

Garmin Ltd. Or its subsidiaries

c/o Garmin International
1200 E. 151st Street
Olathe, KS 66062 USA

FAA Approved Airplane Flight Manual Supplement

Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

Reg. No. _____ S/N _____

This Supplement must be attached to the FAA Approved Airplane Flight Manual when the Garmin G1000 Synthetic Vision and Pathways Option is installed in accordance with STC SA01533WI-D.

The information contained herein supplements the information of the basic Airplane Flight Manual and the airplane specific G1000 Airplane Flight Manual Supplement. For Limitations, Procedures and Performance information not contained in this Supplement consult the basic Airplane Flight Manual and Supplements.

Only Section 2, of this supplement "Limitations" is FAA APPROVED.

Robert Murray
ODA STC Unit Administrator
Garmin International
ODA-240087-CE

Date: _____

Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

190-01038-00 Rev 2

Page 1 of 25

This page is intentionally blank.

FAA Approved Airplane Flight Manual Supplement

Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

LOG OF REVISIONS				
Revision Number	Page Number(s)	Description	FAA Approved	Date of Approval
1	All	Initial Release	Robert Murray	2/24/09
2	10	Removed pathways limitation	See Page 1	See Page 1

Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

190-01038-00 Rev 2

Page 3 of 25

This page is intentionally blank.

FAA Approved Airplane Flight Manual Supplement

Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

Table of Contents

SECTION 1 GENERAL.....	7
SECTION 2 LIMITATIONS	9
SECTION 3 EMERGENCY PROCEDURES	10
SECTION 4A NORMAL PROCEDURES	11
SECTION 4B ABNORMAL PROCEDURES	17
SECTION 5 PERFORMANCE	18
SECTION 6 WEIGHT AND BALANCE	18
SECTION 7 DESCRIPTION AND OPERATION OF THE AIRPLANE AND ITS SYSTEMS.....	19
SECTION 8 AIRPLANE HANDLING, SERVICING, AND MAINTENANCE.....	25

Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

190-01038-00 Rev 2

Page 5 of 25

This page is intentionally blank.

FAA Approved Airplane Flight Manual Supplement
Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

SECTION 1
GENERAL

This document describes the Synthetic Vision sub system (SVS) that is an optional part of the Garmin G1000 Integrated Avionics System. This information supplements the information presented in the Aircraft Flight Manual and the aircraft specific Flight Manual. For additional information, consult the "G1000 Integrated Flight Deck Cockpit Reference for the Piper PA-46 Meridian", P/N 190-00764-01

The purpose of the SVS system is to assist the pilot in maintaining situational awareness with regard to the terrain and traffic surrounding the aircraft and the navigational situation relative to the programmed flight plan. A typical SVS display is shown below.



Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

190-01038-00 Rev 2

Page 7 of 25

FAA Approved Airplane Flight Manual Supplement
Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

SVS provides additional features on the G1000 primary flight displays which display the following information:

- **Synthetic Terrain**; an artificial, database derived, three dimensional view of the terrain ahead of the aircraft within a field of view of approximately 30 degrees left and 35 degrees right of the aircraft heading.
- **Obstacles**; obstacles such as towers, including buildings over 200 AGL that are within the depicted synthetic terrain field of view.
- **Flight Path Marker (FPM)**; an indication of the current lateral and vertical path of the aircraft. The FPM is always displayed when synthetic terrain is selected for display.
- **Pathway**; a pilot selectable three dimensional representation of the programmed flight plan path that can be selected for display alone or with the flight director anytime synthetic terrain is selected for display.
- **Traffic**; a display on the PFD indicating the position of other aircraft detected by the Traffic Alerting System (TAS) system.
- **Horizon Line**; a white line indicating the true horizon is always displayed on the SVS display.
- **Horizon Heading**; a pilot selectable display of heading marks displayed just above the horizon line on the PFD.
- **Airport Signs**; pilot selectable "signposts" displayed on the synthetic terrain display indicating the position of nearby airports that are in the G1000 database.
- **Runway Highlight**; a highlighted presentation of the location and orientation of the runway(s) at the destination airport.

Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

190-01038-00 Rev 2

Page 8 of 25

FAA Approved Airplane Flight Manual Supplement
Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

The synthetic terrain depiction displays an area approximating the view from the pilot's eye position when looking directly ahead out the windshield in front of the pilot. Terrain features outside this field of view are not shown on the display.

The synthetic terrain display is intended to aid the pilot awareness of the terrain and obstacles in front of the airplane. It may not provide either the accuracy or fidelity, or both, on which to solely base decisions and plan maneuvers to avoid terrain or obstacles. The synthetic vision elements are not intended to be used for primary aircraft control in place of the primary flight instruments.

The Pathway presentation is intended only to aid the pilot's awareness of the programmed flight path location relative to the airplane's current position. No vertical Pathway information is presented for climbs.

SECTION 2
LIMITATIONS

1. Use of the Synthetic Vision system display elements alone for aircraft control without reference to the G1000 primary flight instruments or the aircraft standby instruments is prohibited.
2. Use of the Synthetic Vision system alone for navigation, or obstacle or terrain avoidance is prohibited.
3. Use of the SVS traffic display alone to avoid other aircraft is prohibited.

FAA Approved Airplane Flight Manual Supplement
Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

SECTION 3
EMERGENCY PROCEDURES

No change. Refer to the basic aircraft flight manual or aircraft specific flight manual supplements.

FAA Approved Airplane Flight Manual Supplement
Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

SECTION 4A
NORMAL PROCEDURES

Turn Synthetic Vision on/off

The SVS system may be turned on or off as desired. To turn the synthetic vision system on or off;

On either PFD;

PFD keypress

SYN VIS keypress

SYN TERR keypress as desired

The synthetic vision system will cycle on or off with each press of the SYN TERR key. The Flight Path Marker is displayed anytime SYN TERR is selected for display.

The SVS display may be turned on or off from either the pilot or copilot PFD displays. Turning SVS on or off from either display will simultaneously make the same change on the other PFD. The system will not permit display of SVS on one PFD and non-SVS on the other PFD.

Turn Pathways on/off

On the PFD;

PFD keypress

SYN VIS keypress

PATHWAY keypress as desired

The Pathway display will cycle on or off with each press of the PATHWAY key. The Pathway can be displayed separately or in

Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

190-01038-00 Rev 2

Page 11 of 25

FAA Approved Airplane Flight Manual Supplement
Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

conjunction with the flight director and may be independently selected on each PFD as desired by the pilots.

NOTE:

If displayed, the Pathway may be quickly turned off by pressing the PFD softkey at the bottom of the PFD followed by two presses of the far left PFD soft key.

Turn Horizon Heading on/off

On the PFD;

PFD keypress

SYN VIS keypress

HRZN HDG keypress as desired

The horizon heading display will cycle on or off with each press of the HRZN HDG key and may be independently selected on each PFD as desired by the pilots.

Turn Airport Signs on/off

On the PFD;

PFD keypress

SYN VIS keypress

APTSIGNS keypress as desired

The horizon heading display will cycle on or off with each press of the APTSIGNS key and may be independently selected on each PFD as desired by the pilots.

FAA Approved Airplane Flight Manual Supplement
Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

Use of Pathway

If Synthetic Terrain is displayed on the PFD, the Pathway may be used to assist the pilot's awareness of the programmed lateral and vertical navigation path. The following sections describe the basic use of the Pathway in various flight segments. For more detailed information, consult the G1000 Pilot's Guide.

Departure

Prior to departure, load and activate the desired flight plan into the G1000 FMS, set the initial altitude on the G1000 altitude selector and select GPS on the HSI display just as you would without the SVS system.

