

# FlightMax™

Flight Situation Display

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## FlightMax Map

Part Number 600-0057 Revision 01

### Revision History

Date	Revision	Description
Sep. 7, 2000	00	Pre-production Release
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# FlightMax Map Contents

<b>Introduction</b>	<b>1</b>
Database Updates .....	2
Limitations and Other Restrictions .....	2
Map and Position Source Interface .....	3
<b>FlightMax Map Overview</b>	<b>4</b>
<b>FlightMax Map Displays and Menus</b>	<b>5</b>
FlightMax Map Main Menu .....	7
Fixed Function Display .....	10
Wx .....	12
Overlay Sensor Status .....	19
Track and Heading .....	23
<b>Navigational Symbols and Data</b>	<b>25</b>
Symbols .....	25
Data Blocks .....	28
<b>How to Use FlightMax Map</b>	<b>31</b>
FlightMax Map Startup .....	31
Display the Traffic Overlay .....	32
Changing the FlightMax Map's Scale .....	32
Changing the Map's Orientation .....	32
To Select a Weather Overlay .....	33
Changing the Map Type .....	33
Compass Rose Display .....	34
Find the Nearest Waypoint/Airport .....	34
Display Runway Depiction .....	34
Change the Airport Display Settings .....	35

Change the NavMap Settings .....	35
Declutter the Map .....	35
Change the Knob function .....	36
Modify the Data Blocks .....	36
<b>Failure Indications</b> .....	<b>38</b>
Loss of Position .....	38
Loss of Heading/Track .....	38
Unhealthy Sensor .....	39
<b>Menu Organization</b> .....	<b>40</b>

## Figures

Figure 1: Map Icon .....	1
Figure 2: Map Data Page .....	5
Figure 3: Map Main Menu .....	7
Figure 4: Settings Menu .....	7
Figure 5: Data Block .....	8
Figure 6: Airports Displayed Page .....	8
Figure 7: NavMap Settings Page .....	9
Figure 8: Fixed Function Display keys .....	10
Figure 9: The Nearest Page .....	11
Figure 10: Airport Information .....	11
Figure 11: Terrain Legend .....	14
Figure 12: Trip Page .....	17
Figure 13: Overlay Status .....	19
Figure 14: Line Styles .....	27
Figure 15: Track and Heading Indicators .....	24

## Tables

Revision History .....	ii
Table 1: Elevation colors .....	15
Table 2: Color Code for Overlay Status .....	19
Table 3: Map Layers .....	20
Table 4: Traffic Threat Symbols .....	22
Table 5: Lightning Symbols .....	22
Table 6: Map Symbols-Navigational Fixes .....	25
Table 7: Map Symbols-Airports (Fuel Available) .....	26
Table 8: Map Symbols-Airports (NO Fuel Available) ...	26
Table 9: Line Styles for Airspaces and Airways .....	27
Table 10: Map Symbols-Other .....	28
Table 11: Data Block Information .....	29



# FlightMax Map

## Introduction

This part of the Pilots Guide explains Flightmax Map.

Flightmax Map is an overlay display that combines most of Avidyne's applications into one unified display. In addition to the overlay feature, Map also displays navigation information. Topics in this section include:

- *FlightMax Map Overview* - presents an overview of the Map function and its various modes of operation.
- *FlightMax Map Displays and Menus* - explains every page and menu used in FlightMax Map.
- *Navigational Symbols and Data* - explains all the symbols and data displays used by Map.
- *How to Use FlightMax Map* - explains how to use the overlay features of Map as well as other Map functions.
- *Failure Indications* - explains what is displayed when position data, heading/track data or sensor data is lost or invalid.
- *Menu Organization* - graphically shows the path to any menu in FlightMax Map.

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



Figure 1: Map Icon

## Database Updates

FlightMax Map includes a complete database of airports, nav aids, airways, and navigational fixes. This database is used with the moving map to provide navigational information, and situational awareness.

The database should be kept current. Updates are available on CD-ROM. Consult the FAA-approved Flight Manual Supplement for details of any limitations imposed on the use of FlightMax Map when the database has expired. Contact Avidyne (1-800-AVIDYNE) for database update services.

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### **WARNING**

FlightMax Map is an electronic aid to navigation, designed to be used in conjunction with approved navigational charts, not to replace them. Only charts and Notices to Airmen contain all of the information needed for safe flight and the pilot is responsible for their prudent use. It is a violation of the Federal Aviation Regulations to conduct flight operations without all available information concerning the flight. It is the pilot's responsibility to obtain, understand and obey current FAA guidance on the use of GPS-based navigational equipment and database currency requirements.

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## Limitations and Other Restrictions

FlightMax Map uses data supplied by a position source (GPS, FMS, etc.). Both the FlightMax FSD and the position source must be separately approved for use in your aircraft. Limitations that apply to the position source also apply to the FSD. If your GPS receiver is limited to



VFR use, this limitation applies to any use of its data by the FSD. Limitations may be imposed as part of the certification of FSD installation in your aircraft.



The use of FlightMax Map may be subject to limitations that are specific to your installation. Limitations are listed in your Approved Flight Manual Supplement, not in this manual, and are binding under the Federal Aviation Regulations.

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### **Map and Position Source Interface**

FlightMax Map has been designed to interface with the most common positional sources available for general aviation, including the GPS and FMS. Any position source is capable of monitoring and reporting its operating status, which allows it to perform some of the following:

- detect loss of satellite reception
- detect excessive error in position estimation based on poor satellite geometry
- detection of reception or calculation errors by comparing the results obtained with different sets of satellite
- other conditions that could result in inaccurate position reports.

The type of certification the position source received determines the degree of self monitoring and annunciation.

