

**ENSTROM 480B OPERATOR'S MANUAL  
AND  
FAA APPROVED  
ROTORCRAFT FLIGHT MANUAL  
EASA SUPPLEMENT**

**G1000H INTEGRATED FLIGHT DECK**

\* \* \* \* \*

REPORT NO. 28-AC-072


HELICOPTER SERIAL NO. \_\_\_\_\_

HELICOPTER REGISTRATION NO. \_\_\_\_\_

\* \* \* \* \*

**THIS SUPPLEMENT MUST BE CARRIED IN THE  
HELICOPTER AT ALL TIMES IF EQUIPPED WITH THE  
GARMIN G1000H INTEGRATED FLIGHT DECK.**

**CHAPTERS 1, 2, 3, AND 4 ARE FAA APPROVED ON  
BEHALF OF EASA.**

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FEDERAL AVIATION ADMINISTRATION

FAA APPROVAL DATE:                     MAY 11 2017                    

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## INTRODUCTION

### Intro-1 General

This supplement contains the operating instructions, procedures, and limitations for helicopters equipped with the G1000H Integrated Flight Deck and registered in countries that recognize approvals granted by EASA.

The supplement is divided into two basic parts, the FAA Approved (on behalf of EASA) RFM Supplement (Chapters 1, 2, 3, and 4) and Supplemental Data provided by the Enstrom Helicopter Corporation (Enstrom). It is required by EASA Regulations that this supplement be carried in the helicopter at all times if the G1000H Integrated Flight Deck is installed.

In this document, the term *G1000H* may be used interchangeably in reference to the complete G1000H Integrated Flight Deck system.

For additional information regarding the supplement format and text emphasis or definitions, refer to the Basic Flight Manual.

Abbreviations noted in this supplement are listed in Table Intro-1.

**Table Intro-1. List of Abbreviations**

A/F	Airframe
ACK	Acknowledge
ADC	Air Data Computer
ADS-B	Automatic Dependent Surveillance - Broadcast
AHRS	Attitude Heading Reference System
ALT	Altimeter
AMLCD	Active Matrix Liquid Crystal Display
AMP	Amperes
AOG	Aircraft On Ground
ARTCC	Air Route Traffic Control Center
ATC	Air Traffic Control
AUX	Auxiliary

BARO	Barometer
BATT	Battery
Bksp	Backspace
BRG	Bearing
C	Celcius
CAL	Calibration
CAS	Crew Alerting System
CDI	Course Deviation Indicator
CHKLST	Checklist
CNCL	Cancel
COM	Communication
CRC	Cyclic Redundancy Check
CRS	Course
CTN	Caution
DC	Direct Current
DCLTR	Declutter
DFLTS	Defaults
DG	Directional Gyro
DISP	Display
DME	Distance Measuring Equipment
DN	Down
DR	Drive
DVI	Deviation Indicator
EASA	European Aviation Safety Agency
EHS	Enhanced Surveillance
EIS	Engine Indication System
EMERG	Emergency
ENG	Engine
ENT	Enter
FAA	Federal Aviation Administration
FAF	Final Approach Fix
FMS	Flight Management System
FRMT	Format
FSS	Flight Service Station
GMT	Greenwich Mean Time
GND	Ground
GPS	Global Positioning System
GS	Glide Slope

HDDD°MM. MM	Hours, Degrees, Minutes
HDG	Heading
hPa	Hectopascals
HPM	Heading Preset Mode
HSI	Horizontal Situation Indicator
HTAWS	Helicopter Terrain Awareness and Warning System
I/O	Input / Output
IAS	Indicated Airspeed
IAU	Integrated Avionics Unit
ID	Morse Code Identifier
IDENT	Identification
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IN	Inch
In HG	Inches of Mercury
kHz	Kilo Hertz
LBS	Pounds
LCD	Liquid Crystal Display
LED	Light Emitting Diode
LOC	Localizer
LOI	Loss of Integrity
LRU	Line Replaceable Unit
LTNG	Lightning
mb	Millibar
METAR	Meteorological Terminal Aviation Routine Weather Report
MFD	Multi-Function Display
MGRS	Military Grid Reference System
MHz	Mega Hertz
MSG	Message
MTA	Magnetic Transducer Accessory
N1	Gas Generator Speed
N2	Power Turbine Speed
NAV	Navigation Receiver (VOR/LOC/GS)
NDB	Non-Directional Beacon
NEXRAD	Weather Radar

NR	Rotor Speed
NRST	Nearest
NORSEE	Non-Required Safety Enhancing Equipment
OAT	Outside Air Temperature
OBS	Omni-Bearing Selector
OPTN	Option
PFD	Primary Flight Display
PRESS	Pressure
PSI	Pounds per Square Inch
RAM	Random Access Memory
REF	References
RFM	Rotorcraft Flight Manual
RFMS	Rotorcraft Flight Manual Supplement
RMI	Radio Magnetic Indicator
ROM	Read Only Memory
RPM	Revolutions per Minute
RVSI	Required Vertical Speed Indication
RX	Receive
SBAS	Satellite-Based Augmentation System
SD	Secure Digital
SHW CHRT	Show Chart
SOC	State of Charge
SQ	Squelch
SS.S	Seconds
STBY	Standby
STD	Standard
SUA	Special Use Airspace
SUSP	Suspended
SVT	Synthetic Vision Technology
SYN VIS	Synthetic Vision
SYNC	Synchronize
TAS	True Airspeed
TEMP	Temperature
TFC	Traffic
TMR	Timer
TOD	Top of Descent
TOPO	Topographical data
TOT	Turbine Outlet Temperature

TRQ	Torque
TX	Transmit
UPS	Uninterruptable Power Supply
USB	Universal Serial Bus
UTC	Coordinated Universal Time
UTM	Universal Trans-Mercator
VDC	Volts Direct Current
VDI	Vertical Deviation Indicator
VFR	Visual Flight Rules
VHF	Very High Frequency
VLOC	VOR Localizer
VMC	Visual Meteorological Conditions
VNE	Never-Exceed Velocity
VNV	Vertical Navigation
VOL	Volume
VOR	VHF Omnidirectional Range
VSI	Vertical Speed Indicator
WAAS	Wide Area Augmentation System
WPT	Waypoint
WX	Weather
XM	Satellite Radio
XMSN	Transmission
XPDR	Transponder
XTK	Crosstalk

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## CHAPTER 1 OPERATING LIMITATIONS

### 1.1 General

This chapter includes operating limitations and restrictions that must be observed during ground and flight operations. The operating limitations set forth in this chapter are the direct results of design analysis and flight tests. Compliance with these limitations will allow the pilot to derive maximum utility from the helicopter.

Use of this rotorcraft flight manual supplement is limited to G1000H-equipped helicopters registered in countries that recognize approvals granted by EASA.

### 1.2 Placards

1. The following placards shall be placed in the vicinity of the PFD/MFD:

a.

**GPS DISPLAYS APPROVED FOR  
VFR OPERATIONS ONLY**

b.

**THIS HELICOPTER IS APPROVED  
FOR OPERATIONS UNDER DAY VFR  
NON-ICING CONDITIONS ONLY**

2. See Table 1-5 for interim placard requirement.

### 1.3 Operational Limits

1. Rotorcraft operation with the G1000H is limited to VFR Day only.
2. The G1000H attitude indicator is only approved for operations where no attitude indicator is required.
3. The following publications should be referred to for operating instructions and must be kept accessible to the flight crew at all times:

1-2

## ENSTROM 480B RFM SUPPLEMENT

- a. Garmin G1000H Cockpit Reference Guide, Document Number 190-01729-00.
  - b. Enstrom 480B Operator's Manual and EASA Approved Rotorcraft Flight Manual, Document Number 28-AC-023.
4. The G1000H system and components must utilize the software versions (or later EASA Approved version) listed in Table 1-1.

**Table 1-1. Approved Software Versions**

<b>Component</b>	<b>Identification</b>	<b>Software Version</b>
G1000H	480B System	1852.02
GDC 74H	ADC	3.09
GDU 1040H	PFD, MFD	13.05
GEA 71H	Engine I/O	2.07
GIA 63W Main	Integrated Avionics Unit	7.09
GIA 63W GPS	Integrated Avionics Unit	5.0
GIA 63W COM	Integrated Avionics Unit	11.20
GIA 63W NAV	Integrated Avionics Unit	6.02
GMU 44	Magnetometer	2.05
GRS 77H	AHRS	3.52
GTP 59	Temperature Probe	No Software
GTX 33 ES	Transponder	7.02
ST 32	Signal Conditioner	No Software

**Table 1-2. Optional Equipment Software Versions**

<b>Component</b>	<b>Identification</b>	<b>Software Version</b>
GDL 69 AH	XM Weather	See 28-AC-062
GMA 350H	Audio Panel	See 28-AC-073
GTS 800	Traffic Alert	See 28-AC-061

### **1.3.1 Databases**

Databases must be maintained as current in order to utilize database functions.

### **1.3.2 Terrain and Obstacle Display**

Terrain and Obstacle information is depicted for advisory purposes only and is not to be used for aircraft maneuvers or navigation.

### **1.3.3 Helicopter Terrain Awareness and Warning System (HTAWS)**

Do not use HTAWS information for primary terrain avoidance. HTAWS is intended only to enhance situational awareness.

### **1.3.4 Datalinked Weather Display**

The weather information displayed on the MFD of the G1000H is limited to supplemental use only.

### **1.3.5 Traffic Display**

Traffic information shown on system displays is provided as an aid in visually acquiring traffic. Pilots must maneuver the aircraft based only upon Air Traffic Control (ATC) guidance or positive visual acquisition of conflicting traffic.

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### **1.3.6 Maximum Airspeed**

#### **1.3.6.1 Airspeed Limits**

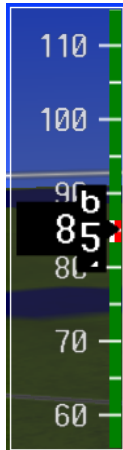
This rotorcraft was originally equipped with a set of placards for determining maximum airspeed (VNE) based on pressure altitude, temperature, takeoff gross weight and takeoff center of gravity; those placards remain as the means to determine VNE.

#### **1.3.6.2 Autorotation VNE**

The autorotation VNE limit is 85 knots or the power on VNE limit, whichever is less.



**Figure 1-1. Maximum Power-On VNE**



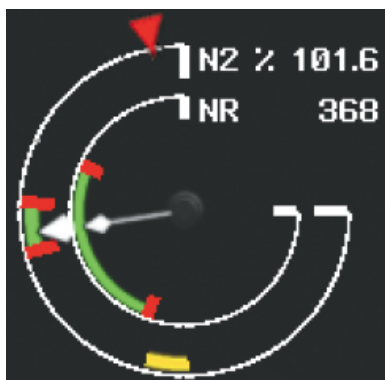
**Figure 1-2. Maximum Autorotation VNE**

**Table 1-3. Airspeed Indicator Limitations**

<b>Value</b>	<b>Indication</b>	<b>Description</b>
125 kts (See 1.3.6.1 Airspeed Limits)	RED Radial Airspeed tape flashes RED as long as condition persists.	Maximum Power-On VNE. Exceedance will be recorded.
85 kts	RED Cross-Hatched Radial	Maximum Autorotation VNE
0 kts to 2 kts below Power-on VNE	GREEN Speed Range Vertical Strip	Normal Operational Airspeed

### 1.3.7 Engine Indication System (EIS) Instrument Markings

#### 1.3.7.1 Dual (Rotor and Power Turbine) Tachometer



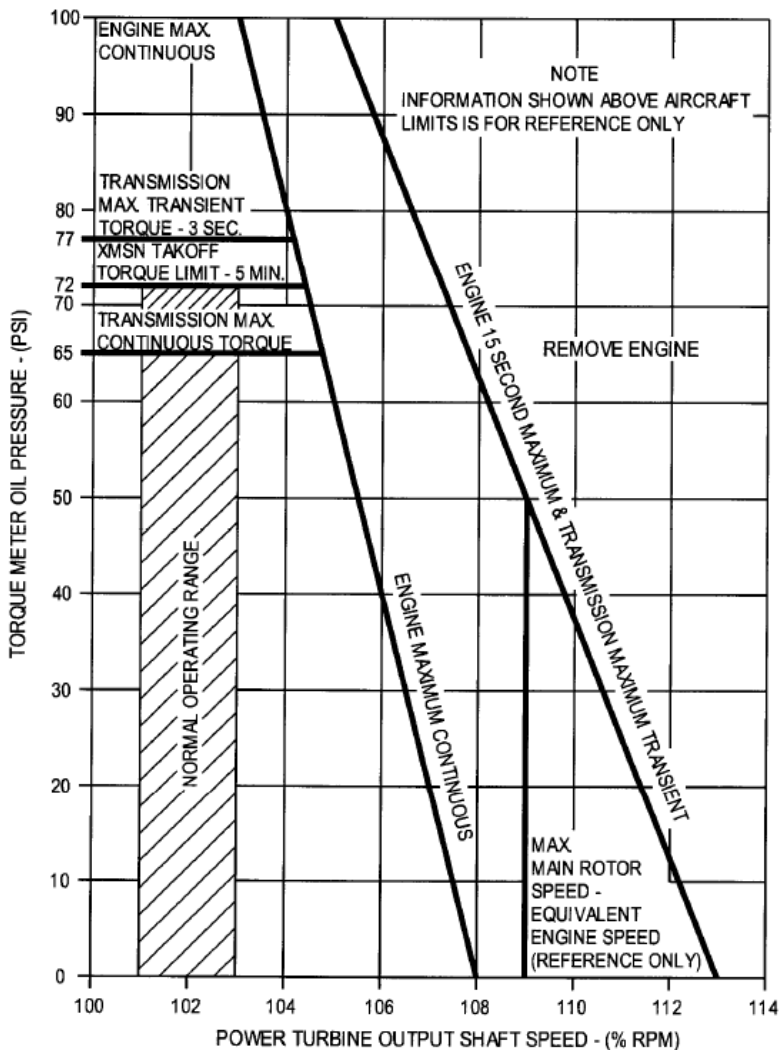
**Figure 1-3. Dual Tachometer**

**Table 1-4. Rotor RPM (NR)**

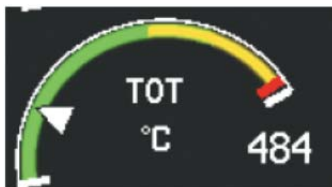
Value	Indication	Description
386-415.34 RPM	Instrument: CLEAR Arc	ROTOR RPM Exceedance
	Digital: RED	
386 RPM	Instrument: RED Tick Mark	Redline Exceedance; Never operate at or above this value
385 RPM	Top of GREEN Arc	Maximum power off RPM
	Digital: WHITE	
334-385 RPM	Instrument: GREEN Arc	Continuous Operation Including Autorotation
	Digital: WHITE	
334 RPM	Bottom of GREEN Arc	Minimum Power Off RPM
	Digital: WHITE	
333 RPM	Instrument: RED Tick Mark	Lower Limit Redline; Do not operate at or below this value

**Table 1-5. Power Turbine (N2)**

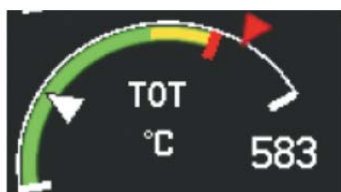
<b>Value</b>	<b>Indication</b>	<b>Description</b>
103.5-115% RPM	Instrument: CLEAR Arc	N2 Exceedance Range
	Digital: RED	
113%	Instrument: RED Triangle	15 Second Maximum Transient, N2 varies linearly from 113% in autorotation per Figure 1-5
103.5 % RPM	Instrument: RED Tick Mark	Redline Exceedance; Never operate at or above this value
101-103% RPM	Instrument: GREEN Arc	Normal Operating Range
	Digital: WHITE	
100.5% RPM	Instrument: RED Tick Mark	Lower Limit Redline; Do not operate at or below this value
71-88% RPM (see NOTE)	Instrument: YELLOW	Speed Avoid Range. Move through range as expediently as possible.
<p><b>NOTE: The yellow indication may only display to 75%; however, the limitation is at 71%. This variance will persist until the next TSO software release.</b></p> <p><b>In the interim, the following placard shall be located on the instrument panel adjacent to either the PFD or MFD:</b></p> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p><b>EXTENDED N2 SPEED AVOID RANGE IS 71-88% RPM. MOVE THROUGH RANGE AS EXPEDIENTLY AS POSSIBLE.</b></p> </div>		



**Figure 1-4. Maximum Allowable Torque and N2**

**1.3.7.2 Turbine Outlet Temperature (TOT)****Figure 1-5. Turbine Outlet Temperature - Start****Table 1-6. Turbine Outlet Temperature (TOT) - Start**

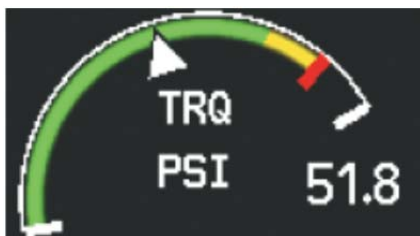
Value	Indication	Description
928-1000°C	Instrument: CLEAR Arc	TOT Exceedance Range; Any operation in this range will activate TOT exceedance message.
	Digital: RED	
928°C	Instrument: RED Tick Mark	Redline Exceedance; Never operate at or above this value
927°C	Top of the YELLOW Arc	Maximum Temp. while starting not to exceed 1 second – starting only; Greater than 1 second will activate Exceedance message
	Digital: 927°C YELLOW	
811-927°C	Instrument: YELLOW Arc	Not to exceed 10 seconds during start; greater than 10 seconds will activate exceedance message
	Digital: YELLOW	
100-810°C	Instrument: GREEN Arc	No time limit during normal start operation



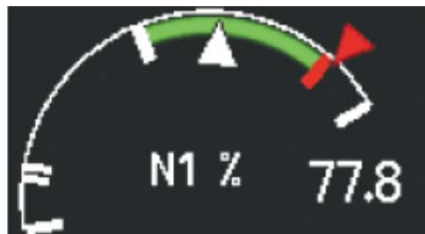
**Figure 1-6. Turbine Outlet Temperature - Flight**

**Table 1-7. Turbine Outlet Temperature (TOT) - Flight**

Value	Indication	Description
811-1000°C	Instrument: CLEAR Arc	Flight TOT Exceedance Range; Will activate TOT exceedance message
	Digital: RED	
811°C	Instrument: RED Tick Mark	Flight Redline Exceedance; never operate during flight at or above this value
810-843°C	RED Tick Mark at 811°C	Maximum 6 seconds during transient power only
	RED triangle at 843°C	
810°C	Top of the YELLOW Arc	Maximum Takeoff (5 minute limit)
	Digital: 810°C YELLOW	
738-810°C	Instrument: YELLOW Arc	Maximum 5 Minutes (takeoff power)
	Digital: YELLOW	
100-737°C	Instrument: GREEN Arc	Continuous Operation

**1.3.7.3 Torque (TRQ)****Figure 1-7. Torque (TRQ)****Table 1-8. Torque (TRQ)**

Value	Indication	Description
72.5-80 PSI	Instrument: CLEAR Arc	Torque Exceedance Range
	Digital: RED	
72.5 PSI	Instrument: RED Tick Mark	Redline Exceedance; Never operate at or above this value
72 PSI	Top of the YELLOW Arc	Maximum for Takeoff
	Digital: 72 PSI YELLOW	
65.5-72 PSI	Instrument: YELLOW Arc	5 Minute Limit
	Digital: YELLOW	
0-65 PSI	Instrument: GREEN Arc	Continuous Operation
	Digital: WHITE	

