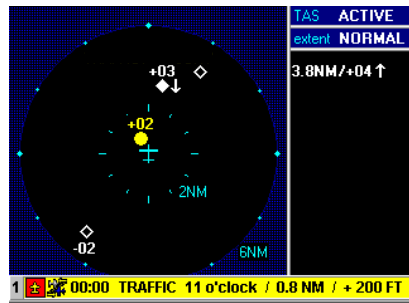


FlightMax™

Flight Situation Display



FlightMax Traffic

(TAS)

Revision History

Date	Revision	Description
Sep. 7, 2000	00	Production Release
May 18, 2001	01	Production Release per ECO 01-052
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FlightMax Traffic

Introduction

This part of the Pilot's Guide explains FlightMax Traffic and its use with the Goodrich

Skywatch™ Traffic Advisory System (TAS), the Bendix King KTA-870 TAS, and the KMH-880 TAS/EGPWS. Topics include:

- *Traffic Description* - provides a description of the Traffic function and the Skywatch sensor.
- *Traffic Pages and Menus* - explains every page and menu used in FlightMax 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 as well as the criteria used to generate information.
- *Menu Path* - graphically depicts the path to any menu in Traffic.

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

Before reading this section, you should read and understand the TAS Pilot's Guide. It contains information essential to the proper use and interpretation of the displays presented by FlightMax Traffic.



Figure 1: Traffic Icon

Traffic Description

FlightMax Traffic displays Traffic avoidance data gathered by a Traffic Alert System (TAS). Proper use of Traffic with the TAS can improve situational awareness of potential threat aircraft.

The purpose of the traffic display is to aid the pilot in visual acquisition of threat aircraft. This is accomplished by displaying the intruder aircraft's horizontal and, if altitude information is available, vertical position relative to the host 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 alert pilots to other aircraft within their immediate airspace. They all consist of three major units: a sensor unit containing a processor with support electronics, a display unit, and antenna (Figure 2). The FSD provides more information and easier recognition of potential threat aircraft.

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.

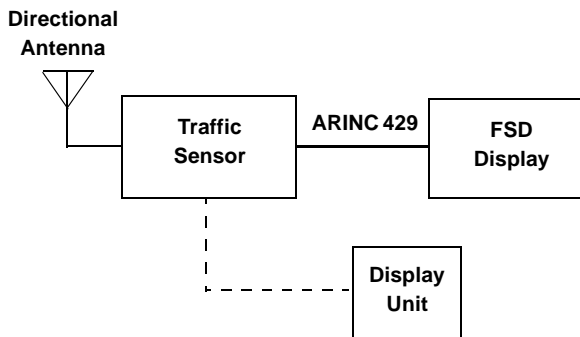


Figure 2: Traffic System Block Diagram

Skywatch TAS Description

Skywatch consists of three major assemblies:

- The Traffic Sensor (Goodrich calls this unit the TRC: Transmitter Receiver Computer)
- The Display Unit
- The Directional Antenna

The FSD replaces the Skywatch Display unit although the user has the option of continuing to use the Skywatch display. Both the Traffic Sensor and the Directional Antenna are still required. The FSD receives all its data from the Traffic Sensor. All displays on the FSD are generated using data from the Traffic Sensor.

The Stormscope Option

Goodrich also makes the Stormscope weather detection system. It can be configured to work with their Skywatch unit. If the STORMSCOPE option is attached to the Skywatch, the FSD operates as a slave to the Skywatch Traffic Sensor. The reason for this is to avoid conflict with the STORMSCOPE functions. In this configuration the pilot has access to weather information via the STORMSCOPE and traffic awareness via the FSD traffic option. As a slave, the FSD has no control over the traffic sensor, however, the following functions can be accessed:

- Altitude Display Mode - selects and displays the current altitude mode: Above, Below, Normal, and Unlimited.
- Display Range Mode - selects and displays the current range mode in nautical miles.
- Help

If the STORMSCOPE option is not attached, the FSD can exercise greater control over the Traffic Sensor.

Bendix/King TAS Description

The Bendix/King KMH 880 and the KTA 870 are the Traffic components of an Integrated Hazard Avoidance System (IHAS).

The KMH 880 is an integrated traffic advisory system and Enhanced Ground Proximity Warning System (EGPWS).

The KTA870 is a dedicated traffic advisory system. Both products use an active Mode C interrogation technique. They use dual directional antennas that present position and altitude for up to 30 intruder aircraft. The system will display traffic equipped with a Mode S and/or Mode A/C transponder.