The GPS/FMS is responsible for verifying the integrity with the FSD, and reporting any failures it detects to your FSD. The pilot is also responsible for cross-checking the position source for messages that indicate current or impending failure.

## FlightMax Map Overview

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FlightMax Map is a flexible moving map display. It can display a terrain or political map which can be overlaid with navigational information as well as other FlightMax functions including: Radar, Lightning and Traffic displays. The amount of detail and layers is controlled by the pilot.

FlightMax Map's moving map is generated from a database of information on airports, navigation aids, and airways. The aircraft's position, ground track, and heading are obtained from the external GPS receiver or Flight Management System (FMS). Other features, such as airports, navigation aids, and airways, are shown on the map in the proper position, with appropriate graphics. Detailed information about any airport or navigation aid in the navigation database is also available, when viewing the Nearest Page.

All flight plans are from the external navigational data source (GPS/FMS). When a flight plan is active, it is depicted on the map. The appropriate navigational information is also displayed.

FlightMax Map's display can be customized (within limits) to reflect the pilot's information requirements. In addition to the map display, there are two configurable data blocks available for navigation information. The overlay feature allows pilots to display radar, lightning and traffic information over the map. The amount and type of data displayed is controlled by the declutter function. This function defines which information is displayed at various map scales.

The pilot may adjust the map's scale and orientation at any time.

## FlightMax Map Displays and Menus

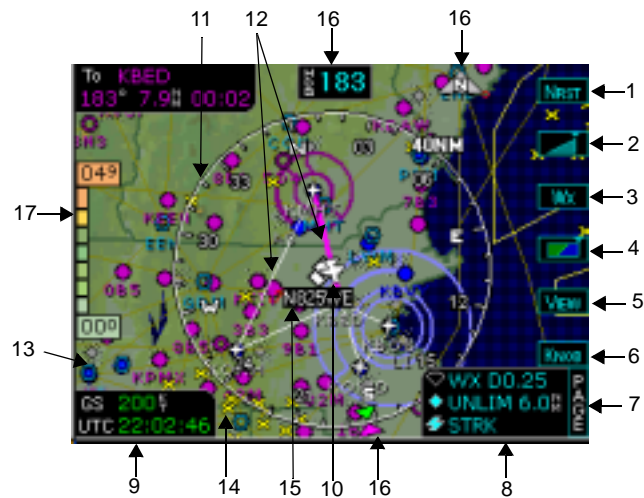


Figure 2: Map Data Page

1. **NRST** - Provides access to database information about the nearest airports, VOR's, or NDB's within a 60nm radius of the aircraft's present position.
2. **Declutter** - The declutter function provides a choice of four predefined levels of database nav map detail.
3. **Wx** - The Wx function selects the available weather sensors for display, radar and or lightning.
4. **MAP** - The MAP function will cycle through three types of map displays, none, base and terrain (+base).
5. **View** - The View function orients the map for Center view (shown), Forward view, Track/Heading, or North up.
6. **Knob function Select** - Selects the function of the outer knob. The functions are; trip page, bearing line control , and radar tilt .
7. **Knob Status** - Indicates the current function of the outer knob.
8. **Sensor Status** - Displays the status of the three external sensor functions, Radar, Traffic and Lightning.

9. **Data (Status) Blocks** - Contain course and navigation data. They are user defined and can be removed from the display.
10. **Airplane Symbol** - Shows the position of your aircraft in relation to the moving map and the selected view.
11. **Compass Rose** - Displays a 360° or 120° compass circle or arc. Also indicates the current range setting.
12. **Course Indications** - a magenta line represent the current leg of the trip, white lines represent all other legs.
13. **Nav Symbols** - The various nav symbols are described in Table 6 through Table 10. The amount of symbols is controlled by the Declutter button.
14. **Weather Indications** - Weather indications from the Radar and Lightning sensors are displayed when the weather overlays are active. The same symbology is used (lightning strikes are shown in Figure 2).
15. **Traffic Symbols** - Traffic indications from the Traffic sensor are displayed when the Traffic overlay is active. The same symbology is used.
16. **Track/ Heading Indications** - Three triangles around the compass rose provide actual track, desired track and heading indications. H/T Block provides the numerical heading info. The map orientation is indicated in the triangle to the right of the H/T Block. Indications are; N (North up), HDG (Heading up), TRK (Track up).
17. **Terrain Elevation Indicator (shown only when terrain is displayed)** - Indicates the color range currently being used. The numeric value is also indicated.

## FlightMax Map Main Menu

The FlightMax Map main menu (Figure 3) provides access to various operating functions used to control the Map display.

### Traffic

Selecting Traffic allows the pilot to turn on/off the traffic overlay. This is a toggle function, a check mark indicates that the Traffic overlay is active. The traffic display is dependent upon the type of traffic sensor being used and how the display is configured.



Figure 3: Map Main Menu

**NOTE:** If your FlightMax does not interface with a traffic sensor, this menu item will not be displayed.

### Compass Rose

Selecting the compass rose turns on/off the compass rose display. Depending upon the view selected, a full 360° ring is displayed or a 120° arc is displayed over the moving map. The cardinal points are labeled on the ring as well as tick marks in 10° increments. The ring is oriented in a track up or north up (magnetic) direction, depending on the view selected. Switching between views also changes the location of the aircraft symbol.

The current range scale (from 1nm to 500nm) is also shown next to the Compass Rose. However, when the Compass Rose is turned off, a basic range ring is still displayed.

### Clear Strikes

Clears the current lightning strike data being displayed.

### Settings

Selecting the Settings function provides access to the Settings submenu (Figure 4).