The programmed flight path will be displayed as a series of magenta boxes along the path at the flight plan altitude subject to the following conditions;

- If the first segment of the flight plan is a heading to altitude leg, the Pathway will not be displayed for that segment. The first Pathway segment displayed will be the first GPS course leg.
- The Pathway must be within the SVS field of view of 30 degrees left and 35 degrees right. If the programmed path is outside that field of view, the Pathway will not be visible on the display until the aircraft has turned toward the course.
- The Pathway will be displayed at either the altitude selected on the G1000 selector OR the altitude published for the procedure (e.g. SID) WHICHEVER IS HIGHER.

After departure, the primary aircraft control must be by reference to the primary aircraft instruments. The SVS and Pathway displays should be used to aid in awareness of the terrain and programmed flight path.

Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

190-01038-00 Rev 2

Page 13 of 25

FAA Approved Airplane Flight Manual Supplement
Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

Prior to intercepting the programmed course, the Pathway will be displayed as a series of magenta “boxes” with pointers at each corner that point in the direction of the programmed course. The Pathway boxes will not be displayed on portions of the course line that would lead the pilot to intercept the course in the wrong direction.

As the aircraft approaches the center of the programmed course and altitude, the number of Pathway boxes will decrease to a minimum of four.

Enroute

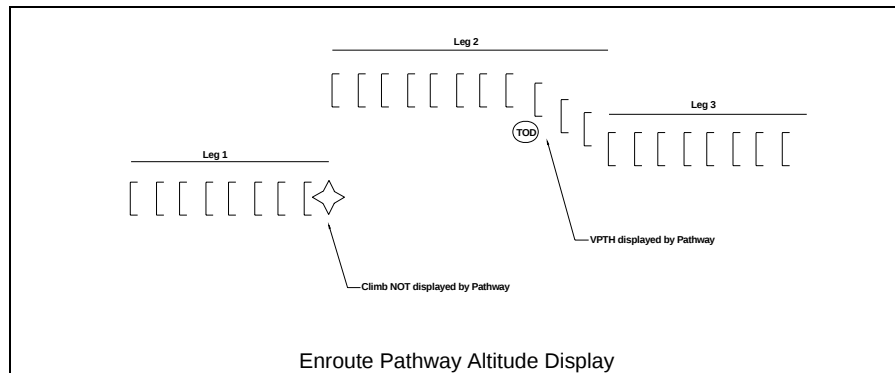
When enroute, the Pathway will be displayed along the lateral path defined by the flight plan, at the altitude selected on the G1000 altitude selector.

Flight plan changes in altitude that require a climb will be indicated by the Pathway being displayed as a level path at the altitude entered for the current flight plan leg. Because the G1000 system does not have information available to it about aircraft performance, climb profiles are not displayed by the Pathway.

If the programmed flight plan includes one or more defined VNAV descent segments, the descent path(s) will be displayed by the Pathway as prompted by the G1000 FMS.

If the flight plan includes a significant change in course at a waypoint, the Pathway boxes toward the currently active waypoint will be magenta in color. The boxes defining the next flight plan segment may be visible, but will be displayed in a white color.

FAA Approved Airplane Flight Manual Supplement
Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP



Approach

Prior to beginning an instrument approach, the Pathway display must be turned off on both the pilot and copilot PFD's

Missed approach

Pathways may be re-enabled for a missed approach as desired by the pilot. When the missed approach is selected on the G1000 FMS, the Pathway to the Missed Approach Holding Point will be displayed just as described for the departure segment.

