Evolution 1000 Pro / VFR PFD
Evolution 1000/500 MFD
ADS-B Pilots Guide Supplement
Evolution 1000 Pro / VFR PFD
Evolution 1000/500 MFD
ADS-B Pilots Guide Supplement
## Document Revisions

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<th>REVISION</th>
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<tr>
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<td>Initial Release</td>
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Approvals

The  EFD1000 is approved under the following Technical Standard Orders (TSOs): C2D, C3D, C4C, C6D, C8D, C10B, C106, C113 ,C165, C198(Incomplete), C195a(Incomplete), C157a(Incomplete)

The following certification levels also apply to this product:
- Environmental Certification Level: RTCA DO-160E
- Software Certification Level: RTCA DO-178B Level C

The  ATX100 is approved under the following Technical Standard Orders (TSOs): C154c(A1H,A1S), C157a(Class 1-Incomplete), C195a(Class C1)

The following certification levels also apply to this product:
- Environmental Certification Level: RTCA DO-160G
- Software Certification Level: RTCA DO-178B Level C
- Hardware Certification Level: RTCA DO-254 Level C

The  ATX100G is approved under the following Technical Standard Orders (TSOs): C154c(A1H,A1S), C157a(Class 1-Incomplete), C195a(Class C1), C145c(Beta 1)
The following certification levels also apply to this product:
  • Environmental Certification Level: RTCA DO-160G
  • Software Certification Level: RTCA DO-178B Level C
  • Hardware Certification Level: RTCA DO-254 Level C

This Pilot’s Guide provides information on the use and operation of the Aspen ADS–B receivers and transceivers connected to the Aspen Evolution Flight Display 1000/500 Multifunction Flight Display (EFD1000 MFD) and Evolution Flight Display 1000 Pro/VFR. This guide is current as of the Date Published. Specifications and operational details are subject to change without notice. Please visit the Aspen Avionics web site, aspenavionics.com, for the most up-to-date Pilot’s Guide.

Aspen Avionics, Inc.
5001 Indian School Road NE
Albuquerque, NM 87110
Phone: (505) 856-5034
Fax: (505) 314-5440
www.aspenavionics.com

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Aspen Avionics, Inc.

1. YOUR WARRANTY. Aspen Avionics, Inc. (“Aspen”) warrants to you, the original purchaser, that its Products (if purchased from an authorized dealer) will comply with applicable specifications (as set forth in the owner’s manual) in all material respects and will be free from material defects in workmanship or materials for a period of twenty-four (24) months beginning with the date that the aircraft in which the Product has been installed has been returned to service following installation by an Aspen authorized dealer (“Return to Service Date”). “Product” means new end equipment or hardware items, replaceable units and components of those units.

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3. CONDITIONS TO COVERAGE. Aspen’s obligation under this warranty is conditioned on your fulfillment of the obligation to:
   A. Maintain records accurately reflecting operating time of and maintenance performed on the Product,
   B. Furnish proof sufficient to establish that the item is a Nonconforming Product, and
   C. Allow Aspen access to all relevant records in order to substantiate your warranty claim.

4. EXCLUSIONS. The following are not covered by (and are expressly excluded from) this warranty:
   A. Normal wear and tear and the need for regular overhaul and maintenance,
B. Exposure of the Product to temperature, environmental, operating, or other conditions other than those prescribed in the owner’s manual,

C. Failure to install or operate the Product as prescribed in the owner’s manual or as Aspen otherwise directs,

D. Alterations or repairs made

E. Maintenance, repair, installation, handling, transportation, storage, operation (including, without limitation, operation of the product’s software or host medium), or use which is improper or otherwise does not comply with Aspen’s instructions as set forth in the owner’s manual

F. Accident, contamination, damage from a foreign object or weather conditions, abuse, misuse, neglect, or negligence,

G. Exposure of the product or the product’s host medium to any computer virus or other intentionally disruptive, destructive, or disabling computer code, and

H. Any damage precipitated by failure of a product Aspen has supplied that is not under warranty or by any product supplied by someone else.

5. **INVALIDATION OF WARRANTY.** This warranty is void if the product is altered or repair is attempted or made by anyone other than Aspen or its authorized service center.

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11. **EXTENSION OF WARRANTY.** No extension of this warranty will be binding upon Aspen unless set forth in writing and signed by Aspen’s authorized representative.

12. **DEALER WARRANTIES.** Any express or implied warranty or remedy in addition to or different from those stated herein that is offered by a dealer (“Dealer Warranty”) will be the sole responsibility of the dealer, who will be solely responsible for all liability, loss, cost damage, or expense arising out of or in connection with any such Dealer Warranty. Although Aspen provides training and assistance to dealers, it cannot control the installation of its Products by its dealers, which are independent businesses not owned or controlled by Asp

13. **TRANSPORTATION COSTS.** Aspen will assume round trip transportation costs for a Product determined by Aspen to be a Nonconforming Product in an amount not to exceed normal (non express) shipping charges within the continental United States. You are responsible for all import/export fees, taxes, duties, customs, documentation fees, clearance fees, and similar fees and charges. You may contact Aspen to obtain a freight courier account number for prepaid shipping of the return. If Aspen subsequently determines that the Product is not a Nonconforming Product, that this warranty is inapplicable, that the Product is out of warranty, that the defect or malfunction is excluded from coverage, or that the warranty is invalid, Aspen will invoice you for repair or replacement costs and the shipping costs. Risk of loss or damage for any Product in transit will be borne by the party initiating the transportation.

14. **WARRANTY PROCEDURE.** If you require warranty service, you may contact your local Aspen Authorized Dealer or you may contact Aspen directly as described below. An original or copy of the sales receipt from the original Aspen Authorized dealer will be required to obtain any warranty service. You may contact Aspen for warranty service directly by calling Aspen Customer Service at (505) 856-5034; by writing to Aspen Customer Service Department, Aspen Avionics, Inc., 5001 Indian School Road NE, Albuquerque, New Mexico, 87110; or by visiting the Aspen Website at http://www.aspenavionics.com.

_This warranty gives you specific legal rights, and you may also have other rights, which vary from State to State._
Conventions

The following conventions, functionality, terminology, color philosophy and definitions are used in this manual and the EFD 1000 PFD, EFD 1000/500 MFD.

Covered Functionality

This guide covers all the functions available in the EFD 1000 PFD and EFD 1000 / 500 MFD and the optional ADS-B receiver or transceivers. For instructions on: the operation of the EFD 1000 PFD PRO refer to the Aspen Pro Pilot guide, document number 091-00005-001, the operation of the EFD 1000 PFD VFR, refer to the Aspen VFR Pilot guide, document number 091-00028-001, the operation of the EFD 1000 / 500 MFD, refer to the Aspen MFD Pilot guide, document number 091-00006-001.

Terminology

The term ADS-B is used extensively throughout this Pilots Guide and refers to Automatic Dependent Surveillance Broadcast technology. The Aspen Evolution Flight Displays use UAT to describe the ADS-B technology. The term PFD refers to the Aspen EFD 1000 PFD PRO and VFR, while the term MFD refers to the Aspen EFD 1000 / 500 MFD's.

Example Graphics

The example graphics and screen shots used throughout this Pilot’s Guide are provided for reference only and are taken from a simulated flight. They should not be used for actual flights.

Pilot Familiarity

While the Aspen PFD and MFD connected to ADS-B solutions are reasonably intuitive and easy to use, some familiarity is required. Aspen Avionics strongly recommends that new users get some dual instruction from an experienced CFI, and spend some time becoming familiar with the PFD in day VFR conditions with a safety pilot, before flying in actual instrument meteorological conditions (IMC). To reduce pilot workload, the use of autopilot (when available) is strongly encouraged.
Chapter 1
Welcome and Introduction

Welcome to Aspen's NextGen ADS-B product line which provides an easy, cost-effective path to meeting the upcoming ADS-B Out mandate, and receiving the benefits of ADS-B In. Aspen’s ADS-B product line helps reduce the cost of meeting the ADS-B mandate by complementing what aircraft owners already have in their panels.

