ASPEN AVIONICS

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FAA APPROVED
AIRPLANE FLIGHT MANUAL SUPPLEMENT
or
SUPPLEMENTAL AIRPLANE FLIGHT MANUAL
for the
ASPEN AVIONICS EVOLUTION FLIGHT DISPLAY SYSTEM
EFD1000 PRIMARY FLIGHT DISPLAY
Optionally with
EFD1000 AND/OR EFD500 MULTI-FUNCTION DISPLAYS

The information contained in this Supplement must be attached to the FAA Approved Airplane Flight Manual or placed with the Pilot's Operating Handbook or other operating information when the Aspen EFD1000 PFD and optionally the Aspen EFD1000 MFD and/or EFD500 MFD are installed in accordance with AML STC SA10822SC. This document must be carried in the aircraft at all times.

The information in this Supplement supplements or supersedes the information in the FAA Approved Airplane Flight Manual or other operating information only as set forth herein.

This document and the required ESV Quick Reference document (see Section 2.1) describe the operating procedures for the Aspen Evolution Synthetic Vision System when it has been installed in accordance with the Aspen document 900-00003-001, EFD1000 and EFD500 Software Version 2.X Installation Manual Revision AE or subsequent.

For limitations, procedures, and performance data not contained in this Supplement, consult the Airplane Flight Manual or other operating information.

Airplane Make: _____

Airplane Model: _____

Airplane Registration Number: _____

Airplane Serial Number: _____

FAA APPROVED By: _____

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DOCUMENT REVISIONS

Document Revision	Pages Revised	Description of Change	FAA Approval Date	ECO
( )	All	Internal Release.		1775
A	All	Initial Release for FAA Approval.	9/28/2009	1784
B	All	See ECO	12/10/2009	1847
C	All	See ECO	4/12/2010	1950
D	All	See ECO	Not submitted	2074
E	All	See ECO	7/6/2010	2092
F	All	See ECO	7/14/2010	2113
G	All	See ECO	Not submitted	2147
H	All	See ECO	10/5/2010	2251
J	All	See ECO	12/3/2010	2317
K	All	See ECO	Not Submitted	2626
L	All	See ECO	7/20/2011	2675
M	All	See ECO	Not Submitted	2769
N	All	See ECO	9/20/2011	2803
P	All	See ECO	11/03/2011	2890
Q	All	See ECO	Not Submitted for approval	3246
R	All	See ECO	8/7/2012	3307
S	All	See ECO	7/29/2013	3755
T	All	Added configuration of the EFD1000 PFD VFR to the installed equipment configuration matrix. Update the limitations section with requirements for the EFD1000 PFD VFR and Synthetic Vision Trial. Removed the block diagrams.	Not Submitted	4025
U	All	Improved System Description	Not Submitted	4187
V	All	Added note regarding Course Pointer operation in the Normal Procedures Section. Corrected the VFR feature set listing.		4195

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1 General

1.1 System Description

This Airplane Flight Manual Supplement (AFMS) applies to aircraft installations of the following possible display combinations:

- EFD1000 Level B PFD Pro (C3) or EFD1000 PFD Pro
- EFD1000 Level B PFD Pro (C3) or EFD1000 PFD Pro, and EFD500 MFD
- EFD1000 Level B PFD Pro (C3) or EFD1000 PFD Pro, and EFD1000 MFD
- EFD1000 Level B PFD Pro (C3) or EFD1000 PFD Pro, and EFD1000 MFD and EFD500 MFD
- EFD1000 PFD Pilot
- EFD1000 PFD Pilot and EFD500 MFD
- EFD1000 PFD VFR
- EFD1000 PFD VFR and EFD500 MFD

The Evolution Flight Display System is a multi-display, Electronic Flight Instrument System (EFIS) with integral Micro Electromechanical Systems (MEMS)-based Air Data Attitude and Heading Reference System (ADAHRS) with either internal backup battery or external Emergency Backup Battery (EBB). The system includes a Primary Flight Display (PFD) with an optional Flight Director, an optional Evolution Synthetic Vision System that includes a Flight Path Marker and Terrain Warning System (TWS), and optional satellite weather, traffic and Stormscope© overlays. When combined with the optional EFD1000 MFD and/or EFD500 MFD, the system offers a multi-panel, Multi-Function Display (MFD) solution that displays high resolution moving maps with Jeppesen© enroute and terminal data, satellite weather information, Stormscope data, traffic sensor data, relative terrain depictions, secondary attitude information, optional Evolution Synthetic Vision System that includes Flight Path Marker and Terrain Warning System (TWS) and a secondary HSI display. Pressing the REV button on the EFD1000 MFD reverts the MFD to a fully-functional Primary Flight Display generated from ADAHRS data completely independent of that generated by the PFD. When combined with the optional Emergency Backup Battery the EFD1000 PFD and MFD can replace mechanical airspeed and altitude instruments.

The EFD1000 Pilot PFD is a Primary Flight Display (PFD) with Attitude indicator, heading indicator and moving map. The Pilot PFD does not interface with weather or traffic data, and cannot be installed with an EFD1000 MFD.

The EFD1000 VFR is a Primary Flight Display (PFD) with Attitude indicator, heading indicator and moving map. The EFD1000 VFR does interface with weather or traffic data, and can be installed with an EFD500 MFD.

The Level B EFD1000 PFD (C3) provides a higher level of software integrity, primarily for certification on higher-performance (Class III[1]) aircraft. The C3 PFD does not interface with weather data, and can be installed with an EFD1000 MFD and/or an EFD500.

The EFD500 is a fully functional MFD with all the capability of the EFD1000 MFD except reversion, HSI, Remote Sensor Module (RSM), Emergency Backup Battery, Cross Link information (receive only) and the air data, attitude and heading features.

The standard internal battery in the EFD1000 or EFD500 is capable of providing 30 or more minutes of operation at typical cockpit temperatures if aircraft power to the system fails. An optional Emergency Backup Battery (EBB) available for the EFD1000 MFD provides a guaranteed 30 minutes of emergency operation, even under extreme environmental conditions, when maintained as required by the Instructions for Continued Airworthiness (Document 900-00012-001). Typical EBB endurance at 25°C is two or more

[1] FAA Advisory Circular 23-1309-1E defines a Class III aircraft as typically Single Reciprocating Engine, Single Turbine Engine, Multiple Reciprocating Engine and Multiple Turbine Engine equal or over 6000 pounds Maximum Certificated Gross Takeoff Weight.

hours, depending on the backlight intensity.

When the EFD1000 MFD with Emergency Backup Battery is used to replace backup altimeter and airspeed indicators the battery condition must be verified prior to each flight.

The EA100 Autopilot AHRS (A/P AHRS) optionally provides attitude information to the autopilot.

The Connected Panel System (Aspen Gateway) provides controlled wireless access to the cockpit avionics through the CG100 and the EFD1000 or EFD500 MFD.

Table 1 Installed Equipment Configuration, identifies the configuration for this aircraft.

The installed Aspen Evolution Synthetic Vision System complies with AC 20-167 performance criteria for situation awareness.

For detailed information on the operation of the EFD1000 PFD or EFD1000/500 MFD refer to the Pilot Guides identified in Section 2.1 of this document.

The EFD1000 Pilot includes the following features (refer to the Pilot's Guide for detailed information):

- Airspeed and Altitude Tapes
- Integral Altitude Alerter (visual only; no audible alert)
- Slaved heading indicator with heading Bug
- Base map with flight plan legs and waypoints
- 360° and arc view
- GPS Groundspeed, OAT and TAS
- Display of calculated winds aloft
- Integral Air data computer and Attitude Heading Reference System (ADAHRS)
- Built in backup battery and available emergency GPS
- Brilliant Display
- The Pilot can only be configured for only one GPS navigator

The EFD1000 VFR features include the EFD1000 Pilot features plus:

- Course Deviation Indicator (CDI)
- Integrates with many General Aviation autopilot systems
- Dual GPS and dual VHF Nav support
- Built-in GPS Steering, (with compatible GPS navigator)
- Optional Traffic and Weather interfaces
- Integration with EA100 Autopilot AHRS Adapter (A/P AHRS Adapter), providing attitude data to compatible autopilot systems. See Table 1.
- The EFD1000 VFR does not provide glideslope

The EFD1000 Pro features include the EFD1000 Pilot features plus:

- Horizontal Situation Indicator (HSI) with dual bearing pointers
- Vertical Deviation
- Integrates with most GA autopilot and Flight Director systems
- Dual GPS, dual ADF and dual VHF Nav support
- Built-in GPS Steering, (with compatible GPS navigator)
- Radar Altimeter display and DH annunciation
- Approach minimums alerting
- Optional Traffic and Weather interfaces
- Integration with EA100 Autopilot AHRS Adapter (A/P AHRS Adapter), providing attitude data to compatible autopilot systems. See Table 1.
- Optional Evolution Synthetic Vision with Flight Path Marker and Aspen Terrain Warning System (TWS)

1.2 Installed Equipment Configuration Matrix

The table below records the equipment and optional interfaces installed in your aircraft, and will be completed during installation by the installation facility. The table is marked with the specific equipment that is installed in your aircraft, and shows what external interfaces have been installed, such as traffic and weather, and to which EFD the data is provided.

Please refer to this sheet to determine which portions of this AFMS are applicable to your specific aircraft installation:

NOTE: These tables are to be completed by the Avionics Installer.	**EFD500 MFD**	**EFD1000 PFD PRO**	**EFD1000 PFD PILOT**	**EFD1000 Level B PFD PRO (C3)**	**EFD1000 MFD**	**EFD1000 PFD VFR**
Installed Evolution Flight Displays						
RSM with GPS	Not Available					
RSM without GPS	Not Available					
EBB Emergency Backup Battery	Not Authorized	Not Authorized	Not Authorized	Not Authorized		Not Authorized
Traffic Interface			Not Available			
Stormscope© Interface			Not Available	Not Available		
XM Weather Interface (Requires optional EWR50)			Not Available	Not Available		
Charts		Not Available	Not Available	Not Available		Not Available
EA100 Autopilot AHRS Connection	Not Available		Not Available			
Evolution Synthetic Vision with Flight Path Marker and Aspen Terrain Warning System (TWS)			Not Available	Not Available		Not Available
Aspen Terrain Warning System (TWS) audible and textual alerts. The audible and textual alerts are only available if TAWS is not installed.			Not Available	Not Available		Not Available
Aspen Gateway (GTWY) Not Authorized for EASA-registered aircraft. See Section 2.16, CG100 Aspen Connected Gateway Limitations.		Not Available	Not Available	Not Available		Not Available
Evolution Synthetic Vision with Flight Path Marker and Aspen Terrain Warning System (TWS)10-Hour Demo*	Not Available		Not Available	Not Available	Not Available	Not Available
Altitude Pre-selector Function						
A/P Source Select						

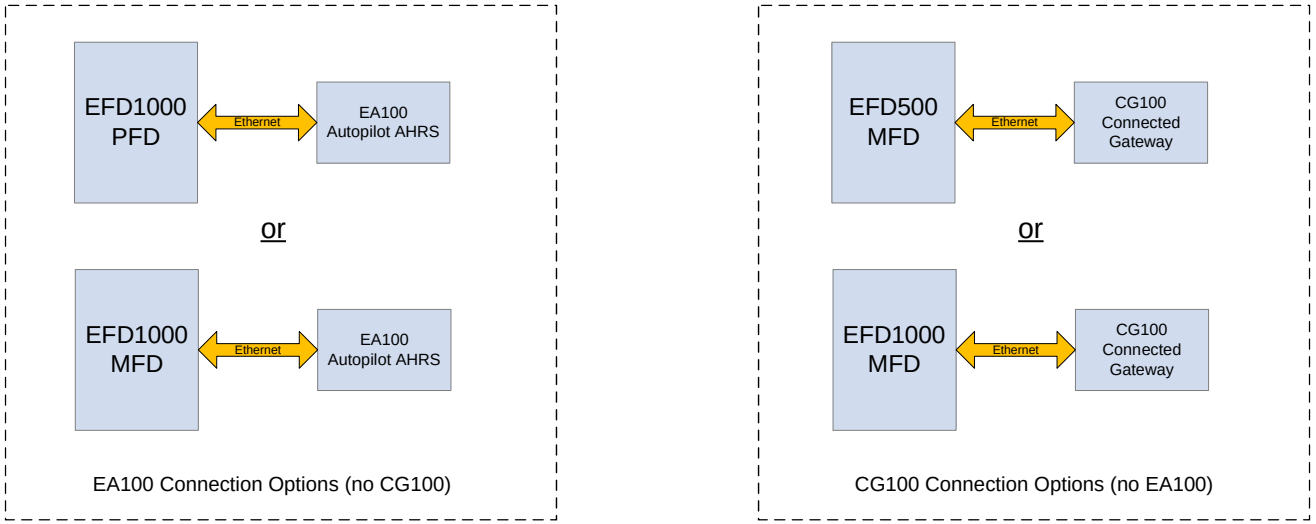
Table 1 Installed Equipment Configuration

*The Aspen Synthetic Vision Demo enables Synthetic Vision for a trial period. The remaining trial period is displayed on the acknowledgement page when the EFD1000 is turned on. The Synthetic Vision function will not stop in flight. When the 10-hour demo expires, an annunciation is displayed once on the acknowledgment page. See Section 2.10.2.