Traffic Pages and Menus

Data Page Layout

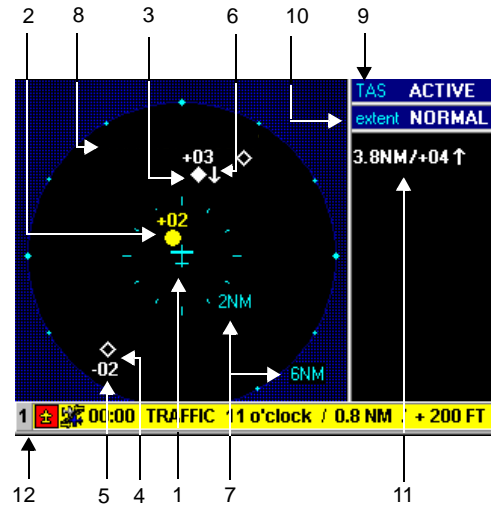


Figure 3: Data Page

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.
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. **Other 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 Trend**- The arrow symbol represents the vertical trend 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 in level flight, moving vertically slower than 500fpm, or a non-altitude reporting intruder.
7. **Range** - The possible ranges for Skywatch sensors are, 2nm, 6nm, and 11nm. The Skywatch HP model has an additional range of 35nm.
The possible ranges for the Bendix/King sensors are 2nm, 6nm, 10nm, 20nm, and 40m.
The blue field around the outer most ring represents the limits of sensor.
8. **System Status (not Shown)** - The System Status annunciation provides textual information across the primary view pane. The displays are in amber or cyan and include the following:
SENSOR OFF, SENSOR STANDBY, SENSOR SELF-TEST, SENSOR FAIL, SENSOR DATA FAIL, OFF-SCALE
9. **TAS Status** - The TAS indicator displays the current status of the sensor. The possible displays are: Off, Active, Error, and Standby.
10. **Extent Status** - The extent indicator displays the vertical mode the display 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 Traffic is active on the Avidyne FSD when a traffic advisory occurs, the FSD will display a bright yellow message bar along the bottom of the screen. This alerts the pilot to a TA. The

message bar includes the TA's bearing, distance, and relative altitude (if available). The pilot can access the Traffic display by pressing Enter.

Traffic Main Menu (Skywatch)

The FSD supports two configurations of the Goodrich Skywatch sensor. In one configuration there is no STORMSCOPE option on the Skywatch sensor. Only the FSD will display Traffic.

The other possible configuration has the STORMSCOPE option present with the WX-1000 Skywatch Display Unit attached to the sensor. Both the WX-1000 and the FSD can display traffic.

Main Menu Without Stormscope

Operate/Standby

Operate is a toggle function. Operate will place the Skywatch sensor in a normal operating mode. The sensor will provide traffic data to the display.

Standby stops traffic data from being displayed on the FSD screen. The sensor is on, but no data is displayed. If the aircraft has a squat switch and is in the air, the Skywatch unit will not enter Standby mode. Attempting to enter standby from the Traffic main menu while in flight will fail, and Traffic will display a message informing the operator of its inability to place the Skywatch unit in standby.

Test

Selecting Test will initiate the standard TAS self-test. Refer to the TAS Pilot's Guide for information on Test mode. Test will only be displayed on the menu when in Standby.



Figure 4: Menu w/o Stormscope

Main Menu with Stormscope

Help Menu

Help is the only available function when Traffic is configured with the WX-1000 Skywatch Display Unit and Stormscope. All operator functions are performed at the

WX-1000 display.

Traffic Main Menu (Bendix/King TAS)

When a Bendix/King TAS is used as the traffic awareness sensor, there are no menus. To leave the Traffic display press the ESC button. This will return you to the last function you were at prior to viewing Traffic.

Data Pane Displays

The data pane contains two constant displays: TAS and Extent.



Figure 5: Data Pane

The TAS display indicates the mode of operation.

TAS Displays

Off

Displayed if there is no power to the Traffic Sensor unit. The FSD will display sensor OFF.

Active

Indicates the unit is functioning normally.

Fail

Indicates a failure has occurred.

Stdbby

Indicates the unit is in the standby mode.

Test

Indicates the unit is undergoing a self test.

Extent Displays

Extent displays the selected altitude range of the system. Figure 6 depicts the various altitude display modes.

Normal

Displays traffic 2700 ft. above and below your aircraft.