Aspen’s single-band solutions need to be connected to an Aspen PFD to control the transponder functions while ADS-B weather and traffic can be displayed on any of the Aspen Evolution PFDs and MFDs. Each of the Aspen ADS-B solutions utilize a single, bottom-mounted antenna.

NOTE
Aspen Avionics’ culture is to welcome integration with all ADS-B product manufacturer’s solutions to work with our primary flight and multi-function displays. To date, Aspen Avionics displays have been approved for use with the L-3 family of ADS-B products, FreeFlight and Garmin’s GDL® 88 Universal Access Transceiver. Look for more Aspen display integration with other manufacturer’s ADS-B products in the near future.
1.1 Aspen ADS-B Models

**Single-band**

Aspen single band ADS-B transceivers receive and transmit on 978 MHz Universal Access Transceiver (UAT)

**ATX100** – ADS-B transceiver provides an ADS-B solution for aircraft equipped with a Mode A/C transponder and a WAAS GPS navigation receiver. Receives ADS-B subscription-free weather, traffic and meets ADS-B Out mandate below 18,000 feet.

**ATX100G** – ADS-B transceiver with internal WAAS GPS sensor provides a solution for aircraft equipped with a Mode A/C transponder without a compatible WAAS GPS navigation receiver. Receives ADS-B subscription-free weather, traffic and meets ADS-B Out mandate below 18,000 feet.

1.2 Aspen ADS-B System functions

**Single-band transceiver models**

1. ADS-B reception on the 978 MHz (UAT) frequency

   Receives ADS-B traffic from other ADS-B equipped aircraft, vehicles and ground stations transmitting on 978MHz. Receives weather data from ground stations.

2. Displays ADS-B traffic and weather data on Evolution PFD and MFD's

3. ADS-B out transmission on the 978 MHz (UAT) frequency to other ADS-B equipped aircraft, ground vehicles and ground stations.

4. Emergency entry for squawk code, and ident
Chapter 2

ADS-B Overview

ADS-B or automatic dependent surveillance broadcast which will become mandatory for most aircraft flying in the USA Jan 1, 2020 began as a “Capstone” project to improve GA flight safety in Alaska in the late 1990’s. Alaska is one of the largest states, with the smallest populations but yet has a high pilot population density. The harsh Alaskan environment led to an average of one aircraft accident every other day with an accident rate 2.5x higher than the lower forty eight states.

In 1997 the FAA began developing a comprehensive program to improve safety in Alaska which was rolled out in phases and initially called “Flight 2000”. It was successful beyond expectations and reduced the Alaskan accident rate 40%. There was also an unexpected by product of the project, the ATC work load was reduced 26%.

ADS-B is now a key component in the FAA’s NextGen air traffic control system.

ADS-B is a ground based system that is scheduled to be operational by 2014. At the core of the system are 700 planned ground stations. (Figure 2-1)

There are many parts to the ADS-B puzzle but the simplest way to think about it is ADS-B Out and ADS-B In. The FAA has mandated ADS-B out for most aircraft flying in the USA beginning January 1, 2020. Whereas ADS-B In, which provides subscription free traffic and weather information to suitably equipped aircraft, is not part of the mandate.
2.1 ADS-B Out – The Mandate

ADS-B is the automatic broadcast of position reports by aircraft, and vehicles on the ground equipped with ADS-B transmitters that are in proximity to aircraft. ADS-B out provides ATC with a more accurate position reporting than traditional radar, which will allow ATC to more accurately position and separate aircraft in flight.

There are a number of requirements aircraft need to meet the ADS-B out Mandate. Aircraft are required to have either a Mode S with extended squitter (1090MHz) or a UAT (978MHz) transponder and a WAAS GPS to meet the mandate.

Aircraft equipped with a Mode S + ES and WAAS GPS are approved for flight at any altitude. This equipment is also a requirement for flight above 18,000’ and for aircraft flying internationally. Whereas aircraft equipped with 978MHz (UAT) out and a WAAS GPS meet the ADS-B out mandate below 18,000’.
UAT (978 MHz) Approved Below 18,000 ft

Mode S with ES (1090 MHz)
Approved Any Altitude
Required above 18,000 ft

Figure 2.1a
ADS-B Out
(FAA Illustration)
2.2 **ADS-B In**

While ADS-B out meets the FAA mandate it is ADS-B In that provides the benefits most pilots desire. Aircraft that meet the ADS-B out mandate and are equipped with ADS-B in also will:

1. Receive position location information (traffic) directly from aircraft transmitting on a similar frequency 978 MHz or 1090 MHz
2. Receive position location of aircraft with an alternative ADS-B frequency and from non-ADS-B equipped aircraft from the ground station
   a. ADS-R rebroadcasts via ground station position data from 978 MHz equipped aircraft to 1090MHz equipped aircraft and vice versa
   b. TIS-B rebroadcasts via ground station position data for other non-ADS-B equipped aircraft within +/- 3,500 feet and 15nm.
3. UAT IN equipped aircraft receive weather from the ground station
   a. FIS-B broadcasts weather products including NEXRAD radar, Graphical AIRMET / SIGMET, METAR’s, TAF’s, Special use airspace status, and textual NOTAM’s to 978 MHz in equipped aircraft
UAT (978 MHz) Approved Below 18,000 ft

Direct UAT ADS-B Aircraft Position

UAT ADS-B Aircraft Position

UAT ADS-B Aircraft Position

Weather Traffic

Non-ADS-B Equipped Mode A/C

Non-Equipped Mode A/C Aircraft Position

FIS-B Weather Provider

FAA ADS-B

Mode S with ES (1090 MHz) Approved Any Altitude Required above 18,000 ft

Direct Mode S ADS-B Aircraft Position

Direct Mode S ADS-B Aircraft Position

Traffic

Mode S ADS-B Aircraft Position

Figure 2.1B
ADS-B IN
(FAA Illustration)
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Chapter 3

Aspen ADS-B Out

ADS-B out transmits more precise real time position information directly to other ADS-B equipped aircraft and to ATC than what could be previously provided using radar based systems. This improved accuracy will help pilots and ATC to more safely position and separate aircraft in a given area.

<table>
<thead>
<tr>
<th>Information transmitted on ADS-B frequencies includes:</th>
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<tr>
<td>Altitude</td>
<td>Ground Speed</td>
</tr>
<tr>
<td>GPS Position</td>
<td>Velocity Integrity</td>
</tr>
<tr>
<td>Position Integrity</td>
<td>Air / Ground state</td>
</tr>
<tr>
<td>Ground track or heading</td>
<td>Squawk, Call sign, ICAO Registration, Integrity</td>
</tr>
</tbody>
</table>
3.1 Transponder Interrogation Mode

Your transponder and UAT transceiver must be transmitting the same squawk code in order to not transmit two different targets for the same aircraft to ATC. Normally your ADS-B transceiver interrogates your transponder for the UAT code and IDENT status.

The transponder remains the primary control point for entering squawk code, and performing the IDENT Function. Even though you now have an ADS-B transceiver on board your aircraft.

Only when your transponder fails will you need to set the UAT code and IDENT of the UAT transceiver manually using the PFD. The PFD UAT controls are found on the PFD UAT Menu page.

3.2 UAT Menu Page

The UAT menu page is found in the PFD MENU. (Figure 3-1)

Push the PFD MENU button and step through to the UAT menu page. Included on this page is the:

- UAT Status annunciation
- UAT Code annunciation
- Push to Ident feature
- Horizontal Vector Scale select feature
- FIS-B Weather legend
Whenever UAT CTL: MENU is displayed on the Aspen PFD, pressing the MENU button immediately presents the Aspen PFD’s UAT menu page. When UAT CTL: MENU is not displayed, push the MENU button and rotate the right know to the PFD’s UAT menu page.

