Ultra **EFIS**

Software: version 5.6 and higher
Firmware: version 3.15

User and Installation Manual

AvMAP
SATELLITE NAVIGATION

Your journey, Our technology

DISCLAIMER & WARNINGS

The information displayed by the Ultra EFIS is not certified for use for VFR or IFR flights.

The Ultra EFIS is meant as an aid to VFR navigation and is not a substitute for certified EFIS.

All critical flight information is presented for reference only and must be verified by the use.

The Ultra EFIS is not a substitute for on-board instruments.

The pilot in command assumes total responsibility and risk associated with the use of this device and remains solely responsible for flying in safe conditions.

AvMap disclaims any liability deriving from an improper use of the device, in a way that may violate the flight and navigation rules, regulations and safety.

1. Overview

Ultra EFIS is a complete instrumentation system for primary flight display (PFD) and horizontal situation indicator (HSI) functions. It is a rugged and reliable system designed for fixed panel installation.
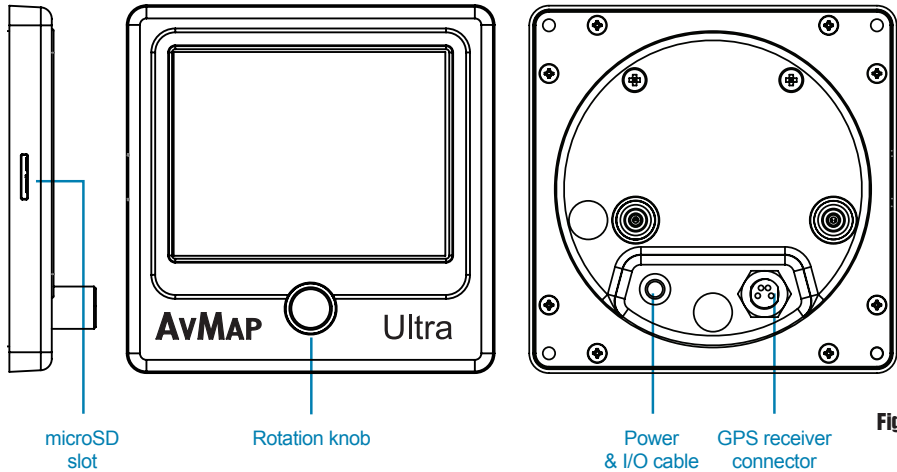

microSD slot   Rotation knob   Power & I/O cable   GPS receiver connector

Figure 1

Note: For connection specifications see Chapter 2.

ADAHRS
The core of the Ultra EFIS is the ADAHRS module. The ADAHRS module contains solid-state gyros, accelerometers, magnetic field sensors and air data sensors, providing attitude, heading, altitude and airspeed data to the system. In order to take full advantage of its functionality, the Pitot and Static ports should be connected to the aircraft pitot-static system.

GPS receiver
Connecting the external GPS receiver to the Ultra EFIS, the system provides the pilot with navigation information on the HSI page , providing its position, direction and radials relative to reference navigation points.

Preloaded Navdata POI's
Ultra EFIS is preloaded with Jeppesen Navdata POI's: Airports, NDB's and VOR's.
Coverage available: Europe-Africa, North America, South America, Asia-Australia.
The Jeppesen aeronautical database is updated every 28 days. Updates can be purchased and downloaded at www.avmap.it.

Micro SD card
A microSD card is included in the Ultra EFIS box. The microSD card is a blank card without data preloaded.
The microSD card should be used for Software updates and data transfer from/to the Ultra EFIS like updating the Navdata POI's.
Note: For more details see Chapter 4.

Rotation knob
The rotor plus centre click allow to switch from one mode to the other and to select different menu option.
Note: For more details see Chapter 4 and 5.

2. Installation

The installation procedure is divided in the following steps:

- Location
- Mechanical Installation
- Connections & wiring

2.1 Location
The Ultra EFIS is designed to be installed on the aircrafts instrument panel.
It is assumed that the instrument panel is completely perpendicular to the level and straight flight attitude.
In case the instrument panel is rotated the simple Horizon Alignment calibration procedure is required.
Note: For calibration see Chapter 3.

IMPORTANT: The Ultra EFIS contains a magnetometer and other precision electrical sensors. The location selected for installation should be clear of strong magnetic or electromagnetic disturbances as much as possible. Avoid installing the Ultra EFIS near electronic equipment (other digital EFIS, radios, transponders, etc), AC or variable DC cables, alternators, electrical motors, ferrous materials, etc. In such cases the proper behaviour of the compass is not guaranteed (i.e. the compass may be crossed as "out of order" or may give erroneous indications).
Hint: use a hand-held compass to verify the magnetic disturbance in the area selected for installation. If the needle shows relevant changes or unstable indication, the location is not suitable for installation. Make sure to perform this test with all on-board electronic devices switched ON.

2.2 Mechanical Installation
Make sure you have enough space on the front and behind the cockpit panel to install the Ultra EFIS. Check the Ultra EFIS measurements on Figure 2.

