ENSTROM 480B OPERATOR'S MANUAL

AND

FAA APPROVED

ROTORCRAFT FLIGHT MANUAL

SUPPLEMENT

GARMIN GTS 800 TRAFFIC ADVISORY SYSTEM

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REPORT NO. 28-AC-061

HELICOPTER SERIAL NO._____

HELICOPTER REGISTRATION NO._____

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THIS SUPPLEMENT MUST BE CARRIED IN THE HELICOPTER AT ALL TIMES IF EQUIPPED WITH THE GARMIN GTS 800. CHAPTERS 1, 2, 3, AND 4 ARE FAA APPROVED.

FAA APPROVED BY: _Ronald O M'Elroy_____

FOR STEVEN L. LARDINOIS, ACTING MANAGER
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CENTRAL REGION
FEDERAL AVIATION ADMINISTRATION

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ROTORCRAFT FLIGHT MANUAL SUPPLEMENT

GARMIN GTS 800

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INTRODUCTION

Intro-1. General

This supplement contains the operating instructions, procedures, and limitations for the Garmin GTS 800. The supplement is divided into two basic parts, the FAA approved RFM Supplement and Supplemental Data provided by the Enstrom Helicopter Corporation (Enstrom). Chapters 1, 2, 3, and 4 make up the FAA approved RFM Supplement. It is required by Federal Regulations that this supplement be carried in the helicopter at all times if the Garmin GTS 800 unit is installed.

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.

Intro-1. List of Abbreviations

ADS-B	Automatic Dependent Surveillance-Broadcast
ALT	Altitude
ATC	Air Traffic Control
FLT	Flight
FPM	Foot per Minute
GBT	Ground Based Transceiver Broadcast
MFD	Multi Function Display
NM	Nautical Mile
PA	Proximity Advisory
PFD	Primary Flight Display
RFM	Rotorcraft Flight Manual
SVT	Synthetic Vision Technology
TA's	Traffic Advisories
TAS	Traffic Advisory System

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CHAPTER 1. OPERATING LIMITATIONS

1-1. General

1. The GTS 800 Traffic Advisory System is intended for advisory use only to aid the pilot in visually acquiring traffic. No avoidance maneuver should be based solely upon TAS traffic information. It is the responsibility of the pilot in command to see and maneuver to avoid traffic.

2. Altitude information provided by the GTS 800 is advisory only and is not to be used for dispatch purposes.

3. Regulations state that "When an ATC clearance has been obtained, no pilot in command may deviate from that clearance, except in an emergency, unless he obtains an amended clearance." Traffic information provided by the GTS 800 does **NOT** relieve the pilot in command of this responsibility.

4. The following table shows the display limitations. See the GTS 8XX Pilot's Guide for more information.

Table 1-1. Traffic Display Limitations

GTS 800 Part Number	011-01356-00
GTS 800 Software Version	3.00, or later approved version
Active Interrogation Range	12 NM
Vertical Separation Maximum	± 10,000 feet
Maximum Operating Altitude	55,000 feet
Traffic Alert Limits	TSO-C147 Specified Warning Times

1-2. Applicable Documents

1. The applicable Garmin documents listed in Table 1-2 must be available for the flight crew whenever the GTS 800 is used.

Table 1-2. Pilot's Guide References

Garmin GTS 8XX Pilot's Guide	Document No. 190-00587-02, latest revision

CHAPTER 2. NORMAL PROCEDURES

2-1. General

Traffic alerts are automatic. The GTS 800 sends all the data to the display system. Pilot control of the GTS 800 is through the interfaced control and display unit, the GDU 1040H.

The traffic system must be in Operating Mode for traffic to be displayed and for traffic advisories (TA) to be issued. After power up, the traffic system is in Standby Mode. The GTS 800 must be in Operating Mode for traffic to be displayed and for TAs to be issued.

NOTE

Check that the remote TAS ON/OFF switch is switched ON. If set to OFF, the NO DATA annunciation will be displayed. (The switch may be left ON during engine starting as it is interfaced with the avionics master switch.)

NOTE

The GTS 800 will automatically transition from STANDBY to OPERATE mode or from OPERATE to STANDBY mode based on input received from the G1000H.

