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Installation Manual

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- Software Part Number: 530-00195-010, -012, -110, -210, -510, -512, Release 8 or Later
- Software Part Numbers: 530-00195-000, -002, -100, -200, -210, -400, -402, -500, -502, -504, Pre-Release 8

The latest revision of the Entegra EX5000-Series MFD Installation Manual is available to authorized Avidyne dealers on the web at www.avidyne.com.

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Contents

1 About the EX5000 MFD 1
1.1 Standard Functionality 1
1.2 Optional Functionality 1
2 General Information 3
2.1 Equipment Description 4
2.2 MFD Technical Specifications 6
2.3 TSO and ETSO Information 7
2.4 Configuration Options 12
3 Unpacking the MFD 17
4 Installation Planning 19
4.1 Location and Viewing Angle 19
4.2 Cooling 19
4.3 Mounting the MFD 19
4.4 Electrical and Sensor Interfaces 21
4.4.1 Wiring Notes 21
4.4.2 Weight and Balance 22
4.5 Electrical Load Analysis 23
4.6 Datalink Antenna Installation Considerations 23
4.6.1 ORBCOMM Antenna Details 24
4.6.2 Broadcast Antenna Details 24
4.7 Wiring External Devices 25
4.7.1 GPS and FMS Wiring 25
4.7.2 Dual GPS Setup with GAMA 429 25
4.7.3 Broadcast Datalink Receiver Wiring 25
4.7.4 ORBCOMM Datalink Antenna 25
4.7.5 Iridium Datalink Antenna 25
4.7.6 Lightning Sensor Wiring 25
4.7.7 Traffic Sensor Wiring 26
4.7.8 TAWS Wiring 26
4.7.9 Map Configuration 26
4.7.10 Radar Sensor Wiring 28
5 MFD Feature Setup and Checkout 29
5.1 Preliminary Test 29
5.2 Optional MFD Function Activation Utilities 31
5.3 Using the Configuration Save and Restore (CSR) Utility 32
5.4 Using the Maintenance Mode Page 33
5.4.1 Entering Maintenance Mode 33
5.4.2 Working in Maintenance Mode 34
5.5 GPS/FMS Navigators Setup 35
5.5.1 GAMA 429 Graphics Setup 35
5.5.2 Dual GPS Setup with GAMA 429 36

5.5.3 RS-232 Setup 37
5.5.4 Dual GPS Setup with RS-232 38
5.5.5 GPS/FMS Communications Check (Messages) 38
5.5.6 GPS/FMS Manufacturer's Matrix 39
5.5.7 GPS/FMS Installation-Specific Issues 40
5.6 Lightning Sensor Setup 41
5.6.1 Lightning Sensor Setup 42
5.6.2 Lightning Sensor Checkout 44
5.7 Traffic Sensor Setup 46
5.7.1 TAS (SkyWatch & Bendix/King) Setup 47
5.7.2 TAS (SkyWatch) Checkout 48
5.7.3 TAS (Bendix/King) Checkout 48
5.7.4 TCAD Setup 49
5.7.5 TCAD Dual Display Setup 50
5.7.6 TCAD Checkout 50
5.7.7 TIS Setup 51
5.7.8 TIS Checkout 51
5.7.9 Traffic Communications Check (Messages) 52
5.8 TAWS Setup (Optional) 53
5.8.1 TAWS Setup 53
5.8.2 TAWS Communications Check (Messages) 54
5.9 Radar Sensor (700-00030-005/-805 only) 55
5.9.1 RADAR System Calibration 56
5.9.2 Roll Trim Adjustment 66
5.9.3 RADAR Checkout 66
5.9.4 RADAR Sensor Communications Troubleshooting 66
5.10 Engine Instruments Setup 67
5.10.1 Engine Instruments Setup 67
5.10.2 Engine Sensor Checkout 72
5.11 Aircraft Setup 73
5.11.1 Auxiliary Data Setup 74
5.11.2 2-Way (Narrowcast) Datalink Setup 74
5.11.3 Broadcast Datalink Setup 76
5.11.4 Broadcast Datalink Checkout 77
5.11.5 Long Range Tanks Setup 77
5.11.6 Checklists Setup (Cirrus & Columbia Only) 78
5.11.7 Dimming Bus Setup 78
5.11.8 Dimming Bus Checkout 78
5.12 Map Setup 79
5.12.1 Setup with Entegra PFD as Heading Source 79
5.12.2 Setup with GPS/FMS as Heading Source 79
5.12.3 Setup with StormScope as Heading Source 80
5.12.4 Setup with Traffic (TAS) as Heading Source 80
5.12.5 Map Orientation with Track 80

5.12.6 Map Heading/Track Status 81
6 Post-Installation Check 83
6.1 System Info Pages 83
6.1.1 System Info Datalink Page 83
6.1.2 System Info Platform Page 84
6.1.3 System Info Port Page 84
6.2 Electro-Magnetic Compatibility (EMC) Check 85
6.3 Lightning Sensor Strike Test 85
6.4 Traffic Test 85
6.5 2-Way Datalink Satellite Reception Confirmation 85
6.6 Broadcast Datalink Satellite Reception Confirmation 86
6.7 Magnetic Compass Swing 87
7 MFD General Maintenance 89
7.1 Cleaning the EX5000 Screen 89
7.2 MFD Data Updates 89
7.2.1 Loading NavData (the Navigation Database) 90
7.2.2 Loading CMax Chart Data 91
7.2.3 Downloading EMax Data 92
8 Avidyne Technical Support and Service 93
8.1 Technical Support 93
8.2 Service 93
Appendix A: Environmental Qualification Data 95
Appendix B: Flight Manual Supplement Information 97
Appendix C: STC Permission 98
Appendix D: Landscape EX5000 Dimensions 99
Appendix E: Landscape EX5000 with Integrated Datalink Dimensions 100
Appendix F: Portrait EX5000 Dimensions 101
Appendix G: Landscape Cutout Dimensions 102
Appendix H: Portrait Cutout Dimensions 103
Appendix I: Wiring Diagram – Power, Dimming Bus, and Exceedance Horn 104
Appendix J: Wiring Diagram – GPS/FMS 105
Appendix K: Wiring Diagram – Lightning, Datalink Sensors, and ORBCOMM Antenna 106
Appendix L: Wiring Diagram – Traffic Sensors 107
Appendix M: Wiring Diagram – TAWS 108
Appendix N: Wiring Diagram – Radar Sensor 109
Appendix O: Wiring Diagram – Engine Sensors 110
Appendix P: Wiring Diagram – Primary Flight Display (PFD) 111
Appendix Q: 3rd Party Avionics System Interconnect 112
Appendix R: ORBCOMM Datalink Antenna Mounting 114
Appendix S: ORBCOMM Datalink Antenna Coupler Installation 115

List of Figures

Figure 1: Multi-Function Display Landscape and Portrait Rear Views 4
Figure 2: Main Connector Sample Port Assignments 16
Figure 3: Heading Configuration with GPS/FMS 27
Figure 4: Heading Configuration with StormScope 27
Figure 5: Heading Configuration with SkyWatch 27
Figure 6: EX5000 Landscape Front View 30
Figure 7: Example Maintenance Mode Page 33
Figure 8: GPS Setup, GAMA 429 36
Figure 9: Dual GPS Setup, RS-232 37
Figure 10: Selection Page 42
Figure 11: WX-500 Setup Page 42
Figure 12: TWX-670 Setup Page 43
Figure 13: TAS selection on Traffic Setup Page 47
Figure 14: TCAD selection on Traffic Setup Page 49
Figure 15: TIS selection on Traffic Setup Page 51
Figure 16: TAWS Sensor Setup Page 53
Figure 17: ART-2000 Radar Setup Page 55
Figure 18: Radar Setup Page 59
Figure 19: Engine Instruments Setup Pages 68
Figure 20: Aircraft Setup Page with Datalink 73
Figure 21: System Info—MLX Info Page for Iridium 75
Figure 22: System Info—Datalink Info Page for ORBCOMM 76
Figure 23: Map Setup Page for Track 81
Figure 24: System Info—Datalink Page 83
Figure 25: System Info—Platform Page 84
Figure 26: System Info—Port Page 84

List of Tables

Table 1: MFD Technical Specifications 6
Table 2: TSOs by Software Part Number 7
Table 3: ETSOs by Part Number 9
Table 4: TSO and ETSO Descriptions 9
Table 5: Partial Function TSO 9
Table 6: Functions Not Covered by TSO 10
Table 7: TSO Deviations 10
Table 8: Sensor Port Configuration Options 12
Table 9: Main Connector (P1) Pin Assignments 14
Table 10: Port Pinout Cross-Reference 15
Table 11: RS-232 Port Pinout Cross-Reference 15
Table 12: MFD Parts, Components, and Software 17
Table 13: Electrical and Sensor Interface Wiring 21
Table 14: Suggested ORBCOMM Antennas 24
Table 15: GPS/FMS Communications Messages 38
Table 16: GPS/FMS Manufacturer's Matrix 39
Table 17: TWX-670 Configuration Options 41
Table 18: WX-500 Configuration Options 41
Table 19: Lightning Sensor Messages 44
Table 20: Traffic Setup Configuration Options 46
Table 21: TCAD Shield Settings 50
Table 22: Traffic Messages 52
Table 23: TAWS Error Messages 54
Table 24: ART-2000 Sensor Configuration Options 56
Table 25: Radar Sensor Error Messages 66
Table 26: Auxiliary Data Messages 74
Table 27: Broadcast Datalink Messages 77
Table 28: RTCA/DO-160E Environmental Qualification Form Part No. 700-00004-() 95
Table 29: RTCA/DO-160E Environmental Qualification Form Part No. 700-00030-() 96
Table 30: P1 Pin Assignments 112
Table 31: GPS ARINC429 Receive Messages (GAMA Communication Protocol) 112
Table 32: Traffic ARINC 429 Messages (ARINC 735A communication protocol) 113
Table 33: TAWS ARINC 429 Transmit Messages 113

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1 About the EX5000 MFD

The Avidyne Multi-Function Display, or MFD, is a single unit computer system mounted in an aircraft instrument panel in the pilot's view that interfaces to various aircraft avionics. The MFD increases pilot situational awareness and enhances flight safety by providing supplementary navigation, traffic, terrain, airspace, weather, engine, and approach chart information.

The EX5000-Series MFDs are intended for use as a supplementary situational awareness device. The EX5000 contains software developed in accordance with RTCA/DO-178B Level D requirements.

Note: Avidyne no longer supplies the FlightMax EX3000. For information about the EX3000, see the *FlightMax MFD Installation Manual, Revision 17*.

This section contains the following information:

- Section 1.1, “Standard Functionality” on page 1
- Section 1.2, “Optional Functionality” on page 1

A complete Entegra or Envision EX5000-Series Multi-Function Display system consists of the following components:

- Avidyne Entegra or Envision EX5000-Series Multi-Function Display (MFD).
- System installation kit, including MFD assembly and necessary connectors.
- User documentation including *Pilot's Guide*, *Installation Manual*, and *Instructions for Continued Airworthiness*.

1.1 Standard Functionality

MFD standard functionality available on the EX5000:

- A GPS interface to provide position, velocity, and flight plan data to the MFD.
- The MFD displays the current aircraft position and active flight plan graphically overlaid on the moving map comprised of terrain, geo-political boundaries, airspace, navaids, airports, airways, and obstacles.
- The MFD displays the current active flight plan in textual format.

1.2 Optional Functionality

The following features are optional for the EX5000. However, they may not be available for all aircraft:

- **External traffic detection system**—Allows the MFD to display a pictorial representation of nearby transponder-equipped aircraft overlaid on the moving map display.
- **External lightning detection system**—Allows the MFD to present a visual display of lightning strikes or cells overlaid on the moving map display.
- **External Engine Data Acquisition Unit (DAU) or Sensor Interface Unit (SIU)**—Allows the MFD to display the aircraft engine gauges and other Engine Page functions, and provides engine leaning assistance.

- **External Mini Data Acquisition Unit (Mini-DAU)**— Allows the MFD to display rudder trim, generator and alternate current, and bus voltage.
- **Two-Way Datalink transceiver**—Allows the MFD to display strategic weather and airspace information in graphical and textual formats. Supports either:
  - MLX770 Iridium Datalink transceiver

Note: EX5000 Release 8 or greater software is required to support the MLX770 Iridium Datalink Transceiver. All Iridium or MLX770 references in this document assume Release 8 or greater software is installed in the EX5000.

  - Built-in ORBCOMM Datalink transceiver (not included in 700-0004-007/008/009/010 and 700-00030-805)

Note: ORBCOMM support is being discontinued in 2010. Release 8.1 software and later does not support the ORBCOMM Datalink transceiver.

- **Broadcast Datalink receiver**—Allows the MFD to display strategic weather and airspace information in graphical and textual formats. When used with Two-Way Datalink, the MultiLink feature can be enabled and used.
- **External Terrain Awareness and Warning System (TAWS)**—Allows the MFD to display EGPWS terrain image data on a TAWS page.
- **Terminal and Procedure Chart Data (CMax™ Charts)**—Optional charts available from Jeppesen Sanderson, Inc. provide terminal and procedure charts at the touch of a button.
- **External Digital Radar Receiver/Transmitter**—Allows the MFD to display radar image data on a radar page or overlaid on the moving map display.

2 General Information

This section contains the following information:

- Section 2.1, “Equipment Description” on page 4
- Section 2.2, “MFD Technical Specifications” on page 6
- Section 2.4, “Configuration Options” on page 12

This manual contains information about the physical, mechanical, electrical characteristics, and installation instructions for part numbers:

- 700-00030-() - Landscape MFD
- 700-00004-() - Landscape or Portrait MFD

This manual applies to EX5000-Series MFDs with software listed in Table 12, “MFD Parts, Components, and Software,” on page 17.

➥ To obtain maximum performance from the MFD, follow the installation instructions carefully.

MFD operating information is contained in the Entegra or Envision EX5000-Series MFD Pilot's Guide, which is supplied with the MFD. The specific *Pilot’s Guide* part number applicable to each software part number is shown in Table 12.

➥ Avidyne strongly recommends that avionics installers review the *Pilot’s Guide* before operating the MFD.

The current version is available on the web at www.avidyne.com.

Note: The conditions and tests required for TSO approval of this article are minimum performance standards. It is the responsibility of those installing this article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO standards. TSO articles must have separate approval for installation in aircraft. The article may be installed only if the installation is performed in accordance with Part 43 or the applicable airworthiness requirements.

Caution: AC 20-68B, Recommended Radiation Safety, sets forth recommended radiation safety precautions to be taken by personnel when operating airborne weather radar on the ground. Dangers from ground operation of airborne weather radar include the possibility of human body damage and ignition of combustible material by radiated energy. The full text of this FAA Advisory Circular may be found on the web at http://faa.gov/RegulatoryAdvisory/ac_index.htm.

2.1 Equipment Description

The EX5000 MFD is a panel-mounted, multi-function display, available as follows:

- The 700-00004-() MFD is available in two display orientations:
  - Landscape
  - Portrait

  In all configurations, part number 700-00004 has the following attributes:
  - Two control knobs.
  - Four ARINC 429 ports. Each port can be individually set to transmit (TX) or receive (RX).
  - Two ARINC 453 ports, both set to receive (RX)
- The 700-00030-() MFD with dual-concentric knobs is available only in landscape format.

  In all configurations, part number 700-00030 has the following attributes:
  - Two dual-concentric knobs (that is, four knobs). Dual-concentric knobs are required for Radar installations.
  - Eight ARINC 429 ports. Four ports are set to transmit (TX) and four ports to receive (RX).
  - Two ARINC 453 ports, both set to receive (RX)

Note: For clarity, most unit and display illustrations in this guide are shown in landscape orientation. Unless otherwise specified, all information is applicable to both viewing orientations.

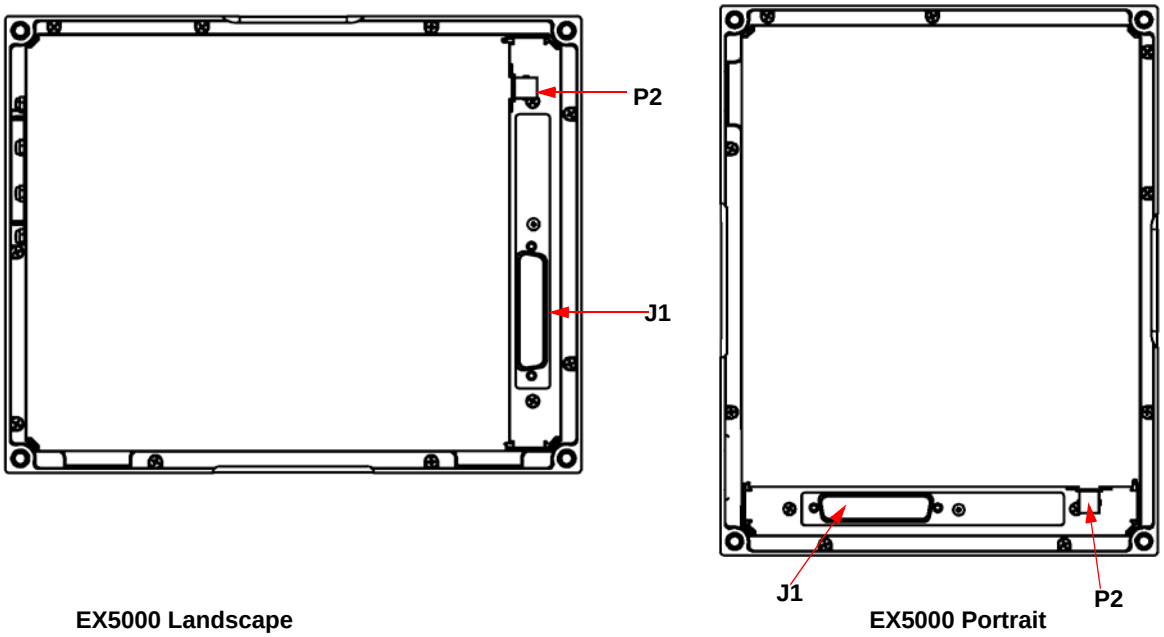


Figure 1: Multi-Function Display Landscape and Portrait Rear Views

The MFD system consists of the following components:

- EX5000 Multi-Function Display (MFD), (see Table 12, “MFD Parts, Components, and Software,” on page 17 for part numbers) with standard and optional interfaces
- Zip Drive dataloader and Zip Disk, or for Release 6 and later, USB Flash Memory Drive. For more information about loading data, see the Avidyne *Data Update Guide* (Document number 600-00148-000).
- User documentation including the appropriate *MFD Pilot's Guide* and *Installation Manual* (optional).

2.2 MFD Technical Specifications

Table 1: MFD Technical Specifications

Standard Features	
Display	High Brightness Color Active Matrix LCD, sunlight readable
Diagonal size	10.4 inches
Resolution	SVGA 800 X 600
Interfaces	RS-232, USB
Viewing angle (Landscape)	± 60 degrees horizontal, +45/-15 degrees vertical
Viewing angle (Portrait)	± 60 degrees vertical, +45/-15 degrees horizontal
Optional Interfaces	
EX5000-Series only	ARINC 429, ARINC 453, and TTL
Physical Characteristics	
Weight	
700-00004-001/002/007/008/009/010 700-00030-805	6.4 lbs
700-00004-004/005/006 700-00030-005	7.6 lbs (with Narrowcast)
700-00004-104	7.6 lbs (with Narrowcast)
CG from Instrument Panel (Landscape) 700-00004-001/002/007/008/009/010 700-00004-004/005/006 700-00030-005	1.60 inches
CG from Instrument Panel (Portrait) 700-00004-104	1.60 inches
CG from Instrument Panel (Landscape)	1.60 inches
Height (Landscape)	8.50 inches
Height (Portrait)	11.0 inches
Width (Landscape)	10.7 inches
Width (Portrait)	7.8 inches
Depth	
700-00004-001/002	4.3 inches (3.7 inches behind the panel)
700-00004-004/005/006/007/008/009/010/104 700-00030-005/805	5.2 inches (4.6 inches behind the panel)
Electrical Requirements	
Voltage	18-35 VDC, negative ground
Current	
700-00004-001/002/007/008/009/010 700-00030-805	Maximum 3.5 A at 28V
700-00004-004/005/006/104 700-00030-005	Maximum 4.0 A at 28V
Cooling Requirement	Unrestricted airflow to the top and bottom of the landscape chassis or both sides of portrait chassis.
Operating Limits	See *Appendix A: Environmental Qualification Data*
TSOs	See Table 2: *TSOs by Software Part Number*.
ETSOs	See Table 3: *ETSOs by Part Number*.

2.3 TSO and ETSO Information

This section covers information regarding TSOs and ETSOs applicable to the MFD. (Except as noted, all information in this section pertaining to a given TSO applies to the corresponding ETSO as well.) The conditions and tests required for TSO approval of this article are minimum performance standards. It is the responsibility of those installing this article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO standards. TSO articles must have separate approval for installation in aircraft. The article may be installed only if performed under 14 CFR part 43 or the applicable airworthiness requirements.

The following note from TSO-C157 applies to MFD installations using Broadcast or Two-Way (Narrowcast) datalink.

Note: "The FIS-B equipment installer needs to assess FIS-B equipment integration with other avionics and airborne applications, such as integration of FIS-B display products with display of terrain, proximate aircraft traffic information, flight plan overlays, moving map displays, and so forth. Manufacturers, installers, and applicants must assess identification of display integration issues, and their potential impact upon FIS-B equipment design and developmental assurance, during equipment installation. For example, FIS-B equipment may share common avionics display resources hosting multiple applications. Evaluate tHere, the installation for hazards contributed by FIS-B equipment malfunction that may cause loss or malfunction of other aircraft applications. Limited display resource computing capability will require the installer to review display resource priority schemes to ensure FIS-B equipment does not preclude, corrupt, or delay display of applications necessary for the continued safe flight of the aircraft. Installers must assess the incompatible use of common color coding philosophies and symbology."

Table 2: TSOs by Software Part Number

Part #	TSO#
530-00117-000	TSO-C43c, TSO-C44b, TSO-C45a, TSO-C47, TSO-C49b, TSO-C110a, TSO-C113, TSO-C147
530-00126-000	TSO-C43c, TSO-C44b, TSO-C45a, TSO-C47, TSO-C49b, TSO-C55, TSO-C110a, TSO-C113, TSO-C147
530-00130-000	TSO-C43c, TSO-C44b, TSO-C45a, TSO-C47, TSO-C49b, TSO-C110a, TSO-C113, TSO-C147
530-00132-000	TSO-C43c, TSO-C44b, TSO-C45, TSO-C47, TSO-C49b, TSO-C55, TSO-C110a, TSO-C113, TSO-C147
530-00137-000	TSO-C43c, TSO-C44b, TSO-C45a, TSO-C47, TSO-C49b, TSO-C55, TSO-C110a, TSO-C113, TSO-C147
530-00137-001	TSO-C43c, TSO-C44b, TSO-C45a, TSO-C47, TSO-C49b, TSO-C110a, TSO-C113, TSO-C147
530-00148-000	TSO-C43c, TSO-C44b, TSO-C45a, TSO-C47, TSO-C49b, TSO-C110a, TSO-C113, TSO-C147
530-00162-000	TSO-C43c, TSO-C44b, TSO-C45a, TSO-C47, TSO-C49b, TSO-C110a, TSO-C113, TSO-C147
530-00162-001	TSO-C43c, TSO-C44b, TSO-C45a, TSO-C47, TSO-C49b, TSO-C110a, TSO-C113, TSO-C147
530-00162-002	TSO-C110a, TSO-C113, TSO-C147
530-00170-000	TSO-C43c, TSO-C44b, TSO-C45a, TSO-C47, TSO-C49b, TSO-C55, TSO-C63c, TSO-C110a, TSO-C113, TSO-C147

Part #	TSO#
530-00170-002	TSO-C43c, TSO-C44b, TSO-C45a, TSO-C47, TSO-C49b, TSO-C55, TSO-C110a, TSO-C113, TSO-C147
530-00180-000	TSO-C43c, TSO-C44b, TSO-C45a, TSO-C47, TSO-C49b, TSO-C55, TSO-C63c, TSO-C110a, TSO-C113, TSO-C147
530-00180-002 530-00180-300	TSO-C43c, TSO-C44b, TSO-C45a, TSO-C47, TSO-C49b, TSO-C55, TSO-C110a, TSO-C113, TSO-C147
530-00180-100	TSO-C43c, TSO-C44b, TSO-C45a, TSO-C47, TSO-C49b, TSO-C110a, TSO-C113, TSO-C147
530-00180-200	TSO-C43c, TSO-C44b, TSO-C45a, TSO-C47, TSO-C49b, TSO-C110a, TSO-C113, TSO-C147
530-00195 -000	TSO-C43c, TSO-C44c, TSO-C45b, TSO-C47a, TSO-C49b, TSO-C55a, TSO-C63c, TSO-C110a, TSO-C113, TSO-C147, TSO-C157, TSO-C165
530-00195 -002	TSO-C43c, TSO-C44c, TSO-C45b, TSO-C47a, TSO-C49b, TSO-C55a, TSO-C110a, TSO-C113, TSO-C147, TSO-C157, TSO-C165
530-00195-010	TSO-C43c, TSO-C44c, TSO-C45b, TSO-C47a, TSO-C49b, TSO-C55a, TSO-C63c, TSO-C110a, TSO-C113, TSO-C147, TSO-C157, TSO-C165
530-00195-012	TSO-C43c, TSO-C44c, TSO-C45b, TSO-C47a, TSO-C49b, TSO-C55a, TSO-C110a, TSO-C113, TSO-C147, TSO-C157, TSO-C165
530-00195 -100	TSO-C43c, TSO-C44c, TSO-C45b, TSO-C47, TSO-C49b, TSO-C110a, TSO-C113, TSO-C147, TSO-C157, TSO-C165
530-00195-110	TSO-C43c, TSO-C44c, TSO-C45b, TSO-C47a, TSO-C49b, TSO-C110a, TSO-C113, TSO-C147, TSO-C157, TSO-C165
530-00195 -200	TSO-C43c, TSO-C44b, TSO-C45a, TSO-C47a, TSO-C49b, TSO-C110a, TSO-C113, TSO-C147, TSO-C157, TSO-C165
530-00195 -210	TSO-C43c, TSO-C44c, TSO-C45b, TSO-C47a, TSO-C49b, TSO-C110a, TSO-C113, TSO-C147, TSO-C157, TSO-C165
530-00195 -400	TSO-C43c, TSO-C44c, TSO-C45b, TSO-C47a, TSO-C49b, TSO-C55a, TSO-C63c, TSO-C110a, TSO-C113, TSO-C147, TSO-C157, TSO-C165
530-00195 -402	TSO-C43c, TSO-C63c, TSO-C110a, TSO-C113, TSO-C147, TSO-C157, TSO-C165
530-00195 -500	TSO-C43c, TSO-C63c, TSO-C110a, TSO-C113, TSO-C147, TSO-C157, TSO-C165
530-00195 -502	TSO-C43c, TSO-C110a, TSO-C113, TSO-C147, TSO-C157, TSO-C165
530-00195 -504	TSO-C43c, TSO-C110a, TSO-C113, TSO-C147, TSO-C157, TSO-C165
530-00195 -510	TSO-C43c, TSO-C63c, TSO-C110a, TSO-C113, TSO-C147, TSO-C157, TSO-C165
530-00195 -512	TSO-C43c, TSO-C110a, TSO-C113, TSO-C147, TSO-C157, TSO-C165
530-00201-000	TSO-C43c, TSO-C44c, TSO-C45b, TSO-C47a, TSO-C49b, TSO-C55a, TSO-C63c, TSO-C110a, TSO-C113, TSO-C147, TSO-C157, TSO-C165
530-00201-002	TSO-C43c, TSO-C44c, TSO-C45b, TSO-C47a, TSO-C49b, TSO-C55a, TSO-C110a, TSO-C113, TSO-C147, TSO-C157, TSO-C165
530-00201-100	TSO-C43c, TSO-C44c, TSO-C45b, TSO-C47a, TSO-C49b, TSO-C110a, TSO-C113, TSO-C147, TSO-C157, TSO-C165
530-00201-200	TSO-C43c, TSO-C44c, TSO-C45b, TSO-C47a, TSO-C49b, TSO-C110a, TSO-C113, TSO-C147, TSO-C157, TSO-C165
530-00201-500	TSO-C43c, TSO-C63c, TSO-C110a, TSO-C113, TSO-C147, TSO-C157, TSO-C165
530-00201-502	TSO-C43c, TSO-C110a, TSO-C113, TSO-C147, TSO-C157, TSO-C165

Table 3: ETSOs by Part Number

Part #	ETSO#
530-00137-000	ETSO-C43c, ETSO-C44b, ETSO-C45a, ETSO-C47, ETSO-C49b, ETSO-C55, ETSO-C110a, ETSO-C113, ETSO-C147
530-00137-001	ETSO-C43c, ETSO-C44b, ETSO-C45a, ETSO-C47, ETSO-C49b, ETSO-C55, ETSO-C110a, ETSO-C113, ETSO-C147
530-00195-()	ETSO-C43c, ETSO-C44b, ETSO-C45a, ETSO-C47, ETSO-C49b, ETSO-C55, ETSO-C110a, ETSO-C113, ETSO-C147

Table 4: TSO and ETSO Descriptions

TSO#	ETSO#	Meaning
TSO-C43c	ETSO-C43c	Temperature Instruments
TSO-C44c	ETSO-C44b	Fuel Flowmeters
TSO-C45b	ETSO-C45a	Manifold Pressure Instruments
TSO-C47a	ETSO-C47	Pressure Instruments—Fuel, Oil, and Hydraulic (Reciprocating Engine Powered Aircraft)
TSO-C49b	ETSO-C49b	Electric Tachometer: Magnetic Drag (RPM)
TSO-C55a	ETSO-C55	Fuel and Oil Quantity Instruments (Reciprocating Engine Aircraft)
TSO-C63c	ETSO-2C63c	Airborne Weather and Ground Mapping Pulsed Radars
TSO-C110a	ETSO-C110a	Airborne Passive Thunderstorm Detection Equipment
TSO-C113	ETSO-C113	Airborne Multipurpose Electronic Displays
TSO-C147	ETSO-C147	Traffic Advisory System (TAS) Airborne Equipment
TSO-C151b		Terrain Awareness and Warning System.
TSO-C157		Aircraft FIS-B Datalink Systems and Equipment
TSO-C165		Electronic Map Display Equipment for Graphical Depiction of Aircraft Position

For some of the functions for which TSO approval has been granted, the MFD only provides part of the functionality covered by the TSO. Table 9 below lists those partial function TSOs along with the portion of the TSO functionality provided by the MFD.

Table 5: Partial Function TSO

TSO	Function Performed by MFD
C43c	Display function only
C44c	Display function only
C45b	Display function only
C47a	Display function only
C49b	Display function only
C55a	Display function only
C63c	Display function only
C110a	Display functions only

Table 5: Partial Function TSO

C147	Display functions only
C157	Airborne display functions only

There are some functions performed by the MFD that are not covered by TSOs. It is the installer's responsibility to ensure that when the MFD is installed it will meet the required minimum performance standards for those functions. Those functions performed by the MFD but not covered by TSO are listed in Table 10.

Table 6: Functions Not Covered by TSO

Non-TSO Functions
Display of charts
Display of checklists
Lean assist function
Display of percent power

Table 11 below lists the TSO deviations that have been granted for the applicable TSOs.

Table 7: TSO Deviations

TSO	Deviation
TSO-C43c -- Temperature Instruments	The MFD is environmentally qualified using the conditions and procedures of DO-160E instead of those prescribed in the TSO.
TSO-C44c – Fuel Flow meters	A digital readout is used instead of a dial.
	Digits change from white to yellow or red when the parameter is in the caution or warning range.
	The MFD is environmentally qualified using the conditions and procedures of DO-160E instead of those prescribed in AS407c.
TSO-C45b – Manifold Pressure	Digits change from white to yellow or red when the parameter is in the caution or warning range.
	The MFD is environmentally qualified using the conditions and procedures of DO-160E instead of those prescribed in the TSO.
TSO-C47a – Fuel, Oil and Hydraulic Pressure Instruments	Digits change from white to yellow or red when the parameter is in the caution or warning range.
	The MFD is environmentally qualified using the conditions and procedures of DO-160E instead of those prescribed in AS408c.
TSO-C49b – Tachometer	Digits change from white to yellow or red when the parameter is in the caution or warning range.
	Graduations are every 100 RPM instead of every 50 RPM as would be required by AS404b.
	The MFD is environmentally qualified using the conditions and procedures of DO-160E instead of those prescribed in AS404b.
TSO-C55a - Fuel and Oil Quantity	The MFD is environmentally qualified using the conditions and procedures of DO-160E instead of those prescribed in the TSO.
TSO-C63c -- Airborne Weather and Ground Mapping Pulsed Radars	The MFD is environmentally qualified using the conditions and procedures of DO-160E instead of those prescribed in the TSO.