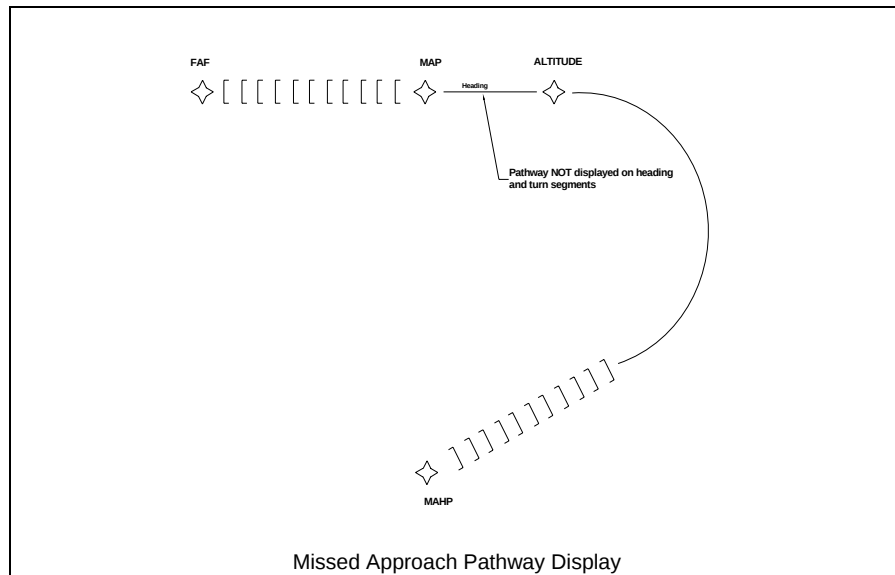
The pilot must assure that the aircraft path will, at all times, comply with the requirements of the published missed approach procedure.

If the initial missed approach leg is heading-to-altitude or a leg defined by other than a GPS course, the Pathway will not be displayed for that segment.

FAA Approved Airplane Flight Manual Supplement
Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

If the course to the Missed Approach Holding Point is out of the SVS field of view during the initial missed approach climb, the Pathway will not be visible on the PFD until the aircraft is turned toward the course.

The Pathway will be displayed at the published missed approach altitude OR the altitude set on the G1000 altitude selector WHICHEVER IS HIGHER. If the G1000 altitude selector is set to MDA on the final approach segment and not reset during the initial missed approach, the Pathway will still be displayed at the published missed approach altitude.



FAA Approved Airplane Flight Manual Supplement
Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

SECTION 4B
ABNORMAL PROCEDURES

SVS Displays information inconsistent with G1000 primary flight instrumentation.

On the PFD:

PFD keypress

SYN VIS keypress

SYN TERR keypress

SVS is removed from both PFD displays Verify

Use G1000 primary displays for navigation and aircraft control.

G1000 operation in display backup mode is required

Select display backup mode on the G1000 system.

NOTE:

When display backup mode is selected, the MFD will initially present a non-SVS (blue sky over solid brown ground) display. SVS will be presented on the backup display within 20 seconds if it was enabled on the PFD when display backup was selected.

FAA Approved Airplane Flight Manual Supplement
Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

SECTION 5
PERFORMANCE

No change. Refer to the basic aircraft flight manual or aircraft specific flight manual supplements.

SECTION 6
WEIGHT AND BALANCE

No change. Refer to current weight and balance data for your aircraft.

FAA Approved Airplane Flight Manual Supplement
Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

SECTION 7
DESCRIPTION AND OPERATION OF THE AIRPLANE AND ITS
SYSTEMS



General

The SVS sub system is dependent upon terrain data provided by the underlying G1000 system. If, for some reason, the terrain data is not available from the G1000, all of the components of the SVS system will be unavailable. The flight path marker, horizon heading, and airport signs are all sub-components of the Synthetic Terrain display and are only available when Synthetic Terrain is enabled. Those features are selected or de-selected using the PFD softkeys on the SVS menu.

Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

190-01038-00 Rev 2

Page 19 of 25

FAA Approved Airplane Flight Manual Supplement
Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

Synthetic Terrain

The synthetic (3D) terrain display on the PFD provides a perspective view of the terrain ahead of the aircraft showing ground features up to 30 degrees left and 35 degrees right of the airplane heading. The terrain display is derived from the same terrain data contained in the G1000 system that is optionally used to display terrain on the MFD map display. The terrain data has a resolution of 9 arc-seconds, this means that the terrain elevation contours in the database are stored broken down into squares 9 arc-seconds on each side. That data is processed and smoothed by the G1000 system to provide the synthetic terrain display. In some instances, terrain features such as lakes in mountainous areas may be presented by the SVS system as if the lake water extends somewhat up the mountainside. This is due to the limitations of the terrain database resolution but is not significant for the approved uses of the SVS system.