The Ultra EFIS is designed to be installed in an 3.3" (84mm) diameter hole.
The instrument has to be installed from the front of the panel and screwed from behind the panel according to Figure 3.
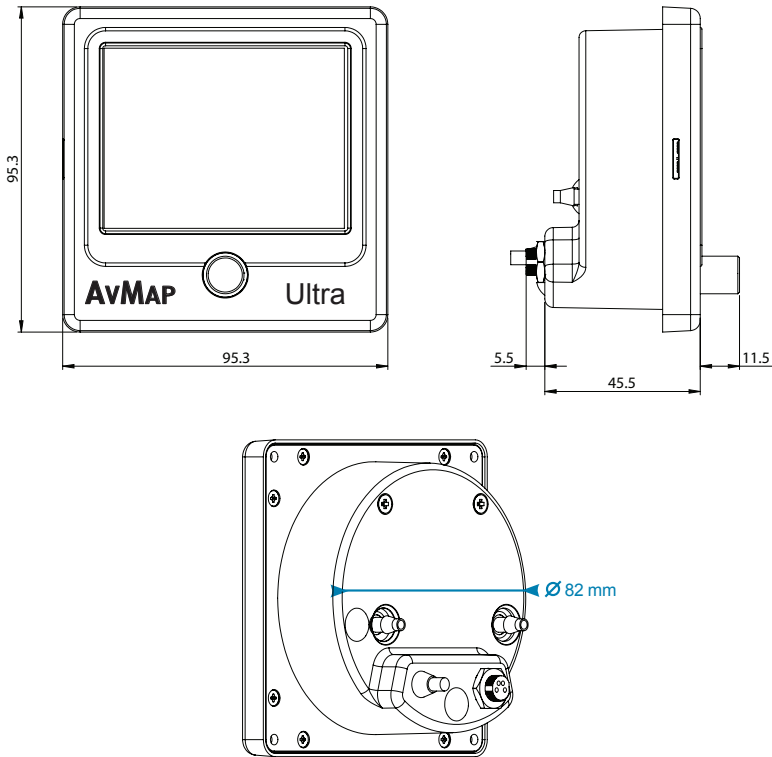

Figure 2

The screw length that need to be used for panel installation depend on the panel thickness and is based on the following formula:

$$7mm \leq l - t \leq 10mm$$

l = length of the screw
t = thickness of the panel

Use the screws and metal washer included in the box for standard panel thickness of up to 3mm. For thicker instrument panels, use longer screws and use the formula to choose the right screw length.

Aircraft instrument panel

3mm

Panel thickness
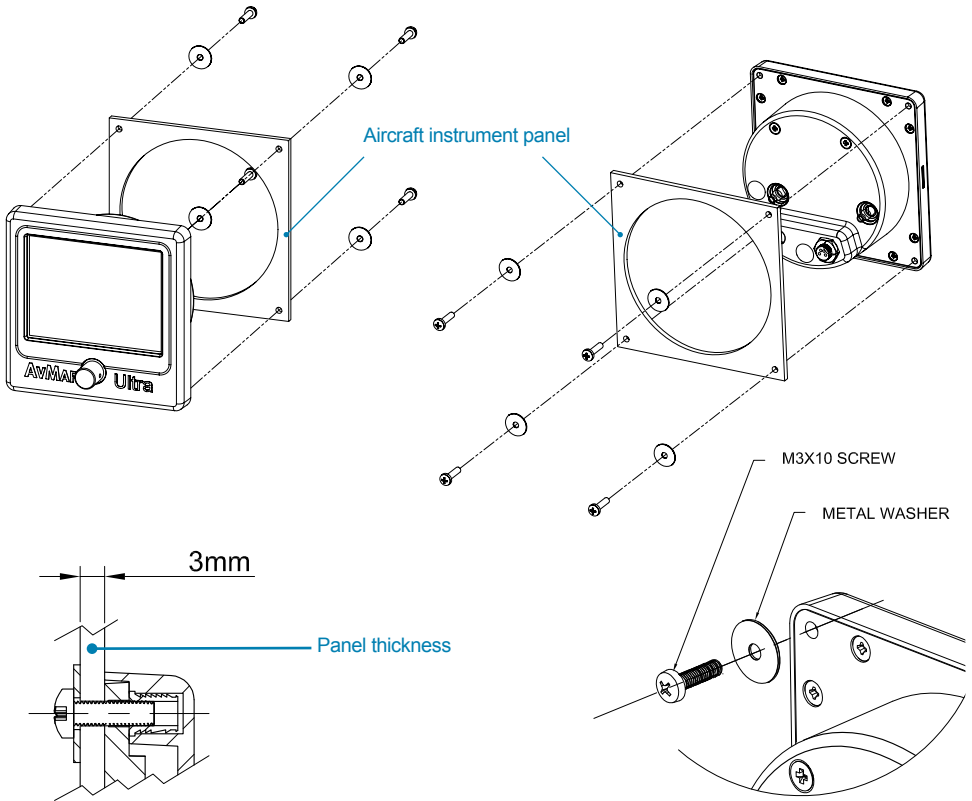
M3X10 SCREW

METAL WASHER

Figure 3

IMPORTANT: Make sure you respect the screw length formula to avoid damaging the plastic of the Ultra EFIS. Use light thread locker to prevent screw loosening with vibration. Use the Cutting template, included in the box, to cut out the panel. (see Figure 4)
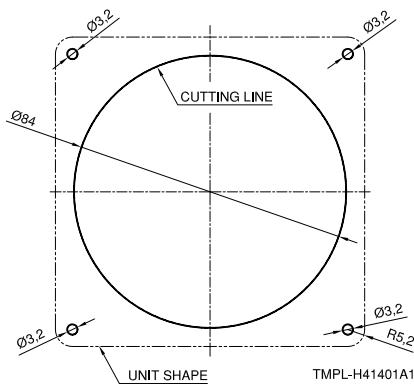