Type of backup Attitude Indicator in this aircraft:	**Mechanical backup attitude (this is required)**	
Type of Standby Airspeed Indicator in this aircraft:	EFD1000 MFD*	Mechanical Airspeed
Type of Standby Altimeter in this aircraft:	EFD1000 MFD*	Mechanical Altimeter

Table 2 Backup Instruments Configuration

*An operational EBB Emergency Backup Battery connected to an EFD1000 MFD is required unless a standby Airspeed indicator and a standby Altimeter are installed. See Section 1.1 and Table 4



CG100 Connection Options with EA100

2 Limitations

2.1 Pilot's Guide

Limitation: For EFD1000 PFD installations:

- For EFD1000 PFD Pilot or Pro installations, Aspen Avionics document 091-00005-001, *EFD1000 PFD Pilot's Guide,* Revision A or subsequent must be carried in the aircraft and available to the flight crew.
- For EFD1000 PFD VFR installations, Aspen Avionics document 091-00028-001, *EFD1000 VFR PFD Pilot's Guide* Revision ( ) or subsequent must be carried in the aircraft and available to the flight crew.
- For EFD1000 Level B PFD Pro installations, Aspen Avionics document 091-00019-001, *EFD1000 C3 Pro PFD Pilot's Guide* Revision ( ) or subsequent must be carried in the aircraft and available to the flight crew.
- For Synthetic Vision operation, document 091-00032-001 *Evolution Synthetic Vision ESV Quick Reference R*evision ( ) or subsequent must be carried in the aircraft and available to the flight crew.

The latest revision of these documents can be downloaded at the www.aspenavionics.com Customer Port or the Dealer Ramp, or contact Aspen Avionics.

Limitation: For installations that include the optional EFD1000 MFD or EFD500 MFDs:

- Aspen Avionics document 091-00006-001, *EFD1000/500 MFD Pilot's Guide Revision ( ) or subsequent* must be carried in the aircraft and available to the flight crew.
- For Synthetic Vision operation, document 091-00032-001 *Evolution Synthetic Vision ESV Quick Reference* Revision ( ) or subsequent must be carried in the aircraft and available to the flight crew.

The latest revision of these documents can be downloaded at the www.aspenavionics.com Customer Port or the Dealer Ramp, or contact Aspen Avionics.

2.2 Software Versions

Limitation: The EFD1000/500 display and associated hardware must use the software versions listed below, or later FAA approved versions.

The EFD1000 and EFD500 use identical software source code. A license key "image" stored in the unit Configuration Module determines the associated operating mode (i.e. PFD, MFD) and enabled features (i.e. weather, traffic) of the connected EFD hardware. The EFD software version is displayed on the Main Menu System Status page. Refer to Table 1 Installed Equipment Configuration, to determine the configuration of this aircraft.

System Component	Software Name	Version 2.X Software Version (or subsequent)	Notes
EFD1000 (PFD or MFD) and EFD500	MAP	2.1 2.4.1 for Evolution	The EFD1000 PFD or MFD must be at MAP Version 2.2.2 (or

System Component	Software Name	Version 2.X Software Version (or subsequent)	Notes
MFD		Synthetic Vision 2.6.4 for PFD VFR	subsequent) when using the EA100 A/P AHRS
	IOP	2.0 2.0.2 for Evolution Synthetic Vision	The EFD1000 PFD or MFD must be at IOP Version 2.0.1 (or subsequent) when using the EA100 A/P AHRS
EFD1000 Level B Pro (PFD) C3	MAP	B2.1 B2.3.2 for Evolution Synthetic Vision	The EFD1000 C3 PFD must be at MAP Version B2.2.3.1 (or subsequent) when using the EA100 A/P AHRS
	IOP	B2.0 2.0.2 for Evolution Synthetic Vision	The EFD1000 C3 PFD must be at IOP Version B2.0.2 (or subsequent) when using the EA100 A/P AHRS

2.3 Airspeed Limitation

Limitation:	The maximum approved operating airspeed for this system is 270 KIAS (311 MPH IAS).

2.4 Pitot Obstruction Monitor

Limitation:	For aircraft with two EFD1000 displays, an IFR GPS must be operable for dispatch under IFR.

NOTE:

This limitation applies only to aircraft with both an EFD1000 PFD and an EFD1000 MFD, regardless of the standby instrument configuration

Most light aircraft have a single pitot and static system. The pitot and static inputs are shared among the EFD1000 PFD, EFD1000 MFD, the backup altimeter and the airspeed indicator. Should pitot or static become blocked, then both the EFD1000 PFD and the EFD1000 MFD, along with any standby indicators of airspeed and altitude, could display erroneous attitude, airspeed and altitude information.

When connected to a GPS, the EFD1000 system compares airspeed and groundspeed to identify a blocked pitot system.

The EFD1000 PFD automatically removes attitude and heading and replaces them with red-X indications shortly (~5 seconds) after the airspeed reduces to less than 30 KIAS when the GPS groundspeed remains above 50 knots (the EFD1000MFD will show ADAHRS FAIL). The EFD1000 attitude will gradually pitch up until the attitude indication is automatically removed. This is a detectable condition that is directly linked to the airspeed loss.

When an EFD1000 is connected to an EA100 A/P AHRS and the autopilot is engaged, a pitot block causes the autopilot to gradually pitch down until the autopilot is manually or automatically disengaged. The red-X indication and "CHECK PITOT HEAT" from the connected EFD1000 PFD (or ADAHRS FAIL from the connected MFD) will cause the autopilot to automatically disengage and the A/P AHRS FAIL lamp to illuminate. The autopilot cannot be reengaged until the attitude on the EFD1000 is restored and the A/P AHRS FAIL lamp is extinguished.

NOTE:

When the autopilot is engaged, the most apparent indication of an attitude malfunction due to a blocked pitot may be the simultaneous decrease in pitch attitude and the airspeed decreasing below expected values.

The autopilot should be manually disengaged during a blocked pitot condition. In a blocked pitot condition, the autopilot will automatically disengage five seconds after the airspeed reduces to less than 30 knots.

When the autopilot is not engaged, the most apparent indication of an attitude malfunction due to a blocked pitot may be the simultaneous change in pitch attitude indication and the airspeed decreasing below expected values.

Once the system detects that the pitot obstruction has been cleared, the "CHECK PITOT HEAT" annunciation is removed and the system automatically performs an ADAHRS in-flight reset.

Should a GPS failure be experienced in flight, the Pitot Obstruction Monitor (POM) continues to operate in a fail safe mode and will continue to detect blockages in the pitot system that might occur. The POM remains active after touchdown. As the airplane slows below 30 KIAS the system will post red-X indications in place of the attitude and heading information and display the "CHECK PITOT HEAT" message. In this circumstance, restoring the GPS system, or cycling power to the affected EFD1000 will restore normal POM operation and attitude indications.

In some aircraft with very low stall speeds it may be possible to activate the Pitot Obstruction Monitor when performing slow flight at indicated airspeeds below 30 KIAS. Under these circumstances if the groundspeed exceeds 50kts the POM will activate. Should this occur, fly by reference to the standby attitude indicator or the visual horizon. To restore normal ADAHRS operation, increase the indicated airspeed to a value greater than 30 KIAS; the affected display will then perform an automatic reset.

This Pitot Obstruction Monitor is not available in installations without a GPS. An IFR approved GPS configuration is required for installations with two EFD1000 displays or when an EA100 system is installed.

2.5 Databases (EFD1000/500 MFD Only)

There are several databases available (see Table 3). Jeppesen provides terrain, NavData©, cultural information and obstacle data. The intended function of each of these databases for the Terrain (TERR) moving map selection on the MFD and for the NAV Map selection on the MFD is to provide a background graphical depiction of the surrounding map features used to improve the flight crew awareness of the aircraft ownship position relative to other items depicted on the moving maps. The background graphical depiction of the surrounding map features is not to be used for navigation and must not be used as a basis for maneuvering.

The overlaid flight plan originates from the GPS and can be used for navigation within the limitations of the GPS approval.

The EFD1000 PFD and MFD use the Jeppesen databases with Evolution Synthetic Vision and the associated features of the Flight Path Marker and the Terrain Warning System.

Limitation:	Database currency date must be acknowledged on the EFD1000 MFD and EFD500 MFD prior to each flight. Flight with an expired database is not recommended. Any out of date data displayed on the EFD must either a) be verified to be correct by the flight crew before use or b) not be used.

Limitation:	Legend information, as well as climb and descent tables, MLS frequency pairing and general data that are found in the NACO paper Terminal Procedures Volumes are not provided in the Charts Database. The operator is responsible for access to this information as required by regulation.

The Jeppesen NavData©, Cultural database and Obstacle database are all combined into a single download from Jeppesen. Terrain data is loaded at the factory and does not require periodic updating. The terrain database is available from Jeppesen.

The Terminal Procedures Charts (Charts) database updates are provided by Seattle Avionics.

Data base valid dates for Jeppesen and Charts are displayed at power up and require a pilot action to acknowledge. Database valid date information can also be accessed via the main menu of the MFD.

NOTE:

Flight with an expired database is not recommended.
An expired database does not prevent terrain or other Nav Map features from being displayed on the MFD.

Database Type	Includes	Update Cycle	Database Provider	Limitations
Terrain	High resolution terrain data for Americas, International, or Worldwide geographic regions. Terrain depiction is limited to the region between 65 deg N latitude to 65 deg South latitude	Delivered with unit, updated intermittently as announced by Jeppesen	Jeppesen mail order	These databases are intended to improve flight crew awareness and are not to be used for navigation.
NavData	Includes Navaids, Controlled Airspace, Restricted, Prohibited and Special Use Airspace, Airports, etc.	28 day update cycle	Jeppesen JSUM©	
Cultural	Includes Roads, Rivers, Railroads, Political boundaries, Cities, etc.	28 day update cycle	Jeppesen JSUM©	
Obstacles	Includes man made obstacles greater than 200 ft. AGL. This database relies upon data reported by government agencies and may not include all obstacles due to inherent reporting and processing delays in the data. In addition, obstacle data may not be available for all regions within the data card coverage area.	28 day update cycle	Jeppesen JSUM©	

Database Type	Includes	Update Cycle	Database Provider	Limitations
Charts	NACO Terminal Procedures Charts	28 day update cycle	Seattle Avionics	

Table 3 Database Listing and Descriptions

2.6 RSM GPS Usage (if installed)

Limitation:	The RSM GPS is limited to EMERGENCY USE ONLY.

The EFD1000 RSM can optionally include a non-certified GPS receiver. This GPS can provide positioning data when all other approved sources of GPS data have failed. Position data from the RSM GPS will only become available for use following a loss of position information from all other connected GPS system(s). When the RSM GPS is in use, the current flight plan leg will be shown in white rather than magenta, and a message is presented limiting the RSM GPS to EMERGENCY USE ONLY.

2.7 Operation on Internal Battery or EBB

Limitation:	Takeoff with aircraft voltage (as indicated on the EFD) below 12.3V (14V electrical system) or 24.6V (28V electrical system) is NOT AUTHORIZED.

Each EFD1000 or EFD500 is equipped with either an internal battery, or an external Emergency Backup Battery. Battery operation and logic is the same regardless of which battery is connected to your display. The Emergency Backup Battery has a wider operating temperature envelope than the internal battery, and will provide battery capacity for a significantly longer time than the internal battery.

The EFD system incorporates sophisticated power logic to determine when to transition to battery. On the ground, the system will turn on and turn off with the application or removal of aircraft power. In the air, the system will transition to battery if aircraft power is removed or degraded, or if an overvoltage is detected. Transition thresholds and times will vary as a function of the input voltage to the display, which can be observed via the Menu Power Settings Page. Battery operation should be expected any time the aircraft charging system is unable to maintain a voltage at the EFD of 12.3 V (14V electrical system) or 24.6V (28V electrical system). Under these circumstances, should the aircraft dispatch the EFD will transition to battery shortly after reaching flying speed.

