FlightMax™
Flight Situation Display
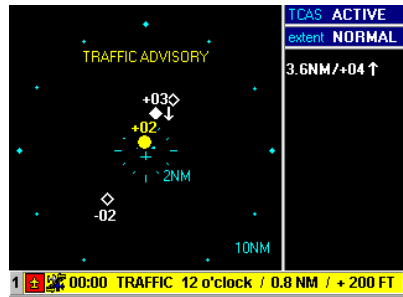
FlightMax Traffic
(TCAS)

Revision History

Date	Revision	Description
Sep. 7, 2000	00	Production Release
Sep. 14, 2000	01	Production Release

FlightMax Traffic
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FlightMax Traffic

Introduction

This part of the Pilot's Guide explains FlightMax Traffic and its use with a TCAS (ARINC 735-2) traffic awareness system. Topics include:

Figure 1: Traffic Icon

- *Traffic Overview* - presents an overview of the Traffic function.

- *Traffic Pages and Menus* - explains every page and menu used in Traffic.

- *How to Use Traffic* - explains how to perform specific tasks using Traffic.

- *Messages and Error Indications* - provides the meanings of Traffic messages and error indications.

FlightMax Traffic is verified by the presence of its icon and text label in the Main menu. If Traffic's icon and legend, shown in Figure 1, are not present in the Main menu, contact your installer for assistance.

For a complete understanding of the capabilities and performance characteristics of your system it is important that you read and understand the manual supplied with your traffic awareness system.

Traffic Overview

FlightMax Traffic displays Traffic avoidance data gathered by a TCAS System. FlightMax Traffic interfaces with TCAS I (Honeywell CAS 66A, BFG 791) systems. Proper use of Traffic with the TCAS system can improve situational awareness of potential threat aircraft.

The goal of any traffic awareness system is to identify potential threat aircraft. TCAS is an interrogation system that monitors the surrounding airspace searching for threat aircraft. Transponder signals from nearby aircraft are received by these systems. Information from the transponder signal is used to determine the range, bearing, relative altitude and closure rate of the threat aircraft. In some cases the aircraft ID can also be determined.

The purpose of the traffic display is to aid the pilot in visual acquisition of threat aircraft. The traffic display system will provide traffic information on Mode A (no altitude data available), Mode C, and Mode S transponder equipped aircraft.

Traffic awareness systems consist of three major units: a sensor unit containing a processor with support electronics, a display unit, and antenna (Figure 2). The FSD replaces or supplements the display unit. It provides more information and easier recognition of potential threat aircraft.
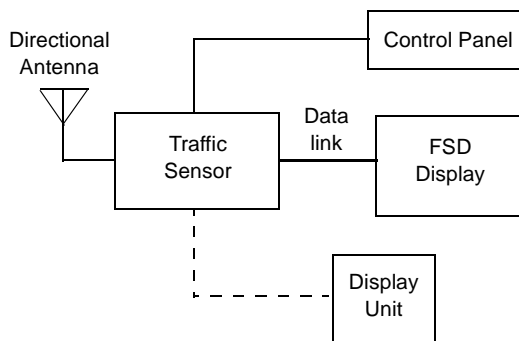

Figure 2: Traffic System Block Diagram

Traffic Pages and Menus
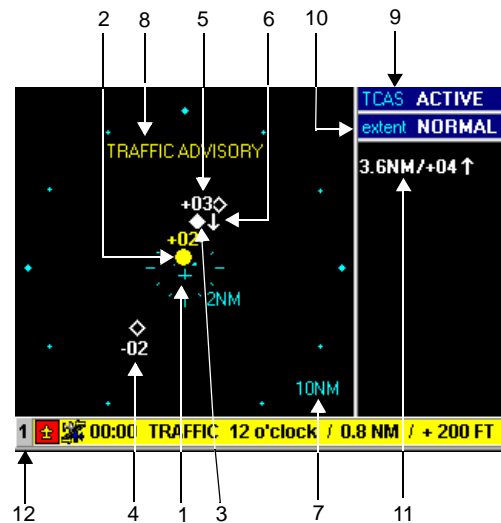
Data Page Layout

Figure 3: Data Page

The FAA has worked closely with the ATA, NASA, and both the SAE 5-7 and G-10 Committees in an effort to standardize TCAS symbology and features. A consensus has been reached for TCAS symbols and they are provided in AC 20-131A. Avidyne Traffic is in compliance with the display standards.

1. **Aircraft Symbol** - This symbol represents your aircraft.

2. **Traffic Advisory Threat** - This symbol (a closed amber circle) represents an immediate traffic advisory threat and indicates the relative bearing and range of the intruder.