Ø3,2

Ø3,2

CUTTING LINE

Ø84

Ø3,2

Ø3,2

R5,2

UNIT SHAPE

TMPL-H41401A1

Figure 4

2.3 Connections & wiring

On the back of the unit there are 4 connectors: the pitot port, the static port, the power supply connector, and the GPS receiver connector (see Figure 5).
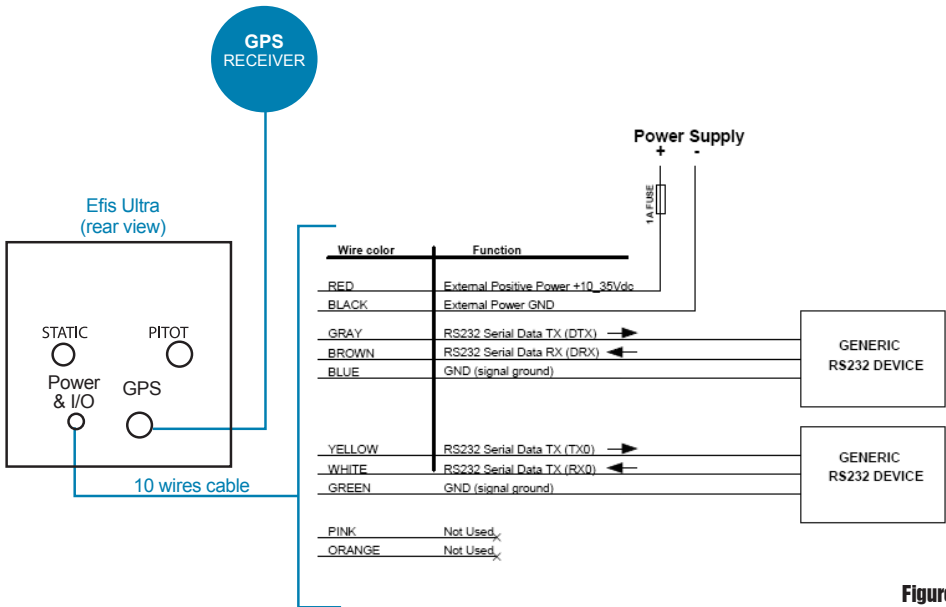

GPS RECEIVER

Efis Ultra (rear view)

Power Supply

Wire color — Function

RED	External Positive Power +10_35Vdc
BLACK	External Power GND
GRAY	RS232 Serial Data TX (DTX)
BROWN	RS232 Serial Data RX (DRX)
BLUE	GND (signal ground)
YELLOW	RS232 Serial Data TX (TX0)
WHITE	RS232 Serial Data TX (RX0)
GREEN	GND (signal ground)
PINK	Not Used
ORANGE	Not Used

GENERIC RS232 DEVICE

GENERIC RS232 DEVICE

STATIC PITOT
Power & I/O   GPS

10 wires cable

Figure 5

Connection to the pitot-static system

In order to display accurate speed and altitude data the Ultra EFIS needs to be connected to the aircraft pitot-static system. First of all remove the two caps protecting the STATIC and PITOT ports. Installation along with other mechanical or digital altimeters and airspeed indicators is supported by mean of a T coupler (not included in the Ultra EFIS box).
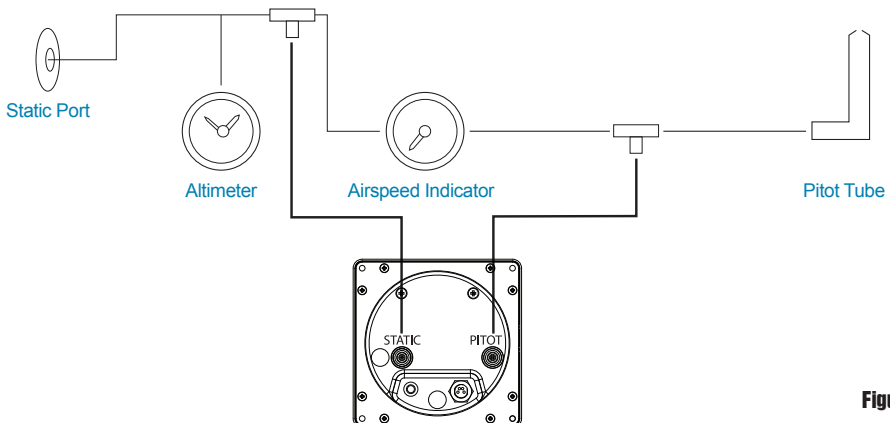

Static Port

Altimeter   Airspeed Indicator   Pitot Tube

STATIC   PITOT

Figure 6

Connect the pitot line to the port labeled PITOT and the static line to the port labeled STATIC. Make sure the tubes fit tightly into the Ultra EFIS.

IMPORTANT: Use flexible plastic tubes with an inside diameter of 5 mm (0,2 inches).

IMPORTANT: We recommend to test the pitot-static system for leakage after any alteration.

External GPS receiver connection
Connect the external GPS receiver, included in the box, on the back side of the Ultra EFIS to the GPS port as shown on Figure 5.
The GPS receiver comes with a 1,5 meter cable and is designed for use inside the aircraft.
The GPS receiver can be mounted to any convenient surface that has a clear view of the sky. It can be mounted on the aircraft's dashboard using the included velcro strip. The GPS receiver must have a clear view of the sky in order to receive satellite signals. GPS uses "line of sight" signals to locate and track satellites.
If the signals are obstructed by dense objects such as aluminium, steel or even heavy ice, the Ultra EFIS will not operate properly. Signals may also be blocked by heated wind screens (fibreglass, plexiglas and other plastics are normally transparent to GPS signals). If you find that the Ultra EFIS does not locate GPS FIX quickly or consistently, moving the location of the GPS receiver a few inches often provides a better view of the sky.