2.8 Emergency Backup Battery (EFD1000 MFD Only)

Limitation:	Dispatch when EBB charge status of less than 80% is NOT AUTHORIZED if the EBB is required by the KOEL in section 2.14. Dispatch with a cabin temperature below -20°C is NOT AUTHORIZED if the EBB is required by the KOEL in section 2.14. When the EFD1000 MFD with Emergency Backup Battery is used to replace backup altimeter and airspeed indicators the battery condition must be verified prior to each flight

The Emergency Backup Battery is an approved emergency power source for the EFD1000 MFD. When installed, the EBB enables the EFD1000 MFD to be the approved backup instrument to the EFD1000 PFD, and authorizes removal of independently-powered standby airspeed and altitude instruments. When maintained in accordance with the Installation Manual (annual check and scheduled replacement

per 900-00003-001) and the EFD1000 MFD shows a charge status of 80%, the EBB will provide at least 30 minutes operation when cold-soaked to -20°C and the display is operated at the default maximum backlight intensity. Battery operation below this temperature is not assured. The EBB charge status must be verified prior to each flight where the EBB is required by the KOEL in section 2.14. The minimum dispatch limit is 80% when the EBB is required.

At cold temperatures it takes 10 minutes for the EFD1000 system to calculate an accurate EBB charge status. On the ground when the battery is colder than 0°C, a timer will run for 10 minutes before EBB charge status is displayed. In the air, the charge status will be indicated after a 15 second delay. When the battery is cold (<0°C) the % remaining value will initially decrease rapidly for several minutes, but will subsequently increase and stabilize at the correct value. This stabilization process may take as long as 10 minutes. During this period the pilot should consider the charge status determined during the pre-flight checks to be the battery charge state.

NOTE: The limitations in this section apply only to those installations with an EBB installed without mechanical standby airspeed and altitude instruments. See section 2.12.7 for the Kinds of Operation Equipment List.

2.9 Geographic Limitation

Limitation: Use of the EFD1000 for IFR operations in the region within 750 nautical miles of the magnetic North or South Pole, based solely upon the attitude and heading data provided by the EFD1000, is NOT AUTHORIZED.

The ADAHRS solution in the EFD1000 uses multiple inputs, including the earth's magnetic field, to determine aircraft heading, pitch and roll. The system must be able to periodically sense the earth's magnetic vector to be able to correctly resolve heading and stabilize the ADAHRS attitude solution.

All magnetic sensors, including the one in the EFD1000, will experience degraded performance in the vicinity of the earth's magnetic poles. When the horizontal component of the earth's magnetic field is no longer strong enough to provide reliable heading data, the EFD1000 will detect this condition and compensate for the reduced magnetic fields. The system can continue to operate for a short time without reference to magnetic North, but must be able to periodically resolve the magnetic vector to continue operations.

If the EFD1000 is unable to resolve the earth's magnetic field for two minutes, the system will switch to and annunciate Free Gyro Mode. In this mode, the ADAHRS continues to provide attitude and heading data based on gyro-only operating logic. This will be accompanied by a "FREE GYRO MODE" message posted on the HSI, and a "CROSS CHECK ATTITUDE" annunciation posted on the attitude indicator. Under these circumstances, increased vigilance and instrument cross check is required.

If the weak magnetic conditions persist, and the EFD1000 is unable to resolve the magnetic vector for six minutes or greater, then the attitude and heading solution will be considered failed and will be removed (i.e. red X indication). The ADAHRS solution will automatically restore once the magnetic vector can again be resolved.

Within a region approximately 750 nautical miles from the magnetic pole, the conditions described above are expected to be persistent. In the Northern Hemisphere, this distance approximately equates to operations in the Arctic Islands found north of continental North America.

2.10 Placards and Decals

When the EBB has been installed and independently-powered airspeed and altitude instruments have

been removed, the following placard must be shown on the instrument panel in plain view of the flight crew:

EMER BAT DISPATCH LIMIT 80%
SEE EFD AFMS

When an EA100 A/P AHRS is installed an amber annunciator lamp is installed in the Pilot's Primary Field of View. The lamp is labeled with the following:

A/P AHRS FAIL

2.10.1 MFD Initialization placard

The following electronic placard is displayed during initialization of the MFD (the SV message is displayed when SV is configured):

CAUTION:
Synthetic Vision information and terrain information are for awareness Only. Do not maneuver based solely on this Information.

The aircraft ownship position presented on Instrument Procedure Charts and Airport Diagrams may be inaccurate - reference to ownship position for navigation or maneuvering is prohibited.

2.10.2 PFD Initialization placard

The following electronic placard is displayed during initialization of the PFD when SV is configured:

CAUTION:
Synthetic Vision information and terrain information are for awareness Only. Do not maneuver based solely on this Information.

The following electronic placards are displayed during initialization of the PFD when the Aspen Synthetic Vision Demo is configured and the trial period is not expired:

CAUTION:
Aspen Synthetic Vision Demo
Time Remaining: ## Hours ## Minutes

Synthetic Vision information and Terrain information are for awareness Only. Do not maneuver based solely on this Information.

The following electronic placard is displayed once on the acknowledgement page initialization of the PFD when the Aspen Synthetic Vision Demo is configured and the trial period is expired:

CAUTION:
Aspen Synthetic Vision Demo has Expired
To Re-Enable SV, See your Authorized Dealer

2.10.3 PFD VFR Placard

When an EFD1000 PFD VFR is installed, a placard is displayed in the Pilot's Primary Maximum Field of View. The placard is labeled with the following:

No Vertical Deviation on PFD

2.11 Seaplane Operation

Limitation: If the ADAHRS is unable to align due to wave action, departure under IMC or IFR is PROHIBITED.

The EFD1000s may not be able to align when on water as a function of the wave action being experienced by the aircraft. When aligning on water, always perform a visual verification of the attitude reference with a secondary source, such as a mechanical gyro or the horizon. If the alignment is not successful, it is acceptable to depart under VFR/VMC and, while maintaining VFR/VMC, perform an ADAHRS in-flight alignment per Section 3.5.

2.12 Hazard Awareness Limitations (EFD1000 PFD PRO and MFDs ONLY)

2.12.1 Terrain and Obstacle Display Limitation (MFD)

Limitation: Maneuvering based solely on the EFD1000 terrain and obstacle depiction is not authorized. The Pilot In Command has the responsibility to use accepted visual and instrument procedures to avoid terrain and obstacles.

The EFD1000/500 MFD display of terrain and obstacle information colorizes the terrain based on the aircraft proximity to the terrain or obstacles.

The EFD1000/500 MFD display of terrain and obstacle information on the dedicated (TERR) view and the Navigation Map is advisory only. In addition, the MFD Terrain and Obstacle view does not provide terrain or obstacle alerts. Not all obstacles within a given region will be charted. The pilot is responsible for terrain and obstacle avoidance by visual means, or by following approved instrument procedures. At system start up the pilot must acknowledge this operational limitation by pressing either MODE/SYNC knob.

The terrain and obstacle information is based on barometric altitude compared to the altitude of the terrain and obstacles in the databases. The altitude is not temperature-compensated. Incorrect or inaccurate barometric pressure, or very cold temperatures can significantly affect the accuracy of the displayed elevations. See the FAA Aeronautical Information Manual Section 7-2-3 for more information.

WARNING: The Terrain and Obstacle depictions are dependent on accurate barometric altitude. An inaccurate altimeter setting will cause an incorrect

depiction of the elevation of terrain and obstacles. Very cold temperatures can also cause significant errors in altimetry. The Pilot In Command has the responsibility to use accepted visual and instrument procedures to avoid terrain and other obstacles.

The terrain and obstacle databases may contain errors. Obstacles less than 200 feet AGL are not displayed.

Terrain and obstacle information is intended to assist the flight crew in fulfilling the responsibility to avoid terrain and obstructions through visual means or by following instrument procedures.

NOTE: The optional Evolution Synthetic Vision System includes a Terrain Warning System that is consistent with the terrain and obstacle display. See section 2.13.

2.12.2 Traffic Display Limitation:

Limitation: Maneuvering based solely on the EFD1000 traffic display is not authorized. The Pilot In Command has the responsibility to see and avoid traffic.

The EFD1000/500 MFD and EFD1000 PFD will display traffic information when connected to a TIS, TAS or TCAS I system. Traffic information is presented to assist the pilot in visually identifying nearby aircraft.

2.12.3 XM Datalink Information Limitation:

Limitation: Datalink information (e.g. NEXRAD, METAR, TFR, etc.) shown on the PFD or MFD displays is supplemental to data available from official sources.

The EFD1000/500 MFD and EFD1000 PFD may be connected to an optional EWR50 XM weather receiver. Datalink information displayed on the EFD1000 system is supplemental to the out of the cockpit view and weather information from approved sources.

The XM service and reporting area includes the United States, Southern Canada and Puerto Rico.

The maximum wind speed capable of being shown is 180 knots. Wind speeds greater than 180 knots will be shown as 180 knots.

2.12.4 Electronic Map Display Limitation:

Limitation: The EFD1000/500 moving map display is not a substitute for approved maps or charts required by the operating rules.

The EFD1000 Moving Map Display is not a substitute for approved aeronautical maps or charts from approved sources. Approved maps and charts must be carried in the aircraft, as required by the applicable operating regulations.

2.12.5 Aerodrome Moving Map Display (AMMD) Limitation:

Limitation: The aircraft ownship position presented on the Airport Diagrams may be inaccurate – reference to ownship position for navigation or maneuvering is prohibited.

The intended function of Aerodrome Moving Map Display (AMMD) is to help flight crew orient themselves on the airport surface and improve pilot positional awareness during taxi operations. AMMD function is

not sufficient to be used as the basis for maneuvering and shall not be used for navigation. This application is limited to ground operations only.

This function is a Class 3 Electronic Flight Bag Type C application. See FAA AC 91-78 for more information.

The intersection of the wings and fuselage of the aircraft ownship symbol on the AMMD corresponds to the ownship's actual position.

2.12.6 Terminal Procedures Charts ("Charts") Limitation (no Ownship Depiction)

Limitation:	Except as provided for by regulation, the Terminal Procedures Charts depictions on the EFD are not substitutes for aeronautical charts required to be carried aboard the aircraft. This function does not replace any system or equipment required by the regulations.

The intended function of the Terminal Procedures Charts depiction without the aircraft ownship depicted on the chart is to provide a convenient location to view portions of the Terminal Procedures Charts information.

The Terminal Procedures Charts depiction is not sufficient to be used as the basis for maneuvering and must not be used for navigation.

This function is a Class 3 Electronic Flight Bag Type B application. For most 14 CFR Part 91 operations, the in-flight use of an Electronic Flight Bag/Electronic Chart Display in lieu of paper reference material is the decision of the aircraft operator and the pilot in command. For Part 91 subpart K, Part 91 subpart F and Part 135, Part 121 and Part 125 operations, consult your Operating Specifications. See FAA AC 91-78 for more information.

2.12.7 Terminal Procedures Charts ("Charts") Limitation (with Ownship Depiction)

Limitation:	The aircraft ownship position presented on the Terminal Procedures Charts may be inaccurately portrayed due to errors in the charts – reference to the ownship position for navigation or maneuvering is prohibited.
Limitation:	Except as provided for by regulation, the Terminal Procedures Charts depictions on the EFD are not substitutes for aeronautical charts required to be carried aboard the aircraft. This function does not replace any system or equipment required by the regulations.

The intended function of the display of terminal procedures with the ownship position is to provide a graphical depiction of the approach chart used to improve the flight crew awareness of the aircraft ownship position relative to other items depicted on the chart.

The Terminal Procedures Charts depiction is not sufficient to be used as the basis for maneuvering and must not be used for navigation.

2.13 Synthetic Vision and Terrain Warning System Limitation:

Limitation:	Navigation or maneuvering based solely on the EFD1000 or MFD500 Synthetic Vision background display and associated Terrain Warning System (TWS) is not authorized. The Pilot In Command has the responsibility to use accepted visual and instrument procedures to avoid terrain and other obstacles.

NOTE:

Note: Flight with an expired database is not recommended. An expired database does not prevent terrain or other Synthetic Vision features from being displayed.