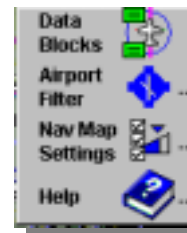


Figure 4: Settings Menu

### Data Blocks

Selecting this function will allow modification of the data blocks. The navigation item being modified is highlighted in green (Figure 5). Up to four line items within each data block can be modified. The inner and outer knobs are used to select and modify the data block ( See “Modify the Data Blocks” on page 36.). The changes are complete when Data Blocks is deselected from the sub menu or when the Fixed Function keys are displayed and the knobs key is pressed.



Figure 5: Data Block

### Airport Filter

Selecting Airport Filter will bring up the Airports Displayed page. This page is used for defining the airport type and symbols to be displayed. The Min. Runway Length box can be used to filter out airports by runway length (from 2000ft. - 7000ft. or show all lengths).



Figure 6: Airports Displayed Page

### Nav Map Settings

Selecting this function will bring up the NavMap Settings page (see Figure 7). This page is used to define the navigation symbols for the Declutter button. Individual items can be selected for display or a specific group of items can be selected by choosing the VFR or IFR Default buttons.

Defining the NavMap settings will provide the pilot with some choices as to what items are available for display. The display of NavMap symbols is determined by this page, range, and predefined settings of the DeClutter button.



Figure 7: NavMap Settings Page

Each navaid has three possible Display settings:

**On** - Certain types of NavMap symbols will be displayed all the time regardless of range.

**Auto** - The navaid is displayed automatically. At lower map scales the navaid is displayed and as the scale is increased (zoomed out), at some “predefined point” the navaid is no longer displayed. The point at which the navaid is no longer displayed is based on the number and density of the symbols or display elements.

**Off** - Certain types of NavMap symbols are never displayed, regardless of range.

A check in the label box indicates the navaid name is displayed along with the symbol. If the box is grayed out,

there is no choice in label display.

The nine circles to the right of the navaid represent the nine available map scales (1, 2, 5, 10, 25, 50, 100, 250, 500nm). A cyan color in the circle indicates that the navaid is displayed at that range. If the circle is open than its not available at that particular range. The vertical dash line indicates the current scale that is displayed on the moving map. See “Change the NavMap Settings” on page 35. for procedures on how to change the settings.

**NOTE:** With a radar interface, some of the map scales will be the scales from the radar range. For example: if you have an RDR 1300 radar, one of the scales will be 40 instead of 50nm. Map will still cover a 1-500nm range no matter the limits of the radar.

### Fixed Function Display

The Fixed Function Display keys (see Figure 8) are accessed by pressing any one of the line select keys only when the menus are not displayed.

#### NRST

The NEAREST page (Figure 9) provides information about navigational fixes, including airports within 60 nm of your present position. The small window is used to select the waypoint type: airport, VOR, or NDB. The large window displays the list of the selected type. The list includes the ID of the waypoint, the bearing and distance from your present location, and it’s radio frequency.

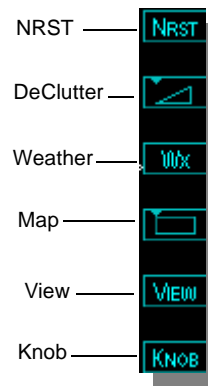


Figure 8: Fixed Function Display keys



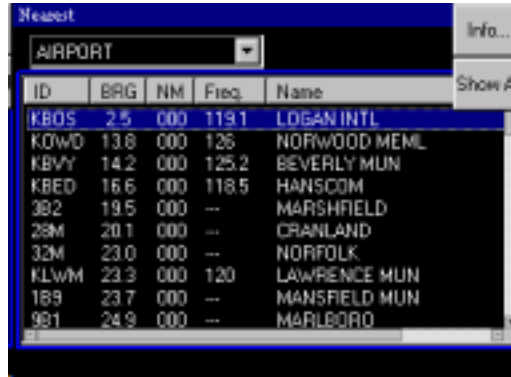


Figure 9: The Nearest Page

Use the outer knob to switch between the waypoint type and list. Use the inner knob to scroll and select the waypoint from the list. Selecting the Info key (see Figure 10) will display more information about the runway and radio frequencies of the selected airport (if available). The Show All/Filter key is used to show all airports or to apply the filter as defined in the Airport Display page (see Figure 6).







Figure 10: Airport Information

## Declutter

The Declutter button is used to reduce the number of displayed navigation symbols on the map. There are four selectable levels of declutter. The highest level of map content displays all available nav symbols. Each subsequent level reduces the number of symbols displayed until the lowest level is reached, where only the flight plan is displayed (no NavMap symbols are displayed). Decluttering is based on the density of symbols being displayed. Moving through areas of high and low density will cause symbols to appear and disappear from the screen. Which symbols get removed at each level is determined automatically by the software. The pilot does have some choices as to what NavMap symbols are displayed, based on the settings in the NavMap Settings page and the range selected.

**NOTE:** Changing ranges will also declutter the map. Certain symbols are not displayed at the higher map scales. See “Nav Map Settings” on page 9.

The declutter symbol represents a sliding scale with the following meanings:

-  Maximum map content
-  Medium map content
-  Minimum map content
-  Nav Map is not displayed

## Wx

The Wx button turns on/off the weather overlays on the moving map display. Radar and Lightning are the two weather overlays available (if a radar and lightning source are connected to your system). The weather overlays can be displayed together or separately. The status of each weather overlay is shown in the status box located in the lower right corner of the display. A solid color symbol indicates that the overlay is in use. An open outlined symbol indicates the layer is not displayed. A yellow fill in the symbol indicates the function is on but is not available

for display at Map. This could indicate that radar or lightning is not turned on at its function display, there is a communication problem between Map and the function, or the function is not configured properly for Map.

**NOTE:** Whatever settings were being used in the function are applied to the function when its being used as an overlay, i.e. if Lightning was in the cell mode then when its brought up as an overlay, it is also in the cell mode.