Power supply
IMPORTANT: Power the Ultra EFIS from an 11V to 36V supply. Mount on the power wire (RED) the 1A fuse holder, provided in the box, to protect against short circuits.

Serial Connection
The Ultra EFIS has serial RS232 connection ports to interface to an external device, used to interface with a transponder.
The Ultra EFIS can be connected to a Micro Air T2000 transponder using the RS232 serial connection shown on Figure 5.

3. System Calibration

There are two type of calibration procedures;

1. Horizon Alignment calibration (AHRS)
2. Magnetometer (compass) calibration

3.1 Horizon Alignment Calibration (AHRS)

Scenario A –Horizon Alignment Calibration NOT required
It is assumed that Ultra EFIS is installed in an instrument panel that is completely perpendicular compared to the level & straight flight attitude and aligned with the Lateral axis of the airplane.

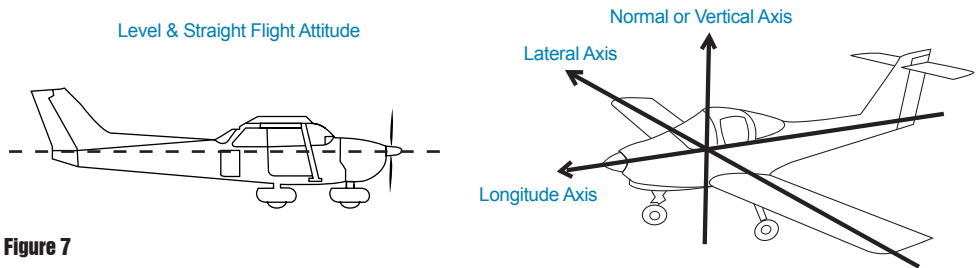In this case no Horizon Alignment Calibration is needed.

Level & Straight Flight Attitude

Normal or Vertical Axis

Lateral Axis

Longitude Axis

Figure 7

Scenario B - Horizon Alignment Calibration required
In case the Ultra EFIS is installed in an instrument panel that is aligned with the aircraft lateral axis, but not perpendicular to the straight & level flight attitude, the simple Horizon Alignment calibration procedure must be executed.

Horizon Alignment Calibration procedure
Execute this calibration procedure to align the Horizon line of the Ultra EFIS with the aircrafts straight & level flight attitude.
The procedure needs to be performed on the ground and can be started from the System menu.
Set the aircraft in level and straight flight attitude by using jacks or blocks (or by asking a friend to push or lift the tail and hold).
Enter the Setup mode (See Chapter 4 System Operation) by keeping pressed the rotation

knob for 5 seconds and release it.

Push again the rotor knob, select CALIBRATE to enter the Calibration menu and select HORIZON to enter the HORIZON menu.

In the Horizon menu select ZERO to calibrate the AHRS. Now the Horizon line of the Ultra EFIS is aligned with the aircrafts straight & level flight attitude.

IMPORTANT: If after the first attempt the horizon is not alligned with the aircrafts straight & level flight attitude, execute the horizon calibration again but before executing the calibration first restore the Horizon to DEFAULT in the Horizon menu.

IMPORTANT: If you want to restore AHRS calibration to the factory default (scenario A), select DEFAULT in the Horizon Menu.

3.2 Magnetometer (compass) calibration

The purpose of this procedure is to compensate magnetic disturbances the Ultra EFIS is subject to, due to aircraft metal structures and electromagnetic components. These disturbances, if not compensated, could alter the heading value provided by the system.

For this reason the magnetometer is disabled before the Magnetometer Calibration procedure is executed.

The procedure requires to point the aircraft nose in 4 directions (North, East, South and West oriented to Magnetic North) . The total duration for this procedure is about 20 minutes.

IMPORTANT: When the magnetometer of the Ultra EFIS is not enabled the Ultra EFIS uses GPS source to show COG (course over ground) on the compass. To enable compass heading it is neccessary to calibrate the magnetometer. In case both GPS and Magnetometer sources are lost the compass becomes RED and is out of order.

IMPORTANT: Before you proceed with the magnetometer (compass) calibration, make sure that the horizon line of the Ultra EFIS is aligned with the aircrafts straight & level flight attitude (see paragraph 3.1)

IMPORTANT: The Compass Calibration procedure must be executed in an open field clean of magnetic disturbances (we recommend at the compass rose of your airport).

Note: Most airports have a compass rose, which is a series of lines marked out on a ramp or maintenance run up area where there is no magnetic interference. Lines, oriented to magnetic north, are painted every 30° which is used to perform a compass calibration.

Magnetometer (Compass) Calibration procedure:

STEP 1: Prepare aircraft position and system

Taxi the aircraft to the airports compass rose or an open field free from magnetic disturbances.

Have the aircraft nose pointed to the Magnetic NORTH (0°) radial on the Airport Compass

Rose.
Note: use a magnetic compass for your reference if you execute the procedure in an open field free from magnetic disturbances).

Set the aircraft in level and straight flight attitude by using jacks or blocks.
Note: Make sure that the Horizon line of the Ultra EFIS is aligned with the aircrafts straight & level flight attitude.

IMPORTANT: Perform this test with all on-board electronic devices switched ON.

