

G1000TM

pilot's guide appendices

Record of Revisions

Revision	Date of Revision	Revision Page Range	Description
A	10/19/04	A-1 – A-2 B-1 – B-4 C-1 – C-4 D-1 – D-2 E-1 – E-2 F-1 – F-4 G-1 – G-2	Production Release.

SD CARD USE

The G1000 system uses Secure Digital (SD) cards to load and store various types of data. For basic flight operations, SD cards are required for terrain database storage as well as aviation database updates.

AVIATION DATABASE

Jeppesen aviation databases are released every 28 days, and are provided directly to the pilot by Jeppesen. Updates must be loaded to both the MFD and PFD using an aviation database update SD card provided by Jeppesen. The card reader downloads the aviation database files and stores them in the PFD and MFD internal memory.



NOTE: *The display downloads the aviation database and stores it internally. The aviation database SD card is not required to remain in the display after the update.*

To update the Jeppesen aviation database:

1. With the G1000 system off, insert the aviation database update SD card into the top card slot on PFD (Label of SD card facing left).
2. Turn the G1000 system on. The following prompt is displayed in the upper left corner of the PFD:

```
DO YOU WANT TO UPDATE THE AVIATION DATABASE?
PRESS CLR FOR NO AND ENT FOR YES
YOU HAVE 30 SECONDS BEFORE NO IS RETURNED
```

3. Press the **ENT** key to confirm the database update. The following prompt is displayed:

```
DO YOU WANT TO UPDATE THE AVIATION DATABASE?
PRESS CLR FOR NO AND ENT FOR YES
YOU HAVE 30 SECONDS BEFORE NO IS RETURNED
UPDATING AVIATION DATABASE
.
UPDATED 1 FILES SUCCESSFULLY!
```

4. After the update completes, the PFD starts in normal mode. Remove the aviation database update SD card from the PFD.
5. Power the G1000 system down.
6. Repeat steps 1 through 4 for the MFD. The MFD and PFD aviation databases are now updated.
7. Verify that the correct update cycle and version is loaded during startup of the MFD.

TERRAIN DATABASE

G1000 topography and terrain data are stored on an SD card provided by Garmin. Since this database is not downloaded internally to the MFD or PFD, a terrain SD card must be kept in both displays in order to retain terrain and topography data. A terrain card should be inserted into the bottom card slot of the PFD and MFD.



NOTE: *If the terrain SD card is removed from the display, the **TOPO** and **TERRAIN** softkeys are not functional and are grayed out on the MFD Map Page.*

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Abbreviation or Acronym	Definition	Abbreviation or Acronym	Definition
ADF	Automatic Direction Finder	D ALT	Density Altitude
AF	Arc to fix	DB	Database
AFM	Aircraft Flight Manual	DBASE	Database
AFMS	Aircraft Flight Manual Supplement	DEC FUEL	Decrease Fuel
AGL	Above Ground Level	DECLTR	Declutter
AHRS	Attitude and Heading Reference System	DEP	Departure
ALT	Altitude	DF	Direct to Fix
AMPS	Amperes	DFLT	Default
ANNUNC	Annunciation	DFLTS	Defaults
APPR	Approach	DIS	Distance
APR	Approach	DME	Distance Measuring Equipment
APT	Airport	DOP	Dilution of Precision
ARINC	Aeronautical Radio Incorporated	DP	Departure Procedure
ARSPC	Airspace	DSBL	Disabled
ARTCC	Air Route Traffic Control Center	DTK	Desired Track
ARV	Arrival		
AS	Airspeed	ECU	Engine Control Unit
ASB	Aviation Support Branch	EGT	Exhaust Gas Temperature
ATC	Air Traffic Control	EIS	Engine Indication System
ATCRBS	ATC Radar Beacon System	ELEV	Elevation
AUTOSEQ	Automatic Sequence	EMI	Electromagnetic Interference
AUX	Auxiliary	ENDUR	Endurance
		ENGD	Engaged
B ALT	Barometric Altitude	ENR	Enroute
BARO	Barometer	ENT	Enter
BKSP	Backspace	EPE	Estimated Position Error
BRG	Bearing	ERR	Error
		ESA	Enroute Safe Altitude
C	Celsius	ETA	Estimated Time of Arrival
CA	Course to Altitude	ETE	Estimated Time Enroute
CALC	Calculator	EXPIRD	Expired
CD	Course to DME distance		
CDI	Course Deviation Indicator	FA	Course From Fix to Altitude
CDU	Control Display Unit	FAA	Federal Aviation Administration
CF	Course to Fix	FAF	Final Approach Fix
CHT	Cylinder Head Temperature	FAIL	Failure
CHKLIST	Checklist	FC	Course From Fix to Distance
CHNL	Channel	FCC	Federal Communication Commission
CI	Course to Intercept	FD	Course From Fix to DME Distance, Flight Director
CLR	Clear		
COM	Communication Radio	FFLOW	Fuel Flow
CONFIG	Configuration	FM	Course From Fix to Manual Termination
COPLT	Co-pilot	FMS	Flight Management System
CR	Course to Radial	FOB	Fuel On Board
CRG	Cockpit Reference Guide	FPL	Flight Plan
CRNT	Current	FREQ	Frequency
CRS	Course to Steer	FSS	Flight Service Station
CRSR	Cursor	ft	Foot/feet
CTRL	Control		
CVR	Cockpit Voice Recorder	G/S	Glideslope
CYL	Cylinder		