The EFD1000/500 Evolution Synthetic Vision System provides a computer-derived perspective view of the nearby terrain, obstacles and airports. The Flight Path Marker graphically presents the aircraft vertical speed and the GPS track converted to an angular direction. The Terrain Warning System (TWS) uses the Flight Path Marker to present an estimated time-to-collision function for terrain and obstacles combined with a terrain proximity view that colorizes nearby terrain based on the relative aircraft height. Unless inhibited by the pilot, TWS operates even when SV is turned off.

The EFD1000/500 display of synthetic vision information is advisory only. The pilot is responsible for terrain and obstacle avoidance by visual means, or by following approved instrument procedures. At system start up the pilot must acknowledge this operational limitation by pressing either MODE/SYNC knob.

Evolution Synthetic Vision is a computer-generated image of the external scene topography from the perspective of the flight deck, derived from aircraft altitude, high-precision navigation solution, and database of terrain, obstacles and cultural features, such as runways. Evolution Synthetic Vision creates an image relative to terrain, obstacles and airports within the limits of the navigation source, altimetry and databases. Evolution Synthetic Vision provides situation awareness, but no operational credit. The intended function is flight crew awareness of the external scene topography.

The Aspen Evolution Synthetic Vision System uses 9 arc-second resolution data enhanced with 3 arc-second data to provide better depiction of the terrain. The depiction of terrain is most like the outside view in the narrow FOV1 view, and a more expansive view of the horizon is available in FOV2. The terrain depicted in FOV2 is closer than it appears.

The intended function of the Flight Path Marker is to display the current vertical and lateral path of the aircraft based on two parameters, barometric vertical speed and GPS track. These parameters lag during dynamic maneuvers. Therefore the Flight Path Marker should only be used during steady state, non-accelerated flight. It is not intended to provide accurate information during turns or transitions to climb or descent.

The intended function of the Terrain Warning System associated with the Evolution Synthetic Vision application is to provide warnings when the system predicts a collision with the terrain or an obstacle. The Flight Path Marker is an integral part of this system and changes in shape and color if the aircraft continues on the collision path. In addition, the terrain is colored based on the aircraft proximity to the terrain; yellow when the aircraft is within 500 feet vertically of the terrain or obstacle, and red when the aircraft is within 100 feet vertically.

WARNING: Synthetic Vision and the associated Terrain Warning System are dependent on accurate barometric altitude. An inaccurate altimeter setting will cause an incorrect depiction of the elevation of terrain and obstacles. Very cold temperatures can also cause significant errors in altimetry. The Pilot In Command has the responsibility to use accepted visual and instrument procedures to avoid terrain and other obstacles.

Obstacles less than 200 feet AGL are not displayed. Terrain and obstacle information is intended to assist the flight crew in fulfilling the responsibility to avoid terrain and obstructions through visual means or by following instrument procedures.

Pressing menu and selecting “TWS INH” will inhibit the Terrain Warning System. An annunciator will indicate that TWS is inhibited. TWS can be inhibited for all applications except Synthetic Vision by

selecting “SV ONLY”. When TWS is inhibited, no terrain warning is provided.

Terrain/obstacle caution and warning messages are generated due to nearby terrain or obstacles. See the references in Section 2.1 for more information. On a precision approach, terrain cautions or warnings are not anticipated. On a non-precision approach a terrain caution or warning is probable depending on the rate of descent toward the terrain.

Landings at most airports do not generate an alert. Some airports with unusual topography may generate alerts when the flight path marker points toward nearby higher terrain.

2.14 Kinds of Operations Equipment List (KOEL)

The EFD1000/500 system must be installed and maintained in accordance with the STC. The system is approved for day/night IFR and VFR operations in accordance with 14 CFR Part 91. The system is generally suitable for Part 135 operations, but must be evaluated in accordance with the regulations and the limitations of the Part 135 certificate.

Table 4 below shows the minimum equipment required for dispatch based on the kind of flight operation being conducted. Any other system limitations, such as the minimum battery charge detailed within this AFMS, must also be adhered to when that equipment is required for the kinds of flight operation being conducted.

The minimum equipment required for dispatch, based on the kind of flight operation conducted, must include all of the components shown in at least one of the columns in Table 4. If all of the equipment in a particular column is installed and serviceable, then the type of operation indicated at the top of that column is authorized.

Additionally, VFR day/night operations are authorized with any of the minimum IFR equipment configurations.

For example, in a single PFD installation, if the PFD is inoperative, but a whiskey compass, altimeter and airspeed indicator are available, then the flight may proceed if conducted under day/night VFR.NOTE: The numbers in the table refers to the quantity of items required.

Kinds of Operations Equipment Requirements (see 14 CFR Part 91.213(d))	**Day VFR**	**Day/ Night VFR**	**Day/ Night VFR**	**IFR**	**IFR**	**IFR**
EFD1000 PFD (includes PRO, VFR and PILOT Versions)	1	1		1	1	1
EFD1000 MFD with EBB		1		1		
EFD1000 MFD with Internal Battery					1	
Magnetic Compass	1	1	1	1	1	1
Standby Attitude Indicator				1	1	1
Standby Airspeed Indicator			1		1	1
Standby Altimeter			1		1	1
IFR Approved GPS				1	1	
Analog Converter Unit	As needed for navigation. Deactivated and placarded if inoperative and not required					

Table 4 – Minimum Equipment Required for Dispatch Based on the Kind of Flight Operations being Conducted.

2.15 EA100 Autopilot AHRS Limitations

The EA100 Autopilot AHRS (A/P AHRS) optionally provides attitude information to the autopilot. When installed, the EFD1000MFD supplies the EA100 with the data used to generate the attitude solution. If an EFD1000MFD is not installed, the EFD1000 PFD supplies the data. Table 1 Installed Equipment Configuration, identifies the configuration for this aircraft.

An amber panel annunciator labeled A/P AHRS FAIL illuminates, the autopilot automatically disconnects and the flight director goes out of view when any of the following conditions exist:

- The EA100 A/P AHRS detects an internal failure
- Power is removed from the EA100 A/P AHRS
- When the EFD1000 connected to the EA100 is turned off
- The EFD1000 PFD connected to the EA100 A/P AHRS displays an ATTITUDE FAIL (red-X) indication (A CROSS CHECK ATTITUDE condition does not cause an A/P AHRS FAIL annunciation)
- The EFD1000 connected to the EA100 A/P AHRS is manually reset (this also resets the A/P AHRS)
- The EFD1000 MFD connected to the EA100 A/P AHRS displays an ADAHRS FAIL indication (A CHECK AHRS annunciation on the EFD1000 MFD does not disconnect the autopilot or cause an A/P AHRS FAIL annunciation)
- The ASPEN GTWY is powered off (Only when both the EA100 and the CG100 are installed and connected to the EFD1000 MFD. See Table 1 Installed Equipment Configuration for the configuration of this aircraft.)

The autopilot and the flight director cannot be restored until the A/P AHRS annunciator is extinguished. It is possible to activate the autopilot/flight director modes using the Autopilot Mode Controller or CWS, however the only response will be illumination of the corresponding elements on the Mode Annunciator Panel until the A/P AHRS annunciator is extinguished.

2.16 CG100 Aspen Connected Gateway Limitations

The optional CG100 (ASPEN GTWY) allows wireless portable devices to send information to and receive information from panel-mounted avionics through an EFD1000/500 MFD. Table 1 Installed Equipment Configuration, identifies the configuration for this aircraft.

Limitation:	Aircraft registered in countries under EASA authority are not eligible for installation of the CG100 under this STC

Limitation:	The Aspen GTWY and the associated applications on the wireless portable device are only to be used as intended by Aspen Avionics. Any manipulation of the system or unauthorized access is prohibited.

The CG100 installation was checked to assure non-interference in the aircraft, however the operator must assure that the wireless devices do not interfere with the aircraft. See 14 CFR 91.21.

The Flight Plan Review Map on the Gateway Flight Plan review page is a map designed to assist in pilot verification of the Candidate Flight Plan. It is not for navigation.

Limitation:	The Flight Plan Review Map is not to be used for navigation.

The Aspen GTWY permits loading a flight plan into compatible Garmin WAAS systems, automating the manual loading of flight plan waypoints. This automation carries the same limitations as adding route waypoints into the Garmin navigators individually. Specifically, when flight plans are sent to the EFD1000/500 for review, careful examination of each waypoint compared to the expected fix is required.

Loading of the individual fixes that pertain to a SID or STAR procedure via the wireless device can result in incorrect flight plan depictions because headings and altitude restrictions are not provided. SID and STAR procedures must be loaded as complete named procedures selected from the database of the IFR Approved GPS Navigator, and the published procedure must be flown.

Limitation:	Departure Procedures (such as a SID) and Standard Terminal Arrival Routes (STAR) must be loaded as complete named procedures selected from the database of the IFR Approved GPS Navigator.

Limitation:	Instrument approach procedures must be loaded as a complete named procedure selected from the database of the IFR Approved GPS Navigator. Loading instrument approach procedure waypoints by any other means is not authorized.

The named approach procedure in the navigator is the authorized approach procedure. Loading waypoints by any other means is not an approach procedure and is not authorized.

Limitation:	The pilot must verify that the flight plan as shown on the MFD is correct and authorized before sending the flight plan to the navigator(s).

It is essential that the flight plan be reviewed for accuracy and correct order. The EFD1000 system only checks the fixes against a known database. Verifying the position and order of the fixes, that no fixes are added or dropped, and that the fixes are correct is the Pilot's responsibility.

2.17 EFD 1000 VFR PFD Coupled Autopilot (Vertical Deviation) Limitation

Limitation:	Flying coupled approaches with vertical guidance based solely on the EFD1000 PFD VFR is not authorized. The EFD1000 PFD VFR does not display vertical deviations for the pilot to monitor glide path performance.

The EFD1000 PFD VFR does not display vertical deviations. Aircraft with autopilots that provide tracking of vertical deviations are not authorized to install the EFD1000 VFR PFD

3 Emergency and Abnormal Procedures/Conditions

3.1 Pitot/Static System Blockage

If a blocked pitot or static line is suspected or annunciated, proceed as follows:

PITOT HEAT ..... ON

ALTERNATE STATIC SOURCE ..... SELECT OPEN

AUTOPILOT ..... MANUALLY DISCONNECT

NOTE: For installations with the EA100 A/P AHRS, the autopilot will automatically disconnect five seconds after the indicated airspeed decreases below 30 knots.

ATTITUDE ..... Maintain straight and level flight by reference to standby sources of attitude.

Consider exiting IMC

CAUTION:

Most light aircraft have only a single pitot and static pneumatic system available for flight instrument use. Should the static line become blocked, the standby and the EFD1000 (PFD and MFD) altimeters and airspeed indicators will be erroneous. If the pitot line is blocked, the airspeed indication will be erroneous on all indicators.

The EFD1000 (PFD and MFD) also uses pitot and static pressures as part of the attitude and heading solution. Loss or corruption of this data will affect the accuracy or availability of attitude and heading information.

For installations with GPS, if the pitot system is blocked in flight, the EFD1000 PFD and MFD will present red "X"s over the attitude and heading indicators, and display an amber "CHECK PITOT HEAT" annunciation. The EFD1000 MFD will display an amber "ADAHRS FAIL" annunciation.

For installations with the EA100 A/P AHRS, the ATTITUDE FAIL (red-X) condition resulting from a CHECK PITOT HEAT indication on the EFD1000 will cause the autopilot to automatically disconnect.

3.2 CROSS CHECK ATTITUDE Message

Persistent or frequent CROSS CHECK ATTITUDE annunciations during normal maneuvers are indicative of a degraded ADAHRS solution. CROSS CHECK ATTITUDE on the EFD1000 does not cause an autopilot disconnect.

ATTITUDE ..... Maintain by reference to other instruments or the visible horizon

Consider exiting IMC

NOTE:

The CROSS CHECK ATTITUDE message indicates that the statistical confidence in the ADAHRS solution is degraded. Momentary annunciations may be seen during aggressive maneuvers, such as 60-degree turns or aerobatics, which are normal.

3.3 ADAHRS Attitude Disagreement

Should differences be observed between one or more EFD1000 displays and/or the standby instruments, monitor all available attitude, airspeed, and altitude information to diagnose faulty indicator(s).

ATTITUDE..... Maintain straight and level flight

If an EFD1000 ADAHRS is suspected as faulty, proceed as follows:

AUTOPILOT.....MANUALLY DISCONNECT

MENU..... Select “GENERAL SETTINGS” Page

“ADAHRS: RESET?” LINE SELECT KEY .....PRESS

“ADAHRS: RESET?” LINE SELECT KEY .....PRESS AGAIN TO CONFIRM RESET

Consider exiting IMC

CAUTION:

When the EFD1000 PFD and MFD share a common pitot/static system, their otherwise independent attitude solutions would be similarly affected by pitot/static faults.