Table 7: TSO Deviations

TSO-C110a -- Airborne Passive Thunderstorm Equipment	The MFD is environmentally qualified using the conditions and procedures of DO-160E instead of those prescribed in the TSO.
TSO-C113 - Airborne Multipurpose Electronic Displays	The MFD is environmentally qualified using the conditions and procedures of DO-160E instead of those prescribed in the TSO.
TSO-C147 - Traffic Advisory System (TAS) Airborne Equipment	The MFD is environmentally qualified using the conditions and procedures of DO-160E instead of those prescribed in the TSO.
TSO-C157 – Aircraft Flight Information Services – Broadcast (FIS-B) Data Link Systems and Equipment	The EX5000 MFD provides a simple scaling and smoothing mechanism to overlay NEXRAD on a variable range moving map in a distinctive, easy to interpret format. At large map ranges, small areas of high-intensity NEXRAD may not be displayed.
	On the map page, the MFD is capable of displaying a number of weather data products, including NEXRAD, graphical METARs, SIGMET and AIRMET areas, and various forecast products. Of these, only NEXRAD displays product age.
	The MFD is environmentally qualified using the conditions and procedures of DO-160E instead of those prescribed in the TSO.
TSO-C165 - Electronic Map Display Equipment for Graphical Depiction of Aircraft Position	The MFD is environmentally qualified using the conditions and procedures of DO-160E instead of those prescribed in the TSO.

2.4 Configuration Options

To support the many sensor types encountered in the typical aircraft installation, the installer must configure the EX5000 for the sensor type and select the correct port configuration. Table 8 lists sensor options and their associated port configurations. This data may be used when executing Maintenance Mode sensor setup utilities. Port selection must match the aircraft wiring. Default port assignments must match the wiring diagrams shown from Appendix I: *Wiring Diagram – Power, Dimming Bus, and Exceedance Horn* through Appendix P: *Wiring Diagram – Primary Flight Display (PFD)*. For configurations with dual GPS/FMS inputs, see Appendix J: *Wiring Diagram – GPS/FMS* on page 105.

When the MFD is used in conjunction with a digital radar system, ARINC 429 TX port 3 and ARINC 453 RX port 1 are default settings, which are not selectable via the procedures contained in this document. Table 9, “Main Connector (P1) Pin Assignments,” on page 14 provides a cross reference between port assignments and functional use.

Table 8: Sensor Port Configuration Options

Sensor Type	Sensor Option	Port Type	Default Port	System Type	Port Configuration
Engines	DAU	ARINC 429		Meggitt DAU	Speed: High
	SIU	RS-232		Avidyne SIU	Baud: 9600
		RS-232		Avidyne DAU	Baud: 19200
GPS/FMS	GAMA 429 Format	ARINC 429	1	Garmin GPS 155XL, GNC 300XL	Speed: Low
			1	Garmin GPS 400/500	Speed: Low
			1	Garmin GNC 420	Speed: Low
			1	Garmin GNS 430/530 (GAMA 429 Graphics w/INT)	Speed: Low
			1	Bendix/King KLN-90B	Speed: High
			1	Universal UNS-1B	Speed: High
	King/Aviation Format	RS-232	1	Bendix/King GNS-XLS	Baud: 9600
			1	Bendix/King KLN-90B	Baud: 9600
			1	Trimble 2000, 2101	Baud: 9600
			1	UPSAT – all GPS units	Baud: 9600
	Northstar Format	RS-232	1	Northstar M3	Baud: 9600
	NMEA 0183 Format	RS-232	1	Garmin 150/250	Baud: 4800
Traffic	*Not Installed*	—		—	—
	TCAD	RS-232	2	Avidyne TAS600 Series (except 9900BX)	—
	TAS	RS232/ ARINC429	2	Avidyne TAS600 Series 9900BX, TAS600 Series	—
		ARINC 429	2	L3 Skywatch, Skywatch HP	—
		ARINC 429	2	Bendix/King KTA-870, KMH-880	—
	TIS-G	ARINC 429	2	Garmin GTX330	—
	TCAS	ARINC 429	2	Goodrich TCAS 791	—
		ARINC 429	2	Bendix/King CAS-66A, KTA-970	—
Broadcast Datalink	*Not Installed*				—
	MLB700	RS-232	4	Avidyne MLB700	—
	XM WX Datalink Receiver	RS-232	4	Heads Up Technologies XMD076	—

Table 8: Sensor Port Configuration Options (Continued)

Sensor Type	Sensor Option	Port Type	Default Port	System Type	Port Configuration
Two-Way (Narrowcast) Datalink	*Not Installed*				—
	MLX770	RS-232	4	Avidyne MLX770	—
	ORBCOMM	RS-232		Internal	—
Lightning	*Not Installed*	—		—	—
	WX-500	RS-232	3	L3 WX500	—
	TWX-670	RS-232	3	Avidyne TWX670	—
Radar	Allied Signal ART-2000	ARINC 429/ ARINC 453	3/1	N/A	—
TAWS	*Not Installed*	—		—	—
	Honeywell EGPWS	ARINC 429/ ARINC 453	4/2	Honeywell EGPWS	—
Map Heading {Source}	GPS/FMS	ARINC 429		Multiple manufacturers	—
	Traffic	ARINC 429		Multiple manufacturers	
	Stormscope	ARINC 429		L3 Stormscope	
	Entegra EXP5000 PFD	RS 232/ ARINC 429		Avidyne	
	None (use GPS Track)	RS 232/ ARINC 429		Multiple manufacturers	

Some installations of EX3000 and EX5000 MFDs have been made with Garmin 400 and 500 series GPS units connected via RS-232 under previous revisions of this installation manual. Those installations are known, non-compliant installations with respect to TSO-C165 as curved paths from the GPS are depicted as straight lines on the MFD.

Avidyne recommends customers with Garmin 400 and 500 series GPS units connected via RS-232 switch to an ARINC 429 connection, otherwise the following warning must be added to the pilot's guide: "Warning: The EX5000 MFD will display straight lines instead of curved lines when curved paths are in the flight plan of a Garmin 400 or 500 series GPS unit."

Installations of EX5000 MFDs with Garmin 400 and 500 series GPS units under this installation manual must be done using ARINC 429.

Table 9: Main Connector (P1) Pin Assignments

Pin	Function	Suggested	Your Setup		Pin	Function	Suggested	Your Setup
1	RT ON/OFF	RADAR			40	28 VDC		
2	RESERVED				41	28 VDC		
3	RESERVED				42	28 VDC		
4	GND				43	ARINC 429 TX1 A		
5	ARINC 429 RX1 A	GPS1			44	TESTn	RADAR	
6	ARINC 429 TX2 A				45	ARINC 429 RX2 A	TRAFFIC	
7	DISCRETE OUT 2				46	ARINC 429 TX3 A	RADAR	
8	ARINC 429 RX3 A				47	DISCRETE OUT 3		
9	ARINC 429 TX4 A	TAWS			48	ARINC 429 RX4 A		
10	RS232 TX1				49	RS232 TX3	Lightning	
11	RS232 RX1	GPS1			50	RS232 RX3	Lightning	
12	RS232 RTN1	GPS1			51	RS232 RTN3	Lightning	
13	RESERVED				52	RESERVED		
14	DISCRETE OUT 4	Exceedance Horn			53	RESERVED		
15	GND				54	RESERVED		
16	RESERVED				55	ARINC 453 TX3 A	(UNUSED)	
17	RESERVED				56	ARINC 453 RX2 A	TAWS	
18	DIMMING				57	GND		
19	RESERVED				58	ARINC 453 TX3 B	(UNUSED)	
20	GND				59	ARINC 453 RX2 B	TAWS	
21	RESERVED				60	PWR GND		
22	RESERVED				61	PWR GND		
23	RESERVED				62	PWR GND		
24	RESERVED				63	ARINC 429 TX1 B		
25	ARINC 429 RX1 B	GPS1			64	RESERVED		
26	ARINC 429 TX2 B				65	ARINC 429 RX2 B	TRAFFIC	
27	RESERVED				66	ARINC 429 TX3 B	RADAR	
28	ARINC 429 RX3 B				67	RESERVED		
29	ARINC 429 TX4 B	TAWS			68	ARINC 429 RX4 B		
30	RS232 TX2	TCAD			69	RS232 TX4	DL, GPS2	
31	RS232 RX2	TCAD			70	RS232 RX4	DL, GPS2	
32	RS232 RTN2	TCAD			71	RS232 RTN4	DL, GPS2	
33	RESERVED				72	RESERVED		
34	RESERVED				73	RESERVED		
35	RESERVED				74	RESERVED		
36	GND				75	ARINC 453 RX1 A	RADAR	
37	GND				76	RESERVED		
38	RESERVED				77	RESERVED		
39	RESERVED				78	ARINC 453 RX1 B	RADAR	

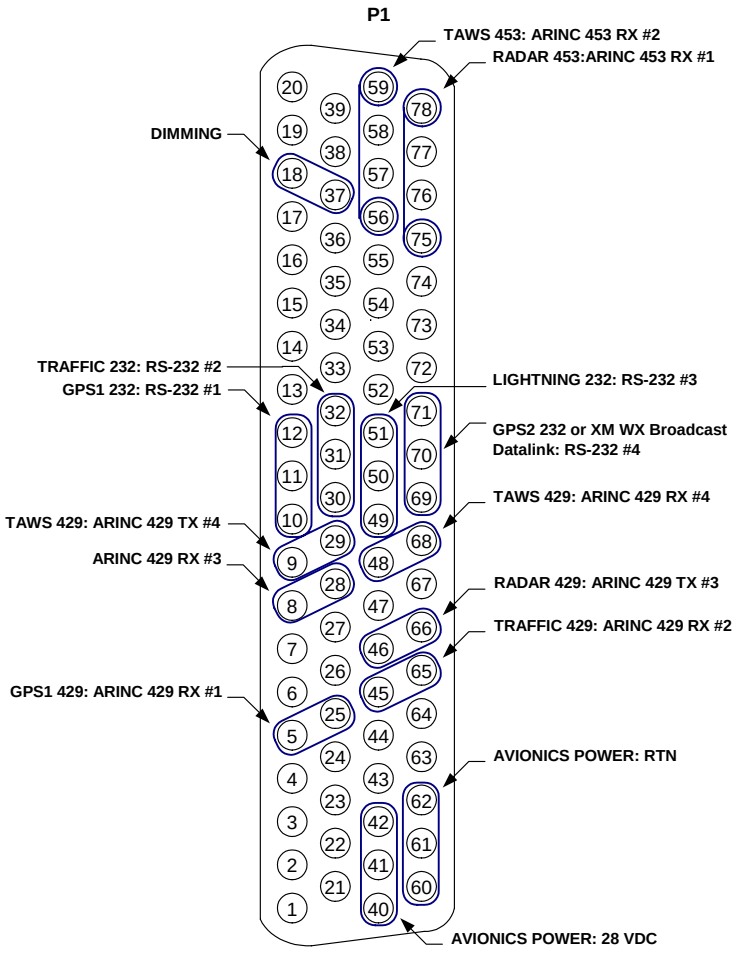
Table 10: Port Pinout Cross-Reference

ARINC 429					ARINC 453			
700-0004 Ports	**700-00030 Ports**	**Signal**	**Pin**	**Your Setup**	**Port**	**Signal**	**Pin**	**Your Setup**
1	1	TX A	43		1	RX A	75	
		TX B	63			RX B	78	
		RX A	5		2	RX A	56	
		RX B	25			RX B	59	
2	2	TX A	6					
		TX B	26					
		RX A	45					
		RX B	65					
3	3	TX A	46					
		TX B	66					
		RX A	8					
		RX B	28					
4	4	TX A	9					
		TX B	29					
		RX A	48					
		RX B	68					

Table 11: RS-232 Port Pinout Cross-Reference

RS-232 Ports			
Port	**Signal**	**Pin**	**Your Setup**
1	TX	10	
	RX	11	
	RTN	12	
2	TX	30	
	RX	31	
	RTN	32	
3	TX	49	
	RX	50	
	RTN	51	
4	TX	69	
	RX	70	
	RTN	71	

Note that the connector assignments are suggested, but not required. If you use different pin assignments, be sure to document the changes.



P1 - MAIN CONNECTOR
SERIAL DATA PORT
ASSIGNMENTS

NOTES:
1. AVAILABLE FOR GPS2 WHEN TRAFFIC 429: ARINC 429 RX #2 PORT IS NOT WIRED
2. AVAILABLE FOR GPS2 WHEN TAWS 429: ARINC 429 TX #4 PORT IS NOT WIRED

Figure 2: Main Connector Sample Port Assignments

3 Unpacking the MFD

Your shipping carton for the MFD contains one of following configurations:

Table 12: MFD Parts, Components, and Software

Part Number	Description	Aircraft	Pilot's Guide Part Number	Software Part Number
700-00004-005	EX3000 Landscape Multi-Function Display (MFD)	Cirrus SRV, SR20, SR22	600-00072	530-00117-000
				530-00130-000
			600-00108-000	530-00162-000
700-00004-006	EX5000 Landscape MFD ■ ARINC 429 Databus ■ Internal Datalink Transceiver (Two-Way (Narrowcast))	Cirrus SRV, SR20, SR22	600-00072	530-00117-000
				530-00130-000
			600-00108-000	530-00148-000
			600-00108-003	530-00195-110
		Lancair Super ES	600-00076	530-00132-000
		Diamond DA40	600-00101-000	530-00126-000
		Piper PA28, PA32, PA44	600-00105-000	530-00137-000
				530-00137-001
				530-00170-002
				530-00180-002
				530-00195-002
			600-00105-001	530-00195-012
		Envision	600-00151-000	530-00180-003 530-00180-006 530-00195-502
			600-00151-001	530-00195-512
		Symphony 160	600-00136-000	530-00180-300
		Adam A500	600-00132-000	530-00180-400 530-00195-402 530-00195-412
700-00004-007	EX3000 Landscape MFD	Cirrus SRV, SR20, SR22	600-00108-000	530-00162-000
			600-00108-003	530-00195-110
700-00004-010	EX5000 Landscape MFD ■ ARINC 429 Databus	Aftermarket installations	600-00108-001	530-00162-001
			600-00151-001	530-00195-512 530-00201-502
700-00004-104	EX5000 Portrait MFD ■ ARINC 429 Databus ■ Internal Datalink Transceiver (Two-Way (Narrowcast))	Columbia (Lancair) 350, 400	600-00102-000	530-00129-000 530-00162-002 530-00180-200
			600-00102-002	530-00195-210 530-00201-200
		Aftermarket installations	600-00102-001	530-00119-000 530-00195-504 530-00195-514

Table 12: MFD Parts, Components, and Software (Continued)

Part Number	Description	Aircraft	Pilot's Guide Part Number	Software Part Number
700-00030-005	EX5000 Landscape MFD ■ ARINC 429 Databus ■ Internal Datalink Transceiver (Two-Way (Narrowcast)) ■ Radar ■ Twin-engine support	Piper PA34, PA46	600-00121-000	530-00170-000 530-00180-000
			600-00121-001	530-00195-010
		Envision Radar-Capable	600-00152-000	530-00180-001
			600-00152-001	530-00195-510
		Adam A500	600-00132-001	530-00195-400 530-00195-410
700-00030-805	EX5000 Landscape MFD ■ ARINC 429 Databus ■ Radar ■ Twin-engine support	Piper PA34, PA46	600-00121-000	530-00170-000 530-00180-000 530-00195-000 530-00195-001
			600-00121-001	530-00195-010 530-00201-000
		Envision Radar-Capable	600-00152-000	530-00180-001
			600-00152-001	530-00195-510 530-00201-500
		Adam A500	600-00132-001	530-00195-400 530-00195-410
700-00004-008	EX5000 Landscape MFD ■ ARINC 429 Databus	Cirrus SRV, SR20, SR22	600-00108-000 600-00108-002	530-00162-000 530-00180-100 530-00195-100
			600-00108-003	530-00195-110 530-00201-100
		Piper PA28, PA32, PA44	600-00105-000	530-00195-002
			600-00105-001	530-00195-012 530-00201-002
600-00073	EX5000 MFD Installation Manual (Optional)	All		All
600-00248-000	EX5000 MFD Pilot's Guide Addendum	Columbia (Lancair) 350, 400	600-00102-002	530-00201-200
		Piper PA28, PA32, PA44	600-00105-001	530-00201-002
		Cirrus SRV, SR20, SR22	600-00108-003	530-00201-100
		Piper PA34, PA46	600-00121-001	530-00201-000
		Aftermarket installations	600-00151-000	530-00201-502
		Envision Radar-Capable	600-00152-001	530-00201-500

➥ Ensure that all the parts were received and sustained no shipping damage.

If damage occurs during shipping, the damaged shipping carton and packing material will help substantiate your claim to the shipping company. Retain the original shipping carton and packing material in case you need to ship the unit for service.

Do not open the MFD cover in any manner and do not remove the internal Compact Flash memory card, unless the operation is being conducted by authorized personnel using an approved Avidyne Service Bulletin. Otherwise, the Compact Flash memory or MFD may be damaged.

4 Installation Planning

This section contains the following information:

- Section 4.1, “Location and Viewing Angle” on page 19
- Section 4.2, “Cooling” on page 19
- Section 4.3, “Mounting the MFD” on page 19
- Section 4.4, “Electrical and Sensor Interfaces” on page 21
- Section 4.5, “Electrical Load Analysis” on page 23
- Section 4.6, “Datalink Antenna Installation Considerations” on page 23
- Section 4.7, “Wiring External Devices” on page 25

This section contains information for installing and wiring the MFD. All installation procedures should follow the acceptable practices, methods, and techniques of avionics installations as described in FAA Advisory Circulars. Use appropriate appendices for guidance with MFD dimensions and panel cutout requirements.

Installations not identified in applicable STCs may require additional substantiation. See Appendix C: *STC Permission* for information pertaining to STCs. Referring to an STC may assist in securing installation approval.

4.1 Location and Viewing Angle

The MFD is designed to be panel-mounted. Locate the MFD in a position on the panel where the pilot and co-pilot can both easily reach the knobs and controls to operate and view it from the proper viewing angle.

4.2 Cooling

The MFD uses two internal fans; an inlet and outlet fan, to provide adequate cooling.

➥ Be sure that there are at least 2 inches of clearance, top and bottom, to allow for proper air circulation.

4.3 Mounting the MFD

Before installing the MFD, carefully assess how you can most effectively position the MFD given space availability, viewing angle, and wiring considerations. Before starting the installation, develop an installation strategy by carefully reviewing all the installation instructions. The unique requirements of your aircraft will determine the specifics of the installation.

➤ To install the MFD, make a cutout hole in the cockpit panel:

- For a Landscape MFD, see Appendix G: *Landscape Cutout Dimensions*. The Landscape MFD is held in place by four Dzus ¼-turn fasteners.
- For a Portrait MFD, see Appendix H: *Portrait Cutout Dimensions*. The Portrait MFD is held in place by four captive 10-32 screws.

The fasteners require a panel thickness of 0.080” for proper engagement. Hole patterns and placements are illustrated in the corresponding appendices.

Do not exceed the recommended panel thickness, or the MFD may not fully seat. If communication between the MFD and any of the sensor interfaces is not established, ensure that the MFD is fully seated, and then check all sensor connections.

A low resistance (0.5 Ohm) ground path must be established between the MFD chassis and airframe ground.

4.4 Electrical and Sensor Interfaces

28-volt DC electrical power must be supplied to the MFD. In aircraft with a 28-volt system, the MFD is usually connected to a non-essential avionics bus. Non-28-volt systems can use a regulated +28 VDC converter. The MFD does not have an on/off switch and will start as soon as power is applied. The MFD may be wired to the aircraft dimming bus to control front panel LED brightness via the cockpit panel brightness control. The MFD uses a single 78 pin High Density, D-sub connector for all power and electrical interfaces (See Figure 1, “Multi-Function Display Landscape and Portrait Rear Views,” on page 4).

4.4.1 Wiring Notes

Table 13: Electrical and Sensor Interface Wiring

Designation	Vendor	Part #	Description
P1	Positronic	DD78F10G00	78-Pin High Density Female D-Sub Connector
J2	Delta Electronics	4205-018-N995	50 Ohm Right Angle Plug BNC Connector

- **Power**—P1- input: 5 A @ 28 vdc.
  - Use 20 AWG for lengths greater than 3ft.
  - Use 22 AWG for P2 high-density sockets. Circuit breaker: 7.5 amp recommended.
  - For 14 vdc A/C, use 14 to 28 vdc converter (KGS Electronics RB-125, Ameri-King AK550-6 or similar with TSO-C71, output 5 A min. @ 28 vdc.)
- **Dimming**—P1-input—Use 22 AWG, connect to a/c instrument dimming bus. Supports any range 0-28 vdc. Connection to dimming-bus ground reference required.
- **ARINC 429**—P1-wire—Use 22 AWG twisted shielded pair, MS22759/18-22-2 or equivalent. Connect shield to P1 connector metallic backshell grounding screw with solder or crimp ring terminal.
- **ARINC 453**—P1-wire—Use 22 AWG twisted double shielded pair (Quadrax), (Bendix/King p/n 024-00064-0000) or equivalent.
  - Connect outer shield to P1 connector metallic backshell grounding screw with solder or crimp terminal ring.
  - Connect inner and outer shield to sensor connector metallic backshell grounding screw with solder or crimp terminal ring.
- **RS-232**—P1-wire—Use 22 AWG shielded triple, MS22759/18-22-3 or equivalent.
  - Connect a dedicated RS-232 signal ground from the sensor to the MFD.
  - Connect shield to P1 connector metallic backshell grounding screw with solder or crimp ring terminal.
- **ORBCOMM Two-Way (Narrowcast) Datalink Antenna**—J2-coax cable—Use M17/128-RG400, (Thermax/CDT p/n RGS-400) high temperature, 50 ohm, stranded core with 0.038 o.d., or equivalent
  - Terminate antenna end with BNC series plug connector.
  - See mechanical installation notes.
- **Shield Terminations**—Make shield termination as close as feasible to the protected signal wire terminations.

For more information, see Appendix I: *Wiring Diagram – Power, Dimming Bus, and Exceedance Horn* and Appendix K: *Wiring Diagram – Lightning, Datalink Sensors, and ORBCOMM Antenna*.

4.4.2 Weight and Balance

An aircraft Weight and Balance calculation is required as part of installation approval process.

For information about weight and balance, see Table 1, “MFD Technical Specifications,” on page 6.

For technical drawings, including center of gravity, see the appropriate appendix:

- Appendix D: *Landscape EX5000 Dimensions*
- Appendix E: *Landscape EX5000 with Integrated Datalink Dimensions*
- Appendix F: *Portrait EX5000 Dimensions*

➥ Follow the guidelines as established in AC 43.13-1B, Chapter 10, Section 2.

4.5 Electrical Load Analysis

Before installing the MFD, perform an electrical load analysis that is specific to the aircraft. This analysis should be in accordance with AC 43.13-1B, Chapter 11.

Use the following values to support the analysis:

- **28 VDC Nominal Load**—2 A
- **28 VDC Maximum Load**—5 A

Ensure that the power input to the MFD is circuit-protected in accordance with the guidelines of AC 43.13-1B, Chapter 11, Section 2.

➥ A 7.5 amp circuit breaker is recommend for use with the MFD.

4.6 Datalink Antenna Installation Considerations

The EX5000 supports the following 2-Way Datalink installations:

- MLX770 Iridium Datalink transceiver
- Built-in ORBCOMM Datalink transceiver

For information on MLX770 installation, refer to the *MLX770 Datalink Transceiver Installation Manual* (600-00204-000).

Note: ORBCOMM is not supported with hardware part numbers 700-0004-007/008/009/010, 700-00030-805 and software part numbers 530-00162-000, 530-00180-100, or 530-00201-().

The ORBCOMM datalink system is designed to work with a VHF antenna covering the band from 137 MHz to 151Mhz. If an existing comm antenna is in the preferred location for a datalink antenna, consider using the Avidyne DC50 Datalink Coupler and replacing the existing comm antenna with a combined VHF/datalink antenna. Please contact Avidyne for details.

The EX5000 also supports Broadcast Weather data, which provides more weather data in a more timely fashion. Avidyne supports two Broadcast Weather suppliers:

- XM WX Satellite Weather, using the XMD076 XM WX Receiver from Heads Up Technologies.
- WSI Weather, using the Avidyne MLB700.

The Broadcast datalink system operates in the S-band at 2.3 GHz. Several types of combination antennas are available in addition to the standalone broadcast antenna. Contact Heads Up Technologies or Comant, Inc. for details on available XM antennas. Contact Avidyne for information on available Sirius antennas.

The EX5000 can operate with two different Datalink systems simultaneously. With both 2-Way and Broadcast Datalink systems installed, the EX5000 can provide Avidyne's unique Multilink features, which include text messaging, flight tracking, and enhanced weather coverage.

4.6.1 ORBCOMM Antenna Details

To improve ORBCOMM reception performance and minimize potential damage to the ORBCOMM datalink transceiver, an antenna design with a DC-short between the antenna center conductor and shield termination is required. The following commercially available antennas satisfy this requirement:

Table 14: Suggested ORBCOMM Antennas

Manufacturer	P/N	Application
Comant	CI 177-4	Max 210 kts indicated at 10,000 ft.
	CI 248-30	Max 210 kts indicated at 10,000 ft.
	CI 108-1	Max 600 kts TAS at 35,000 ft.
	CI 211-1	Max 600 kts TAS at 35,000 ft.
Sensor Systems	S65-8280-10	Max 600 kts TAS

➥ Refer to manufacturers for detailed performance specifications and aircraft applicability

Due to the low signal levels inherent with satellite communications, adhere to the following guidelines and recommended practices:

- Mount the ORBCOMM antenna on the aircraft top-side, as high on the fuselage as practical. Mount the antenna no closer than 36 inches to other transmitters. Relocation of other less location-sensitive transmitters may be necessary to achieve optimal datalink performance.
- On radar-equipped aircraft mount the antenna as far aft as possible, but no closer than 36 inches from vertical obstructions (ex. vertical stabilizer). Reflected radar energy may cause damage to the datalink transceiver.
- Install in accordance with the applicable portions of AC43.13 and antenna manufacturer instructions.

For more information, see Appendix R: *ORBCOMM Datalink Antenna Mounting*.

This Installation Manual does not contain approved data for type-specific aircraft antenna installations.

4.6.2 Broadcast Antenna Details

- Mount the antenna no closer than 36 inches to VHF-Comm transmitters of 15 Watts or less. For more powerful transmitting antennas, separation should be a minimum of 48 inches.
- If an XM/VHF-Comm combo antenna is being installed and is replacing the operation of an existing approved antenna installation, the existing separations are acceptable. SATCOM antennas transmit at 40 Watts and should be separated by the largest distance possible. This distance must be a minimum of 36 inches.
- When routing the broadcast antenna cable, the maximum possible separation from transmitter antenna feed cables must be considered, especially with SATCOM and other high power transmitters. Antenna feed cables of VHF transmitters of 15 Watts or less should require only a minimal separation.
- Receive-only antennas such as GPS and ADF do not produce interference and require little separation. The broadcast antenna should be placed as close as possible to these types of antennas to gain separation from transmitters.

➥ For further details, including installation pre-testing, please refer to the Heads Up Technologies *XMD076 XM WX Receiver Installation Manual*, document number XMD076-3 or Avidyne MLB700 Multilink Broadcast Receiver Installation Manual, document number 600-00174-000.

4.7 Wiring External Devices

4.7.1 GPS and FMS Wiring

GPS data may be received via a GAMA 429 Graphics interface or a RS-232 interface. See the appropriate wiring diagram and the specific installation instructions for your particular GPS. For more information, see Section 5.5, “GPS/FMS Navigators Setup” on page 35.

Note: For the EX5000, Avidyne recommends using an GAMA 429 Graphics connection for FMS/GPS. The GAMA 429 Graphics input can contain heading data, necessary for overlay capabilities as well as approach procedures and the display of curved segments. For more information, see Section 5.5.1, “GAMA 429 Graphics Setup” on page 35.

4.7.2 Dual GPS Setup with GAMA 429

The EX5000 can receive information from two GAMA 429 Graphics capable GPS units. Connect the GPS according to the wiring diagram in Appendix J: *Wiring Diagram – GPS/FMS*.

Select a different ARINC port for GPS 2.

4.7.3 Broadcast Datalink Receiver Wiring

See the wiring diagram in Appendix K: *Wiring Diagram – Lightning, Datalink Sensors, and ORBCOMM Antenna* and the *HeadsUp XMD076 Installation Manual*. Connect the RS-232 port of the Datalink receiver to any of the available RS-232 ports of the MFD as shown. (RS232 #4 is the default assignment, but not mandatory.) Use shielded wiring, terminated at each end to chassis ground. Contact Heads Up Technologies at www.heads-up.com for information on the *HeadsUp XMD076 Broadcast Datalink Receiver,* contact Avidyne for information on the MLB700 Multilink Broadcast Receiver.

4.7.4 ORBCOMM Datalink Antenna

For MFDs with internal ORBCOMM Datalink transceivers, see the wiring diagram in Appendix K: *Wiring Diagram – Lightning, Datalink Sensors, and ORBCOMM Antenna*. Connect MFD J2 with an approved ORBCOMM Datalink antenna using RG-400U double-shielded coax cable MFD as shown. Contact www.Comant.com for a broad selection of ORBCOMM antennas and multi-system antennas.

4.7.5 Iridium Datalink Antenna

For information on MLX770 installation, refer to the *MLX770 Datalink Transceiver Installation Manual* (600-00204-000).

4.7.6 Lightning Sensor Wiring

See the wiring diagram in Appendix K: *Wiring Diagram – Lightning, Datalink Sensors, and ORBCOMM Antenna* and the *WX-500 Installation Manual* or *TWX-670 Installation Manual*. Connect the RS-232 port of the lightning sensor to any of the available RS-232 ports of the MFD as shown. Use shielded wiring, terminated at each end to chassis ground. Connect the lightning sensor jumpers for correct stabilization source and antenna position. These settings will be also be set in the MFD and must agree.

Caution: It is extremely important that you perform noise mapping and ensure that the proper grounds have been installed and checked after the Lightning interface is installed. Ensure that the lightning sensor is installed and set up according to its installation instructions. Excessive noise can produce erroneous lightning strike indications.

4.7.7 Traffic Sensor Wiring

The MFD supports a number of different traffic sensors. Be sure to follow the instructions for the specific traffic sensor installed on the aircraft.

- **TAS** (L-3 SkyWatch: SKY497, TRC497 and TRC899)—Connect data and TTL control lines and configure as shown in Appendix L: *Wiring Diagram – Traffic Sensors*. Use shielded wiring and terminate as shown.

Note: If using a TRC 497, ensure the software revision is 1.6 or later.

- **TAS/IHAS** (Avidyne TAS600 Series, Bendix/King Honeywell: KTA 870)—Connect data lines and configure as shown in Appendix L: *Wiring Diagram – Traffic Sensors*. Use shielded wiring and terminate as shown.
- **TCAD** (Avidyne 9900BX)—Connect aircraft power to the Avidyne TCAD sensor as described in the Avidyne TAS600 Installation manual. Connect and configure as shown in Appendix L: *Wiring Diagram – Traffic Sensors*. Use shielded wiring and terminate as shown.

Note: The TCAD 9900BX is a TAS-type active device. Under Sensor, you can select either TCAD or TAS. However, the EX5000 stores this configuration as a TAS sensor. This does not affect the way the EX5000 receives or displays the traffic information.

Note: Ensure the 9900BX software revision is 1.07 or later.

- **TIS** (Garmin: GTX-330, GTX-330D)—Ensure the Garmin software revision is 3.03 or higher. Connect data lines and configure as shown in Appendix L: *Wiring Diagram – Traffic Sensors*. Use shielded wiring and terminate as shown.

  Wire power to the Garmin GTX -330 transponder as directed in the *Garmin Installation Manual*.

Note: The MFD does not provide power to the GTX sensor. TIS uses an ARINC 429 data connection between the transponder and the MFD. Make this connection after consulting the wiring diagrams in the appendix of this document and the GTX-330 installation manual.

4.7.8 TAWS Wiring

(Honeywell: KGP 560) – Ensure the Honeywell KGP 560 has part number 965-1198-005. Connect as shown in Appendix M: *Wiring Diagram – TAWS*.

The EGPWS software must support KC Picture Bus (KCPB) Phase 2. See the Honeywell EGPWS documentation for applicable software configurations. If the EGPWS interface is operating properly, there will be no system status messages.

4.7.9 Map Configuration

Wiring for Map can be done in a number of different ways, depending on the aircraft configuration and options. After you determine the appropriate configuration

Configuring Map Heading from the EXP5000 PFD

The EX5000 can receive heading directly from an installed Avidyne Entegra EXP5000 PFD via an ARINC 429 or an RS-232 bus.

For the correct interconnection between the EXP5000 PFD and the EX5000, see Appendix P: *Wiring Diagram – Primary Flight Display (PFD)*.

Configuring Map Heading from a GPS/FMS

The MFD can receive heading from an GPS/FMS via an ARINC 429 bus. The source of heading is usually a gyro transmitting synchro or stepper to SkyWatch or StormScope sensor connected to the GPS/FMS, as shown in Figure 3.

See Appendix J: *Wiring Diagram – GPS/FMS* for the correct pinouts to the MFD.

When checking the GPS/FMS connection to the EX5000, the GPS/FMS must have a valid position fix (latitude/longitude).