APPENDIX B

Abbreviation or Acronym	Definition	Abbreviation or Acronym	Definition
GAL	Gallon(s)	LAT	Latitude
GDC	Garmin Air Data Computer	LBL	Label
GDU	Garmin Display Unit	LB	Pound
GEA	Garmin Engine/Airframe Unit	LCD	Liquid Crystal Display
GIA	Garmin Integrated Avionics Unit	LCL	Local
GL	Gallon(s)	LED	Light Emitting Diode
GMU	Garmin Magnetometer Unit	LO	Low
GND	Ground	LRU	Line Replacement Unit
GPH	Gallons per Hour	LTNG	Lightning
GPS	Global Positioning System	M	Middle Marker
GRS	Garmin Reference System	MAG VAR	Magnetic Variation
GS	Ground Speed	MAHP	Missed Approach Hold Point
GTX	Garmin Transponder	MAN IN	Manifold Pressure (inches Hg)
HA	Hold Terminating at Altitude	MAN SQ	Manual Squelch
HDG	Heading	MAP	Missed Approach Point
HF	Hold Terminating at Fix	MASQ	Master Avionics Squelch
Hg	Mercury	MAX	Maximum
HI	High	MFD	Multi Function Display
HI SENS	High Sensitivity	MGRS	Military Grid Reference System
HM	Hold with Manual Termination	MIC	Microphone
hPa	Hectopascal	MIN	Minimum
HR	Hour	MKR	Marker Beacon
HSI	Horizontal Situation Indicator	MOA	Military Operations Area
HUL	Horizontal Uncertainty Level	MSA	Minimum Safe Altitude
Hz	Hertz	MSL	Mean Sea Level
I	Inner Marker	MT	Meter
IAT	Indicated Air Temperature	mV	Millivolt(s)
ICAO	International Civil Aviation Organization	NAV	Navigation
ICS	Intercom System	NAVAID	NAVigation AID
ID	Identification/Morse Code Identifier	NDB	Non-directional Beacon
IDENT, IDNT	Identification	Nexrad	Next Generation Radar
IF	Initial Fix	nm	Nautical Mile(s)
IFR	Instrument Flight Rules	NRST	Nearest
IG	Imperial Gallon	O	Outer Marker
ILS	Instrument Landing System	OAT	Outside Air Temperature
IMC	Instrument Meteorological Conditions	OBS	Omni Bearing Selector
INACTV	Inactive	P ALT	Pressure Altitude
INC FUEL	Increase Fuel	PA	Passenger Address
IND	Indicated	PASS	Passenger(s)
INT	Intersection(s)	PFD	Primary Flight Display
IrDA, IRDA	Infrared Data Association	PI	Procedure Turn to Course Intercept
KEYSTK	Key Stuck	POSN	Position
KG	Kilogram	P. POS	Present Position
KHz	Kilohertz	PRES	Pressure
KM	Kilometer	PRESS	Pressure
KT	Knot	PROC	Procedure(s)
L	Left	PSI	Pounds per Square Inch

Abbreviation or Acronym	Definition	Abbreviation or Acronym	Definition
PTCH	Pitch	TEL	Telephone
PTT	Push-to-Talk	TEMP	Temperature
PWR	Power	TF	Track Between Two Fixes
		TIS	Traffic Information System
QTY	Quantity	TMA	Terminal Maneuvering Area
		TRG	Target
R	Right	TRUNC	Truncated
RAD	Radial	TX	Transmit
RAIM	Receiver Autonomous Integrity Monitor	UNAVAIL	Unavailable
REF, REFS	References	USR	User
REM	Remaining (fuel remaining above Reserve)	UTC	Coordinated Universal Time
REQ	Required	UTM/UPS	Universal Transverse Mercator / Universal Polar Stereographic Grid
RES	Reserve (fuel reserve entered by pilot)		
RF	Constant Radius Turn to Fix	V	Airspeed/Velocity
RMI	Radio Magnetic Indicator	Vne	Never-exceed Speed
RNG	Range	Vr	Rotate Speed
RNWX	Runway	Vx	Best Angle of Climb Speed
RPM	Revolutions per Minute	Vy	Best Rate of Climb speed
RST FUEL	Reset Fuel	VA	Heading Vector to Altitude
RSV	Reserve	VD	Heading Vector to DME Distance
RVRSNRY	Reversionary	VERT	Vertical
RX	Receive	VFR	Visual Flight Rules
		VHF	Very High Frequency
SA	Selective Availability	VI	Heading Vector to Intercept
SAT	Static Air Temperature	VLOC	VOR/Localizer Receiver
SD	Secure Digital	VM	Heading Vector to Manual Termination
SEC	Second(s)	VMC	Visual Meteorological Conditions
SEL	Select	VNAV	Vertical Navigation
SIAP	Standard Instrument Approach Procedures	VOL	Volume
SID	Standard Instrument Departure	VOR	VHF Omnidirectional Range
Sim	Simulator	VPROF	VNAV Profile
SLCT	Select	VR	Heading Vector to Radial
SLP/SKD	Slip/skid	VS	Vertical Speed
SPD	Speed	Vspeed	Airspeed
SPI	Special Position Identification		
SPKR	Speaker	WAAS	Wide Area Augmentation System
SQ	Squelch	WGS-84	World Geodetic System - 1984
STAR	Standard Terminal Arrival Route	WPT	Waypoint(s)
STATS	Statistics	WPTS	Waypoints
STBY	Standby	WW	World Wide
STD	Standard	WX	Weather
SUA	Special Use Airspace		
SW	Software	XFER	Transfer
SYS	System	XPDR	Transponder
		XTALK	Cross-talk
T HDG	True Heading		
TAS	True Airspeed		
TAT	Total Air Temperature		
TCA	Terminal Control Area		
TCAS	Traffic Collision Avoidance System		