Above

Displays traffic 2700 feet below you and extends the

ceiling up to 9000 feet above your aircraft.

Below

Displays traffic 2700 feet above you and extends the floor down to 9000 feet below your aircraft.

Unlimited (Unltd)

In this mode the FSD provides maximum altitude coverage above and below your aircraft. The maximum coverage is ± 9900 .

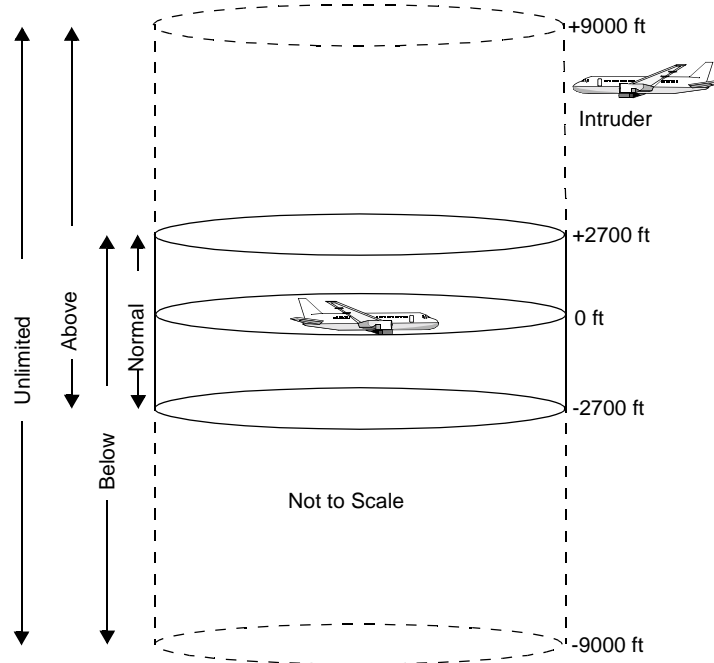


Figure 6: Altitude Display Modes

How to Use Traffic

Accessing Traffic

FlightMax Traffic starts automatically as part of the normal initialization sequence of the FSD. To use Traffic press **Escape** to bring up the Main Menu then select TRAFFIC. Traffic then displays its data page and main menu.

Operation

Skywatch Without Stormscope

For systems without a Stormscope attached, FlightMax Traffic allows the operator to transition between operate, standby and test mode. Switching to Test mode can only be done when the aircraft is on the **ground**. To transition between operate, standby and test do the following:

1. From Traffic's main menu, select STANDBY to enter standby mode.
2. From Traffic's main menu, select OPERATE to enter operate mode. The ability to switch out of STANDBY on the ground in conjunction with the ABOVE display mode is useful for scanning the airspace above the airport before takeoff.
3. From Traffic's main menu, select TEST, the system will perform the normal Skywatch startup self test.

NOTE: Test mode can only be entered into while the aircraft is on the ground.

Skywatch With Stormscope

For systems with a Stormscope attached, the system goes through the following sequence:

1. Upon power up, the Goodrich Skywatch unit performs a self-test.
2. If the Skywatch unit passes the self-test, and the aircraft is on the ground, FlightMax Traffic enters standby mode.

3. If the Skywatch unit passes self-test, and the aircraft has a squat switch and is in the air, FlightMax Traffic enters normal operating mode, with the maximum display range and an altitude display mode of NORMAL.
4. If the aircraft has a squat switch and FlightMax Traffic is in standby mode, Traffic will automatically enter normal operating mode 8 to 10 seconds after takeoff.
5. Upon landing, FlightMax traffic will automatically enter standby mode 24 seconds after landing.

NOTE: All behavior of FlightMax Traffic described in the preceding is determined by ARINC commands FlightMax Traffic receives from the TAS sensor

Bendix/King TAS Operation

Bendix/King TAS operation is done by external control. See your TAS pilot's guide and installer for information on how your unit is controlled.

Control Knob Functions

Outer Knob - Extent

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→UNLIMITED

Rotating the knob clockwise will produce the opposite sequence.

Inner Knob - Range

The inner knob is used to select the range (scale). The possible ranges for Skywatch are: 2nm, 6nm and 11nm. The Skywatch HP adds an additional range of 35nm. The Bendix/King sensors use 2nm, 6nm, 10nm, 20nm and 40nm. Turning the knob counter clockwise will decrease the range scale.

Once the display range is at the lowest range, further counter clockwise turns will have no effect.