IMPORTANT: Let the Ultra EFIS system warm up and stabilize for about 5 minutes before starting the calibration.

IMPORTANT: Check on the HSI display if the Ultra EFIS receives a GPS fix.
Note: in case of no GPS reception the Ultra reports on the PFD and HSI page in RED "NO GPS".

STEP 2: Calibration calculation for NORTH direction
Enter the Setup mode by keeping the rotation knob pressed for 5 seconds and release (see chapter 4 for further details). Push again the rotor knob, select CALIBRATE to enter the Calibration menu, then select COMPASS and select CALIBRATE ("Mag clear done" message will pop up on the display).
The Ultra display shows: "Point to NORTH. Press NEXT when ready".
Make sure that the aircraft nose is pointed to the Magnetic NORTH (0°) radial on the Airport Compass Rose and make sure that the aircraft is not moving. Then confirm by pressing "NEXT".
Note: The calibration calculation for NORTH direction will start and a counter will inform of the progress.

STEP 3: Calibration calculation for EAST direction
The Ultra display shows: "Point to EAST. Press NEXT when ready".
Have the aircraft nose pointed to the Magnetic EAST (90°) radial on the Airport Compass Rose.
Set the aircraft in level and straight flight attitude by using jacks or blocks.
Let the system stabilize for about 30 seconds and make sure that the aircraft is not moving. Then confirm by pressing "NEXT".
Note: The calibration calculation for EAST direction will start and a counter will inform of the progress.

STEP 4: Calibration calculation for SOUTH direction
The Ultra display shows: "Point to SOUTH. Press NEXT when ready".
Have the aircraft nose pointed to the Magnetic SOUTH (180°) radial on the Airport Compass Rose.
Set the aircraft in level and straight flight attitude by using jacks or blocks.
Let the system stabilize for about 30 seconds and make sure that the aircraft is not moving.

Then confirm by pressing "NEXT".
Note: The calibration calculation for SOUTH direction will start and a counter will inform of the progress.

STEP 5: Calibration calculation for WEST direction
The Ultra display shows: "Point to WEST. Press NEXT when ready".
Have the aircraft nose pointed to the Magnetic WEST (270°) radial on the Airport Compass Rose.
Set the aircraft in level and straight flight attitude by using jacks or blocks.
Let the system stabilize for about 30 seconds and make sure that the aircraft is not moving.
Then confirm by pressing "NEXT".
Note: The calibration calculation for WEST direction will start and a counter will inform of the progress.

STEP 6: Check Compass Calibration
At the end of the calibration process Ultra will confirm if the magnetometer is calibrated successfully.
The message "Calibration done" will pop up.
Note: In the SETUP page after COM 1 will be written "ENABLED MAG".

IMPORTANT: Don't power off the system. Let the system stabilize for about 15 minutes before moving the aircraft.

Note: In the SETUP menu you can choose to display compass heading in reference to Magnetic North or True North. (see Chapter 4).

Note: If the calibration fails or the compass indicator is not enabled, repeat the calibration procedure. If several calibration attempts fails review the installation location of the Ultra EFIS. Magnetic disturbance could be too high in the area selected.

4. System Operation

4.1 How to operate the unit

The Ultra EFIS contains three display modes:
1. PFD (Primary Flight Display) mode
2. HSI (Horizontal Situation Information) mode
3. Setup mode

The rotor plus centre click allow to switch from one mode to the other and to select different menu option.
At start up the disclaimer page is shown. In the disclaimer page rotate the knob (or push once the rotation knob) to read the disclaimer and confirm by pushing once the rotation knob to enter the PFD mode.
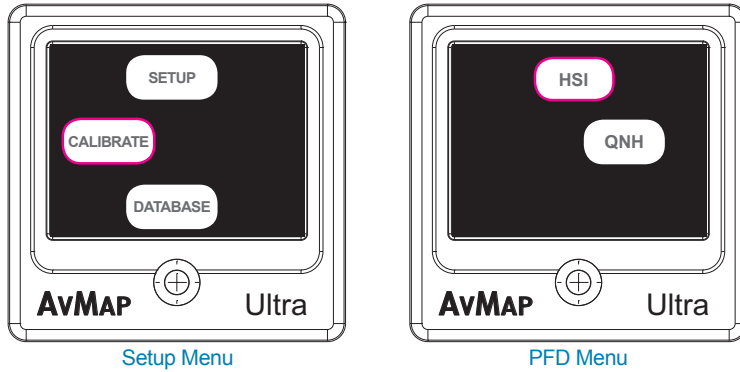
Setup Menu   PFD Menu   **Figure 8**

While in PFD mode, pushing once the rotation knob an option menu window appears on the display. Rotate the knob to select a menu and confirm by pushing the rotation knob. The option menu window disappears if the rotation knob has not been operative for more than 5 seconds.

While in PFD mode, you can enter the HSI mode by pushing the rotation knob, select HSI rotating the knob and confirm by pushing again the rotation knob. To go back to the PFD display mode push the rotation knob, select PFD and confirm by pushing again the rotation knob.
To enter the Setup mode from either the PFD or HSI mode keep the rotation knob pressed for 5 seconds.