The weather overlay sequence is as follows:

	RADAR	LIGHTNING
1	OFF	OFF
2	OFF	ON
3	ON	ON
4	ON	OFF

### Map Level

The map button is used to select the type of map display used under the NavMap display. There are three types of map displays available. They are:

#### None

No map features are displayed. The background color is solid black.

#### Base Map

Only political boundaries and water are displayed against a black and blue background.




#### Terrain (+Base) Map

Political boundaries, water and terrain features (based on USGS terrain maps) are displayed. Terrain maps are available for North America, Europe, and Australia.

Map data is not displayed when your own ship's latitude is greater than 75 degrees (North or South)

The Map level button represents a sliding scale that

represents the following map level:

-  Terrain and Base Map
-  Base Map Only
-  No Maps

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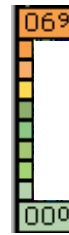
 **WARNING**

Not for terrain avoidance. Terrain maps are derived from the USGS EDC. They use DTED (digital terrain enhanced data) as a basis for their maps. The maps have a vertical accuracy of  $\pm 30$  meters linear error at 90 percent confidence level.

Under NO circumstances should the color representations be used as a basis for terrain avoidance.

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The colors used by FlightMax Map for terrain representation should in no way be used to determine relative altitude to your aircraft. The color scale ranges from a light green, representing low elevations to a dark brown, representing higher elevations with white representing altitudes above 15,000 feet. The Terrain Display Legend, visible when the terrain map is viewed, shows the color range from the lowest to the highest elevation for the current display. The numerical representations are in hundreds of feet.



**Figure 11:**  
**Terrain Legend**

Table 1 gives the altitudes for the color ranges used on the terrain maps.

**Table 1: Elevation colors**

<b>Range</b>	<b>Colors</b>
0 to 2500 ft.	Light green, to dark green
>2500 to 3000 ft.	Yellow
>3000 to 15,000 ft.	Light brown to dark brown
>15,000 ft.	White

### **View**

The view button is used to orient the airplane symbol to the map. The View button cycles through the following view orientations:

- Forward View - Heading/Track UP
- Center View - Heading/Track UP
- Center View - North UP

There are three possible views:

#### **Forward View**

Places the aircraft symbol at the bottom center of the display. In forward view most activity is depicted as occurring in front of your aircraft. The compass rose is displayed as a 120° arc ahead of your aircraft. Lightning strikes and radar sweeps are displayed within the 120° arc.

In forward view the airplane symbol remains stationary with the nose pointing to the top of the screen. The map moves under the airplane symbol, to indicate ground track.

#### **Center View**

Places the aircraft symbol in the center of the display screen. Activity is depicted a full 360° around the airplane. The compass rose is displayed as a 360° ring. Lightning strikes are displayed a full 360° around the airplane. Radar is displayed within the limits of your radar arc parameters.

In center view the airplane symbol remains stationary with the nose pointing to the top of the screen. The map moves under the airplane symbol, to indicate course track.

**NOTE:** GPS receivers determine ground track, not heading. When the aircraft is stationary, ground track is indefinite, which means the display may not be properly oriented to the aircraft's heading. Also at very low ground speeds the ground track may appear erratic. Some GPS receivers do not report ground track when the aircraft is stationary or at very low ground speeds. FlightMax Map reports whatever data it receives from the GPS receiver.

### **North Up**

In North up the map is oriented with true north toward the top of the screen. The airplane symbol rotates to reflect your ground track angle or heading. In NORTH UP mode, the map does not rotate; only the airplane symbol rotates in response to turns.

The compass rose is displayed as a full 360° compass. The airplane symbol remains centered within the compass, but changes its orientation depending on course track and heading.

### **Knob**

Selecting the knob button determines the function for the *Outer* knobs. There are three possible choices:

#### **Page**

Turning the outer knob brings up the Trip page. The trip page provides relevant information for the current flight plan (Figure 12). Planned route data is displayed in the largest portion of the page. It lists next waypoints and route information from the current point to a destination. The planned distance and course (for To Waypoint) are given. The current route leg is the first line in the list of waypoints (the line with a "to" in front of it). The final destination is the last line of the list (the one with a "Dest" in front of it). It also lists ETA (estimated time of arrival) and cumulative ETE (estimated time en route) to each waypoint. The ETA and ETE calculations are based on the current rate of closure to the current waypoint, then travel along the planned route of flight at the current ground speed thereafter. ETA is reported in local time.



Figure 12: Trip Page

The top portion of the page displays your ground speed and track. Local and UTC time are also displayed.

A Course Deviation Indicator (CDI) showing lateral distance from the desired course is also shown. This is a graphical indication of the value given numerically for the To Wpt. There is  $\pm 5$ nm maximum deflection, regardless of system units setting. Arrow points toward current waypoint – up if fix is ahead, down if fix is behind. CDI is always correct sensing.

FlightMax Map's CDI does not act like a conventional OBS-style CDI, it reacts more like an HSI.

FlightMax Map uses your ground track angle and its knowledge of the location of the current waypoint to determine whether the waypoint is generally forward or aft of you. The direction indicator on the CDI is set accordingly.

The sensitivity for FlightMax's CDI does not change with distance to a fix, unlike a VOR. With FlightMax Map, the sensitivity and accuracy of the deviation bar is fixed at 5 nm maximum deflection.

The trip page is continuously maintained during flight. The distance and time values are updated with each new position fix from the GPS. The route legs advance with each waypoint passage.

If the flight plan doesn't fit on the entire screen, an ellipsis

(three dots to indicate an omission) is shown in the next to last line of the screen. The last line is still displayed.