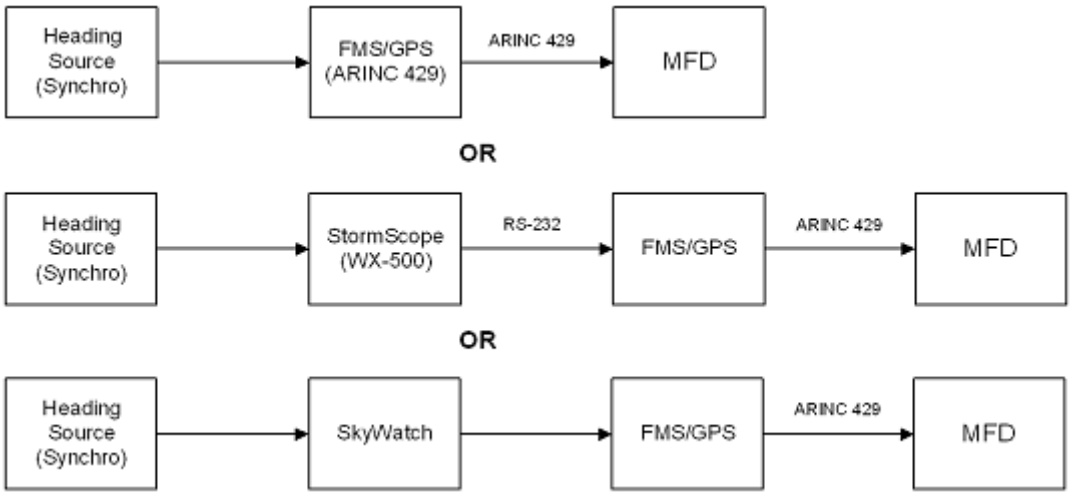


Figure 3: Heading Configuration with GPS/FMS

Configuring Map Heading from StormScope

The MFD is capable of receiving heading data from the WX-500 StormScope via RS-232. Configure the MFD as shown in Figure 4:

Figure 4: Heading Configuration with StormScope

Configuring Map Heading from TAS (Traffic)

The EX5000 is capable of receiving heading data from a TAS system. Configure the MFD as shown in Figure 5. See Appendix L: *Wiring Diagram – Traffic Sensors* for the correct pin outs to the MFD.

Figure 5: Heading Configuration with SkyWatch

4.7.10 Radar Sensor Wiring

See Appendix N: *Wiring Diagram – Radar Sensor* for the wiring diagram.

5 MFD Feature Setup and Checkout

This section contains the following information:

- Section 5.1, “Preliminary Test” on page 29.
- Section 5.2, “Optional MFD Function Activation Utilities” on page 31
- Section 5.4, “Using the Maintenance Mode Page” on page 33
- Section 5.5, “GPS/FMS Navigators Setup” on page 35
- Section 5.6, “Lightning Sensor Setup” on page 41
- Section 5.7, “Traffic Sensor Setup” on page 46
- Section 5.8, “TAWS Setup (Optional)” on page 53
- Section 5.9, “Radar Sensor (700-00030-005/-805 only)” on page 55
- Section 5.10, “Engine Instruments Setup” on page 67
- Section 5.11, “Aircraft Setup” on page 73
- Section 5.12, “Map Setup” on page 79

5.1 Preliminary Test

➤ Power up the MFD for post installation evaluation and configuration. To do so:

1. Turn on the MFD by applying power to the aircraft electrical bus supplying the MFD.

Note: Read the appropriate *Pilot’s Guide* for explanations of various functions.

2. The green LED control lights behind all the front panel controls should light up.
3. After the initial power up, the software will load and go through several checks. During this startup sequence the screen displays the text “Initializing-Please Wait...”.
4. The startup sequence is finished when the “Press any bezel key to Continue...” message displays.

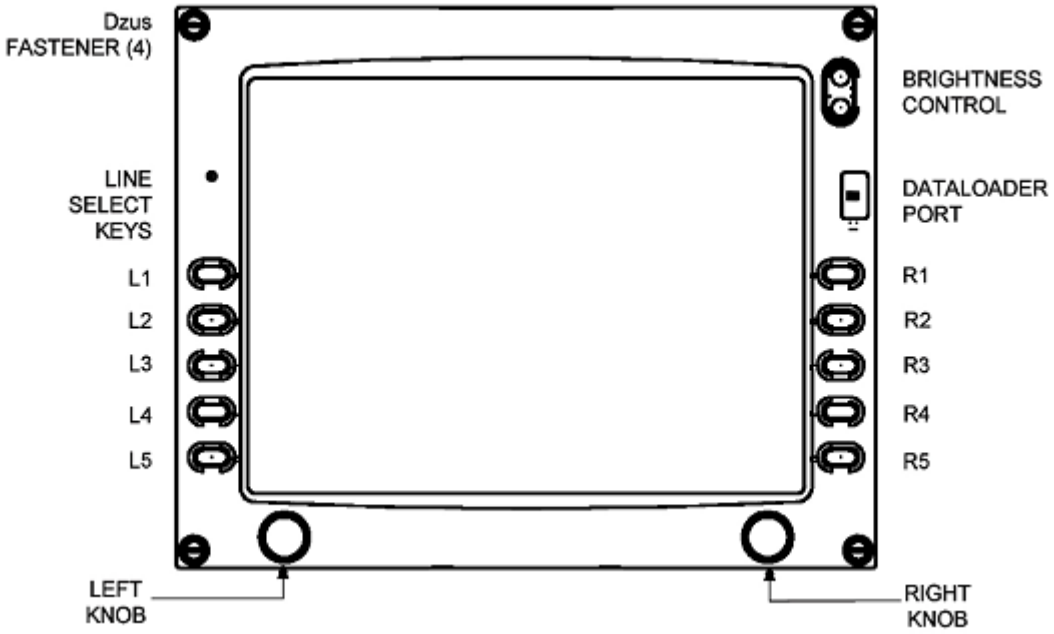


Figure 6: EX5000 Landscape Front View

5.2 Optional MFD Function Activation Utilities

Avidyne provides the ability to install certain optional functionality using single-use activation utility disks. This section describes the installation procedure for these utilities.

➥ The Activation Utilities are available for use only by avionics repair facilities performing MFD installations, MFD software upgrades, and MFD function activation on installed MFD software.

➤ To activate the CMax, TAWS, and Broadcast Datalink MFD features:

1. Obtain the Activation Utility disk for each feature you want to install from Avidyne or an authorized aircraft manufacturer. Be sure to specify the software part number of the MFD for which you want to activate a feature.

   - **MFD Single-Use CMax Activation Utility**—This utility activates the MFD CMax™ function. This utility is for use in FAA-approved aircraft repair stations only. This utility is for use for software part numbers 530-00162-(), 530-00170-() and 530-00180-() only.
   - **MFD Single-Use TAWS Activation Utility**—This utility activates the MFD TAWS function. This utility is for use in FAA-approved aircraft repair stations only. This utility is for use for software part numbers 530-00162-(), 530-00170-(), 530-00180-(), and 530-00201-() only.
   - **MFD Single-Use Broadcast Activation Utility**—This utility activates the MFD Broadcast Datalink function. This utility is for use in FAA-approved aircraft repair stations only. This utility is for use for software part numbers 530-00162-(), 530-00170-() and 530-00180-() only.

   These utility disks can be run only once to activate a single function on an MFD. After a single use they will not run on an MFD.

2. Follow the instructions in the accompanying service bulletin for each Activation Utility.

➥ After activation, the utility disks may be erased and reused for any purpose.

5.3 Using the Configuration Save and Restore (CSR) Utility

When performing an upgrade or replacement to an existing MFD, you may want to use the Configuration Save and Restore CSR) Utility. This utility allows you to save off many of the configuration options that had previously been set on the MFD, including:

- Fuel Calibration (where available). Fuel Calibration is described in *Fuel Quantity Calibration (Optional)* on page 71.
- Any added-cost utilities such as TAWS, CMax, and Broadcast Datalink (as described in Section 5.2, “Optional MFD Function Activation Utilities” on page 31).
- Engine Setup parameters, as described in Section 5.10, “Engine Instruments Setup” on page 67.
- Lightning, Traffic, GPS, and MAP parameters, described in this section.

The CSR Utility can save you many hours of work and a CSR Utility Zip disk should be included as part of the ship kit for MFD Upgrades.

For detailed information about the CSR Utility, see the Avidyne Service Bulletin *EX5000 Save & Restore Utility*, Document Number 601-0004-056.

5.4 Using the Maintenance Mode Page

The MFD Maintenance Mode Page contains the setup pages for each function.

➤ To start using the Maintenance Mode Page, apply power to all the sensors that interface with the MFD, including the GPS, the Lightning and Traffic sensors, Engine interface unit, and TAWS sensor.

5.4.1 Entering Maintenance Mode

➤ To access Maintenance Mode, press the buttons from the Aux or Setup Page as follows:

1. Turn on the MFD by applying power to the aircraft

   The system will begin its normal start up sequence

2. At the prompt, “Press any bezel key to continue”, press any button.
3. Rotate the left knob clockwise until the Aux or Setup Page displays.
4. Simultaneously press and hold buttons L1 (top left) and L3 (3rd down on the left) (See Figure 6 on page 30) for at least 5 seconds.

   The Maintenance Mode Page displays. Note that the available setup options depend on the specific aircraft.

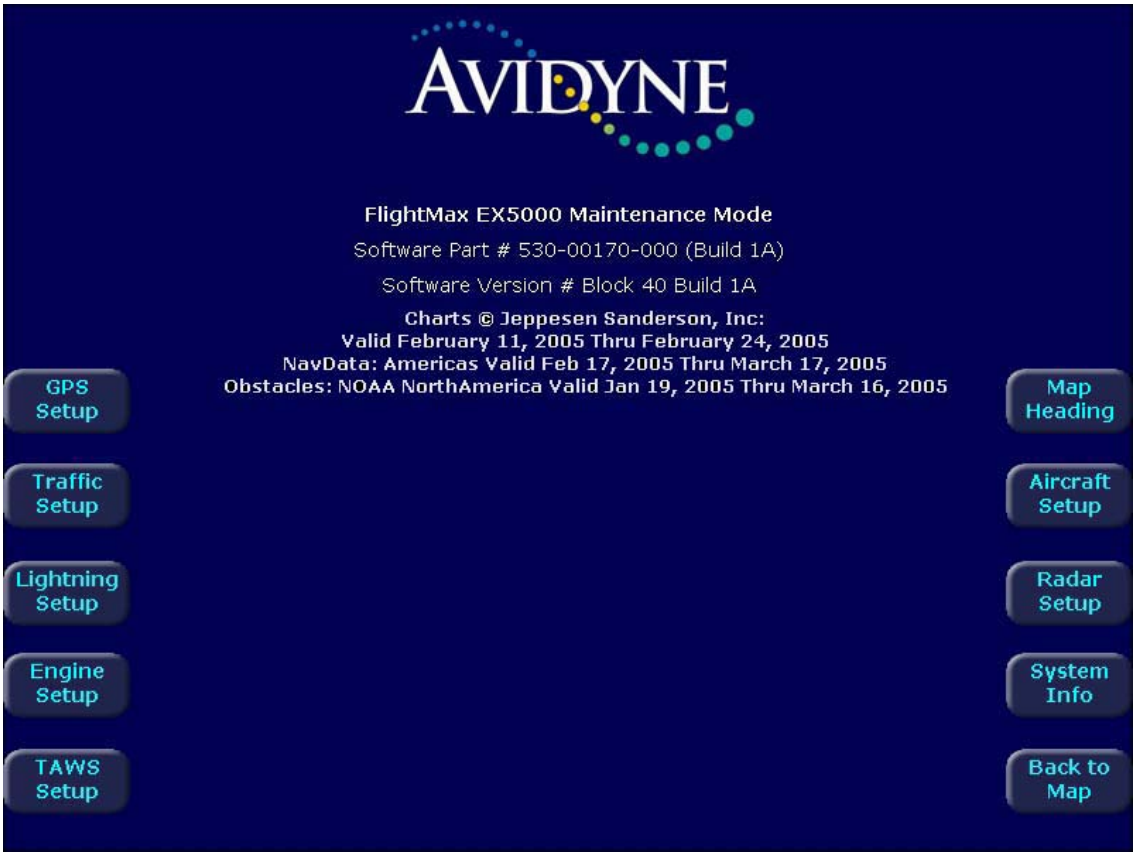


Figure 7: Example Maintenance Mode Page

5.4.2 Working in Maintenance Mode

As shown in Figure 7, the Maintenance Mode Page contains setup buttons for the available EX5000 features. When you select a Setup feature, the appropriate page displays. From the Setup page, the following options will always be available:

- **Select Knob**—Rotate to change the highlighted parameter box.
- **Change Knob**—Rotate to select a parameter to modify from the highlighted box.
- **Save**—Store any setup changes made since entering the page and return to the Maintenance Mode Main page.
- **Cancel**—Return to the Maintenance Mode Main page without saving your changes

➤ When working in Maintenance Mode:

1. After making changes to each setup page press *Save* to save your changes and return to the main menu.

   To exit without saving your changes, press *Cancel*.

2. Changes in the setup pages do not take effect until the MFD has been restarted. From the Maintenance Mode Page, press *Restart System*.

➥ Avidyne suggests that you restart the system after you make changes to each setup page.

If no changes were made, press *Back to Map* to exit Maintenance Mode.

5.5 GPS/FMS Navigators Setup

The MFD can interface with several types of GPS/FMS systems. Table 16 on page 39 lists the GPS/FMS systems that can interface with the MFD. Table 16 includes information about data formats available and GPS configurations.

Note: Use the matrix as a general guideline only. GPS manufacturers are constantly improving and upgrading their products. Always refer to the *Installation Manuals* that come with the GPS/FMS to confirm configuration and setup parameters. Additionally, keep in mind that not all GPS configurations can be used with all aircraft.

There are two interface configurations that the MFD uses to connect with the GPS:

- GAMA 429
- RS-232

EX5000 MFDs support both GAMA 429 and RS-232. However, GAMA 429 Graphics is the only configuration from the GPS capable of providing heading information if the GPS is being used as the heading source (see Section 5.12, “Map Setup” on page 79 for a complete explanation on setting up the various heading configurations within the MFD).

5.5.1 GAMA 429 Graphics Setup

If your GPS is capable of GAMA 429 Graphics output, use the wiring diagram in Appendix J: *Wiring Diagram – GPS/FMS* when installing the MFD.

Note: Using a 429 graphics output allows for the display of curved flight segments and approach data, if that data is available.

➤ To setup a GAMA 429-capable GPS:

1. From the Maintenance Mode Page, press *GPS Setup*. The GPS Setup Page displays:

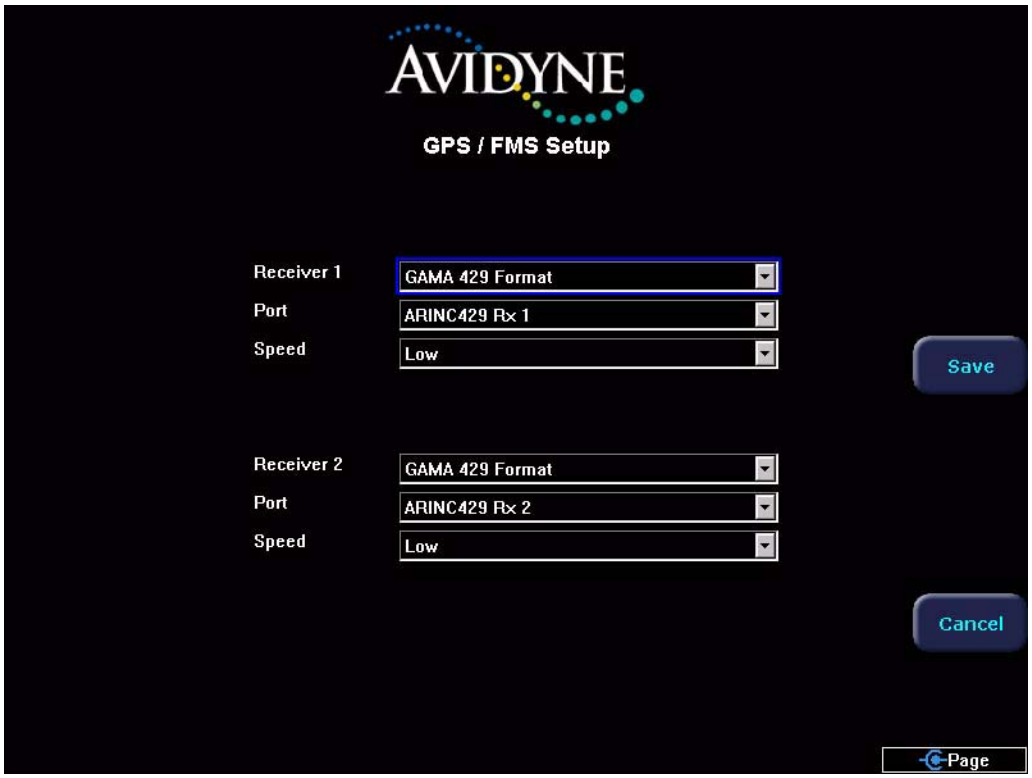


Figure 8: GPS Setup, GAMA 429

2. Configure the following:

- **Receiver**—Select GAMA 429 Graphics Format.
- **Port—** Select ARINC1.

Note: Selecting Port=None indicates that a GPS is not connected to the MFD. In this case, the MFD software does not expect GPS input.

- **Speed—**There are two speeds available, High and Low. See Table 16, “GPS/FMS Manufacturer’s Matrix,” on page 39 to determine the correct speed for your system.

3. When you are done, press *Save* to save your changes. Press *Cancel* to exit without saving changes.

4. Changes do not take effect until the MFD has been restarted. From the Maintenance Mode Page, press *Restart System*.

5.5.2 Dual GPS Setup with GAMA 429

The EX5000 can receive information from two GAMA 429 Graphics capable GPS units. Connect the GPS according to the wiring diagram in Appendix J: *Wiring Diagram – GPS/FMS*, using a different ARINC port for GPS2. Follow the setup instructions in Section 5.5.1.

5.5.3 RS-232 Setup

If your GPS uses an RS-232 configuration, use Appendix J: *Wiring Diagram – GPS/FMS* for wiring information.

Note: An RS-232 interface does not provide for heading data from the GPS/FMS.

➤ To set up the MFD for the RS-232 Interface:

1. From the Maintenance Mode Page, press *GPS Setup*. The GPS Setup Page displays.
2. Configure the interface as follows:
   - **Receiver—**Select the receiver-type for your GPS/FMS system. Determine the RS-232 output format using Table 16, “GPS/FMS Manufacturer’s Matrix,” on page 39 or your GPS/FMS Installation manual. Select one of the following RS-232 formats:
     - NMEA 0183
     - King/Aviation Format
     - Northstar Format
   - **Port—**Select RS232 1, or as wired.
   - **Baud—**Select the highest-possible baud rate for your GPS/FMS system. See the appropriate GPS/FMS Installation manual or see Table 16, “GPS/FMS Manufacturer’s Matrix,” on page 39 to determine for the maximum speed. The following speeds are available: 1200, 2400, 4800, 9600, 19200, or 38400.

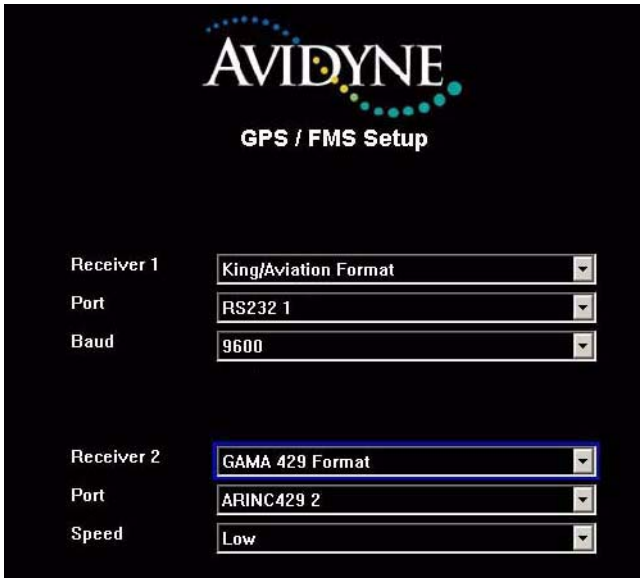


Figure 9: Dual GPS Setup, RS-232

3. When you are done, press *Save*. Press *Cancel* to exit without saving changes.
4. Changes do not take effect until the MFD has been restarted. From the Maintenance Mode Page, press *Restart System*.

5.5.4 Dual GPS Setup with RS-232

The MFD can interface with two RS-232 GPS units, or with a combination of one RS-232 GPS unit along with one ARINC 429-capable GPS unit. Connect the MFD ports as appropriate, using Appendix J: *Wiring Diagram – GPS/FMS*. Follow the set up instructions in Section 5.5.1and Section 5.5.3.

5.5.5 GPS/FMS Communications Check (Messages)

After the MFD has been restarted, any of the following messages may appear in the main viewing screen or in the message bar and Aux or Setup Page.

Table 15: GPS/FMS Communications Messages

Message	Meaning/Action	Action
Nav Source: Is Not Communicating	No RS-232 or ARINC 429 GPS data is being received.	Check wiring and COM port setting.
Nav Source: Data is Not Valid	Data is being received from the external GPS. However, insufficient information is available to determine position.	Aircraft could be in the hanger or the GPS may not have determined its “fix” or location.
Nav Source: Data is Valid	The MFD is receiving valid position data from the GPS/FMS.	—
Nav Source: Data Format Error	Data is being received, however the MFD does not recognize the data as the format selected.	May indicate a baud rate or receiver type error.
Nav Source: No Port selected	The RS232 port setting in the GPS setup dialog is set to NONE.	To correct this, choose the port to which the GPS is connected, typically RS232 1.
Nav Source: Reconnecting	This message is displayed when data between the MFD and the GPS is being synchronized.	—
Nav Source: Can't Open Port	Another device is configured for the same port.	Check the Setup page for all devices. Typically the GPS/FMS is configured for Port1 (for RS-232) or ARINC1 (for ARINC 429). If a second GPS/FMS is being used it is configured for Port2 or ARINC2.
Heading Data is Not Valid	Heading data is no longer available from the GPS/FMS.	Will only appear if the GPS/FMS is being used as your heading source.
Heading Data is Valid	Heading data has been restored.	—

5.5.6 GPS/FMS Manufacturer's Matrix

Table 16: GPS/FMS Manufacturer's Matrix

GPS/FMS	RS232	RS-232 Formats	ARINC 429	Baud/Data Rate	Heading Output	GPS/FMS Configuration Notes	DME ARC
KLN-89B	Yes	King/ Aviation	No	Serial – 9600	No	—	Flight Plan ends at entry point
KLN-90B	Yes	King/ Aviation	Yes	Serial – 9600 ARINC – Low	ARINC only	—	Flight Plan ends at entry point
NorthStar M1, M2, or M3	Yes	NorthStar	No	1200 or 9600	No	The Northstar default baud rate is 1200. Better performance and extended data is achieved by setting it to 9600 (1200 will work). See the NorthStar manual to change the baud rate.	—
Trimble 2000, 2101	Yes	King/ Aviation	Some models	9600	Not Available	Use RS-232 port 2 No Parity, 8 bits.	Sends multiple waypoints around arc
Garmin 150, 250	Yes	King/ Aviation	150- No 250-No	Serial – 9600 ARINC – Low	ARINC only	For the 250 DO NOT use the W/O GAMA mode, use the EFIS mode. If using the NMEA format use the 2nd channel.	—
Garmin 155, 165	Yes	King/ Aviation	No	9600	No	—	—
Garmin 400 Series	No*	No*	Yes	Serial – 9600 ARINC – Low	ARINC only	With ARINC 429 operation use GAMA with Graphics	—
Garmin 500 Series	No*	No*	Yes	Serial – 9600 ARINC – Low	ARINC only	With ARINC 429 operation use GAMA with Graphics	—

Table 16: GPS/FMS Manufacturer's Matrix (Continued)

GPS/FMS	RS232	RS-232 Formats	ARINC 429	Baud/Data Rate	Heading Output	GPS/FMS Configuration Notes	DME ARC
Universal UNS-1B	No		Yes	ARINC – High	Yes	—	—
Honeywell GNS-XLS	No		Yes	ARINC – High or Low	Yes	For GNS-XLS Configuration Programming set as follows: GAMA ARINC 329 Bus Data Set= 1. Basic EFIS DME Arc Style=1. Arc as Gap	The arc is depicted as a gap
Morrow Apollo GX-50	Yes	King/ Aviation	No	9600	No	Use the Moving Map format.	—

* Installations of EX5000 MFDs with Garmin 400 and 500 series GPS units under this installation manual must be done using ARINC 429. Existing installions may continue to use RS-232 with the King/Aviation format. See Section 2.4 for more information.

5.5.7 GPS/FMS Installation-Specific Issues

- **Garmin Installation—**Some Garmin units provide two RS-232 formats for GPS data. One is an "aviation" format. The other is an RS232 "plotting" format. The "aviation" format provides a "King" format 9600 baud output at a higher repetition rate and is the preferred RS-232 output. Consult the specific Garmin GPS installation manual for full details.
- **Northstar Installations—**Many Northstar units have a hidden setup screen to change configuration parameters to make it difficult to change in flight. See the Northstar installation manual for the specific codes to enter to set this up correctly.
- **Trimble 2000A Installations**—This unit has a hidden setup screen documented in the installation manual to change configuration parameters to make it difficult to change in flight. See the Trimble Installation manual for the specific codes to enter.

Trimble units have been observed to sometimes lose configuration when the aircraft battery is discharged

5.6 Lightning Sensor Setup

The MFD supports the Avidyne TWX-670 and L-3 WX-500 Lightning sensors. Table 11 describes the Avidyne TWX-670 Configuration Options.

Table 17: TWX-670 Configuration Options

Option	Values	Notes
Operating Mode	Weather	Normal operating mode.
	Demo	Used to learn lightning operations.
The options below are available on the "TWX-670 Configuration" page.		
Enable Geo Stabilization	Check/Clear	The TWX-670 uses data from a connected position source (GPS/FMS).
Enable Heading Stabilization	Check/Clear	The TWX-670 uses heading data from a connected heading source (e.g., Synchro, PFD).
Enable Audio Output	Check/Clear	Enables audible alerts from the sensor.

There is a button labelled, "TWX-670 Config," that goes to another menu with the following options (all check boxes):

- Use Position Source
- Use Heading Source
- Enable Audio Output

The TWX-670 will configure these settings automatically, but the check boxes can be used to force particular setups. A red **X** will show next to the check box if the TWX does not agree with the chosen setup.

Table 18 describes the WX-500 configuration options.

Table 18: WX-500 Configuration Options

Option	Values	Notes
Operating Mode	Weather	Normal operating mode.
	Noise Monitor	Supports noise mapping tests.
	Demo	Used to learn lightning operations.
Stab Type	Synchro to WX-500	The WX-500 will use the synchro supplied heading data connected directly to the WX500.
	Stepper to WX-500	The WX-500 will use stepper data from a remote compass system.
	Use Map Heading/Track	The WX-500 will use orientation information supplied by the EX5000 based on the Map Heading configuration, described in Section 5.12, "Map Setup" on page 79.
Enable Lightning Ahead Warning?	Check/Clear	When checked, the EX5000 issues lightning ahead warning messages.
Antenna on Top?	Check/Clear	Check if the lightning sensor antenna is located on top of the aircraft and must correspond with the WX-500 jumper settings.

5.6.1 Lightning Sensor Setup

➤ To configure the Lightning sensor:

1. From the Maintenance Mode Page, select Lightning Setup. The selection page is displayed:

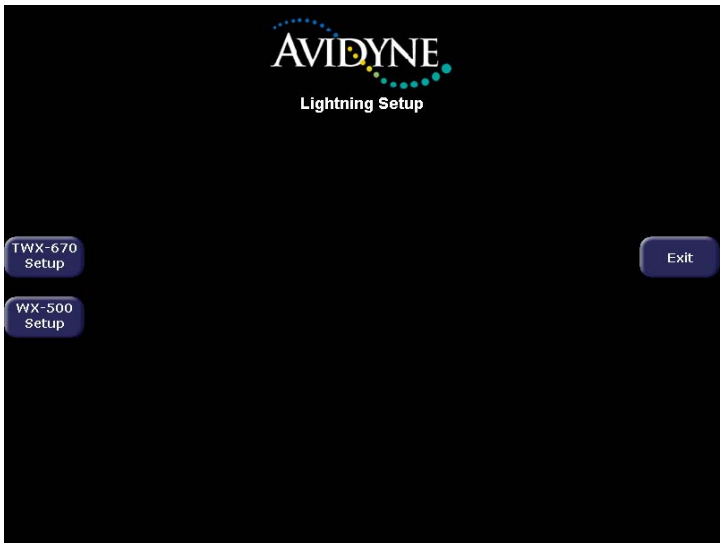


Figure 10: Selection Page

2. Choose the sensor to be connected to the MFD. The Setup Page is displayed.

For the WX-500 Setup The screen shown in Figure 11 is displayed.

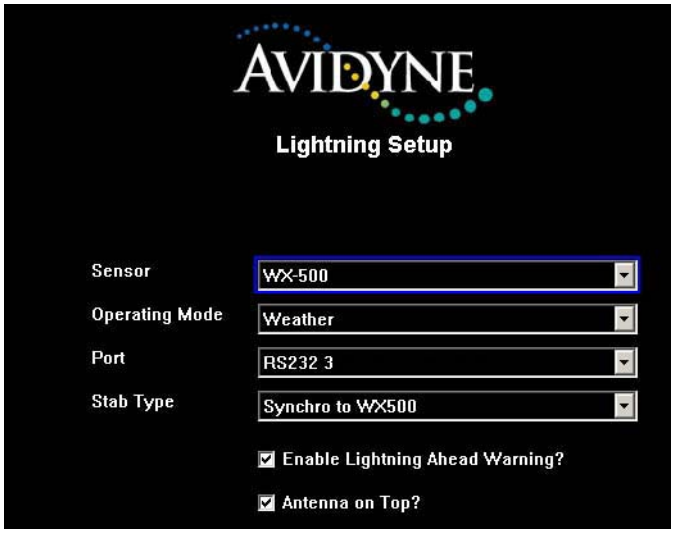


Figure 11: WX-500 Setup Page

For the TWX-670 Setup, the screen shown in Figure 12 is displayed.

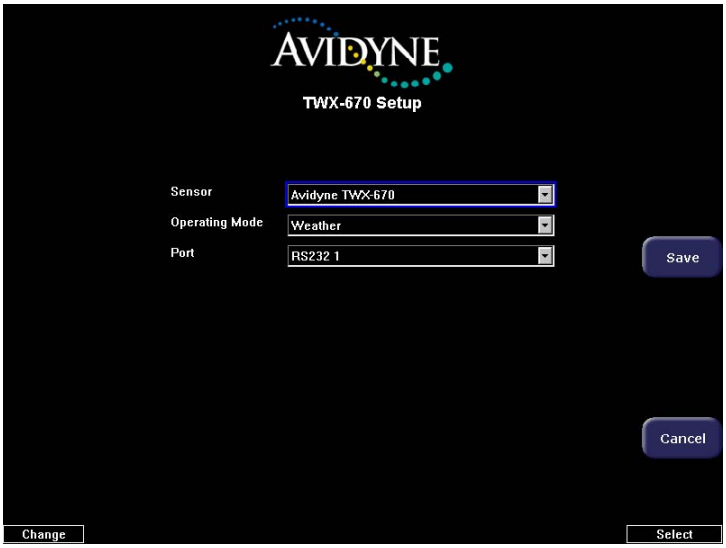


Figure 12: TWX-670 Setup Page

3. For WX-500, set the following options:

- Sensor – Select between the lightning sensor and a simulation program (WX-500 only). The normal selection is the sensor name ("Avidyne TWX-670" or "WX-500"). The WX-500 simulation setting is used in conjunction with the demo mode on the sensor to simulate operations on the ground.
- Operating Mode – The normal operating mode is weather. Demo is used to simulate lightning operations. For the WX-500, Noise Monitor mode is used during noise mapping tests. See the WX-500 installation manual for testing procedures.
- Port – Set the MFD RS-232 port that is connected to the lightning sensor to match the aircraft wiring.
- **Stab Type—**Select the source of stabilization for use by the WX-500. Stabilization aids in correctly positioning strikes when the aircraft is turning. The choices are:
  - **Synchro to WX500—**a remote compass system that generates and transmits synchro signals received by the WX-500. This heading data can also be used by the MFD to orient the map.
  - **Stepper—**a remote compass system that generates and transmits stepper signals received by the WX-500. This heading data can also be used by the MFD to orient the map. See the Map Heading Setup section.
  - **Use Map Heading/Track—**The WX-500 uses orientation information supplied by the EX5000 based on the Map Heading configuration, described in Section 5.12, "Map Setup" on page 79. The WX-500 receives heading or track data from the MFD via RS232. Heading will be sent from the MFD only if GPS/FMS is the heading source via ARINC 429.

  The best method of stabilization is a heading source (synchro or stepper input to the WX-500 or Map Heading). The next best method is Track. The wiring and WX-500 jumpers must agree with the setup on the MFD.
- **Enable Lightning Ahead Warning?—**Enables display of the Lightning Ahead warning message in the message bar when checked and disables it when not checked.
- **Antenna on Top?—**Indicates that the sensor antenna is mounted on top of your aircraft when checked and that it is mounted on the bottom of your aircraft when not checked.

Note: The antenna position setting and stabilization source must agree with the WX-500 jumper setting and the physical mounting location of the antenna.

4. For the TWX-670 the following options are available in the TWX-670 Config page:
   - Enable geo stabilization – an external position source (GPS or FMS) connected to the sensor will stabilize the lightning strikes to the aircraft position
   - Enable heading stabilization – an external heading source (e.g., a synchro) connected to the sensor will stabilize the lightning strikes to the aircraft heading.
   - Enable Audio Output – if connected to the aircraft audio panel, the TWX-670 will provide audible warnings concerning nearby lightning strikes.