**1.3.7.4 Gas Generator Speed (N1)****Figure 1-8. Gas Generator Speed (N1)****Table 1-9. Gas Generator Speed (N1)**

Value	Indication	Description
105.5-120% RPM	Instrument: CLEAR Arc	Exceedance Range
	Digital: RED	
106% RPM	Instrument: RED Tick Mark and RED Triangle	Maximum for 15 Seconds
	Digital: RED	
105.5%	Instrument: RED Tick Mark	Maximum Continuous
59-105% RPM	Top of the GREEN Arc	Normal Operation
	Digital Readout: 105% RPM GREEN	
59-105% RPM	Instrument Marking: GREEN Arc	Normal Operation
12-15%, & 58% RPM	Instrument Marking: WHITE Tick Mark	Start Sequence N1 Speeds; See RFM engine start procedures

**1.3.7.5 Transmission Oil Temperature (XMSN OIL °C)****Figure 1-9. Transmission Oil Temp. (XMSN OIL °C)****Table 1-10. Transmission Oil Temp. (XMSN OIL °C)**

Value	Indication	Description
108-125°C	Instrument: CLEAR Horizontal Strip	XMSN Oil Temp Exceedance Range
	Digital Readout color: RED	
108°C	Instrument: RED Tick Mark	Redline Exceedance; Never operate at or above this value
0-107°C	Instrument: GREEN Horizontal Strip	Normal Operation
	Digital: WHITE	

**1.3.7.6 Engine Oil Temperature and Pressure****Figure 1-10. Engine Oil Temperature (ENG OIL °C)****Table 1-11. Engine Oil Temperature (ENG OIL °C)**

Value	Indication	Description
108-125°C	Instrument: CLEAR Horizontal Strip	ENG Oil Temp Exceedance Range
	Digital: RED	
108°C	Instrument: RED Tick Mark	Redline Exceedance; Never operate at or above this value
0-107°C	Instrument: GREEN Horizontal Strip	Normal Operation
	Digital: WHITE	



**Figure 1-11. Engine Oil Pressure N1: 0-94%**

**Table 1-12. Engine Oil Pressure N1: 0-94% (ENG OIL PSI)**

Value	Indication	Description
131-150 PSI	Instrument: CLEAR Horizontal Strip	ENG Oil PSI Exceedance Range
	Digital: RED	
131 PSI	Instrument: RED Tick Mark	Redline Exceedance; Never operate at or above this value
90-130 PSI	Instrument: GREEN Horizontal Strip	Oil Pressure Range for N1 Speeds between 78.5% and 94.2%
	Digital: WHITE	
50-89 PSI	Instrument: YELLOW Horizontal Strip	Oil pressure range for N1 speeds below 78.5%
	Digital: YELLOW	
49 PSI	Instrument: RED Tick Mark	Do not operate at or below this redline

**Figure 1-12. Engine Oil Pressure N1:94-120%****Table 1-13. Engine Oil Pressure N1: 94-120% (ENG OIL PSI)**

Value	Indication	Description
131-150 PSI	Instrument: CLEAR Horizontal Strip	ENG Oil PSI Exceedance Range
	Digital: RED	
131 PSI	Instrument: RED Tick Mark	Redline Exceedance; Never operate at or above this value
115-130 PSI	Instrument: GREEN Horizontal Strip	Normal Operation for All N1 Speeds
	Digital: WHITE	
50-114 PSI	Instrument: YELLOW Horizontal Strip	90-114 PSI is the oil pressure range for N1 speeds of 78.5- 94.2%
	Digital: YELLOW	50-90 PSI is the oil pressure range for N1 speeds below 78.5%
49 PSI	Instrument: RED Tick Mark	Do not operate at or below this redline

**1.3.7.7 DC Ammeter****Figure 1-13. DC Ammeter****Table 1-14. DC Ammeter**

<b>Value</b>	<b>Indication</b>	<b>Description</b>
151-200 AMPS	Instrument: CLEAR Horizontal Strip	Generator current exceedance range
	Digital: RED	
151 AMPS	Instrument: RED Tick Mark	Redline exceedance; never operate at or above this value
0-150 AMPS	Instrument: GREEN Horizontal Strip	Normal generator operation range
	Digital: WHITE	

**1.3.7.8 DC Voltmeter****Figure 1-14. DC Voltmeter****Table 1-15. DC Voltmeter**

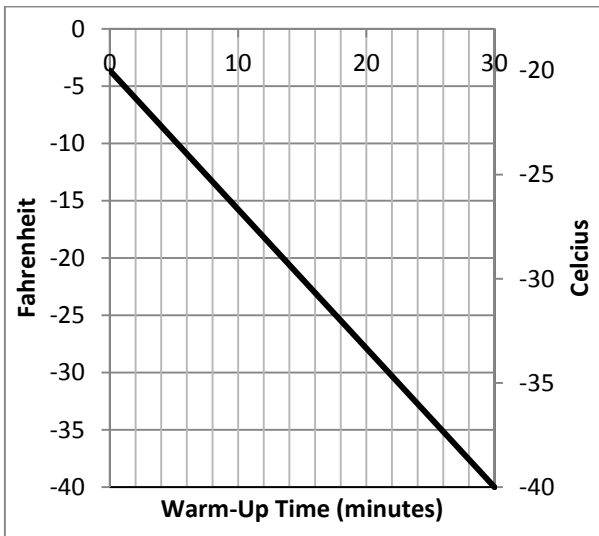
Value	Indication	Description
32.5-35.0 Volts	Instrument: CLEAR Horizontal Strip	Voltage Exceedance Range
	Digital: RED	
32.5 Volts	Instrument: RED Tick Mark	Redline Exceedance; Never operate at or above this value
24.0-32.0	Instrument: GREEN Horizontal Strip	Normal Voltage Operation Range
	Digital: WHITE	
15.0-23.5	Instrument: YELLOW Horizontal Strip	
	Digital: YELLOW	

**1.3.8 Ambient Temperature Limits**

Maximum ambient temperature is 111°F (44°C) at sea level to 64°F (18°C) at 13,000 ft.

### 1.3.8.1 GDU 1040H

The minimum internal operating temperature range for the GDU 1040H LCD display is  $-4^{\circ}\text{F}$  ( $-20^{\circ}\text{C}$ ). If the temperature falls below  $-4^{\circ}\text{F}$  ( $-20^{\circ}\text{C}$ ), the GDU 1040H has an internal heater to raise the temperature of the display to minimum operating temperature prior to start-up. At any temperature below  $-4^{\circ}\text{F}$  ( $-20^{\circ}\text{C}$ ), there is a required warm-up period. The warm-up time is plotted below. It is recommended that external power be used to run the system long enough to warm up the GDU displays in addition to the power required to start the engine/transmission after the displays have reached operating temperature. Refer to the basic 480B RFM, paragraph 7-58, for external power receptacle use.



**Figure 1-15. GDU Display Warm-Up Time**

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## CHAPTER 2 NORMAL PROCEDURES

### 2.1 Power-Up

The G1000H system is integrated with the aircraft electrical system and receives power directly from electrical busses. The G1000H PFD, MFD and supporting sub-systems include both power-on and continuous built-in test features that exercise the processor, RAM, ROM, external inputs and outputs to provide safe operation.

During system initialization, test annunciations are displayed, as shown in Figure 2-1. All system annunciations should disappear typically within one minute of power-up at normal temperature, but may take as long as 30 minutes at cold temperatures (refer to paragraph 1.3.11.1 for GDU warm-up procedures). Upon power-up, key annunciator lights also become momentarily illuminated on the control units and the display bezels.

**NOTE:** During power-up, a red X over the torque indicator will remain illuminated until the ST-32 signal conditioner has had sufficient warm-up time. This may take up to two minutes.

On the PFD, the AHRS begins to initialize and displays 'AHRS ALIGN: Keep Wings Level'. The AHRS should display valid attitude and heading fields typically within one minute of power-up. The AHRS can align itself both while taxiing and during level flight.

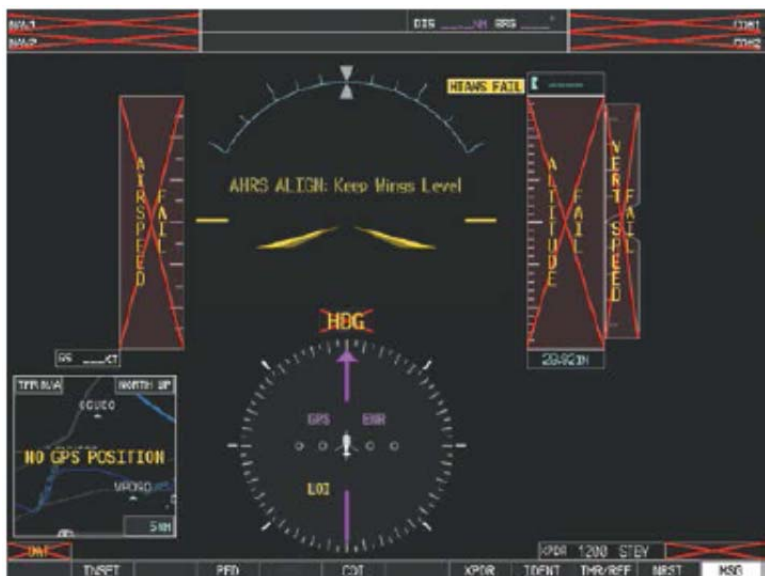
When the MFD powers up, the MFD Power-up Page (Figure 2-2) displays the following information:

- System version
- Copyright
- Land database name and version
- Safe Taxi database information
- Terrain database name and version

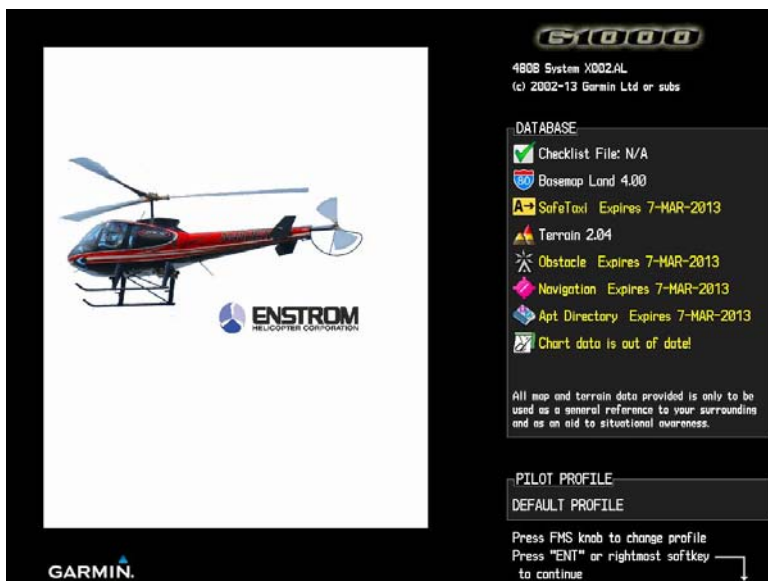
## 2-2 ENSTROM 480B RFM SUPPLEMENT

- Airport Terrain database name and version
- Obstacle database name and version
- Navigation database name, version, and effective dates
- Airport Directory name, version and effective dates
- FliteCharts/ChartView database information
- Pilot Profile selection

Current database information includes the valid operating dates, cycle number and database type. When this information has been reviewed for currency (to ensure that no databases have expired), the pilot is prompted to continue. Pressing the ENT Key acknowledges this information, and the Navigation Map Page is displayed upon pressing the key a second time. When the system has acquired a sufficient number of satellites to determine a position, the aircraft's current position is shown on the navigation Map Page.



**Figure 2-1. PFD Initialization**



**Figure 2-2. MFD Power-up Page**

### 2.1.1 Normal Display Operation

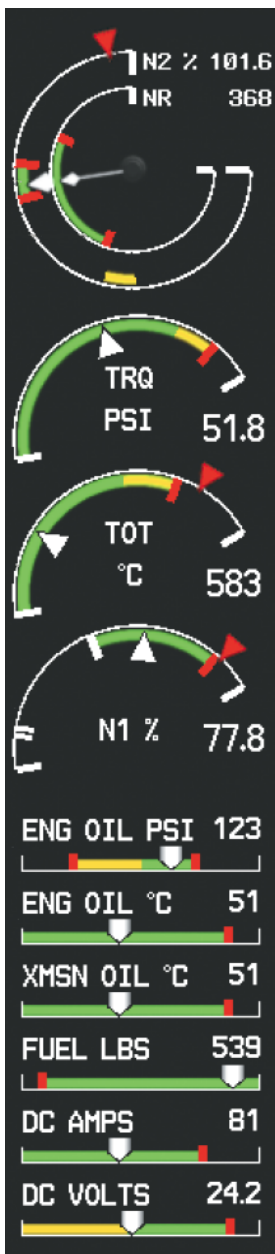
In normal operating mode, the PFD presents graphical flight instrumentation (attitude, heading, airspeed, altitude, vertical speed), replacing the traditional flight instrument cluster (see the Flight Instruments Section for more information). Figure 2-3 shows the normal PFD display. The Engine Indication System (Figure 2-4) and CAS messages are also displayed on the PFD.

The MFD normally displays a full-color moving map with navigation information (Figure 2-5), while the left portion of the MFD is dedicated to the Engine Indication System (Figure 2-4) (EIS; see the EIS Section).

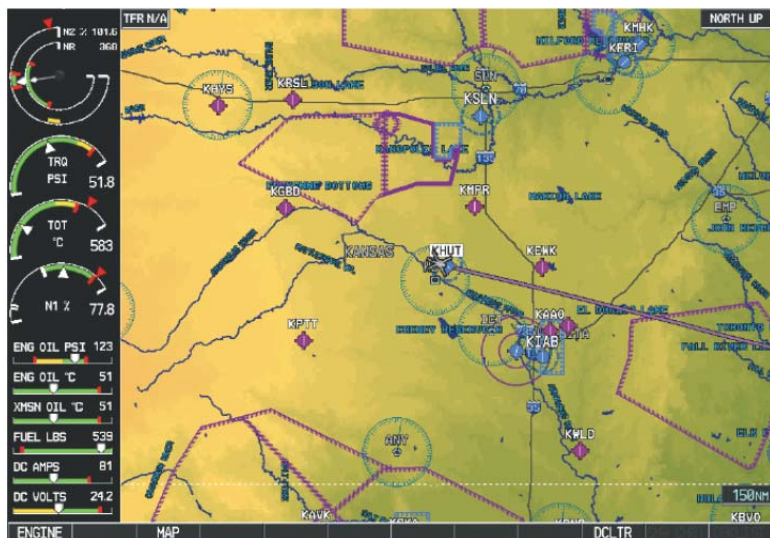
Both displays offer control for COM and NAV frequency selection.



**Figure 2-3. PFD Normal Mode**



**Figure 2-4. EIS Display (PFD or MFD)**



**Figure 2-5. MFD Normal Mode**

### 2.1.2 Reversionary Display Operation

**NOTE:** The G1000H System alerts the pilot when backup paths are utilized by the LRUs. Refer to the G1000H Pilot's Guide, Appendix A for further information regarding system-specific alerts.

In the event of a display failure, the G1000H System automatically switches to reversionary (backup) mode. In reversionary mode, flight information is presented on the remaining display in the same format as the PFD operating in normal mode (Figure 2-6).

Reversionary display mode for the MFD can be manually activated by switching DISP BACKUP, located in the upper center pedestal, to the 'ON' position.



**Figure 2-6. MFD Reversionary Mode**

## 2.2 G1000H Controls

The G1000H system controls are located on the PFD and MFD bezels as shown in Figure 2-7.



**Figure 2-7. PFD/MFD Controls**

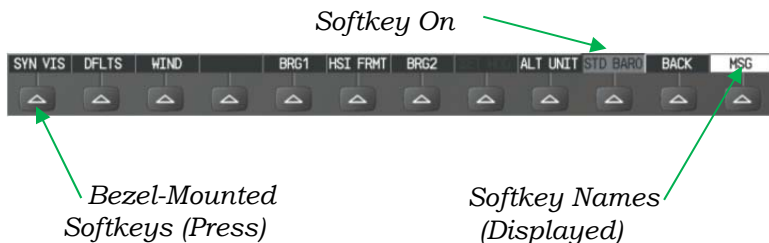
### 2.2.1 Control Knobs

The display controls are adjacent to and beneath the display. Rotary knobs on the left and right of the display perform functions as labeled. The bottom right corner of the display has buttons that perform functions associated with the Flight Management System (FMS) knob.

The NAV, CRS/BARO, COM, FMS, and ALT knobs are concentric dual knobs, each having small (inner) and large (outer) control portion. When a portion of the knob is not specified in the text, either may be used.

### 2.2.2 Softkey Controls

The softkeys are located along the bottoms of the displays. The softkeys shown depend on the softkey level or page being displayed. The bezel keys below the softkeys can be used to select the appropriate softkey. When a softkey is selected, its color changes to black text on gray background and remains this way until it is turned off, at which time it reverts to white text on black background.



**Figure 2-8. Softkeys (Typical)**

#### 2.2.2.1 Softkey Function

The softkeys allow for the rapid selection of pre-defined functions to be performed on each page. The softkeys will toggle through up to three levels of options that are associated with the softkey pressed. The **BACK** softkey is used to return to the previous level.

The PFD softkeys provide control over flight management functions, including GPS, NAV, terrain, traffic, and lightning (optional). Each softkey sublevel has a **BACK** Softkey which can be selected to return to the previous level.