**NOTE:** All flight plans are from the GPS/FMS.

### **Brg**

Selecting bearing brings up a bearing line display. The bearing line is a white line drawn from the airplane symbol position to the outer range ring. The bearing line provides the pilot with an approximate bearing to any point within the range ring, i.e. a region of weather. The bearing number, in degrees, is displayed within the line and changes to reflect the corresponding movement of the bearing line.

The outer knob is used to move the bearing line right or left. The bearing line remains on screen until it is deselected or there is no knob movement for 15 seconds. Then the outer knob function reverts back to “Tilt” control. For systems without radar the display reverts back to “Page”.

### **Tilt**

Selecting tilt provides for manual adjustment of the radar antenna using the outer knob. A screen annunciation indicates the angle and direction of the radar antenna: U for up, D for down and the amount of antenna tilt in quarter degrees, using decimal notation.

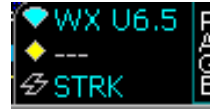
**NOTE:** Tilt is not displayed if there is no radar connected to the FSD.



## Overlay Sensor Status




The Overlay Sensor Status box displays the current operating status of the three overlay sensors: Radar, Traffic and Lightning. The type of status information includes the sensor operating state, range options, selectable modes, etc. For example, Radar may be in Hold, Traffic is set for Unlimited range and Lightning is operating in Cell mode. This type of information will be displayed as a single line of text next to the sensor icon. When a sensor fails, the status line for that sensor will display "FAIL" in yellow.

To the left of each sensor status line is a symbol representing the sensor. The color of the symbol indicates the sensor status. The color-coding of the symbols indicates the following:



**Figure 13: Overlay Status**

**Table 2: Color Code for Overlay Status**

Symbol	Status
 Radar	If the symbol is filled with cyan, the graphical data from that sensor is available for display in the FlightMax Map function.
 Traffic	If the symbol is filled with yellow, the system is unable to display data from that particular sensor. This may be due to a communication error, the function is not On, or there is a configuration problem.
 Lightning	If the symbol is empty (outline only), that function (radar, traffic, or Lightning) is not active in the FlightMax Map function. Radar and Lightning are turned ON/OFF by the Wx button and Traffic is turned ON/OFF at the FlightMax Map main menu.

### Overlay Sensor Parameters

Complete control of the configuration parameters and operating modes for the overlay sensors are controlled at that particular function. Some parameters and modes are not available in the FlightMax Map function.

For example: To change from strike mode to cell mode for the Lightning display you need to access the Lightning function and make the change. Contour cells is a way to display lightning strikes within the Lightning function but that mode is not available for display within the FlightMax Map function.

To understand how the layers of Map information are displayed refer to Table 3. The layers are listed in descending order, i.e. top level displays are listed at the top of the table and bottom level displays are listed at the bottom of the table.

**Table 3: Map Layers**

1	Status Block Data, Knob Label, Up Indicator, Own-Ship Symbol (OSS) and the Terrain legend Note: these items do not occupy common areas so the order among them is irrelevant.
2	Bearing Line
3	Traffic (when configured)
4	Range Ring3
5	Flight Plan
6	Lightning (when configured)
7	Navigational Data (when configured)
8	Radar Data (when configured)
9	Base Map (political boundaries and water) (when configured)
10	Terrain Data (when configured)
11	Black background

### **Radar**

The purpose of the radar display in FlightMax Map is to present radar echoes on the display. Depending on the display options selected by the pilot, the echoes may appear over terrain, political boundaries and or bodies of water, or they may appear against a black background as in a normal radar display. The FlightMax Map radar function is a full screen color depiction of mapped radar echoes in a 120° Forward View format or a 360° Center View format. The radar echoes are scaled and rotated to their correct position relative to the nose of the aircraft. The pilot has control of the radar range and sensor tilt function. The Weather Alert Mode (WxA and CYC) are also available in FlightMax Map.




Not all Radar features and messages are available while viewing radar in FlightMax Map. The following will cause a loss of the radar display in FlightMax Map:

- Radar is in Vertical Profile mode.
- Radar is off.
- Radar is in standby.
- If there is a communication error between Radar and Map

### **Traffic**

The purpose of the Traffic display in FlightMax Map is to present airborne intruders on the display. There are several possible traffic sensors available for use with FlightMax Map including SkyWatch, TCAD, and TCAS. Intruders are displayed as they are received from and identified by the sensor. The threat level assigned to an intruder is the threat level specified by the sensor when it transmits the intruder data. Threat data, range, bearing, altitude, ID and closing direction is defined by the sensor and the type of sensor used in your system. See the Traffic section.



**Table 4: Traffic Threat Symbols**

Symbol	Description
 Traffic Advisory	Solid yellow circle with black border.
 Proximate Traffic	Solid white diamond with black border.
 Other Traffic	Open white diamond with white border.

**Lightning**

FlightMax Map displays thunderstorm lightning strike data with the Lightning overlay display. Lightning data comes from a passive thunderstorm detection system, such as a BF Goodrich Stormscope WX-500. The Thunderstorm Detector system maps thunderstorm activity by monitoring electrical discharge activity within a 200-mile radius of the aircraft. Thunderstorm information consists of current cell data (including range and azimuth) or strike data (including range and azimuth). Lightning strikes less than 25nm distant are not displayed if the display range is set too less than 25nm. If the display range is set to greater than 25nm, all lightning strikes will be displayed.

**Table 5: Lightning Symbols**

Symbol	Description
 Strike Mode	Diagonal yellow cross (x), black border
 Cell Mode	Orthogonal yellow cross (+), black border

FlightMax Map removes strikes when they are older than three minutes. To clear strikes, use the CLEAR STRIKES function from Map's main menu.

## Track and Heading

FlightMax Map operates in a track-referenced or heading-referenced configuration. The possible sources for Track and Heading are: GPS, FMS, Stormscope (WX-500), and SkyWatch. Your installer will configure your system based on the equipment in your plane.