   In general a TA is displayed when an intruder aircraft is within 30 seconds of a possible collision or within 0.5nmi horizontal radius and a $\pm$ relative altitude range of your aircraft.

3. **Proximate Traffic** - This symbol (a white closed diamond) represents proximate traffic detected within a selected display range and altitude that is closer to your aircraft than the open diamond symbol, but does not generate a TA.

4. **Traffic** - This symbol (a white open diamond) represents traffic detected within a selected display range and altitude that does not generate a TA.

5. **Altitude** - The altitude number represents in hundreds of feet the relative altitude of an intruder aircraft. A positive tag indicates the intruder is above you, a negative tag indicates the intruder is below you. If the intruder is at the same altitude, 00 will be displayed. For example: +10 indicates the intruder is 1000 feet above you.

6. **Vertical Direction** - The arrow symbol represents the vertical direction of an intruder aircraft relative to your aircraft, moving at a relative rate of ascent or descent faster than 500fpm. An up arrow indicates an ascending intruder, a down arrow indicates the intruder is descending. No arrow indicates an intruder flying: level flight, moving vertically slower than 500fpm, or a non-altitude reporting intruder.

7. **Range** - The range display is defined by the TCAS sensor. The TCAS sensor defines the sensing limit and sends that data to the FSD. The FSD displays pre- defined range rings up to and including the TCAS's sensing limit. The FSD also places a blue field around the outer most range ring to clearly annunciate the limit of the sensor. The FSD is capable of displaying ranges up to 40nm. Using the FSD display, the pilot can zoom in and out to the sensing limit of their TCAS sensor.

8. **System Status Annunciation** - The System Status annunciation provides textual information across the primary view pane. The displays are in amber and include the following:
SENSOR OFF, SENSOR SELF-TEST, SENSOR FAILED, SENSOR DATA FAIL, TRAFFIC ADVISORY, TRAFFIC ADVISORY OFF-SCALE

9. **TCAS Status** - The TCAS indicator displays the current status of the sensor. The possible displays are: Off, Active and Error.

10. **Extent Status** - The extent indicator displays the vertical mode the sensor is in. This includes: Normal, Above, Below, and Unlimited.

11. **Traffic Text** - Threats and other intruders which can't be depicted in the view pane due to lack of bearing or range data are presented as a row of text. The text contains the threat level (TA if applicable) the distance or bearing from the host aircraft, the relative altitude (when available) and the vertical speed indicator. The text is the color of the associated threat level.

12. **Message Bar** - If a function other than FlightMax Traffic is active on the Avidyne FSD when a traffic advisory occurs, the FSD does not automatically switch to the Traffic display. Instead, a bright yellow message bar is displayed along the bottom of the screen, alerting the pilot to a TA. The message bar includes the TA's bearing, distance, and relative altitude (if available). The message bar can display other traffic information as well. The pilot can access the Traffic display by pressing Enter.

Traffic Menu

When TCAS is used as the traffic awareness sensor, there is minimal operator control. The only menu functions available are the HELP and HIDE MENU functions.

Figure 4: Main Menu

Data Pane Displays

Status of the system is displayed in the right hand column of the Traffic Data page. There are only two constant displays, TCAS and extent.

Figure 5: Data Pane

TCAS

The TCAS display indicates what mode of operation the sensor is in.

Off

If the TCAS Display Unit is turned off or there is no power to the Traffic Sensor unit, the FSD will display sensor OFF. If the display Unit is not present, the system will

automatically come up when the Traffic Data page is selected from the FSD main menu.

Active
indicates the unit is functioning under normal operating conditions.

Fail
Indicates a failure has occurred.

Extent

Displays the altitude range of the system. The values for the different altitude ranges are defined by your TCAS sensor (on the CAS66, the control panel controls the altitude range). The following ranges are available:

Normal
displays traffic 2700 feet above and below your aircraft

Above
The Above mode displays traffic 2700 feet below you and extends the ceiling up to 8700 feet above your aircraft.

Below
The Below mode displays traffic 2700 feet above you and extends the floor down to 8700 feet below your aircraft.

Figure 6 shows typical values for these ranges.