Turning the knob clockwise will increase the range scale.

Once the display range is at maximum range, further clockwise turns will have no effect.

NOTE: At the maximum scale a dark blue field surrounds the outer radius. This indicates that aircraft are not indicated beyond that range.

Audio

The Audio function of TAS is still active when the FSD is being used. Aural Traffic awareness warnings are generated from the TAS Sensor and connected directly to the aircraft audio system.

NOTE: There is no direct control of the audio from the FSD.

Messages and Error Indications

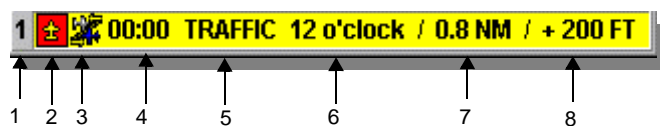
The system status annunciation describes the operating state of the system. The status is displayed in amber or cyan letters across the main Data page.

Table 1: Messages Issued by Traffic

Message	Meaning
MESSAGE COLOR = CYAN	
SENSOR STANDBY	Indicates the sensor is in standby mode. Standby is the normal status while the plane is on the ground. You must switch out of STANDBY to display traffic information.
SENSOR OFF	Indicates that the TAS sensor is powered down or incorrectly attached to the FSD (i.e. connected to the wrong ARINC port).
SENSOR FAIL or SENSOR DATA FAIL	Indicates that the TAS sensor or FSD has a fault.
SENSOR SELFTEST	Indicates the TAS is performing a self testing diagnostic. The self test can only be run from the Standby mode. Upon successful completion of the self test an audio message will be heard "Traffic Advisory System Test Passed" and the FSD screen will display STANDBY. If SENSOR FAILED is displayed, try repeating the test a few times. If it continues to fail refer to the TAS Pilot's Guide.
MESSAGE COLOR = AMBER	
SENSOR FAIL or SENSOR DATA FAIL	Indicates that the TAS sensor or FSD has a fault.
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 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. The yellow background indicates that confirming this message (by pressing enter) will take you to the issuer's data page (in this case Traffic).



1. Number of messages awaiting Confirmation
2. Priority
3. Issuer
4. Elapsed time since message was issued/updated (in the case of a TA, the time remains at 0)
5. Type of Message
6. Bearing to intruder
7. Range in nautical miles
8. Vertical Separation

Traffic Advisory Criteria

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

Sensitivity Levels

The Skywatch sensor uses two sensitivity levels for detecting intruders and generating a traffic advisory.

- *Sensitivity level A* is used during take-offs and landings. Its purpose is to reduce the number of nuisance TA's encountered during those phases of your flight.
- *Sensitivity level B* is used to maximize the detection of intruders during the cruise phase of your flight.

The sensitivity levels are explained below.

Table 2: Sensitivity Level Parameters

Sensitivity Level	TA Parameters
A	Intruder is detected within 0.2nm horizontal radius and a ± 600 ft relative altitude
	Intruder is detected within 15 -20 seconds of CPA*
B	Intruder is detected within 0.55nm horizontal radius and a ± 800 ft relative altitude
	Intruder is detected within 20 -30 seconds of CPA*

* CPA means Closest Point of Approach

Sensitivity Level Criteria

There are three criteria that the Skywatch uses to determine which sensitivity level the sensor will operate in:

- Does your aircraft have a radio altimeter?¹
- The current altitude of your aircraft
- The type and status of your aircraft's landing gear

The Sensitivity Level Criteria table on the next page provides a matrix of all possible configurations based on the three criteria that the Skywatch sensor uses to issue a traffic advisory and at which sensitivity level

1. Having a radio altimeter means having a compatible Arinc 429 radio altimeter wired to the Skywatch and providing valid altitude information.

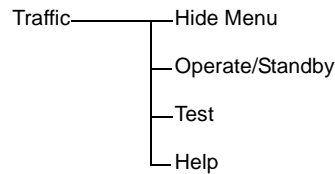
Table 3: Sensitivity Level Criteria (Skywatch)

Sensitivity Level	Radio Altimeter	Your Aircraft's Altitude	Your Landing Gear
A	Yes	Below 2000 ft AGL	N/A
B	Yes	Above 2000 ft AGL	N/A
A	No	N/A	Down
B	No	N/A	Up
B	No	N/A	Fixed

Menu Path

The following Menu Tree graphically depicts the paths to all the Traffic menu functions.

Without Stormscope



With Stormscope