**Table 2-1. PFD Softkeys**

Level 1	Level 2	Level 3	Description
<b>CAS</b> ↑			Scroll up (Displayed only when a sufficient number of items are displayed in the Crew Alerting System Display to warrant scrolling)
<b>CAS</b> ↓			Scroll down (Displayed only when a sufficient number of items are displayed in the Crew Alerting System Display to warrant scrolling)
<b>PFD</b>			Displays second-level softkeys for additional PFD configurations
	<b>SYN VIS</b>		Displays the softkeys for enabling or disabling Synthetic Vision features
		<b>PATHWAY</b>	Displays rectangular boxes representing the horizontal and vertical flight path of the active flight plan
		<b>SYN TERR</b>	Enables synthetic terrain depiction.
		<b>HRZN HDG</b>	Displays compass heading along the Zero-Pitch line

Level 1	Level 2	Level 3	Description
		<b>APTSIGNS</b>	Displays position markers for airports within approximately 15 nm of the current aircraft position. Airport identifiers are displayed when the airport is within approximately 9 nm.
	<b>DFLTS</b>		Resets PFD to default settings, including changing units to standard
	<b>WIND</b>		Displays softkeys to select wind data parameters
		<b>OPTN 1</b>	Wind direction arrow and speed
		<b>OPTN 2</b>	Wind direction arrow with headwind and crosswind components
		<b>OPTN 3</b>	Wind direction arrow with direction and speed
		<b>OFF</b>	Information not displayed
	<b>BRG1</b>		Cycles the Bearing 1 Information Window through NAV1, GPS/waypoint identifier and GPS-derived distance information
	<b>HSI FRMT</b>		Provides access to the HSI formatting softkeys
		<b>360 HSI</b>	Displays the HSI in a 360 degree view
		<b>ARC HSI</b>	Displays the HSI as an arc

<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Description</b>
	<b>BRG2</b>		Cycles the Bearing 2 Information Window through NAV2 or GPS waypoint identifier and GPS-derived distance information
	<b>SET HDG</b>		
		<b>HDG SYNC</b>	Synchronizes heading to the selected heading
		<b>HDG -</b>	Slows heading counterclockwise
		<b>HDG +</b>	Slows heading clockwise
		<b>HPM OFF</b>	Manually disables Heading Preset Mode
	<b>ALT UNIT</b>		Displays softkeys for setting the altimeter and BARO settings to metric units
		<b>METERS</b>	When enabled, displays altimeter in meters
		<b>IN</b>	Press to display the BARO setting as inches of mercury
		<b>HPA</b>	Press to display the BARO setting as hectopascals
	<b>STD BARO</b>		Sets barometric pressure to 29.92 in Hg (1013 hPa if METRIC softkey is selected)
<b>OBS</b>			Selects OBS mode on the CDI when navigating by GPS (only available with active leg)
<b>CDI</b>			Cycles through GPS, VOR1, and VOR2 navigation modes on the CDI

<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Description</b>
<b>XPDR</b>			Displays transponder mode selection softkeys
	<b>STBY</b>		Selects standby mode (transponder does not reply to any interrogations)
	<b>ON</b>		Selects Mode A (transponder replies to interrogations)
	<b>ALT</b>		Selects Mode C – altitude reporting mode (transponder replies to identification and altitude interrogations)
	<b>GND</b>		Allows manual selection of ground mode in certain conditions
	<b>VFR</b>		Automatically enters the VFR code (1200 in the U.S.A. only)
	<b>CODE</b>		Displays transponder code selection softkeys 0 – 7
		<b>0-7</b>	Use numbers to enter code
	<b>IDENT</b>		Activates the Special Position Identification (SPI) pulse for 18 seconds, identifying the transponder return on the ATC screen
	<b>BKSP</b>		Removes numbers entered, one at a time
<b>IDENT</b>			Activates the Special Position Identification (SPI) pulse for 18 seconds, identifying the transponder return on the ATC screen

Level 1	Level 2	Level 3	Description
<b>TMR / REF</b>			Displays Timer/References Window
<b>NRST</b>			Displays Nearest Airports Window
<b>MSG</b>			Displays the Messages Window

**Table 2-2. MFD Softkeys**

Level 1	Level 2	Level 3	Description
<b>ENGINE</b>			Displays the EIS-Engine Page
<b>MAP</b>			Enables second-level Navigation Map softkeys
	<b>TRAFFIC</b>		Displays traffic information on Navigation Map
	<b>TOPO</b>		Displays topographical data (e.g., coastlines, terrain, rivers, lakes) and elevation scale on Navigation Map
	<b>AIRWAYS</b>		Displays airways on the map; cycles through the following: AIRWAYS: No airways are displayed AIRWY ON: All airways are displayed AIRWY LO: Only low altitude airways are displayed AIRWY HI: Only high altitude airways are displayed

<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Description</b>
	<b>NEXRAD</b>		Displays NEXRAD weather and coverage information on Navigation Map (optional feature)
	<b>XM LTNG</b>		Displays XM lightning information on Navigation Map (optional feature)
	<b>METAR</b>		Displays METAR flags on airport symbols shown on the Navigation Map
	<b>LEGEND</b>		Displays the legend for the selected weather products. Available only when NEXRAD, XM LTNG, and/or METAR softkeys are selected.
	<b>BACK</b>		Returns to top-level softkeys
<b>DCLTR</b>			Selects desired amount of map detail; cycles through declutter levels: DCLTR (No Declutter): All map features visible DCLTR-1: Declutters land data DCLTR-2: Declutters land and SUA data DCLTR-3: Removes everything except the active flight plan
<b>SHW CHRT</b>			When available, displays optional airport and terminal procedure charts
<b>CHKLIST</b>			When available, displays optional checklist

## **2.2.3 Fuel Management**

### **2.2.3.1 Fuel Calculations**

The fuel management section, available on the full page EIS-ENGINE display, provides digital readout values for FUEL FLOW, FUEL REMAINING, FUEL USED, ENDURANCE and EFFICIENCY.

Calculations are based on the current fuel flow and the amount of fuel remaining which is manually entered by the flight crew. The fuel remaining can be increased or decreased in 10 pound increments by pressing the DEC FUEL or INC FUEL softkeys. The RST FUEL softkey will reset the FUEL REMAINING indication to full fuel capacity and will also reset FUEL USED indication to zero.

**NOTE:** The fuel quantity indicators are not used for fuel on board calculations.

### **2.2.3.2 Fuel Quantity**

Fuel quantity, measured from the fuel probe, is shown in pounds (lbs) along a horizontal bar indicator beneath the Transmission Oil Temperature indicator on the EIS strip display (Figure 2-4) or on an arc type gauge between the Engine Oil and Electrical gauge clusters on the full page EIS ENGINE page (Figure 2-34).

The green band indicates the normal fuel range. On the ground, the low fuel range is indicated by a yellow band. In flight, the low fuel range is indicated by a red line. The low fuel warning area is indicated by an unmarked section at the bottom end of the horizontal bar indicator.

On the ground and in flight, the FUEL LBS and the digital indicator will appear as black text on a yellow background if the indicated fuel quantity is in the low fuel range (59 lbs or less).

In flight, the FUEL LBS and the digital indicator will flash red and white if the fuel quantity pointer is on the red line (49 lbs or less).

When there is approximately 10 minutes of fuel remaining or less, the LOW FUEL CAS message (ref. Table 3-7) is displayed. The CAS message is activated by an independent low fuel float switch.

## 2.2.4 Flight Instruments

### 2.2.4.1 Airspeed Indicator

The Airspeed Indicator displays airspeed on a moving tape rolling number gauge. The groundspeed is displayed in knots below the Airspeed Indicator. The numeric labels and major tick marks on the moving tape are marked at intervals of 10 knots. The minor tick marks on the moving tape are indicated at intervals of five knots. Speed indication starts at 20 knots, with 60 knots of airspeed viewable at any time. The indicated airspeed is displayed inside the black pointer. The pointer remains black until reaching never-exceed speed (VNE), at which point it turns red.



**Figure 2-9. Airspeed Indicator**



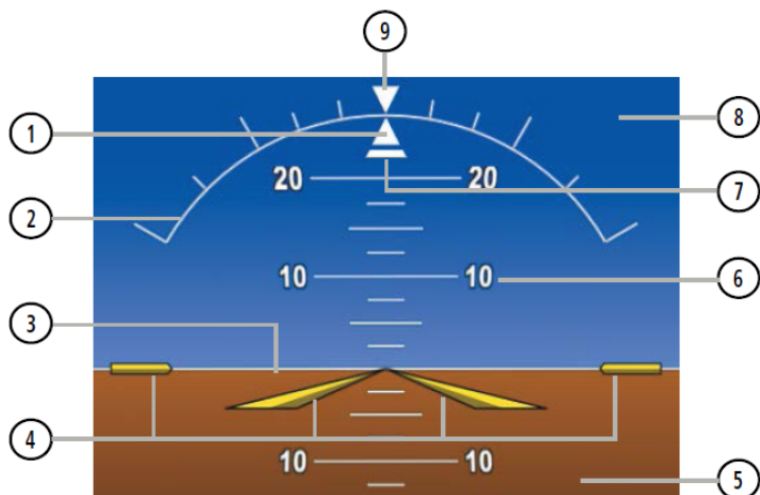
**Figure 2-10. Red Pointer at VNE**

A color-coded (green and red) speed range strip is located on the moving tape. The colors denote normal operating range and never-exceed speed (VNE).

The Airspeed Trend Vector is a vertical, magenta line that appears to the right of the color-coded speed range strip when airspeed is either accelerating or decelerating. One end of the magenta line is anchored to the tip of the airspeed pointer while the other end moves continuously up or down corresponding to the rate of acceleration or deceleration. For any constant rate of acceleration or deceleration, the moving end of the line shows approximately what the indicated airspeed value will be in six seconds. If the trend vector crosses VNE, the text of the actual airspeed readout changes to yellow. The trend vector is absent if the speed remains constant or if any data needed to calculate airspeed is not available due to a system failure.

### 2.2.4.2 Attitude Indicator

Attitude information is displayed over a virtual blue sky and brown ground with a white horizon line. The Attitude Indicator displays the pitch, roll, and slip/skid information.



- |                       |                       |
|-----------------------|-----------------------|
| ① Roll Pointer        | ⑥ Pitch Scale         |
| ② Roll Scale          | ⑦ Slip/Skid Indicator |
| ③ Horizon Line        | ⑧ Sky Representation  |
| ④ Aircraft Symbol     | ⑨ Roll Scale Zero     |
| ⑤ Land Representation |                       |

**Figure 2-11. Attitude Indicator**

The horizon line is part of the pitch scale. Above and below the horizon line, major pitch marks and numeric labels are shown for every 10°, up to 80°. Minor pitch marks are shown for intervening 5° increments, up to 25° below and 45° above the horizon line. Between 20° below to 20° above the horizon line, minor pitch marks occur

every 2.5°. When the Synthetic Vision System is activated, the pitch scale is reduced to 10° up and 7.5° down.

The inverted white triangle indicates zero on the roll scale. Major tick marks at 30° and 60° and minor tick marks at 10°, 20°, and 45° are shown to the left and right of the zero. Angle of bank is indicated by the position of the pointer on the roll scale.

The Slip/Skid Indicator is the bar beneath the roll pointer. The indicator bar moves with the roll pointer and moves laterally away from the pointer to indicate uncoordinated flight. Slip (inside the turn) or skid (outside the turn) is indicated by the location of the bar relative to the pointer.



**Figure 2-12. Slip/Skid Indication**

### 2.2.4.3 Altimeter

The Altimeter displays 600 feet of barometric altitude values at a time on a moving tape rolling number gauge. Numeric labels and major tick marks are shown at intervals of 100 feet. Minor tick marks are at intervals of 20 feet. The current altitude is displayed in the black pointer.

The Selected Altitude is displayed above the Altimeter in the box indicated by a selection bug symbol. A bug corresponding to this altitude is shown on the tape. If the Selected Altitude exceeds the range shown on the tape, the

bug appears at the corresponding edge of the tape. When the metric value is selected it is displayed in a separate box above the Selected Altitude.

A magenta Altitude Trend Vector extends up or down the left of the altitude tape, the end resting at the approximate altitude to be reached in 6 seconds at the current vertical speed. The trend vector is not shown if altitude remains constant or if data needed for calculation is not available due to a system failure.

#### 2.2.4.3.1 Setting the Selected Altitude:

Turn the ALT Knob to set the Selected Altitude. The large knob adjusts the Selected Altitude in 1000-ft increments, the small knob in 100-ft increments. If the altimeter is set to display meters, the large knob adjusts the Selected Altitude in 500-meter increments, the small knob in 50-meter increments.

If set, the Minimum Descent Altitude/Decision Height (MDA/DH) value is also available for the Selected Altitude.

Altitudes can also be displayed in meters (Figure 2-13). Note that the altitude tape does not change scale.



**Figure 2-13. Altimeter**

### 2.2.4.3.2 Displaying altitude in meters:

- 1) Select the **PF D** Softkey to display the second-level softkeys.
- 2) Select the **ALT UNIT** Softkey.
- 3) Select the **METERS** Softkey to turn on metric altitude readouts.
- 4) Select the **BACK** Softkey to return to the top level softkeys.

### 2.2.5 Barometric Pressure

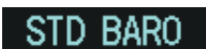
The barometric pressure setting is displayed below the Altimeter in inches of mercury (in Hg) or hectopascals (hPa) when metric units are selected. Adjusting the altimeter barometric setting creates discontinuities in VNV vertical deviation, moving the descent path. For large adjustments, it may take several minutes for the aircraft to re-establish on the descent path. If the change is made while nearing a waypoint with a VNV Target Altitude, the aircraft may not re-establish on the descent path in time to meet the vertical constraint.

#### 2.2.5.1 Selecting the altimeter barometric pressure setting:

Turn the **BARO** Knob to select the desired setting.

#### 2.2.5.2 Selecting standard barometric pressure:

- 1) Select the **PF D** Softkey to display the second-level softkeys.
- 2) Select the **STD BARO** Softkey.
- 3) STD BARO is displayed in barometric setting box. (Figure 2-14)



STD BARO

**Figure 2-14. Standard Barometric Altimeter Setting**

### 2.2.5.3 Changing altimeter barometric pressure setting units:

- 1) Select the **PFD** Softkey to display the second-level softkeys.
- 2) Select the **ALT UNIT** Softkey.
- 3) Select the **IN** Softkey to display the barometric pressure setting in inches of mercury (in Hg). Or, select the **HPA** Softkey to display the barometric pressure setting in hectopascals.
- 4) Select the **BACK** Softkey to return to the top-level softkeys

### 2.2.6 Vertical Speed Indicator (VSI)

The Vertical Speed Indicator (VSI) displays the aircraft vertical speed on a fixed scale with labels at 1000 and 2000 fpm (Figure 2-15). Digits appear in the pointer when the climb or descent rate is greater than 100 fpm. If the rate of ascent/descent exceeds 2000 fpm, the pointer appears at the corresponding edge of the tape and the rate appears inside the pointer.

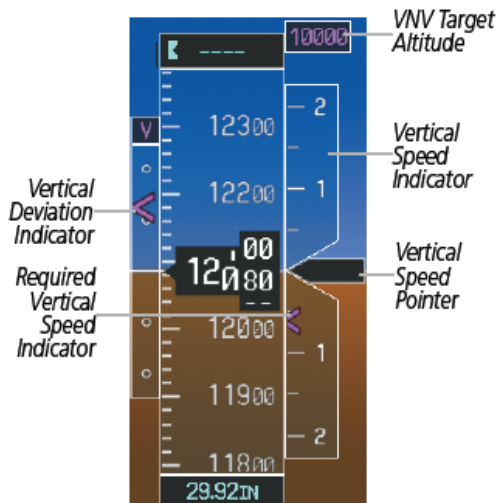
A magenta chevron is displayed as the Required Vertical Speed Indication (RVSI) for reaching a VNV Target Altitude once the “TOD [Top of Descent] within 1 minute” alert has been generated. See the G1000H Pilot’s Guide for details on VNV features.

#### 2.2.6.1 Vertical Deviation

**NOTE:** Approach information is advisory only. GPS is to be used for VFR only.

**NOTE:** The Glidepath Indicator is only shown when SBAS is available.

The Vertical Deviation Indicator (VDI) is a magenta chevron indicating the BARO-VNV vertical deviation when Vertical Navigation (VNV) is being used (Figure 2-15). The VDI appears in conjunction with the “TOD within 1 minute” alert. The VDI is removed from the display if vertical deviation becomes invalid.



**Figure 2-15. Vertical Speed and Deviation Indicator (VSI and DVI)**

The Glideslope Indicator (Figure 2-16) appears to the left of the Altimeter whenever an ILS frequency is tuned in the active NAV field. A green diamond acts as the Glideslope Indicator, like a glideslope needle on a conventional indicator. If a localizer frequency is tuned and there is no glideslope, “NO GS” is displayed in place of the diamond.



**Figure 2-16. Glideslope Indicator**

The glidepath is analogous to the glideslope for GPS approaches supporting SBAS vertical guidance (LNAV+V, L/VNV, LPV). When an approach of this type is loaded into the flight plan and GPS is the selected navigation source, the Glidepath Indicator (Figure 2-17) appears as a magenta diamond. If the approach type downgrades past the final approach fix (FAF), "NO GP" is displayed in place of the diamond. (Full-scale deflection (two dots) is 1000 feet.)



**Figure 2-17. Glidepath Indicator**

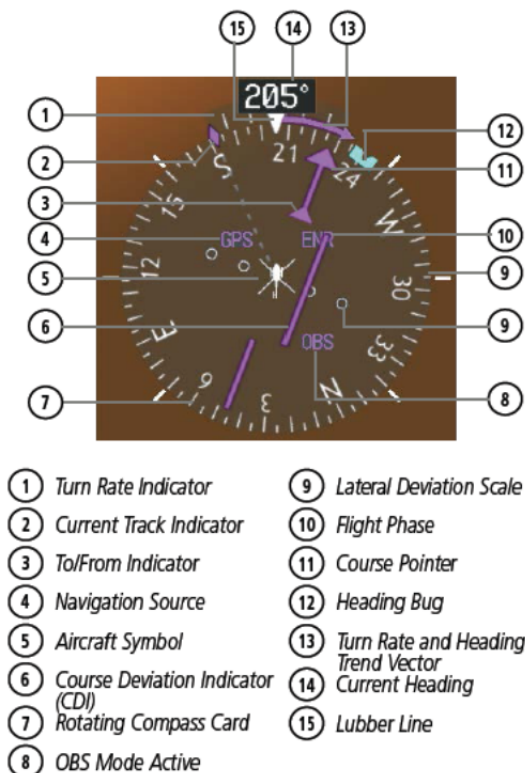
## 2.2.7 Horizontal Situation Indicator (HSI)

The Horizontal Situation Indicator (HSI) displays a rotating compass card in a heading-up orientation (Figure 2-18). Letters indicate the cardinal points with numeric labels every 30°. Major tick marks are at 10° intervals and minor tick marks are at 5° intervals. A digital reading of the current heading appears on top of the HSI, and the current track is represented on the HSI by a magenta diamond connected to a gray dashed line. The HSI also presents turn rate, course deviation, bearing, and navigation source information. The HSI is available in two formats, a 360° compass rose and a 140° arc.

### 2.2.7.1 Changing the HSI display format:

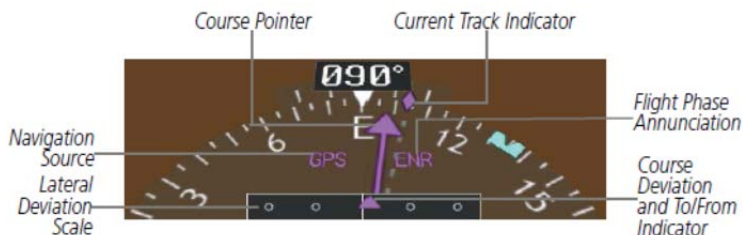
- 1) Press the **PFD** Softkey
- 2) Press the **HSI FRMT** Softkey.
- 3) Press the **360 HSI** or **ARC HSI** Softkey.

The 360° HSI contains a Course Deviation Indicator (CDI), with a Course Pointer, To/From Indicator, and a sliding deviation bar and scale. The course pointer is a single line arrow (GPS, VOR1, and LOC1) or a double line arrow (VOR2 and LOC2) which points in the direction of the set course. The To/From arrow rotates with the course pointer and is displayed when the active NAVAID is received.



**Figure 2-18. Horizontal Situation Indicator (360° HSI)**

The Arc HSI is a 140° expanded section of the compass rose (Figure 2-19). The Arc HSI contains a Course Pointer, combined To/From Indicator and a sliding deviation indicator, and a deviation scale. Upon station passage, the To/From Indicator flips and points to the tail of the aircraft, just like a conventional To/From flag. Depending on the navigation source, the CDI on the Arc HSI can appear in two different ways, an arrowhead (GPS, VOR, OBS) or a diamond (LOC).



**Figure 2-19. Arc HSI**

The Selected Heading is shown to the upper left of the HSI for 3 seconds after being adjusted (Figure 2-20). The light blue bug on the compass rose corresponds to the Selected Heading. While the HSI is displayed as an arc, if the Heading Bug is adjusted off the shown portion of the compass rose, the digital reading is displayed.

### **2.2.7.2 Adjusting the Selected Heading:**

- 1) Turn the **HDG** Knob to set the Selected Heading.
- 2) Press the **HDG** Knob to synchronize the bug to the current heading.

The Selected Course is shown to the upper right of the HSI for 3 seconds after being adjusted (Figure 2-20). While the HSI is displayed as an arc, the Selected Course is displayed whenever the Course Pointer is not within the 140° currently shown.