Navigation Term	Definition	Navigation Term	Definition
Bearing	The compass direction from your present position to a destination waypoint.	Indicated	Information provided by properly calibrated and set instrumentation on the aircraft panel.
Calibrated Airspeed	Indicated airspeed corrected for installation and instrument errors.	Leg	The portion of a flight plan between two waypoints.
Course	The line between two points to be followed by the aircraft.	Left Over Fuel On Board	The amount of fuel remaining on board after the completion of one or more legs of a flight plan or direct-to.
Course to Steer	The recommended direction to steer in order to reduce course error or stay on course. Provides the most efficient heading to get back to the desired course and proceed along your flight plan.	Left Over Fuel Reserve	The amount of flight time remaining, based on the amount of fuel on board after the completion of one or more legs of a flight plan or direct-to, and a known consumption rate.
Crosstrack Error	The distance the aircraft is off a desired course in either direction, left or right.	Minimum Safe Altitude	Uses Grid Minimum Off-Route Altitudes (Grid MORAs) to determine a safe altitude within ten miles of the aircraft present position. Grid MORAs are one degree latitude by one degree longitude in size. The Grid MORA clears the highest elevation reference point in the grid by 1000 feet for all areas of the grid.
Cumulative Distance	The total of all legs in a flight plan. The 'great circle' distance from your present position to a destination waypoint.	Track	The direction of aircraft movement relative to a ground position. Also referred to as 'Ground Track'.
Dilution of Precision	A measure of GPS satellite geometry quality on a scale of one to ten (lower numbers equal better geometry, where higher numbers equal poorer geometry)	Track Angle Error	The angle difference between the desired track and your current track.
Desired Track	The desired course between the active "from" and "to" waypoints.	Vertical Speed Required	The vertical speed necessary to descend/climb from a current position and altitude to a defined target position and altitude, based upon current groundspeed.
Efficiency	A measure of fuel consumption, expressed in distance per unit of fuel.		
Endurance	Flight endurance, or total possible flight time based on available fuel on board.		
Enroute Safe Altitude	The recommended minimum altitude within ten miles left or right of the desired course on an active flight plan or direct-to.		
Estimated Position Error	A measure of horizontal GPS position error derived by satellite geometry conditions and other factors.		
Estimated Time of Arrival	The estimated time at which the aircraft should reach the destination waypoint, based upon current speed and track.		
Estimated Time Enroute	The estimated time it takes to reach the destination waypoint from the present position, based upon current groundspeed.		
Fuel Flow	The fuel flow rate, expressed in units of fuel per hour.		
Fuel On Board	The total amount of usable fuel on board the aircraft.		
Groundspeed	The velocity that the aircraft is travelling relative to a ground position.		
Heading	The direction an aircraft is pointed, based upon indications from a magnetic compass or a properly set directional gyro.		

QUESTIONS & ANSWERS

This Appendix answers common questions regarding G1000 system operational capabilities. If a particular question is not covered in this Appendix, use the index to find the appropriate section in this manual. If a sufficient answer to a question is not found, please see your authorized Garmin dealer or contact Garmin directly (see Copyright page). Garmin is dedicated to supporting its products and customers.

What is RAIM and how does it affect approach operations?

RAIM is an acronym for Receiver Autonomous Integrity Monitor. RAIM is a GPS receiver function that does the following:

- Monitors and verifies integrity and geometry of tracked GPS satellites.
- Eliminates a corrupt satellite from navigation solution.
- Notifies the pilot when satellite conditions do not provide the necessary coverage to support a certain phase of flight.
- Predicts satellite coverage of a destination area to determine whether the number of available satellites is sufficient to satisfy requirements.

For RAIM to work correctly, the GPS receiver must track at least 5 satellites. A minimum of 6 satellites is required to allow RAIM to eliminate a single corrupt satellite from the navigation solution.