There are two screen views: Centered View and Forward View. These views are referenced to the aircraft symbol.

*Centered View* - The aircraft symbol is placed at the center of the screen.

*Forward View* - The aircraft symbol is placed at the bottom, center of the screen.

The display is capable of the following map orientations:

*North Up* - The map is oriented with true north toward the top of the screen. The airplane symbol rotates to reflect your ground track with a track source or heading with a heading source.

*Heading Up* - The map is drawn with the aircraft heading toward the top of the screen. The airplane symbol will always remain vertical and the map will rotate.

*Track Up* - The map is drawn with the ground track toward the top of the display screen. The airplane symbol will always remain vertical and the map will rotate.

**NOTE:** The combination of Forward View with North Up orientation is not available. Heading Up and Track-Up are mutually exclusive. If a heading source is available then Heading-Up and North-Up are the available map orientations. If no heading source is available then Track-Up and North-Up are the available map orientations.

The map orientation is annunciated on the display as described in the next section.

### Track and Heading Indicators

There are several indicators on the FlightMax Map display that provide Track and Heading information.

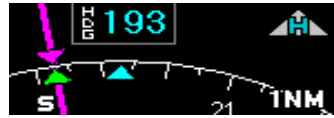


Figure 14: Track and Heading Indicators

**Track** - A magenta triangle is displayed on the outside of the range ring at the angle of desired track. This triangle is only displayed if the GPS source is providing the desired track.

A green triangle is displayed on the interior of the range ring at the actual track-angle. The green triangle is displayed only if, the GPS source is providing actual track information.

If a heading source is providing valid heading, a cyan triangle is displayed on the interior of the range ring pointing to the actual heading.

**Heading/Track Block** - If the current heading/track angle is valid, it is displayed numerically at the top of the screen, in the Heading/Track box. The numbers are cyan color if the source is heading, and green for track.

Abbreviated text is placed to the left of the number: HDG for heading, and TRK for track.

**Up Indicator** - The triangle symbol to the right of the Heading/Track Block indicates the view orientation. The symbol is only present if the current heading/track is valid. The letter within the triangle indicates which view orientation is up:

N = North Up

H = Heading Up

T = Track Up

See page 38 “Loss of Heading/Track” for what happens when heading or track is lost or invalid.

## Navigational Symbols and Data

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### Symbols




FlightMax Map's moving map uses symbols contained in its navigational database, based on your navigational mode and flight situation.

FlightMax Map can display the following database items:













- Airports
- Nav aids (VORs, NDBs and Waypoints)
- Airways ( Victor and jet)
- Intersections, waypoints and other named fixes
- Class B and Class C controlled airspace
- Certain classes of special use airspace (Prohibited, Restricted, Warning, Alert and Military Operating Areas)

Navigational symbols used by FlightMax Map are shown in Table 6 through Table 10.













**Table 6: Map Symbols-Navigational Fixes**

Symbol	Item	Description
	NDB	All NDB's
	VOR	All VOR's
	Waypoint	Terminal, Jet and Victor airway waypoints (intersections)

**Table 7: Map Symbols-Airports (Fuel Available)**

Fuel			Airport Type
Hard	Soft	Water	
			Towered
			Towered
			Non - Towered
			Non - Towered

**Table 8: Map Symbols-Airports (NO Fuel Available)**

NO Fuel			Airport Type
Hard	Soft	Water	
			Towered
			Towered
			Non - Towered
			Non - Towered

**NOTE:** The larger airport symbols are displayed as the map scales are reduced to the smaller ranges.



### Lines

FlightMax Map uses several different line styles to convey airspaces and airways. Figure 15 and Table 9 describe the different line styles.

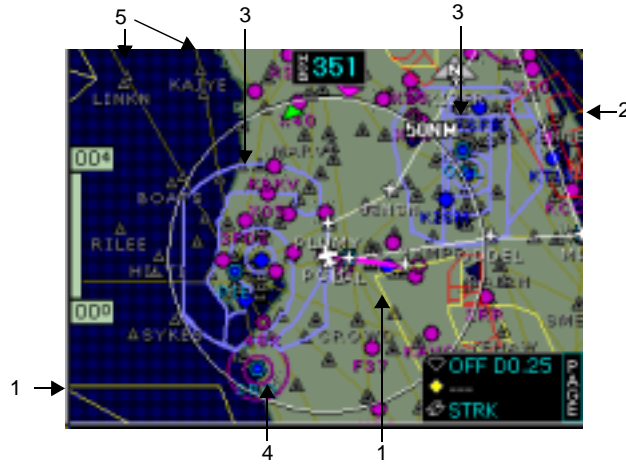







Figure 15: Line Styles

Table 9: Line Styles for Airspaces and Airways

#	Item	Color	Label
1	Military Operations Area	Yellow	ID label
	Alert Airspace	Yellow	ID label
	Warning Airspace	Yellow	ID label
2	Restricted Airspace	Red	ID label
	Prohibited Airspace	Red	ID label
3	Class B	Blue	Elevation
4	Class C	Magenta	Elevation
5	Victor Airways	Dark Yellow	ID label
	Jet Airways	Dark Yellow	ID label

**Table 10: Map Symbols-Other**

Symbol	Item	Symbol	Item
	Flight plan (inactive leg)*		Map Orientation
	Flight plan (active leg)		Airplane symbol
	Flight Plan, Course Waypoints		

\* If all legs are shown in white, the GPS is not reporting the active leg of the flight plan.

## Data Blocks

Navigational information on the moving map is presented in the Navigational Data Blocks. Each data block can display up to 4 items of navigational information, depending on the type and size of the information.