### **2.2.7.3 Adjusting the Selected Course:**

- 1) Turn the CRS Knob to set the Selected Course.

Press the CRS Knob to re-center the CDI and return the course pointer to the bearing of the active waypoint or navigation station.



**Figure 2-20. Heading and Course Indications**

Navigation angles (track, heading, course, bearing) are corrected to the computed magnetic variation (Mag Var) or referenced to true north (T), set on the AUX - System Setup Page (Figure 2-22). When an approach referenced to true north has been loaded into the flight plan, the system generates a message to change the navigation angle setting to True at the appropriate time.



**Figure 2-21. Heading and Course Indications (True)**

#### 2.2.7.4 Changing the navigation angle true/magnetic setting:

- 1) Use the **FMS** Knob to select the AUX - System Setup Page on the MFD.
- 2) Press the **FMS** Knob to activate the cursor.
- 3) Turn the large **FMS** Knob to highlight Nav Angle in the Display Units box.
- 4) Turn the small **FMS** Knob to highlight the desired setting and press the **ENT** Key.
  - TRUE - References angles to true north (T)
  - MAGNETIC - Angles corrected to the computed magnetic variation (Mag Var)

DISPLAY UNITS	
NAV ANGLE	MAGNETIC(°)
MAG VAR	4°W
DIS. SPD	NAUTICAL(NM,KT)
ALT. VS	FEET(FT,FPM)
TEMP	CELSIUS(°C)
FUEL	KILOGRAMS(KG,KG/HR)
WEIGHT	POUNDS(LB)
POSITION	HDDD°MM.MM'

**Figure 2-22. Navigation Angle Settings  
(AUX - System Setup Page)**

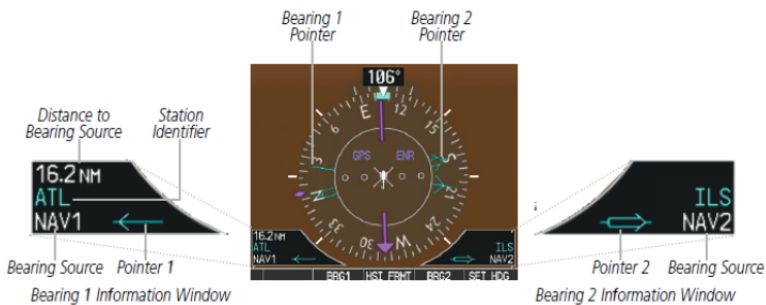
### 2.2.7.5 Turn Rate Indicator

The Turn Rate Indicator is located directly above the rotating compass card (Figure 2-23). Tick marks to the left and right of the lubber line denote half-standard and standard turn rates. A magenta Turn Rate Trend Vector shows the current turn rate. The end of the trend vector gives the heading predicted in 6 seconds, based on the present turn rate. A standard-rate turn is shown on the indicator by the trend vector stopping at the standard turn rate tick mark, corresponding to a predicted heading of 18° from the current heading. At rates greater than 4 deg/sec, an arrowhead appears at the end of the magenta trend vector and the prediction is no longer valid.



**Figure 2-23. Turn Rate Indicator and Trend Vector Bearing Pointers and Information Windows**

Two bearing pointers and associated information can be displayed on the HSI for NAV and GPS sources by pressing the PFD Softkey then a BRG Softkey. The bearing pointers are light blue and are single-line (BRG1) or double-line (BRG2). A pointer symbol is shown in the information windows to indicate the navigation source (Figure 2-24). The bearing pointers never override the CDI and are visually separated from the CDI by a white ring. Bearing pointers may be selected but not necessarily visible due to data unavailability.



**Figure 2-24. HSI with Bearing and Distance Information**

When a bearing pointer is displayed, its associated information window is also displayed. The Bearing Information windows (Figure 2-24) are displayed to the lower sides of the HSI and display the following information:

- Bearing source (NAV, GPS)
- Pointer icon (BRG1 = single line, BRG2 = double line)
- Frequency (NAV)

- Station/waypoint identifier (NAV, GPS)
- GPS-derived great circle distance to bearing source

When the NAV radio is tuned to an ILS frequency the bearing source and the bearing pointer is removed from the HSI. When NAV1 or NAV2 is the selected bearing source, the frequency is replaced by the station identifier when the station is within range. If GPS is the bearing source, the active waypoint identifier is displayed in lieu of a frequency.

The bearing pointer is removed from the HSI and “NO DATA” is displayed in the information window if the NAV radio is not receiving the tuned VOR station or if GPS is the bearing source and an active waypoint is not selected.

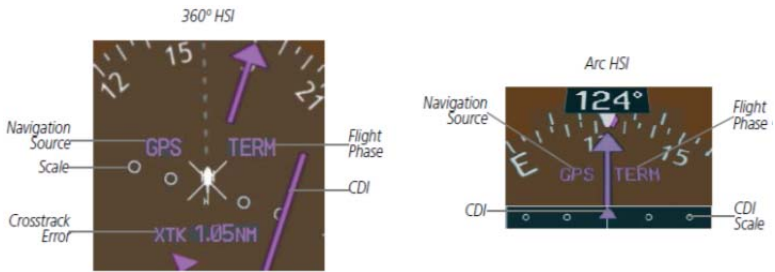
#### **2.2.7.6 Selecting bearing display and changing sources:**

- 1) Select the **PF D** Softkey.
- 2) Select a **BR G** Softkey to display the desired bearing pointer and information window with a NAV source.
- 3) Select the **BR G** Softkey again to change the bearing source to GPS.
- 4) To remove the bearing pointer and information window, select the **BR G** Softkey again.

#### **2.2.7.7 Course Deviation Indicator (CDI)**

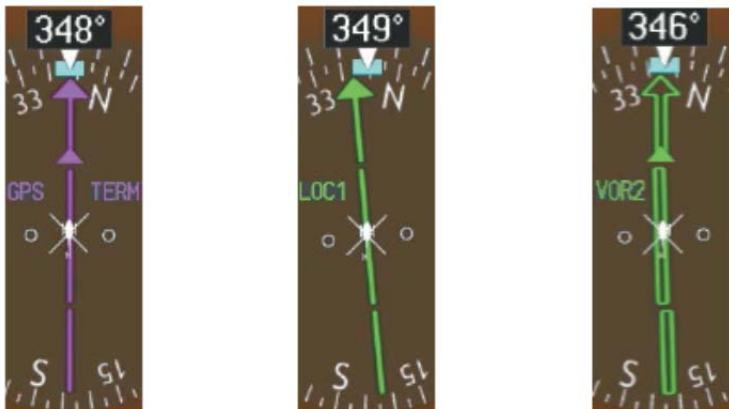
**NOTE:** During a heading change of greater than 105° with respect to the course, the CDI on the Arc HSI switches to the opposite side of the deviation scale and displays reverse sensing.

The Course Deviation Indicator (CDI) moves left or right from the course pointer along a lateral deviation scale to display aircraft position relative to the course (Figure 2-25). If the course deviation data is not valid, the CDI is not displayed.



**Figure 2-25. Course Deviation Indicator**

The CDI can display two sources of navigation, GPS or VOR/LOC. Color indicates the current navigation source, magenta for GPS and green for VOR and LOC (Figure 2-26).



**Figure 2-26. Navigation Sources**

The full scale limits for the CDI are defined by a GPS-derived distance when coupled to GPS. When navigating using a VOR or localizer (LOC), the CDI uses the same angular limits as a mechanical CDI. If the CDI exceeds the maximum deviation on the scale (two dots) while navigating with GPS, the crosstrack error (XTK) is displayed below the white aircraft symbol.

### 2.2.7.8 Changing navigation sources:

- 1) Select the **CDI** Softkey to change from GPS to VOR1 or LOC1. This causes the NAV1 standby frequency in the upper left corner of the PFD to turn GREEN (Figure 2-27).
- 2) Select the **CDI** Softkey again to change from VOR1 or LOC1 to VOR2 or LOC2. This causes the NAV2 standby frequency in the upper left corner of the PFD to turn green.
- 3) Select the **CDI** Softkey a third time to return to GPS.



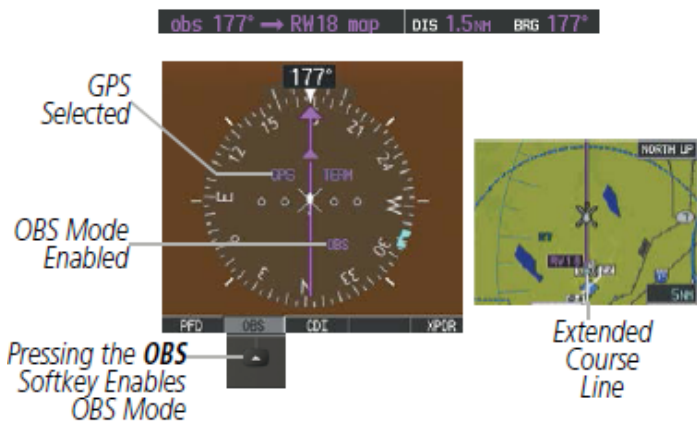
**Figure 2-27. Selecting a Navigation Source**

### 2.2.7.9 OBS Mode

**NOTE:** VNV is inhibited while automatic waypoint sequencing has been suspended.

Enabling Omni-bearing Selector (OBS) Mode suspends the automatic sequencing of waypoints in a GPS flight plan (GPS must be the selected navigation source), but retains the current “active-to” waypoint as the navigation reference even after passing the waypoint. ‘OBS’ is annunciated to the lower right of the aircraft symbol when OBS Mode is selected (Figure 2-28).

While OBS Mode is enabled, a course line is drawn through the “active-to” waypoint on the moving map. If desired, the course to/from the waypoint can now be adjusted. When OBS Mode is disabled, the GPS flight plan returns to normal operation with automatic sequencing of waypoints, following the course set in OBS Mode. The flight path on the moving map retains the modified course line.



**Figure 2-28. Omni-bearing Selector (OBS) Mode Select**

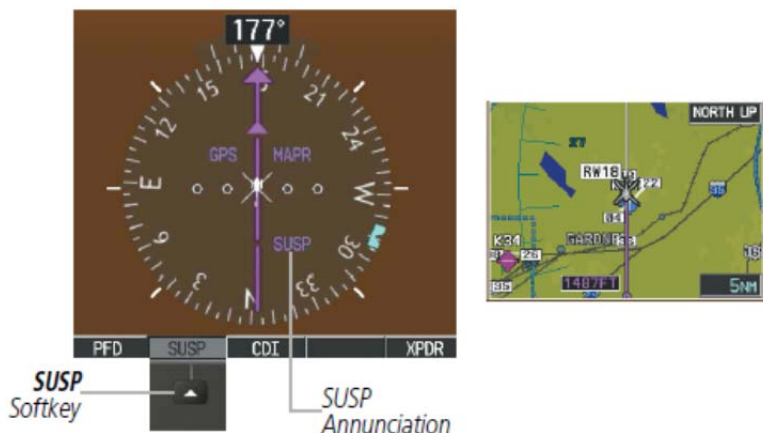
### 2.2.7.9.1 Enabling/Disabling OBS Mode while Navigating a GPS Flight Plan

- 1) Select the **OBS** Softkey to select OBS Mode.
- 2) Turn the **CRS** Knob to select the desired course to/from the waypoint. Press the **CRS** Knob to synchronize the Selected Course with the bearing to the next waypoint.
- 3) Select the **OBS** Softkey again to return to automatic waypoint sequencing (Figure 2-29).



**Figure 2-29. OBS Mode Deselect**

As the aircraft crosses the missed approach point (MAP), automatic approach waypoint sequencing is suspended. 'SUSP' appears on the HSI at the lower right of the aircraft symbol. The OBS Softkey label changes to indicate the suspension is active as shown in Figure 2-30. Selecting the SUSP Softkey, deactivates the suspension and resumes automatic sequencing of approach waypoints.



**Figure 2-30. Suspending Automatic Waypoint Sequencing**

## 2.2.8 Synthetic Vision Technology (SVT)

The SVT function may be inhibited, as desired.

### 2.2.8.1 Accessing the SVT Softkey Menu

- 1) Press the **PFD** softkey on the GDU 1040H.
- 2) Press the **SVT** softkey.
  - a. Synthetic vision terrain, horizon headings, and airport signs can be toggled on and off from this menu.
- 3) Press the **BACK** softkey to return to the root **PFD** menu.

## 2.2.9 Supplemental Flight Data

**NOTE:** Selecting the **DFLTS** Softkey turns off metric Altimeter display, the Inset Map, and wind data display.

In addition to the flight instruments, the PFD also displays various supplemental information, including temperatures, wind data, and Vertical Navigation (VNV) indications.

### 2.2.10 Temperature Displays

The Outside Air Temperature (OAT) is displayed to the left of the Horizontal Situation Indicator in degrees Celsius (°C) (Figure 2-31).



**Figure 2-31. Outside Air Temperature**

### 2.2.11 Wind Data

Wind direction and speed (relative to the aircraft) in knots can be displayed in a window to the upper left of the HSI. When the window is selected for display, but wind information is invalid or unavailable, the window shows "NO WIND DATA". Wind data can be displayed in three different ways: (Figure 2-32)



**Figure 2-32. Wind Data**

#### 2.2.11.1 Displaying wind data:

- 1) Select the **PFD** Softkey.
- 2) Select the **WIND** Softkey to display wind data display options.
- 3) Select one of the **OPTN** softkeys to change how wind data is displayed:

- **OPTN 1:** Wind direction arrows with numeric headwind/tailwind and crosswind components
- **OPTN 2:** Wind direction arrow and numeric speed
- **OPTN 3:** Wind direction arrow with headwind (H) or tailwind (T) and crosswind (X) speed components

4) To remove the window, select the **OFF** Softkey.

### 2.2.12 Vertical Navigation (VNV) Indications

When a VNV flight plan has been activated, VNV indications (VNV Target Altitude, RVSI, VDI) appear on the PFD in conjunction with the “TOD within 1 minute” message and “Vertical track” voice alert (Figure 2-33). See the G1000H Pilot’s Guide for details on VNV features. VNV indications are removed from the PFD according to the criteria listed in Table 2-3.



**Figure 2-33. Vertical Navigation Indications (PFD)**

**Table 2-3. VNV Indication Removal Criteria**

Criteria	VNV Indication Removed		
	Required Vertical Speed (RVSI)	Vertical Deviation (VDI)	VNV Target Altitude
Aircraft > 1 min before the next TOD due to flight plan change	X	X	X
VNV cancelled ( <b>CNCL VNV</b> Softkey selected on MFD)	X	X	X
Distance to active waypoint cannot be computed due to unsupported flight plan leg type	X	X	X
Aircraft > 250 feet below active VNV Target Altitude	X	X	X
Current crosstrack or track angle error has exceeded limit	X	X	X
Active altitude-constrained waypoint cannot be reached	X	X	

### 2.2.13 HTAWS

The MAP - HTAWS Page is specialized to show terrain, obstacle, and potential impact point data in relation to the aircraft's current altitude, without clutter from the basemap. It is the principal page for viewing HTAWS information.

#### 2.2.13.1 Displaying the HTAWS Page:

- 1) Turn the large **FMS** Knob to select the Map Page Group.
- 2) Turn the small **FMS** Knob to select HTAWS Page.

**2.2.13.2 Changing the HTAWS Page view:**

- 1) Press the **VIEW** Softkey.
- 2) Press the **360** or **ARC** Softkey to select the desired view.

Or:

- 1) Press the **MENU** Key.
- 2) Select '**View Arc**' or '**View 360**' (choice dependent on current state) and press the **ENT** Key to change the view.

**2.2.13.3 Showing/hiding aviation information on the HTAWS Page:**

- 1) Press the **MENU** Key.
- 2) Select '**Show Aviation Data**' or '**Hide Aviation Data**' (choice dependent on current state) and press the **ENT** Key.

HTAWS caution voice alerts can be muted while an alert is occurring. Muting an active caution alert has no effect on visual caution or warning annunciations or warning voice alerts. If new HTAWS cautions occur, muting will have no effect until it is enabled again.

**2.2.13.4 Muting/Unmuting an Active HTAWS Caution Voice Alert:**

- 1) Turn the large **FMS** Knob to select the HTAWS Page on the MFD.
- 2) Press the **MUTE CTN** Softkey.

Or:

- 1) Press the **MENU** Key.
- 2) Select '**Mute Active Caution**' or '**Unmute Active Caution**' (choice dependent on current state) and press the **ENT** Key.

## 2.3 Safe Operating Advisory

**NOTE:** See the Rotorcraft Flight Manual (RFM) for operation of Engine Anti-Ice and Pitot Heat.

The following CAS messages do not produce an audio alert and are indicated in green:

**Table 2-4. Safe Operating Advisory CAS Messages**

Annunciation Text
ENGINE ANTI-ICE LDG LT ON LDG LIGHT PULSE

## 2.4 Engine Indication System

The G1000H Engine Indication System (EIS) displays critical engine, electrical, fuel, and other system parameters on the left side of the Primary Flight Display (PFD) (reversionary mode only) and Multi Function Display (MFD) during normal operations (Figure 2-4). Pressing the **ENGINE** Softkey on the MFD displays the EIS - Engine Page which provides a full screen view of all engine instruments (Figure 2-34). The EIS - Engine Page is automatically displayed during any engine exceedance.

Green bands on the instruments indicate normal ranges of operation; yellow and red bands indicate caution and warning, respectively. White or uncolored bands indicate areas outside of normal operation not yet in the caution or warning ranges. When unsafe operating conditions occur, the corresponding readouts flash to indicate cautions and warnings. If sensory data to an instrument becomes invalid or unavailable, a red "X" is displayed across the instrument. If sensor data is out of range, dashes are displayed instead of a readout.



**Figure 2-34. EIS Engine Page**

The secondary EIS indications normally presented on the MFD are no longer available in reversionary mode. However, a CAS message is displayed on the remaining display in the event that a secondary EIS indication is out-of-range.

## 2.5 Engine Indication System (EIS) Display

**NOTE:** The following is a list of EIS displays. All displays include a digital readout.

**Table 2-5. EIS Indicators**

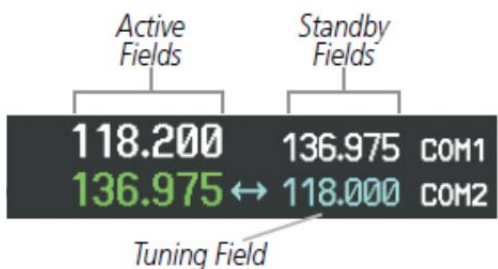
<b>Indicator</b>	<b>Description</b>
Fuel Quantity Indicator (FUEL QTY LB)	Displays the total fuel in pounds.
Turbine Outlet Temperature (TOT)	Displays the current Turbine Outlet Air Temperature in degrees Celsius only.
Gas Generator Speed (N1)	Displays Gas Generator Compressor Speed as a percentage.
Torque (TRQ)	Displays current fuel engine Torque as a percentage.
Power Turbine Speed (N2)	Displays current Power Turbine Speed as a percentage.
Rotor Speed (NR)	Displays Rotor Speed as a percentage.
Engine Oil Pressure Indicator (ENG OIL PSI)	Displays the oil pressure supplied to the engine in pounds per square inch
Engine Oil Temperature Indicator (ENG OIL °C)	Displays engine oil temperature in degrees Celsius
Transmission Oil Temperature (XMSN OIL °C)	Displays the transmission oil temperature in degrees Celsius
Generator Ammeter (AMP)	Displays the generator load in amperes
Generator Voltmeter (VDC)	Displays the generator voltage

## 2.6 COM Operation

### 2.6.1 COM Transceiver Selection and Activation

**NOTE:** When turning on the system for use, the system remembers the last frequencies used and the active COM transceiver state prior to shutdown.

