft). When actual atmosphere deviates from the ISA model it results in altitude errors. For example, if the KICT RNAV (GPS) Y RWY 19R approach shown in Figure were flown with baro-VNAV on a non-standard day, the guidance would be relative to a glide path angle other than the 3.00° published glide path angle.

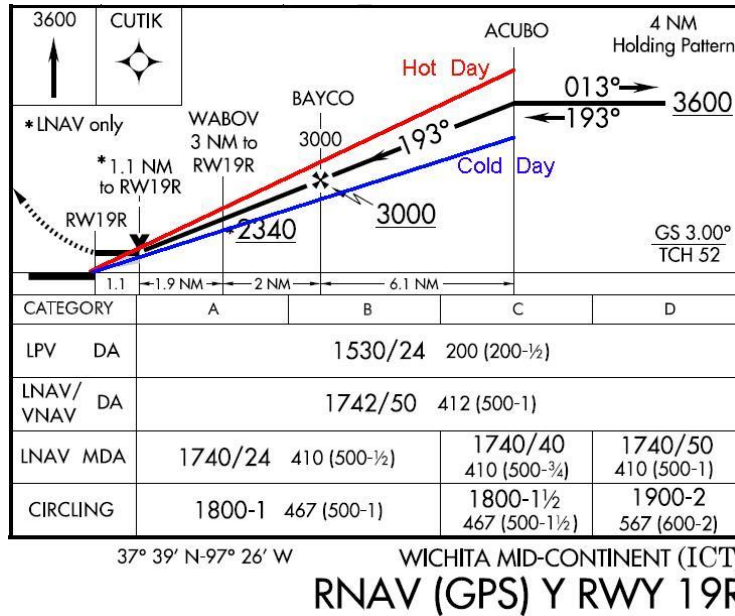


Figure 1, Actual Descent Path on a Hot or Cold Day

In Figure below, the approach plate notes for the same approach indicate it was designed to allow the approach to be safely flown within a temperature range of 2°F to 114°F. Outside of this temperature range, LNAV/VNAV minimums could not be used with uncompensated baro-VNAV systems.

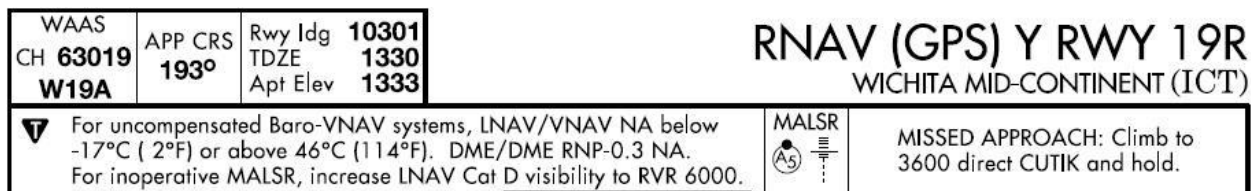


Figure 2, Approach Plate Notes

The Garmin G1000 NXi Approach Baro VNAV system is automatically temperature compensated to produce a glidepath position in space such that Baro VNAV approaches are always flown at the published glide path angle when the actual temperature deviates from the ISA model. This produces results similar to ILS glideslopes and LPV glidepaths that remain in the same position in space without respect to temperature.

To produce the correct geometric glide path angle on the final approach segment, temperature compensation is applied to the barometric altitude and used to determine the displayed vertical deviation. However, the altimeter continues to display uncompensated barometric altitude. The temperature compensation required depends on the temperature profile over the altitude range between the point at which the barometric setting is measured (presumed to be the approach airport) and the present altitude of the aircraft. This temperature profile is estimated by using the air data system static air temperature (SAT) and applying the standard temperature lapse rate to determine the temperature over the rest of the range. When using barometric altitude for vertical guidance along the final approach segment, temperature compensation is applied whether the temperature is above or below standard temperature. The actual compensated altitude is not displayed to the pilot during an approach.

## Compensating Waypoint Altitudes

In some locales, temperature compensation is required for waypoints in the approach prior to the final approach segment due to terrain and/or obstacle clearance requirements. US operations requiring use of temperature compensated waypoint altitudes are indicated by a snowflake icon and associated cold temperature limit on the approach plate. An example is shown in Figure 3. Pilots operating in US airspace must advise ATC of the amount of altitude correction applied when correcting on any segment of the approach other than the final segment prior to using temperature compensated waypoint altitudes since it may result in reduced vertical separation between aircraft. Other countries (e.g. Canada) may require use of temperature compensation on certain procedures.