The UAT menu page displays: **(Figure 3-1)**

1. UAT Status – Good (displayed in Green)
2. UAT Code – Displayed in white, and is editable
3. Push to Ident – Displayed in white, and is selectable
4. Horizontal Vector Scale is displayed in white and is selectable
5. Hold for FIS-B weather legend

### Horizontal Vector Scale

The Horizontal Vector component of traffic is adjustable from 0 to 60 seconds. When the HORZ VECT SCALE Hot key is pushed and the right knob is rotated the vector scale indexes 10 seconds.

#### 3.2.1 PFD Controller Mode

On the rare occasion when your transponder fails the ADS-B transceiver no longer interrogates the UAT code from the transponder and the PFD becomes the UAT Code and IDENT controller.

The UAT code on the UAT Menu page now will be displayed in “WHITE”, the UAT Code legend displays “UAT : MENU” and your PFD is now used to manually control the UAT code and IDENT function.

---

**NOTE**

On the reversionary PFD view of the MFD the control functions (UAT Code and IDENT) are always disabled.

**NOTE**

The reversionary PFD UAT menu page only allows editing of the Horizontal Vector Scale.
3.2.2 **PFD is the controller – Changing the UAT Code (Figure 3-2)**

To change the UAT Code.

1. Press the MENU button

2. Press the Hot key adjacent to the “UAT CODE” label

(The UAT code menu label turns magenta and the EDIT VALUE label and PUSH TO ADVANCE label are displayed above the right know indicating that the code is editable)

3. Press the right knob to select the digit to be edited. The fourth knob press will advance to the first digit.

4. Rotate the right know clockwise to increase or counter-clockwise to decrease the value of the selected digit

5. Press the Hot Key adjacent to the UAT CODE menu label or the MENU button to activate the new code

**NOTE**

It is good practice to change the squawk on the transponder at the same time because the transponder could be interrogated at any moment. Control would then be immediately transferred back to the transponder and the old squawk would be transmitted. Changing the squawk on the PFD does not change the squawk on the transponder. This must be done manually.
3.2.3 **PFD is the controller – UAT IDENT (Figure 3-3)**

When the PFD is the UAT controller, the PUSH TO IDENT UAT menu Hot Key is active. The color of the PUSH TO IDENT main menu is:

- Gray when the PFD is not the UAT controller
- White when the PFD is the UAT controller and the IDENT can be activated

When the PFD is the UAT controller, pressing the “PUSH TO IDENT” Hot key in the UAT CTL menu activates the UAT IDENT function.

The white “PUSH TO IDENT” label changes to a green “IDENT ACTIVE” label when IDENT is being transmitted. The white “PUSH TO IDENT” label returns when IDENT is no longer being transmitted.

---

**NOTE**

The ability to IDENT and change squawk codes are only available with the Aspen Avionics and FreeFlight ADS-B units.
3.2.4 ADS-B Annunciations

**UAT Link Failure (Figure 3-5, 3-6)**

When the ADS-B transceiver is no longer communicating with the PFD the PFD stops displaying traffic symbols and displays a "UAT LINK" annunciation in an amber bubble to the upper left of the Navigation Display. Similarly, the UAT STATUS annunciation in the PFD's UAT Menu displays "LINK FAIL."

The UAT Code in the main menu displays four green dashes if the last interrogation code received was invalid or if no code was received. It will continue to display dashes until a valid UAT code is received.

**UAT TX Fail Annunciation**

The UAT FAIL Annunciation is displayed in an amber bubble to the upper left of the Navigation Display when the UAT transmitter has failed. The UAT STATUS annunciation in the Navigation Display Menu displays "FAIL." *(Figure 3-7, 3-8)*

**UAT Position Fail Annunciation**

The UAT POS Annunciation is displayed in an amber bubble to the upper left of the Navigation Display when the ADS-B position is invalid or not available. The UAT STATUS annunciation in the PFD's UAT menu displays "POS FAIL." *(Figure 3-9, 3-10)*
Chapter 4
Aspen ADS-B In

4.1 Airborne Traffic

The EFD1000/500 MFD and EFD 1000 Pro/ VFR PFD will display ADS-B traffic prioritized in the order received from the ADS-B receiver or transceiver. The system displays multiple advisory levels: Traffic Advisory with and without direction, Basic “Other” Traffic with and without direction, and Proximity Advisory with and without direction.

Traffic Priority

ADS-B traffic systems are capable of displaying up to a maximum of 31 traffic symbols for high traffic areas. The system always displays the highest priority traffic symbols when a new traffic message is received.

The Aspen system uses more than a dozen different inputs to determine and monitor the aircraft attitude. In this way, the system can validate the derived attitude indication by cross-checking the various inputs to the solution for consistency.

4.1.1 Integration with TCAD/TAS/TCAS/ Traffic System

Certain ADS-B systems can be integrated with an active traffic system such as TCAS I, TAS, or TCAD. When an active traffic system is integrated with the ADS-B system, targets from both the active traffic system and the ADS-B system are received and displayed on the EFDs without any duplication to provide the most accurate traffic.
4.1.2 Traffic Symbols

Traffic Advisories

Traffic Advisories are displayed only if the ADS-B system is integrated with an active traffic system or is upgraded with ADS-B Traffic Advisory System (ATAS). Traffic advisory symbols are displayed for traffic that is considered a threat. (Figure 4-1)

When track information is not available, traffic advisory symbols are indicated on the display as a solid amber circle.

When track information is available, traffic advisory symbols are indicated on the display as a filled black arrowhead within a solid amber circle.

Basic “Other” Traffic Symbol

Traffic symbols are displayed for traffic greater than +/-1200 feet or 6 nm of the ownship that is not considered a threat are indicated on the display as an unfilled arrowhead with a cyan border for airborne traffic or a brown border for ground traffic. (Figure 4-2)

Non-Directional Symbol

When track information is not available, traffic symbols are indicated on the display as an open diamond with a cyan border for airborne traffic or a brown border for ground traffic. (Figure 4-3)

Proximity Traffic Symbol

Proximity traffic symbols are displayed for traffic within +/-1200 feet and 6 NM of the ownship that is not considered a threat. Proximity advisory symbols are indicated on the display as a filled cyan arrowhead for airborne traffic or a brown arrowhead for ground traffic. (Figure 4-4)

When track information is not available, traffic symbols are indicated on the display as a filled cyan diamond for airborne traffic or a filled brown diamond for ground traffic.
4.1.3 Traffic Directionality

When a traffic symbol indicates directionality, the directionality of the traffic symbol is displayed relative to the display orientation.

Traffic directionality vector is displayed with a resolution of 15 degrees or better.

All traffic within the current display range and the selected altitude filter are shown. (Figure 4-5).

1. Ground Traffic Advisory – no threat
2. Traffic Advisory – no threat
3. Proximity Advisory – no threat
4. Traffic advisory - threat

The ADS-B traffic system defines (if available) the threat data, range, bearing, relative direction, relative altitude, and altitude trend. Each traffic symbol is positioned at a location representing the relative range and bearing to the ownship symbol.

Traffic Advisories that are outside the current range are indicated by a half-symbol at the edge of the Display with the appropriate data block. Proximity Advisories and Other Traffic that are outside of the current range are not displayed.

When multiple traffic symbols partially or completely overlap, the symbols are visually stacked, with the highest priority alert data on top, obscuring the lower priority alert.

When a traffic symbol and the ownship symbol partially or completely overlap, the traffic symbol and data block will overlay the ownship symbol.

4.1.4 Traffic Data Block

A data block is given for each reported traffic target displaying the relative altitude, vertical trend, horizontal vector and flight ID. The data block text color is the same colors the traffic symbol, amber for Traffic and Horizontal vector if available, and for Proximity Advisories and other traffic. (Figure 4-6)

NOTE

Flight ID only available on MFD.
The relative altitude is shown as two digits indicating the relative altitude difference, in hundreds of feet, from the ownship. The altitude value for traffic above the ownship is preceded by a plus symbol (+) and is on top of the symbol. The altitude value for traffic below the ownship is preceded by a minus symbol (-) and is on the bottom of the symbol.