4.2 PFD mode

The PFD shows critical flight information like attitude, airspeed, altitude, as well as other less critical flight variables like turn coordination, heading, load factor. A detailed explanation of each instrument is given in Figure 9.
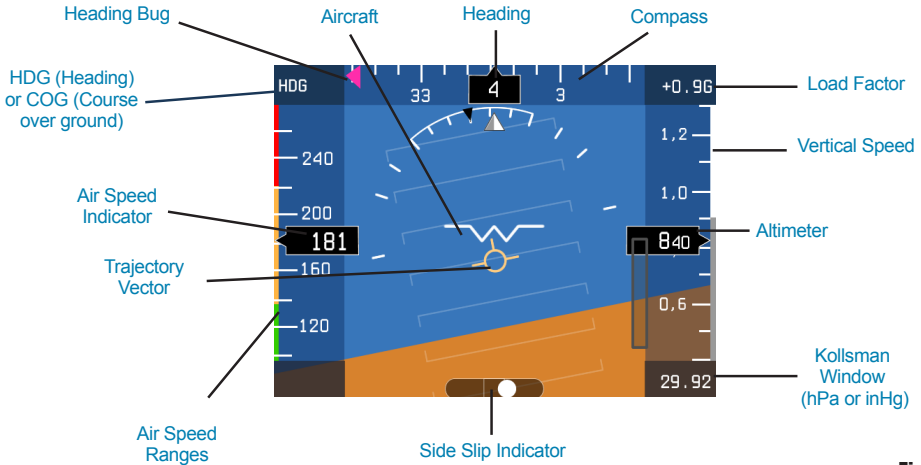

Figure 9

Attitude is displayed with a standard coloured artificial horizon. An aircraft symbol is used to indicate the aircraft's nose orientation.

A **trajectory vector** is displayed with a circle and three lines; the trajectory vector indicates the aircrafts real path with respect to the horizon and the aircraft's nose.

Pitch indicator is displayed by markers that are horizontal with the horizon and are equally divided with 10 degrees pitch of separation between the lines.

Roll indicator is displayed by markers of 10, 20, 30, 45 and 60 degrees of roll.

IAS (Indicated Air Speed) is shown in number representation as well as on a vertical tape. The tape also displays two coloured lines for white and green operating arcs; white from the stall speed in dirty configuration (Vs0) to the maximum flap extension speed (Vfe), and green from the stall speed in clean configuration (Vs1) to the manoeuvring speed (Va).
Note: Aircraft specific V-Speed reference values can be entered in the SETUP menu. See paragraph 4.4.
Note: In the SETUP menu select your preference unit for speeds: knots, kph, mph, m/s.

Altitude is shown in number representation as well as on a vertical tape. Underneath the tape there is a Kollsmann window where the user can adjust the QNH setting.
Note: In the SETUP menu select your preference unit for altitude: feet, meter.

Side Slip Indicator is shown with a standard ball indicator. The ball centered on the inner markers corresponds to the aircraft not side slipping.

Heading is shown in degrees with respect to Magnetic North or True North. The Ultra EFIS contains an internal world magnetic model that allows it to calculate the local magnetic deviation and dip. A vertical card compass is also displayed for fast heading reference.
Note: in the SETUP menu you can choose reference with respect to Magnetic North or True North.

Course over Ground (COG) is shown on the compass instead of heading in case the magnetometer is not calibrated or when the magnetometer has an failure. The COG data is based on GPS source.
Note: If the compass source is GPS, the device shows "COG" aside the compass. If the compass source is the magnetometer, the device shows "HDG" aside the compass. Both can be shown in reference to Magnetic North or True North.

Transponder information is shown on the PFD screen only if the Ultra EFIS is connected to compatible transponder. Ultra EFIS is compatible with Micro Air T2000 Transponder. Both the transponder code and mode are shown, with four octal digits for the code, and one letter for the mode (S for standby, A for mode Alfa –no altitude encoding-, and C for mode Charlie –with altitude encoding-). The Ultra EFIS acts also as an altitude encoder, so no additional altitude encoder is necessary.

QNH Setting
When the Ultra EFIS is in Primary Flight Display mode the pressure reference for the altimeter can be selected by pushing the rotation knob.
Select QNH to enter the QNH menu.
Select BARO to set the standard atmosphere: QNH value is equal to 1013,25 hPa or 29.92 inch of mercury.
Select MAN to set manually local air pressure at mean sea level (QNH value).

Aircraft Specific V-Speed reference values
Set the aircraft specific V-speed values to get the right information on the air speed ranges bar.
Refer to the aircraft operating manual to find the correct values of your aircraft.
To change V-speed reference values go to the Setup display mode by pressing the rotation knob for 5 seconds.
Select SETUP to enter the Setup menu and select SPEEDS to enter the V-Speed reference values shown on the bottom of the SETUP display mode.
Rotate the rotation knob to change values and push the rotation knob to confirm.

List of available reference values

V-speed values	
Vne	Never to exceed speed
Vn0	Maximum cruise speed
Vs0	Stall speed with flaps & landing gear deployed
Vfe	Maximum flaps extended speed
Vs1	Stall speed with flaps & landin gear retracted