3.4 MFD Reversionary Mode Operation (EFD1000 MFD only)

To select REV mode and to change the autopilot source from the PFD to the MFD (if configured), proceed as follows:

Autopilot	DISCONNECT
EFD1000 MFD REV Button	MOMENTARY PRESS
REVERSIONARY PFD Display	Select XFILL as desired
BARO SETTING	Verify
If the Autopilot Source Select is installed (see Section 1.2)	
A/P Source Select	MFD
Autopilot	CONNECT AS DESIRED
The reverted MFD will be the heading and nav source for the autopilot.	

NOTE:

Press and hold the REV key for 5 seconds to shut off the unit. The REV button is located on the EFD bezel, marked with "REV" in red text.

NOTE:

When reversion mode is selected, it is possible to crossfill (XFILL) the PFD data by pressing the XFILL button. After crossfill the pilot should verify that the display is configured as necessary. Crossfill transfers the Altitude Bug, Airspeed Bug, Minimums, CDI Nav Source, Selected Course and Heading, ARC/360 Mode, Map configuration, Traffic and Weather as appropriate.

EFD1000 MFD can revert to PFD operation in order to mitigate the effects of a failure of the PFD, including the loss of ADC or ADAHRS functions. With a single press and release of the red text REV key located on the MFD bezel, the MFD will immediately change to the PFD operating mode. The system provides the option to crossfill (XFILL) the PFD data to the MFD if desired. To return to the MFD operating mode, press the REV key again. In the MFD Reversionary PFD mode, operation is identical to the PFD except the optional tone generator does not function (altitude alerter). In addition, selection of the REV mode does not switch autopilot outputs to the MFD.

Information that is not related to Primary Flight Information (e.g. navigation configuration data such as navigation source, selected course, selected heading, altitude bug, minimums bug, airspeed bug) is only passed when the XFILL button is pressed. XFILL is a useful function that can be used prior to entering critical phases of flight. After configuring the MFD REV mode, the unit may be returned to normal MFD operation. This simple step will ensure that the MFD is ready to assume all of the duties performed by the PFD should that equipment experience a failure.

Autopilot Source Select (A/P Source)
The autopilot source select is intended to provide the ability to connect the autopilot heading and nav functions to an EFD1000 MFD that is reverted to a PFD. An EFD1000 that is not reverted to a PFD cannot be used to drive the autopilot because there would be no visual guidance to permit the pilot to monitor the autopilot operation.
The A/P Source is controlled by a momentary toggle switch that permits selection of the MFD only when the EFD is in reversion mode. Indicator lights annunciate which display is providing data to the Autopilot. If the reverted MFD is changed back to an MFD, the A/P source connection will automatically return to the

EFD1000 PFD and the annunciation will change accordingly.

3.5 In-Flight ADAHRS Reset

To reset an EFD1000 ADAHRS proceed as follows:

ATTITUDE	MAINTAIN STRAIGHT AND LEVEL FLIGHT by visual reference, or by standby instruments
AUTOPILOT	MANUALLY DISCONNECT
MENU	Select “GENERAL SETTINGS” Page A
“ADAHRS: RESET?” LINE SELECT KEY	PRESS
“ADAHRS: RESET?” LINE SELECT KEY	PRESS AGAIN TO CONFIRM ADAHRS RESET
	Activate any other control to cancel the reset

NOTE:

When an EFD1000 ADAHRS is manually reset in flight, it performs an abbreviated initialization that usually takes less than 30 seconds.

During the initialization, the attitude and direction information are removed and replaced with red "X"s and the annunciations, "ATTITUDE FAIL" and "DIRECTION INDICATOR FAIL" are presented.

Gentle maneuvering during the initialization is permitted.

The ADAHRS reset is considered complete when the EFD1000 attitude and heading are once again displayed and the attitude display is stable and correct with respect to other sources of attitude information.

When the EFD1000 connected to the EA100 A/P AHRS is reset, A/P AHRS will also reset, the autopilot will disconnect and the A/P AHRS FAIL annunciation on the instrument panel will illuminate. The annunciation will extinguish when the A/P AHRS reset is complete.

The EFD1000 ADAHRS is normally stable, self-correcting, and accurate. The pilot may elect to manually reset it if pitch and roll indications disagree with the standby attitude indicator, or the ADAHRS is suspected to be inaccurate (e.g., following aerobatic maneuvers). The ADAHRS reset function is analogous to "caging" a gyroscopic attitude indicator.

3.6 Alternator or Generator Failure, or ON BAT Annunciation

UNRESTORABLE LOSS OF AIRCRAFT POWER
(Alternator or Generator failure)
IS AN EMERGENCY SITUATION

Aircraft Electrical Power	Follow AFM procedures to restore power
If unable to restore aircraft alternator or generator	
EFD1000/500 Circuit Breaker / Switch.....	OPEN for each display
LAND AS SOON AS PRACTICAL	

CAUTION:

If the aircraft alternator or generator fails and the EFD is operated until its battery is exhausted, the screen may fade to solid white for several seconds before blanking. To avoid this condition at night, manually turn off the EFD once the display shows 0% battery remaining.

NOTE:

The internal battery normally provides 30-60 minutes of operation at 20°C and warmer. At very cold temperatures internal battery operation is not assured.

The Emergency Backup Battery will provide at least 30 minutes of operation with 80% indicated charge when at -20°C. A fully charged EBB at +20°C or warmer will typically provide power for two or more hours of operation.

When operating "ON BAT" the maximum "auto" backlight setting is 40% and the maximum manual backlight setting is 70%. Changing the backlight setting changes battery endurance, reflected by the % remaining indication.

A fully charged battery will indicate a charge level of 99% for some time before beginning to show discharge. Once discharge is indicated the charge level will decrease in a steady manner with a slight acceleration nearing 0%.

The "ON BAT" annunciation and estimated charge remaining, is displayed in the upper half of each EFD whenever the system is operating from battery.

The internal battery (or EBB) provides power for both the EFD and optional RSM GPS.

If aircraft generated power to the EFD is degraded or fails, such as from an aircraft alternator or generator failure, each EFD will begin an automatic load-shed routine, and will disconnect from the power bus two minutes after input power degrades, or immediately if the input power fails.

To complete the load-shed process, the pilot must open each EFD Circuit Breaker / Switch. This may be done as soon as the degraded power is noticed.

These actions prevent the EFD from automatically restarting from connected external power should the flight continue until the EFD battery is fully depleted. If it is desired to reconnect the EFD to the aircraft power bus, close the associated Circuit Breaker / Switch and select EXT Power from the Power Settings Menu.

3.7 Abnormal Shutdown Procedure

In the event of an EFD malfunction requiring in-flight shut down of the equipment, proceed as follows

EFD1000 MFD (with EBB)

EFD Circuit Breaker / Switch ..... OFF / PULL

EBB Disconnect Switch ..... DISC

- OR -

EFD1000/500 display with internal battery

EFD Circuit Breaker / Switch ..... OFF / PULL

REV Button ..... PUSH AND HOLD UNTIL DISPLAY BLANKS

NOTE:

Heading and navigation inputs to the autopilot are provided by the PFD. Turning off the PFD may affect selected or available autopilot modes.

NOTE:

For installations with the EA100 A/P AHRS, turning off the EFD1000 connected to the EA100 will cause automatic disconnection of the autopilot and removes the flight director display on the remaining EFD1000.

NOTE:

Each EFD 1000/500 has a labeled circuit breaker and optional master switch or a combined circuit breaker / switch. These switches are mounted on or adjacent to the instrument panel and within the pilot's reach.

NOTE:

If the EFD1000/500 MFD associated with the Aspen Connected Gateway is shut down, crossfill between the Garmin navigators will be inoperative.

3.8 EBB Disconnect (EFD1000 MFD only)

To isolate the EBB in the event of an EBB or EFD1000 MFD malfunction, proceed as follows:

EBB Switch .....Select DISC

NOTE:

When in the "DISC" position, the EBB isolation relay is powered from the EBB. When the switch is in the disconnect position the Emergency Backup Battery will gradually discharge.

The EBB is protected by thermal and short-circuit sensing circuitry to prevent battery overheating or damage. The battery is normally connected to its EFD1000 MFD. If it is desired to remove battery power from the EFD1000 MFD, or to otherwise isolate the EBB, the EBB includes an externally activated isolation relay integral to the EBB aluminum housing. The EBB Disconnect switch installed in the instrument panel activates this relay.

The EBB Emergency Disconnect switch is either a guarded or lever-lock switch mounted on or adjacent to the instrument panel and within the pilot's reach. The switch should be left in the NORM position at all times, including when away from the aircraft. When it is desired to disconnect the EBB from the EFD1000

MFD display, move the switch to the DISC position.

3.9 Power Override

In the event that the pilot wishes to override the automatic power configuration of the equipment, proceed as follows:

MENU .....“POWER SETTINGS” Page
To switch FROM aircraft power to Battery:
“BATTERY” LINE SELECT KEY.....PRESS
To switch FROM Battery TO aircraft power:
“EXT PWR” LINE SELECT KEY .....PRESS

3.10 EFD1000/500 Intercommunications Failure

In the event of a “CROSS LINK FAILURE” message, verify that barometric altimeter setting information is correctly transferred between the displays. On the EFD1000 MFD, the barometric altimeter setting can only be set from the MFD REV mode.

BARO SETTING .....VERIFY
If the EFD1000 Baro Setting must be set
EFD1000 MFD REV Button .....PRESS TO DISPLAY PFD
BARO SETTING .....SET

CAUTION:

Relative terrain is based on the barometric altitude from the EFD1000 displays. BARO setting may not be shared between the EFD1000 displays during this Cross Link Failure condition. It is necessary to set BARO individually on both EFD1000 displays to prevent the display of erroneous relative terrain.

The Barometric Pressure Setting is shown on the EFD1000/500 MFD Data Bar*.

An intercommunications link exists between the EFD1000 PFD, EFD1000 MFD, and EFD500 MFD to share various information, including barometric setting, heading, airspeed and altitude information. The EFD1000 PFD and EFD1000 MFD both receive and transmit data to each other, and each also transmits data to the EFD500 MFD. The EFD500 MFD only receives data, but does so from each installed EFD1000 display.

In the event of an intercommunication failure between the EFD1000 PFD, EFD1000 MFD, or EFD500 MFD, a CROSS LINK FAILURE annunciation will be presented in the affected PFD/MFD’s Data Bar. When this occurs, the altimeter’s barometric pressure setting may not be communicated between EFDs. It will be necessary to confirm if the baro setting information is being transferred. If it is not, the pilot should manually adjust the BARO setting on the affected display. For the EFD1000 MFD, this is

* The Data Bar is a segment of the MFD that shows barometric pressure, waypoint information, GPS selection and track direction information.

accomplished in the PFD Reversion Mode.

In a three display configuration it is possible for the EFD500 MFD to display this message, but still maintain synchronization. This indicates that only one of the intercommunications buses to the EFD500 has failed.

3.11 Loss of GPS effect on the Moving Map

CAUTION:

In the event of complete GPS failure, the Nav Map stops moving and orients North Up, the airplane symbol is removed and reverts to a stationary map with an accompanying "GPS POS FAILED" annunciation. In this case, the Nav Map may be manually panned to correlate to the estimated aircraft position determined by other means.

Position and flight plan data for the PFD and MFD is provided from aircraft GPS equipment. The EFD displays may be configured to receive data from one or two external GPS systems. In addition, when an RSM connected to the EFD includes an emergency GPS, this information may be used if the aircraft GPS system(s) fail.

The Nav Map function in either the PFD or MFD follows an automatic position reversion scheme to determine which GPS is the position source for the map. The primary GPS is always the one selected by the pilot, either by the associated CDI nav source (PFD), or via the menus (MFD). If the selected GPS fails, the EFD automatically switches to another GPS (when installed), and will annunciate "GPS# Reversion", where # represents the GPS source providing position data.

If all external GPS systems fail, and an RSM GPS is connected to that display, the EFD will use position data from the RSM and annunciate RSM GPS REVERSION EMER USE ONLY." In this case, the map data is approved for emergency use only.