   These options are only available after the Sensor and Port options have been selected and the MFD restarted. Green check marks will appear next to each option if the TWX-670 agrees with the configuration. If red X's appear, it may be because another display connected to the sensor is trying to set a different configuration. Consult the TWX-670 installation manual for more information.
5. When you are done, press Save. Press Cancel to exit without saving changes.
6. Changes do not take effect until the MFD has been restarted. From the Maintenance Mode Page, press Restart System.

In addition to the settings on the Lightning Setup Page, the following buttons may be available:

- **WX-500/TWX-670 Diags** – allows access to the lightning sensor diagnostic modes. See your sensor's Installation Manual about how to verify software versions, wiring configurations, antenna environment, and fault logs (not available on all software releases).
- **Self Test (WX-500)** – Runs the WX-500 Self Test and reports Pass or Fail. See the WX-500 Installation Manual for information about testing and the interpretation of the results (not available on all software releases).

5.6.2 Lightning Sensor Checkout

After the MFD has been restarted, any of the following messages may appear in the main viewing screen or the message bar and Setup page.

Table 19: Lightning Sensor Messages

Message	Meaning
Lightning Sensor is Operating Normally	Verifies that strike data to the MFD is valid.
Lightning Sensor in Demo Mode	Demo mode has been selected as the operating mode from the Lightning Setup Page.
Lightning Sensor is in Noise-Monitor Mode	Noise-Monitor mode has been selected as the operating mode from the Lightning Setup Page.
Lightning Sensor in Test Mode	Test mode has been selected as the operating mode from the Lightning Setup Page.
Lightning Sensor ERROR	The sensor system has reported an error that may mean current data is incomplete or erroneous. The error may clear.
Lightning Sensor has FAILED	The sensor system has reported an error that may mean current data is incomplete or erroneous. The error will not clear until power is removed from and reapplied to the sensor system.

Table 19: Lightning Sensor Messages (Continued)

Message	Meaning
Lightning Sensor is Not Communicating	Communication between the Lightning sensor to the MFD has been lost. The wiring may be incorrect, the MFD setup may not match the wiring or the sensor may have an error.
Lightning Ahead	The Lightning Ahead option has been checked on the Lightning Setup page. Displayed when a Lightning Ahead condition exists.
Lightning Heading Source Failed	Heading data is no longer available from the WX-500. Strike data may still be valid. Will only appear if the WX-500 is used as the heading source.
Lightning Heading Source OK	Heading data has been restored.
Stuck mic-PLEASE CHECK	Check your COM transmitters for indication of a stuck mike.
Lightning Antenna Location Changed	There may be an inconsistency between the antenna location jumper setting and the software configuration. This message should only appear during installation.
Lightning Position Source Failed **(TWX-670 only)**	The position reporting source (GPS or FMS) connected to the TWX-670 has encountered a fatal fault.
Lightning Position Source OK **(TWX-670 only)**	The position reporting source (GPS or FMS) connected to the TWX-670 has returned to normal operation.
Noise Present **(TWX-670 only)**	The TWX-670 has detected excessive noise in the system. Accuracy and efficiency of the lightning sensor may be negatively affected.
Stuck MK **(TWX-670 only)**	Microphone PTT switch is stuck open. Lightning strikes will not be displayed until the problem is fixed.
No Position Data **(TWX-670 only)**	The position reporting source (GPS or FMS) connected to the TWX-670 is not sending position data.

Lightning Sensor Noise Mode

When operating the Lightning sensor (WX-500 only) in Noise Monitor mode, the Lightning button on the Map page will display “Noise” as the current Lightning state.

➥ Do not press the button in this state, or it may suppress lightning display unnecessarily.

See the operating guide for the Lightning Sensor for more information.

If no lightning strikes are shown at all during noise testing, press the button until it says Display Off, then press once more to return to the proper Noise mode display.

5.7 Traffic Sensor Setup

The EX5000 only supports the listed Traffic sensors. If a traffic sensor not on the supported list is connected to the MFD some of the data may display but its accuracy and traffic sensor control functions may be incorrect or inoperable. Display of traffic sensor data is not a guaranty of correct traffic sensor installation and configuration.

The aircraft should be equipped with one of the following Traffic Sensors. Follow the setup instructions for the appropriate sensor:

- For TAS, see Section 5.7.1, “TAS (SkyWatch & Bendix/King) Setup” on page 47.
- For TCAD, see Section 5.7.4, “TCAD Setup” on page 49.
- For TIS, Section 5.7.7, “TIS Setup” on page 51.

Note: If you need to switch between types of installed traffic sensors, first change the traffic sensor type to *None*, press *Save*, and restart the EX5000. Then select the new traffic sensor type.

Table 20 describes the system configuration options (option availability depends on the EX5000 configuration ordered):

Table 20: Traffic Setup Configuration Options

System	Option		Values	Notes
TAS	External Controller?		Check/Clear	Check this box if a dedicated external Skywatch controller is installed. With this box checked the EX5000 does not initiate Skywatch standby or Self Test functions.
TCAD (9900B selected)	Shields		Terminal Standard Enroute	
	Range	Terminal	0.5 – 1.5 nm	
		Standard	1 – 3 nm	
		Enroute	2 – 15 nm	Limited to 6 nm max. by the 9900B sensor
	Height	Terminal	200 – 1000 ft.	
		Standard	500 – 1500 ft.	
		Enroute	1000 – 2000 ft.	
TIS-G	None			
TCAD	TYPE		9900B	
			9900BX	

5.7.1 TAS (SkyWatch & Bendix/King) Setup

SkyWatch uses an ARINC 429 data connection between the TRC (Transmitter/Receiver Computer) and the MFD.

➤ To set up the TAS Traffic Sensor:

1. From the Maintenance Mode Page, select Traffic Setup. The Traffic Setup Page displays:

Figure 13: TAS selection on Traffic Setup Page

2. Set the following options:

- **Sensor—**TAS
- **Port**—Select the MFD ARINC 429 port to which the TAS sensor is wired.
- **TAS Type**—Skywatch or Bendix/King.

Note: Check the wiring considerations discussed in Section 4.7.7, “Traffic Sensor Wiring” on page 26.

- **External Controller?** (SkyWatch only)—If this box is checked, control of Standby/Operate and Self Test functions is not performed by the MFD but by the SkyWatch display or a GPS. Only one device may control the Standby/Operate and the Self Test functions; therefore they are not available on the MFD when the External Controller box is selected.

3. When you are done, press *Save*. Press *Cancel* to exit without saving changes.

4. Changes do not take effect until the MFD has been restarted. From the Maintenance Mode Page, press *Restart System*. If needed, see Table 22, “Traffic Messages,” on page 52.

5.7.2 TAS (SkyWatch) Checkout

For TAS (SkyWatch), Self Test can only be performed from STANDBY mode and will return to STANDBY mode upon successful completion of the Self Test.

➤ To perform a Self Test:

1. With Traffic in Stand By, rotate the left knob and select the Setup Page.
2. Select Traffic Self Test. The following actions occur:
   - The Map Page displays.
   - The Sensor Status indicates that the sensor is in “Test” and a Traffic test pattern appears on the display.

   If the Self Test fails, an error message is generated and displayed on the MFD screen. See the *SKY497 Installation Manual* for explanations and fault isolation procedures.

➤ To test the Sky497 installation:

1. Use the alternate display procedure described in Appendix E of the *SKY497 Installation Manual*. A terminal device using a RS-232 serial data cable is needed for these setup procedures.
2. See Appendix D in the *SKY497 Installation Manual* for information about configuring the terminal device. Any computer with RS-232 terminal emulation software (e.g., Procomm, HyperTerminal, etc.) may be used as the terminal device.

5.7.3 TAS (Bendix/King) Checkout

➤ To test the TAS (Bendix/King) installation, verify correct communication by monitoring the Message List on the Setup page for the following message: “Traffic Sensor Operating Normally”.

Note: The MFD does not command the KTA870 in Self Test mode. Use the KTA870 control panel if installed. See the *KTA870 Installation Manual* for fault isolation procedures.

5.7.4 TCAD Setup

The MFD optionally supports Avidyne TAS600 Series 9900BX TCAD sensors.

Note: The MFD does not provide power to the 9900BX sensor. TCAD is interfaced to the MFD via RS232 or ARINC 429 (9900BX only).

➤ To set up the TCAD Traffic Sensor:

1. From the Maintenance Mode Page, select Traffic Setup. The Traffic Setup Page displays:

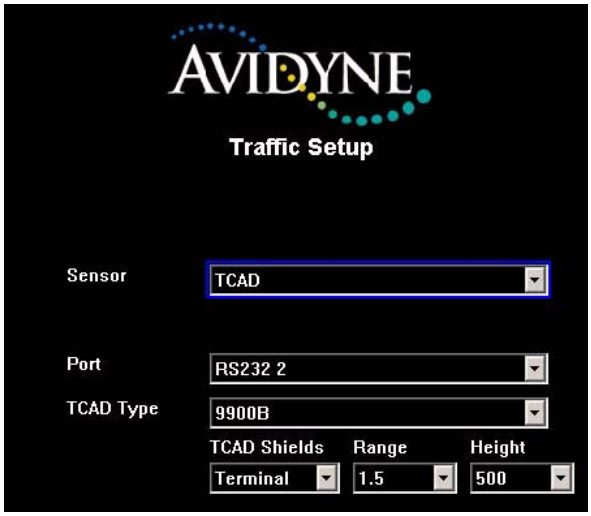


Figure 14: TCAD selection on Traffic Setup Page

2. Set the following options:

- **Sensor—**TCAD.

Note: The TCAD 9900BX is a TAS-type active device. Under Sensor, you can select either TCAD or TAS. However, the EX5000 stores this configuration as a TAS sensor. This does not affect the way the EX5000 receives or displays the traffic information.

- **Port—** Select the MFD RS232 port to which the TCAD sensor is wired.
- **TCAD Type—**Select either 9900B or 9900BX, corresponding to the installed TCAD sensor unit.
- **TCAD Shields—**When interfaced with the TCAD 9900B, you can set shield sizes for Terminal, Standard, and Enroute. See Table 21 in this manual for settings.

Note: TCAD Shield sizes are only adjustable with the TCAD 9900B.

Some software versions do not allow you to select TCAD type. If the option is not available, all TCAD sensors will use the shield size settings described in Table 21 on page 50.

➥ See the *Avidyne TAS600 Series Installation Manual* for wiring procedures and information about shields.

- **Range—**Sets the horizontal range of the shield. The range is in nautical miles and can be set for a value between 0.0 and 10nm, in 0.1nm increments
- **Height**—Sets the vertical distance in feet with a value between 0 and 5000 ft. in 100 ft. increments

3. Select each shield you want to configure from the Shield drop down menu.
4. Select the Range and Height for that shield from the drop-down lists.

   Table 21 provides the suggested minimum and maximum values for the range and height of each shield.

Table 21: TCAD Shield Settings

	Range (NM: 0.5)		Height (feet: 100)	
	Min	**Max**	**Min**	**Max**
Terminal	0.5	1.5	200	1000
Standard	1.0	3.0	500	1500
Enroute	2.0	6.0	1000	2000

Note: The Max range values shown above are the largest values that the TCAD processor will accept. Choosing larger values than those shown will cause the processor to default to smaller shield sizes and is not recommended.

5. When you are done, press *Save*. Press *Cancel* to exit without saving changes.
6. Changes do not take effect until the MFD has been restarted. From the Maintenance Mode Page, press *Restart System*. If needed, see Table 22, “Traffic Messages,” on page 52.

5.7.5 TCAD Dual Display Setup

When installing the MFD with an Avidyne TAS600 9900BX display unit, see the *Avidyne TAS600 Series Installation Manual* for wiring procedures. See Figure 2-15 Wiring Diagram for Dual Displays and Section 7 in the Ryan manual for instructions.\

5.7.6 TCAD Checkout

The MFD does not display the TCAD Self Test function. To perform this test, use the Avidyne TAS600 display unit.

- On installations with the TCAD 9900 display unit, follow the checkout procedures shown in the *Avidyne TAS600 Series Installation Manual*.
- On installations without the TCAD 9900 display unit (MFD only), follow the checkout procedures shown in the *Avidyne TAS600 Series Installation Manual* with the exception of the display test.

5.7.7 TIS Setup

The EX5000 optionally supports the display of traffic information from a Garmin GTX-330 TIS-capable Mode-S transponder.

Note: This option is available on 530-00148-000, 530-00162-(), 530-00170-(), 530-00180-(), and 530-00195-() software.

➤ To set up the TIS Traffic Sensor:

1. From the Maintenance Mode Page, select Traffic Setup. The Traffic Setup Page displays:

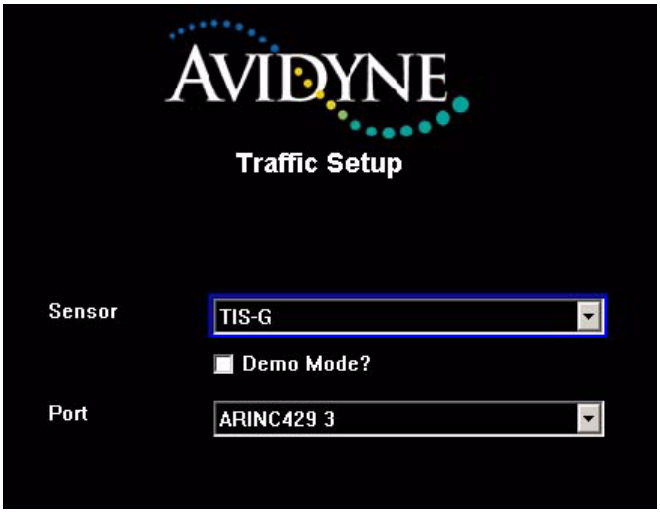


Figure 15: TIS selection on Traffic Setup Page

2. Set the following options:
   - **Sensor—**TIS-G
   - **Port—**Select the MFD ARINC 429 port to which the TIS transponder is wired.
3. When you are done, press *Save*. Press *Cancel* to exit without saving changes.
4. Changes do not take effect until the MFD has been restarted. From the Maintenance Mode Page, press *Restart System*. If needed, see Table 22, “Traffic Messages,” on page 52.

5.7.8 TIS Checkout

Use a TIS transponder test set to test the combined installation of GTX-330 and the EX5000. If no test set is available, conduct operations in an area that supports TIS data and verify that data is received and traffic is displayed.

5.7.9 Traffic Communications Check (Messages)

After the MFD has been restarted, any of the following messages may appear in the main viewing screen or the message bar and Setup page.

Table 22: Traffic Messages

Message	Meaning
Traffic Sensor is Not Communicating	Traffic data is not being received.
Traffic Sensor is in Stand-By (TAS/TIS)	The traffic sensor has been placed in Standby mode.
Traffic Sensor is in Self-Test (TAS)	The traffic sensor has been placed in Self-Test mode.
Traffic Sensor is Operating Normally	Verification that Traffic data is valid.
TCAD Altitude Unavailable (TCAD)	Occurs when altitude data has been lost from the TCAD sensor.
Traffic Sensor has Failed	The traffic sensor has reported an internal fault, or the RS-232 ports are not configured correctly (TCAD).

Note: After completing all configuration procedures, confirm that the MFD is configured for the correct Traffic sensor.

5.8 TAWS Setup (Optional)

The MFD can interface to the Honeywell Bendix/King EGPWS systems with Phase 2 or later software.

5.8.1 TAWS Setup

➤ To configure the TAWS interface:

1. From the Maintenance Mode Page, select TAWS Setup. The TAWS Setup Page displays:

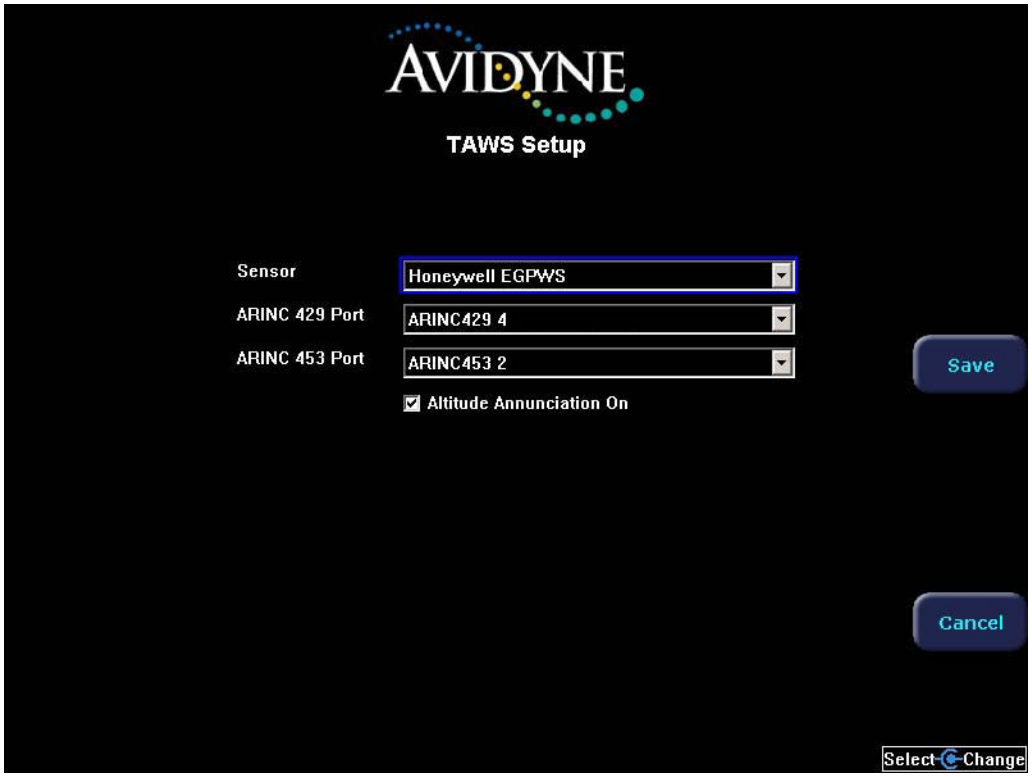


Figure 16: TAWS Sensor Setup Page

2. Set the following options:

- **Sensor—**Honeywell EGPWS
- **ARINC 429 Port—**ARINC 429 4 – TAWS Default
- **ARINC 453 Port—**ARINC 453 2 – TAWS Default
- **Altitude Annunciation On—**Select this feature to permit a visual annunciation of GPS altitude on the TAWS display. If selected, a checkmark displays.

3. When you are done, press *Save*. Press *Cancel* to exit without saving changes.

4. Changes do not take effect until the MFD has been restarted. From the Maintenance Mode Page, press *Restart System*.

TAWS Checkout

➤ To test the TAWS installation:

1. From the Maintenance Mode Page, select TAWS Setup.
2. Perform a functional test of the EGPWS system in accordance with manufacturer's instructions. See the *MFD Pilot Guide* for display operation.
3. If the Self Test fails, an error message is generated and displayed on the MFD display. See the *EGPWS System Installation Manua*l for explanations and fault isolation procedures.

5.8.2 TAWS Communications Check (Messages)

If there is a communication or data error between the TAWS sensor and the MFD, one of the following messages will display on the bottom of the screen.

Table 23: TAWS Error Messages

Message	Meaning/Action
TAWS Failed	An incorrect system configuration or failure in one of the system components has occurred. ■ Verify that the sensor is turned on and valid. ■ Verify system wiring.
TAWS Initializing	If message does not clear within 60 seconds, communication between the MFD and the Terrain sensor has not been established. ■ Verify that the sensor is turned on and valid. ■ Verify system wiring. ■ See terrain sensor Installation and User's Manual for troubleshooting guidance.
TAWS Not Communicating	Indicates that the MFD is not receiving data from the Terrain sensor. ■ Verify that the sensor is turned on and valid. ■ Verify system wiring. ■ See TAWS sensor Installation and User's Manual for troubleshooting guidance.
TAWS Display Unavailable	The TAWS Sensor has declared itself inoperative. ■ Verify system wiring. ■ Verify that the sensor inputs to the TAWS are turned on and valid. ■ See TAWS sensor Installation and User's Manual for troubleshooting guidance.
TAWS Sensor Self-Test	The TAWS Sensor is performing a Self-Test. The message will remain until the self-test is finished. ■ Verify that the "Self-Test" mode has been not been selected at the separate TAWS control panel. ■ Verify system wiring. ■ See TAWS sensor Installation and User's Manual for troubleshooting guidance.
TAWS Inhibited	The TAWS sensor is in the "Inhibited" mode. ■ Verify that the "Inhibit" mode has been not been selected at the separate TAWS control panel. ■ See TAWS sensor Installation and User's Manual for troubleshooting guidance.

Note: If the EGPWS interface is operating properly, there will be no system status messages.

5.9 Radar Sensor (700-00030-005/-805 only)

Radar support is provided by the Bendix/King RDR-2000 Radar system, including the AlliedSignal ART-2000 sensor, and is an option available only on the 700-00030-005/-805 EX5000. Radar is supported only by software part numbers 530-00170-000/001, 530-00180-000/001/, 530-00195-000//001/010/400/410/510, and 530-00201-000/500.

➤ To set up radar support:

1. From the Maintenance Mode Page, select Radar Setup. The Radar Setup Page displays:

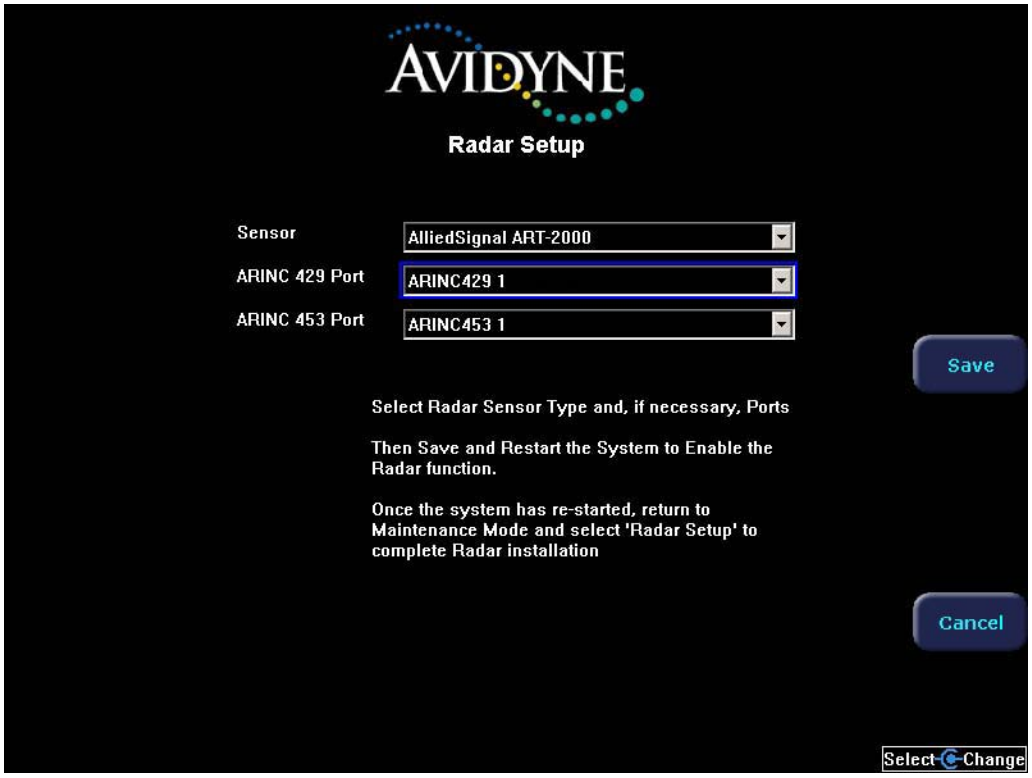


Figure 17: ART-2000 Radar Setup Page

2. From the Radar Setup Page, select the radar sensor installed on this aircraft.

3. Press *Save* to return to the Maintenance Mode Page

4. From the Maintenance Mode Page, press *Restart System*.

5. Re-enter Maintenance Mode and select the Radar Setup Page again.

6. Select the following options to finish the installation:

- ARINC 429 Port—ARINC 429 Tx1
- ARINC 453 Port—ARINC 453 1

7. When you are done, press *Save*. Press *Cancel* to exit without saving changes.

8. Changes do not take effect until the MFD has been restarted. From the Maintenance Mode Page, press *Restart System*.

Table 24 describes the configuration options offered by the ART-2000 sensor. For more information, see the Bendix-King *Radar Installation and Operations Manual*.

Table 24: ART-2000 Sensor Configuration Options

Option	Value	Notes
Park Position	Last position	Set the park/startup position for the radar antenna tilt angle.
	Full up	
	Centered	
	Full down	
Beam Width ■ 10” Antenna ■ 12" Antenna	 10° 8.1°	Defines the Width and Height of the radar sweep graphical depiction on the EX5000 radar display.
Beam Height	0.0^{o} – 19.5^{o}	
Enable Gain Control	Check/Clear	Enables R/T variable gain control to be commanded from the EX5000.
Enable VP	Check/Clear	When checked, enables Radar Vertical Profile mode.
Enable Auto-Tilt Control	Check/Clear	When checked, enables Radar auto-tilt mode.
Primary Indicator (1)	Check/Clear	When checked, enables EX5000 control of radar functions.
Disable Stabilization	Check/Clear	Disables EX5000 display of the “Stab Off” annunciation
Enable Automatic Standby	Check/Clear	When checked, enables the EX5000 to auto-command the radar to standby when ground is sensed to be below 20 kts.

5.9.1 RADAR System Calibration

Calibrating the Radar R/T unit requires access to the Radar Calibration Page on the Entegra or Envision EX5000 unit. This section explains how to access the calibration page and complete the radar calibration.

➥ Perform radar R/T calibration according to the procedures and specifications for the specific unit installed in the aircraft.

Calibration can be performed after the Radar has been installed, setup and checked out per the radar manufacturer’s instructions.

➤ To calibrate the system:

1. From the Maintenance Mode Page, select *Setup Radar*.
2. From the Radar Setup page. access the Calibration Mode
3. Perform the calibration according to the specifications in the R/T unit's Installation Manual.
4. Press Enter to accept the new values.
5. When you are done, press *Save* from the Radar Setup Page. Press *Cancel* to exit without saving changes.
6. Changes do not take effect until the MFD has been restarted. From the Maintenance Mode Page, press *Restart System*.

Calibrating the AlliedSignal (Bendix/King) 2000 Radar Sensor

This section describes Post-Installation System Configuration and Calibration of the Bendix/King RDR-2000 Radar System using the EX5000 and replaces specific sections of the Bendix/King *Installation Manual* that describe configuration and calibration using the Bendix/King IN-182A Indicator.

➤ To configure and calibrate the system, follow the original Bendix/King Installation Manual substituting the following two sections with the instructions provided herein:

- 2.4.1 CONFIGURATION PROCEDURE USING RADAR INDICATOR
- 2.4.4.1 Stabilization Calibration with Radar Indicator

Note: If the EX5000 is replacing the indicator of currently installed and previously calibrated RDR 2000 Series Radar, this procedure may not be necessary. The calibration values are contained in the configuration module of the R/T and should remain valid. Avidyne recommends that you check the calibration values after the Avidyne unit has been installed to ensure that nothing has changed.

Bendix/King Installation Manual Replacement Section 1

2.4.1 CONFIGURATION PROCEDURE USING RADAR INDICATOR
The R/T Configuration Module must be configured using the Allied Signal KPA 900 Configuration Module Programmer Kit (Part Number 050-03311-0000) in conjunction with a personal computer. See the configuration module user data for detailed setup instructions. Follow the instructions for the programmer.

2.4.1.1 Antenna Clearance Check

Complete the Antenna Clearance Check by performing the following steps:

A. From the Aux Page, enter Maintenance Mode, as described in Section 5.4, “Using the Maintenance Mode Page” on page 33).

B. Set the radar park position to Full Up.

C. Restart the MFD.

D. From the Radar Setup Page, set the radar Function to SBY.

E. Set the radar Mode to GND.

F. Reduce the gain until the gain indicator shows the minimum setting.

G. Set the Antenna Tilt to full UP (U 15.0).

H. Set Range to 240 NM.

I. From the Aux Page, enter Maintenance Mode, as described in Section 5.4, “Using the Maintenance Mode Page” on page 33).

J. Press *Radar Setup*.

K. Press *Calibration* to display the RT CALIBRATION DATA page. Upon display of the RT CALIBRATION DATA page with the system in calibration mode, all fault fields will flash briefly. This verifies that the system is in calibration mode.

L. Starting at -30, slowly adjust the gain downward until the antenna clearance scan begins. This should take place at a gain value no lower than -26. The antenna will move to each of the extreme positions to determine that there is no interference with antenna movement and all scan motors are working properly.

Bendix/King Installation Manual Replacement Section 2

2.4.4.1 Stabilization Calibration with Radar Indicator

➤ To calibrate the radar pitch and roll:

A. From the Aux Page, enter Maintenance Mode, as described in Section 5.4, “Using the Maintenance Mode Page” on page 33. Select *Radar Setup* to display the Radar Setup Page:

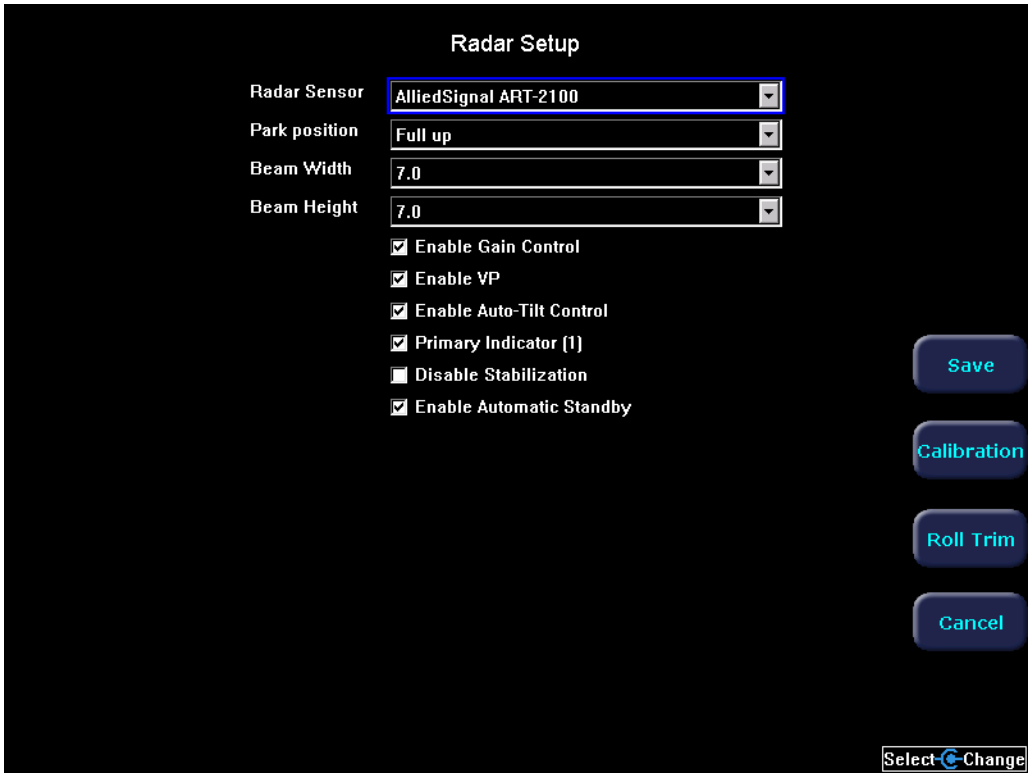


Figure 18: Radar Setup Page

Note: Once the ART-2000 has been installed, the Radar Setup Page will be similar to the Page shown here.

B. Set Park position to Full up.

C. Ensure that Enable Automatic Standby is selected.

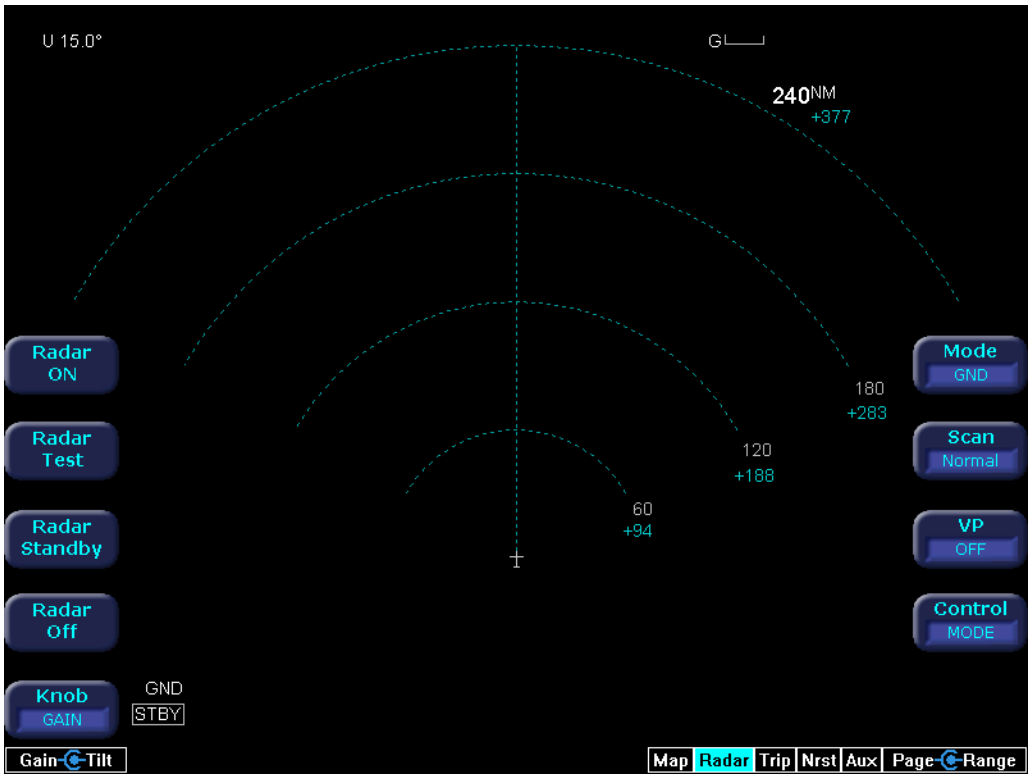
D. Restart the MFD, and open the Radar Page.