Switching from Standby Mode to Operating Mode:

1. On the Traffic Page, select the OPERATE SoftKey, or press the MENU Key and turn the small FMS knob to select 'Operate Mode'.

2. Press the ENT Key.

Switching from Operating Mode to Standby Mode:

1. On the Traffic Page, select the STANDBY SoftKey, or press the MENU Key and turn the small FMS knob to select 'Standby Mode'.
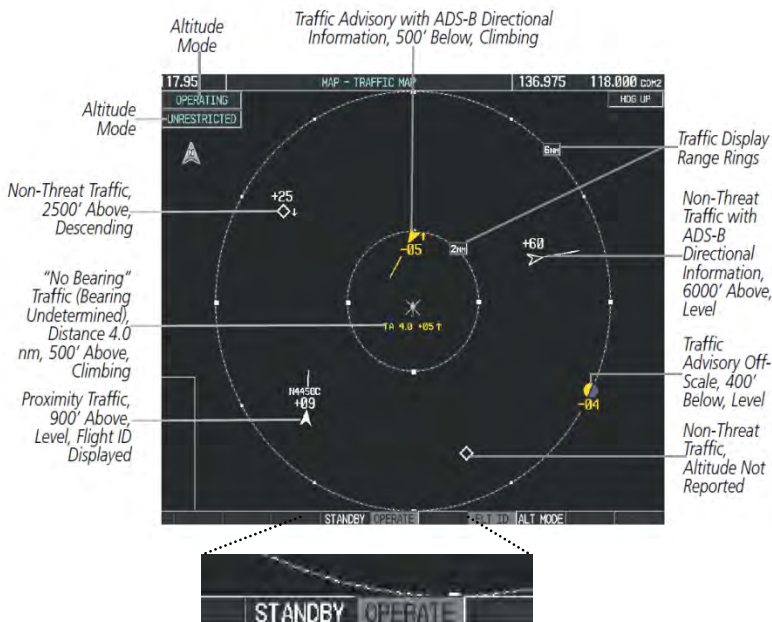
2. Press the ENT Key.

Figure 2-1. Traffic Map Page

Displaying traffic on the Traffic Map Page:

1. Turn the large FMS knob to select the Map Page Group.

2. Turn the small FMS knob to select the Traffic Map Page.

3. Select the OPERATE Softkey to begin displaying traffic. 'OPERATING' is displayed in the Traffic mode field.

4. Select the STANDBY Softkey to place the system in the Standby mode. 'STANDBY' is displayed in the Traffic mode field.

5. Turn the RANGE Knob clockwise to display a larger area or counter-clockwise to display a smaller area.

Altitude Display:

The pilot can select the volume of airspace in which non-threat and proximity traffic is displayed. TAs occurring outside of these limits will always be shown.

Changing the altitude range:

1. On the Traffic Map Page, select the ALT Mode Softkey.

2. Select one of the following SoftKeys:

   a. Above- displays non-threat and proximity traffic from 9,000 feet above the aircraft to 2700 feet below the aircraft. Typically used during climb phase of flight.

   b. Normal- Displays non-threat and proximity traffic from 2700 feet above the aircraft to 2700 feet below the aircraft. Typically used during enroute phase of flight.

   c. Below-Displays non-threat and proximity traffic from 2700 feet above the aircraft to 9000 feet below the aircraft. Typically used during descent phase of flight.

   d. Unrest (unrestricted)- All traffic is displayed from 9900 feet above and 9900 feet below the aircraft.

3. To return to the Traffic Page

   a. Select the BACK SoftKey, or Press the MENU Key.

   b. Turn the small FMS Knob to select one of the following:
      - Above
      - Normal
      - Below
      - Unrest

   c. Select the ENT SoftKey.

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Flight ID Display:

The Flight IDs of other aircraft (when available) can be enabled for display on the Traffic Map Page (Figure 2-2). When a flight ID is received, it will appear above or below the corresponding traffic symbol on the Traffic Map Page when this option is enabled.