RAIM ensures that satellite geometry allows for a navigation solution calculation within a specified protection limit (2.0 nautical miles for oceanic and en route, 1.0 nm for terminal, and 0.3 nm for non-precision approaches). The G1000 system monitors RAIM and issues an alert message when RAIM is not available (see Annunciation

and Alerts section). Without RAIM, GPS position accuracy cannot be monitored. If RAIM is not available when crossing the FAF, the pilot must fly the missed approach procedure.



NOTE: *If RAIM is not predicted to be available for the final approach course, the approach does not become active, as indicated by the “RAIM not available from FAF to MAP” message and the INTEG annunciation flagging.*

Why are there not any approaches available for my flight plan?

Approaches are available for the final destination airport in a flight plan or as a direct-to (keep in mind that some VOR/VORTAC identifiers are similar to airport identifiers). If a destination airport does not have a published approach, the G1000 indicates “NONE” for the available procedures.

What happens when I select an approach? Can I store a flight plan with an approach, a departure or an arrival?

When an approach, departure, or arrival is loaded into the active flight plan, a set of approach, departure or arrival waypoints is inserted into the flight plan – along with a header line showing the title of the selected instrument procedure. The original enroute portion of the flight plan remains active, unless the instrument procedure is activated. This may be done either when the procedure is loaded, or at a later time.

Flight plans can also be stored with an approach, a departure, or an arrival. Note that the active flight plan is erased when the system is turned off. Also, the active flight plan is overwritten when another flight plan is activated. When storing flight plans with an approach, a departure, or an arrival, the G1000 uses the waypoint information

from the current database to define the waypoints. If the database is changed or updated, the G1000 automatically updates the information, provided the procedure has not been modified. Should an approach, departure, or arrival procedure no longer be available, the flight plan becomes locked until the procedure is deleted from the flight plan.

Can I file “slant Golf” (“/G”) using the G1000?

You may file your flight plan /G as your G1000 system meets the requirements of TSO-C129 Class A1 or A2 installation. Non-precision GPS approaches may not be flown with an expired database. See the approved Airplane Flight Manual Supplement and also the Aeronautical Information Manual (AIM) for more information.

What does the OBS softkey do?

The **OBS** softkey is used to select manual sequencing of waypoints. Activating OBS mode sets the current active-to waypoint as the primary navigation reference and prevents the system from sequencing to the next waypoint in a flight plan. When OBS mode is cancelled, automatic waypoint sequencing is continued and the G1000 automatically activates the next waypoint in the flight plan once the aircraft has crossed the present active waypoint.

Normal (OBS not activated)

- Automatic sequencing of waypoints
- Manual course change on HSI is not possible
- Always navigates ‘TO’ the active waypoint
- Must be in this mode for final approach course

OBS

- Manual sequencing - ‘holds’ on selected waypoint
- Manually select course to waypoint from HSI
- Will indicate ‘TO’ or ‘FROM’ waypoint
- Cannot be set for final approach course or published holding patterns

When OBS mode is active, the G1000 allows the pilot to set a desired course to/from a waypoint using the **CRS/**

BARO knob and HSI (much like a VOR).

One application for the **OBS** softkey is holding patterns. The **OBS** softkey is used to suspend waypoint sequencing and select the desired course along the waypoint side of the hold. For many approach operations, setting and resetting of waypoint sequencing is automatic. Holding patterns that are part of an approach automatically disable waypoint sequencing, then re-enable waypoint sequencing after one time around the holding pattern. To fly the holding pattern a second time, press the **OBS** softkey. An example of this operation is an approach which begins with a holding pattern at the initial approach fix (IAF).

The most common application for using the **OBS** softkey is the missed approach. The G1000 suspends automatic waypoint sequencing (indicated by a “SUSP” annunciation placed on the HSI) when you cross the missed approach point (MAP). This prevents the G1000 from automatically sequencing to the missed approach holding point (MAHP). During this time, the **OBS** softkey designation changes to **SUSP**. Pressing the **SUSP** softkey reactivates automatic waypoint sequencing. The **OBS** softkey then resumes its normal functionality.



WARNING: *The G1000 does not provide guidance to the missed approach hold point (MAHP). Always follow published missed approach procedures when flying a missed approach.*

Why won't the G1000 automatically sequence to the next waypoint?

The G1000 only sequences flight plan waypoints when automatic sequencing is enabled (i.e., no “OBS” or “SUSP” annunciation). For automatic sequencing to occur, the aircraft must also cross the “bisector” of the turn being navigated. The bisector is a perpendicular line between two flight plan legs which crosses through the waypoint common to both legs.

How do I skip a waypoint in an approach, a departure, or an arrival?

The G1000 allows the pilot to manually select any approach, departure, or arrival leg as the active leg of the flight plan. This procedure is performed on the MFD, from the Active Flight Plan Page by highlighting the desired waypoint and pressing the **ACT LEG** softkey, then the **ENT** key to approve the selection. The GPS then provides navigation along the selected flight plan leg.