A vertical arrow next to the traffic symbol gives the direction of vertical movement in relation to the ownship. Traffic climbing or descending at a rate greater than 500 fpm display an up-arrow (climbing), or down-arrow (descending) to the right of the traffic symbol. Traffic that is at co-altitude with the aircraft and has no vertical trend is indicated by an altitude value of 00 below the traffic symbol.

When traffic with altitude value of 00 and down trend vector, the value is displayed above the traffic symbol.

The ADS-B traffic data block contains the following information at all times, if available (Figure 4-7):

1. Relative Altitude
2. Vertical Trend
3. Horizontal Vector
4.1.5 Surface Vehicle Traffic

**Other Ground Vehicle Traffic**

Other Ground vehicle traffic symbols are displayed for traffic greater than +/-1200 feet or 6 nm of the ownship that is not considered a threat.

**Non-Directional Other Ground Vehicle Traffic**

If track information is not available, ground vehicle traffic symbols are indicated on the display as an unfilled rectangle with 4 attached rectangles drawn with a brown border. *(Figure 4-8)*

**Directional Other Ground Vehicle**

When track information is available, ground vehicle traffic symbols are indicated on the display as an unfilled rectangle with an open end triangle and 4 attached rectangles drawn with a brown border. *(Figure 4-9)*

**Ground Vehicle Proximity Traffic**

If track information is not available, but target is within +/- 1200 feet and 6 nm of the ownship ground vehicle traffic symbols are indicated on the display as an filled rectangle (brown) with 4 attached rectangles drawn with a brown border. *(Figure 4-10)*

If track information is available and target is within +/- 1200 feet and 6 nm of the ownship ground vehicle traffic symbols are indicated on the display as an filled rectangle (brown) with a brown filled triangle and 4 attached rectangles drawn with a brown border. *(Figure 4-11)*
When track information is not available, proximity ground vehicle advisory symbols are indicated on the display as a filled brown rectangle with 4 attached rectangles.

When track information is available, proximity ground vehicle advisory symbols are indicated on the display as a filled brown rectangle with an open end triangle and 4 attached rectangles. (Figure 4-11, 4-12)

1. Ground vehicle – no threat
2. Proximity ground vehicle - threat

**Ground Data Tag**

The ground data tag contains the following information, if available: (Figure 4-13)

1. Call Sign
2. Horizontal Vector
4.1.6 Traffic Annunciations

When ADS-B IN is working properly the TFC annunciation is visible on the PFD main screen in GREEN. (Figure 4-14)

If you are in a marginal coverage area and not receiving TIS-B or ADS-R data from the ground station and the traffic picture is not as complete as possible the TFC annunciation turns AMBER. (Figure 4-15)

When the ADS-B transceiver is not integrated with an active traffic system and the Aspen ADS-B receiver fails the TFC annunciation is displayed in white with a red line through it. (Figure 4-16)

**ADS-B Receiver Fail Annunciation**

When the ADS-B transceiver is integrated with an active traffic system and the ADS-B receiver fails, the TFC annunciation is changed to ADSB FAIL. (Figure 4-17)

**TCAS Fail Annunciation**

When the ADS-B transceiver is integrated with an active traffic system and the active traffic fails, the TFC annunciation is changed to TCAS FAIL. (Figure 4-18)

**ADS-B Receiver & Active Traffic Fail Annunciation**

When the ADS-B transceiver is integrated with an active traffic system and the ADS-B receiver and active traffic fails the TFC annunciation is displayed in white with a red line through it. (Figure 4-16)

**ADS-B Invalid Position Annunciation**

When the ADS-B transceiver receives an invalid position, the TFC annunciation is displayed in white with a red line through it. (Figure 4-16)
4.1.7 Traffic Altitude Filter

There are five Altitude Filters available per Table 4-1. The pilot selects the altitude filter level by continuously pressing the TRFC Hot Key.

<table>
<thead>
<tr>
<th>Hot Key Label</th>
<th>Altitude Filter Level</th>
<th>Traffic Display Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>TFC</td>
<td>Off</td>
<td>None</td>
</tr>
<tr>
<td>TFCN</td>
<td>Normal</td>
<td>±2,700 ft</td>
</tr>
<tr>
<td>TFCU</td>
<td>Unrestricted</td>
<td>±9,900 ft</td>
</tr>
<tr>
<td>TFCA</td>
<td>Above</td>
<td>+9,900 ft to -2,700 ft</td>
</tr>
<tr>
<td>TFCB</td>
<td>Below</td>
<td>+2,700 ft to -9,000 ft</td>
</tr>
</tbody>
</table>

Table 4-1
Traffic Filter Parameters

**NOTE**

Only traffic overlay supports the “Off” altitude filter level.

**NOTE**

Traffic that is within 100 feet of the ownship shown an altitude value of 00, above or below the traffic symbol as appropriate.

**NOTE**

When the traffic is flying level, no arrow is shown. When the traffic is not reporting an altitude, neither the arrow nor the altitude indication is shown.

**NOTE**

Depending on the position of the Traffic Advisory at the edge of the screen, the traffic symbol data block may or may not display.

**WARNING**

Do not rely on the PFD or MFD as the sole source of data for collision avoidance. It is the pilot’s responsibility to visually acquire other aircraft for safe flight. Maneuver your aircraft based only on ATC guidance or positive acquisition of conflicting traffic. Traffic information is:

- Provided as a proximity warning only
- Intended to assist the pilot in the visual acquisition of other aircraft
- Not intended to provide recommended avoidance maneuvers
- Not provided for aircraft that are not transponder equipped, experiencing a transponder failure, or out of radar coverage.
4.2 Evolution EFD 1000/500 MFD Traffic Overlay

The MFD allows the ADS-B traffic to be displayed on a dedicated traffic view and overlaid on the navigation map (NAV MAP) view. The TRFC Hot Key enables the display of traffic on the Navigation Map VIEW. MFD traffic annunciations are depicted in Table 4-2.

<table>
<thead>
<tr>
<th>ADS-B Condition</th>
<th>MFD NAV MAP Traffic Annunciations</th>
<th>MFD Dedicated Traffic View Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADS-B In Working Properly</td>
<td>TFC</td>
<td>&lt;No Text&gt;</td>
</tr>
<tr>
<td>Marginal Coverage</td>
<td>TFC</td>
<td>TFC DEGRADED</td>
</tr>
<tr>
<td>Traffic Fail</td>
<td>TFC</td>
<td>TFC FAIL</td>
</tr>
<tr>
<td>ADS-B Fail</td>
<td>ADSB FAIL</td>
<td>ADSB FAIL</td>
</tr>
<tr>
<td>TCAS Fail</td>
<td>TCAS FAIL</td>
<td>TCAS FAIL</td>
</tr>
</tbody>
</table>

Table 4-2
MFD Traffic Annunciations

Traffic Overlay
• To overlay ADS-B traffic on the Navigation Map. (Figure 4-19)
  1. Select the Navigation MAP (NAV MAP) View 2. Display the 2/2 Hot Key Menu, with Synthetic vision configured this is 2/3
  3. Press the TFC Hot Key to select the desired altitude filter level

Dedicated Traffic (TRFC) View
• The Traffic VIEW (Figure 4-20) is oriented Heading-Up, with either a 360° or ARC compass view, with a white outer and inner range ring. The pilot selects the compass view by pressing the 360/ARC Hot Key; 360° is the default when
not previously set. The range is pilot-selectable with the outer-range ring and inner-range ring representing the following range selections from the ownship position:

- 2 nm outer-range ring
- 3 nm outer-range ring and 2 nm inner-range ring
- 5 nm outer-range ring and 2 nm inner-range ring
  (Default if not previously set)
- 10 nm outer-range ring, 5 nm middle-range ring, and 2 nm inner-range ring
- 15 nm outer-range ring and 7.5 nm inner-range ring
- 20 nm outer-range ring and 10 nm inner-range ring
- 30 nm outer-range ring and 15 nm inner-range ring
- 40 nm outer-range ring and 20 nm inner-range ring

**Traffic Advisory Pop-Up**

When a Traffic Advisory occurs and the dedicated traffic view is not displayed, the MFD will display an amber TRAFFIC annunciation in the data bar. Additionally, the annunciation above the lower middle button displays in TFC amber. (Figure 4-21)

Pressing the lower middle button labeled TFC switches the display to the split screen PAGE displaying the Traffic VIEW in the top WINDOW for situational awareness. The lower middle button label changes to BACK to enable the pilot to quickly switch back to the previous display. (Figure 4-20)
4.2.1 Traffic Advisory

Display a Traffic Advisory

1. When “TRAFFIC” is displayed in the data bar, press the amber TFC button. The dedicated Traffic View displays in the top WINDOW of the split screen layout (Figure 4-20)

2. Press the lower middle BACK button to return to the previous PAGE

Once the traffic is no longer a threat, or the pilot presses the lower middle button, the annunciation is removed from the data bar.