Whenever the map has reverted to an alternate position source, all map features and capabilities are retained, including the display of the flight plan from the selected GPS. However, when the GPS position source is different from the source that generated the flight plan, the flight plan is presented without showing an active (magenta) leg. The flight plan and map data from each external GPS is retained independently. If two external GPS were connected prior to, and if each had a different flight plan at the time of failure, both of these flight plans are retained and can be viewed by the pilot.

In the unlikely event that there is a complete loss of all GPS data to an MFD, including loss of the RSM GPS (if installed), the NAV Map is retained, the flight plan is removed, and the map is no longer updated with aircraft position information. An annunciation of "GPS POS FAILED" is presented in the center of the map, the airplane symbol is removed, the map changes to a North-up orientation and the map will no longer move with the aircraft. Manual panning is still possible and all map features that are not GPS position dependent continue to remain available, including relative terrain overlays.
GPS groundspeed is compared to airspeed to determine if a pitot blockage has occurred. When the GPS is inoperative, the attitude and heading indications will be replaced by red-X indications when the aircraft slows after landing.

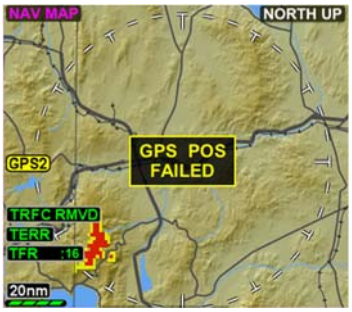


Figure 1 GPS POS FAILED indication

3.12 Loss of MFD or PFD Database Card

Each EFD1000 and EFD500 includes a microSDHC (SD card, High Capacity) card slot that can accept a database card. The database card must remain in the EFD display.

Generally, when the microSDHC database card is removed from the card slot, or communications with the card fails, the MFD and PFD will continue to operate using the last data that was loaded into memory. As the aircraft position changes, the software will attempt to access the data card to retrieve additional data for the new location. When this occurs, if the data card cannot be detected, an annunciation of "DATABASE FAILURE" is displayed. In the case of the MFD, new data is not available and in the case of the PFD, Synthetic Vision reverts to SV off operation and the Synthetic Vision display will not be selectable. When the data card is restored, restarting the EFD will reinitialize the database.

3.13 Automatic Autopilot Disconnect (EA100 A/P AHRS Installations)

An amber panel annunciator labeled A/P AHRS FAIL illuminates and the autopilot automatically disconnects when any of the following conditions exist:

- The EA100 A/P AHRS detects an internal failure
- Power is removed from the EA100 A/P AHRS
- When the EFD1000 connected to the EA100 is turned off
- The EFD1000 PFD connected to the EA100 A/P AHRS displays an ATTITUDE FAIL (red-X) indication (A CROSS CHECK ATTITUDE condition does not cause an A/P AHRS FAIL annunciation)
- The EFD1000 connected to the EA100 A/P AHRS is manually reset (this also resets the A/P AHRS)
- The EFD1000 MFD connected to the EA100 A/P AHRS displays an ADAHRS FAIL indication (A CHECK AHRS annunciation on the EFD1000 MFD does not disconnect the autopilot or cause an A/P AHRS FAIL annunciation)
- The ASPEN GTWY (CG100) is powered off. (Only when both the EA100 and the CG100 are installed and connected to the EFD1000 MFD, see Table 1)

The autopilot cannot be re-engaged until the connected EFD1000 attitude resets and the amber A/P AHRS annunciator lamp is extinguished.

3.14 Loss of Synthetic Vision

Evolution Synthetic Vision (EVS) requires a proper database input, proper GPS input and proper altitude input. If any of these inputs are missing or detected as erroneous, Synthetic Vision is removed from the display. In the case of the MFD, the screen is replaced with a message indicating the nature of the problem. In the case of the PFD, the system will present the normal attitude and heading display and EVS cannot be selected. All navigation and attitude presentations remain in view and permit the pilot to conduct the flight operation normally. The autopilot operation will

continue with no interruption, unless the issue causing the removal of Synthetic Vision also causes disconnection of the autopilot.

3.15 Continuous EFD1000 or EFD500 System Reset (does not apply to the C3 PFD)

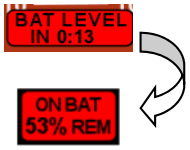
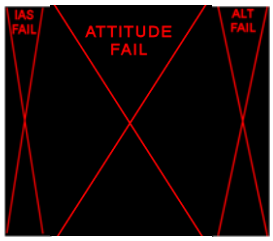
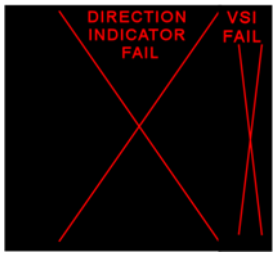
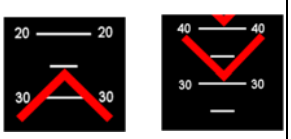
The EFD systems have been tested to assure that there are no conditions that could cause multiple resets. In the event of an unexpected condition that causes the system to continually reset, there are some steps that can be accomplished to remove external inputs to the system and restore functionality:

Steps to remove external inputs to the system and restore functionality in the event of a continuous reset:

Remove the following external inputs, if installed:	
REMOVE THE DATABASE CARD	PERMIT THE SYSTEM TO REINITIALIZE. If the condition persists, then:
TURN OFF THE Aspen GTWY SWITCH	PERMIT THE SYSTEM TO REINITIALIZE. If the condition persists, then:
PULL THE XM WEATHER CIRCUIT BREAKER	PERMIT THE SYSTEM TO REINITIALIZE. If the condition persists, then:
PULL THE STORMSCOPE CIRCUIT BREAKER	PERMIT THE SYSTEM TO REINITIALIZE.

3.16 Warning, Caution, and Advisory Summary

Warning **W** Caution **C** Advisory **A**

	Applicability							Annunciation	Description
	EFD 1000 PFD PRO C3	EFD 1000 PFD PRO	EFD 1000 VFR	EFD 1000 PFD PILOT	EFD 1000 MFD REV	EFD 1000 MFD	EFD 500 MFD		
W	✓	✓	✓	✓	✓	✓	✓		Red annunciations presented whenever the EFD1000 is operating on the internal battery or EBB. The countdown timer appears first, and is then replaced by the ON BAT and % charge annunciation
W	✓	✓	✓	✓	✓	✓		 	Red-X annunciation presented whenever the EFD1000 determines that the associated function is invalid or failed. On the EFD1000 MFD SAI and SHSI, only the “ATTITUDE FAIL” and DIRECTION INDICATOR FAIL” annunciations are presented. These indications are also presented when the ADAHRS system is re-initializing after a manual or automatic reset. Fly by reference to standby sources of attitude, altitude and airspeed, such as the EFD1000 MFD, standby instruments, or the visible horizon. In this circumstance GPSS operation is still possible. In addition, the LDI and VDI will continue to remain available and display either GPS approach lateral and vertical deviations, or localizer lateral deviation information, which may be manually flown. For installations with the EA100 A/P AHRS, all conditions that result in a red-X annunciation automatically disconnect the autopilot.
W	✓	✓	✓	✓	✓	✓			Red chevrons displayed on the Attitude Indicator’s pitch scale to indicate extreme pitch up and down attitudes and the appropriate fly-to direction to restore level flight.

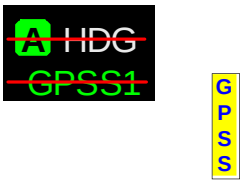
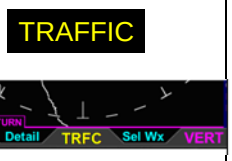
	Applicability							Annunciation	Description
	EFD 1000 PFD PRO C3	EFD 1000 PFD PRO	EFD 1000 VFR	EFD 1000 PFD PILOT	EFD 1000 MFD REV	EFD 1000 MFD	EFD 500 MFD		
W		✓			✓	✓	✓		A red flight path marker indicates that the Evolution Synthetic Vision System has generated a warning alert predicting conflict with terrain or an obstacle within 30 seconds.
W		✓			✓	✓	✓	WARNING – TERRAIN, TERRAIN or WARNING – OBSTACLE, OBSTACLE	Red textual message indicating the Evolution Synthetic Vision System has generated a warning alert predicting conflict with terrain or an obstacle within 30 seconds. In the event of a Warning alert when SV is not displayed, a “TERR” message is presented over the lower center button. Press the button to instantly display the SV image.
W		✓			✓	✓	✓		Small Tower (<1000’ AGL) or group of small obstructions (<1000’ AGL) above or within 100’ below the ownship altitude.
W		✓			✓	✓	✓		Tall Tower (>1000’ AGL) or group of tall obstructions (>1000’ AGL) above or within 100’ below the ownship altitude.

	Applicability							Annunciation	Description
	EFD 1000 PFD PRO C3	EFD 1000 PFD PRO	EFD 1000 VFR	EFD 1000 PFD PILOT	EFD 1000 MFD REV	EFD 1000 MFD	EFD 500 MFD		
C								Panel Mounted Indicator Lamp  **A/P AHRS Fail** or **A/P AHRS FAIL**	An amber panel annunciator labeled A/P AHRS FAIL illuminates and the autopilot automatically disconnects when any of the following conditions exist: • The EA100 A/P AHRS detects an internal failure • Power is removed from the EA100 A/P AHRS • When the EFD1000 connected to the EA100 is turned off • The EFD1000 PFD connected to the EA100 A/P AHRS displays an ATTITUDE FAIL (red-X) indication (A CROSS CHECK ATTITUDE condition does not cause an A/P AHRS FAIL annunciation) • The EFD1000 connected to the EA100 A/P AHRS is manually reset (this also resets the A/P AHRS) • The EFD1000 MFD connected to the EA100 A/P AHRS displays an ADAHRS FAIL indication (A CHECK AHRS annunciation on the EFD1000 MFD does not disconnect the autopilot or cause an A/P AHRS FAIL annunciation) • The ASPEN GTWY (CG100) is powered off. (Only when both the EA100 and the CG100 are installed and connected to the EFD1000 MFD, see Table 1) Illumination of the annunciator indicates that the autopilot cannot be engaged.

	Applicability							Annunciation	Description
	EFD 1000 PFD PRO C3	EFD 1000 PFD PRO	EFD 1000 VFR	EFD 1000 PFD PILOT	EFD 1000 MFD REV	EFD 1000 MFD	EFD 500 MFD		
C	✓	✓	✓	✓	✓	✓		CROSS CHECK ATTITUDE	Amber annunciation centered in the upper half of the attitude indicator whenever the EFD1000 ADAHRS internal integrity monitor determines that attitude is potentially degraded. If a steady CROSS CHECK ATTITUDE annunciation is presented, cross check attitude, airspeed and altitude indications against alternate sources.
C						✓		ADAHRS FAIL	Amber annunciation displayed in the Data Bar of the EFD1000 MFD when its internal ADAHRS reports a failure (e.g. during ADAHRS Reset). For installations with the EA100 A/P AHRS, this condition automatically disconnects the autopilot.
C						✓		CHECK AHRS	Amber annunciation presented on the EFD1000 MFD when its internal ADAHRS reports a “CROSS CHECK ATTITUDE” condition.
C						✓	✓	CROSS LINK FAILURE	Amber annunciation presented in the EFD1000 MFD Data Bar when it loses communication with the PFD, and in the EFD500 MFD Data Bar when it loses communication with either the PFD or the EFD1000 MFD.
C						✓	✓	(HDG FAIL)	Amber annunciation presented on the MFD in the Charts, Nav Map and WX applications when heading has failed.

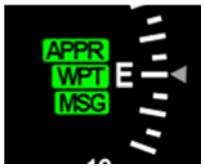
	Applicability							Annunciation	Description
	EFD 1000 PFD PRO C3	EFD 1000 PFD PRO	EFD 1000 VFR	EFD 1000 PFD PILOT	EFD 1000 MFD REV	EFD 1000 MFD	EFD 500 MFD		
C	✓	✓	✓	✓	✓	✓		CHECK PITOT HEAT	Amber annunciation accompanied by an "ATTITUDE FAIL" annunciation. Presented when the software detects an obstruction in the pitot system that could potentially degrade the attitude solution This annunciation is removed when the detected condition is resolved, which would be followed by an automatic ADAHRS reset. A GPS system configuration is required for this monitor to be enabled. For installations with the EA100 A/P AHRS, this results in an autopilot disconnect.
C	✓	✓	✓	✓*	✓	✓	✓	GPS1 GPS2 RSM GPS GPS1 REVERSION GPS2 REVERSION RSM GPS REVERSION EMER USE ONLY	Amber annunciations presented when a connected GPS is invalid or not available. GPS# or RSM REVERSION (optional) annunciations indicate the current GPS basemap source. Note: the EFD500 MFD cannot revert to RSM GPS since it is not configured with an RSM. ***GPS2 is not applicable to the PFD Pilot. "GPS1", "RSM GPS" and "RSM GPS REVERSION" are the only annunciations of this type that apply to the PFD Pilot.
C		✓			✓	✓	✓		A bold amber flight path marker indicates that the Evolution Synthetic Vision System has generated a caution alert predicting conflict with terrain or an obstacle within 45 seconds.
C		✓			✓	✓	✓	CAUTION – TERRAIN, TERRAIN Or CAUTION – OBSTACLE, OBSTACLE	An amber textual message indicates that the Evolution Synthetic Vision System has generated a Caution alert predicting conflict with terrain or an obstacle within 45 seconds. In the event of a Caution alert when SV is not displayed, a "TERR" message is presented over the lower center button. Press the button to instantly display the SV image.