When does turn anticipation begin?

The G1000 smooths adjacent leg transitions based upon a normal 15° bank angle (with the ability to roll up to 25°) and provide three pilot cues for turn anticipation:

- 1) A waypoint alert (“NEXT DTK ###°”) flashes on the PFD 10 seconds before the turn point.
- 2) A flashing turn advisory (“TURN TO ###°”) appears on the PFD when you are to begin the turn. The HSI (GPS mode) automatically sequences to the next DTK value.
- 3) The To/From indicator on the HSI flips momentarily to indicate that you have crossed the mid-point of the turn.

When does the CDI scale change?

When 30 nm from the destination, the G1000 begins a smooth CDI scale transition from 5.0 nm (en-route mode) to 1.0 nm (terminal mode). When 2 nm from the FAF during an active approach, the CDI scale transitions to 0.3 nm (approach mode). When executing a missed approach, the CDI can be returned to the 1.0 nm scale by pressing the **SUSP** softkey. The CDI is also set to 1.0 nm (terminal mode) within 30 nm of the departure airport.

Why does my HSI not respond like a VOR when OBS mode is active?

Unlike a VOR, the CDI scale used on GPS equipment is based on the cross-track distance to the desired course, not an angular relationship to the destination. Therefore, the CDI deflection on the GPS is constant regardless of the distance to the destination and does not become less sensitive when further away from the destination.

What is the correct missed approach procedure? How do I select the missed approach holding point?

To comply with TSO specifications, the G1000 does not automatically sequence past the MAP. The first waypoint in the missed approach procedure becomes the active waypoint when the **SUSP** softkey is pressed AFTER crossing the MAP. All published missed approach procedures must be followed, as indicated on the approach plate.

To execute the missed approach procedure prior to the MAP (not recommended), select the Active Flight Plan Page and use the **ACT LEG** softkey to activate the missed approach portion of the procedure.

How do I re-select the same approach or activate a new approach after a missed approach?

After flying the missed approach procedure, the pilot may reactivate the same approach for another attempt from the Procedures Page. Once the clearance is given for another attempt, activate the approach from the Procedures Page by highlighting “Activate Approach?”, then pressing the **ENT** key. The G1000 provides navigation along the desired course to the waypoint and rejoins the approach in sequence from that point on.

To activate a new approach for the same airport, select the new procedure from the Procedure Page. To view the Procedure Page, press the **PROC** key and rotate the large **FMS** knob to highlight “Select Approach?”. Select the desired approach from the list shown and press the **ENT** key. Select the desired transition, then activate the approach using the **ENT** key.

To activate a new approach to a different airport, press the **Direct-to** key and select the desired airport using the **small** and **large FMS knobs**. Press the **ENT** key to accept the selected airport, then follow the steps in the preceding paragraph to select an approach for the new airport.



NOTE: Do not attempt to reactivate the same approach you’re currently on, prior to crossing the missed approach point (MAP). If you attempt to do so, an alert message “Are you sure you want to discontinue the current approach?” appears. If you still proceed with reactivating the approach, the G1000 directs you back to the transition waypoint and does NOT take into consideration any missed approach procedures.

G1000 MAP DATUMS (CONT.)

NAD27 CARIBBEAN	North American 1927 – Caribbean: Barbados, Caicos Islands, Cuba, Dominican Republic, Cayman Islands, Jamaica, Leeward and Turks Islands	POTSDAM	Germany
NAD27 CENTRAL AMERICA	North American 1927 – Central America: Belize, Costa Rica, El Salvador, Guatemala, Honduras, and Nicaragua	PROV SO AMERICA '56	Bolivia, Chile, Colombia, Ecuador, Guyana, Peru, Venezuela
NAD27 CONUS	North American 1927 – Continental United States	PROV SO CHILEAN 1963	South Chile
NAD27 CUBA	North American 1927 – Cuba	PUERTO RICO	Puerto Rico and Virgin Islands
NAD27 GREENLAND	North American 1927 – Greenland (Hayes Peninsula)	QATAR NATIONAL	Qatar
NAD27 MEXICO	North American 1927 – Mexico	QORNOQ	South Greenland
NAD27 SAN SALVADOR IS	North American 1927 – San Salvador Island	REUNION	Mascarene Island
NAD83	North American 1983 – Alaska, Canada, Central America, CONUS, Mexico	ROME 1940	Sardinia Island
NAHRWAN MASIRAH IS	Masirah Island (Oman)	RT 90	Sweden
NAHRWAN SAUDI ARABIA	Saudi Arabia	SANTO (DOS)	Espirito Santo Island
NAHRWAN UNITD ARAB E	United Arab Emirates	SAO BRAZ	Sao Miguel, Santa Maria Islands (Azores)
NAPARIMA BWI	Trinidad and Tobago	SAPPER HILL 1943	East Falkland Island
NETHERLAND TRIAG '21	Netherlands	SCHWARZECK	Namibia
NOU TRIAG FRANCE	France	SOUTH AMERICAN 1969	Argentina,
NOU TRIAG LUXEMBOURG	Luxembourg	Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Venezuela	Singapore
OBSERVATORIO 1966	Corvo and Flores Islands (Azores)	SOUTH ASIAN	Porto Santo and Madeira Islands
OLD EGYPTIAN	Egypt	SOUTHEAST BASE	Faial, Graciosa, Pico, Sao Jorge and Terceira Islands
OLD HAWAIIAN KAUAI	Kauai	SOUTHWEST BASE	Madagascar
OLD HAWAIIAN MAUI	Maui	TANANARIVE OBSV 1925	Brunei and East Malaysia (Sarawak and Sabah)
OLD HAWAIIAN MEAN	Mean Value	TIMBALAI 1948	Japan, Korea, Okinawa
OLD HAWAIIAN OAHU	Oahu	TOKYO	Tristan da Cunha
OMAN	Oman	TRISTAN ASTRO 1968	Viti Levu Island, Fiji Islands
ORD SRV GRT BRITAIN	England, Isle of Man, Scotland, Shetland Islands, Wales	VITI LEVU 1916	Marshal Islands
PICO DE LAS NIEVAS	Canary Islands	WAKE-ENIWETOK 1960	World Geodetic System 1972
PITCAIRN ASTRO 1967	Pitcairn Island	WGS 72	World Geodetic System 1984
PORTUGUESE 1973	Portugal	WGS 84	Uruguay
		YACARE	Surinam
		ZANDERIJ	