The SVS terrain display will show land contours; large water features; and, towers and other obstacles over 200 ft AGL (including buildings), that are included in the G1000 obstacle database. In order to provide a clean, uncluttered PFD display, cultural features on the ground such as; roads and highways, railroad tracks, cities, and political boundaries (state / county lines) are not displayed on the PFD even if those features are selected for display on the MFD. The colors used to display the terrain elevation contours are similar to those used on the MFD map. The terrain display also includes a north-south, east-west grid to assist in orientation relative to the terrain.

The terrain display is intended to serve as an awareness tool only. It may not provide either the accuracy or fidelity, or both, on which to solely base decisions and plan maneuvers to avoid terrain or obstacles. Navigation must not be predicated solely upon the use of the TAWS, Terrain or Obstacle data displayed by the G1000 SVS system.

Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

190-01038-00 Rev 2

Page 20 of 25

FAA Approved Airplane Flight Manual Supplement
Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

The Terrain/Obstacle/Airport databases have an area of coverage as detailed below:

- The Terrain Database has an area of coverage from North 75° Latitude to South 60° Latitude in all longitudes.
- The Airport Terrain Database has an area of coverage that includes the United States, Canada, Mexico, Latin America, and South America.
- The Obstacle Database has an area of coverage that includes the United States.

NOTE

The area of coverage may be modified, as additional terrain data sources become available.

Obstacle and Terrain Alerts and Warnings

Obstacles and terrain displayed on the SVS system may be highlighted if an alert or warning is generated by the G1000 Terrain or TAWS system. If an obstacle alert is presented for an obstacle that is in the SVS field of view, the obstacle symbol on the PFD will turn yellow in color. If an obstacle warning is generated by the G1000 system, the obstacle symbol on the PFD will turn red.

If the G1000 Terrain or TAWS system generates a terrain alert or warning, the terrain feature displayed on the PFD will be colored yellow for an alert or red for a warning for as long as the alert remains valid.

Because the area monitored by the Terrain or TAWS system can be wider than the field of view that can be displayed by the SVS system, it is possible to receive an obstacle or terrain audible alert for an obstacle or terrain that is not shown on the SVS display. In those cases, the object generating the alert will be left or right of the aircraft. Refer to the other displays in the aircraft to determine the cause of the message.

Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

FAA Approved Airplane Flight Manual Supplement
Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP



Flight Path Marker

The SVS display includes a green circular barbed symbol called the Flight Path Marker (FPM) that represents the current path of the airplane relative to the terrain display. The FPM is always displayed when synthetic terrain is displayed and the aircraft ground speed exceeds 30 kt. The FPM indicates the current lateral and vertical path of the airplane as determined by the GPS sensor. If the FPM is above the horizon line, the airplane is climbing, and similarly if the FPM is below the horizon line, the airplane is descending. If the airplane is flying in a crosswind, the FPM will be offset from the center of the display. In that case, the center of the PFD airplane reference symbol indicates the airplane heading and the FPM indicates the direction that the airplane is actually moving, taking into account the crosswind.

The FPM indicates the current path of the airplane but does not predict the future path. If aircraft attitude, power setting, airspeed, crosswind, etc. are changed, the FPM will move to indicate the new path resulting from those changes.

If the FPM is below the terrain or obstacle displayed behind it on the PFD, the current aircraft path will not clear that terrain or obstacle. If the FPM is above that terrain or obstacle, the aircraft will clear the terrain or obstacle IF, AND ONLY IF, THE CURRENT AIRCRAFT CONFIGURATION IS MAINTAINED, AND THE AIRCRAFT PERFORMANCE WILL PERMIT YOU TO MAINTAIN THE CURRENT VERTICAL (CLIMB) GRADIENT UNTIL PAST THE TERRAIN OR OBSTACLE.

Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

190-01038-00 Rev 2

Page 22 of 25

FAA Approved Airplane Flight Manual Supplement
Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP



Pathway

If PATHWAY is enabled on the SVS menu of the PFD and a defined navigation path has been entered on the G1000, the SVS system will display a pathway, sometimes called a “highway in the sky” or HITS. The pathway is a perspective representation of the programmed flight path. When the aircraft is well off course, the pathway will be displayed as a number boxes floating in the sky along the programmed lateral and vertical path. As the aircraft intercepts the programmed flight path, the number of boxes displayed will be reduced to a maximum of four to avoid cluttering the PFD display. The pathway is only displayed for navigation paths that are fully defined by the sensor in use. Because a fully defined lateral and vertical path through space is not defined by them, a Pathway is not displayed for heading legs, VOR, LOC only, BC or ADF segments. When the Pathway is displayed, the color of the boxes indicates the sensor generating the path. If the GPS sensor is in use, the boxes will be magenta colored. If the LOC sensor is defining the path in use, the boxes will be green.

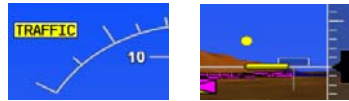
The Pathway boxes are +/- 100 ft in vertical dimension and approximately +/-380 ft horizontally from the center of the box. The Pathway presentation is intended only to aid the pilot in awareness of the programmed flight path location relative to the airplane's current position. The pathway is not intended for use as a primary reference in tracking the navigation path.

If a GPS based descent profile has been programmed either on the G1000 flight plan page or as part of an approach or STAR, the descent will be displayed by the Pathway. Climb paths are never displayed by the Pathway. If a profile requires a climb, the Pathway will be displayed as a level segment at the higher of the altitude defined by the programmed path or the G1000 altitude selector.

Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

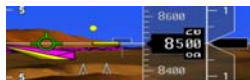
FAA Approved Airplane Flight Manual Supplement
Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

Traffic



If traffic that is within the SVS field of view is detected by the G1000 system, a symbol will be displayed on the PFD indicating the direction and relative altitude of the traffic. The traffic will be displayed as a white diamond unless it generates a traffic alert. Traffic that causes an alert will be displayed as a solid yellow circle accompanied by a yellow TRAFFIC annunciator to the right of top of the airspeed display tape.

Horizon line



The SVS display includes an always visible white horizon line that represents the true horizon. Terrain will be presented behind the horizon line, and terrain shown above the horizon line is above the current aircraft altitude. Terrain that is shown below the horizon line is below the aircraft altitude.

Horizon Heading



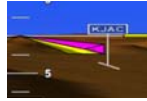
A heading scale may be displayed on the PFD horizon line, if selected by the pilot. The heading marks are spaced in even 30 degree increments and are presented just above the horizon line with tic marks that intersect the horizon line. The horizon heading will correspond to that presented by the HSI. Because the horizon heading is only displayed in 30 degree increments, it should only be used for general heading awareness and not be used to establish the aircraft heading.

Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP

190-01038-00 Rev 2

Page 24 of 25

FAA Approved Airplane Flight Manual Supplement
Synthetic Vision and Pathways Upgrade Meridian PA-46-500TP



Airport Signs and runway highlight

If APTSIGNS is selected, a “sign post” along with a representation of the runways will be plotted on the SVS display for nearby airports that are contained in the G1000 airport database. The signpost will become visible when you are within approximately 15nm of the airport. The text identifier for the airport will be displayed inside the airport sign when the aircraft reaches approximately 8 nm from the airport. Once the aircraft reaches approximately 4.5 nm from the airport, the airport sign will be removed but the runways presentation will remain. If an approach to a specific runway has been loaded and activated, that runway will be highlighted on the SVS display.

When on an approach, the highlight for the approach runway will be considerably larger than “normal” to assist in visually acquiring the runway. The oversized highlight will automatically shrink around the runway depiction so that the runway is proportionally displayed when the aircraft is within approximately ½ nm of the threshold. Runway highlighting is displayed even if APTSIGNS are turned off.

SECTION 8
AIRPLANE HANDLING, SERVICING, AND MAINTENANCE

No change. Refer to the basic aircraft flight manual or aircraft specific flight manual supplements.