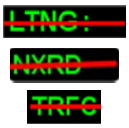
	Applicability							Annunciation	Description
	EFD 1000 PFD PRO C3	EFD 1000 PFD PRO	EFD 1000 VFR	EFD 1000 PFD PILOT	EFD 1000 MFD REV	EFD 1000 MFD	EFD 500 MFD		
C		✓			✓	✓	✓		Small Tower (<1000' AGL) or group of small obstructions (<1000' AGL) is between 500' and 100' below the ownship altitude.
C		✓			✓	✓	✓		Tall Tower (>1000' AGL) or group of tall obstructions (>1000' AGL) is between 500' and 100' below the ownship altitude.
C						✓	✓		Amber annunciation presented in the center of the NAV Map when all GPS sources have failed. When presented, the map changes to a North-up orientation and the map no longer moves with the aircraft. Manual panning is still possible and all map features that are not GPS position dependent continue to remain available, including relative terrain overlays.
C	✓	✓	✓	✓	✓	✓			Amber annunciation presented whenever the selected GPS source indicates that GPS integrity is degraded. See the applicable GPS AFMS for more information.
C	✓	✓			✓				Amber annunciation presented when the aircraft reaches, or is below the set MINIMUMS. Will be accompanied by a one-second stuttered tone when the optional tone generator is installed.

	Applicability							Annunciation	Description
	EFD 1000 PFD PRO C3	EFD 1000 PFD PRO	EFD 1000 VFR	EFD 1000 PFD PILOT	EFD 1000 MFD REV	EFD 1000 MFD	EFD 500 MFD		
C	✓	✓	✓*	✓*	✓				Amber flag presented to indicate the aircraft is reaching (steady) or deviating (flashing) the selected altitude. Will be accompanied by a one-second steady tone when the optional tone generator is installed. ***The tone is not available on the PFD Pilot, PFD VFR or the EFD1000MFD reverted to a PFD.
C	✓	✓			✓				Amber "DH" annunciation presented when a connected radar altimeter indicates the aircraft has reached the radar altitude set by the pilot. See the radar altimeter's AFMS for more information.
C	✓	✓	✓		✓				GPSS annunciation that indicates the previously selected GPSS source is invalid (e.g. the flight plan was deleted) or a different GPSS has been selected by pilot. Commands the autopilot to roll the aircraft to wings level until GPSS is re-engaged, or a valid GPSS signal is available.
C						✓	✓		Amber annunciation presented on the dedicated terrain display when any of the information needed to render the map (position, altitude, or heading) is detected as invalid.
C		✓			✓	✓	✓		A "TRAFFIC" Advisory annunciation is presented in the Data Bar whenever a connected traffic system generates a Traffic Advisory and a dedicated traffic view is not being displayed. In the event of a Traffic Alert when traffic is not displayed on the PFD, a "TRFC" message is presented over the lower center button. Press the button to instantly display a plan view of Traffic.

	Applicability							Annunciation	Description
	EFD 1000 PFD PRO C3	EFD 1000 PFD PRO	EFD 1000 VFR	EFD 1000 PFD PILOT	EFD 1000 MFD REV	EFD 1000 MFD	EFD 500 MFD		
C	✓	✓	✓		✓	✓	✓	TRFC UNAV TRFC UNAVAILABLE	Amber annunciations provided when Traffic data is reported as unavailable by the connected traffic sensor.
C	✓	✓	✓		✓	✓	✓	TRFC RMVD AGE: ##	Amber annunciation that indicates that the traffic data has not been refreshed within 6 seconds. The Primary Flight Display shows only TRFC RMVD. The PFD does not display the AGE.
C						✓	✓	TRFC FAIL	Amber annunciation that indicates a traffic sensor failure.
C						✓	✓	TEST INIT FAIL	Amber annunciation presented when the spherics (lightning) sensor reports that the self-test response has not been received within 10 seconds of the test request.
C						✓	✓	FAIL	Amber annunciation presented when the spherics (lightning) sensor reports a failed self-test, an unrecoverable fault, or an undefined fault.
C						✓	✓	ERROR	Amber annunciation presented when the spherics (lightning) sensor reports an undefined but recoverable error
C						✓	✓	ERROR ANT ERROR	Amber annunciation presented when the spherics (lightning) sensor reports a recoverable antenna error
C						✓	✓	ERROR MIC INHIBIT STUCK	Amber annunciation presented when the spherics (lightning) sensor reports a recoverable inhibit line stuck microphone error
C						✓	✓	ERROR ANT JUMP CHG	Amber annunciation presented when the spherics (lightning) sensor reports a recoverable changed antenna jumper error.

	Applicability							Annunciation	Description
	EFD 1000 PFD PRO C3	EFD 1000 PFD PRO	EFD 1000 VFR	EFD 1000 PFD PILOT	EFD 1000 MFD REV	EFD 1000 MFD	EFD 500 MFD		
C						✓	✓		Amber annunciation presented when the spherics (lightning) sensor reports no heading data. Accompanied by removal of spherics (lightning) sensor data.
C						✓	✓		Amber annunciation presented when the spherics (lightning) sensor reports that the sensor is enabled but no data is detected
C		✓	✓		✓	✓	✓		Datalink weather product data not received.
C	✓	✓	✓	✓	✓	✓			Annunciation presented on the HSI whenever the HSI compass card is no longer receiving magnetic corrections. After 6 minutes of free gyro operation the attitude and heading solutions will be removed.
C	✓	✓	✓	✓	✓	✓	✓		Annunciation presented in the menus when the connected EFD1000 battery is not detected or failed
A	✓	✓	✓	✓			✓		Annunciation presented when the EFD1000 PFD's or EFD500 MFD's "REV" button is pressed.
A					✓	✓			Annunciation presented when the EFD1000 MFD's "REV" button is pressed.

	Applicability							Annunciation	Description
	EFD 1000 PFD PRO C3	EFD 1000 PFD PRO	EFD 1000 VFR	EFD 1000 PFD PILOT	EFD 1000 MFD REV	EFD 1000 MFD	EFD 500 MFD		
A	✓	✓	✓		✓				Green annunciations provided whenever GPSS is enabled and the GPS source is valid. Either “GPSS1” or “GPSS2” may be annunciated depending on aircraft configuration.
A	✓	✓	✓		✓	✓			GPS annunciations provided by an active GPS source. TERM may also be displayed in the same location as APPR. See the GPS AFMS for additional information on the meaning of these annunciations.
A	✓	✓	✓		✓	✓	✓		Green annunciation that indicates that the traffic sensor is enabled.
A						✓	✓		Green annunciation that indicates that the traffic sensor is in standby.
A	✓	✓	✓		✓	✓	✓		Green annunciation that indicates that the traffic sensor is in the self-test mode.
A	✓	✓	✓		✓	✓	✓		Green annunciation that indicates that the TIS traffic data has not been refreshed within 6 seconds.
A		✓	✓		✓	✓	✓		Lightning (spherics) Strike display mode selected. The rate indicates the approximate number of lightning strikes detected per minute.
A		✓	✓		✓	✓	✓		Lightning (spherics) Cell clustering display mode selected. The rate indicates the approximate number of lightning strikes detected per minute.
A		✓	✓		✓	✓	✓		Self-test mode annunciation that replaces spherics (lightning) Strike / Cell rate information.
A						✓	✓		Lightning (spherics) Self-test mode selected.
A						✓	✓		Annunciation that replaces aircraft ownship symbol during a spherics (lightning) self-test.

	Applicability							Annunciation	Description
	EFD 1000 PFD PRO C3	EFD 1000 PFD PRO	EFD 1000 VFR	EFD 1000 PFD PILOT	EFD 1000 MFD REV	EFD 1000 MFD	EFD 500 MFD		
A		✓	✓		✓	✓	✓		A data age annunciation is presented for datalink weather products when the XM receiver is operational. The elapsed time since last data update is expressed in minutes (e.g.:05). NOTE: The data may be several minutes older than the time shown. It is not real-time data.
A		✓			✓	✓	✓		A green flight path marker indicates that full TWS alerts are available, and the ownship position is outside the proximate region of a runway (more than two miles from a runway on approach or climbing from the runway on departure).
A		✓			✓	✓	✓		Small Tower (<1000’ AGL) or group of small obstructions (<1000’ AGL) is between 900’ and 500’ below the ownship altitude.
A		✓			✓	✓	✓		Tall Tower (>1000’ AGL) or group of tall obstructions (>1000’ AGL) is between 900’ and 500’ below the ownship altitude.
A		✓	✓		✓	✓	✓		A horizontal red line through the spherics (lightning) rate legend that indicates the data is no longer detected.
A	✓	✓	✓		✓	✓	✓		A horizontal red line through the legend of selected data indicates that the data is invalid, unavailable, or for datalink products, that the data product is expired. (TRFC only for PFD PRO C3)

	Applicability							Annunciation	Description
	EFD 1000 PFD PRO C3	EFD 1000 PFD PRO	EFD 1000 VFR	EFD 1000 PFD PILOT	EFD 1000 MFD REV	EFD 1000 MFD	EFD 500 MFD		
A	✓	✓	✓		✓				A horizontal red line through the source legend of selected data indicates that the data is invalid or unavailable.
A	✓	✓	✓		✓	✓			A horizontal red line through the selected navigation source indicates that the data is invalid or unavailable. HSI and SHSI only.
A	✓	✓			✓				A horizontal red line through the Radar Altitude display indicates that the data is invalid or unavailable.
A						✓	✓		Annunciation presented at the bottom center of the Nav Map or the Charts application if the software is unable to access the data base stored to the microSDHC memory card.
A						✓	✓		Annunciation presented at the bottom center of the Nav Map when data is being loaded from the micro SD card at start up. The current data type and total number of data types to be loaded is identified (i.e. “11/11”), along with an indication of the type of data that is currently being loaded (i.e. “AIRWAYS”).
A						✓	✓		Annunciation presented at the top center of the CHARTS application when the OWN hotkey is selected and the aircraft ownship cannot be displayed because the chart is not geo-referenced.
A						✓	✓		Annunciation presented at the top center of the CHARTS application when the displayed chart is geo-referenced, the OWN hotkey is selected and the aircraft position is not on the chart.
A		✓			✓	✓	✓		Attitude, altitude or heading becomes invalid.

	Applicability							Annunciation	Description
	EFD 1000 PFD PRO C3	EFD 1000 PFD PRO	EFD 1000 VFR	EFD 1000 PFD PILOT	EFD 1000 MFD REV	EFD 1000 MFD	EFD 500 MFD		
A		✓			✓	✓	✓	SV POSITION INVALID	Position or magnetic variation is not received from an externally configured GPS unit.
A		✓			✓	✓	✓	DATABASE FAIL	Jeppesen database failure.
A		✓			✓	✓	✓	DATABASE INIT	Presented during initialization of the data base.
A		✓			✓	✓	✓	SV DATABASE UNAVAILABLE	Ownship is located outside the valid database area.
A		✓			✓	✓	✓	SV LOADING…	When synthetic vision data is loading.
A		✓			✓	✓	✓	MAP LOADING…	When SV3 horizontal situation indicator data is loading.
A		✓			✓	✓	✓		A white flight path marker indicates that approach TWS alerts are available (Terrain Alerts will be generated by terrain 100 feet higher than the runway elevation and all mapped obstacles).