There are two possible data block locations, one in the upper left and one in the lower left corner of the display screen. If the data block is configured with no data, it will not be displayed. The content of each data block is determined by selecting navigational items from a database of 12 items. The navigational items are described in Table 11. The size of the data block is determined by the size and amount of text within the data block. The data block will automatically adjust to take up the least amount of real estate on the display screen.

A series of dashes (- - -) represents data that is invalid or unavailable at this time from the GPS.

Distances and speeds reported in the data blocks generally follow the system units settings.

**Table 11: Data Block Information**

Name	Description	Range
TO WPT	Name of, bearing and distance to the “to” waypoint in the active flight plan. Note that the bearing is from your <i>present position</i> directly to the fix. If you are off course, it will differ from your planned course. Distance is measured direct.	5 characters (Name) 1 to 360 degrees 0.0 to unlimited nm
TO WPT+ETE	Name of, bearing and distance to the “to” waypoint in the active flight plan. Note that the bearing is from your <i>present position</i> directly to the fix. If you are off course, it will differ from your planned course. Also displays ETE (Estimated Time En route)	5 characters (Name) 1 to 360 degrees 0.0 to unlimited nm HH:MM
NEXT WPT	Name of, and distance to the “next” waypoint in the active flight plan. Also displays ETE (Estimated Time En route)	5 characters (Name) 0.0 to unlimited nm HH:MM
DEST WPT	Name of and distance to final destination waypoint in system distance units. Distance is measured along planned route.	5 characters 0.0 to unlimited nm
NRST ARPT	Identifier of, bearing and distance to the nearest airport	5 characters (name)

**Table 11: Data Block Information**

<b>Name</b>	<b>Description</b>	<b>Range</b>
LAT/LON	Current latitude and longitude in degrees and decimal minutes	N/S 0 to 90° 0' E/W 0 to 180° 0'
BARO ALT	Barometric Altitude	Based on data from FMS or GPS (see Note)
GND SPD	Current ground speed in system speed units.	0.0 to 999.9 knots
TRUE AIRSPD	Actual airspeed	From FMS
UTC TIME	UTC (or "Zulu") time.	0 to 23h 59m 59s
LOCAL TIME	Local date and time. Derived from UTC time with time zone setting applied.	0 to 23h 59m 59s
blank	Blank space	

**NOTE:** The Baro Altitude is received from the FMS or GPS (via 429). The FMS calculates the altitude based on the barometric pressure entered into the FMS by the pilot.

This display is used to verify what has been put into the FMS/GPS. Do not rely on this display for terrain separation.

# How to Use FlightMax Map

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## FlightMax Map Startup

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

1. Turn Power on to the FSD. The FSD will go through its normal startup routine. The FlightMax Map product Identification page will appear.

Read all of the information on the product identification page and observe any operating limitations it reflects.

**NOTE:** FlightMax Map's product identification page provides important information on database currency. Map displays the expiration date for the navigation data being used or the word "Expired" if past that date.

2. When prompted to do so, press **Enter** to start the FlightMax Map application.

The FlightMax Map data page will appear.

3. The settings for FlightMax Map will be as follows:

View - Forward view, Heading/Track or last configuration prior to shutdown.

Declutter - last configuration.

Data blocks - last configuration.

Nav Map Symbols Setting - last configuration

Airport Filters - last configuration prior to shutdown

Traffic, Radar, and Lightning Overlays - are set to whatever configurations are available from the individual applications.

**NOTE:** The message bar will display several messages indicating the status of the system and the other applications. Note any problems that may have occurred with the other applications. Press Enter to clear all messages from the message bar.



## CAUTION

Operation with expired data may be hazardous and may be a violation of Federal Aviation Regulations. Avidyne recommends that Map is used with current data.

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### Display the Traffic Overlay

**NOTE:** Traffic can only be displayed if your system is configured with a traffic sensor.

1. Press the Menu key to display FlightMax Map's main menu
2. Select Traffic by pressing the line select key next to it.
3. To verify that the Traffic overlay is functional, check the traffic symbol (the middle one) in the status box located in the lower right hand corner of the display. The diamond should be a solid cyan color.

### Changing the FlightMax Map's Scale

The map can be displayed in a wide range of scales, ranging from one nautical mile up to 500nm.

FlightMax Map scale, or zoom level, is controlled by the inner knob. When viewing a map page the inner knob will always control the map scale.

1. Rotate the inner knob clockwise to increase (zoom out) the map scale. Rotate counter clockwise to decrease (zoom in) the scale.

### Changing the Map's Orientation

To change the maps orientation press the fixed function **View** line select key. There are three possible views:

Forward View - is verified by the airplane symbol located at the bottom center of the display and the compass rose display is a 120° arc.

Center View - is verified by the airplane symbol located in

the center of the display and the compass rose display is a 360° ring.

North Up - is verified by the airplane symbol located in the center of the display, the compass rose display is a 360° ring and the orientation symbol displays an “N”.

### **To Select a Weather Overlay**

To add the weather overlays (if available with your system) press the fixed function weather (Wx) line select key. Starting from a display with no weather overlays, there are three possible combinations:

1. Press the line select key once. This adds the Radar overlay. To verify that the Radar overlay is functional, check the Radar symbol (the top one) in the status box located in the lower right hand corner of the display. The symbol should be a solid cyan color.
2. Pressing the key again adds Lightning with the Radar overlay. To verify that Lightning has been added, check the Lightning symbol (the bottom one) in the status box located in the lower right hand corner of the display. The cross should be a solid cyan color
3. Press the key a third time and Radar is removed with only Lightning displayed
4. Pressing the key again removes all weather overlays. Selecting weather overlays is cyclic, you can continuously cycle through all the weather overlays.