GENERAL TIS INFORMATION

INTRODUCTION

The Traffic Information Service (TIS) provides traffic advisory information in the cockpit of non-TCAS equipped aircraft. TIS is a ground-based service providing relative location of all ATCRBS Mode-A and Mode-C transponder equipped aircraft within a specified service volume. The TIS ground sensor uses real time track reports to generate traffic notification. The G1000 system displays TIS traffic information on the Traffic Map Page of the MFD. TIS information may be display for overlay on the default map page on the MFD, as well as on the PFD map inset. Surveillance data includes all transponder-equipped aircraft within the coverage volume. The G1000 system displays up to eight traffic targets within a 7.5 nautical mile radius, from 3,000 feet below, to 3,500 feet above the requesting aircraft.



NOTE: Aircraft without an operating transponder are invisible to TIS.

TIS VS. TCAS

The main difference between TIS and TCAS is the source of surveillance data. TCAS uses an airborne interrogator with a half-second update rate, while TIS utilizes the terminal Mode S ground interrogator and accompanying data link to provide a five-second update rate. TIS and TCAS both have similar ranges.

TIS LIMITATIONS

This section describes basic TIS limitations and is not comprehensive. The pilot should review the TIS Limitations section of the Aeronautical Information Manual (AIM), Section 1-2-5.



NOTE: TIS is NOT intended to be used as a collision avoidance system and does not relieve the pilot of the responsibility to “see and avoid” other aircraft. TIS shall not be used for avoidance maneuvers during IMC or when there is no visual contact with the intruder aircraft.

TIS is intended only to assist in visual acquisition of other aircraft in VMC conditions. No recommended avoidance maneuvers are provided for, nor authorized, as a direct result of a TIS intruder display or TIS advisory.

While TIS is a useful aid to visual traffic avoidance, there are system limitations that must be fully understood to ensure proper use. Many of these limitations are inherent in secondary radar surveillance. In many cases, information provided by TIS is neither better nor more accurate than the information used by ATC.

TIS relies on surveillance of the Mode-S radar system, which is a “secondary surveillance” radar system similar to that used by ATCRBS. TIS operation may be intermittent during turns or other maneuvering. TIS is dependent on two-way, line-of-sight communications between the aircraft and the Mode S radar antenna. Whenever the structure of the aircraft comes between the transponder antenna and the ground-based radar antenna, the signal may be temporarily interrupted. Other limitations and anomalies associated with TIS are described in the AIM, Section 1-2-5.



WARNING: Garmin is not responsible for Mode S geographical coverage. Operation of the ground stations is the responsibility of the FAA. Refer to the AIM for a Terminal Mode S radar site map.



NOTE: *TIS is unavailable at low altitudes in many areas of the United States. This is often the case in mountainous regions.*

TIS information is collected during a single radar sweep. Collected information is then sent through the Mode S up-link on the next radar sweep. Thus, the surveillance information is approximately five seconds old. TIS ground station tracking software uses a prediction algorithm to compensate for this delay. This algorithm uses track history data to calculate expected intruder positions consistent with the time of display. Occasionally, aircraft maneuvering may cause variations in this calculation and create slight errors on the Traffic Map Page. Such errors affect relative bearing information and target track vector. This tends to cause a delay in the displayed intruder information. However, intruder distance and altitude typically remain relatively accurate and may be used to assist in spotting traffic.