The COM Frequency Box is composed of four fields; the two active frequencies are on the left side and the two standby frequencies are on the right. (Figure 2-35) During reception of audio from the COM radio selected for transmission, audio from the other COM radio is muted.

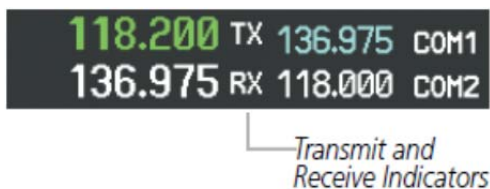


**Figure 2-35. Selecting a COM Radio for Transmit**

#### 2.6.1.1 Transmit/Receive Indications

During COM transmission, a white TX appears by the active COM frequency replacing the Frequency Transfer Arrow (Figure 2-36).

During COM signal reception, a white RX appears by the active COM frequency replacing the Frequency Transfer Arrow. Entertainment audio, if selected, is muted during active COM radio reception.



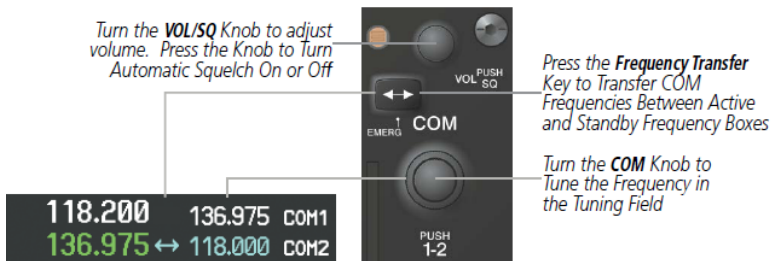
**Figure 2-36. COM Radio Transmit and Receive Indications**

## 2.6.2 COM Transceiver Manual Tuning

The COM frequency controls and frequency boxes are on the right side of the MFD and PFD.

### 2.6.2.1 Manually tuning a COM frequency:

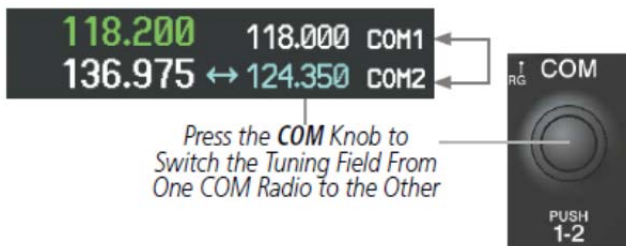
- 1) Turn the **COM** Knob to tune the desired frequency in the COM Tuning Box (large knob for MHz; small knob for kHz) (Figure 2-37).
- 2) Press the **Frequency Transfer** Key to transfer the frequency to the active field.
- 3) Adjust the volume level with the COM **VOL/SQ** Knob.
- 4) Press the COM **VOL/SQ** Knob to turn automatic COM squelch on and off.



**Figure 2-37. COM Frequency Tuning**

### 2.6.3 Selecting the Radio to be Tuned

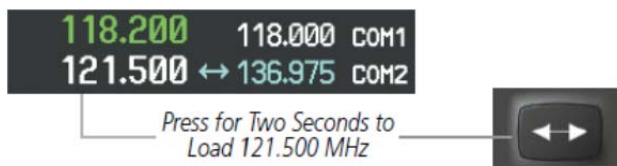
Press the small **COM** Knob to transfer the frequency tuning box and Frequency Transfer Arrow between the upper and lower radio frequency fields (Figure 2-38).



**Figure 2-38. Switching COM Tuning Boxes**

### 2.6.3.1 Quick-Tuning and Activating 121.500 MHz

Pressing and holding the COM **Frequency Transfer** Key for two seconds automatically loads the emergency COM frequency (121.500 MHz) in the active field of the COM radio selected for tuning (the one with the transfer arrow) (Figure 2-39).



**Figure 2-39 Quickly Tuning 121.500 MHz**

### 2.6.3.2 Auto-Tuning the Com Frequency

COM frequencies can be automatically tuned from the following:

- Nearest Airports Window (PFD)
- WPT – Airport Information Page
- NRST – Nearest Airports Page
- NRST – Nearest Frequencies Page (ARTCC, FSS, WX)
- NRST – Nearest Airspaces Page

### 2.6.4 Auto-Tuning a COM Frequency from the PFD

COM frequencies for the nearest airports can be automatically tuned from the Nearest Airports Window on the PFD. When the desired frequency is entered, it becomes a standby frequency. Pressing the Frequency Transfer Key places this frequency into the COM Active Frequency Field.

#### 2.6.4.1 Auto-tuning a COM frequency for a nearby airport from the PFD:

- 1) Press the **NRST** Softkey on the PFD to open the Nearest Airports Window (Figure 2-40). A list of 25 nearest airport identifiers and COM frequencies is displayed.

- 2) Turn the **FMS** Knob to scroll through the list and highlight the desired COM frequency.
- 3) Press the **ENT** Key to load the COM frequency into the COM Standby Tuning Box.
- 4) Press the **Frequency Transfer** Key to transfer the frequency to the COM Active Frequency Field.



**Figure 2-40. Nearest Airports Window (PFD)**

## 2.6.5 Auto-Tuning a COM Frequency from the MFD

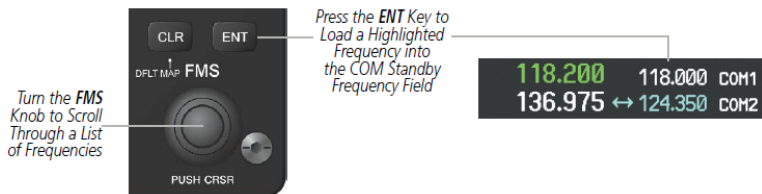
Frequencies can be automatically loaded into the COM Frequency Box from pages in the NRST or WPT page group by highlighting the frequency and pressing the ENT Key (Figure 2-41, Figure 2-42, and Figure 2-43).

### 2.6.5.1 Auto-tuning a COM frequency from the WPT and NRST Pages:

- 1) From any page that the COM frequency can be auto-tuned, activate the cursor by pressing the **FMS** Knob or the appropriate softkey.

## 2-48 ENSTROM 480B RFM SUPPLEMENT

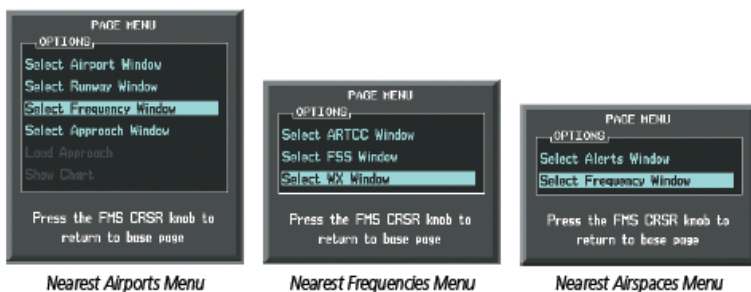
- 2) Turn the **FMS** Knob to place the cursor on the desired COM frequency (Figure 2-41).
- 3) Press the **ENT** Key to load the COM frequency into the standby field of the selected COM radio.
- 4) Press the **Frequency Transfer** Key to transfer the frequency to the COM Active Frequency Field.



**Figure 2-41. COM Frequency Auto-Tuning from the MFD**

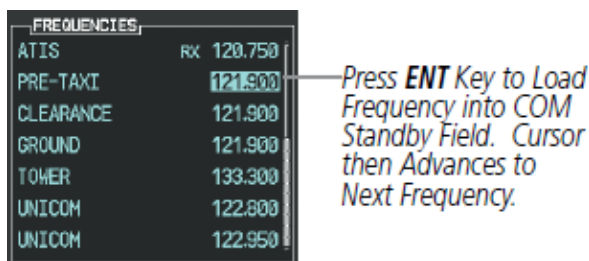
Or:

- 1) On the Nearest Airports, Frequencies, or Airspaces page, press the **MENU** Key to display the page menu (Figure 2-42).
- 2) Turn the large **FMS** Knob to scroll through the menu options.
- 3) Press the **ENT** Key to place the cursor on the desired selection.
- 4) Scroll through the frequency selections with the **FMS** Knob.
- 5) Press the **ENT** Key to load the COM frequency into the standby field of the selected COM radio.
- 6) Press the **Frequency Transfer** Key to transfer the frequency to the COM Active Frequency Field.



**Figure 2-42. Nearest Pages Menus**

On the WPT - Airport Information Page, the cursor can be placed on the frequency field by pressing the FMS Knob and scrolling through the list. The frequency is transferred to the COM Standby Field with the ENT Key (Figure 2-43).

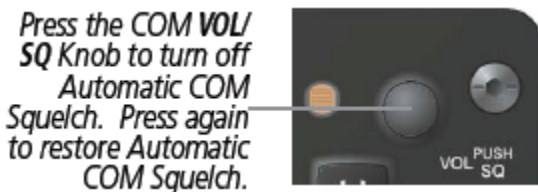


**Figure 2-43. WPT - Airport Information Page**

COM frequencies can also be auto-tuned from the NRST - Nearest Airspaces, NRST - Nearest Frequencies, and NRST - Nearest Airports Pages on the MFD in a similar manner using the appropriate softkeys or MENU Key, the FMS Knob, and the ENT Key.

### 2.6.6 Automatic Squelch

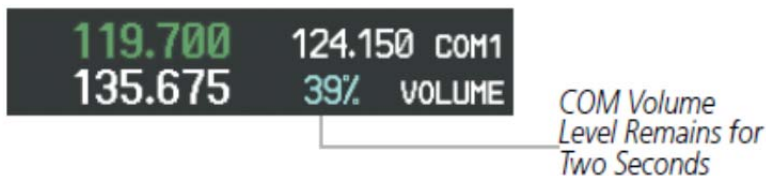
Automatic COM Squelch quiets unwanted static noise when no audio signal is received, while still providing good sensitivity to weak COM signals. To disable Automatic COM Squelch, press the VOL/SQ Knob (Figure 2-44). When Automatic COM Squelch is disabled, COM audio reception is always on. Continuous static noise is heard over the headsets and speaker, if selected. Pressing the VOL/SQ Knob again enables Automatic COM Squelch.



**Figure 2-44. Overriding Automatic COM Squelch**

### 2.6.7 COM Volume

COM radio volume level can be adjusted from 0 to 100% using the VOL/SQ Knob. Turning the knob clockwise increases volume, turning the knob counterclockwise decreases volume. When adjusting volume, the level is displayed in place of the standby frequencies (Figure 2-45). Volume level indication remains for two seconds after the change.



**Figure 2-45. COM Volume Level**

## 2.7 NAV Operation

### 2.7.1 NAV Radio Selection and Activation

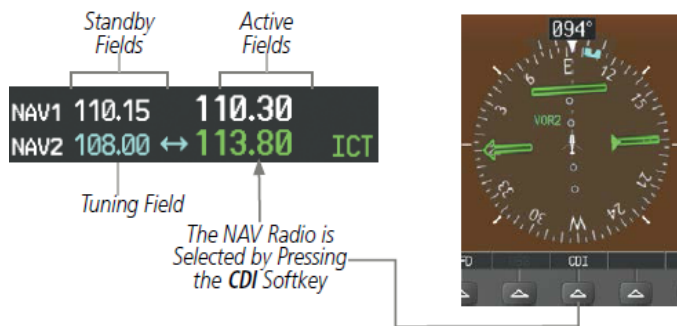
The NAV Frequency Box is composed of four fields; two standby fields and two active fields. The active frequencies are on the right side and the standby frequencies are on the left.

A NAV radio is selected for navigation by pressing the **CDI** Softkey located on the PFD (Figure 2-46). Pressing the **CDI** Softkey once selects NAV1 as the navigation radio. Pressing the **CDI** Softkey a second time selects NAV2 as the navigation radio. Pressing the **CDI** Softkey a third time activates GPS mode. Pressing the **CDI** Softkey again cycles back to NAV1.

While cycling through the **CDI** Softkey selections, the NAV Tuning Box and the Frequency Transfer Arrow are placed in the active NAV Frequency Field.

The three navigation modes that can be cycled through are:

- VOR1 (or LOC1) – If NAV1 is selected, a green single line arrow (not shown) labeled either VOR1 or LOC1 is displayed on the HSI.
- VOR2 (or LOC2) – If NAV2 is selected, a green double line arrow (shown) labeled either VOR2 or LOC2 is displayed on the HSI.
- GPS – If GPS Mode is selected, a magenta single line arrow (not shown) appears on the HSI and neither NAV radio is selected. Both active NAV frequencies are then displayed in white.



**Figure 2-46. Selecting a NAV Radio for Navigation**

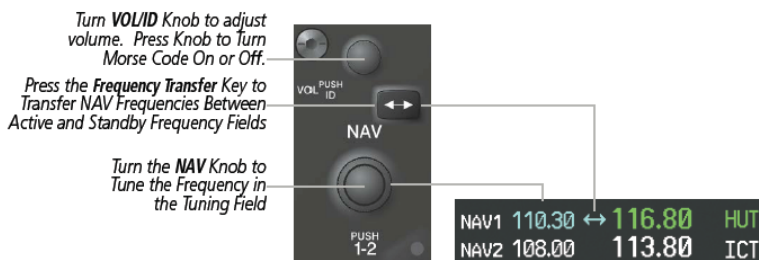
See Section 2.2.7.6 for selecting the Bearing Information windows.

## 2.7.2 NAV Receiver Manual Tuning

The NAV frequency controls and frequency boxes are on the left side of the MFD and PFD.

### 2.7.2.1 Manually tuning a NAV frequency:

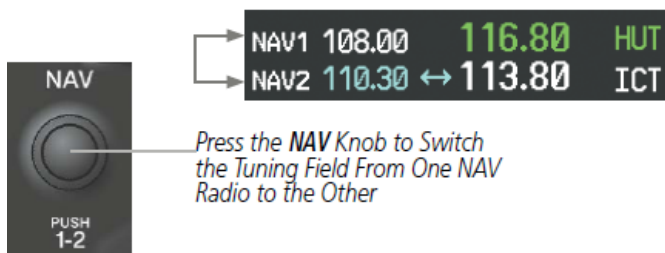
- 1) Turn the **NAV** Knob to tune the desired frequency in the NAV Tuning Box (Figure 2-47).
- 2) Press the **Frequency Transfer** Key to transfer the frequency to the NAV Active Frequency Field.
- 3) Adjust the volume level with the NAV **VOL/ID** Knob.
- 4) Press the NAV **VOL/ID** Knob to turn the Morse code identifier audio on and off.



**Figure 2-47. NAV Frequency Tuning**

### 2.7.2.2 Selecting the Radio to be Tuned

Press the small **NAV** Knob to transfer the frequency tuning box and Frequency Transfer Arrow between the upper and lower radio frequency fields (Figure 2-48).



**Figure 2-48. Switching NAV Tuning Boxes**

### 2.7.2.3 VOR/LOC ID

When the Morse code Identifier audio is on for a NAV radio, a white ID appears to the left of the active NAV frequency.

Pressing the **VOL/ID** Knob turns off the Morse code audio only in the radio with the NAV Tuning Box. To turn off both NAV IDs, transfer the NAV Tuning Box between NAV1 and NAV2 by pressing the small **NAV** Knob and pressing the **VOL/ID** Knob again to turn the Morse code off in the other radio (Figure 2-49).

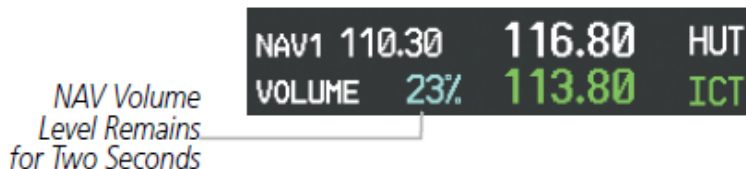


**Figure 2-49. NAV Radio ID Indication**

### 2.7.2.4 NAV Volume

NAV Radio volume level can be adjusted from 0 to 100% using the **VOL/ID** Knob. Turning the knob clockwise increases volume, counterclockwise decreases volume.

When adjusting, the level is displayed in place of the standby frequencies (Figure 2-50). Volume level indication remains for two seconds after the change.



**Figure 2-50. NAV Volume Levels**

### 2.7.3 Auto-Tuning a NAV Frequency from the MFD

NAV frequencies can be selected and loaded from the following MFD pages:

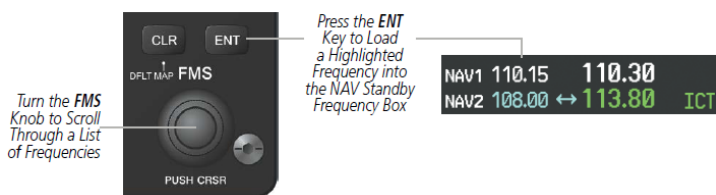
- WPT – Airport Information
- WPT – VOR Information
- NRST – Nearest Airports
- NRST – Nearest VOR
- NRST – Nearest Frequencies (FSS, WX)
- NRST – Nearest Airspaces

The MFD provides auto-tuning of NAV frequencies from waypoint and nearest pages. During enroute navigation, the NAV frequency is entered automatically into the NAV standby frequency field. During approach activation the NAV frequency is entered automatically into the NAV active frequency field.

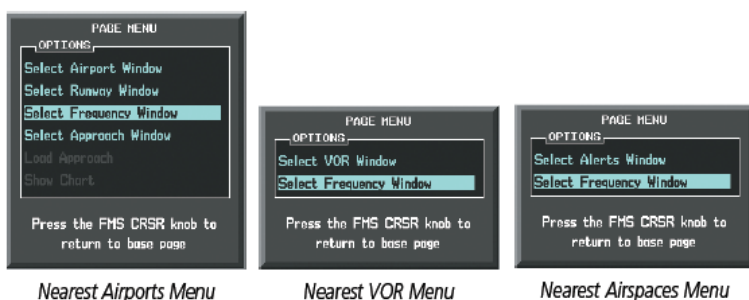
Frequencies can be automatically loaded into the NAV Frequency Box from pages in the NRST or WPT page group by highlighting the frequency and pressing the ENT Key (Figure 2-51, Figure 2-52, and Figure 2-53).

### 2.7.3.1 Auto-tuning a NAV frequency from the WPT and NRST Pages:

- 1) From any page that the NAV frequency can be auto-tuned, activate the cursor by pressing the **FMS** Knob or the appropriate softkey.
- 2) Turn the **FMS** Knob to place the cursor on the desired NAV identifier or NAV frequency (Figure 2-51).
- 3) On the Nearest VOR and Nearest Airports pages, press the **FREQ** Softkey to place the cursor on the NAV frequency (Figure 2-52).
- 4) Press the **ENT** Key to load the NAV frequency into the standby field of the selected NAV radio.
- 5) Press the **Frequency Transfer** Key to transfer the frequency to the NAV Active Frequency Field.



**Figure 2-51. NAV Frequency Auto-Tuning from the MFD**



**Figure 2-52. Nearest Pages Menus**

Or:

- 1) When on the Nearest VOR, Nearest Airspaces, and Nearest Airports pages, press the **MENU** Key to display the page menu (Figure 2-52).
- 2) Turn the large **FMS** Knob to scroll through the menu options.
- 3) Press the **ENT** Key to place the cursor in the desired window.
- 4) Scroll through the frequency selections with the **FMS** Knob.
- 5) Press the **ENT** Key to load the NAV frequency into the standby field of the selected NAV radio.
- 6) Press the **Frequency Transfer** Key to transfer the frequency to the NAV Active Frequency Field.