Enabling/Disabling Flight ID Display:

1. On the Traffic Map Page, select the FLT ID SoftKey, or press the MENU Key.

2. Turn the small FMS Knob to select 'Show Flight ID's' or 'Hide Flight ID's'.

3. Press the ENT Key.
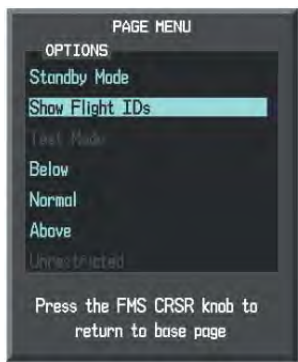

Figure 2-2. Traffic Map Page with Flight IDs Enabled

Figure 2-3. Traffic Map Page Menu

Traffic Map Page Display Range

The display range on the Traffic Map Page can be changed at any time. Map range is adjustable with the RANGE Knob from 2 to 12 nm, as indicated by the map range rings.

Changing the display range on the Traffic Map:

1. Turn the RANGE Knob.

2. The following range options are available:

   - 2nm
   - 2 to 6 nm
   - 6 to 12 nm

TAS Alerts

When the traffic system detects a new TA, the following occur:

- A single "**Traffic!**" voice alert is generated, followed by additional voice information about the bearing, relative altitude, and approximate distance from the intruder that triggered the TA (Figure 2-4). The announcement "**Traffic! 12 o'clock, high, four miles**," would indicate the traffic is in front of own aircraft, above own altitude, and approximately four nautical miles away.

Bearing	Relative Altitude	Distance (nm)
"One o'clock" through "Twelve o'clock" or "No Bearing"	"High", "Low", "Same Altitude" (if within 200 feet of own altitude), or "Altitude not available"	"Less than one mile", "One Mile" through "Ten Miles", or "More than ten miles"

Figure 2-4. TA Descriptive Voice Announcements

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Figure 2-5. Traffic Annunciation on the PFD

Additional Traffic Displays

Refer to Chapter 7 of this document for operational instructions for viewing traffic on additional displays.

CHAPTER 3. EMERGENCY PROCEDURES

3-1. General

Refer to the visual display on the GDU 1040H, as well as the audio announcement. Information shown on the display is provided to the pilot as an aid to visually acquire traffic. Pilots should maneuver their aircraft based only on ATC guidance or positive visual acquisition of the conflicting traffic. Maneuvers should be consistent with ATC instruction. No maneuvers should be made solely on the Traffic Advisory.

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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

Table 6-1. GTS 800 Weight and Balance

Weight with Rack (lbs)	Moment Arm (in)	Moment (in-lb)
11.14	230.25	2564.985

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CHAPTER 7. SYSTEM DESCRIPTION AND OPERATION

7-1. System Description

1. The GTS 800 enhances flight crew situational awareness by displaying traffic information for transponder-equipped aircraft. The system also provides visual and aural traffic alerts including voice announcements to assist in visually acquiring traffic.

2. The system uses information from the transponders of intruding aircraft to derive the distance, relative bearing, and, if reported, the altitude and vertical trend for each aircraft within its surveillance range. The traffic system then calculates a closure rate to each intruder based on the projected Closest Point of Approach. If the closure rate meets the threat criteria for a Traffic Advisory (TA), the system provides visual annunciations and alerts.

3. The GTS 800 interfaces with the G1000H Integrated Flight Deck.

4. Power to the GTS 800 unit is provided via the **TAS** circuit breaker (CB) (7.5 Amp) located on the lower panel and the **TAS** ON/OFF switch remotely located along the bottom of the circuit breaker panel.
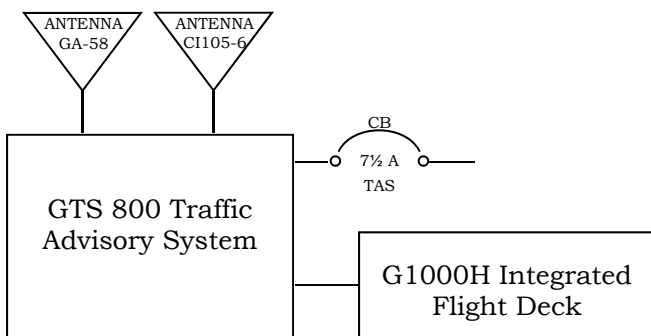

Figure 7-1. GTS 800 System Interface

7-2. Operation

1. The GTS 800 is capable of tracking up to 45 intruding aircraft equipped with Mode A or C transponders, and up to 30 intruders equipped with Mode S transponders. A maximum of 30 aircraft with the highest threat potential can be displayed simultaneously.