4.3 Evolution EFD 1000 PFD Traffic Overlay

The PFD allows the ADS-B traffic to be overlaid on the navigation display when the TRFC Hot Key is set to one of the following altitude filter values: TFCN, TFCU, TFCA or TFCB.

Display a Traffic Advisory

1. Select the 2/2 Hot Key Menu, with Synthetic Vision configured this is 2/3

2. Press the TFC Hot Key to select the desired Altitude Filter

When the normal, unrestricted, above or below altitude filter level is selected on the Navigation Map, a traffic annunciation is displayed to indicate the status of the ADS-B traffic information.

The TFC annunciation displays in the lower left corner of the PFD’s Navigation Display. (Figure 4-22)
4.4 Aspen ADS-B In Weather

4.4.1 FIS - B Weather

Flight Information Services (FIS-B) provides graphical and textual descriptions of weather-related information for the continental United States, Alaska, and Hawaii. This information is transmitted from UAT Ground Broadcast Transceivers to an Aspen ADS-B transceiver ATX100 & ATX100G and displayed on an Aspen EFD1000/500 MFD or an EFD 1000 PFD.

Several weather products are available:

- Convective (Regional, CNUS, and Convective SIGMETs)
- METAR's
- AIRMET's/SIGMET's
- PIREP
- TFRs
- Winds Aloft / Temp

The Convective screen displays severe weather information overlaid on a basic weather map. Precipitation is displayed as a color coded NEXRAD radar overlay on the basic weather map.

NEXRAD (Next-Generation Radar) is a network of 159 high-resolution Doppler radars operated by the National Weather Service (NWS) to detect meteorological data for the United States. The data can be processed and displayed in a mosaic map showing patterns of precipitation and its movement.

1. Not available on PFD
2. Not included in sw release 2.9, scheduled for future release
There are two forms of NEXRAD, CONUS and Regional. CONUS NEXRAD is a summary composite of available NEXRAD radar imagery across the 48 states and is updated every 15 minutes. Regional NEXRAD is a composite of available NEXRAD imagery in a local area up to 200 nm and shows a more detailed image than the CONUS NEXRAD.

Each NEXRAD radar site has a maximum range of 250 nm. Since NEXRAD data is not real-time, data is updated from 5 - 15 minutes not including processing and dissemination time, it should be used for long range planning only. Do not use NEXRAD to penetrate severe weather. NEXRAD has some limitations including:

- Although reflectivity echoes are possible up to 248 nm, the interpretation of the data doesn't work beyond 186 nm, beyond which only the general shape of storms can be made out.

- The inability to differentiate between types of precipitation, e.g. hail versus heavy rain.

- Since the radar beam is oriented five degrees above the horizon, the farther from the antenna, the higher the area scanned by the beam. This translates to limited low storm detection farther from individual radar locations (i.e. tornados), and conversely, limited high altitude storm detection directly above the radar location.
NEXRAD weather surveillance can detect most precipitation within 80 nm, and intense rain or snow within 140 nm, of the radar. NEXRAD measures moisture in DBz or decibels of Z, with Z representing the reflection back to the radar. NEXRAD does not report precipitation below 20 DBz.

Each weather product has an age limit and is usually updated at the Update Rate indicated in the Table 4-3.

<table>
<thead>
<tr>
<th>Weather Product</th>
<th>Update Interval (Min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONUS NEXRAD</td>
<td>15</td>
</tr>
<tr>
<td>Regional NEXRAD</td>
<td>1-2</td>
</tr>
<tr>
<td>METAR¹</td>
<td>20</td>
</tr>
<tr>
<td>AIRMET'S¹</td>
<td>20</td>
</tr>
<tr>
<td>SIGMET'S¹</td>
<td>20</td>
</tr>
<tr>
<td>PIREP¹</td>
<td>20</td>
</tr>
<tr>
<td>Winds &amp; Temp aloft¹</td>
<td>12 hr</td>
</tr>
</tbody>
</table>

Table 4-3
Weather Product update Frequency

---

¹. Not available on PFD
4.4.2 METAR

The METAR screen displays graphical Aviation Routine Weather Reports with a color coded flag at weather reporting airports. A METAR is an hourly Aviation Routine Weather Report from the reporting airport (not all airports have a forecast). US METARs generally provide METAR information about the airport, date and time, wind direction and speed, visibility, precipitation, current weather conditions, cloud cover and layer, temperature, barometric pressure, and any other critical data. (Figure 4-23)

The EFD1000/500 MFD displays METARs as colored flags. The METAR screen displays the flags, at the airport location from which the METAR is reported, overlaid on a basic weather map. A legend is available that describes the colors of the METAR flags used. (Figure 4-24)

METAR flags are de-cluttered according to the range selected as outlined in Table 4-4.

<table>
<thead>
<tr>
<th>Airport Size</th>
<th>Range (NM)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Large Airports</td>
<td></td>
</tr>
<tr>
<td>Medium/Large Airports</td>
<td></td>
</tr>
<tr>
<td>Medium Airports</td>
<td></td>
</tr>
<tr>
<td>Medium/Small Airports</td>
<td></td>
</tr>
<tr>
<td>Small Airports</td>
<td></td>
</tr>
</tbody>
</table>

F* – METAR Flag displayed with Airport identifier
F – METAR Flag displayed

Table 4-4
METAR Declutter Settings
4.4.3 AIRMET / SIGMET

The EFD 1000/500 MFD displays AIRMET/SIGMET graphical depiction of AIRMETs (AIRman’s METeorological Information) and SIGMETs (SIGNificant METeorological Information). AIRMETs and SIGMETs are weather advisories broadcast by National Weather Service for the lower 48 states and adjacent coastal waters. Both AIRMETs and SIGMETs warn pilots of potentially hazardous weather. AIRMETs warn of less severe weather than SIGMETs. The AIRMET/SIGMET screen displays these advisories as graphical images overlaid on the basic weather map.

There are three AIRMET types: S (sierra) for mountain obscuration and IFR conditions, T (tango) for turbulence, and Z (zulu) for icing. They are all issued for six hour periods beginning at 0245 UTC, and are amended when necessary for changing weather conditions or issuance/cancellation of a SIGMET. See Table 4-5 for a description and definition of AIRMET/SIGMET symbology.