WAAS CH <b>58299</b> <b>W01A</b>	APP CRS <b>006°</b>	Rwy Idg <b>6300</b> TDZE <b>6431</b> Apt Elev <b>6451</b>	<b>RNAV (GPS) X RWY 1</b> <b>JACKSON HOLE (JAC)</b>		
 -26°C	Circling NA east of Rwy 1-19. Inoperative table does not apply. If local altimeter setting not received, procedure NA. For uncompensated Baro-VNAV systems, LNAV/VNAV NA below -27°C (-16°F) or above 46°C (114°F). DME/DME RNP-0.3 NA.		MALS 	MISSED APPROACH: Climb to 14000 direct QUIRT and via 088° track to DNM VOR/DME and hold, continue climb-in-hold to 14000.	
ATIS* <b>120.625</b>	SALT LAKE CENTER <b>133.25 285.6</b>	JACKSON TOWER* <b>118.075 (CTAF) 0</b>	GND CON <b>124.55</b>	UNICOM <b>122.95</b>	

Figure 3, Approach Plate Notes – Temperature compensation

For the G1000 NXi system, temperature compensation of waypoint altitudes on the active flight plan page is pilot-enabled by a menu option on the FPL – ACTIVE FLIGHT PLAN MFD page. Selecting the menu option displays a pop-up window to allow the pilot to enter the temperature at the destination that is cross-filled to the GDU so that a consistent temperature is used for temperature compensation of published approach waypoint altitudes and the approach minimum altitude. Refer to Figure . Enabling temperature compensation of published approach waypoint altitudes on one display enables it on all displays in the system. If compensation is already active, and the temperature matches the temperature being used for compensation of waypoint altitudes, the field at the bottom of this pop-up page reads “CANCEL COMPENSATION?”

Displayed waypoint altitudes should remain constant. Because the compensation may originally be computed when the aircraft is at a much higher altitude than the approach waypoint altitudes, compensation of published waypoint altitudes on the active flight plan page is based on the temperature reported at the field elevation (rather than using the measured static air temperature at the aircraft altitude).

Rather than adjusting the measured altitude (displayed as uncompensated barometric altitude on the altimeter), temperature compensation is applied to each published approach waypoint altitude shown in the active flight plan. This includes approach waypoints in the initial, intermediate, final, and missed approach segments. When the altimeter reaches the barometric altitude displayed in the active flight plan for the waypoint, this geopotential altitude is the original published MSL altitude for the waypoint.

### NOTE

Only published approach waypoint altitudes shown on the active flight plan are temperature compensated. No altitude outside a published approach procedure, no user entered altitude, and no altitude shown as a flight level is temperature compensated.

Temperature compensation of published waypoint altitudes on the active flight plan page is not dependent on use of barometric altitude for vertical guidance on the final approach segment, and is therefore available for any type of approach. Use of temperature compensation to adjust the vertical deviation along the final approach segment and display of temperature compensated waypoint altitudes on the active flight plan page are two separate features. Enabling the display of temperature compensated altitudes on the active flight plan page for published approach waypoints is independent of using temperature compensated altitude to compute vertical deviation along the final approach segment.



Figure 4, Temperature Compensation Pop-Up Page

## Display of Compensated Altitudes

To differentiate altitude values that have been adjusted for temperature compensation from uncompensated altitudes and user-entered altitudes, a snowflake icon is shown next to the compensated altitude on the G1000 NXi system (Figure ) on altitude constraints that have temperature compensation applied. Temperature-compensated altitudes may be white, cyan, or crossed out, to indicate reference altitudes, altitudes used for vertical guidance, and invalid altitudes respectively. Altitudes shown as a flight level (e.g. FL350) and user-entered altitudes are never temperature compensated by the system.



Figure 5, Display of Temperature-Compensated Altitudes

## Temperature Compensation of Approach Minimums

To enable temperature compensation of the minimum altitude, select the “TEMP COMP”, option for the minimum altitude reference type (in addition to “OFF”, “BARO”, and “RAD ALT”). The temperature at the destination airport is used for this purpose. The compensated value is displayed below the entered, uncompensated value (Figure ). If a temperature has been entered for compensating waypoint altitudes on the active flight plan page, it is used as the default here, and vice-versa. Similar functionality exists in the minimums selection field on the approach selection pages (Figure ).