2. TAS Surveillance Volume: The GTS 800 surveillance system monitors the airspace within ±10,000 feet of own altitude. Under ideal conditions, the GTS 800 unit scans transponder traffic up to 22 nm in the forward direction. The range is somewhat reduced to the sides and aft of own aircraft due to the directional interrogation signal patterns. In areas of greater transponder traffic density or when TCAS II (Traffic Alert and Collision Avoidance System II) systems are detected, the GTS 800 automatically reduces its interrogation transmitter power (and therefore range) in order to limit potential interference from other signals. When paired with a 1090 MHz extended squitter transponder, the GTS 800 receives 1090ES ADS-IN traffic information from other 1090ES ADS-B OUT compliant airborne aircraft to enhance the positional accuracy and display of traffic within the TAS surveillance range. Traffic data supplied only by ADS-B Ground Based Transceivers (GBTs) is not displayed.

3. The GTS 800 TAS symbology used to depict intruding traffic is shown in Table 7-1 and described as follows.

    *   A Traffic Advisory displayed as a yellow circle or triangle, alerts the crew to a potentially hazardous intruding aircraft, if the closing rate, distance, and vertical separation meet TA criteria. A Traffic Advisory that is beyond the selected display range (off scale) is indicated by a half TA symbol at the edge of the screen at the relative bearing of the intruder.

- A Proximity Advisory (PA), displayed as a solid white diamond or triangle, indicates the intruding aircraft is within ±1200 feet and is within a 6 nm range, but is still not considered a TA threat.

- A Non-threat Advisory, shown as an open white diamond or triangle, is displayed for traffic beyond 6 nm that is neither a TA nor PA.

- A solid white rounded arrow indicates either a PA or Non-Threat traffic with ADS-B directional information, but the position of the traffic is shown with degraded accuracy.

- Relative altitude, when available, is displayed above or below the corresponding intruder symbol in hundreds of feet. When this altitude is above own aircraft, it is preceded by a '+' symbol; a minus sign '-' indicates traffic is below own aircraft.

- A vertical trend arrow to the right of the intruder symbol (Figure 7-2) indicates traffic is climbing or descending at least 500 fpm with an upward or downward-pointing arrow respectively.

- If the intruding aircraft is providing ADS-B track information, this is displayed as a vector line extending beyond the traffic symbol in the direction of the track (Figure 7-3).

Table 7-1. GTS 800 Traffic Symbols

| Symbol	Description
	Traffic Advisory (TA) arrow with ADS-B directional information. Points in the direction of the intruder aircraft track. (Not available in all installations.)
	Traffic Advisory without ADS-B directional information.
	Traffic Advisory out of the selected display range. Displayed at outer range ring at proper bearing.
	Proximity Advisory (PA) arrow with ADS-B directional information. Points in the direction of the aircraft track. (Not available in all installations.)
	Proximity Advisory without ADS-B directional information.
	Non-threat traffic arrow with ADS-B directional information. Points in the direction of the intruder aircraft track. (Not available in all installations.)
	Non-Threat Traffic without ADS-B directional information
	PA or Non-threat traffic arrow with ADS-B directional information, but positional accuracy is degraded. Points in the direction of the aircraft track. (Not available in all installations.)
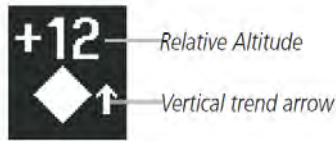
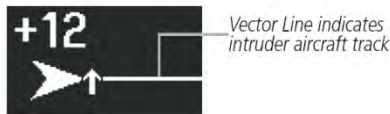**Figure 7-2. Intruder Altitude and Vertical Trend Arrow**

Figure 7-3. Intruder Traffic with ADS-B Directional Information and Track

- System Test: The traffic system provides a system test mode to verify the system is operating normally. The test takes ten seconds to complete. When the system test is initiated, a test pattern of traffic symbols is displayed on the Traffic Map Page (Figure 7-4). The voice alert "TAS System Test Passed" or "TAS System Test Failed" is issued when the test is complete, and the traffic system will be in Standby Mode.