The following are some common examples of such errors:

- When the client or intruder aircraft maneuvers excessively or abruptly, the tracking algorithm may report incorrect horizontal position until the maneuvering aircraft stabilizes.
- When a rapidly closing intruder is on a course that intercepts the client aircraft course at a shallow angle (either overtaking or head-on), and either aircraft abruptly changes course within 0.25 nautical miles, TIS may display the intruder aircraft on the incorrect side of the client aircraft.

These are rare occurrences and are typically resolved within a few radar sweeps once client/intruder aircraft courses stabilize.








Pilots using TIS can provide valuable assistance in the

correction of malfunctions by reporting their observations of undesirable performance. Reporters should identify the time of observation, location, type and identity of aircraft, and describe the condition observed. Reports should also include the type of transponder and transponder software version as well. Since TIS performance is monitored by maintenance personnel, not ATC, it is suggested that malfunctions be reported in the following ways:









- By telephone to the nearest Flight Service Station (FSS) facility.
- By FAA Form 8000-7, Safety Improvement Report (Postage-paid card can be obtained at FAA FSSs, General Aviation District Offices, Flight Standards District Offices, and General Aviation Fixed Base Operators).

MAP SYMBOLS
















AIRPORT

Item	Symbol
Unknown Airport	
Non-towered, Non-serviced Airport	
Towered, Non-serviced Airport	
Non-towered, Serviced Airport	
Towered, Serviced Airport	
Restricted (Private) Airport	
Heliport	





NAVAIDS

Item	Symbol
Intersection	
LOM (compass locator at outer marker)	
NDB (Non-directional Radio Beacon)	
VOR	
VOR/DME	
VOR/ILS	
VORTAC	
TACAN	





BASEMAP

Item	Symbol
Interstate Highway – 2-digit drawn inside	
Interstate Highway – 3-digit drawn inside	
State Highway – 2-digit drawn inside	
State Highway – 3-digit drawn inside	
State Highway – 4-digit drawn inside	
State Highway – 5-digit drawn inside	
US Highway – 2-digit drawn inside	
US Highway – 3-digit drawn inside	
National Highway – 2-digit drawn inside	
National Highway – 3-digit drawn inside	
National Highway – 4-digit drawn inside	
National Highway – 5-digit drawn inside	
Small City or Town	
Medium City	
Large City	










TRAFFIC

Item	Symbol
Traffic	
Proximate Traffic	
Traffic Advisory, Out of Range	
Traffic Advisory	











LIGHTNING STRIKE

Item	Symbol
Lightning Strike - Age is 0 - 6 Seconds	
Lightning Strike - Age is 6 - 20 Seconds	
Lightning Strike - Age is 20 - 60 Seconds	
Lightning Strike - Age is 60 - 120 Seconds	

MISCELLANEOUS





Item	Symbol
ARTCC Frequency or FSS Frequency	
Default Map Cursor	
Elevation Pointer Cursor	
Measuring Cursor	
Overzoom Indicator (map toolbar)	
Terrain Proximity Enabled (map toolbar)	
Traffic Enabled (map toolbar)	
User Waypoint	
Wind Vector	

LINE SYMBOLS

Item	Symbol
ICAO Control Area Class B Airspace	
Mode C Tower Area	
Warning Area Alert Area Caution Area Danger Area Prohibited Area Restricted Area Training Area Unknown Area	
Class C Terminal Radar Service Area Mode C Area	
Military Operations Area (MOA)	
State or Province Border	
International Border	
Road	
Railroad	
Latitude/Longitude	

OBSTACLE DATABASE

Obstacle Color	Indication
RED	WARNING: Obstacle height is at or above 100' below the current aircraft altitude.
YELLOW	CAUTION: Obstacle height is between 100' and 1000' below the current aircraft altitude.
GRAY	SAFE: Obstacle height is lower than 1000' below the current aircraft altitude.

Unlighted Obstacle (Height is less than 1000' AGL)	Lighted Obstacle (Height is less than 1000' AGL)	Unlighted Obstacle (Height is greater than 1000' AGL)	Lighted Obstacle (Height is greater than 1000' AGL)
			

TERRAIN COLOR CHART

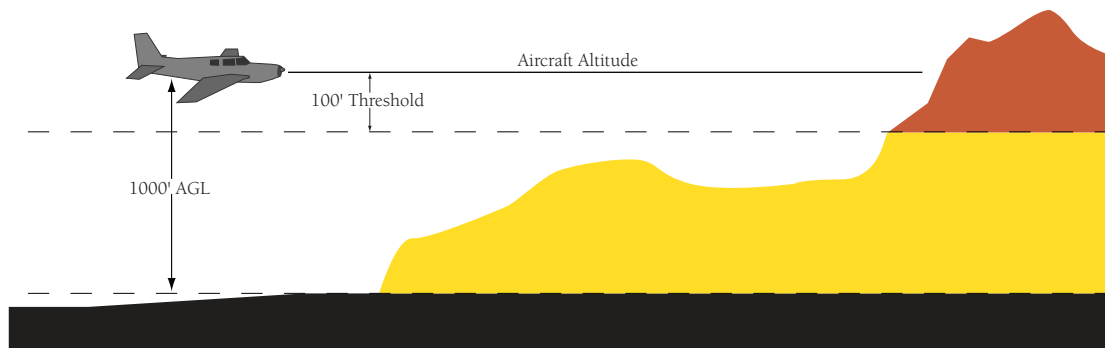


Figure F.1 Terrain Color Chart

G1000 SYSTEM SPECIFICATIONS

GDU 1040 MFD & PFD

Physical Specifications

Height:	7.70 inches (19.56 cm)
Width:	11.80 inches (29.97 cm)
Depth:	3.55 inches (9.02 cm)
Weight:	6.6 lb (2.99 kg)
Voltage Range:	9 – 33 Vdc
Display:	10.4-inch diagonal XGA 1024 x 768 pixels 262,144 colors