### **Changing the Map Type**

To change the map display, press the fixed function Map line select key. Pressing the key will cycle through three possible map displays:

None - No map features are displayed. The background color is solid black.

Base Map - Only political boundaries are displayed against a black background.

Terrain (+Base) Map - Political boundaries, water and terrain features (based on USGS terrain maps) are displayed.

## Compass Rose Display

To display or remove the compass rose, do the following:

1. Bring up the Map main menu (Press Menu or Escape).
2. Select/deselect Compass Rose.  
A check mark indicates it is active.

## Find the Nearest Waypoint/Airport

1. Bring up the fixed function keys by pressing any line select key (if they're not visible).
2. Press the line select key next to the NRST button to bring up the Nearest page.
3. The top small window should be highlighted. Use the inner knob to activate the drop down menu and select the list of waypoints to view: Airports, VOR's or NDB's.
4. Use the outer knob to select the larger bottom window and the inner knob to scroll down the displayed list.
5. If airports were selected the Info and Show All key will be active, they are grayed out if VOR's and NDB's are selected. Use the inner knob to select (highlight) an airport.
6. Press Info to see more detailed information about the highlighted airport (provided there is information available), including runway information and com frequencies.
7. Press Show all/Filter to see all airport types or only the airport types as defined on the Airport filter page.

## Display Runway Depiction

To display runway depictions (if available), while flying near an airport, use the inner knob and adjust the range.

1. Under 10nm, white lines are used to depict the runway layout. Runway data is also displayed.
2. Between 10 and 25nm, a larger version of the airport symbol, with the runway layout is displayed.
3. Over 25nm just the airport symbol is displayed.



## Change the Airport Display Settings

1. Select MAP→SETTINGS→AIRPORT FILTER
2. The Airports Displayed page (Figure 6) appears.
3. Use the outer knob to highlight the type and surface of airport. Use the Min. runway Length (ft.) to filter airports by runway length.  
Use the inner knob to place a check in any box.
4. Press Enter to accept the changes.

## Change the NavMap Settings

1. Bring up the Map main menu and select Settings.
2. From the Settings submenu select Nav Map Settings, this brings up the Nav Map Settings page.
3. Use the outer knob to select the Display and Label boxes. Use the inner knob to change the setting.  
The Display setting choices are ON, OFF or AUTO  
The Label is displayed if the box is checked.
4. Use the VFR or IFR keys to select a predefined grouping of nav aids.
5. Press Enter to accept the changes.

## Declutter the Map

1. Bring up the fixed function keys by pressing any line select key.
2. Press the line select key next to the Declutter button (the right angle triangle symbol) to change the declutter display.  
A sliding arrow along the hypotenuse of the declutter symbol indicates what level of declutter is being displayed.

## Change the Knob function

1. Bring up the fixed function keys by pressing any line select key.
2. Press the line select key next to the knob button to change the knob function.
3. There are three possible functions:  
Page - Turn the outer knob to bring up the trip page.  
BRG - Bring up the bearing line. Turn the outer knob to orient the bearing line.  
Tilt - Allows manual control of the radar tilt. Turn the outer knob to move the antenna.  
The default setting is Page.

## Modify the Data Blocks

1. Bring up the Map main menu and select Settings.
2. From the Settings submenu select Modify Data Blocks.  
If the Data blocks are currently displayed the first line of the top left data block will be highlighted. The text will reflect the current data item in that position.  
If no Data blocks are displayed, the two data blocks will appear and the top line in the top left block will be highlighted. The text will say "blank".
3. Use the inner knob to select a data item for that line. When a new item is selected the change is reflected immediately.
4. Use the outer knob to move to the next line. Use the inner knob to make any changes to this line.
5. If no item is to go into a line, select blank.
6. There are two sizes of data items that can be used in the data blocks, double line and single line items. Each data block is limited to four lines. Any combination of single and double line items, totaling up to four lines can be used.
7. When all changes to the data blocks are complete, press the menu button to bring up the Settings submenu again.  
Deselect Modify Data Blocks. The green highlight line will disappear. Or press the fixed function knob key.

**NOTE:** Any changes will remain in effect, until the data blocks are modified again. This includes powering down the FSD, the last modification remains in effect.

A series of dashes (---) represents data that is unavailable at this time from the GPS.

## Failure Indications

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### Loss of Position

If the position source becomes unavailable or invalid, the following conditions will occur:

- all sensor data (radar, traffic, and lightning) is removed from the display.
- the aircraft symbol is removed from the display.
- the range ring labels (N,E W, and S) are removed from the display.
- the map and flight plan data will continue to be displayed but the display is based on the last known good position
- the map orientation annunciation is removed form the display

When position data is restored, FlightMax Map will resume normal operations.

### Loss of Heading/Track

If the heading/track source becomes unavailable or invalid, the following conditions will occur:

- all sensor data (radar, traffic, and lightning) is removed from the display.
- the aircraft symbol is replaced by a direction less symbol (a white + symbol).
- the range ring labels (N,E W, and S) are removed from the display.
- the map and flight plan data will continue to be displayed but the display is based on the last known good heading/track reading.
- the map orientation annunciation is removed form the display
- the heading/track indicator will display a series of dashes ("---")

When heading/track is restored, FlightMax Map will resume normal operations.

### **Unhealthy Sensor**

FlightMax Map monitors the "health" of the sensor applications (radar, traffic and lightning) by means of a signal pulse. Map looks for a signal every three seconds from each sensor. If it doesn't see this signal it assumes the sensor application has failed in some way. When this happens, the following occurs on the display:

- application data is removed from the overlay display.
- the word "FAIL" is displayed in the sensor's status line in yellow.
- the sensor symbol changes from cyan to yellow (if the sensor was on).

## Menu Organization

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