Figure 7-4. System Test in Progress with Test Pattern

4. Traffic information can also be displayed on the following maps on the MFD when the unit is operating:

- Navigation Map Page
- Traffic Map Page
- Trip Planning Page
- Nearest Pages
- Active Flight Plan Page
- System Pages

Traffic information can also be displayed on the PFD with Synthetic Vision Technology (SVT) enabled.

Displaying traffic information (MFD maps other than the Traffic Map Page):

1) Select the MAP SoftKey

2) Select the TRAFFIC SoftKey. Traffic is now displayed on the map.

3) A traffic icon is shown to indicate traffic is enabled for display (Figure 7-5).

Displaying Traffic on the Navigation Map:

1) Ensure the TAS system is operating. With the Navigation Map displayed, select the MAP SoftKey.

2) Select the TRAFFIC SoftKey. Traffic is now displayed on the map as shown in Figure 7-5.

Figure 7-5. TAS Traffic on Navigation Map

Customizing the traffic display on the Navigation Map Page:

1) Select the Navigation Map Page.

2) Press the MENU Key.

3) With Map Setup highlighted, press the ENT Key.

4) Turn the small FMS Knob to select the Traffic Group and press the ENT Key.

5) Turn the large FMS Knob or press the ENT Key to scroll through the selections:

  • TRAFFIC - Turn the display of traffic data on or off.

  • TRAFFIC MODE - Select the traffic mode for display; select from:

    o All Traffic - Displays all traffic

    o TA/PA - Displays Traffic Advisories and Proximity Advisories

    o TA Only - Displays Traffic Advisories only

  • TRAFFIC SMBL - Selects the maximum range at which traffic symbols are shown

  • TRAFFIC LBL - Selects the maximum range at which traffic labels are shown with the option to turn off

6) Turn the small FMS Knob to scroll through options (ON/OFF, range settings, etc.).

7) Press the ENT Key to select an option.

8) Press the FMS Knob or CLR Key to return to the Navigation Map Page.

The Navigation Map Page Setup Menu also controls the display of traffic. The setup menu controls the map range settings. Traffic data symbols and labels can be decluttered from the display. If a map range larger than the map range setting is selected, the data is removed from the map. Maps besides the Traffic Map Page use settings based on those selected for the Navigation Map Page.

5. System Status:

The traffic mode is annunciated in the upper left corner of the Traffic Map Page (Figure 7-6). If the traffic unit fails, an annunciation as to the cause of the failure is shown in the center of the Traffic Map Page (Figure 7-6). During a failure condition, the Operating Mode cannot be selected.

The annunciations to indicate the status of the traffic information appear in a banner at the lower left corner of maps on which traffic can be displayed.

Mode	Traffic Mode Annunciation (Traffic Map Page)	Traffic Display Status Icon (Other Maps)
Traffic System Test Initiated	TEST (also shown in white in center of page)	
Operating	OPERATING	
Standby	STANDBY (also shown in white in center of page)	
Traffic System Failed*	FAIL	

Figure 7-6. Traffic Modes

Traffic Map Page Annunciation	Description
NO DATA	Data is not being received from the traffic unit
DATA FAILED	Data is being received from the traffic unit, but the unit is self-reporting a failure
FAILED	Incorrect data format received from the traffic unit, or data has been lost from radar altimeter (if installed)

Figure 7-7. Traffic Failure Annunciations

Traffic Status Banner Annunciation	Description
TA OFF SCALE	A Traffic Advisory is outside the selected display range*. Annunciation is removed when traffic comes within the selected display range.
TA X.X ± XX ↕	System cannot determine bearing of Traffic Advisory**. Annunciation indicates distance in nm, altitude separation in hundreds of feet, and altitude trend arrow (climbing/descending).
TRFC FAIL	Traffic unit has failed (unit is self-reporting a failure or sending incorrectly formatted data)
NO TRFC DATA	Data is not being received from the traffic unit

*Shown as symbol on Traffic Map Page
**Shown in center of Traffic Map Page

7-8. Traffic Status Annunciations