There are two types of SIGMETs, non-convective and convective. Non-convective SIGMETs warn about severe icing, extreme turbulence, dust storms and/or sandstorms lowering visibilities to less than three (3) miles, and volcanic ash. Convective SIGMETS are issued hourly for thunderstorm-related aviation hazards. SIGMETS are issued for 6 hour periods for conditions associated with hurricanes and 4 hours for all other events. If conditions persist beyond the forecast period, the SIGMET is updated and reissued.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Í</td>
<td>ICING AIRMET</td>
</tr>
<tr>
<td>Í</td>
<td>ICING SIGMET</td>
</tr>
<tr>
<td>—-</td>
<td>Turbulence AIRMET</td>
</tr>
<tr>
<td>WINDS</td>
<td>Surface Winds AIRMET</td>
</tr>
<tr>
<td>—-</td>
<td>Turbulence SIGMET</td>
</tr>
<tr>
<td>IFR</td>
<td>IFR AIRMET</td>
</tr>
<tr>
<td>MTOS</td>
<td>Mtn. Obsc. AIRMET</td>
</tr>
<tr>
<td>DUST</td>
<td>Dust storms SIGMET</td>
</tr>
<tr>
<td>SAND</td>
<td>Sandstorms SIGMET</td>
</tr>
<tr>
<td>ASH</td>
<td>Volcanic Ash SIGMET</td>
</tr>
<tr>
<td>R</td>
<td>Convective SIGMET</td>
</tr>
<tr>
<td>UNKN</td>
<td>Unknown AIRMET</td>
</tr>
<tr>
<td>UNKN</td>
<td>Unknown SIGMET</td>
</tr>
</tbody>
</table>

Table 4-5
AIRMET / SIGMET Symbology
4.4.4 TFR

The TFR screen displays a graphical depiction of Temporary Flight Restrictions, outlined in red, on a basic weather map. These restrictions are usually issued in the United States and are typically short term. They can include major sporting events, air shows, natural disaster areas, space launches, and Presidential movements. (Figure 4-25)

**NOTE**

Depicted TFR data may not be a complete listing. For the latest information contact Flight Service.
4.4.5 Winds/Temps aloft

The EFD1000/500 MFD Winds /Temps Aloft screen displays the forecast wind vector and temperature at the selected altitude above MSL on a basic weather map. Winds are depicted as barbs up to a map range of 500 nm; for map ranges of 1000 nm and above station identifier and temperatures may be omitted. (Figure 4-26)

When the map range is below 500 nm the wind direction is depicted by wind pointer lines extending upwind from the reporting weather station (the small dot on the bottom of the shaft). Wind speed is depicted by pennants or short lines (barbs) on the upwind end of the shaft. Each short barb represents 5 kts, each long barb represents 10 kts and a pennant represents 50 kts. Wind pointer lines can depict winds up to 190 kts (3 pennants and 4 long barbs). The Winds Aloft legend provides a depiction of each type of measurement. (Figure 4-27)
4.4.6 PIREP¹
A pilot report or PIREP is a pilot’s report of weather conditions encountered by an aircraft in flight. PIREPS can either be routine (UA) or urgent (UUA). PIREPS contain mandatory information including location, time, altitude and aircraft type plus at least one optional data field such as sky cover, temperature, wind velocity, turbulence, icing, remarks or visibility.

4.5 Evolution MFD 500/1000 ADS-B Weather View
There are two ways that the EFD1000/500 MFD displays ADS-B weather:

- ADS-B Weather VIEW
- ADS-B Weather Navigation Map Overlay

Several weather products are available; each weather product is presented on a separate screen in the ADS-B VIEW. Each weather product is initially displayed at the default map range of 200 nm. To display a different product screen, set the FOCUS on the ADS-B VIEW by pressing the Right Knob, press the lower right button sel Wx, then rotate the Right Knob to select and view a different product screen.

¹ Not included in sw release 2.9, scheduled for future release
Weather VIEW contains the following product screens:

- Convective (Radar, NEXRAD, Lightning, and Convective SIGMETs)
- METARs
- AIRMET’s/SIGMET’s
- PIREP
- TFRs
- Winds/Temp Aloft

Each ADS-B Weather product screen displays the ownship symbol and flight plan overlaid on a black background, oriented North-Up, centered in a 360° range ring. The available map ranges are the same as the Navigation Map, starting at 10 nm, with the default display at 200 nm. In order to provide situational awareness, each screen displays international boundaries, State or Province boundaries for the United States, and water features. The METARs, AIRMETs/SIGMETs, and TFRs product screens provide the pilot with the option to select and view data. (Figure 4-28).

The ADS-B Weather VIEW is oriented North-Up with the ownship oriented in the direction of the aircraft’s true heading or its true track if heading information is unavailable. If the current heading or track is not available the label NORTH UP (HDG FAIL) is displayed in the upper right corner of the display. If both the heading and the track are unavailable the ownship is removed from the display.

---

1. Not included in sw release 2.9, scheduled for future release
4.5.1 MFD 1000/500 Selecting ADS-B Weather Products

The ADS-B Weather VIEW offers several types of weather product information, each displayed in a different screen of the ADS-B Weather VIEW. There is a screen for each of the following ADS-B Weather VIEW options:

- Convection (NEXRAD, Convective, Convective SIGMETs)
- METARs
- AIRMETs/SIGMETs
- TFRs
- Winds/Temps Aloft

The current weather product name displays in the center of the ADS-B Weather VIEW. Use the bottom Right Button to activate VIEW control mode and select another ADS-B Weather product screen.

4.5.2 View Different ADS-B Weather Products

1. Select the WINDOW that contains the ADS-B Weather VIEW. (Figure 4-29).
2. Press the lower Right Button, labeled sel Wx, to activate Weather Product Selection. The Right Button and Knob labels turn magenta and the Right Knob label changes to Wx X/Y where X is current selected page and Y is total number of available pages. (Figure 4-30)
3. Rotate the Right Knob to select another weather product screen. The ADS-B Weather VIEW, hot keys, and Right Knob label change as you select different Weather product screens.
4. Press the lower Right Button to deactivate Weather Product Selection.
4.5.3 Convective

The EFD1000/500 MFD provides the pilot with several methods to view severe weather. On the Navigation Map VIEW, as previously discussed, severe weather is presented as an overlay. The Convective weather product screen presents severe weather information as a graphical depiction separate from the Navigation Map VIEW.

The Convective screen displays severe weather information overlaid on a basic weather map. Precipitation is displayed as a color coded NEXRAD radar overlay on the basic weather map. The LGND Hot Key displays a legend for the precipitation coloring.

**Convective Age Annunciations**

When convective weather is displayed one of the data age annunciations in Table 4-6 shall be displayed with the correct age value.

<table>
<thead>
<tr>
<th>Convective Age Annunciation</th>
<th>Age Annunciation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional</td>
<td></td>
</tr>
<tr>
<td>Nexrad data is being received and updated</td>
<td><img src="image1.png" alt="RGNL.png" /></td>
</tr>
<tr>
<td>Dashes will appear in time slot during initialization</td>
<td><img src="image2.png" alt="CNUS.png" /></td>
</tr>
<tr>
<td>Data link Receiver has failed</td>
<td><img src="image1.png" alt="RGNL.png" /></td>
</tr>
<tr>
<td>The data is unavailable</td>
<td><img src="image2.png" alt="CNUS.png" /></td>
</tr>
<tr>
<td>The data is intermittent but not expired and may still be valid</td>
<td><img src="image1.png" alt="RGNL.png" /></td>
</tr>
<tr>
<td>Dashes will appear in time slot during initialization</td>
<td><img src="image2.png" alt="CNUS.png" /></td>
</tr>
<tr>
<td>The data age exceeds expiration time</td>
<td><img src="image1.png" alt="RGNL.png" /></td>
</tr>
<tr>
<td>No valid data received for &gt; 30 seconds</td>
<td><img src="image2.png" alt="CNUS.png" /></td>
</tr>
<tr>
<td>GPS information invalid or unavailable</td>
<td><img src="image1.png" alt="RGNL.png" /></td>
</tr>
</tbody>
</table>

Table 4-6  
Weather Age Annunciation Legend
When the range is above 200 NM CONUS annunciations are displayed and when the ranges is at or below 200NM Regional annunciations are displayed.

**Display the Convective Legend**
- With the Convective weather product screen displayed, press the LGND Hot Key. The Convective legend displays on the right of the screen. (Figure 4-31)

**Hide the Convective Legend**
- Press the LGND Hot Key to hide the Convective legend.

**Hide or Display Convective Overlays**
- With the Convective screen selected, press the Hot Keys to enable (green) or disable (gray) the applicable weather feature.