4.3 HSI display mode

The HSI shows navigation data: position, distance, directions, and radials relative to reference navigation points. Figure 10 shows the data layout on the screen:
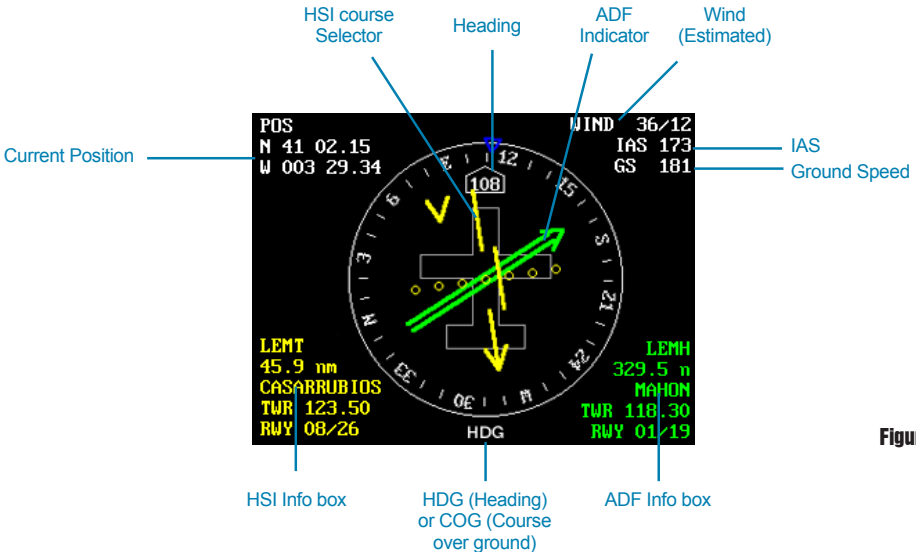

Figure 10

Heading is shown in degrees with respect to Magnetic North or True North. The Ultra EFIS contains an internal world magnetic model that allows it to calculate the local magnetic deviation and dip. A vertical card compass is also displayed for fast heading reference.
Note: in the SETUP menu you can choose reference with respect to Magnetic North or True North.

Course over Ground (COG) is shown on the compass instead of heading in case the magnetometer is not calibrated or when the magnetometer has an failure. The COG data is based on GPS source.
Note: If the compass source is GPS, the device shows "COG" aside the compass. If the compass source is the magnetometer, the device shows "HDG" aside the compass. Both can be shown in reference to Magnetic North or True North.

Current Position is shown in latitude/longitude format. The Ultra EFIS can calculate position even in the absence of GPS. In absence of GPS fix the position indicator change in RED.

Wind data is approximated and displayed by the system when suitable GPS, compass and IAS data are available. Wind direction is referred to the direction where the wind is coming from.
Note: The speed units selected in the SETUP menu are also applied to wind speed.
Note: Without Magnetometer calibration (see Chapter 3) wind data are not available.

GS (Ground Speed). The Ultra EFIS can calculate ground speed even in the absence of GPS, with degraded quality; this is indicated by a change in colour (RED) in the ground speed indicator.
Note: In the SETUP menu select your preference unit for speeds: knots, kph, mph or m/s.

ADF (Automatic Direction Finder) is shown with a standard double line needle in green color. The ADF info box of the point-of-interest (POI) used to calculate distance and direction is shown in the bottom right corner. The ADF info box displayed includes the POI ID, distance (in nm, km or miles), POI name, and two lines of miscellaneous textual information (frequencies and runways for airports, for example).

HSI (Horizontal Situation Indicator) is shown with a standard single line needle in yellow colour. The HSI indicator is complete, with course deviation indicator (CDI) and to/from flag. The HSI info box of the point-of-interest (POI) used to calculate distance and direction is shown in the bottom left corner. The HSI info box displayed includes the POI ID, distance (in nm, km or miles), POI name, and two lines of miscellaneous textual information (frequencies and runways for airports, for example).

HSI settings
When the Ultra EFIS is in HSI display mode press the rotation knob to enter the HSI mode menu.
Select HSI to enter the HSI menu:
In the HSI menu you can select an Airport (ARPT), VOR and NDB as your navigation point.
Select CDI to setup the course deviation indicator on the HSI indicator. Use the rotation knob to change CDI.

ADF menu
On the HSI display mode menu, select ADF to enter the ADF menu.
In the ADF menu you can select an Airport (ARPT), VOR and NDB as your Automatic Direction Finder point.

BUG
On the HSI display mode menu, select BUG to setup the BUG on the HSI. Use the rotation knob to select the BUG direction and confirm by pressing the rotation knob. The BUG is shown on the compass in magenta colour, both on the HSI and PFD display.

4.4 Setup mode
To enter the Setup display mode from either the PFD or HSI display mode keep the rotation knob pressed for 5 seconds.
The Setup menu display mode provide you information regarding the Software Version, enabled COM ports, V-speed values and Display brightness.

In the Setup mode push the rotation knob to enter the Setup menu:
In the Setup Menu you can enter the following menu's:
   • CALIBRATE: To calibrate the magnetometer (Compass) and AHRS (Horizion).
   • DATABASE: To update the Navdata POI's.
   • SETUP: To change display brightness, configure the aircraft specific V-Speed values and change units measurements.
Note: For Magnetometer and AHRS calibration see Chapter 3.

Aircraft Specific V-Speed reference values
Select SPEEDS in the Setup menu to enter the V-Speed reference values shown on the bottom of the SETUP display mode.
Rotate the rotation knob to change values and push the rotation knob to confirm.
Refer to the aircraft operating manual to find the correct values of your aircraft.

Navdata POI management
Ultra EFIS is preloaded with Jeppesen Navdata POI's: Airports, NDB's and VOR's.
In the Database menu you can choose to IMPORT navdata to the Ultra EFIS through the microSD card.
Make sure the microSD card is inserted in the Ultra EFIS.

Navdata Update
To update the navdata on your Ultra EFIS visit www.avmap.it and purchase the latest navdata update.
When you purchase an update, you'll receive a navdata file. Save the navdata file on your PC and copy it on the microSD card.
To import the navdata update from the microSD to the Ultra EFIS insert the microSD in to the device, go to the Database menu and select IMPORT.
After the update is completed, turn off the device and start it up again.