In the example shown, the VOR list is selected with the **VOR** Softkey or from the page menu (Figure 2-53). The **FMS** Knob or **ENT** Key is used to scroll through the list. The cursor is placed on the frequency with the **FREQ** Softkey and loaded into the NAV Tuning Box with the **ENT** Key.



**Figure 2-53. Loading the NAV Frequency from the NRST – Nearest VOR Page**

### 2.7.3.2 Auto-Tuning Nav Frequencies on Approach Activation

**NOTE:** The primary NAV frequency is auto-tuned upon loading a VOR or ILS/Localizer approach.

**NOTE:** When an ILS/LOC approach has been activated while navigating by GPS, the system automatically switches to LOC as the final approach course is intercepted (within 15 nm of the FAF). See the Flight Management Section for details.

NAV frequencies are automatically loaded into the NAV Frequency Box on approach activation.

When loading or activating a VOR or ILS/LOC approach, the approach frequency is automatically transferred to a NAV frequency field as follows:

- If the current CDI navigation source is GPS, the approach frequency is transferred to the NAV1 active frequency field. The frequency that was previously in the NAV1 active frequency field is transferred to standby.
- If the current CDI navigation source is GPS, and if the approach frequency is already loaded into the NAV1 standby frequency field, the standby frequency is transferred to active.
- If the current CDI navigation source is NAV1 or NAV2, the approach frequency is transferred to the standby frequency fields of the selected CDI NAV radio.

## **2.8 GTX 33H ES Mode S Transponder**

The GTX 33H ES Mode S Transponder provides Mode A, Mode C, and Mode S interrogation and reply capabilities. Selective addressing or Mode Select (Mode S) capability includes the following features:

- Level-2 reply data link capability (used to exchange information between aircraft and ATC facilities)
- Surveillance identifier capability
- Flight ID (Flight Identification) reporting – The Mode S Transponder reports aircraft identification as either the aircraft registration or a unique Flight ID.
- Altitude reporting
- Airborne status determination
- Transponder capability reporting
- Mode S Enhanced Surveillance (EHS) requirements
- Acquisition squitter – Acquisition squitter, or short squitter, is the transponder 24-bit identification address. The transmission is sent periodically, regardless of the presence of interrogations. The purpose of acquisition squitter is to enable Mode S ground stations and aircraft equipped with a Traffic Avoidance System (TAS) to recognize the presence of Mode S-equipped aircraft for selective interrogation.

- Extended squitter – Transmits the Automatic Dependent Surveillance-Broadcast (ADS-B) position, velocity, and heading information periodically without requiring an interrogation.

### 2.8.1 Transponder Controls

Transponder function is displayed on three levels of softkeys on the PFD (Figure 2-54): Top-level, Mode Selection, and Code Selection. When the top-level **XPDR** Softkey is pressed, the Mode Selection softkeys appear: **STBY, ON, ALT, GND, VFR, CODE, IDENT, BACK**.

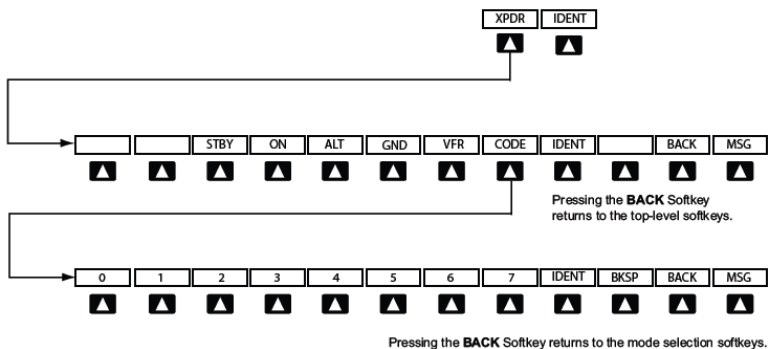
When the **CODE** Softkey is pressed, the number softkeys appear: **0, 1, 2, 3, 4, 5, 6, 7, IDENT, BKSP, BACK**. The digits 8 and 9 are not used for code entry. Pressing the numbered softkeys in sequence enters the transponder code. If an error is made, the code selection cursor can be moved back to the left one digit with each press of the **BKSP** Softkey.

Pressing the **BACK** Softkey during code selection reverts to the Mode Selection Softkeys. Pressing the **BACK** Softkey during mode selection reverts to the top-level softkeys.

The code can also be entered with the **FMS** Knob on the PFD. Code entry must be completed with either the softkeys or the **FMS** Knob, but not a combination of both.

Pressing the **IDENT** Softkey while in Mode or Code Selection initiates the IDENT function and reverts to the top-level softkeys.

After 45 seconds of transponder softkey inactivity, the system reverts back to the top-level softkeys.



**Figure 2-54. Transponder Softkeys (PFD)**

## 2.8.2 Transponder Mode Selection

Mode selection can be automatic (Ground and Altitude Modes) or manual (Standby, ON, and Altitude Modes). The **STBY**, **ON**, and **ALT** Softkeys can be accessed by pressing the **XPDR** Softkey.

Selecting a transponder mode:

- 1) Press the **XPDR** Softkey to display the Transponder Mode Selection Softkeys.
- 2) Press the desired softkey to activate the transponder mode.

### 2.8.2.1 Ground Mode

Ground Mode is normally selected automatically when the aircraft is on the ground. The transponder powers up in the last mode it was in when shut down. Ground Mode can be overridden by pressing any one of the Mode Selection Softkeys. A green **GND** indication and transponder code appear in the mode field of the Transponder Data Box (Figure 2-55). In Ground Mode, the transponder does not allow Mode A and Mode C replies, but it does permit acquisition squitter and replies to discretely addressed Mode S interrogations.

When Standby Mode has been selected on the ground, the transponder can be returned to Ground Mode by pressing the **GND** Softkey.



**Figure 2-55. Ground Mode**

### 2.8.2.2 Standby Mode (Manual)

**NOTE:** In Standby Mode, the IDENT function is inoperative.

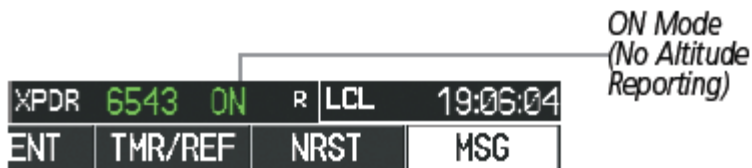
Standby Mode can be selected at any time by pressing the **STBY** Softkey. In Standby, the transponder does not reply to interrogations, but new codes can be entered. When Standby is selected, a white STBY indication and transponder code appear in the mode field of the Transponder Data Box (Figure 2-56). In all other modes, these fields appear in green.



**Figure 2-56. Standby Mode**

### 2.8.2.3 Manual ON Mode

ON Mode can be selected at any time by pressing the **ON** Softkey. ON Mode generates Mode A and Mode S replies, but Mode C altitude reporting is inhibited. In ON Mode, a green ON indication and transponder code appear in the mode field of the Transponder Data Box (Figure 2-57).

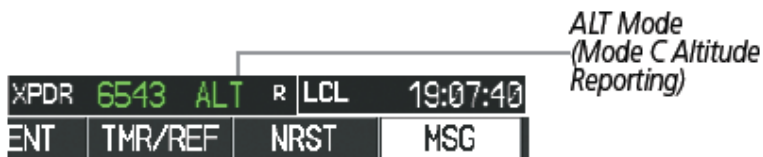


**Figure 2-57. ON Mode**

#### 2.8.2.4 Altitude Mode (Automatic or Manual)

Altitude Mode is automatically selected when the aircraft becomes airborne. Altitude Mode may also be selected manually by pressing the **ALT** Softkey.

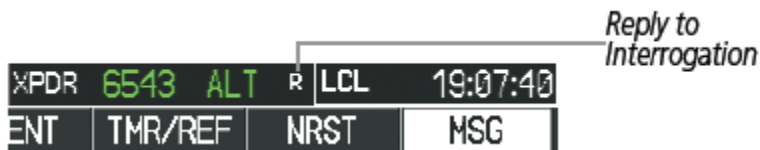
If Altitude Mode is selected, a green ALT indication and transponder code appear in the mode field of the Transponder Data Box, and all transponder replies requesting altitude information are provided with pressure altitude information (Figure 2-58).



**Figure 2-58. Altitude Mode**

#### 2.8.2.5 Reply Status

When the transponder sends replies to interrogations, a white R indication appears momentarily in the reply status field of the Transponder Data Box (Figure 2-59).



**Figure 2-59. Reply Indication**

## 2.8.3 Entering A Transponder Code

### 2.8.3.1 Entering a transponder code with softkeys:

- 1) Press the **XPDR** Softkey to display the Transponder Mode Selection Softkeys.
- 2) Press the **CODE** Softkey to display the Transponder Code Selection Softkeys, for digit entry (Figure 2-60).
- 3) Press the digit softkeys to enter the code in the code field. When entering the code, the next softkey in sequence must be pressed within 10 seconds, or the entry is cancelled and restored to the previous code. Pressing the **BKSP** Softkey moves the code selection cursor to the previous digit. Five seconds after the fourth digit has been entered, the transponder code becomes active.

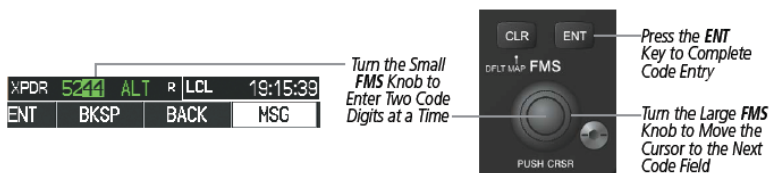


Figure 2-60. Entering a Code

### 2.8.3.2 Entering a transponder code with the PFD FMS Knob:

- 1) Press the **XPDR** and the **CODE** Softkeys as in the previous procedure to enable code entry.
- 2) Turn the small **FMS** Knob on the PFD to enter the first two code digits (Figure 2-61).
- 3) Turn the large **FMS** Knob to move the cursor to the next code field.
- 4) Enter the last two code digits with the small **FMS** Knob.
- 5) Press the **ENT** Key to complete code digit entry.

Pressing the **CLR** Key or small **FMS** Knob before code entry is complete cancels code entry and restores the previous code. Waiting for 10 seconds after code entry is finished activates the code automatically.

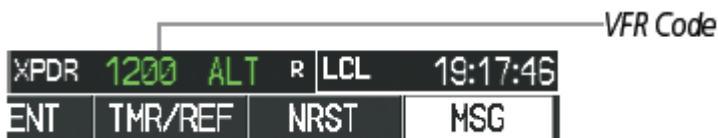


**Figure 2-61. Entering a Code with the FMS Knob**

### 2.8.3.3 VFR Code

The VFR code can be entered either manually or by pressing the **XPDR** Softkey, then the **VFR** Softkey. When the **VFR** Softkey is pressed, the pre-programmed VFR code is automatically displayed in the code field of the Transponder Data Box. Pressing the **VFR** Softkey again restores the previous identification code.

The pre-programmed VFR Code is set at the factory to 1200. If a VFR code change is required, contact a Garmin-authorized service center for configuration (Figure 2-62).



**Figure 2-62. VFR Code**

### 2.8.4 IDENT Function

**NOTE:** In Standby Mode, the **IDENT** Softkey is inoperative.

Pressing the **IDENT** Softkey sends a distinct identity indication to Air Traffic Control (ATC). The indication distinguishes the identifying transponder from all the others on the air traffic controller's screen. The **IDENT** Softkey appears on all levels of transponder softkeys. When the

**IDENT** Softkey is pressed, a green IDNT indication is displayed in the mode field of the Transponder Data Box for a duration of 18 seconds (Figure 2-63).

After the **IDENT** Softkey is pressed while in Mode or Code Selection, the system reverts to the top-level softkeys.



**Figure 2-63. IDENT Softkey and Indication**

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## CHAPTER 3 EMERGENCY PROCEDURES

### 3.1 Loss of Electrical Power

In the event of a total loss of electrical power, the G1000H system will cease to operate and the pilot must utilize visual references to fly the aircraft. Many components of the G1000H system have dual power inputs.

The engine governor is a pneumatic/hydraulic system and will continue to operate without electrical power. The aircraft will continue to fly until the system reinitializes or the pilot has located a place for an off-airport landing.

If power is lost to the Main 28VDC Battery bus, energizing the 28VDC Emergency Battery Bus will supply power directly to the components of the G1000H required to maintain Navigation and EIS/CAS monitoring. To energize the Emergency Battery Bus:

- Press the **EMERG BUS** switch located in the center pedestal to the “**ON**” position.

**NOTE:** VHF COM operation is not restored when the Emergency Bus Switch is activated.

### 3.2 Malfunction Indications and Procedures

These procedures supersede those presented as markings or placards, or documented in the aircraft’s EASA Approved Rotorcraft Flight Manual as a result of the installation of the G1000H system. All other emergency procedures remain in effect.

The G1000H System Messages convey messages to the flight crew regarding problems with the G1000H system. Typically, a large red “X” appears in a window when a related LRU fails or detects invalid data.

**NOTE:** Failure annunciations are shown in Table 3-1.

### 3.2.1 Flight Display Failure

In the event of a display failure, the G1000H System automatically switches to reversionary (backup) mode. In reversionary mode, flight information is presented on the remaining display in the same format as the PFD operating in normal mode. The secondary EIS indications normally presented on the MFD are no longer available in reversionary mode. However, a CAS message is displayed on the remaining display in the event that a secondary EIS indication is out-of-range. Reversionary mode can be manually selected on the MFD by the following:

- Press the **DISP BACKUP** switch located in the center pedestal to the **“ON”** position.

If both displays fail or appear invalid, utilize visual references.

#### 3.2.1.1 PFD Failure

In the event of a PFD failure, if either a ROTOR RPM or an ENGINE OUT condition is activated, the red warning annunciator light, the voice/tone alert, and the NR indication will continue to function. However, the external warning horn will be disabled.

#### 3.2.1.2 MFD Failure

In the event of an MFD failure, if either a ROTOR RPM or an ENGINE OUT condition is activated, the external warning horn, the voice/tone alert, and the NR indication will continue to function. However, the red warning annunciator light will be disabled.

### 3.2.2 AHRS Failure

A failure of the Attitude and Heading Reference System (AHRS) is indicated by a removal of the sky/ground presentation, a red X over the attitude indicator, and a yellow “AHRS FAILURE” shown on the PFD. A heading failure will also be indicated.

- Use visual references for aircraft control.

The Attitude, Heading and Reference System (AHRS) requires at least one GPS or air data input to function properly. In the unlikely event that GPS data and air data is not received by the AHRS, the system will not provide Attitude, Heading, Altitude, or Airspeed information; however, if the PFD is receiving valid GPS information, the reversionary data on the PFD provides GPS Track and GPS Altitude data along with course information and deviations which are still valid and may be used to navigate.

### **3.2.3 Heading Failure**

A magnetometer failure is indicated by a HDG with a red X over it just to the left of the heading display. The aircraft can be flown by reference to GPS ground track instead of heading.

If the magnetometer input fails, the AHRS transitions to one of the reversionary No-Magnetometer modes and continues to output valid attitude information. However, if the aircraft is airborne, the heading output on the PFD does become invalid (as indicated by a red "X"). The course pointer will indicate straight up and operate much like a traditional CDI, with the Omni-Bearing Selector being adjusted by the CRS knob. Under this condition, the pilot must use the standby compass.

### **3.2.4 Air Data Computer (ADC) Failure**

Complete loss of the Air Data Computer is indicated by a red X and yellow text over the airspeed, altimeter, vertical speed, and OAT displays. Some derived functions, such as true airspeed and wind calculations, will also be lost.

- Use visual references and secondary cues.

### **3.2.5 Navigation**

If navigation information on the PFD/MFD (HSI, RMI, WPT bearing and distance information, or Moving Map Data) is not available or appears invalid, select an alternate data source (via CDI softkey).

If GPS position information from the GPS WAAS navigator is not valid, the own-ship icon on the MFD is removed and “NO GPS POSITION” text is overlaid on the MFD moving map. The system will annunciate a loss of integrity, “LOI” on the HSI. The LOI annunciation will be colored yellow and the HSI needle will flag. The pilot should select an alternate navigation source (via CDI softkey). Pressing the CDI soft key will change the HSI navigation source. If GPS navigation is subsequently restored, the MFD moving map will display the own-ship icon, and the HSI navigation source may be selected to GPS; at that time the “LOI” annunciation will be removed.

### 3.2.6 Synthetic Vision

The synthetic vision display of terrain used several data sources (GPS, terrain database, attitude information, etc.) in order to accurately display terrain. If any of these data sources become unreliable or unavailable, the display of synthetic terrain will automatically revert to the non-SVT display, the display of synthetic vision should be manually turned off by the following procedure in section 2.2.8 of this document.

### 3.2.7 Display Dimming

When operating at high Outside Air Temperatures, the G1000H display may automatically dim to reduce equipment temperatures. The display will return to full brightness when operating temperatures are reduced.

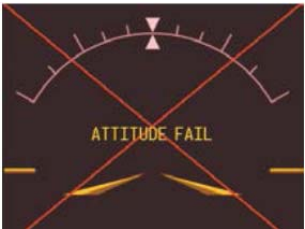

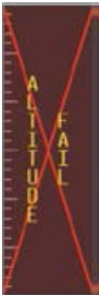
### 3.2.8 Warnings, Cautions, and Advisory Annunciations




**NOTE:** The G1000H Cockpit Reference Guide and the G1000H Pilot’s Guide contain detailed descriptions of the annunciator system and all warnings, cautions and advisories.





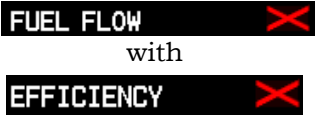
Table 3-1 through Table 3-5 show the color and significance of the warning, caution, advisory messages, and the voice alerts which may appear on the G1000H displays. These alerts, cautions and warnings are representative of the some of the most common annunciations and do not cover all possible alerts.

**NOTE:** The G1000H Cockpit Reference Guide and the G1000H Pilot's Guide contain detailed descriptions of the annunciator system and all warnings, cautions and advisories.

**Table 3-1. System Failure Annunciations**

Annunciation	Pilot Action	Cause
 <p>The image shows a cockpit attitude indicator with a red 'X' overlaid across the entire display. The text 'ATTITUDE FAIL' is centered in yellow. The background is dark with white and red markings for pitch and roll.</p>	Use visual references	Display system is not receiving attitude reference information from the AHRS; accompanied by the removal of sky/ground presentation and a red X over the attitude area
 <p>The image shows a vertical airspeed indicator with a red 'X' overlaid across the display. The text 'AIRSPEED FAIL' is written vertically in yellow. The background is dark with white markings.</p>	Use visual references	Display system is not receiving airspeed input from the air data computer; accompanied by a red X through the airspeed display.
 <p>The image shows a vertical altimeter with a red 'X' overlaid across the display. The text 'ALTITUDE FAIL' is written vertically in yellow. The background is dark with white markings.</p>	Use visual references	Display system is not receiving altitude input from the air data computer; accompanied by a red X through the altimeter display.