**4.5.4 METAR**

**Display the METAR Legend**
- With the METAR weather product screen displayed, press the LGND Hot Key. The METAR legend displays on the right of the screen. (Figure 4-32)

**Hide the METAR Legend**
- Press the LGND Hot Key to hide the METAR legend.

The pilot can display full textual details for any METAR. The text display will show the latest METAR and if available the previous METAR and latest TAF. If the latest METAR is a special observation, Special Observation displays above the METAR text in cyan. Previous METAR information is identified by Previous Observation displaying above the METAR text in cyan. When the latest TAF is displayed Terminal Forecast displays above the TAF text in cyan. There are two options for viewing textual METARs; either rotating through multiple airports’ METARs, or viewing an individual airport METAR by entering the airport identifier.
Display Multiple Airports’ METAR Information

1. With the METAR weather product screen displayed, press the lower Left Button labeled INFO. The Left Knob label changes to APT and both the Left Knob and Left Button label turn magenta.
2. Rotate the Left Knob to scroll through each METAR reporting airport. As each airport is selected, the METAR flag displays at a larger size. (Figure 4-33)
3. Press the Left Knob to display the METAR pop-up. (Figure 4-34)
4. Press the Left Knob, to close the pop-up. Press the INFO button to exit selection mode. The Left Knob and Left Button label turn cyan.

Display an Individual Airport’s METAR Information

1. With the METAR weather product screen displayed, press the TEXT Hot Key. The METAR pop-up displays with a four character pilot-selectable airport identifier field. The first character placeholder is selected indicated by the magenta color. (Figure 4-35)
2. Rotate the Left Knob to change the first character. (Figure 4-35)
3. Press the Left Knob to advance to the second character. The first character changes to white and the second character is magenta. (Figure 4-36)
4. Rotate the Left Knob to change the second character.
5. Repeat steps 2–4 for each character.
6. Press the TEXT Hot Key to close the METAR pop-up.
**METAR Age Annunciations**

When METAR is displayed one of the data age annunciations in Table 4-7 shall be displayed with the correct age value.

<table>
<thead>
<tr>
<th>METAR Age Annunciation</th>
<th>Age Annunciation</th>
</tr>
</thead>
<tbody>
<tr>
<td>METAR data is being received and updated</td>
<td><img src="image" alt="AGE:" /></td>
</tr>
<tr>
<td>Dashes will appear in time slot during initialization</td>
<td></td>
</tr>
<tr>
<td>Data link Receiver has failed</td>
<td></td>
</tr>
<tr>
<td>The data is unavailable</td>
<td><img src="image" alt="AGE:" /></td>
</tr>
<tr>
<td>The data is intermittent but not expired and may still be valid</td>
<td></td>
</tr>
<tr>
<td>Dashes will appear in time slot during initialization</td>
<td></td>
</tr>
<tr>
<td>The data age exceeds expiration time</td>
<td><img src="image" alt="AGE:" /></td>
</tr>
<tr>
<td>No valid data received for &gt; 30 seconds</td>
<td></td>
</tr>
<tr>
<td>GPS information invalid or unavailable</td>
<td></td>
</tr>
</tbody>
</table>

Table 4-7
METAR Age Legend

**NOTE**

It is possible to select a METAR item that is not in the current viewable display area. Use the Range +/- button to zoom out or in (respectively) to see selectable items. Selecting a higher map range may make it easier to see selected items. When viewing the map at a lower map range the selected item may be at the edge of the map display and the expanded flag will not be visible.
4.5.5 AIRMET/SIGMET

The Hot Keys provided allow the pilot to enable and disable AIRMETs and/or SIGMETs to aid in declutter. There is a Hot Key for each type of AIRMET/SIGMET. Each type of AIRMET/SIGMET will display outlined in the color indicated with a symbol centered in the outlined area affected by the AIRMET/SIGMET. Stippled lines outline AIRMETs, and smooth lines outline SIGMETs. Unknown AIRMET/SIGMETs are always shown. A legend is available that displays the different AIRMET/SIGMET symbols used.

Display/Hide the AIRMET/SIGMET Legend

- With the AIRMET/SIGMET weather product screen displayed, press the LGND Hot Key. A legend displays. Press the LGND Hot Key again to hide the legend. (Figure 4-37).

Display AIRMET/SIGMET

- With the AIRMET/SIGMET screen displayed and selected, press any of the Hot Keys to display or hide the applicable overlay.

The pilot can display full textual details for any AIRMET/SIGMET. First selection mode must be activated on by pressing the lower left Detail button. Next select the particular AIRMET/SIGMET you want to read, then press the Left Knob labeled INFO to view the AIRMET/SIGMET.

Display AIRMET/SIGMET Information

1. With the AIRMET/SIGMET weather product screen displayed, press the lower Left Button labeled INFO. The Left Knob label changes to MET and both the Left Knob and Left Button label turn magenta. (Figure 4-38)

2. Rotate the Left Knob to select the desired AIRMET/SIGMET. A white border will surround the colored AIRMET/SIGMET border. (Figure 4-39)
3. Press the Left Knob to display the selected AIRMET/SIGMET information
   (Figure 4-40)

4. Repeat steps 2 and 3 as desired.

5. Press the lower Left Button, to exit selection mode. The Left Knob and Left
   Button labels turn cyan

**AIRMET/SIGMET Age Annunciations**

When AIRMET/SIGMET is displayed one of the data age annunciations in Table 4-8
shall be displayed with the correct age value.

<table>
<thead>
<tr>
<th>Annunciation Description</th>
<th>AIRMET</th>
<th>SIGMET</th>
<th>TFR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Received</td>
<td>AIR</td>
<td>SIG</td>
<td>TFR</td>
</tr>
<tr>
<td>Received/Stale</td>
<td>AIR</td>
<td>SIG</td>
<td>TFR</td>
</tr>
<tr>
<td>Initializing</td>
<td>AIR :--</td>
<td>SIG :--</td>
<td>TFR :--</td>
</tr>
<tr>
<td>No data for &gt; 15 minutes during initialization</td>
<td>AIR :--</td>
<td>SIG :--</td>
<td>TFR :--</td>
</tr>
<tr>
<td>No data received</td>
<td>AIR</td>
<td>SIG</td>
<td>TFR</td>
</tr>
</tbody>
</table>

Table 4-8

Figure 4-40
Selected IFR AIRMET information Pop up
4.5.6 TFR

Display TFR Information

1. With the TFR weather product screen displayed, press the lower Left Button labeled INFO. The Left Knob label changes to TFR and both the Left Knob and Left Button label turn magenta. (Figure 4-41)

2. Rotate the Left Knob to select the desired TFR. A white border will surround the red TFR border. (Figure 4-42)

3. Press the Left Knob to display the selected TFR information. (Figure 4-43)

4. Repeat steps 2 and 3 as desired.

5. Press the lower Left Button, to exit selection mode. The Left Knob and Left Button label turn cyan.

TFR Age Annunciations

When TFR is displayed one of the data age annunciations in Table 4-8 shall be displayed with the correct age value.

4.5.7 Winds/Temps Aloft

Winds are displayed using the selected altitude filter. The pilot adjusts the altitude filter value by pressing either the FL+ or the FL- Hot Key. The default Winds Aloft altitude filter is 6000ft (FL060) if not previously set. Once the altitude filter has been changed, the selected setting becomes the default setting. The Winds Aloft filter level is displayed in the lower right corner of the display.

The Winds Aloft altitude filter increments in are 3000, 6000, 9000, 12000, 180000, 24000, 30000, and 39000 (e.g. FL240). When the FL+ Hot Key is pressed, the altitude filter advances to the next filter increment. When the FL- Hot Key is pressed, the altitude filter decreases to the next filter increment. (Figure 4-44).
Display the Winds Aloft Legend

- With the Winds Aloft weather product screen displayed, press the LGND Hot Key. The Winds Aloft legend displays on the right of the screen. Hide the Winds Aloft Legend. (Figure 4-45)
- Press the LGND Hot Key to hide the Winds Aloft legend.

Increase or Decrease Winds Aloft Altitude Filter

- Press the FL+ Hot Key to increase the altitude filter to the next altitude increment.
- Press the FL- Hot Key to decrease the altitude filter to the previous altitude increment.