E. From the Radar Page:

- Press *Radar Standby* until the GND setting reads STBY.
- Set *Mode* to GND. The *Knob* button will display in the lower left corner.
- Set *Knob* to Gain.
- Use the *Gain* knob (outer left) to reduce the gain until the Gain indicator in the upper right shows the minimum setting. Note that you need to turn the Gain knob *clockwise* to reduce the gain (and counter-clockwise to increase it).

- Use the Tilt knob (inner left) to set the Antenna Tilt to full UP (U 15.0°).
- Use the Range knob (inner right) to set the range to 240 NM.

When the Radar Page is ready, it will look similar to the following:



Note: Failure to set any of the settings described in step E will prevent you from entering calibration mode. If more than one radar indicator is installed in the system, all but one indicator must be in the OFF or STBY position in order for the system to enter the calibration mode.

F. Open the Aux Page and enter Maintenance Mode.

G. Press *Radar Setup* to display the Radar Setup Page.

H. From the Radar Setup Page, press *Calibration* to display the Calibration Page (see Figure 2-5 in the Bendix/King Installation Manual). When the system opens in calibration mode, all Fault fields will flash briefly.

If the Fault fields do not flash, the Calibration Page is only open in display mode and you cannot make changes. Make sure that you carefully followed the instructions in step E and try to enter calibration mode again.

I. Once you are in calibration mode, use the left outer knob to set ROLL TRIM to 0°.

J. If desired, copy all displayed values to a notepad in case you need to recall a value that is accidentally changed.

Note: For information about how to adjust the radar settings, see Figures 2-10 and 2-11 in the Bendix-King *Installation Manual*.

If using an ARINC 429 gyro, proceed to step Q.

K. Calibrate 400 Hz REF GAIN

1. Set the tilt table to 0^{o} pitch and roll.
2. Use the GAIN control to set the GAIN POT /2 setting between 28- and 30-.
3. Set the 400 Hz REF field to 0.0 $\pm 1.0^{o}$. To adjust the value:
   - To increment the value of 400 Hz REF, use the right inner knob to change the TILT SETTING to between 5 and 10 UP. When the TILT SETTING is set to between 5 and 10 UP, the value of he 400HzZ REF field will slowly increase.
   - To decrement the value of 400 Hz REF, use the right inner knob to change the TILT SETTING to between 5 and 10 DOWN. When the TILT SETTING is set to between 5 and 10 DOWN, the value of the 400HZzREF field will slowly decrease.
   - When you reach the desired setting, quickly adjust the TILT SETTING to above 10 UP to lock in the setting.
4. Proceed to step L.

Note: If the 400 Hz REF field is zero (0), and does not change when the TILT knob is adjusted, check that the correct gyro has been selected when programming the Configuration Module.

L. Calibrate PITCH GAIN

1. Set the tilt table for 10^{o} pitch up.
2. Use the GAIN control to set the GAIN POT /2 setting to 25- or 26-.
3. Set the PITCH ANGLE field to 10.0 $\pm 1.0^{o}$.
   - To increment the value of the PITCH ANGLE, use the right inner knob to change the TILT SETTING to between 5 and 10 UP. When the TILT SETTING is set to between 5 and 10 UP, the value of the PITCH ANGLE field will slowly increase.
   - To decrement the value of PITCH ANGLE, use the right inner knob to change the TILT SETTING to between 5 and 10 DOWN. When the TILT SETTING is set to between 5 and 10 DOWN, the value of the PITCH ANGLE field will slowly decrease.
   - When you reach the desired setting, quickly adjust the TILT SETTING to above 10 UP to lock in the setting.
4. Set for 10^{o} PITCH DOWN. Repeat steps 2 and 3.
5. Set the tilt table to 0^{o} pitch and roll.
6. Proceed to step M.

M. Calibrate PITCH OFFSET

1. Use the GAIN controls to set the GAIN POT /2 setting to 18- or 19-.
2. Check that the tilt table is set for 0^{o} pitch.
3. Set the PITCH ANGLE field to 0.0 $\pm 1.0^{o}$.

- To increment the value of the PITCH ANGLE, use the right inner knob to change the TILT SETTING to between 5 and 10 UP. When the TILT SETTING is set to between 5 and 10 UP, the value of the PITCH ANGLE field will slowly increase.
- To decrement the value of PITCH ANGLE, use the right inner knob to change the TILT SETTING to between 5 and 10 DOWN. When the TILT SETTING is set to between 5 and 10 DOWN, the value of the PITCH ANGLE field will slowly decrease.
- When you reach the desired setting, quickly adjust the TILT SETTING to above 10 UP to lock in the setting.

4. Set the tilt table to 10^{o} pitch up. The value should be 10.0U ±1.0^{o}. If the value is out of range, repeat step L.
5. Set the tilt table to 10^{o} pitch down. The value should be 10.0D ±1.0^{o}. If the value is out of range, repeat step L.
6. Set the tilt table to 0^{o} pitch. The value should be 0.0 ±1.0^{o}. If the value is out of range, repeat this step (step M.).
7. Proceed to step N.

N. Calibrate ROLL GAIN

1. Set the tilt table for 10^{o} roll right.
2. Use the GAIN controls to set the GAIN POT /2 setting between 21- and 23-.
3. Set the ROLL ANGLE field to 0.0 ±1.0^{o}.
   - To increment the value of the ROLL ANGLE, use the right inner knob to change the TILT SETTING to between 5 and 10 UP. When the TILT SETTING is set to between 5 and 10 UP, the value of the ROLL ANGLE field will slowly increase.
   - To decrement the value of ROLL ANGLE, use the right inner knob to change the TILT SETTING to between 5 and 10 DOWN. When the TILT SETTING is set to between 5 and 10 DOWN, the value of the ROLL ANGLE field will slowly decrease.
   - When you reach the desired setting, quickly adjust the TILT SETTING to above 10 UP to lock in the setting.
4. Set the tilt table for 10^{o}roll left. Repeat Steps 2 and 3 of this section.
5. Set the tilt table for 0^{o} pitch and roll.
6. Proceed to step O.

O. Calibrate ROLL OFFSET

1. Use the GAIN control to set the GAIN POT /2 setting between 14- and 16-.
2. Check that the tilt table is set for 0^{o} roll.
3. Set the ROLL ANGLE field to 0.0 ±1.0^{o}.
   - To increment the value of the ROLL ANGLE, use the right inner knob to change the TILT SETTING to between 5 and 10 UP. When the TILT SETTING is set to between 5 and 10 UP, the value of the ROLL ANGLE field will slowly increase.

- To decrement the value of ROLL ANGLE, use the right inner knob to change the TILT SETTING to between 5 and 10 DOWN. When the TILT SETTING is set to between 5 and 10 DOWN, the value of the ROLL ANGLE field will slowly decrease.
- When you reach the desired setting, quickly adjust the TILT SETTING to above 10 UP to lock in the setting.

4. Set the tilt table to 10^{o} roll right. The value should be 10.0R ±1.0^{o}. If the value is out of range, repeat step N.
5. Set the tilt table to 10^{o} roll left. The value should be 10.0L ±1.0^{o}. If the value is out of range, repeat step N.
6. Set the tilt table to 0^{o} roll. The value should be 0.0 ±1.0^{o}. If the value is out of range, repeat this step (step O.).
7. Proceed to step P.

P. Save Configuration

1. Adjust the GAIN controls for a GAIN POT /2 setting to 4- or 5-.
2. The FAULTS field will display GYRO.
3. Set the TILT SETTING to 15.0D. The fault fields will flash indicating that your settings are being saved. If the save procedure is successful, the GYRO fault will disappear and the azimuth count will cycle through its entire number range.

Note: For an example, see step S.

4. If the GYRO fault remains, set TILT to 0 and repeat step 3.
5. After saving the configuration, this section is complete.

For radar with an ARINC 429 gyro, start here after completing step L.

Q. Calibrate AHRS ARINC 429 PITCH OFFSET

1. Adjust the GAIN buttons for a GAIN POT /2 setting to 11- or 12-.
2. Check that the tilt table is set for 0^{o} pitch.
3. Set the PITCH ANGLE field to 0.0 ±1.0^{o}.
   - To increment the value of the PITCH ANGLE, use the right inner knob to change the TILT SETTING to between 5 and 10 UP. When the TILT SETTING is set to between 5 and 10 UP, the value of the PITCH ANGLE field will slowly increase.
   - To decrement the value of PITCH ANGLE, use the right inner knob to change the TILT SETTING to between 5 and 10 DOWN. When the TILT SETTING is set to between 5 and 10 DOWN, the value of the PITCH ANGLE field will slowly decrease.
   - When you reach the desired setting, quickly adjust the TILT SETTING to above 10 UP to lock in the setting.
4. Set the tilt table to 10^{o} pitch up. The value should be 10.0U ±1.0^{o}. If the value is out of range, repeat Steps 1, 2 and 3 of this section.

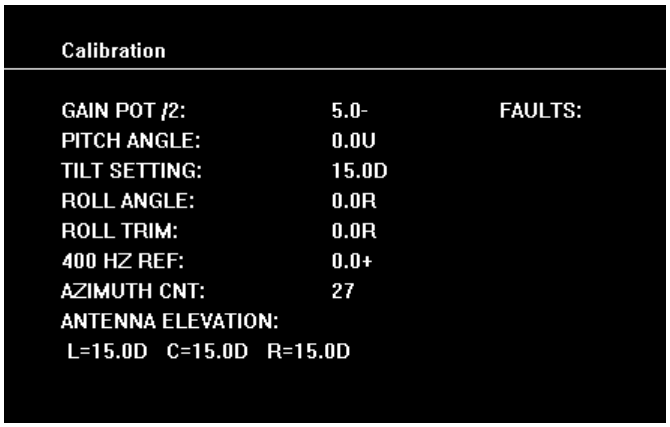
5. Set the tilt table to 10^{o} pitch down. The value should be 10.0D ±1.0^{o}. If the value is out of range, repeat Steps 1, 2, 3 and 4 of this section.
6. Set the tilt table to 0^{o} pitch. The value should be 0.0 ±1.0^{o}.
7. Proceed to step R.

R. Calibrate AHRS ARINC 429 ROLL OFFSET

1. Adjust the GAIN controls for a GAIN POT setting to between 7- and 9-.
2. Check that the tilt table is set for 0^{o} roll.
3. Set the ROLL ANGLE field to 0.0 ±1.0^{o}.
   - To increment the value of the ROLL ANGLE, use the right inner knob to change the TILT SETTING to between 5 and 10 UP. When the TILT SETTING is set to between 5 and 10 UP, the value of the PITCH ANGLE field will slowly increase.
   - To decrement the value of ROLL ANGLE, use the right inner knob to change the TILT SETTING to between 5 and 10 DOWN. When the TILT SETTING is set to between 5 and 10 DOWN, the value of the ROLL ANGLE field will slowly decrease.
   - When you reach the desired setting, quickly adjust the TILT SETTING to above 10 UP to lock in the setting.
4. Set the tilt table to 10^{o} roll right. The value should be 10.0R ±1.0^{o}. If the value is out of range, repeat step R.
5. Set the tilt table to 10^{o} roll left. The value should be 10.0L ±1.0^{o}. If the value is out of range, repeat step R.
6. Set the tilt table to 0^{o} roll. The value should be 0.0 ±1.0^{o}.
7. Proceed to step S.

S. Save Configuration

1. Adjust the GAIN controls for a GAIN POT /2 setting to 4- or 5-.
2. The FAULTS field will display GYRO.
3. Set the TILT SETTING to 15.0D. The fault fields will flash indicating that your settings are being saved. If the save procedure is successful, the GYRO fault will disappear and the azimuth count will cycle through its entire number range.



4. If the GYRO fault remains, set TILT to 0 and repeat step 3.
5. After saving the configuration, this section is complete.

Bendix/King Replacement Sections END

5.9.2 Roll Trim Adjustment

➤ To adjust the Roll Trim Adjustment:

1. From the Maintenance Mode Page, select *Setup Radar*.
2. From the Radar Setup page. select *Roll Trim.*
3. The Roll Trim value appears on the Radar screen and can be modified by the Roll Trim control knob.
4. When you are done, press *Back* to save the new Roll Trim setting and return to the Radar Setup Page.
5. Press *Save* from the Radar Setup Page. Press *Cancel* to exit without saving changes.
6. Changes do not take effect until the MFD has been restarted. From the Maintenance Mode Page, press *Restart System*.

5.9.3 RADAR Checkout

Perform a functional test of the RADAR system in accordance with manufacturers instructions. See the *MFD Pilot Guide* for display operation.

5.9.4 RADAR Sensor Communications Troubleshooting

If there is a communication or data error between the RADAR sensor and the MFD, one of the following messages will display on the bottom of the screen.

Table 25: Radar Sensor Error Messages

Message	Meaning/Action
Radar Sensor Data Is Invalid	Data received from the RADAR sensor system can not be used by the EX5000 ■ Cycle power on the EX5000. ■ See RADAR Sensor Installation and User's Manual for troubleshooting guidance.
Radar Sensor Has Failed	The RADAR sensor system has reported an error. ■ Check R/T configuration module error log. ■ See the RADAR Sensor Installation and User's Manual for troubleshooting guidance.
Radar Sensor Is Not Communicating	Communication of return data from the RADAR sensor to the MFD has been lost. ■ Verify that the RADAR sensor is turned on and valid. ■ Verify that the EX5000 is properly seat in its tray. ■ Verify system wiring.
Invalid GPS Data and Radar is ON	The RADAR is ON and the EX5000 has no ground speed data available from the GPS/FMS. ■ Verify the GPS/FMS is ON and valid. ■ Verify system wiring. ■ See the RADAR Sensor Installation and User's Manual for troubleshooting guidance.
Radar Automatic Standby Disabled	The RADAR is ON, the EX5000 RADAR automatic standby mode is disabled, and the EX5000 has no ground speed data available from the GPS/FMS. ■ Verify the GPS/FMS is ON and valid. ■ Verify system wiring. ■ See the RADAR Sensor Installation and User's Manual for troubleshooting guidance.

5.10 Engine Instruments Setup

The MFD supports engine display on Cirrus, Columbia, Diamond, Lancair, Piper, and Symphony Aircraft by receiving data via RS232 and/or ARINC429 from an engine sensor interface unit specifically designed for each aircraft. Not all display functions are available on all aircraft. For wiring information, see Appendix O: *Wiring Diagram – Engine Sensors*.

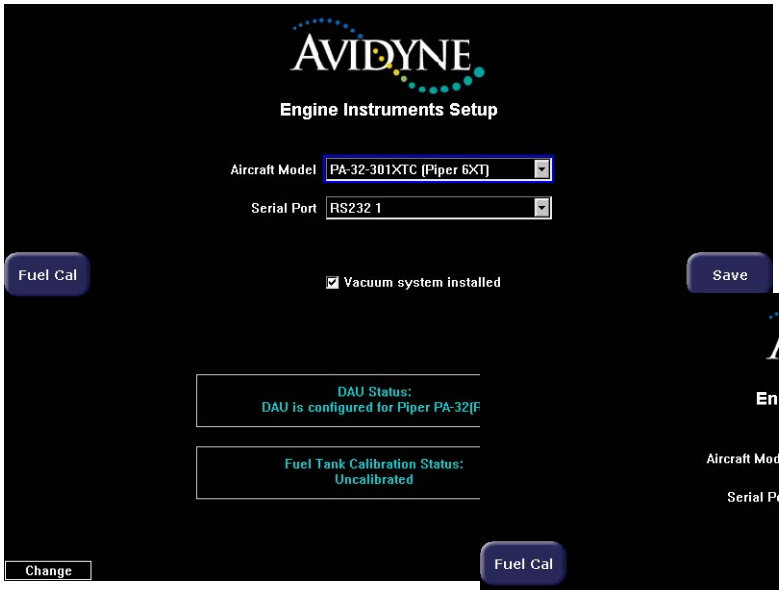
Only activate the Engine Instruments Setup for those aircraft specifically included under Avidyne Service Bulletin, STC, or TC authorization. Do not set up the MFD Engine Sensor interface for any unapproved aircraft installation.

5.10.1 Engine Instruments Setup

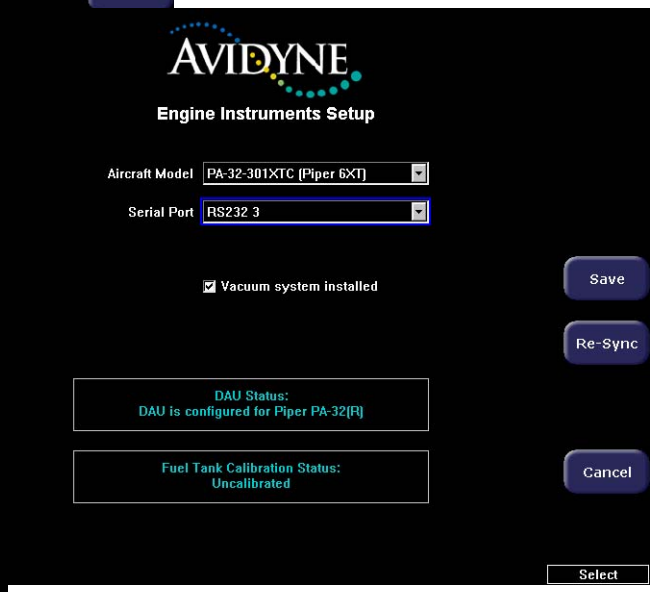
➤ To set up the Engine Sensor:

1. From the Maintenance Mode Page, select Engine Setup. The Engine Instruments Setup Page displays.

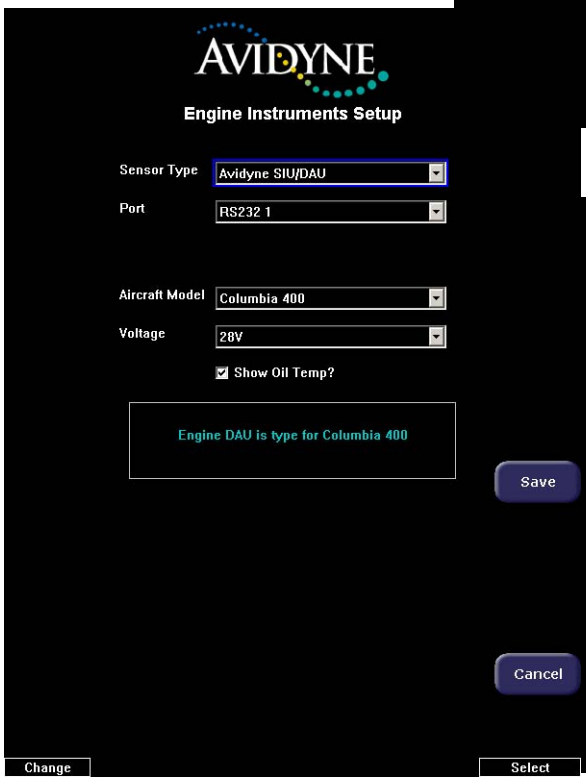
Note: The options available on the Engine Instruments Setup Page can vary widely between different aircraft types and models. In this section, a number of different Engine Instrument Setup Pages are displayed. However, depending on the actual installation, your view may be different.



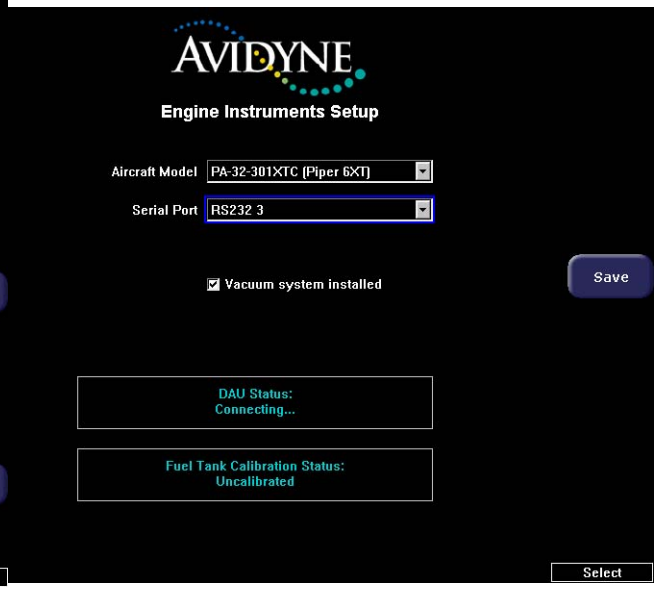
Piper PA32 Engine Setup



Piper 32 Engine Setup (Primary Engines)



Columbia 400 Engine Setup



Piper PA32 Engine Setup

Figure 19: Engine Instruments Setup Pages

2. Depending on the aircraft type and model, you may need to select the **Sensor Type** installed in this airplane, which will be one of:
   - Avidyne SIU
   - Vision DPU
   - Avidyne DAU
   - Avidyne SIU/DAU

➥ Not all aircraft require that you select the sensor type.

3. Select the model of this plane from the **Aircraft Model** pull-down list.

Ensure that you select the airplane type and model that matches this aircraft. Selecting the wrong model can result in displaying inaccurate data.

After you select the aircraft type, you **must** select a valid port for the connection, or press *Cancel* to cancel the setup. Pressing the *Save* button before you select a Port can cause the MFD to hang in an unusable state that must be factory reset.

For Software Part Number 530-00180-200 only: Ensure that you enter the Aircraft Model before pressing the *Save* button.

If you set the SIU/DAU Type to *Avidyne SIU/DAU* and press *Save* without specifying the Aircraft Type, the MFD will become unusable after restarting. In this case, you will need to replace the Compact Flash for the aircraft.

4. Depending on the aircraft type and model, the appropriate options are displayed. These options may include the following:
   - **Port—**If this option is available, select the MFD RS232 port to which the Engine interface unit is wired.

Note: For twin-engine aircraft, make selections for both the left and right ports.

   - **DAU ARINC Port—**Select the ARINC port to which the Engine interface unit is wired.
   - **Electrical/Rudder Trim Port—**Select the RS232 port from which electrical and rudder trim information will be received.
   - **Fuel Quantity Port—**Select the RS232 port from which fuel quantity will be received.
   - **Fuel Units—**Select whether to display fuel information in English or metric units.
   - **Fuel Tank Size**—In gallons (Cirrus DAU aircraft only). Select the appropriate tank size for this aircraft.

If Fuel Tank Size displays, it is very important that you select the correct tank size for the aircraft. The MFD uses the selected tank size to determine fuel quantity.

   - **Fuel to Tabs**—In gallons (Cirrus DAU aircraft only). Select the appropriate fuel to tabs level for this aircraft.

.

If Fuel to Tabs is displayed, it is very important that you select the correct fuel to tabs level for the aircraft.

Vacuum System Installed (Optional)—If the MFD software version supports a display of vacuum system pressure on the Engine Page, a checkbox displays on the Engine Setup page. *If a vacuum system with compatible vacuum pressure sensor is installed in the aircraft*, select this checkbox and use the knob to check the box.

- **Electrical (Optional)—**If this option is available, select the type of electrical system: Single Bus, Single Alternator; Single Bus, Dual Alternator; or Dual Bus, Dual Alternator. (Note that not all selections are available with all aircraft.)
- **Voltage (Optional)—**If this option is available, select 14V or 28V, as appropriate, for the aircraft installation. Only determines Engine Page display ranges for electrical system information.

5. When instructed, proceed to the Aircraft Setup Page to complete the Engine Setup.

Note: Upon completion of all configuration procedures, confirm that the MFD is communicating properly with the corresponding engine interface unit. This can be verified after the Engine Sensor setup is completed.

The MFD uses an RS232 data connection to receive data from the Engine Sensor Unit. An ARINC 429 connection is also used for specific aircraft.

Note: The data box at the bottom of the page shows the configuration of the SIU/DAU and whether data is being properly received.

If the Engine Setup settings do not match with the configuration settings of the SIU/DAU, you will see a yellow annunciation alerting you to recheck configuration of this page and/or the configuration settings of the SIU/DAU.

If the SIU/DAU was off or not properly connected when you entered the Engine Setup page, but subsequently was properly selected and operating correctly, the Engine Setup Page status box may not be properly refreshed to reflect this.

Confirm that the correct Engine Setup options are selected, press *Save*, and restart the MFD. After restarting, confirm that the MFD is properly receiving the engine data from the SIU/DAU.

Note: In the event that the aircraft model and type are configured correctly, but the DAU Status box displays a configuration error, press the ‘Re-Sync’ button. This will fix the problem.

Note: Under certain circumstances, the Engine Page may continue to indicate normal DAU communication even when communication is lost between the MFD and DAU. Additionally, the calibration buttons remain on the page, even though they are inactive.
If this occurs, exit the Engine Page. When you reselect the Engine Page, the appropriate status messages will display.

Fuel Quantity Calibration (Optional)

Fuel quantity indicator calibration is used to compensate for aircraft-to-aircraft variations in the fuel quantities reported by the Engine Data Acquisition Unit (DAU). If available, select the *Fuel Cal* button d from the Engine Instruments Setup Page.

When upgrading an MFD, be sure to use the Configuration Save and Restore Utility instead of recalibrating the fuel quantity. See Section 5.3, “Using the Configuration Save and Restore (CSR) Utility” on page 32 for more information.

Note: This option is not available on all aircraft. This option is only available with software part numbers 530-00137-000, 530-00137-001, 530-00170-000, 530-00170-002, 530-00180-002, 530-00195-002, 530-00195-012, and 530-00201-002.

The fuel quantity indicator can only be calibrated if the DAU is communicating with the MFD and sending valid fuel quantity data. If the DAU is not communicating with the MFD, a DAU failure screen is displayed when the Fuel Cal Page is selected. In this case, the only available selection is to exit the page.

The Fuel Quantity Indicator Calibration Page displays the current fuel quantity indicator calibration values. Different options are available depending on the state of the fuel quantity indicator calibration. The three states of the fuel quantity indicator calibration are:

1. Not Calibrated
2. Calibration Underway
3. Calibrated

➤ To calibrate fuel quantity for 530-00137-() and most 530-00170-(), 530-00180-(), 530-00195-(), and 530-00201-() software:

1. From the Engine Instruments Setup Page, select *Fuel Cal*.
2. From the Not Calibrated state, select *Begin Cal*.
   - The state of fuel calibration changes to Underway and the fuel quantity indicator can be calibrated.
   - If you press *Exit*, the Engine Instruments Setup Page displays with the calibration state unchanged.
3. Use the right knob to select the current calibration point. The selected calibration point is highlighted and the value displayed is the current reported quantity from the DAU. A message at the bottom of the screen prompts you to add the appropriate amount of fuel. Then press *Accept Value* once the value reported from the DAU has stabilized.

   If the DAU reported value is not within 2 gallons of the test point value, the value is not accepted and the message “DAU Reported Fuel Quantity Out Of Tolerance” is displayed. Recalibrate the current calibration point.

   If you cannot correctly calibrate the fuel quantity, inspect the fuel tank and fuel level sensor for problems.
4. Repeat this process for all the calibration points.
5. To pause the calibration process and turn off power to the MFD, press *Save* to save the interim calibration values.

6. Once all points have been calibrated, press *Calibration Complete*. The calibration factors are computed and applied to DAU reported fuel quantity.
7. When you are done, press *Save*. Press *Cancel* to exit without saving changes.
8. Changes do not take effect until the MFD has been restarted. From the Maintenance Mode Page, press *Restart System*.

Other options from the Underway state are to *Restore Last Cal* and *Clear Cal*:

- Press *Restore Last Cal* to restore the calibration values from the last completed calibration. The calibration state is change to Calibrated.
- Press *Clear Cal* to clear all calibration values. The state changes to Not Calibrated.

An *Are You Sure?* prompt gives you the chance to reconsider the decision to either restore or clear the fuel calculations.

➥ Pressing *Cancel* from the Underway state causes the current calibration session to end without saving any interim calibration values.

Note: For the fuel calibration procedure for the 530-00170-000, 530-00180-000, 530-00195-000, 530-00195-001, 530-00195-010, and 530-00201-000 software, see the Piper Process Specification document PPS60185.

Torque Calibration (Optional)

For some aircraft, the MFD provides an interface to the Torque Calibration feature. If this feature is available, the *Torque Cal* button displays.

For information about using the Torque Calibration feature, see the factory procedures for the aircraft.

5.10.2 Engine Sensor Checkout

After restarting the MFD, view the Engine page to verify data communication. Operate the aircraft engine to confirm correct operation of all sensors.

➥ The Percent Power function will not operate correctly on some models until the Aircraft Setup has been completed.

5.11 Aircraft Setup

The options on the Aircraft Setup Page depend on the aircraft model and selected options for that aircraft. These options may include:

- Auxiliary Data
- 2-Way Datalink
- Broadcast Datalink
- Long Range Tanks
- Checklists
- Dimming Bus

Note: The available options depend on the aircraft model and additional purchased features. Your aircraft will not have all options available.

➤ To configure the Aircraft Setup Page:

1. From Maintenance Mode, select Aircraft Setup. The Aircraft Setup Page displays:

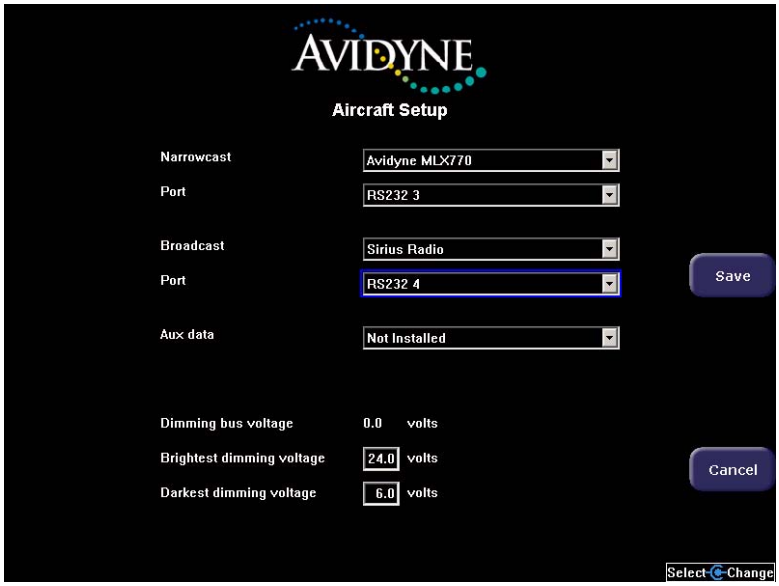


Figure 20: Aircraft Setup Page with Datalink

2. Set the options that appear on the Aircraft Setup Page. These options will vary depending on the aircraft model and optional features selected.

Aircraft Setup options are described in the following sections:

- Section 5.11.1, “Auxiliary Data Setup” on page 74
- Section 5.11.2, “2-Way (Narrowcast) Datalink Setup” on page 74
- Section 5.11.3, “Broadcast Datalink Setup” on page 76
- Section , “” on page 77

- Section , “” on page 77
- Section , “” on page 78

3. When you are done, press *Save*. Press *Cancel* to exit without saving changes.
4. Changes do not take effect until the MFD has been restarted. From the Maintenance Mode Page, press *Restart System*.

5.11.1 Auxiliary Data Setup

On some aircraft, you can optionally configure the MFD to receive pressure altitude and outside air data (OAT) from the PFD via a ARINC 429 interface.

If Aux Data is available, configure it as follows:

- **Aux Data**—Select Entegra PFD. This allows the MFD to receive ARINC 429 data from the PFD for input to the % Power calculations.
- **Port—**Select the MFD ARINC port to which the PFD is wired.

Auxiliary Data Checkout

After the MFD has been restarted, any of the following messages may appear in the message bar on any page and in the message list on the Setup page.

Table 26: Auxiliary Data Messages

Message	Meaning
PFD is Operating Normally	Verifies that pressure altitude and OAT data received by the MFD is valid.
PFD is Not Communicating	Pressure altitude or OAT data are not being received by the MFD.

5.11.2 2-Way (Narrowcast) Datalink Setup

If 2-Way (Narrowcast) Datalink is installed in this aircraft, the Narrowcast pull-down will be available.

Select (enable) the appropriate transceiver as follows:

- **Narrowcast—**Select the appropriate transceiver:
  - **Avidyne MLX770**—Enables a connected MLX770 Iridium transceiver.
  - **Quake SC**—Enables an internal ORBCOMM Datalink transceiver.
  - **Not Installed**—Select if no MLX770 or internal ORBCOMM Datalink transceiver is installed.
- **Port—**RS232 port 6 (Internal Quake SC), or as wired (MLX770).