> **NOTE:** The values in the previous explanations are typical, but may be different, depending upon the TCAS sensor used on your aircraft.
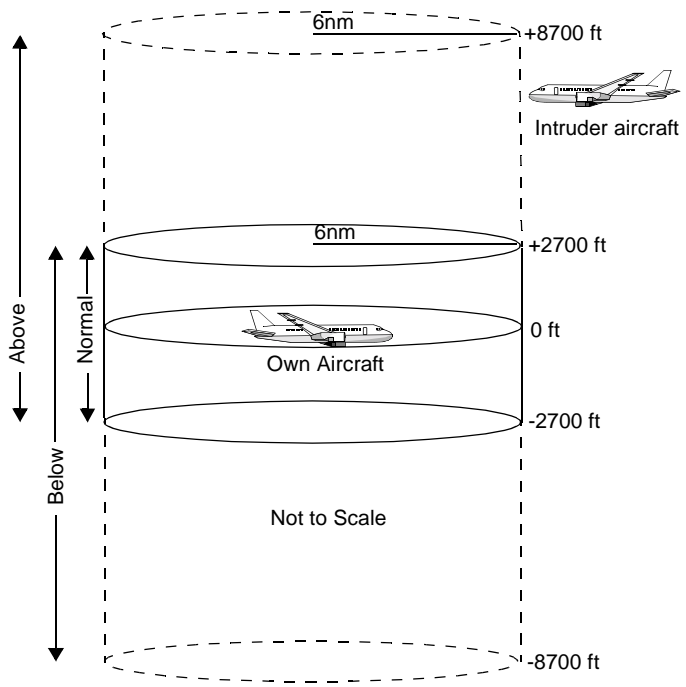
Figure 6: Altitude Display Modes

How to Use Traffic

Traffic Startup

FlightMax Traffic starts automatically as part of the normal initialization sequence of the FSD. To use TRAFFIC do the following:

1. Select Traffic from the Main Menu.
   Traffic's product identification page will appear.
   Read all of the information on the product identification page and observe any operating limitations it reflects.

2. Press **Enter** to start the Traffic application.

3. Traffic then displays its data page and main menu.

   NOTE: When the Traffic product identification page first comes up, a brief error message in the message bar saying that the "traffic sensor has failed", may appear while communication is being established. This message should go away in a few seconds and the startup sequence will continue.

Control Knob Functions

Figure 7: Knob Functions

Altitude

The outer knob is used to select between the different altitude modes.

Rotating the knob counter clockwise will display the modes in this sequence:

BELOW→NORMAL→ABOVE

Rotating the knob clockwise will produce the opposite sequence.

Range

The inner knob is used to select the range (scale) for the Data page display. The range scale is determined by the TCAS sensor . Turning the knob counter clockwise will increase the viewing range (up to 40nm).
Once the display range is at maximum, further counter clockwise turns will have no effect.

Turning the knob clockwise will reduce the viewing scale. Once the display range is at the lowest scale, further clockwise turns will have no effect.

In the 40nm scale a dark blue field surrounds the 40nm radius. This indicates that aircraft are not displayed beyond the 40nm range.

Messages and Error Indications

The system status annunciation describes the operating state of the system. The status is displayed in amber letters across the main Data page (see Figure 3).

Table 1: Messages Issued by Traffic

Message	Meaning
SENSOR OFF	Indicates that the TCAS sensor is powered down or incorrectly attached to the FSD.
SENSOR FAIL or SENSOR DATA FAIL	Indicates that the TCAS sensor or FSD has a fault.
SENSOR SELFTEST	Indicates the TCAS is performing a self testing diagnostic. Upon successful completion of the self test an audio message will be heard "Traffic Advisory System Test Passed". If SENSOR FAILED is displayed, try repeating the test a few times. If it continues to fail refer to the TCAS users Guide.
TRAFFIC ADVISORY	Indicates the sensor has detected and issued a traffic advisory. This display supplements the visual symbol and/or textual information for threat aircraft. This display is the largest visual indicator that a TA exist.
OFF-SCALE	If a threat at the level of the advisory is outside the display range, this message is displayed below the advisory message.

Message Bar

The Traffic Advisory message is shown in Figure 8. This message will appear whenever a TA is issued. When you are on another page or on the Traffic Data page the message bar will appear in yellow across the bottom of the screen with information about the range, bearing and vertical separation of the intruder. The yellow background

indicates that confirming this message (by pressing ENTER) will take you to the issuer's data page (in this case Traffic).
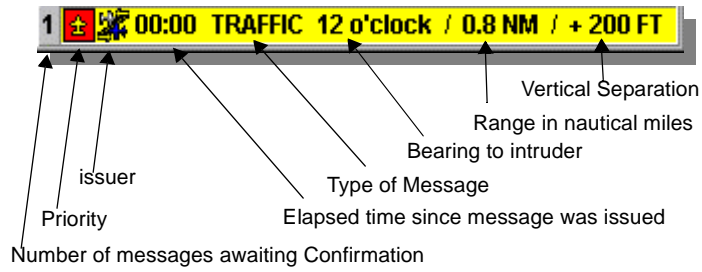

Figure 8: Traffic Advisory Message Bar

Traffic Advisory Criteria

The FSD traffic function receives its data from the TCAS sensor. The FSD is a slave to whatever criteria the sensor uses to issue a traffic advisory.