The temperature at the destination airport is invalidated when a different approach is loaded into the active flight plan or when the system powers up. This disables temperature compensation of both the published approach waypoint altitudes on the active flight plan page and the minimum altitude. The minimum altitude selection type changes to “BARO” if it was previously set to “TEMP COMP”. Temperature compensation of the minimum altitude is not dependent on use of barometric altitude for vertical guidance on the Final Approach Segment (FAS), and is therefore available for any type of approach; in fact, only the destination airport and temperature are required. Compensating the approach minimums bug simply determines where the minimums reference is displayed on the altimeter. No adjustment to the barometric altitude is made as a result of temperature compensating the minimums reference.



Figure 6, Temperature Compensation of Minimum Altitude

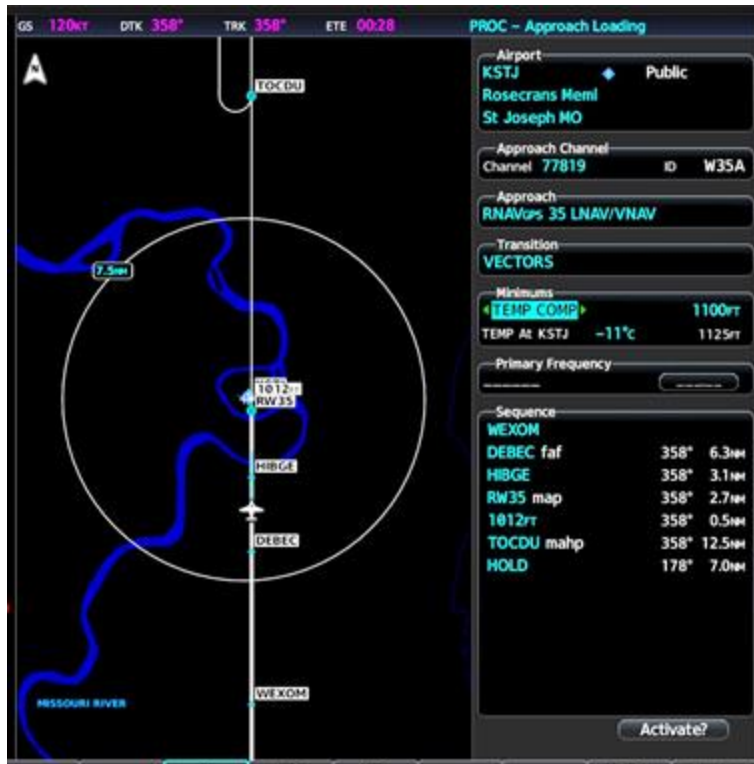


Figure 7, Approach Window Temperature Compensated Minimum Altitude

## Vertical Deviation Display


The vertical deviation for baro-VNAV approaches is displayed using a solid magenta  symbol and “V” label (Figure ), compared to the magenta diamond and “G” label used for SBAS approaches.



Figure 8, Vertical Deviation Display With Barometric Approach Vertical Guidance

The full-scale deflection (FSD) for the vertical deviation indicator (VDI) used for approach baro-VNAV is the same as the full-scale used for an SBAS LNAV/VNAV approach and is shown in Figure . In order to assist flight crews in determining when vertical deviation exceeds  $\pm 75$  feet (23 m), yellow bands have been added to the VDI display as depicted in Figure . The yellow deviation bands are displayed for LNAV/VNAV and RNP approaches only, and only between the FAF and MAP. The indication is displayed regardless of whether SBAS or baro altitude is the vertical guidance source.