Environmental Specifications

Temperature Range:	-40° C to +55° C
Humidity:	95% non-condensing
Altitude Range:	-1,500 feet to 55,000 feet

GMA 1347 AUDIO PANEL

Physical Specifications

Bezel Height:	7.70 inches (19.56 cm)
Width:	1.3 inches (3.4 cm)
Depth:	7.79 inches (19.70 cm)
Weight:	1.7 lb (0.8 kg)
Voltage Range:	11 – 33 Vdc

Environmental Specifications

Temperature Range:	-20° C to +70° C
Humidity:	95% non-condensing
Altitude Range:	-1,500 feet to 55,000 feet

GIA 63 INTEGRATED AVIONICS UNITS

Physical Specifications

Height:	7.26 inches (18.44 cm)
Width:	3.83 inches (9.73 cm)
Depth:	9.73 inches (24.71 cm)
Weight:	4.9 lb (2.22 kg)
Voltage Range:	22 – 33 Vdc

Environmental Specifications

Temperature Range:	-40° C to +65° C
Altitude Range:	-1,500 feet to 55,000 feet

GPS Specifications

Receiver:	12 parallel channel PhaseTrac12™
Acquisition Time:	15 seconds (warm) 45 seconds (cold)
Update Rate:	Once per second, continuous
Accuracy:	Position – 49 feet (15 meters)
Velocity	– 0.1 knot RMS steady state
Dynamics:	1,000 knots maximum velocity 6g maximum acceleration

VHF COM Performance

Channels:	760 (25 kHz spacing) or 2280 (8.33 kHz spacing)
Frequency Range:	118.000 MHz to 136.975 MHz
Transmit Power:	16 watts

VHF NAV Performance

VOR Frequency Range:	108.00 MHz to 117.95 MHz
G/S Frequency Range:	329.15 MHz to 335.00 MHz
LOC Frequency Range:	108.10 MHz to 111.95 MHz

GDC 74A AIR DATA COMPUTER**Physical Specifications**

Height:	3.23 inches (8.20 cm)
Width:	3.05 inches (7.75 cm)
Length:	6.45 inches (16.38 cm)
Weight:	1.69 lb (0.77 kg)
Voltage Range:	10 – 33 Vdc

Air Data Specifications

Pressure Altitude Range:	-1,400 feet to 50,000 feet
Vertical Speed Range:	-20,000 fpm to +20,000 fpm
Airspeed Range:	450 knots
Airspeed Mach Range:	<1.00 Mach
Total Air Temperature Range:	-85° C to +85° C

GTX 33 MODE S TRANSPONDER**Physical Specifications**

Height:	6.30 inches (16.0 cm)
Width:	1.72 inches (4.4 cm)
Depth:	11.05 inches (28.1 cm)
Weight:	3.0 lb (1.36 kg)
Voltage Range:	11 – 33 Vdc

Environmental Specifications

Temperature Range:	-45° C to +70° C
Altitude Range:	-1,500 feet to 55,000 feet

GEA 71 ENGINE/AIRFRAME UNIT**Physical Specifications**

Height:	6.30 inches (16.0 cm)
Width:	1.23 inches (3.12 cm)
Depth:	8.73 inches (22.17 cm)
Weight:	1.75 lb (0.712 kg)
Voltage Range:	9 – 33 Vdc

Environmental Specifications

Temperature Range:	-55° C to +70° C
Altitude Range:	-1,500 feet to 55,000 feet

GRS 77 AHRS**Physical Specifications**

Height:	3.25 inches (8.36 cm)
Width:	3.75 inches (9.53 cm)
Length:	8.5 inches (21.59 cm)
Weight:	2.40 lb (1.08 kg)
Voltage Range:	10 – 33 Vdc

Environmental Specifications

Temperature Range:	-55° C to +70° C
Altitude Range:	-1,500 feet to 55,000 feet

AHRS Performance

Bank Error:	±1.25° within 30° roll, left or right and 15° pitch, nose up or down
Maneuvers Range:	360° pitch and roll
Rotation Rate:	±200° per second
Heading:	±2° straight and level flight

Initialization Limitations

For successful in-flight initialization of the GRS 77, the following conditions must be met:

Primary AHRS operation:	±20° bank and ±5° pitch
Reversion AHRS operation:	±10° bank and ±5° pitch



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