	<p>Cross check instruments</p>	<p>Display system is not receiving vertical speed input from the air data computer; accompanied by a red X through the vertical speed display.</p>
	<p>Use Standby Magnetic Compass or GPS track information</p>	<p>Display system is not receiving valid heading from the AHRs; accompanied by a red X through the digital heading display.</p>
	<p>Limit rotorcraft bank to less than 10 degrees as AHRS Aligns</p>	<p>Attitude and Heading Reference System is aligning. Keep attitude level using outside references. AHRS will not align if bank angle remains over 10 degrees.</p>

	<p>Press the 1-2 button to select other GPS receiver.</p>	<p>GPS data on the selected system is no longer valid. The Moving Map and associated data are not updating.</p>
	<p>Use visual references</p>	<p>Display system is not receiving valid true airspeed information from air data computer.</p>
	<p>Reference mechanical OAT probe</p>	<p>Display system is not receiving valid OAT information from air data computer.</p>
	<p>None</p>	<p>Display system is not receiving valid transponder information.</p>
	<p>Reference fuel quantity indicator</p>	<p>Display system is not receiving valid fuel flow information from the fuel flow transducer.</p>
<p>Various other Red X Indications</p>	<p>Reference the data source or alternate equipment.</p>	<p>A red X through any display field (such as an engine instrument) indicates that the field is not receiving data or is corrupted.</p>

**Table 3-2. HTAWS Alerts**

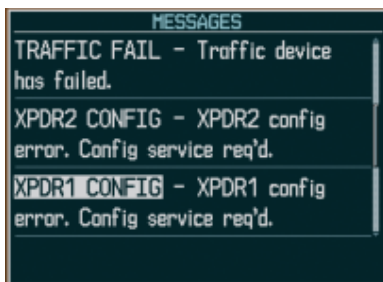
<b>Annunciation</b>	<b>Pilot Action</b>	<b>Cause</b>
<p><b>TERRAIN</b></p> <p>Accompanied by aural Message: “Warning; Terrain, Terrain”.</p>	<p>Visually acquire the terrain and avoid</p>	<p>HTAWS has determined that a nearby terrain is at or above current aircraft altitude and poses a collision hazard.</p>
<p><b>TERRAIN</b></p> <p>Accompanied by aural Message: “Caution; Terrain, Terrain”.</p>	<p>Visually acquire the terrain and avoid</p>	<p>HTAWS has determined that a nearby terrain is between 0’ and 250’ below current aircraft altitude and poses a collision hazard.</p>
<p><b>OBSTACLE</b></p> <p>Accompanied by aural Message: “Warning; Obstacle, Obstacle”.</p>	<p>Visually acquire the obstacle and avoid</p>	<p>HTAWS has determined that a nearby obstacle is at or above current aircraft altitude and poses a collision hazard.</p>
<p><b>OBSTACLE</b></p> <p>Accompanied by aural Message: “Caution; Obstacle, Obstacle”.</p>	<p>Visually acquire the obstacle and avoid</p>	<p>HTAWS has determined that a nearby obstacle is between 0’ and 250’ below current aircraft altitude and poses a collision hazard</p>
<p><b>HTAWS FAIL</b></p> <p>Accompanied by aural message: “HTAWS Failure”</p>	<p>Discontinue use of HTAWS terrain mode</p>	<p>Terrain or Obstacle database unavailable or invalid on all displays, invalid software configuration, HTAWS audio fault</p>

**Table 3-3. Traffic Alerts**

Annunciation	Pilot Action	Cause
<p><b>TRAFFIC</b></p> <p>On PFD, accompanied by aural message: “Traffic followed by additional bearing, relative altitude and distance information”</p>	<p>Visually acquire the traffic to see and avoid</p>	<p>The configured traffic system has determined that nearby traffic may be a threat to the aircraft.</p>
<p><b>NO DATA</b></p>	<p>Use vigilance, as the traffic sensor is not able to detect traffic</p>	<p>Shown in the center of the traffic map. Data is not being received from the traffic unit.</p>
<p><b>DATA FAILED</b></p>	<p>Use vigilance, as the traffic sensor is not able to detect traffic</p>	<p>Shown in the center of the traffic map. Data is being received from the traffic unit, but the unit is self reporting a failure.</p>
<p><b>FAILED</b></p>	<p>Use vigilance, as the traffic sensor is not able to detect traffic</p>	<p>Shown in the center of the traffic map. Incorrect data format received from the traffic unit or data has been lost from radar altimeter (if installed).</p>

**Table 3-4. Advisories – White**

<b>Annunciation</b>	<b>Pilot Action</b>
Various Alert Messages may appear when the PFD MSG softkey flashes. When pressed it opens a system messages window and acknowledges the message. (See Figure 3-1)	View and understand all advisory messages. Typically that indicates communication issues within the G1000H System. Refer to the G1000H Cockpit Reference for the appropriate pilot or service action.

**Figure 3-1. White Alert Message Window****Table 3-5. Voice Alerts**

<b>Voice Alert</b>	<b>Description</b>
“Rotor High”	Rotor RPM has exceeded 385.
“Rotor Low”	Rotor RPM has decreased below 332.
“Engine Out”	N1 has decreased below 58%.
“Minimums, minimums”	The aircraft has descended below the preset barometric minimum descent altitude.
“Vertical track”	The aircraft is one minute from Top of Descent. Issued only when vertical navigation is enabled.
Terrain and Obstacle alerts	See Table 3-2. HTAWS Alerts.
Traffic alerts	See Table 3-3. Traffic Alerts.

### 3.3 Caution Panel Warning Lights

The G1000H Flight Deck installation Caution Advisory System consists of instrument-panel-mounted caution annunciators, and instrument-panel-mounted MASTER CAUTION RESET, and Crew Alert System (CAS) messages that are displayed on the PFD.

#### 3.3.1 Instrument Panel Caution Annunciators and Master Caution Reset Annunciator Switch

The instrument panel Caution Annunciators are located in the upper left instrument panel and consist of annunciators for (Engine Compartment “FIRE”, “ROTOR RPM”, and “ENGINE OUT” (Figure 3-2).



**Figure 3-2. Warning Lights**

The “FIRE”, “ROTOR RPM”, and “ENGINE OUT” annunciators, when activated, will illuminate in steady state and do not require “MASTER CAUTION RESET” acknowledgement.


The “MASTER CAUTION RESET” Annunciator / Switch is also located in the instrument panel with the Caution Annunciators (Figure 3-2). The “MASTER CAUTION RESET” annunciator flashes simultaneously with the following alert warnings:



1. Any Amber CAS alert when displayed on the PFD.

These alert warnings will flash until acknowledged by pressing the “MASTER CAUTION RESET” switch and will

remain on in a steady state as long as the condition persists. Acknowledgement will also cause the flashing “MASTER CAUTION RESET” annunciation to extinguish.

**Table 3-6. Warning Lights**

Annun- ciation	Pilot Action	Cause
	<ol style="list-style-type: none"> <li>1. Enter autorotation.</li> <li>2. Throttle - Idle</li> <li>3. If FIRE <u>warning light extinguishes within 10-15 seconds</u>,               <ol style="list-style-type: none"> <li>a. Resume powered flight at a reduced power level</li> <li>b. Land as soon as practicable.</li> </ol> </li> <li>4. If the FIRE warning light is <u>still illuminated</u> <ol style="list-style-type: none"> <li>a. Throttle – Close</li> <li>b. Land</li> <li>c. Fuel Valve – OFF</li> <li>d. BATT Switch – OFF</li> </ol> <p>If time permits during the descent, turn FUEL valve and BATT switch OFF and turn N1-N2-NR-TOT switch to BATT</p> </li> <li>5. Clear helicopter of passengers and crew</li> <li>6. If practical, fight the fire with the hand-held cockpit fire extinguisher</li> </ol>	<p>The fire detection system has detected either a fire or an extreme overheat condition in either the upper or lower engine compartment.</p>

<b>Annun- ciation</b>	<b>Pilot Action</b>	<b>Cause</b>
	<ol style="list-style-type: none"> <li>1. Enter Autorotation</li> <li>2. Autorotative Glide – Establish.</li> <li>3. Attempt Start – If altitude permits.               <ol style="list-style-type: none"> <li>a. Throttle – Closed.</li> <li>b. Starter Button – Depress.</li> <li>c. Throttle – Idle (N1 15% or greater.)</li> <li>d. TOT and N1 – Monitor.</li> <li>e. Starter Button – Release at 58% N1.</li> <li>f. Throttle – Advance to full ON.</li> <li>g. Powered Flight – Resume.</li> </ol> </li> <li>4. Land Immediately.</li> </ol>	<p>Engine N1 below 58%</p>
	<ol style="list-style-type: none"> <li>1. Lower or raise collective to return RPM to normal operating range.</li> <li>2. Continue to monitor and control the RPM using the collective.</li> </ol>	<p>Low Rotor RPM Warning System: Main rotor RPM below 334 RPM. Hi/Lo Rotor RPM Warning System: Main rotor RPM below 334 RPM or above 385 RPM.</p>

### 3.4 PFD Crew Alerting System (CAS)

When Crew Alerting System (CAS) messages are generated, a CAS window containing messages appears to the right of the vertical speed indicator on the PFD. Up to 10 messages can be displayed; when more than 10 messages accumulate, the CAS Softkeys becomes available. Use the CAS scroll Softkeys to scroll up and down through the messages in the PFD CAS Window.



**Figure 3-3. PFD CAS Messages (Typical)**

#### 3.4.1 CAS Message Prioritization

CAS messages are grouped by criticality (warning, caution, safe operating advisory) and sorted by order of appearance (most recent messages on top). The color of the message is based on its urgency and on required action (Table 3-7).

1. **Warning (Red)** – When activated, all "RED" level alerts will produce a "SINGLE PING" audio alert. Immediate crew awareness and immediate crew action required.

2. **Caution (Amber)** – When activated, all "AMBER" level alerts will produce a "SINGLE PING" audio alert. Immediate crew awareness and subsequent corrective action required.
3. **Safe Operating Advisory (Green)** – Crew awareness required. All "GREEN" level alerts will remain "STEADY ON" as long as the condition persists.

A CAS message does not appear more than once at a given time. Warning and caution CAS messages flash when they are generated, and continue to flash until acknowledged, by pressing the "**MASTER CAUTION RESET**" annunciator switch located in the upper left instrument panel, or until the triggered condition is inactive for more than three seconds.

After the acknowledgment, a message remains displayed at the top of its respective priority group in the CAS Window until either a newer message of the same priority appears or the condition(s) that caused the alert to display no longer exist.

**Table 3-7. Warning and Caution Messages**

Annunciation	Pilot Action	Cause
<b>TOT EXCEEDANCE</b>	Land as soon as practicable. Download TOT Exceedance data from MFD SD card. Determine corrective maintenance action per maintenance manual.	TOT exceeded limits.

Annunciation	Pilot Action	Cause
<p data-bbox="107 269 358 313"><b>ENG CHIP</b></p>	<ul style="list-style-type: none"> <li data-bbox="376 228 633 347">• Accomplish a power-on approach and land immediately.</li> <li data-bbox="376 354 633 589">• If terrain not suitable, continue flight at reduced power to suitable landing area. Be prepared for complete engine failure.</li> </ul>	<p data-bbox="660 370 905 456">Metal fragments detected in engine scavenge oil.</p>
<p data-bbox="107 643 358 670"><b>ENG OIL TEMP</b></p>	<ul style="list-style-type: none"> <li data-bbox="376 609 633 727">• Accomplish a power-on approach and land immediately.</li> <li data-bbox="376 764 633 1000">• If terrain not suitable, continue flight at reduced power to suitable landing area. Be prepared for complete engine failure.</li> </ul>	<p data-bbox="660 760 862 846">Engine oil temperature exceeds 107°C.</p>
<p data-bbox="107 1057 358 1084"><b>ENG OIL PRESS</b></p>	<ul style="list-style-type: none"> <li data-bbox="376 1019 633 1138">• Accomplish a power-on approach and land immediately.</li> <li data-bbox="376 1175 633 1411">• If terrain not suitable, continue flight at reduced power to suitable landing area. Be prepared for complete engine failure.</li> </ul>	<p data-bbox="660 1175 880 1261">Engine oil pressure beyond limits.</p>

<b>Annunciation</b>	<b>Pilot Action</b>	<b>Cause</b>
<b>ENG INLET AIR</b>	Pull the engine Scav-Air control handle full on, reduce power and accomplish a power-on approach and land as soon as practicable.	Engine inlet particle separator swirl tubes partially blocked.
<b>MAIN XMSN CHIP</b>	Accomplish a power-on approach and land as soon as practicable.	Metal fragments detected in main transmission.
<b>MAIN XMSN HOT</b>	<ul style="list-style-type: none"> <li>•Verify the temperature indication by referring to the main transmission temperature gauge.</li> <li>•If verified, perform a power-on approach and land immediately.</li> </ul>	Main transmission oil temp exceeds 107°C.
<b>MAIN XMSN PRESS</b>	Land as soon as practical.	Main transmission oil pump inlet lacks vacuum.

Annunciation	Pilot Action	Cause
<b>DC GENERATOR</b>	<p>Turn searchlight OFF.</p> <p>Attempt to put generator back on line</p> <p>GEN FIELD circuit breaker – IN</p> <p>Main Gen Switch RESET</p> <p>If main generator does not come back online or goes off line again, Main Gen OFF.</p> <p>Place Emergency Bus Switch to <b>ON</b> to supply battery power to critical G1000H components.</p>	DC Generator system off-line.
<b>TAIL ROTOR CHIP</b>	Accomplish a power-on approach and land as soon as practicable.	Metal fragments detected in tail rotor xmsn.
<b>FWD DR BRG HOT</b>	<ul style="list-style-type: none"> <li>• Accomplish a power-on approach and land immediately.</li> <li>• If terrain not suitable, continue flight at reduced power to suitable landing area. Be prepared for a partial power loss or drive system failure.</li> </ul>	Forward lower pulley bearing exceeds 120°C.

Annunciation	Pilot Action	Cause
<b>AFT DR BRG HOT</b>	<ul style="list-style-type: none"> <li>• Accomplish a power-on approach and land immediately.</li> <li>• If terrain not suitable, continue flight at reduced power to suitable landing area. Be prepared for a partial power loss or drive system failure.</li> </ul>	Aft lower pulley bearing exceeds 120°C.
<b>FUEL FILTER</b>	Perform a power-on approach and land as soon as practicable.	Fuel Filter bypass is impending.

Annunciation	Pilot Action	Cause
<b>FUEL LOW</b>	<ul style="list-style-type: none"> <li>• Note the time when the light illuminates and plan a landing prior to fuel exhaustion (approximately 10 minutes at normal power settings).</li> <li>• Avoid excessive maneuvering which might cause fuel to slosh and unport the fuel tank outlet.</li> </ul>	Fewer than 5 gallons/19 liters of fuel remaining.
<b>AVI FAN FAIL</b>	None	Avionics Cooling Fan has failed.
<b>PFD FAN FAIL</b>	None	PFD Cooling Fan has failed.
<b>MFD FAN FAIL</b>	None	MFD Cooling Fan has failed.

## **CHAPTER 4 PERFORMANCE DATA**

### **4.1 General**

Refer to the basic RFM.

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## CHAPTER 6 WEIGHT/BALANCE AND LOADING

### 6.1 General

If any component of the G1000H configuration is removed, a new weight and balance should be recalculated per the instructions in Chapter 6 of the basic RFM using the information provided in Table 6-1.

**Table 6-1. Weight and Balance Information**

LRU	Weight *(lbs)	Moment Arm (in)	Moment (in-lb)
GDC 74H	1.7	65.5	111.35
GDL 69AH	2.94	64.5	189.63
GEA 71H (#1)	2.85	65.25	185.96
GEA 71H (#2)	2.85	110.25	314.21
GIA 63H (#1)	8.27	65.75	543.75
GIA 63H (#2)	8.27	96.25	795.99
GMA 350H	2.4	76	182.4
GRS 77H	3.5	99.75	349.13
GMU 44	0.5	254.75	127.375
GTS 800	11.14	230.25	2564.99
ST 32 (#1)	0.55	116.5	64.08
ST 32 (#1)	0.55	116.5	64.08
GTX 33H ES	4.3	65.25	280.58
GDU 1040H (PFD)	6.1	72.5	442.25
GDU 1040H (MFD)	6.1	71.25	434.625
<b>TOTAL</b>			<b>6650.4</b>

\* Includes LRU and rack, where applicable

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## CHAPTER 7 SYSTEM DESCRIPTION AND OPERATION

### 7.1 System Description

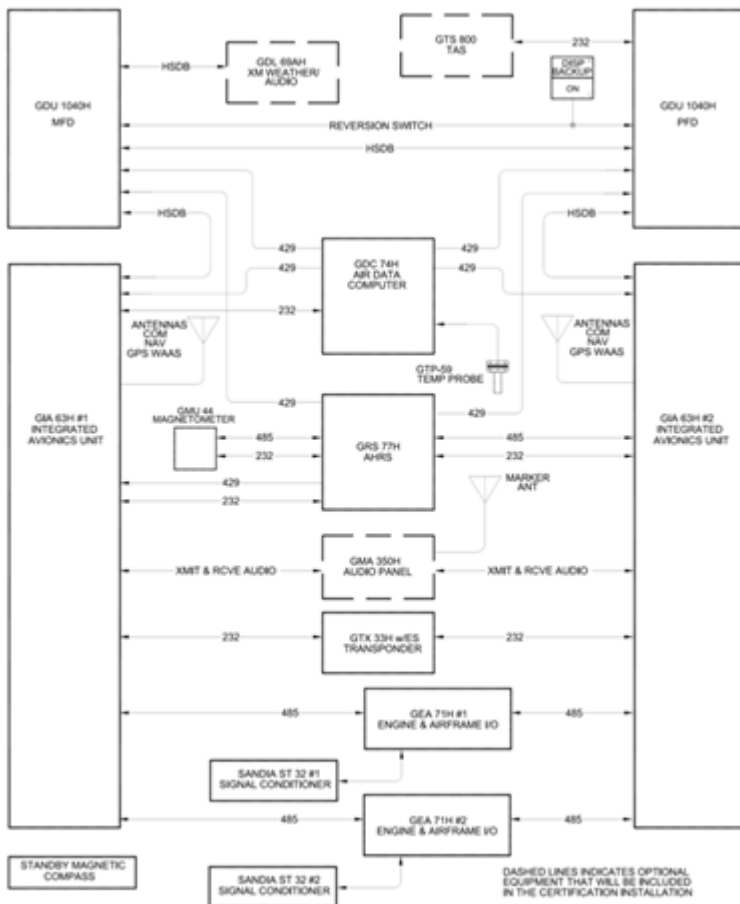
This section provides an overview of the G1000H Integrated Flight Deck as installed in the Enstrom 480B. The G1000H system is an integrated flight control system that presents flight instrumentation, position, navigation, communication, and identification information to the pilot through large-format displays. The system consists of the following Line Replaceable Units (LRUs):

The PFD and MFD displays are connected together via a single Ethernet bus for high-speed communication. Each GIA is connected to a single display, as shown in Figure 7-1. This allows the units to share information, enabling true system integration.

- **GDU 1040H** Primary Flight Display (PFD) and Multi Function Display (MFD)
- **GIA 63H** Integrated Avionics Unit
- **GDC 74H** Air Data Computer (ADC)
- **GEA 71H** Engine/Airframe Unit
- **ST 32** Signal Conditioner
- **GRS 77H** Attitude and Heading Reference System (AHRS)
- **GMA 350H** Audio Panel (**optional**)
- **GMU 44** Magnetometer
- **GTX 33H ES** Mode S Transponder with extended squitter
- **GDL 69AH** Satellite Data Link Receiver (**optional**)
- **GTS 800** Traffic Avoidance System (**optional**)

- **GTP 59** Outside Air Temperature (OAT) Probe
- **COM, NAV, and GPS WAAS** antennas

A top-level G1000H system block diagram is shown in Figure 7-1.