Note: Do not use RS232 ports 5 or 6 for MLX770.

MLX770 Iridium Datalink Checkout

➤ To check the MLX770 Iridium Datalink installation:

1. On the Maintenance Mode page, select System Info. The System Info page opens:

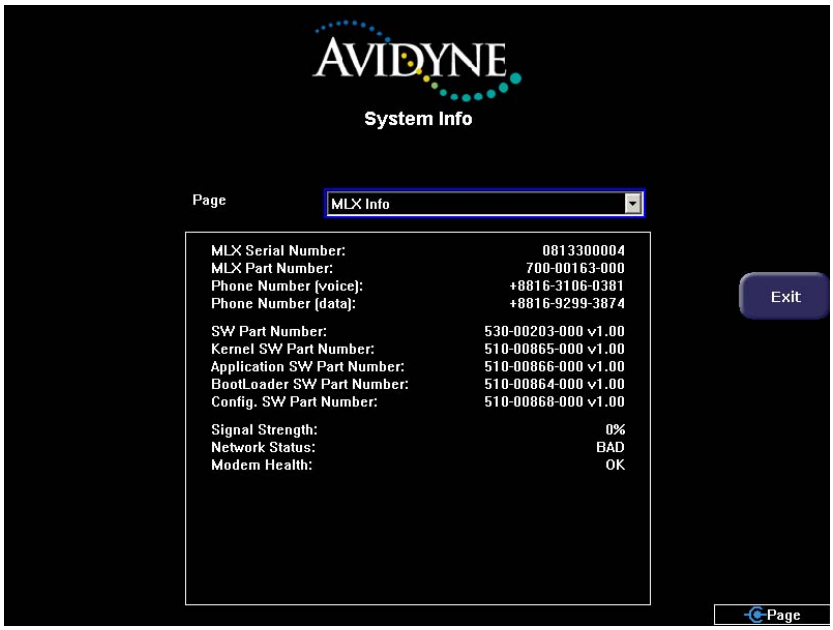


Figure 21: System Info—MLX Info Page for Iridium

2. In the Page dropdown, select MLXInfo.
3. On the MLX Info page, verify the MLX Serial Number and software versions.

   When the MLX770 transceiver is enabled and the port is selected on the Aircraft Setup page, the EX5000 is pre-configured for Iridium Datalink operation.

➥ To finish the checkout process, see Section 6.5, “2-Way Datalink Satellite Reception Confirmation” on page 85.

ORBCOMM Datalink Checkout

➤ To check the ORBCOMM Datalink installation:

1. From the Maintenance Mode page, select System Info. The System Info page displays:

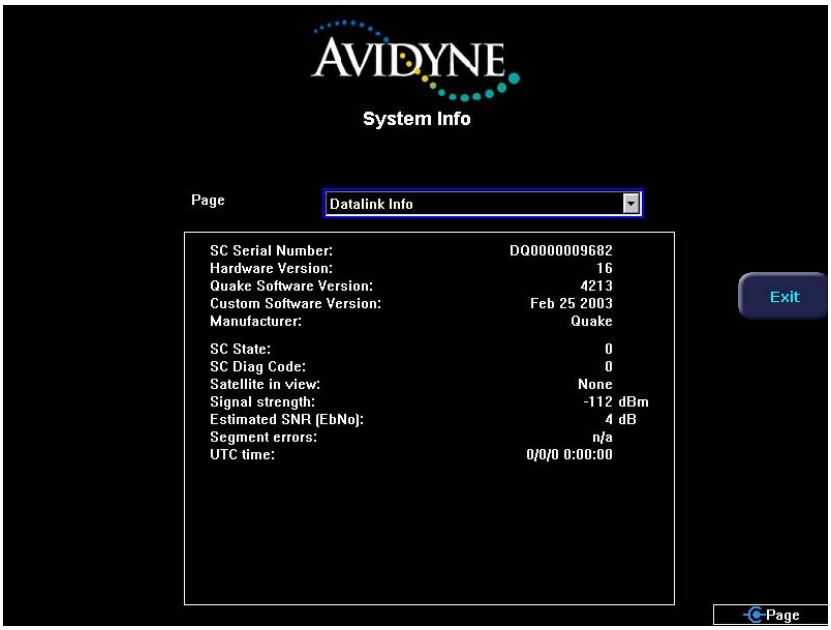


Figure 22: System Info—Datalink Info Page for ORBCOMM

2. In the Page dropdown, select Datalink Info.

3. On the Datalink Info page, verify the SC Serial Number and software versions.

If ORBCOMM is enabled and the port is selected on the Aircraft Setup page, the EX500 is configured for ORBCOMM operation.

➥ To finish the checkout process, see Section 6.5, “2-Way Datalink Satellite Reception Confirmation” on page 85.

5.11.3 Broadcast Datalink Setup

On some aircraft, the MFD supports the Heads Up XMD076 XM data receiver or Avidyne MLB700 Sirius broadcast receiver. If XM or WSI is available and an XM or WSI receiver has been installed on this aircraft, the Broadcast pull-down will be available.

Configure Broadcast as follows:

- **Broadcast**—XM Radio or Sirius Radio. This enables the Datalink functionality and communication with the satellite data receiver.
- **Port—**Select the RS-232 port wired to the broadcast receiver.

5.11.4 Broadcast Datalink Checkout

➤ To check the Broadcast Datalink Installation:

1. Power up the MFD and broadcast datalink Receiver and select the Trip Page.
2. From the Trip Page, press *Display* to view Broadcast Status (down pointing arrow). If the MFD reports a Receiver ID, the receiver is communicating with the MFD and the RS-232 wiring is correct.
3. Position the aircraft in an area open to the sky.
4. Check the Signal Quality, as displayed on the lower half of the Trip Page.
   - **Good**—Confirms the receiver is detecting the satellite signals.
   - **Marginal** or **Weak**—May require repositioning the aircraft to better location.
   - **None**—Indicates a bad antenna, cable, connection or receiver.

For more information about the XM receiver, see the *XMD076 XM Receiver Installation Manual and Activation Instructions* from Heads Up Technologies or contact Heads Up Technologies at service@heads-up.com or (972) 407-1131.

Note: If Broadcast Datalink does not connect because the XM trial period has expired, call Heads Up Technologies at (972) 407-1131 to activate the account for testing. Visit www.myavidyne.com to activate a WSI account for testing.

For information about customer activation, see the appropriate *Entegra EX5000 Pilot's Guide*.

After restarting the MFD, either of the following messages may appear in the message bar on any page and in the message list on the Aux or Setup Page.

Table 27: Broadcast Datalink Messages

Message	Meaning
Broadcast is Operating Normally	Verifies that the MFD is communicating with the broadcast Receiver
Broadcast is Not Communicating. (After 5 minutes of no communication).	The MFD is not communicating with the broadcast Receiver. Check power and signal wiring.

➥ Make a note of the Receiver ID for the aircraft owner, who will need it to begin Broadcast Datalink service.

➥ To finish the checkout process, see Section 6.6, "Broadcast Datalink Satellite Reception Confirmation" on page 86.

5.11.5 Long Range Tanks Setup

Some aircraft are equipped with long range fuel tanks. If the Long Range Fuel Tanks feature is available on this aircraft, the **Long Range Tanks Installed?** checkbox will be available from the Aircraft Setup Page.

Check **Long Range Tanks Installed?** to allow the MFD to track long range fuel usage.

5.11.6 Checklists Setup (Cirrus & Columbia Only)

EX5000 MFDs in Cirrus & Columbia aircraft support Checklists. If Checklists are available for this aircraft, the Checklist pull-down will be available from the Aircraft Setup Page.

Use the Checklist pull-down to select the appropriate aircraft and serial number range. Checklists are only available for aircraft listed in the Checklist pull-down.

Caution: The checklist function is only authorized for use specifically with the aircraft types that are listed on the Aircraft Setup page. **Do not select any aircraft type that does not match the installation aircraft.** If the installation aircraft type is not listed as a checklist option on the Aircraft Setup page, then the checklist function is not available for that aircraft. **Selecting an inappropriate aircraft type can lead to incorrect operation of the aircraft by the pilot**.

Note: This option is only available with software part numbers 530-00117-000, 530-00130-000, 530-00148-000, 530-00162-000/002, 530-00180-100/200, 530-00195-100/110/210, and 530-00201-100/200.

Note: The current revision of the installed checklists will appear on the splash screen on restarting the MFD. If you modify the Checklist settings in the Aircraft setup page, restart the MFD and observe the splash screen to verify the current revision of the Checklist.

Note: If you are using an OEM-supplied build of Checklist Loader, follow the instructions in the manual, “Multi-Function Display Checklist Editor - User’s Guide” (600-00144-000, Latest Revision).

5.11.7 Dimming Bus Setup

On all aircraft, you can configure the LEDs on the bezel to better match the other cockpit instrument lights on the aircraft dimming bus.

➤ To set the dimming bus:

1. Highlight the Brightest dimming voltage selection. An additional button, *Set Voltage,* appears below the *Save* button.
2. Adjust the Airplane dimming bus (usually a knob) to the full bright level. Monitor the dimming bus voltage on the MFD below the selection boxes. When at full bright, press *Set Voltage* to update the highlighted field.
3. Highlight the Darkest dimming voltage selection and adjust the airplane dimming bus to a level so that the other cockpit instruments are at their lowest brightness level.
4. Press *Set Voltage* again to update the Darkest dimming voltage field.

5.11.8 Dimming Bus Checkout

Restart the MFD. Adjust the aircraft dimming bus and verify that the MFD bezel LEDs match the rest of the cockpit instrument lamps and lights.

5.12 Map Setup

The MFD can overlay Traffic intruders and Lightning strikes on the Map pages. To utilize this feature, configure Map Heading with the appropriate source of heading or ground track to match the aircraft wiring. For more information about wiring, see Figure 3, Figure 4, and Figure 5 on page 27.

The MFD can receive heading data transmitted from one of the following sources:

- Avidyne Entegra Primary Flight Display (PFD).
- GPS/FMS (via 429) capable of providing heading information
- L-3 StormScope (via RS -232)
- TAS L-3 SkyWatch (must have 1.6 software level or higher)

The MFD can receive aircraft ground track from one of the following sources.

- GPS/FMS (via 429)
- GPS (via RS-232)

5.12.1 Setup with Entegra PFD as Heading Source

➤ To configure the MFD with the PFD as a heading source:

1. From the Maintenance Mode Page, select Aircraft Setup.
2. Ensure that the Aux Data field on the MFD Aircraft Setup Page is configured to read data from the Entegra PFD.
3. Return to the Maintenance Mode Page and select Map Setup.
4. Set the following option:

   Map Heading—Entegra

   When you are done, press *Save*. Press *Cancel* to exit without saving changes.
5. Changes do not take effect until the MFD has been restarted. From the Maintenance Mode Page, press *Restart System*.

5.12.2 Setup with GPS/FMS as Heading Source

➤ To configure the MFD with the GPS/FMS as a heading source:

1. From the Maintenance Mode Page, select GPS Setup.
2. Ensure that GAMA 429 GPS has been selected in the GPS Setup.
3. Return to the Maintenance Mode Page and select Map Setup.
4. Set the following option:

   Map Heading—GPS/FMS
5. When you are done, press *Save*. Press *Cancel* to exit without saving changes.
6. Changes do not take effect until the MFD has been restarted. From the Maintenance Mode Page, press *Restart System*.

5.12.3 Setup with StormScope as Heading Source

➤ To configure the MFD with the StormScope as a heading source:

1. From the Maintenance Mode Page, select Lightning Setup.
2. Ensure that StormScope is configured for Synchro or Stepper Stabilization in the Lightning Setup Page.
3. Return to the Maintenance Mode Page and select Map Setup.
4. Set the following option:

   Map Heading—StormScope

5. When you are done, press *Save*. Press *Cancel* to exit without saving changes.
6. Changes do not take effect until the MFD has been restarted. From the Maintenance Mode Page, press *Restart System*.

5.12.4 Setup with Traffic (TAS) as Heading Source

➤ To configure the MFD with the Traffic as a heading source:

1. From the Maintenance Mode Page, select Traffic Setup.
2. Ensure that TAS is selected as the traffic sensor in the Traffic Setup Page.
3. Return to the Maintenance Mode Page and select Map Setup.
4. Set the following option:

   Map Heading—Traffic (TAS)

5. When you are done, press *Save*. Press *Cancel* to exit without saving changes.
6. Changes do not take effect until the MFD has been restarted. From the Maintenance Mode Page, press *Restart System*.

If SkyWatch is used as the heading source, the SkyWatch software level must be 1.6 or higher. SkyWatch software levels lower than1.5 can cause the heading to be off by a significant factor.

5.12.5 Map Orientation with Track

If Heading information is unavailable, Track data can be used for Map, Lightning, and Traffic overlays. Track data comes from the GPS/FMS. Track is the actual direction the aircraft is moving relative to the earth's surface.

Note: Avidyne recommends using a Heading reference for the overlay feature. Only use Track if Heading is not available. Track does not compensate for the “crab” angle of the aircraft.

➤ To configure the MFD with GPS track in place of a heading source:

1. From the Maintenance Mode Page, select Map Setup. The Map Setup Page displays:

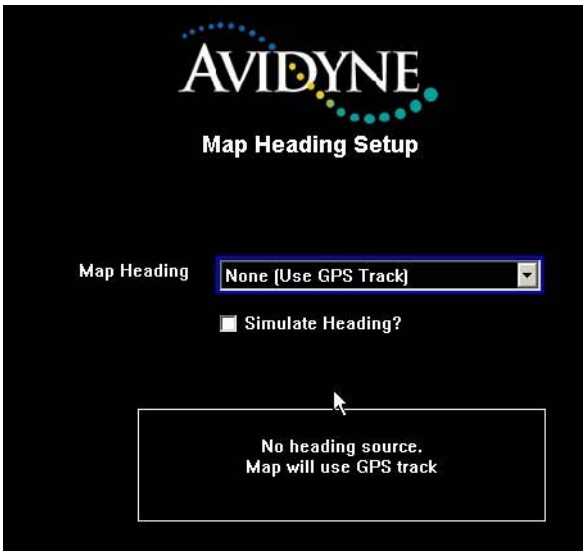


Figure 23: Map Setup Page for Track

2. Set the following option:

   Map Heading—None (Use GPS Track)

3. When you are done, press *Save*. Press *Cancel* to exit without saving changes.
4. Changes do not take effect until the MFD has been restarted. From the Maintenance Mode Page, press *Restart System*.

5.12.6 Map Heading/Track Status

➤ To check the operational status of your heading or track:

1. Return the MFD to normal operation, that is, save all changes and restart the MFD. The GPS/FMS must be on and locked onto a valid position. The selected heading source (GPS, StormScope, SkyWatch, must be on and operational.
2. From the Map Page, look for the following:
   - **Heading—**The box at the top center of the Map display should contain the letters HDG and the value should match the aircraft compass system.
   - **Track—**The box at the top center of the Map display should contain the letters TRK and an appropriate value.

Fault Conditions: The loss of Heading will cause the Center and Forward views of Map to be oriented to Track and the Heading indicator at the top of the Map Page will switch to a Track indicator. Loss of Heading and Track will cause the Heading indicator to display 3 dash lines. The airplane symbol will be replaced by a white “+” sign and the map will be in a north up orientation.

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6 Post-Installation Check

After installing the MFD, you need to perform a post-installation check to ensure that all components are working properly.

This section contains the following information:

- Section 6.1, “System Info Pages” on page 83
- Section 6.2, “Electro-Magnetic Compatibility (EMC) Check” on page 85
- Section 6.3, “Lightning Sensor Strike Test” on page 85
- Section 6.4, “Traffic Test” on page 85
- Section 6.5, “2-Way Datalink Satellite Reception Confirmation” on page 85
- Section 6.6, “Broadcast Datalink Satellite Reception Confirmation” on page 86
- Section 6.7, “Magnetic Compass Swing” on page 87

6.1 System Info Pages

Avidyne provides three System Info pages to help you determine if system settings are correct and functioning.

6.1.1 System Info Datalink Page

The Datalink Page provides information about your Narrowcast and Broadcast set up, as well as UTC time and other information.

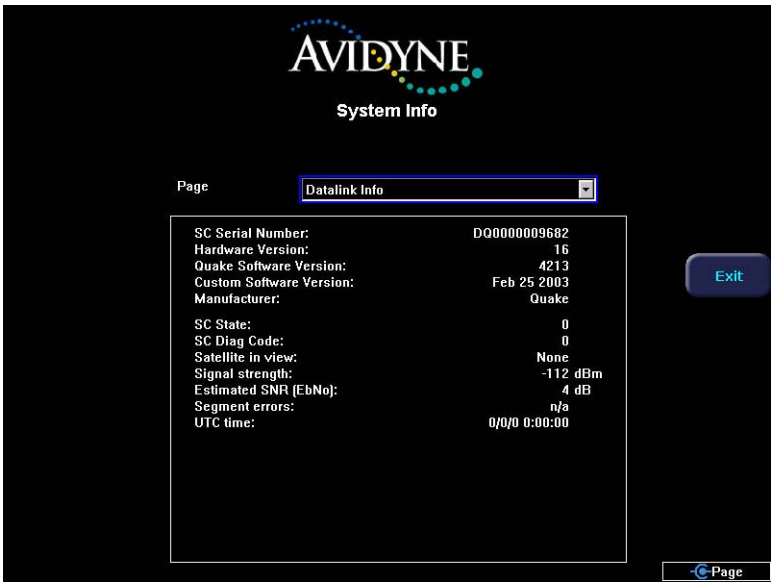

Figure 24: System Info—Datalink Page

6.1.2 System Info Platform Page

The Platform Page provides information about the hardware platform and settings of your MFD.

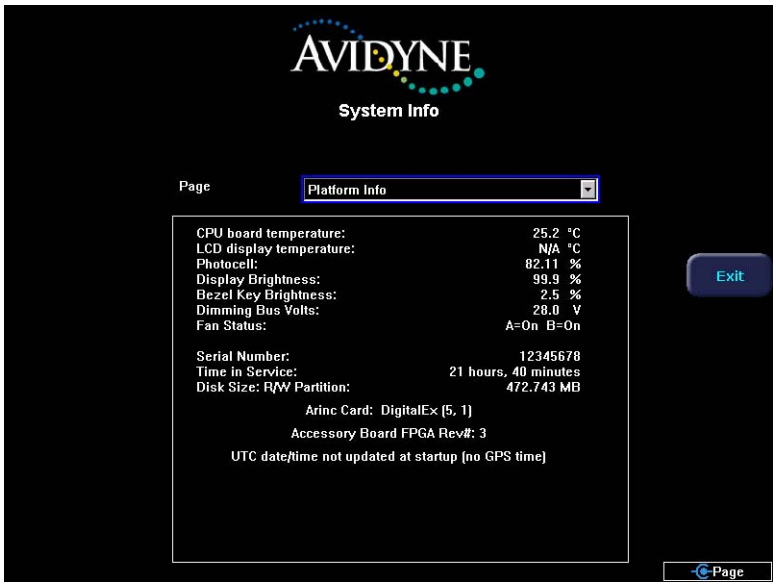

Figure 25: System Info—Platform Page

6.1.3 System Info Port Page

The Port Page displays the ports selected for various features during the setup process.

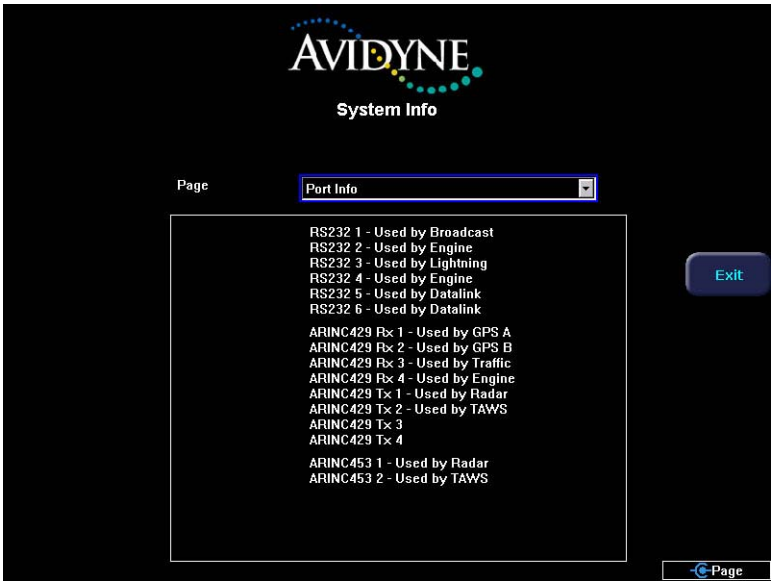

Figure 26: System Info—Port Page

6.2 Electro-Magnetic Compatibility (EMC) Check

The EMC check verifies that all of the electronic systems installed on the aircraft are compatible. Operating the MFD should not result in Nav flags, constant location lightning strikes on the WX-500 sensor, noise on COMM channels, or other phenomena.

- **COM Radios**—Scan through radio channels to ensure there is no interference caused by the MFD. Check random frequencies from 118.00 MHz through 136.975 MHz as well as your local ground and tower frequencies to ensure there is no break in squelch due to the installation.
- **GPS**—Ensure that correct position is displayed and that there is no change in satellite signal strength with the MFD powered off.
- **Autopilot**—Ensure that autopilot Self Test passes OK with the MFD powered on.
- **Other Instruments**—Verify there is no adverse effect on other instruments with the MFD powered on.

6.3 Lightning Sensor Strike Test

After the Lightning Sensor has been installed and set up, as discussed in Section 5.6, “Lightning Sensor Setup” on page 41, *Lightning Strike Test* will be available from the Maintenance Mode Page.

➤ To perform the Lightning Strike Test:

1. *Press Lightning Strike Test* from the Maintenance Mode PAge.
2. The MFD will switch to the Map page and display a single strike at 15 mile range and 45 degrees relative bearing. If it does not, there may be an inconsistency with the heading source, wiring, or MFD setup.

6.4 Traffic Test

After completing all configuration procedures, confirm that the MFD is configured for the correct Traffic sensor.

6.5 2-Way Datalink Satellite Reception Confirmation

The satellite networks transmit very low power signals that the EX5000 must receive. If the antenna is not properly installed or if there is excessive electromagnetic interference (such as a nearby radio transmitter, ground power cart, or inadequately grounded avionics), the system will not achieve successful reception.

➤ To assess system performance.

1. Bring the aircraft to an area with the clearest view of the sky to the horizon.
2. Monitor the Datalink Info table (shown in Figure 22), for a few minutes (up to 5) under each of the following conditions:
   - Other Avionics OFF
   - Avionics ON
   - Engines at idle
   - Engines at takeoff power.

3. With a satellite in view, the signal strength and quality should peak above the following values:

Maintenance Mode, System Info, Datalink/ Narrowcast Info	Trip Page, Narrowcast Status
Signal strength > -118 dBm (-130 is lowest, -100 is highest)	Signal Strength > 4, (scale of 1-10)
Estimated SNR (EbNo) > 10 dB	Signal Quality > 4, (scale of 1-10)
Segment errors = Less than 10%	Message Quality = 10, (scale of 1-10)

4. If the expected reception levels are not achieved, check for possible causes and solutions:

Possible Cause	Possible Solution
The antenna field of view is obstructed.	The antenna field of view is obstructed.
There is a local source of electromagnetic interference:	■ Try shutting off any nearby sources (such as VHF radios, alternators, magnetos, ground power cart). ■ Relocate the aircraft away from potential nearby sources. ■ Check electrical connections and grounds. ■ There is poor satellite coverage. Try again after fifteen minutes. ■ Check the antenna and cable for proper installation. ■ Check the connection between the antenna and its ground plane.

See www.avidyne.com for additional information.

6.6 Broadcast Datalink Satellite Reception Confirmation

The broadcast satellite network transmits signals that are received by an external Datalink receiver, which sends the information on to the MFD through a serial connection. If the Datalink antenna is not properly installed, or if there is excessive electromagnetic interference (such as a nearby radio transmitter or inadequately grounded electronics), the system will not achieve consistent reception.

➤ To assess system performance.

1. Bring the aircraft to an area that has as few obstacles to line-of-sight viewing to the southern horizon as possible.

2. Select the Trip page on the MFD.

3. Press *Display* until Broadcast (down-pointing arrow) Status is selected.

4. The Signal Quality will be reported as Good, Marginal, Weak, or None. If the Broadcast Receiver is working, the antenna and cabling are correct, and the aircraft is in view of at least one Broadcast datalink satellite, the Signal Quality will be “Good” and the Receiver ID will be reported.

5. If the Signal Quality is not reported as Good, check for possible causes and solutions:

Possible Cause	Possible Solution
The antenna field of view is obstructed.	Try moving or rotating the aircraft. **Note:** If rotation works, the antenna location on the aircraft may not be optimal
There is a local source of electromagnetic interference.	■ Try shutting off any nearby sources (such as VHF radios, alternators and magnetos). ■ Relocate the aircraft away from potential nearby sources. ■ Check electrical connections to ensure there is no improper grounding. ■ The antenna and cable are not properly installed. ■ The antenna may not be properly connected to the ground plane. ■ The cable may not be properly connected to the antenna or the EX5000.

See www.avidyne.com for additional information.

6.7 Magnetic Compass Swing

After installation and EMI checks are complete, perform a magnetic compass “swing” in accordance with the aircraft installation manual for updating the heading correction card in accordance with 14 CFR 23.1327 and 23.1547.

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7 MFD General Maintenance

This section briefly describes maintenance procedures that are done by the aircraft owner (or pilot). This information is also available in the MFD Pilot's Guides for all aircraft.

This section contains the following information:

- Section 7.1, Cleaning the EX5000 Screen
- Section 7.2, MFD Data Updates

7.1 Cleaning the EX5000 Screen

If your EX5000 screen should become dirty due to fingerprints or dust, clean the screen using the following materials and methods:

- A clean, soft lint free cloth such as 3M Ultra-Brite Cloth # 2011 or similar.
- A cleaning solution composed of de-ionized water or isopropyl alcohol (IPA).

Always apply the cleaning solution directly onto the cloth. **Never** spray cleaner directly onto the screen.

Note: Use caution when using IPA as it is flammable.

Using any other chemicals or materials voids the warranty.

The EX5000 screen is made of a plastic film that is vulnerable to scratches, damage by sharp articles or improper cleaners. Use care when cleaning.

7.2 MFD Data Updates

Avidyne makes use of three different types of data that can optionally be uploaded to or downloaded from your EX5000:

- **NavData**—For the Map Page, Avidyne uses NavData from Jeppesen Sanderson, Inc. it is your duty as pilot in command to ensure that the data you fly with remains up to date.
- **CMax™ Chart Data**—An optional Avidyne feature that allows you to view JeppView chart data on your EX5000.
- **EMax™ Total Engine Management**—EMax tracks engine and other data, which you can download from the EX5000 to a PC for analysis.

Note: For software part numbers 530-00180-( ) and above, you can use a Zip Drive or USB Flash Memory Drive to move data between your PC and the EX5000.

For software part numbers prior to 530-00180-( ), only a Zip Drive Dataloader can be used.

The Zip Drive or USB Flash Memory Drive are referred to here as a *Portable USB Device*.

For more information about the databases, and about loading data from your PC to a Portable USB Device, see the *Avidyne Data Update Guide*.

This section describes moving data from your Portable USB Device to the EX5000.

If using a Zip Drive Dataloader:

- Allowing the portable Zip Drive to dangle by the cable can result in damage to your MFD, or the Drive, as well as a data load failure.
- Do not insert the Zip disk into the Zip Drive until the regular start screen displays on the MFD. The disk may be damaged if it is already in the Zip Drive when power is applied.
- After loading the CMax data into your MFD, wait until the disk is ejected from the drive before unplugging the Drive, or powering off the MFD. Unplugging the Zip Drive with the disk still engaged may cause damage to the disk.

If using a USB Flash Memory:

- USB Flash Memory is only available for software part numbers 530-00180-( ) and later releases.
- Avidyne strongly suggests that, to avoid confusion, you reserve a USB Flash Memory Drive solely for EX5000 database transfers.
- After uploading data, do not remove the USB Flash Memory Drive until you see and acknowledge the regular EX5000 Startup screen.

Note: When removing the rubber cap from the data port, pull the cap gently **from the top** until it pops out. Make sure the cap is all the way out before plugging anything into the USB port.

Do not tug on the tab at the bottom of the cap, this could separate the cap from the EX5000 bezel.

7.2.1 Loading NavData (the Navigation Database)

Your new EX5000 will be loaded with an up-to-date navigation database. Updates to the EX5000 NavData database are available from Jeppesen Sanderson, Inc. every 28 days and can be purchased either individually or on a subscription basis.

Once you have downloaded the Nav from your PC to a Portable USB Device, as described in the *Avidyne Data Update Guide*, you will need to upload the data to your EX5000.

➤ To load NavData to your EX5000:

1. Bring the Portable USB Device to the EX5000 at the aircraft.
2. Turn power OFF to the EX5000.
3. Connect the data source to the EX5000:
   - If using a USB Flash Memory Drive, plug it into the data port on the front of the EX5000.
   - If using a Zip Drive Dataloader, put the Zip disk into the Zip Drive. Connect one end of the cable to the Zip Drive and the other end to the EX5000 data port.

Note: Ensure that the Dataloader is supported and not dangling by the cable. Letting the Dataloader dangle can cause permanent damage to the data port. It can also cause an intermittent connection, which will result in an unsuccessful data update

4. Turn on the master switch to power up the EX5000. The Dataloader Page displays.

Note: If the regular start screen displays, the EX5000 did not detect the Portable USB Device. Check the connection between the Portable USB Device and the EX5000, then restart the procedure.

5. Press *Proceed*. Do not turn off the EX5000 or disconnect the cable during a data load.The data load is complete when the regular startup Page displays.
6. After the startup Page displays, turn off power to the EX5000, remove your Portable USB Device, and then turn the EX5000 power back on.
7. This step ensures that all data has been checked in self-test and the MFD is ready for use.
8. Store the Portable USB Device in a safe place.

7.2.2 Loading CMax Chart Data

Once you have downloaded the CMax data from your PC to a Portable USB Device, as described in the *Avidyne Data Update Guide*, you will need to upload the data to your EX5000.

➤ To load CMax Data to your EX5000:

1. With the MFD power OFF:
   - If using a USB Flash Memory Drive, plug it into the data port on the front of the EX5000.
   - If using a Zip Drive Dataloader, connect one end of the cable to the Zip Drive and the other end to the EX5000 data port Do not insert the Zip disk into the Zip Drive until after you turn on the MFD (in step 2).

Note: Ensure that the Dataloader is supported and not dangling by the cable. Letting the Dataloader dangle can cause permanent damage to the data port. It can also cause an intermittent connection, which will result in an unsuccessful data update.

2. Turn on the MFD. If you are using a Zip Drive, insert the Zip disk into the Zip Drive when the initial Avidyne logo screen displays.
3. The Dataloader Page displays.

➥ If this is the first-ever update, you may see a warning that you are about to load older data than the MFD already contains. This is because the preloaded demo charts expire in the year 2020, so the warning message is normal.

Press *Proceed* to start the chart data load.

4. The Dataloader Page shows the progress as it loads the data into the MFD. After loading the data, the Dataloader performs an integrity check on the data and displays a successful data load message if all data is valid.
5. When the operation is complete, the EX5000 will continue to the normal startup Page.
6. At this point, turn off power to the EX5000, remove your Portable USB Device, and then turn the EX5000 power back on.

   This step ensures that all data has been checked in self-test and the MFD is ready for use
7. Confirm the valid dates of the Chart data as reported on the Startup Screen.

8. Go to the Chart Page and select a chart from an airport known to be in your subscription coverage area. Confirm that the chart is available.
9. Store the Portable USB Device in a safe place.

7.2.3 Downloading EMax Data

You can download the engine log files from the EX5000 using either a Zip Drive and Zip disk or a USB Flash Memory Drive.

Note: If any of the downloaded engine log files contains file format errors, you may receive an erroneous caution that the data transfer failed. Check your Portable USB Device for the transferred files.

➤ To download the stored engine data log files:

1. Turn power OFF to the EX5000
2. Connect the data source to the EX5000:
   - If using a USB Flash Memory Drive, plug it into the data port on the front of the EX5000.
   - If using a Zip Drive Dataloader, connect one end of the cable to the Zip Drive and the other end to the EX5000 data port. The Zip Drive must be empty.

Note: Ensure that the Dataloader is supported and not dangling by the cable. Letting the Dataloader dangle can cause permanent damage to the data port. It can also cause an intermittent connection, which will result in an unsuccessful data download.

3. Turn on the master switch (which turns on the EX5000).
4. If using a Zip Drive, put a compatible blank disk into the Zip Drive when the Avidyne screen displays.
5. The EX5000 will display a message similar to the following:

   Ready to Write Engine/Narrowcast Data to Removable Media.

6. To begin the download, press *Proceed*. Do not turn off the EX5000 or disconnect the Portable USB Device during data transfer.

   To cancel the download, press *Cancel*.

7. When the data transfer is complete the regular start screen displays. If you are using a Zip Drive, the disk is automatically ejected from the Zip Drive.
8. At this point, turn off power to the EX5000, remove your Portable USB Device, and then turn the EX5000 power back on. This step ensures that all data has been checked in self-test and the MFD is ready for use
9. You can now bring the Portable USB Device to a PC and download the EMax data. See the *Avidyne Data Update Guide* for more information.