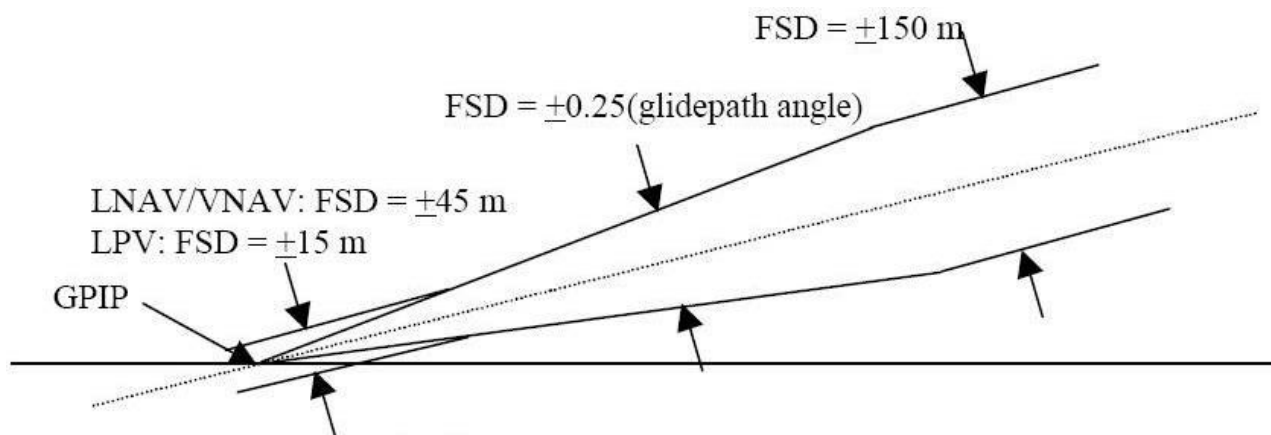


Figure 9, VDI Scale For Baro-Altitude Based LNAV/VNAV Approach



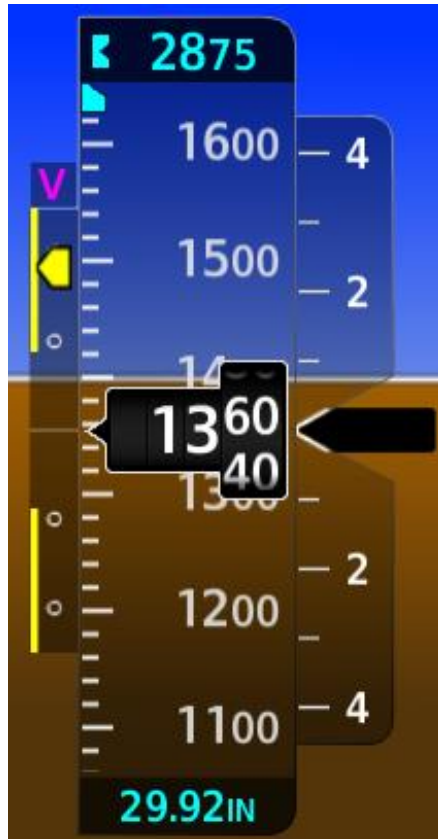


Figure 10, Display Of VDI Range Exceeding ±75 Feet

## **Autopilot Interface**

The GFC 700 autopilot uses the GP mode via the APR button to follow approach baro-VNAV guidance as opposed to the VNAV mode via the VNV button. When coupled in GP mode, the autopilot will not capture a preselected altitude while tracking a baro-VNAV glidepath.

## **Approach Downgrades**

For approaches with minimums that support both SBAS and baro altitude vertical guidance, downgrading or reverting to barometric altitude guidance is allowed prior to one minute before the FAF. If SBAS becomes unavailable after the approach is active but prior to 60 seconds before the FAF, an approach downgrade may be performed (e.g. LPV to LNAV/VNAV) or a vertical source reversion to baro altitude may be performed (e.g. SBAS LNAV/VNAV to baro LNAV/VNAV).

If a loss of SBAS occurs prior to 60 seconds before the FAF, the system will determine whether or not the approach mode can be supported using baro VNAV. If baro VNAV can be supported, the “*APR ADVISORY - SBAS VNAV not available. Using Baro VNAV.*” message will be displayed on the PFD and the VDI will be flagged. If SBAS is required for the approach, the approach mode (e.g. LPV) will be shown in amber but the GPS/SBAS VDI will be displayed until one minute prior to the FAF. If the SBAS integrity has not been restored at one minute prior to the FAF, the system will display the “*APR DWNGRADE - Apr downgraded. Baro VNAV.*” message and flag the VDI.

Once the pilot acknowledges either message by viewing it on the PFD, the VDI will be restored using baro altitude vertical guidance instead of SBAS. There is no downgrade from SBAS to barometric altitude after the FAF or within one minute of the FAF; “LNAV” is the only downgrade option in those cases. For approaches using barometric vertical guidance, downgrade is not allowed; if altitude or temperature data becomes invalid, the vertical deviation will be flagged.

## **Sensor Failures**

### **Outside Air Temperature (OAT) Probe**

If the OAT becomes invalid the VDI will be flagged as invalid.