Display Brightness
Select BRIGHT in the Setup menu to adjust the display brightness. Use the rotation knob to change the display brightness and confirm by pushing the rotation knob.

Units measurement settings
To change units measurement select UNITS in the SETUP menu.
You can change the following units measurements:
- NORTH: compass heading can be set in degrees with respect to magnetic north or true north.
- PRESSURE: barometric pressure can be set in hPa or inHg.
- SPEED: All speed refered information (IAS, wind speed, ground speed, vertical speed, aircraft v-speed range) can be set in knots, kph, mph or m/s.
- ALTITUDE: Altitude can ne set in feet or meters.
- DISTANCE: Distance to an HSI or ADF navigation point can be set in nm, miles or km.

5. Software update

Download the software update file form www.avmap.it and copy the software file on the mSD card.
Insert the microSD card into the Ultra EFIS while the Ultra EFIS is turned OFF.
Turn the Ultra EFIS ON providing power supply to the device.
A message will show on the display: "COPY NEW BINARY?".
Push once the rotation Knob and select "YES" to update the Ultra EFIS with the new Software, or select "NO" if you don't want to proceed with the update.
After the update process the Ultra EFIS starts up as usual and will show the PFD mode.
Check the software version in the Setup mode.

6. Alarms and Trouble shooting

Magnetometer not calibrated or not operating correctly
When the magnetometer is either not calibrated or not operating correctly, the compass on the PFD and HSI display becomes RED.
It can occur sporadically during flight and it is not problematic, as the unit continues to estimate heading correctly using gyroscopic and other internal means. Magnetometer failures on start-up or during prolonged periods lead to incorrect heading readings.

What to do?
Perform magnetometer calibration. If the problem persists, and the magnetometer is external, check connection. If problem persists, relocate magnetometer in the aircraft according to installation instructions and recalibrate. If problem still persists, external magnetometer or unit might require service.

GPS failure
During the Ultra EFIS start-up and until a GPS fix is acquired, the GPS position field on the HSI display will indicate GPS error in RED. If the GPS fails during operation, the same condition is indicated. The unit can continue calculating position with degraded precision in absence of GPS.

What to do?
Allow for some time (up to 3 minutes) for the GPS to acquire first fix. If failure persists after this point, verify GPS antenna connection.

AHRS failure
When the PFD display mode becomes totally RED there is a AHRS failure. This failure occurs when the unit exceeds any of the following limits: 1600deg/s (all axis) and 8g (all axis).

What to do?
This failure should only occur during high dynamics in flight. The unit will accumulate error in the attitude estimation during these high dynamic conditions, but this error is automatically reduced and eliminated even on dynamic conditions (provided limits are not continuously exceeded). If this failure occurs in non-high dynamic conditions, unit requires service.

Altimeter failure
When the altimeter in the unit is either out of range or not operating correctly the altimeter tape becomes RED.

What to do?
If the altitude is within the limits of the unit (as quoted in the specifications), check for a static port blockage. If the static port is not obstructed, the unit requires service.

Transponder failure
When there is no communication between the transponder and the Ultra EFIS the Transponder box on the PFD page becomes RED.

What to do ?
Verify wiring and EFIS configuration.

Unit failure
When the PFD and HSI display modes show a RED cross the system is not operative. This failure indicates that the sensor system on the unit is no longer speaking to the symbol generator CPU.

What to do?
This problem can occur because the unit is configured wrong, because the software

on the device inside it has been erased, or because of an internal failure. The first two causes can be solved by updating the software with the latest available software version. If a software update doesn't resolve the failure the Ultra EFIS requires service at AvMap facility.

7. Technical Specifications

Software features
• Advanced data fusion capability
• Airspeed and Altitude from Pitot-static system
• Attitude (roll, pitch and heading) and side slip
• Wind indicator
• Clear HSI with Course Deviation Indicator (CDI)
• Altimeter reference, Heading reference, Aircraft specific V-speed
  reference values
• Preloaded with Jeppesen Database (APT, VOR, NDB) for navigation back-up
  (4 coverages available: North America, South America, Europe-Africa, Asia- Australia)
• Exceptional navigation capability in case of loss of GPS signal
• Load factor (G-meter)

Hardware:
• Dimensions: 95 x 95 x 49.5 mm (3.74" x 3.74" x 1.95")
• Diameter: 82 mm (3.23"); Installing diameter: 84 mm (3.3")
• Weight: 145 g (5.1 oz)
• Display: 3.5"; 320 x 240 pixels, brightness 500 cd/m2
• Operational Temperature: -20 °C to + 70 °C / -4 °F to +158 °F
• 3-axis gyros, accelerometers and magnetometers
• Acceleration range (3 axis): +/- 8 g
• Rotation Range: +/- 1600 deg/s
• Air data sensors: range 10 to 215 kts, -1000 to 40000 ft
• UAV Navigation® Motion processor
• Micro SD slot
• 1.5 m (59") free wires power supply cable (10/35 VDC)
• 3 serial ports RS-232
• Consumption @ 12 V DC: 100 mA nominal

Included accessories:
• GPS receiver U-Blox NEO 6Q with 1.5 m (59") cable
• Mounting KIT (Cutting template, 4x metal washers and 4x screws)
• 1x 1A fuse holder
• Blank microSD card
• Microfiber cleaner cloth

Ultra EFIS

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