8 Avidyne Technical Support and Service

8.1 Technical Support

Avidyne's web site contains information that may assist the operator and installer with questions or problems with their Avidyne product.

www.avidyne.com

Technical support questions may be submitted, 24 hours per day, via the following.

Email: techsupport@avidyne.com
Fax: 781-402-7599
Voice: 888-723-7592

An Avidyne Technical Support Representative will respond as soon as possible. Avidyne business hours are:

- Monday through Thursday: 8:00 AM to 8:30 PM Eastern Time
- Friday: 8:00 AM to 5:30 PM Eastern Time

Please include the part number, revision number and serial number of the unit in all correspondences. For problem reporting, please provide as many details associated with the problem as possible.

8.2 Service

MLX770 system service is performed at the Avidyne Service Center, and includes a complete checkout.

Before you return the unit for service, contact Avidyne at 888-723-7592 to obtain a Return Merchandise Authorization (RMA) number.

Securely pack the unit in the original Avidyne shipping carton, write the RMA number on the outside of the carton, and return it to the address provided by the Avidyne Customer Service Representative.

Include your name, complete shipping address, daytime telephone number, a complete description of the problem, the desired return date, and shipping method.

If the original shipping carton or other suitable foam packing is not available, contact Avidyne to arrange for packaging materials. Avidyne is not responsible for damage due to poorly packaged returns.

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Appendix A: Environmental Qualification Data

RTCA/DO-160E Environmental Qualification Form
NOMENCLATURE: MFD
PART NO: 700-00004-001/002/003/004/005/006/007/008/009/010/103/104
MANUFACTURER: AVIDYNE CORPORATION
ADDRESS: 55 OLD BEDFORD ROAD, LINCOLN MA. 01773

Table 28: RTCA/DO-160E Environmental Qualification Form Part No. 700-00004-()

Environmental Tests	RTCA/DO-160E Section	Conducted Test Category
Temperature and Altitude		
● Low Temp	4.5.1	Equipment qualified to Category D1
● High Temp	4.5.2 & 4.5.3	Equipment qualified to Category D1
● In-Flight Loss of Cooling	4.5.4	Equipment qualified to Category V
● Altitude	4.6.1	Equipment qualified to Category D1
● Decompression	4.6.2	Equipment qualified to Category D1
● Overpressure	4.6.3	Equipment qualified to Category D1
Temperature Variation	5	Equipment qualified to Category B
Humidity	6	Equipment qualified to Category A
Operational Shock	7.2	Equipment qualified to Category B
Crash Safety	7.3	Equipment qualified to Category B
Vibration	8	Equipment qualified to Category S, Curve M
Explosive Proofness	9	Category X, no test performed
Waterproofness	10	Category X, no test performed
Fluids Susceptibility	11	Category X, no test performed
Sand and Dust	12	Category X, no test performed
Fungus Resistance	13	Category X, no test performed
Salt Spray	14	Category X, no test performed
Magnetic Effects	15	Equipment qualified to Category Z
Power Input	16	Equipment qualified to Category B
Voltage Spike	17	Equipment qualified to Category A
Audio Frequency Conducted Susceptibility	18	Equipment qualified to Category Z
Induced Signal Susceptibility	19	Equipment qualified to Category AC
Radio Frequency Susceptibility	20	Equipment qualified to Category D (Conducted) /Z (Radiated)
Emission of Radio Frequency Energy	21	Equipment qualified to M
Lightning Induced Transient Susceptibility	22	Equipment qualified to A3E3X (Signal Inputs), A4E4X (Power Input)
Lightning Direct Effects	23	Category X, no test performed
Icing	24	Category X, no test performed
Electrostatic Discharge	25	Equipment qualified to Category A
Fire/Flammability	26	Category X, no test performed

RTCA/DO-160E Environmental Qualification Form
NOMENCLATURE: MFD
PART NO: 700-00030-005/805
MANUFACTURER: AVIDYNE CORPORATION
ADDRESS: 55 OLD BEDFORD ROAD, LINCOLN MA. 01773

Table 29: RTCA/DO-160E Environmental Qualification Form Part No. 700-00030-()

Environmental Tests	RTCA/DO-160E Section	Test Category
Temperature and Altitude		
● Low Temp	4.5.1	Equipment qualified to Category D1
● High Temp	4.5.2 & 4.5.3	Equipment qualified to Category D1
● In-Flight Loss of Cooling	4.5.4	Equipment qualified to Category V
● Altitude	4.6.1	Equipment qualified to Category D1
● Decompression	4.6.2	Equipment qualified to Category D1
● Overpressure	4.6.3	Equipment qualified to Category D1
Temperature Variation	5	Equipment qualified to Category B
Humidity	6	Equipment qualified to Category A
Operational Shocks	7.2	Equipment qualified to Category B
Crash Safety	7.3	Equipment qualified to Category B
Vibration	8	Equipment qualified to Category S, Curve M
Explosive Proofness	9	Category X, no test performed
Waterproofness	10	Category X, no test performed
Fluids Susceptibility	11	Category X, no test performed
Sand and Dust	12	Category X, no test performed
Fungus Resistance	13	Category X, no test performed
Salt Spray	14	Category X, no test performed
Magnetic Effects	15	Equipment qualified to Category Z
Power Input	16	Equipment qualified to Category B
Voltage Spike	17	Equipment qualified to Category A
Audio Frequency Conducted Susceptibility	18	Equipment qualified to Category Z
Induced Signal Susceptibility	19	Equipment qualified to Category AC
Radio Frequency Susceptibility	20	Equipment qualified to Category D (Conducted) / Z (Radiated)
Emission of Radio Frequency Energy	21	Equipment qualified to Category M
Lightning Induced Transient Susceptibility	22	Equipment qualified to A3E3X (Signal Inputs), A4E4X (Power Input)
Lightning Direct Effects	23	Category X, no test performed
Icing	24	Category X, no test performed
Electrostatic Discharge	25	Equipment qualified to Category A
Fire/Flammability	26	Category X, no test performed

Appendix B: Flight Manual Supplement Information

A flight manual supplement should be created for each installation, using Avidyne's FAA approved AFMS as a guideline. Hard and electronic copies are available by any of the following means:

Calling Avidyne Technical Support at 1-800-AVIDYNE

E-mail: techsupport@avidyne.com

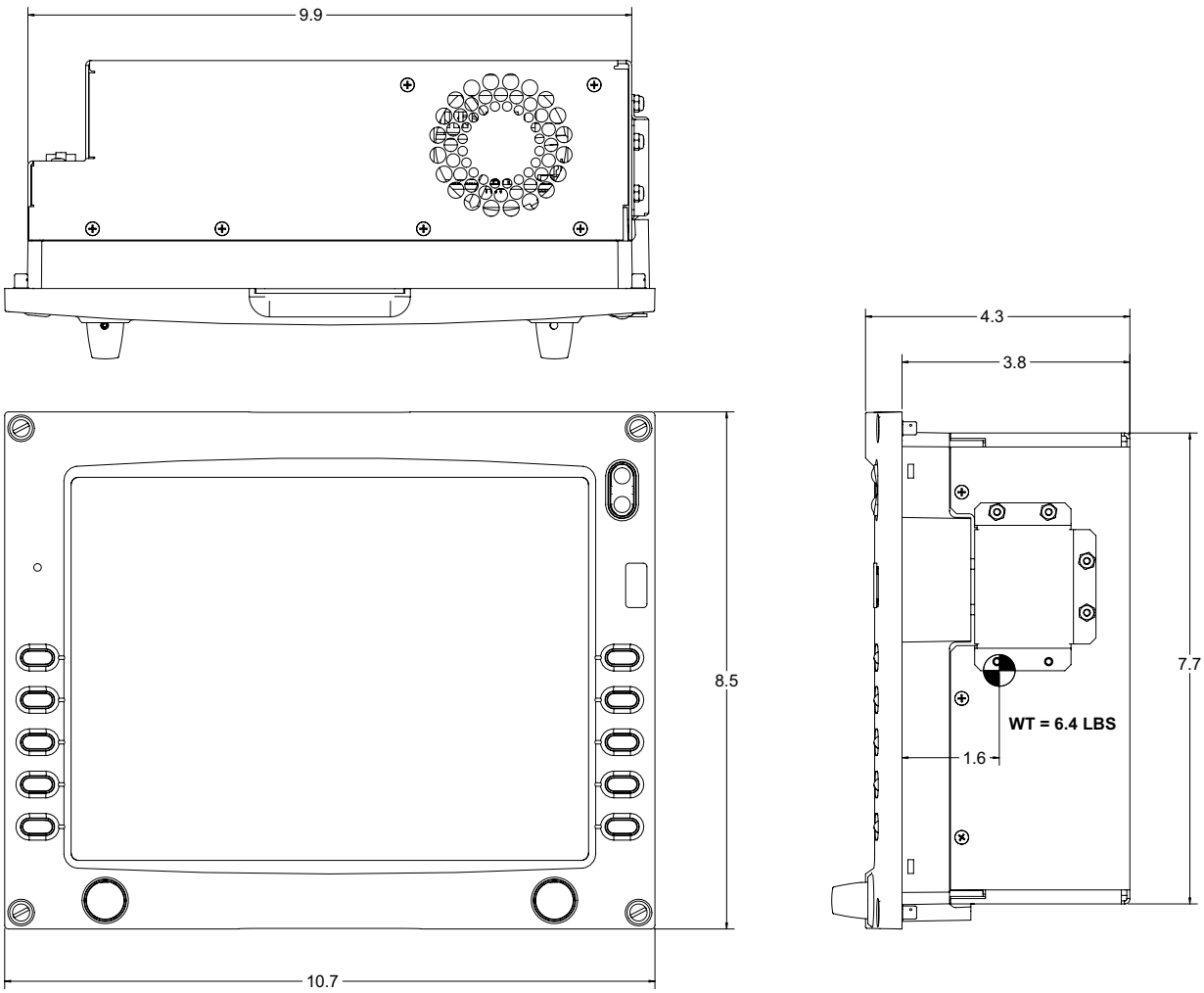
Web: www.avidyne.com

Appendix C: STC Permission

Avidyne Corporation hereby grants permission to all National Aviation Authority (FAA, CAA, JAA) approved installers to use data from all STCs and amendments Avidyne has received to modify aircraft. Copies of the STCs and amendments are available upon request or at the Avidyne web site Technical Publication page.

Appendix D: Landscape EX5000 Dimensions

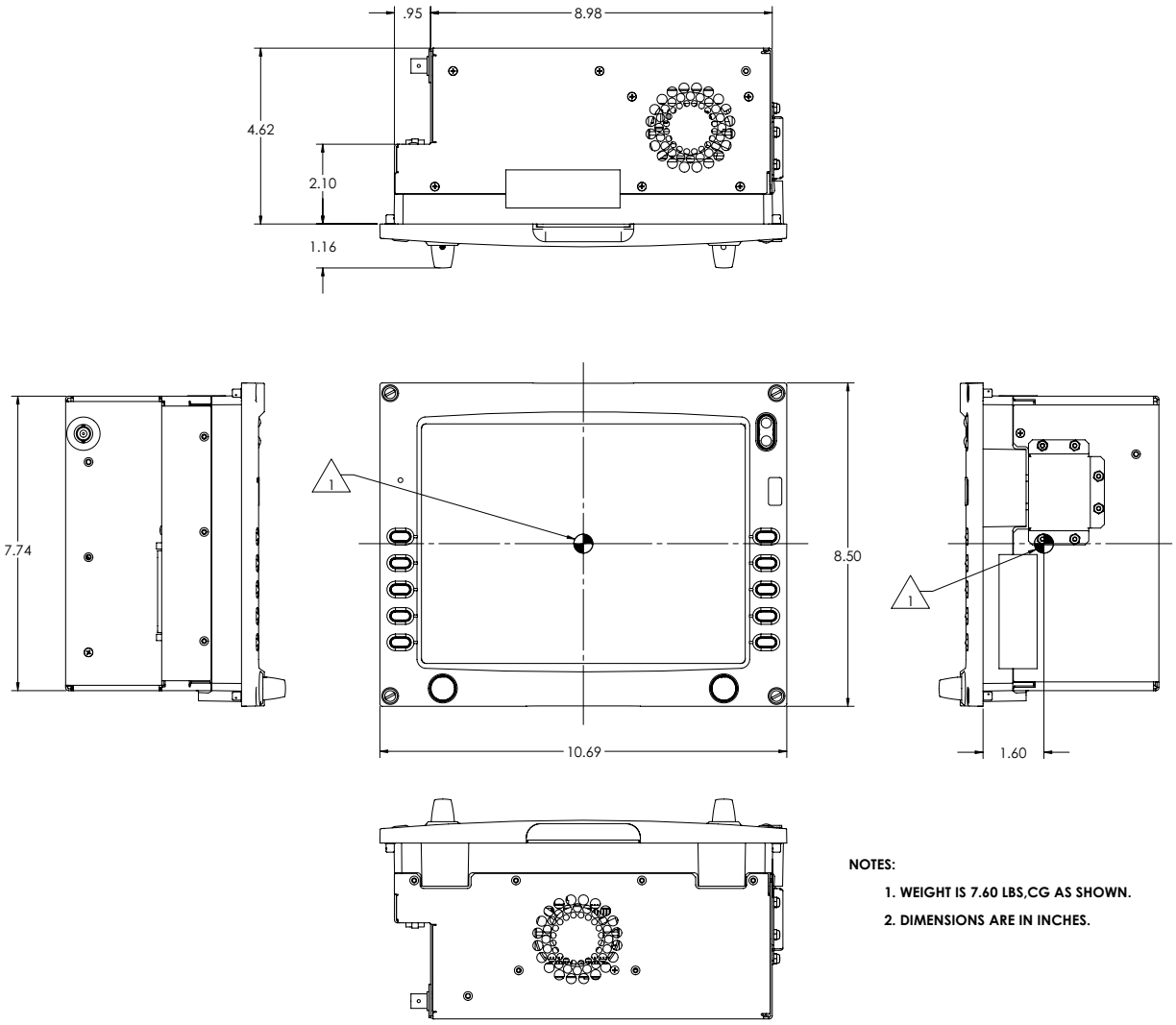
Dimensions for the EX5000 (700-00004-002)



Note: Dimensions for EX5000 (700-00004-008 and -010 and 700-00030-805) are identical as shown, but without BNC connector J1.

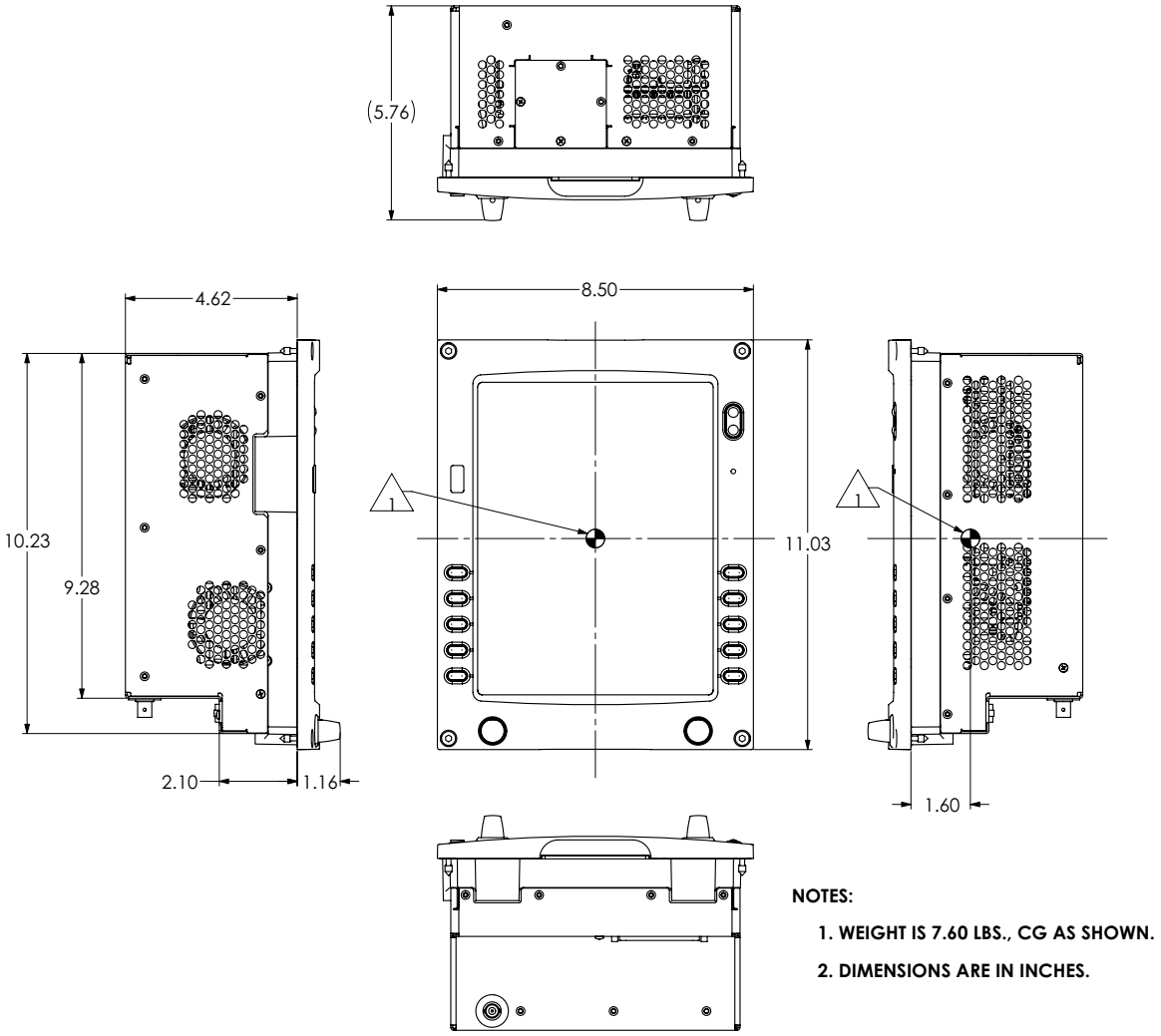
Appendix E: Landscape EX5000 with Integrated Datalink Dimensions

Dimensions for the EX5000 (700-00004-004 & -006, 700-00030-005)



Appendix F: Portrait EX5000 Dimensions

Dimensions for the EX5000 (700-00004-104)

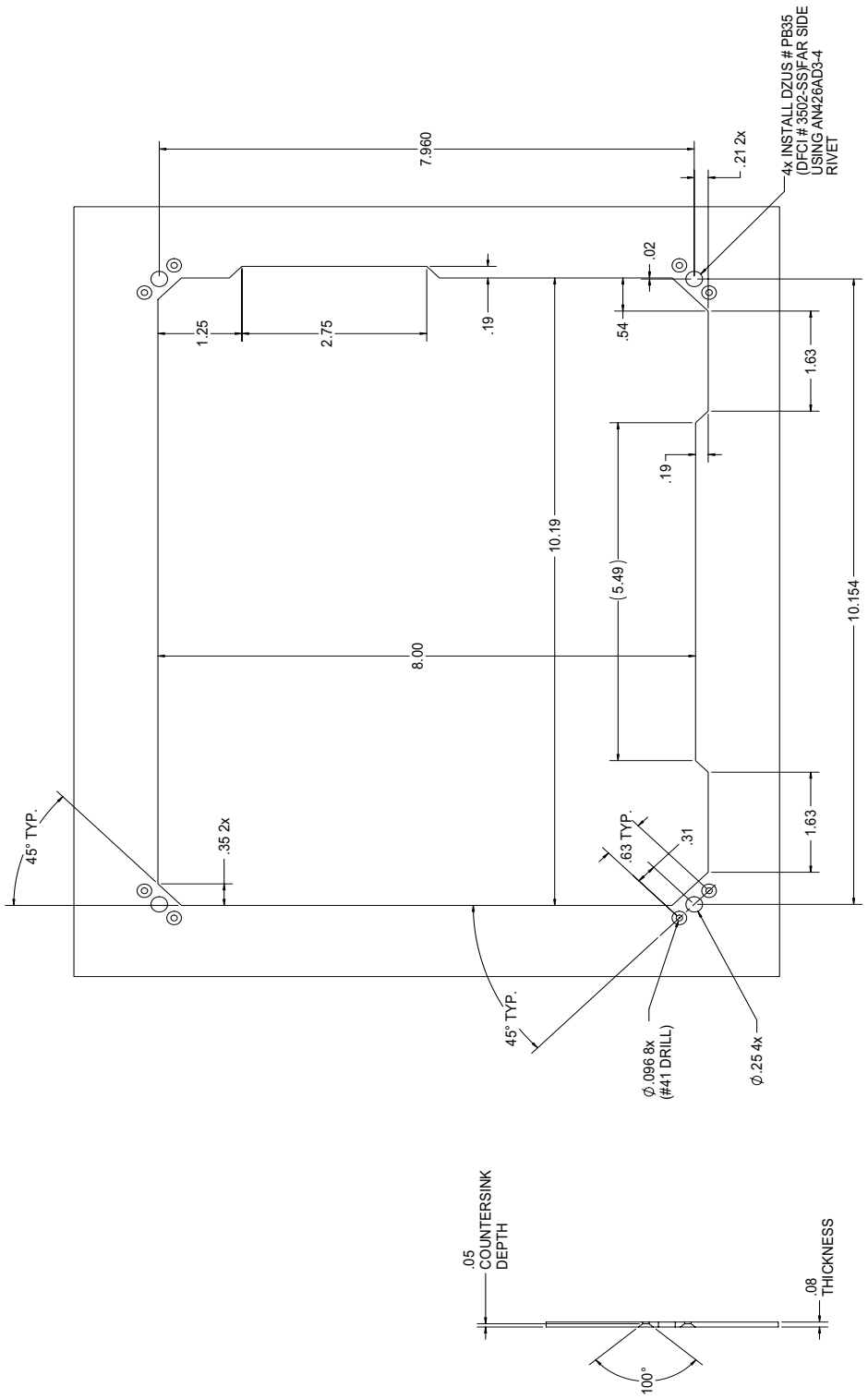


NOTES:

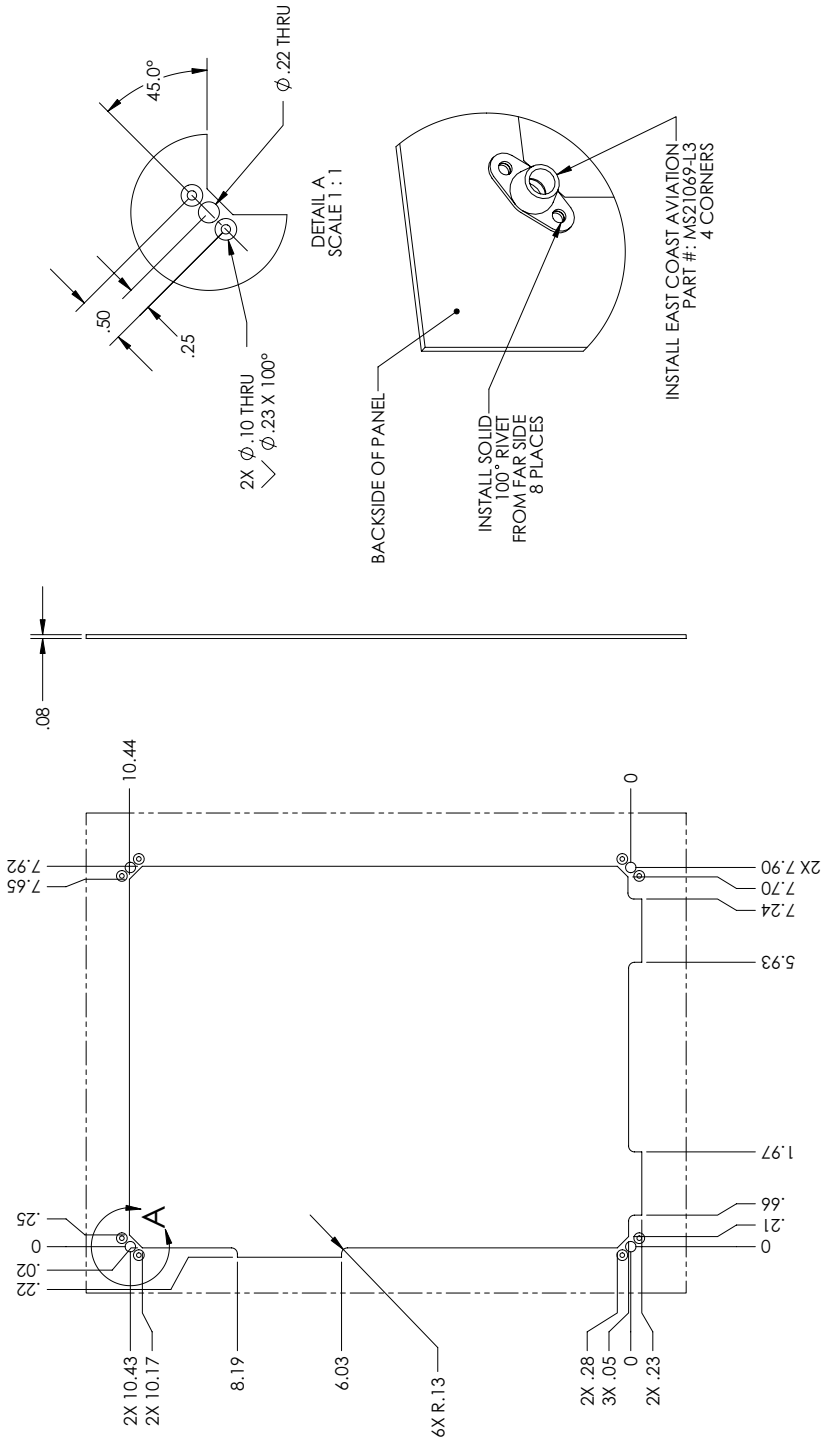
1. WEIGHT IS 7.60 LBS., CG AS SHOWN.

2. DIMENSIONS ARE IN INCHES.

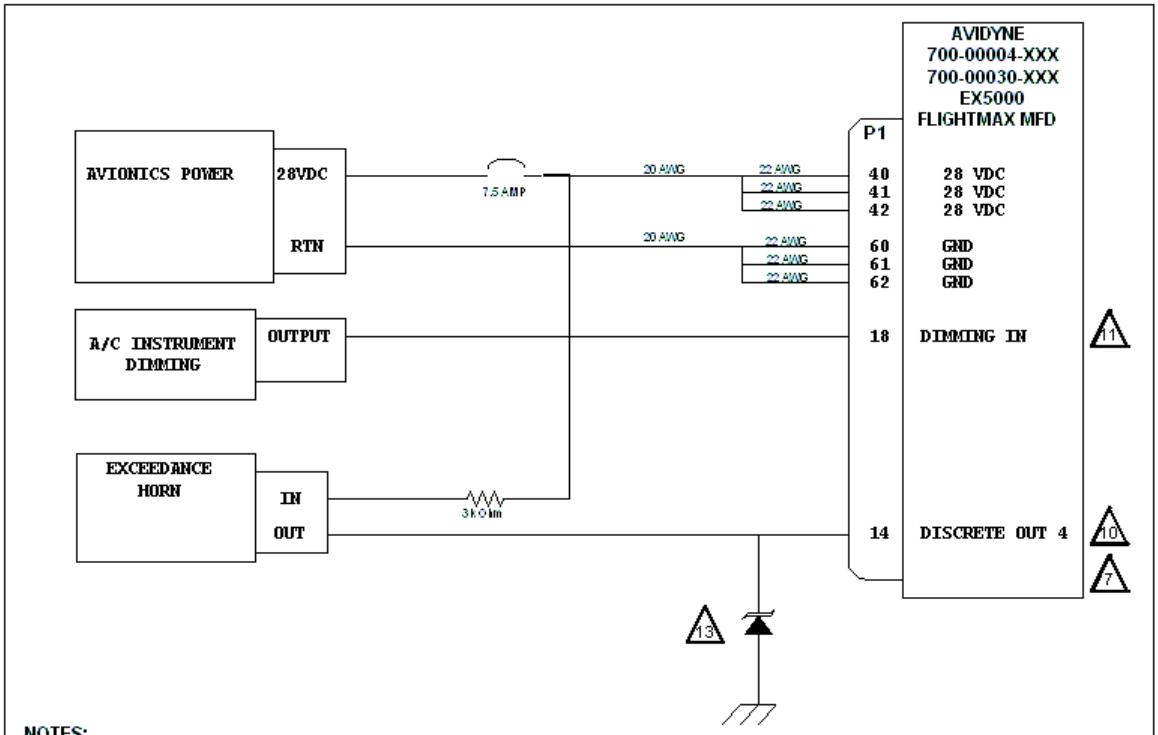
Appendix G: Landscape Cutout Dimensions



Appendix H: Portrait Cutout Dimensions



Appendix I: Wiring Diagram – Power, Dimming Bus, and Exceedance Horn



NOTES:

1. PORT ASSIGNMENTS SHOWN ARE FOR EXAMPLE ONLY. SELECT PORTS IN MFD MAINTENANCE MODE SETUP PAGES TO MATCH AIRCRAFT WIRING.
2. ALL WIRE SHALL BE MIL-W-22759/16 (NON-SHIELDED) OR MIL-C-27500 (SHIELDED) OR EQUIVALENT UNLESS OTHERWISE NOTED.
3. ALL WIRE SHALL BE MINIMUM 24 AWG MIN UNLESS OTHERWISE NOTED.
4. TERMINATE SHIELDS TO THE CONNECTOR BACK SHELL OR CHASSIS GROUND AS CLOSE TO CONNECTOR AS POSSIBLE.
5. FOR ADDITIONAL ROUTING, BONDING, AND GROUNDING GUIDANCE REFER TO AC 43-13-1B, CHAPTER 11, SECTIONS 9, 10, 11, AND 15.
6. REFER TO EACH SENSOR'S INSTALLATION INSTRUCTIONS FOR SPECIFIC CONNECTION REQUIREMENTS.
7. SOME SENSOR INTERFACES ARE NOT AVAILABLE ON ALL SOFTWARE PART NUMBERS.
8. MFD RS-232 PORTS 3 AND 4 ARE ONLY AVAILABLE WITH S/N >1200.
9. J1, THE NARROWCAST DATA LINK COAX CONNECTOR, IS NOT AVAILABLE ON P/N 700-00004-001, -002, -007, -009, -010.
10. DISCRETE OUT 4, P1 PIN 14, IS AN OPEN COLLECTOR OUTPUT. WHEN HIGH IMPEDANCE THE HORN IS QUIET. WHEN LOW IMPEDANCE THE MFD SUPPLIES A CURRENT PATH TO GROUND AND THE HORN SOUNDS.
11. CONNECT TO THE INSTRUMENT PANEL DIMMING BUS TO CONTROL MFD BUTTON AND KNOB LED BRIGHTNESS. (0-28 VDC).
12. IF OVER BRAIDING HARNESSES: OVER BRAID MATERIAL 36 AWG TINNED COPPER PER ASTM-B-33, COVERAGE 98% MINIMUM OPTICAL. OVER BRAID ENDS TO TERMINATE WITH BACK BRAID TO PROVIDE A CLEAN END.
13. LIGHTNING PROTECTION DIODE MUST BE GROUNDED TO CHASSIS GROUND, AS CLOSE TO CONNECTOR AS POSSIBLE. SUGGESTED VENDOR: DIODES INC. P/N 1.5KE30A

SYMBOLS

X — SPECIFIC NOTE APPLIES

WIRING

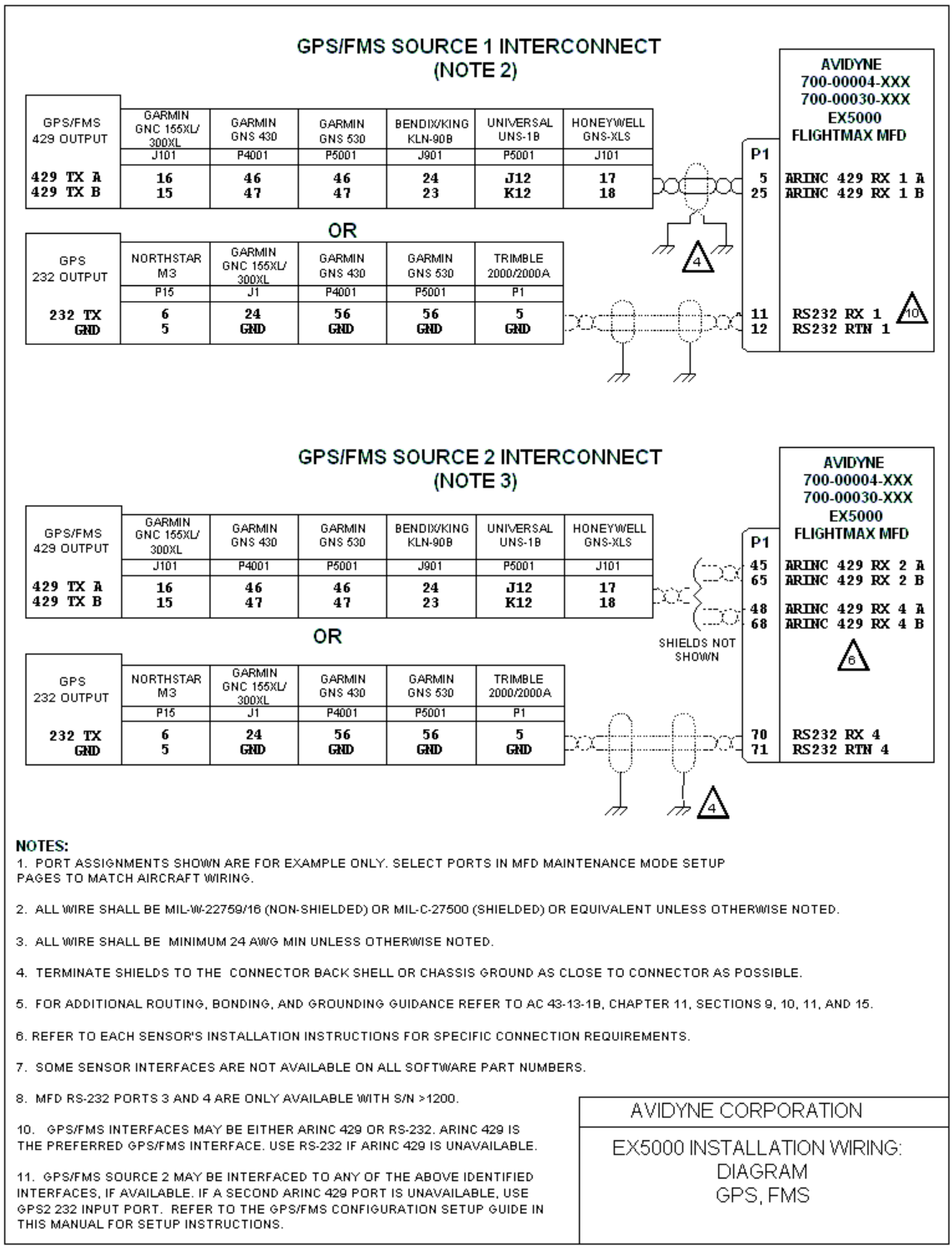
TWISTED PAIR — OPTIONAL WIRING
TWISTED TRIPLE — CHASSIS GROUND
DOUBLE SHIELD — SINGLE SHIELD