The following advisory messages can appear on the EFD1000/500 MFD in connection with the Aspen Connected Gateway System (Aspen GTWY):

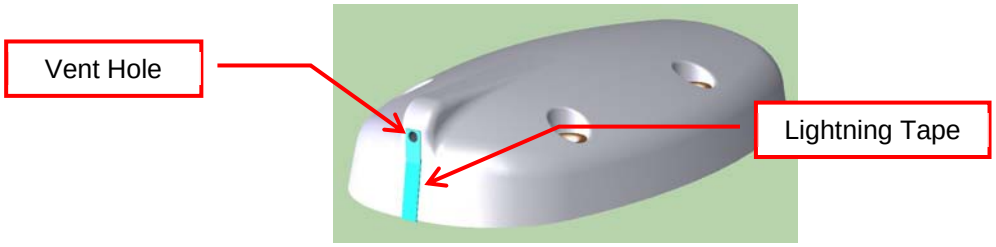
Connected Gateway Message	Description
CG100: DETECTING DEVICE…	The EFD1000/500 is in the process of detecting the CG100
CG100: LINKED	The EFD1000/500 is linked to the CG100. This is the normal Link Status
CG100: NOT LINKED	The EFD1000/500 is not linked to the CG100. This is an abnormal Link Status
CG100: INVALID FLIGHT PLAN RECEIVED Invalid Flight Plan Received Resend the Flight Plan to try again	This indicates that the Flight Plan received from the Wireless device was not valid.
CG100: RECEIVING FPL	This indicates that a new flight plan is being received from the Wireless device through the CG100.
CG100: FPL PENDING…	This indicates that a newly-sent flight plan is in process and will be displayed when the current EFD1000 process is completed.
GPS1: NOT AVAILABLE GPS2: NOT AVAILABLE	The GPS unit that is configured for the Connected Gateway is not available (for example, it is turned off).

GPS1: SENDING FPL… GPS2: SENDING FPL…	The Flight Plan is being sent from the EFD1000/500 to the Garmin Devices.
GPS1: VERIFYING FPL GPS2: VERIFYING FPL	The Flight Plan information received from the Garmin System is being checked against what was sent from the EFD1000/500.
GPS1: FPL VERIFIED GPS2: FPL VERIFIED	The Flight Plan information received from the Garmin System matched what was sent from the EFD1000/500.
GPS1: FPL VERIFICATION FAILED GPS2: FPL VERIFICATION FAILED	The Flight Plan information received from the Garmin System did not match what was sent from the EFD1000/500.
GPS1: READY GPS2: READY	Indicates that the GPS systems are ready to accept flight plans.
GPS1: Waiting for CG100 GPS2: Waiting for CG100	Displayed when the EFD1000/500 is waiting for database status information from the CG100. This should be a momentary indication, if at all.
Databases Incompatible	When the Database in the CG100 was not updated and the Garmin Databases were updated. If the Garmin database is updated and the indexed database is not, the CG100 system will present all waypoints as unverified, i.e. all will have + signs appended to the names.
GPS1 and GPS2 FPL Verification Failed: Use BOTH key to resend, CLR to Clear	The Flight Plan information received from both Garmin Systems did not match what was sent from the EFD1000/500.
GPS1 Flight Plan FPL Verification Failed: Use GPS1 key to resend, CLR to Clear	The Flight Plan information received from the GPS 1 Garmin System did not match what was sent from the EFD1000/500.
GPS2 Flight Plan FPL Verification Failed: Use GPS2 key to resend, CLR to Clear	The Flight Plan information received from the GPS 2 Garmin System did not match what was sent from the EFD1000/500.
<Location Mismatch>	Identifies a waypoint position that was not correlated with the Navigation Database. The fix name will be appended with a '+' symbol.
<User Defined WPT>	Identifies a User-defined waypoint from the Wireless Device. The fix name will be appended with a '+' symbol.
X Waypoints Not Validated	X is the number of Waypoints not validated. This message indicates how many waypoints were not correlated with the Navigation Database.
New Flight Plan Available	Indication on the MFD or reverted PFD Data Bar to indicate that a flight plan is available for review on the Connected Gateway Candidate Flight Plan Page.
GTWY	Press this button to quickly access the Connected Gateway Candidate Flight Plan page.

4 Normal Procedures

4.1 Exterior Inspection

RSM(s)	Check condition and security
RSM Vent Hole	Check clear of obstructions
RSM Lightning Tape	Check condition and security



4.2 Before Taxi Checks

Alternate Static Source	CHECK
EBB Switch (if installed)	Verify set to NORM
EFD MASTER SWITCHES (If installed)	ON
Avionics and Instruments	SET as desired
A/P AHRS FAIL lamp	CHECK

CAUTION:

The EFD1000 MFD Reversionary PFD display references, bugs, navigation sources, etc. must be configured or verified as necessary for takeoff and departure. This will reduce pilot workload should the MFD reversion mode be required.

NOTE:

ADAHRS alignment begins at power up. Avoid movement during ADAHRS alignment as this will delay and degrade the ADAHRS initialization. Attitude and heading data is presented once alignment is complete.

NOTE:

When in the "DISC" position, the EBB isolation relay is powered from the EBB. When the switch is in the disconnect position the Emergency Backup Battery will gradually discharge.

NOTE:

MFD database features load incrementally after power up. Loading progress is indicated at the bottom of the Nav Map.

4.3 Before Take-Off Checks

MENU	"POWER SETTINGS" Page
EXT PWR: (Aircraft Input Voltage)	Check > 12.3V/24.6V
BAT:	Verify battery status is not shown as "FAIL" (normally this shows "CHARGING" or "READY")
PFD	Configure for departure
EFD1000 MFD (if installed)	Select REV and press XFILL. Review the Crossfill parameters and accept the change.

In addition, if an EFD1000 MFD with EBB is installed, perform the following steps from the Power Settings Page:

EFD1000 MFD	Select "BATTERY"
EFD1000 MFD	Verify Battery charge is above 80%
EFD1000 MFD	Select EXT PWR
MENU	Press the MENU button to return to normal operation

CAUTION:

If an EFD is required by the Kinds Of Operations Equipment List, takeoff with indicated aircraft voltage (as displayed in the EFD Power Settings Menu) below 12.3V (14 Volt aircraft) or 24.6V (28Volt aircraft) is NOT AUTHORIZED

If the indicated aircraft voltage is below 12.3V (14V Electrical System) or 24.6V (28V Electrical System) the EFD will automatically switch to battery shortly after takeoff.

Indicated aircraft voltages below these thresholds are indicative of an aircraft electrical system charging problem that must be resolved before flight.

CAUTION:

If the EBB is required by the Kinds Of Operations Equipment List (See section 2.12.7), the minimum EBB charge permitted for dispatch is 80%

CAUTION:

If the EBB temperature is below -20°C the battery may not power the EFD1000 until warmed. When an EBB is required by the kinds of operations limitations (See section 2.12.7), the cabin temperature must be above -20°C before departure

NOTE:

If the EBB temperature is below 0°C, it will take 10 minutes or longer to determine the "BATTERY" charge. Indicated battery charge may rise from the initial indication as the battery warms.

The internal or EBB battery will not charge until the battery temperature is above 0°C. The battery will have to be allowed to warm to accept a charge.

4.4 Synthetic Vision Normal Procedures

Normal Operating Procedures	Refer to the Aspen ESV Quick Reference
Pilot's ESV Display	Refer to the Aspen ESV Quick Reference
Flight Director/Autopilot Coupled Operation	There is no change to the operation of the Flight Director or Autopilot Coupled operation.

4.5 Altitude Preselect Normal Procedures

Altitude Alerter	Set as desired
PRESEL	Press for ARMED
To deselect:	
PRESEL	Press to Disarm

The altitude preselector is intended to automatically engage the altitude hold function on the autopilot when the aircraft reaches the altitude alerter setting in the EFD1000 PFD. The preselector will engage the autopilot at the moment the aircraft crosses the preset altitude, therefore some overshoot is expected, depending on the autopilot performance and the vertical speed. High rate vertical speed will result in a sudden level off just as if the pilot selected altitude hold.

The preselector toggles the autopilot altitude hold function. If the altitude hold is manually engaged just prior to reaching the preselected altitude and the aircraft overshoots to the selected altitude, the preselector will toggle and the altitude hold will disengage. Recommended best practice is to permit the preselector to accomplish the function it is armed for.

4.6 Terrain Coloring on the MFD Moving Map and the Terrain View

When the aircraft is within 1900 feet AGL and two miles of a runway, the terrain coloring thresholds are removed except terrain that is more than 100 feet above the runway elevation.

4.7 Before Approach Checks

EBB Switch (if installed)	Verify set to NORM
Avionics and Instruments	SET as desired
PFD	Configure for arrival
EFD1000 MFD (if installed)	Select REV and press XFILL. Review the Crossfill parameters and accept the change.

NOTE:

Course Pointer Operation with Integrated VOR/Localizer/GPS Navigation Systems
During manual or automatic operation of the Integrated Navigation System, when transitioning from GPS guidance to VOR or localizer guidance, the course pointer on the EFD1000 should be set to the appropriate course.

CAUTION:

The EFD1000 MFD Reversionary PFD display references, bugs, navigation sources, etc. must be configured or verified as necessary for landing and missed or final approach. This will reduce pilot workload should the MFD reversion mode be required. This is accomplished by pressing the XFILL button, which is available when REV is pressed.

4.8 Shutdown Checks

EFD1000/EFD500 Circuit Breaker / Switches	OFF
EBB Switch (if installed)	Verify set to NORM

NOTE:

The EBB disconnect switch should be left in the NORM position, except during an abnormal condition. When in the "DISC" position the EBB energizes a relay that is powered from the EBB. When the switch is in the DISC position the EBB will gradually discharge.

NOTE:

Each EFD display includes either an internal battery or external EBB. On the ground the EFD will initiate a shut down sequence when aircraft power is removed. If this sequence is interrupted, the EFD will continue to operate from battery until the battery is depleted.

To avoid inadvertently discharging the EFD battery, confirm that each EFD is completely powered down before leaving the aircraft.

5 Performance

No change to basic Airplane Flight Manual or other performance information or placards.

6 Weight & Center of Gravity

See current weight and balance records.

7 EFD1000/500 System Operation

Refer to Section 2.1 in this document for references to detailed operating information for the EFD1000 PFD, EFD1000 MFD, and EFD500 MFD systems.

NOTE:

Although intuitive to operate, a reasonable degree of familiarity is required to effectively use the EFD1000/500 system.

Study this AFMS, the Pilot's Guides, and seek instruction from a competent instructor to gain and maintain familiarity and competence with this system.

Gain experience with the system under VMC before flying in IMC.

Practice often.

Go Fly!

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A NEW WAY TO LOOK AT AVIONICS™

8 List of Acronyms and Abbreviations

A/P	Autopilot
ACU	Analog Converter Unit
ADAHRS	Air Data Attitude Heading Reference System
AHRS	Attitude Heading Reference System
AFMS	Airplane Flight Manual Supplement
AMMD	Aerodrome Moving Map Display
ASPEN GTWY	See GTWY
BARO	Barometric Pressure Setting
BAT	Battery
CG100	Connected Gateway remote LRU
CM	Configuration Module
CWS	(autopilot) Control Wheel Steering
DH	Decision Height
EA	Evolution Adapter
EBB	Emergency Backup Battery
EFB	Electronic Flight Bag
EFD	Evolution Flight Display
EFIS	Electronic Flight Instrument System
EOC	Executable Object Code
EWR	Evolution Weather Receiver
FPM	Flight Path Marker
FOV	Field of View
GTWY	Aspen Connected Gateway, including the CG100
GPS	Global Positioning System
GPSS	GPS Steering
HDG	Heading
HSI	Horizontal Situation Indicator
IAS	Indicated Airspeed
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
IOP	Input-Output Processor
KOEL	Kinds of Operations Equipment List
LRU	Line replaceable Unit
MAP	Main Application Processor
MEMS	Micro Electromechanical Systems
MFD	Multi-Function Display
NACO	National Aeronautical Charting Office
OAT	Outside Air Temperature
PFD	Primary Flight Display
POM	Pitot Obstruction Monitor
REV	Reversion
RMVD	Removed
RSM	Remote Sensor Module
SAI	Secondary Attitude Indicator
SDHC	Secure Digital, High-Capacity
SHSI	Secondary Horizontal Situation Indicator
SID	Standard Instrument Departure
STAR	Standard Terminal Arrival Route
SV	Synthetic Vision
TAS	True Airspeed
TAS	Traffic Advisory System

TIS	Traffic Information System
TWS	Terrain Warning System
TRFC	Traffic
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions
VOR	VHF Omni-directional Radio Range
VLOC	VOR / Localizer