Winds/Temps Aloft Age Annunciations

When Winds/Temps Aloft is displayed one of the data age annunciations in Table 4-9 shall be displayed with the issued and valid times.

<table>
<thead>
<tr>
<th>Annunciation Description</th>
<th>Winds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data received and current Dashes will appear in time slot during initialization</td>
<td>Issued: 06:00Z  Valid: 15Z - 00Z</td>
</tr>
<tr>
<td>Data received, current but not updated in past 15 minutes Dashes will appear in time slot during initialization</td>
<td>Issued: 06:00Z  Valid: 15Z - 00Z</td>
</tr>
<tr>
<td>No Data received</td>
<td>Issued: Z  Valid: Z</td>
</tr>
</tbody>
</table>

Table 4-9
4.6 Evolution PFD 1000 ADS-B Weather View

**ADS-B Weather Overlay**

The NXRD Hot Key enables the display of NEXRAD (Next Generation Radar) and precipitation data overlaid on the Navigation Display relative to the Ownship Symbol. The Hot Key label is green when enabled and gray when disabled. The ADS-B Weather default setting is off. NEXRAD coverage includes:

- Regional US NEXRAD Coverage

**Display ADS-B Weather**

1. Select the 2/2 Hot Key Menu, with Synthetic Vision configured is 2/3
2. Press the NXRD Hot Key to enable ADS-B Weather

The NXRD Hot Key label turns inverse green when enabled (Figure 4-46)

**Display ADS-B Weather Legend**

1. Press the MENU Button.
2. Rotate the Right Knob to the UAT page 12 of 14 page.
3. Press and hold the HOLD FOR LGND Menu Key. The ADS-B Weather Legend displays until the Menu Key is released. (Figure 4-47)
4. Press the MENU Button to exit.

**Weather Age**

When the ADS-B Weather is enabled, an age annunciation is shown in the lower left corner of the Navigation Display. The age annunciation indicates the elapsed time in minutes since the information was generated. (see Table 4-6)
Chapter 5
Appendix

5.1 Operating Limitations
Refer to the latest version of the Airplane Flight Manual Supplement (AFMS), Aspen Avionics document 900-00008-001 for the limitations that apply to your specific aircraft installation.

The AFMS and this Pilot’s Guide must be carried in the aircraft and be immediately available to the pilot while in flight.

For installations that include the optional EFD1000 MFD and/or the EFD500 MFD, the EFD1000/500 MFD Pilot’s Guide 091-00006-001, must be carried in the aircraft and be immediately available to the pilot while in flight.
5.2 Specifications

<table>
<thead>
<tr>
<th>Model</th>
<th>ATX 100</th>
<th>ATX 100G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capabilities</td>
<td>TSO Rule Compliant</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ADS-B In/Out</td>
<td></td>
</tr>
<tr>
<td>Link Frequency</td>
<td>978 MHz</td>
<td></td>
</tr>
<tr>
<td>Certifications</td>
<td>TSO-C157a (FISB)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TSO-C195a (TIS-B/Traffic)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TSO-C154c (UAT)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Option TSO C-145c for GNSS</td>
<td>DO-282B</td>
</tr>
<tr>
<td></td>
<td>TSO-C157a (FISB)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TSO-C195a (TIS-B/Traffic)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TSO-C154c (UAT)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Option TSO C-145c for GNSS</td>
<td>DO-282B</td>
</tr>
<tr>
<td>SW assurance</td>
<td>DO-160G</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DO-178B Level C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>DO-254 Level C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SW/HW</td>
<td></td>
</tr>
<tr>
<td>Installation Approval</td>
<td>STC approved in accordance with AC 20-165A</td>
<td></td>
</tr>
<tr>
<td>Size</td>
<td>5.75&quot; L x 5&quot; W x 1.7&quot; H</td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>Less than 1 pound</td>
<td></td>
</tr>
<tr>
<td>Transponder Interface</td>
<td>Mode A/C</td>
<td>Mode S</td>
</tr>
<tr>
<td>Model</td>
<td>ATX 100</td>
<td>ATX 100G</td>
</tr>
<tr>
<td>--------</td>
<td>---------</td>
<td>----------</td>
</tr>
<tr>
<td>Other Interface</td>
<td>2 ARINC 429 Inputs 1 ARINC 429 Output 4 RS-232/422 1 RS-485 4 Discrete Inputs 2 Discrete Outputs</td>
<td></td>
</tr>
<tr>
<td>Input voltage</td>
<td>10-40 VDC</td>
<td></td>
</tr>
<tr>
<td>Input current</td>
<td>0.2 A @12 VDC</td>
<td></td>
</tr>
<tr>
<td>Output Voltage</td>
<td>6.5 VDC</td>
<td></td>
</tr>
<tr>
<td>Output current</td>
<td>350 mA</td>
<td></td>
</tr>
</tbody>
</table>

Table 5-1
Specifications
5.3 Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADS-B</td>
<td>Automatic Dependent Surveillance Broadcast</td>
</tr>
<tr>
<td>ADS-B In</td>
<td>Reception of ADS-R, TIS-B, FIS-B</td>
</tr>
<tr>
<td>ADS-B out</td>
<td>Transmission of aircraft ID, current position, altitude and velocity.</td>
</tr>
<tr>
<td>ADS-R</td>
<td>Automatic Dependent Surveillance Re-broadcast</td>
</tr>
<tr>
<td>AIRMET</td>
<td>Airman's Meteorological Information</td>
</tr>
<tr>
<td>ARINC</td>
<td>Aeronautical Radio Inc</td>
</tr>
<tr>
<td>Extended Squitter</td>
<td>1090 MHz with enhanced accuracy and integrity information, additional parameters for TIS-B and ADS-B rebroadcast (ADS-R).</td>
</tr>
<tr>
<td>CONUS NEXRAD</td>
<td>Summary composite of available NEXRAD radar across 48 states</td>
</tr>
<tr>
<td>Declutter</td>
<td>Reduce amount of objects displayed on screen</td>
</tr>
<tr>
<td>DME</td>
<td>Distance measuring equipment</td>
</tr>
<tr>
<td>FIS-B</td>
<td>Flight Information Service's Broadcast</td>
</tr>
<tr>
<td>GPS</td>
<td>Global Positioning System</td>
</tr>
<tr>
<td>METAR</td>
<td>Aviation routine weather report</td>
</tr>
<tr>
<td>mB</td>
<td>Millibars</td>
</tr>
<tr>
<td>MFD</td>
<td>Multi-function Display</td>
</tr>
<tr>
<td>NEXRAD</td>
<td>Next Generation Radar</td>
</tr>
<tr>
<td>PFD</td>
<td>Primary Flight Display</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
</tr>
<tr>
<td>--------------</td>
<td>------------------------------------------------------</td>
</tr>
<tr>
<td>PIREP</td>
<td>Pilot report of weather conditions</td>
</tr>
<tr>
<td>Regional NEXRAD</td>
<td>Composite available NEXRAD imagery in a local area</td>
</tr>
<tr>
<td>SIGMET</td>
<td>Significant Meteorological Information</td>
</tr>
<tr>
<td>SURF</td>
<td>Surface Situational Awareness</td>
</tr>
<tr>
<td>TA</td>
<td>Traffic Advisory</td>
</tr>
<tr>
<td>TAS</td>
<td>Traffic Advisory System</td>
</tr>
<tr>
<td>TCAS</td>
<td>Traffic Collision Avoidance System</td>
</tr>
<tr>
<td>TFR</td>
<td>Temporary Flight Restriction</td>
</tr>
<tr>
<td>TIS-B</td>
<td>Traffic Information Services Broadcast</td>
</tr>
<tr>
<td>Transponder</td>
<td>Equipment that transmits aircraft squawk, altitude and other information.</td>
</tr>
<tr>
<td>UAT</td>
<td>Universal Access Transceiver</td>
</tr>
<tr>
<td>UAT Code</td>
<td>UAT squawk code</td>
</tr>
</tbody>
</table>
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