**Figure 7-1. Block Diagram of G1000H Flight Deck**

Reference Garmin G1000H System Cockpit Guide for basic operational aspects of the system, Document Number 190-01729-00.

For a complete detailed explanation of all the G1000H capabilities, see the Enstrom 480B G1000H Pilot's Guide, Document Number 190-01728-00.

## 7.2 Basic Operation

The following content covers basic operational procedures. Refer to the Garmin G1000H PFD/MFD System Cockpit Reference Guide P/N 190-01729-00 or G1000H Pilot's Guide P/N 190-01728-00 for detailed operating procedures. This includes all Primary Flight Display and Multi-Function Display information.

Although intuitive and user friendly, the G1000H PFD/MFD System requires a reasonable degree of familiarity to avoid becoming too engrossed at the expense of situational awareness. Pilots should take full advantage of training tools to enhance familiarity with the G1000H system.

If a display fails, the appropriate IAU Ethernet interface to the display is cut off. Thus, the IAU can no longer communicate with the remaining display, and the NAV and COM functions provided to the failed display by the IAU are flagged as invalid on the remaining display. The system reverts to backup paths for the AHRS, ADC, Engine/Airframe Unit, and Transponder, as required. The change to backup paths is completely automated for all LRUs and no pilot action is required.

### 7.2.1 Secure Digital Cards

#### 7.2.1.1 Install an SD card

**NOTE:** Ensure that the G1000H system is powered off before inserting or removing the SD card.

- 1) Insert the SD card in the SD card slot, pushing the card in until the spring latch engages. The front of the card should remain flush with the face of the display bezel (Figure 7-2).



**Figure 7-2. FMS Panel/SD Card Slots**

### 7.2.1.2 Remove an SD card

- 1) Remove power.
- 2) Gently press on the SD card to release the spring latch and eject the card.

### 7.2.2 Date/Time

The Date/Time Box on the System Setup Page displays the current date and time and allows the pilot to set the time format (local 12-hr, local 24-hr, or UTC) and offset. The time offset is used to define current local time. UTC (also called GMT or Zulu) date and time are calculated directly from the GPS satellites signals and cannot be changed. When using a local time format, designate the offset by adding or subtracting the desired number of hours.

#### A. Set the system time format:

- 1) While on the System Setup Page, press the **FMS** Knob momentarily to activate the flashing cursor.

- 2) Turn the large **FMS** Knob to highlight the time format field in the Date/Time Box.
- 3) Turn the small **FMS** Knob to select the desired system time format (local 12hr, local 24hr, UTC) and press the **ENT** Key.

**B. Set the current time offset:**

- 1) While on the System Setup Page, press the **FMS** Knob momentarily to activate the flashing cursor.
- 2) Turn the large **FMS** Knob to highlight the time offset field in the Date/Time Box.
- 3) Turn the **FMS** Knobs to enter the time offset and press the **ENT** Key.

### **7.2.3 Display Units**

Units in which various quantities are displayed on the G1000H screens are listed on the System Setup Page. The Navigation Angle reference and the Position units are pilot selectable (Table 7-1).

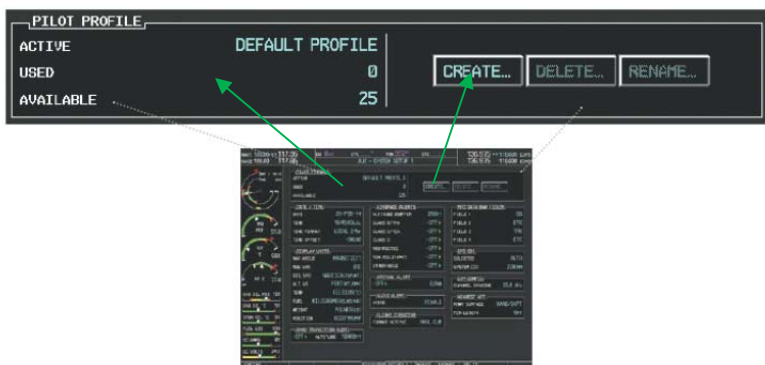
**Table 7-1. Display Units Settings (System Setup Page)**

<b>Category</b>	<b>Settings</b>	<b>Affected Quantities</b>	<b>Exceptions</b>
Navigation Angle	Magnetic (North)* True (North) User	Heading Course Bearing Track Desired Track Wind direction (Trip Planning Page)	N/A
Distance and Speed	Nautical* Metric	Crosstrack error (HSI) Bearing distances (information windows) DME distance (information window) Flight plan distances Map ranges DIS, GS, TAS, XTK fields (Navigation Status Box) All distances on MFD Altitude buffer distance (System Setup) Arrival Alert trigger distance (System Setup) All speeds on MFD	Airspeed Indicator True Airspeed (PFD) Wind speed vector Map range (Traffic Page, HTAWS Page) CDI scaling (System Setup) Fuel range calculation (EIS)

<b>Category</b>	<b>Settings</b>	<b>Affected Quantities</b>	<b>Exceptions</b>
Altitude and Vertical Speed	Feet* Meters	All altitudes on MFD All elevations on MFD	Altimeter Vertical Speed Indicator VNV altitudes (Active Flight Plan)
Category	Settings	Affected Quantities	Exceptions
Temperature	Celsius* Fahrenheit	All temperatures on PFD Total Air Temperature (Trip Planning Page)	Engine Indication System (EIS)
Fuel and Fuel Flow	Gallons* Kilograms Liters Pounds	Fuel parameters (Trip Planning Page)	Engine Indication System (EIS)
Weight	Kilograms Pounds*	Weight Planning Page	N/A
Position	HDDD°MM. MM* HDDD°MM' SS.S" MGRS UTM/UPS	All positions	N/A
<i>* Default setting</i>			

## 7.2.4 Pilot Profiles

System settings may be saved under a pilot profile. When the system is powered on, the last selected pilot profile is shown on the MFD power-up screen (Figure 7-3). The G1000H can store up to 25 profiles; the currently active profile, the amount of memory used, and the amount of memory available are shown at the top of the System Setup Page in the box labeled 'Pilot Profile'. From here, pilot profiles may be created, selected, renamed, or deleted.



**Figure 7-3 Pilot Profiles (System Setup Page)**

### 7.2.4.1 Creating a profile:

- 1) While on the System Setup Page, press the **FMS** Knob momentarily to activate the flashing cursor.
- 2) Turn the large **FMS** Knob to highlight 'CREATE' in the Pilot Profile Box.
- 3) Press the **ENT** Key. A 'Create Profile' window is displayed.
- 4) Use the **FMS** Knob to enter a profile name up to 16 characters long and press the **ENT** Key. Pilot profile names cannot begin with a blank as the first letter.
- 5) In the next field, use the small **FMS** Knob to select the desired settings upon which to base the new profile. Profiles can be created based on Garmin factory defaults, default profile settings (initially based on Garmin factory defaults unless edited by the pilot), or current system settings.

- 6) Press the **ENT** Key.
  - 7) With 'CREATE' highlighted, press the **ENT** Key to create the profile
- Or:** Use the large **FMS** Knob to select 'CREATE and ACTIVATE' and press the **ENT** Key to activate the new profile.
- 8) To cancel the process, select 'CANCEL' with the large **FMS** Knob and press the **ENT** Key.

### 7.2.5 System Status Page

The System Status Page displays the status and software version numbers for all detected system LRUs (Figure 7-4). Pertinent information on all system databases is also displayed. Active LRUs are indicated by green check marks and failed LRUs are indicated by red "X"s. Failed LRUs should be noted and an Enstrom service center or Garmin dealer informed.

LRU INFO	STATUS	SERIAL NUMBER	VERSION	AIRFRAME	
DOH1	✓		7.00	AIRFRAME 480B	
DOH2	✓		7.00	SYS SOFTWARE VERSION 1852.00	
ECU	✓	27000006	2.02d	CONFIGURATION ID 4F10D214	
DDC1	✓	47801548	1.05	CRG PART NUMBER	
DDC2	✓	47801373	1.05	SYSTEM ID 00000000	
DDLG9	✓	47750372	3.02.00	CHECKLIST NOT AVAILABLE	
GEA1	✓	46701911	2.07	<b>RFM1 DATABASE</b>	
GEA2	✓	46701913	2.07	TERRAIN - BOTTOM CARD	
GIA1	✓	FFFFFFF7F	1.02	REGION	WORLDWIDE-9
GIA2	✓	68500319	1.02	VERSION	2.04
GMA1	✓	48400000	3.01	CYCLE	1412
GMA2	✓	48400001	3.01	Copyright 2014 Garmin Ltd. or its subsidiaries	
GHC	✓		2.02d	AIRPORT TERRAIN - BOTTOM CARD	
GHU1	✓	47500593	2.01	REGION	NOT AVAILABLE
GHU2	✓	47500607	2.01	VERSION	
GPS1	✓	A80062149	2.3	CYCLE	
				OBSTACLE - BOTTOM CARD	
				REGION	US/EUROPE
				VERSION	2.08

**Figure 7-4. Example System Status Page**

### **7.2.5.1 Selecting the System Status Page:**

- 1) Turn the large **FMS** Knob to select the AUX Page Group.
- 2) Turn the small **FMS** Knob to select the System Status Page (the last page in the AUX Page Group).

### **7.2.6 Display Backlighting**

The G1000H display and control backlighting can be adjusted either automatically or manually.

#### **7.2.6.1 Automatic Adjustment**

The existing instrument panel dimmer bus normally controls the PFD and MFD backlighting as well as the PFD and MFD bezels. If dimmer voltage to the system is lost, photocell technology automatically controls backlighting adjustments. Photocell calibration curves are pre-configured to optimize display appearance through a broad range of cockpit lighting conditions.

### **7.3 System Power Sources**

Circuits for devices using direct power feed from the battery are protected by circuit breakers located on the Main C/B switch (see Table 7-2).

In the event of a failure, power can be supplied to the emergency battery bus through electronic switching directly from the battery. To activate the emergency battery bus press the EMERG BUS switch located on the upper pedestal. Once activated, power will be supplied to the breakers listed in Table 7-3.

**Table 7-2. DC Power Distribution**

Name	Rating	Location
<b>28 VDC BATTERY BUS CIRCUIT BREAKERS</b>		
FIRE DETECT	2 Amps	Main C/B Switch
FUEL QUANTITY	1 Amp	Main C/B Switch
PFD	5 Amps	Main C/B Switch
MFD	5 Amps	Main C/B Switch
IAU 1	3 Amps	Main C/B Switch
IAU 2	3 Amps	Main C/B Switch
EIS 1	3 Amps	Main C/B Switch
EIS 2	3 Amps	Main C/B Switch
ADC	1 Amp	Main C/B Switch
AHRS	½ Amp	Main C/B Switch
AVIONIC CF	1 Amp	Main C/B Switch
PFD FAN	½ Amp	Main C/B Switch
MFD FAN	½ Amp	Main C/B Switch
ENG WARNING	1½ Amps	Main C/B Switch
<b>28 VDC AVIONICS BUS CIRCUIT BREAKERS</b>		
COM 1	7½ Amps	Main C/B Switch
COM 2	7½ Amps	Main C/B Switch
XPNDR	2½ Amps	Main C/B Switch

**Table 7-3. Emergency Bus Circuit Breakers**

Circuit Breaker Name	Circuit Breaker Rating	Circuit Breaker Location
<b>28 VDC EMERGENCY BATTERY BUS</b>		
PFD	5 Amps	Console Side
MFD	5 Amps	Console Side
IAU 1	3 Amps	Console Side
IAU 2	3 Amps	Console Side
ANN	1 Amp	Console Side
EIS 1	3 Amp	Console Side
EIS 2	3 Amp	Console Side
ADC	1 Amp	Console Side
AHRS	1 Amp	Console Side

## 7.4 AHRS Operation

The GRS 77H AHRS uses GPS data, air data, and magnetometer inputs to improve availability. The GRS 77H will operate in reversionary modes that do not require all inputs to be simultaneously available.

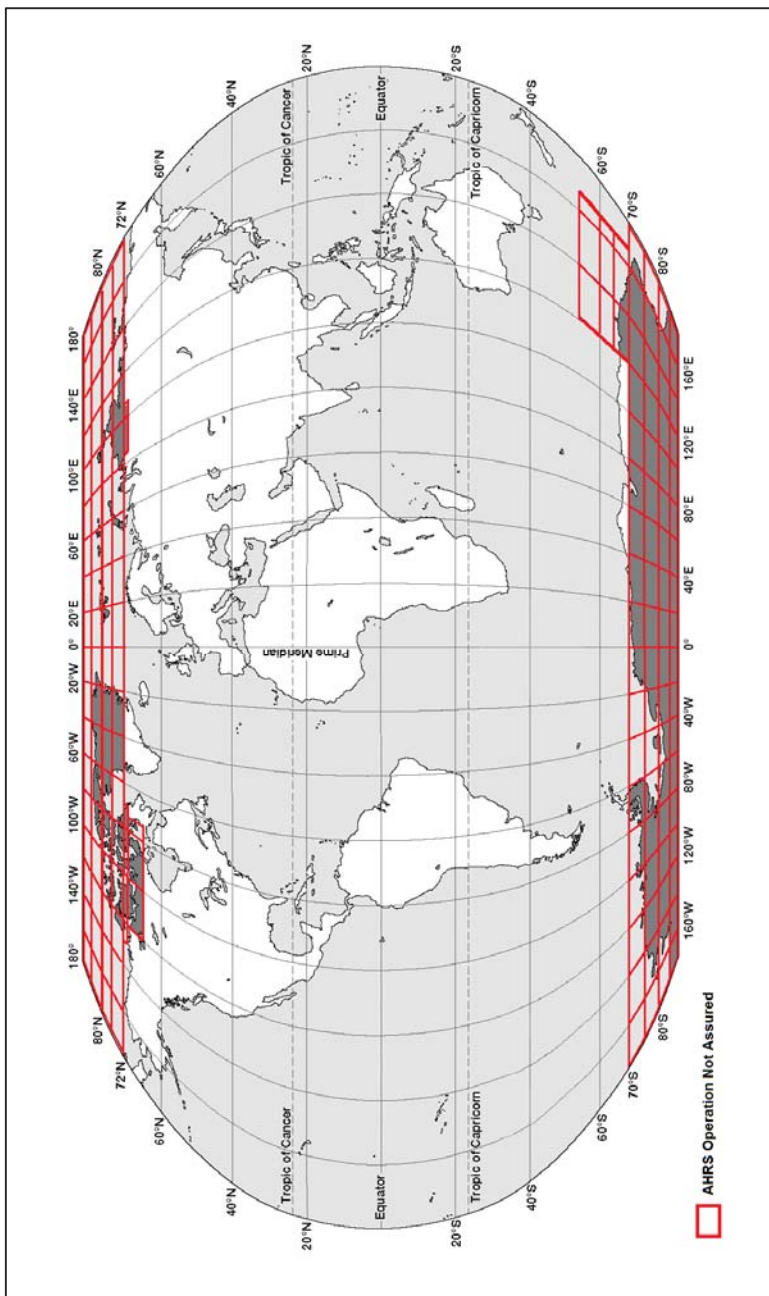
When operating in no magnetometer or no magnetometer/no air data modes rapid pitch or roll movements may result in temporary loss of attitude indication.

### 7.4.1 AHRS Operational Area

The GRS 77H AHRS used in the G1000H is limited in its operational area. AHRS Operation is not assured in the following regions (Figure 7-5):

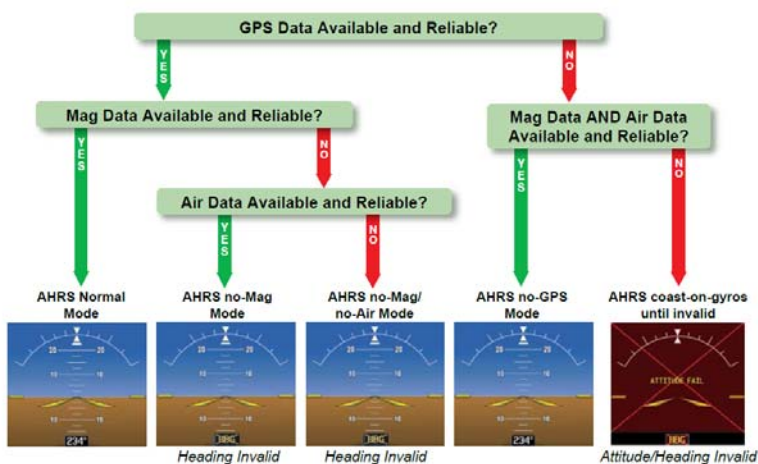
- 1) North of 72°N latitude
- 2) South of 70°S latitude
- 3) North of 65° North latitude between longitude 75° W and 120° W
- 4) North of 70° North latitude between longitude 70° W and 128° W
- 5) North of 70° North latitude between longitude 85° E and 114° E
- 6) South of 55° South latitude between longitude 120° E and 165° E

Loss of the G1000H heading and attitude may occur near the poles, but this will not affect the GPS track.



**Figure 7-5. AHRs Operational Area**

## 7.4.2 AHRS Input Failures



**Figure 7-6. AHRS Operation**

### 7.4.2.1 GPS Input Failure

The G1000H system provides two sources of GPS information. If a single GPS receiver fails, or if the information provided from one of the GPS receivers is unreliable, the AHRS seamlessly transitions to using the other GPS receiver. An alert message informs the pilot of the use of the backup GPS path. If both GPS inputs fail, the AHRS continues to operate in reversionary No-GPS mode so long as the air data and magnetometer inputs are available and valid.

### 7.4.2.2 Air Data Input Failure

A failure of the air data input has no effect on AHRS output while AHRS is operating in normal mode. A failure of the air data input while the AHRS is operating in reversionary No-GPS mode results in invalid attitude and heading information on the PFD (as indicated by red "X" flags).

### **7.4.2.3 Magnetometer Input Failure**

If the magnetometer input fails, the AHRS transitions to one of the reversionary No-Magnetometer modes and continues to output valid attitude information. However, if the aircraft is airborne, the heading output on the PFD does become invalid (as indicated by a red “X”).

## **7.5 Datalinked Weather Display Information**

XM weather data is provided by an optional GDL 69AH interface. Do not use data link weather information for maneuvering in, near, or around areas of hazardous weather. Information contained within data link weather products may not accurately depict current weather conditions.

## 7.6 Database Update Information

The terrain basemap databases are updated periodically and have no expiration date. Coverage of the terrain database is limited to the area between North 75° latitude and South 60° latitude in all longitudes.

The obstacle database contains data for obstacles, such as towers, that pose a potential hazard to aircraft. It is very important to note that not all obstacles are necessarily charted and therefore may not be contained in the obstacle database. Coverage of the obstacle database includes the United States and Europe. This database is updated on a 56-day cycle.

The Garmin SafeTaxi database contains detailed airport diagrams for selected airports. These diagrams aid in following air traffic control instructions by accurately displaying the aircraft position on the map in relation to taxiways, ramps, runways, terminals, and services. This database is updated on a 56-day cycle.

The Garmin FliteCharts database contains procedure charts for the coverage area purchased. This database is updated on a 28-day cycle. If not updated within 180 days of the expiration date, FliteCharts will no longer function.

The Jeppesen ChartView electronic charts database contains procedure charts for the coverage area purchased. An own-ship position icon will be displayed on these charts. This database is updated on a 14-day cycle. If not updated within 70 days of the expiration date, ChartView will no longer function.