## **STANDARD AVIONICS**

### **GSU 75 AIRDATA, ATTITUDE AND HEADING REFERENCE SYSTEM (ADAHRS) AND MAGNETOMETER (GMU)**

If installed, the optional GSU 75 ADAHRS combines information from the airplane's pitot/static system, as well as the aircraft's attitude, to provide the following indications on the G1000 NXi displays: attitude, altitude, airspeed, true airspeed, vertical speed, OAT, and heading information. The ADAHRS is located in the tailcone of the airplane, and contains both an Air Data Computer (ADC), as well as an Attitude and Heading Reference System (AHRS). The magnetometer, located in the left wing panel, provides heading information to the ADAHRS unit.

### **HANDLING, SERVICE, AND MAINTENANCE**

No Change. Refer to Pilot's Operating Handbook and FAA Approved Airplane Flight Manual or appropriate supplement.

# OTHER PROCEDURES

## ADS-B OUT

The installed ADS-B OUT system has been shown to meet the equipment performance requirements of 14 CFR 91.227.

The ADS-B OUT system should be operational during all phases of flight, including airport surface movement operations.

The ADS-B OUT system is operational when the transponder is in the ON or ALT mode. This will be indicated in the transponder window in the lower right corner of the PFD.

If the G1000 NXi system is unable to transmit ADS-B OUT messages, the following message will post on the PFD in the alerts window:

XPDR1 ADS-B NO POS – Transponder: ADS-B is not transmitting position.

If the above message is received, verify valid GPS position is available.

1. MFD AUX – GPS Status Page..... VERIFY GPS Position

## PRESSURE ALTITUDE BROADCAST INHIBIT

While conducting operations within airspace that requires ADS-B Out transmissions, operate the transponder in ALT mode unless requested otherwise by ATC. If ATC requests the inhibit of pressure altitude transmissions, select the transponder to ON mode:

1. XPDR Softkey on PFD.....PRESS
2. ON Softkey .....PRESS

## QFE (IF EQUIPPED)

On ground, if QFE operations are required:

1. BARO setting..... Set to appropriate QFE BARO setting
2. View the MFD Aux – System Setup 1 page.
3. BARO QFE REF ..... Set (Manual or FMS ORIG)
4. BARO QFE ELEV .....Set if Manual REF, verify if FMS ORIG REF
5. BARO QFE Off/On..... Set On

This will make QFE mode active, as indicated by black QFE text on green box in upper right corner of the PFD attitude display.

In Flight, before QFE operations are required:

1. BARO setting..... STD BARO or QFE BARO setting
2. View the MFD Aux – System Setup 1 page.
3. BARO QFE REF .....Set (Manual or FMS DEST)
4. BARO QFE ELEV ..... Set if Manual REF, verify if FMS DEST REF
5. BARO QFE Off/On..... Set On

If STD BARO is set then this will Arm QFE, as indicated by black QFE text on white box in upper right corner of the PFD attitude display. QFE mode will not yet be active if baro setting is STD BARO. Changing the baro setting to a numerical value will activate QFE. If STD BARO is not set, this will activate QFE as indicated by black QFE text on a green box in upper right corner of the PFD attitude display.

### NOTE

Changing the baro setting to STD BARO while QFE is active disables QFE. Selecting QFE On while the baro setting is STD BARO arms QFE which is indicated by black QFE text on a white box. When QFE is armed, changing the baro setting to a number activates QFE, which is indicated by green QFE text on a green box.

## NOTE

Changing the BARO setting while in Autopilot ALT mode will result in the AFCS slowly climbing or descending to eventually recover to the original indicated altitude.

Indicated Altitude on Aux – Trip Planning page will always display MSL altitude, which may not match indicated altitude if QFE is enabled.

When QFE is toggled on or off, the following altitude displays will be converted by the system: Flight Plan altitude constraints, active VNV Profile altitude, ESA and MSA, BARO Transition Alert Altitude, and VSD altitude constraints. These will be displayed with parentheses to indicate QFE altitudes, and without parentheses to indicate MSL altitudes. Flight Levels will NOT be converted.

The following will not be converted by the system, and will not be displayed with parentheses: PFD indicated altitude, PFD selected altitude, and approach minimums altitude.

## **METRIC ALT / VS UNITS (IF EQUIPPED)**

If operation with Metric Altitude and Vertical Speed units is desired or required:

1. View the MFD Aux – System Setup 1 page.
2. Display Units – ALT,VS.....Set to Meters(MT,MPS)

If Metric Altitude and Vertical Speed units are displayed and English units display is desired or required:

1. View the MFD Aux – System Setup 1 page.
2. Display Units – ALT,VS..... Set to Feet(FT,FPM)