AVIDYNE CORPORATION

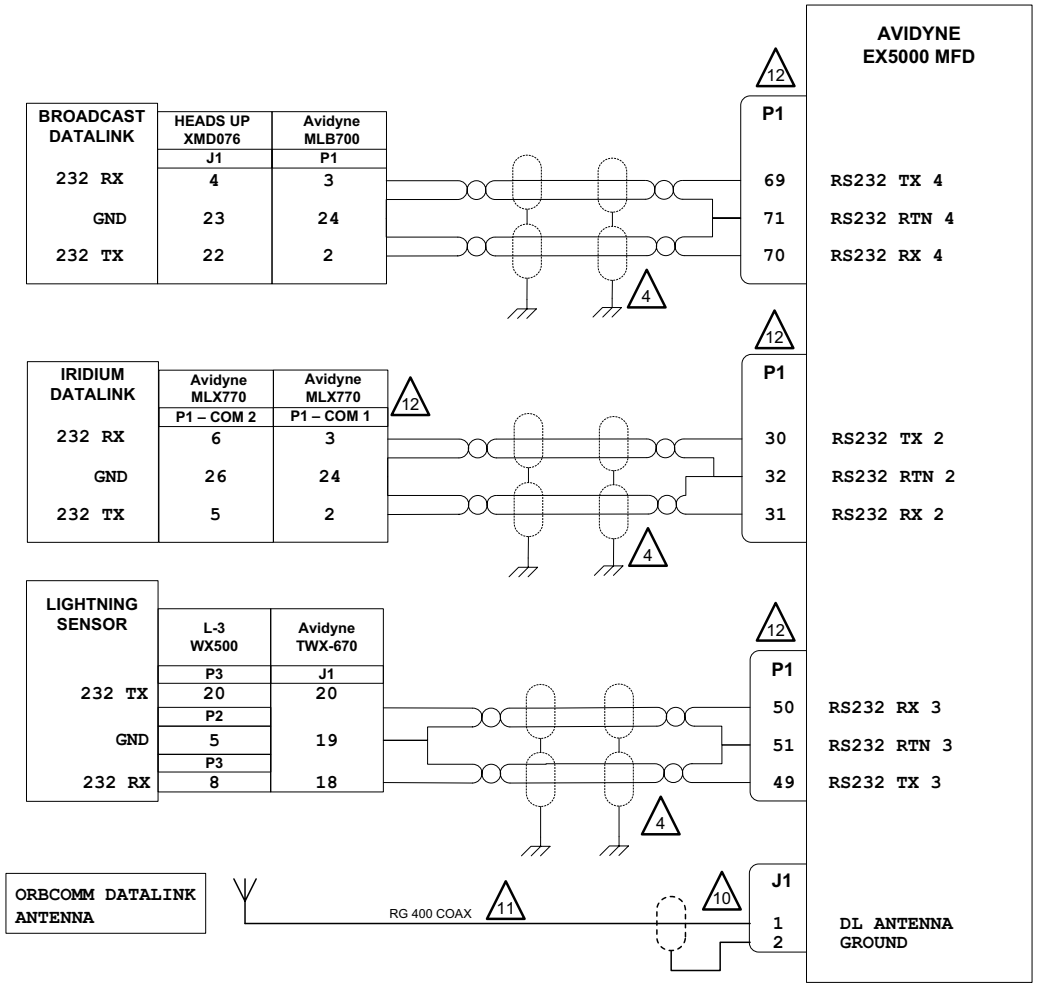
EX5000 INSTALLATION WIRING:
POWER, DIMMING AND HORN

Note: Port assignments shown are nominal assignments. You can select ports as required in Maintenance Mode setup pages, as long as sensors are wired to the corresponding pins.

Appendix J: Wiring Diagram – GPS/FMS



Appendix K: Wiring Diagram – Lightning, Datalink Sensors, and ORBCOMM Antenna



NOTES:

1. PORT ASSIGNMENTS SHOWN ARE FOR EXAMPLE ONLY. SELECT PORTS IN MFD MAINTENANCE MODE SETUP PAGES TO MATCH AIRCRAFT WIRING.

2. ALL WIRE SHALL BE MIL-W-22759/16 (NON-SHIELDED) OR MIL-C-27500 (SHIELDED) OR EQUIVALENT UNLESS OTHERWISE NOTED.

3. ALL WIRE SHALL BE MINIMUM 24 AWG MIN UNLESS OTHERWISE NOTED.

4. TERMINATE SHIELDS TO THE CONNECTOR BACK SHELL OR CHASSIS GROUND AS CLOSE TO CONNECTOR AS POSSIBLE.

5. FOR ADDITIONAL ROUTING, BONDING, AND GROUNDING GUIDANCE REFER TO AC 43-13-1B, CHAPTER 11, SECTIONS 9, 10, 11, AND 15.

6. REFER TO EACH SENSOR'S INSTALLATION INSTRUCTIONS FOR SPECIFIC CONNECTION REQUIREMENTS.

7. SOME SENSOR INTERFACES ARE NOT AVAILABLE ON ALL SOFTWARE PART NUMBERS.

8. MFD RS-232 PORTS 3 AND 4 ARE ONLY AVAILABLE WITH S/N >1200.

10. J1, THE ORBCOMM DATALINK COAX CONNECTOR, IS NOT AVAILABLE ON P/N 700-00004-001, -002, -007, -009, -010

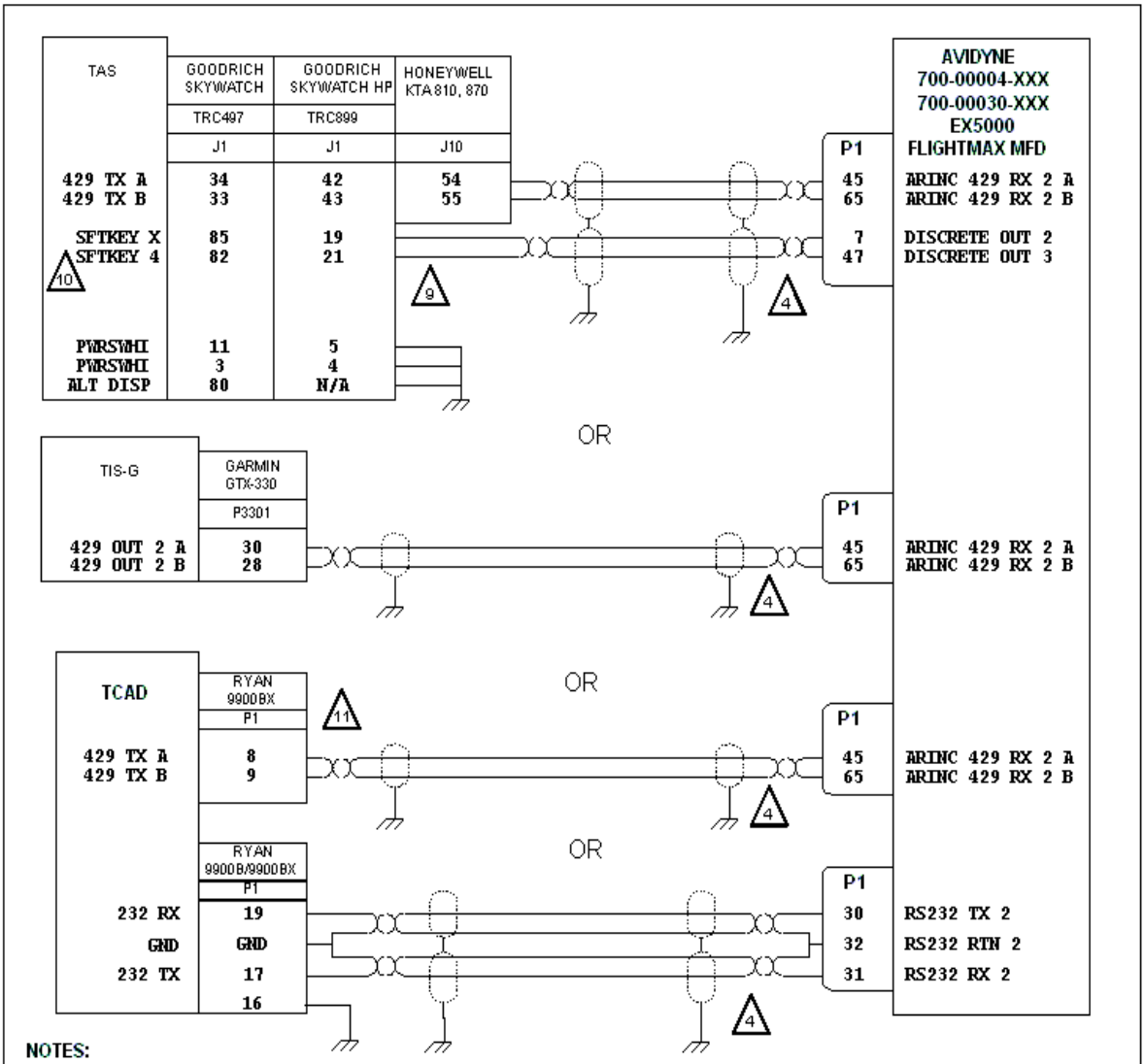
11. TO MINIMIZE POSSIBLE INTERFERENCE, THE ORBCOMM DATALINK ANTENNA CABLE SHOULD BE ROUTED AS TO AVOID CLOSE PROXIMITY WITH OTHER SENSITIVE AVIONICS SYSTEMS. ADDITIONAL CABLE SHIELDING MAY REDUCE ANY DETECTED SYSTEM INTERFERENCE.

12. ANY AVAILABLE RS-232 PORT MAY BE USED.

AVIDYNE CORPORATION

EX5000 INSTALLATION WIRING: LIGHTNING, DATALINK SENSORS, AND ORBCOMM ANTENNA

Appendix L: Wiring Diagram – Traffic Sensors



NOTES:

1. PORT ASSIGNMENTS SHOWN ARE FOR EXAMPLE ONLY. SELECT PORTS IN MFD MAINTENANCE MODE SETUP PAGES TO MATCH AIRCRAFT WIRING.
2. ALL WIRE SHALL BE MIL-W-22759/16 (NON-SHIELDED) OR MIL-C-27500 (SHIELDED) OR EQUIVALENT UNLESS OTHERWISE NOTED.
3. ALL WIRE SHALL BE MINIMUM 24 AWG MIN UNLESS OTHERWISE NOTED.
4. TERMINATE SHIELDS TO THE CONNECTOR BACK SHELL OR CHASSIS GROUND AS CLOSE TO CONNECTOR AS POSSIBLE.
5. FOR ADDITIONAL ROUTING, BONDING, AND GROUNDING GUIDANCE REFER TO AC 43-13-1B, CHAPTER 11, SECTIONS 9, 10, 11, AND 15.
6. REFER TO EACH SENSOR'S INSTALLATION INSTRUCTIONS FOR SPECIFIC CONNECTION REQUIREMENTS, ON/OFF CONTROL AND CONFIGURATION FOR USE WITH AN ALTERNATE DISPLAYS.
7. SOME SENSOR INTERFACES ARE NOT AVAILABLE ON ALL SOFTWARE PART NUMBERS.
8. MFD RS-232 PORTS 3 AND 4 ARE ONLY AVAILABLE WITH S/N >1200.
9. MFD DISCRETE OUTPUTS 2 AND 3 ARE TLL OUTPUTS REASSIGNED TO CONTROL SKYWATCH AND SKYWATCH HP STANDBY AND SELF TEST MODES. CONNECT SKYWATCH SOFT KEYS TO ONLY 1 CONTROLLER.
10. SFTKEY X IS SFTKEY 1 FOR SKYWATCH AND SFTKEY 2 FOR SKYWATCH HP.
11. 9900BX MAY BE ALSO BE CONECTED TO AN ARINC 429 DATABUS ON AN MFD WITH SOFTWARE P/N 530-00170-XXX OR HIGHER INSTALLED.

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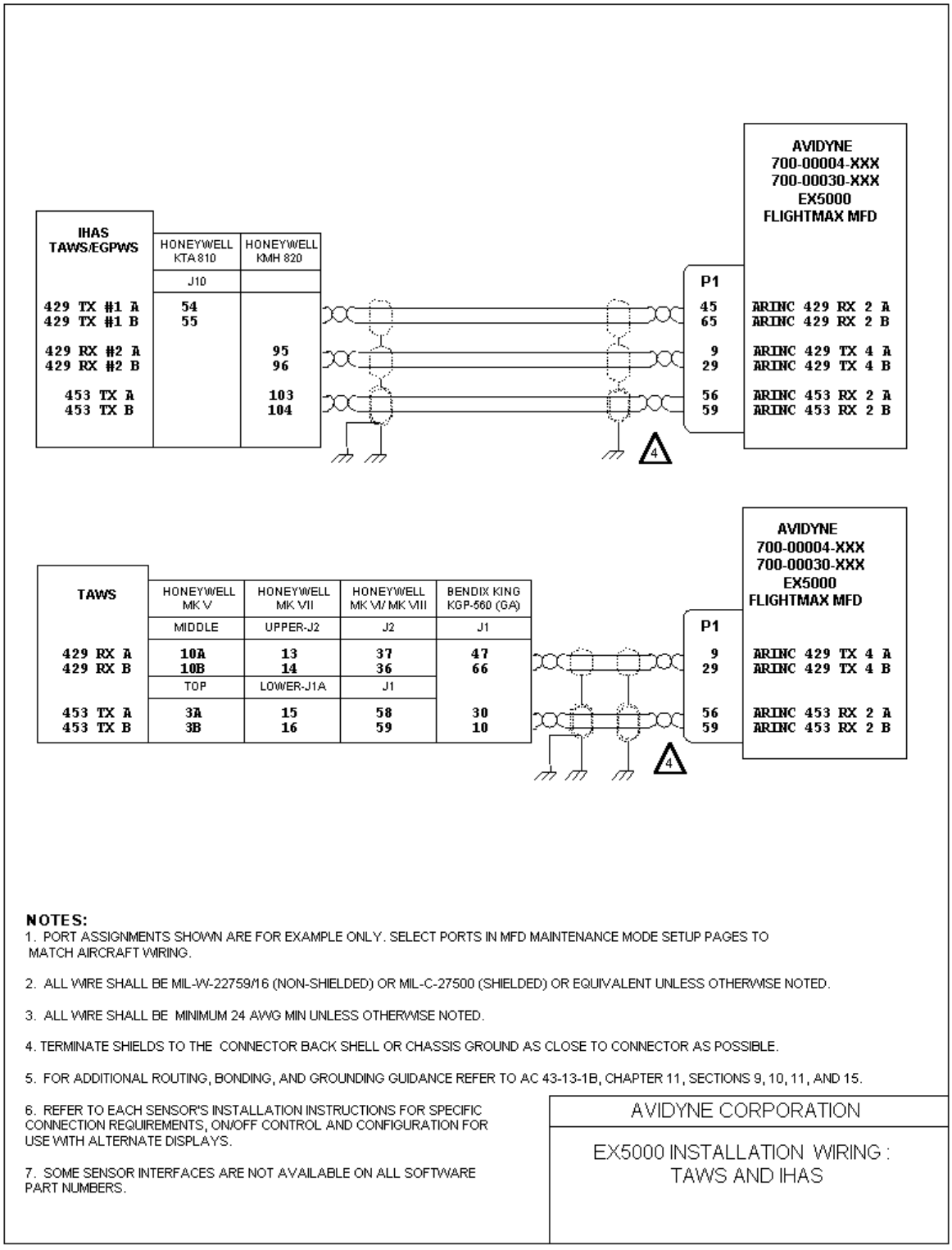
EX5000 INSTALLATION WIRING:
TAS, TCAD, TIS

Appendix M: Wiring Diagram – TAWS



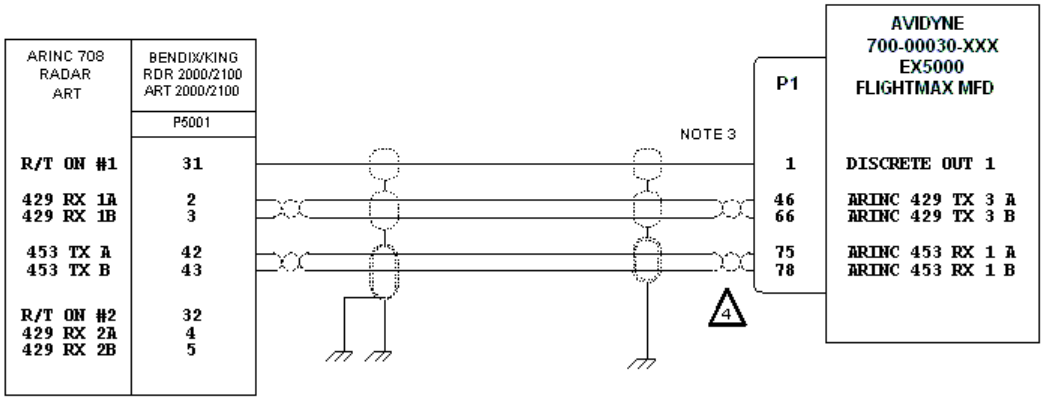
NOTES:

1. PORT ASSIGNMENTS SHOWN ARE FOR EXAMPLE ONLY. SELECT PORTS IN MFD MAINTENANCE MODE SETUP PAGES TO MATCH AIRCRAFT WIRING.
2. ALL WIRE SHALL BE MIL-W-22759/16 (NON-SHIELDED) OR MIL-C-27500 (SHIELDED) OR EQUIVALENT UNLESS OTHERWISE NOTED.
3. ALL WIRE SHALL BE MINIMUM 24 AWG MIN UNLESS OTHERWISE NOTED.
4. TERMINATE SHIELDS TO THE CONNECTOR BACK SHELL OR CHASSIS GROUND AS CLOSE TO CONNECTOR AS POSSIBLE.
5. FOR ADDITIONAL ROUTING, BONDING, AND GROUNDING GUIDANCE REFER TO AC 43-13-1B, CHAPTER 11, SECTIONS 9, 10, 11, AND 15.
6. REFER TO EACH SENSOR'S INSTALLATION INSTRUCTIONS FOR SPECIFIC CONNECTION REQUIREMENTS, ON/OFF CONTROL AND CONFIGURATION FOR USE WITH ALTERNATE DISPLAYS.
7. SOME SENSOR INTERFACES ARE NOT AVAILABLE ON ALL SOFTWARE PART NUMBERS.

AVIDYNE CORPORATION

EX5000 INSTALLATION WIRING : TAWS AND IHAS

Appendix N: Wiring Diagram – Radar Sensor



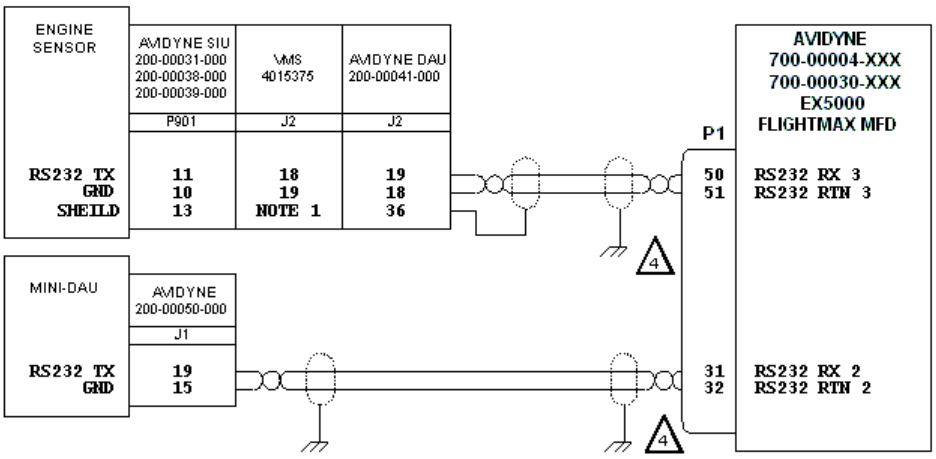
NOTES:

1. PORT ASSIGNMENTS SHOWN ARE FOR EXAMPLE ONLY. SELECT PORTS IN MFD MAINTENANCE MODE SETUP PAGES TO MATCH AIRCRAFT WIRING.
2. ALL WIRE SHALL BE MIL-W-22759/16 (NON-SHIELDED) OR MIL-C-27500 (SHIELDED) OR EQUIVALENT UNLESS OTHERWISE NOTED.
3. ALL WIRE SHALL BE MINIMUM 24 AWG MIN UNLESS OTHERWISE NOTED.
4. TERMINATE SHIELDS TO THE CONNECTOR BACK SHELL OR CHASSIS GROUND AS CLOSE TO CONNECTOR AS POSSIBLE.
5. FOR ADDITIONAL ROUTING, BONDING, AND GROUNDING GUIDANCE REFER TO AC 43-13-1B, CHAPTER 11, SECTIONS 9, 10, 11, AND 15.
6. REFER TO EACH SENSOR'S INSTALLATION INSTRUCTIONS FOR SPECIFIC CONNECTION REQUIREMENTS, ON/OFF CONTROL AND CONFIGURATION FOR USE WITH AN ALTERNATE DISPLAYS.
7. SOME SENSOR INTERFACES ARE NOT AVAILABLE ON ALL SOFTWARE PART NUMBERS.
8. MFD RS-232 PORTS 3 AND 4 ARE ONLY AVAILABLE WITH S/N >1200.
9. MFD DISCRETE OUT 1 IS AN OPEN COLLECTOR OUTPUT. WHEN IN A HIGH IMPEDANCE STATE THE RADAR IS OFF. WHEN IN A LOW IMPEDANCE STATE THE MFD SUPPLIES A CURRENT PATH TO GROUND AND THE RADAR IS ON.

AVIDYNE CORPORATION

EX5000 INSTALLATION WIRING :
DIGITAL RADAR

Appendix O: Wiring Diagram – Engine Sensors



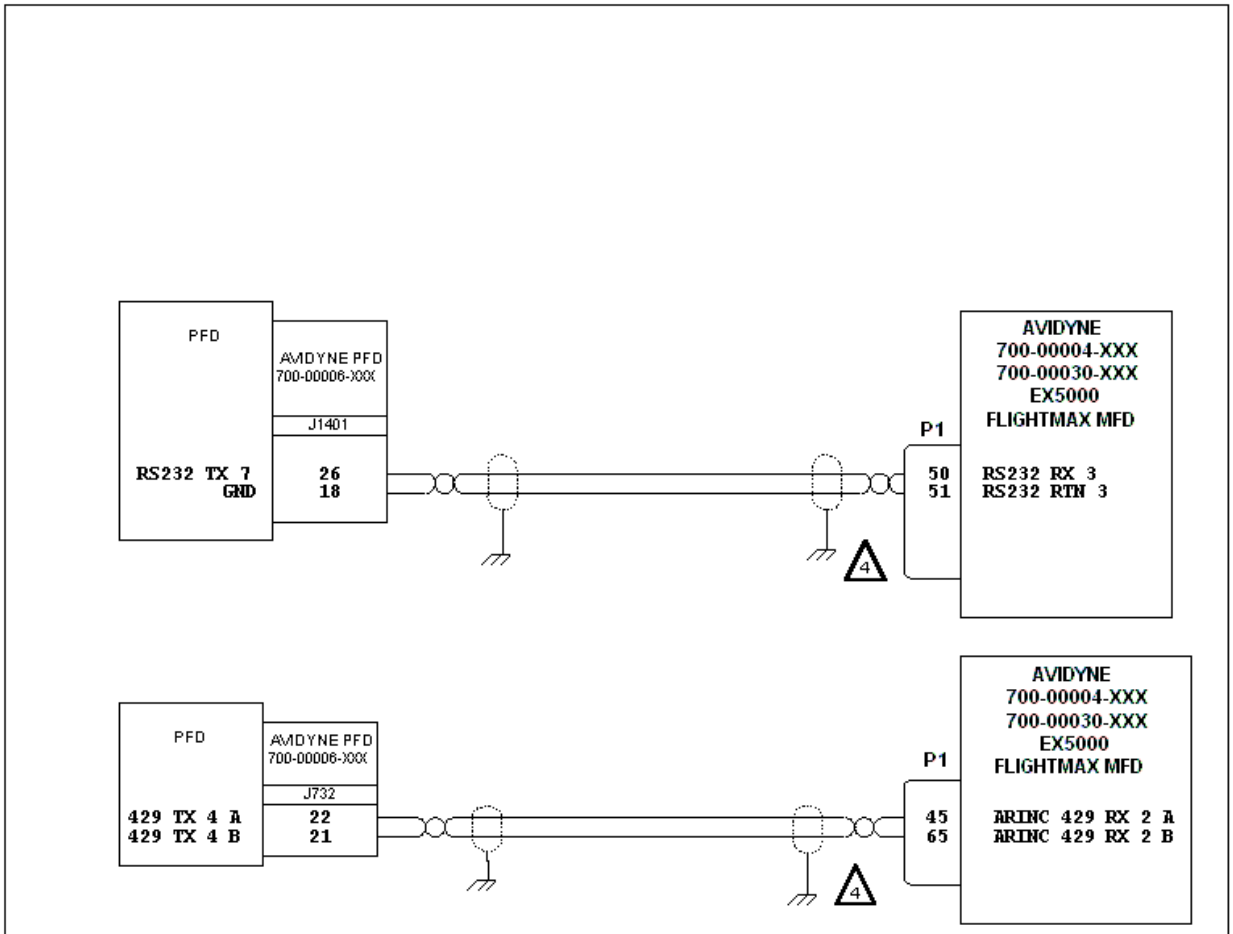
NOTES:

1. PORT ASSIGNMENTS SHOWN ARE FOR EXAMPLE ONLY. SELECT PORTS IN MFD MAINTENANCE MODE SETUP PAGES TO MATCH AIRCRAFT WIRING.
2. ALL WIRE SHALL BE MIL-W-22759/16 (NON-SHIELDED) OR MIL-C-27500 (SHIELDED) OR EQUIVALENT UNLESS OTHERWISE NOTED.
3. ALL WIRE SHALL BE MINIMUM 24 AWG MIN UNLESS OTHERWISE NOTED.
4. TERMINATE SHIELDS TO THE CONNECTOR BACK SHELL OR CHASSIS GROUND AS CLOSE TO CONNECTOR AS POSSIBLE.
5. FOR ADDITIONAL ROUTING, BONDING, AND GROUNDING GUIDANCE REFER TO AC 43-13-1B, CHAPTER 11, SECTIONS 9, 10, 11, AND 15.
5. REFER TO EACH SENSOR'S INSTALLATION INSTRUCTIONS FOR SPECIFIC CONNECTION REQUIREMENTS, ON/OFF CONTROL AND CONFIGURATION FOR USE WITH AN ALTERNATE DISPLAYS.
7. SOME SENSOR INTERFACES ARE NOT AVAILABLE ON ALL SOFTWARE PART NUMBERS.
8. MFD RS-232 PORTS 3 AND 4 ARE ONLY AVAILABLE WITH S/N >1200.

AVIDYNE CORPORATION

EX5000 INSTALLATION WIRING:
ENGINE SENSORS

Appendix P: Wiring Diagram – Primary Flight Display (PFD)



NOTES:

1. PORT ASSIGNMENTS SHOWN ARE FOR EXAMPLE ONLY. SELECT PORTS IN MFD MAINTENANCE MODE SETUP PAGES TO MATCH AIRCRAFT WIRING.
2. ALL WIRE SHALL BE MIL-W-22759/16 (NON-SHIELDED) OR MIL-C-27500 (SHIELDED) OR EQUIVALENT UNLESS OTHERWISE NOTED.
3. ALL WIRE SHALL BE MINIMUM 24 AWG MIN UNLESS OTHERWISE NOTED.
4. TERMINATE SHIELDS TO THE CONNECTOR BACK SHELL OR CHASSIS GROUND AS CLOSE TO CONNECTOR AS POSSIBLE.
5. FOR ADDITIONAL ROUTING, BONDING, AND GROUNDING GUIDANCE REFER TO AC 43-13-1B, CHAPTER 11, SECTIONS 9, 10, 11, AND 15.
6. CONFIGURATION FOR USE WITH AN ALTERNATE DISPLAYS.
7. SOME SENSOR INTERFACES ARE NOT AVAILABLE ON ALL SOFTWARE PART NUMBERS.
8. MFD RS-232 PORTS 3 AND 4 ARE ONLY AVAILABLE WITH S/N >1200.

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EX5000 INSTALLATION WIRING:
PFD

Appendix Q: 3rd Party Avionics System Interconnect

Note: Sensor assignments shown are nominal assignments. You can select ports as required in Maintenance Mode Setup pages (for example. ARINC 429 RX1 is usually used for GPS1. However, if you wire a different sensor to pins 5 & 25, that sensor should be set up for port ARINC1 on the corresponding Setup Page, and GPS1 should use a different port selection.).

Table 30: P1 Pin Assignments

Pin	Pin Name	I/O
5	GPS1 (GPS A) ARINC 429 RX 1A	I
25	GPS1 (GPS A) ARINC 429 RX 1B	I
45	GPS2 (GPS B) ARINC 429 RX 2A	I
65	GPS2 (GPS B) ARINC 429 RX 2B	I
50	RS232 RX 3 (nominally WX-500)	I
49	RS232 TX 3 (nominally WX-500)	O
51	RS232 RTN 3	I
8	ARINC 429 RX 3A (nominally TRAFFIC)	I
28	ARINC 429 RX 3B (nominally TRAFFIC)	I
7	TRAFFIC Command Discrete	O
47	TRAFFIC Command Discrete	O
9	ARINC 429 TX 4A (nominally TAWS)	O
29	ARINC 429 TX 4B (nominally TAWS)	O
56	ARINC 453 RX 2A (nominally TAWS)	I
59	ARINC 453 RX 2B (nominally TAWS)	I
70	RS232 RX 4 (nominally Broadcast)	I
69	RS232 TX 4 (nominally Broadcast)	O
71	RS232 RTN 4 (nominally Broadcast)	I

Table 31: GPS ARINC429 Receive Messages (GAMA Communication Protocol)

Label	Message
310	PPOS LAT
311	PPOS LON
312	GS
313	TRK
147G	MAGVAR
074G	DATA RECORD HEADER
075G	ACTIVE WPT TO/FROM
113G	CHECKSUM
300G	STATION INFO
303	MSG INFO
304G	MSG CHARS 1-3
305G	MSG CHARS 4-6
306G	WPT LAT
307G	WPT LON
330	CONIC ARC INBOUND CRS

Table 31: GPS ARINC429 Receive Messages (GAMA Communication Protocol)

Label	Message
331	CONIC ARC RADIUS
332	CONIC ARC CRS CHANGE
125	UTC TIME

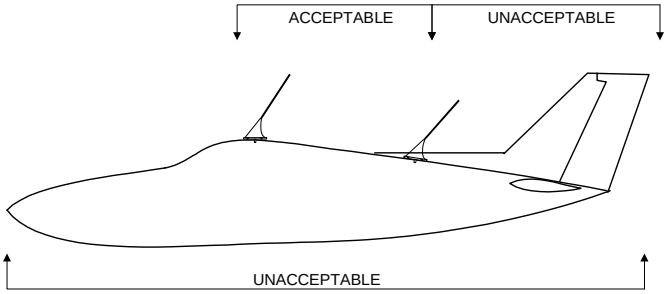
Table 32: Traffic ARINC 429 Messages (ARINC 735A communication protocol)

Label	Message
013	DITS Control
015	Altitude Select Limits
016	DITS Control
203	Own Aircraft Altitude
270	Vertical Resolution Advisory
274	TCAS SL, RI
320	Own Aircraft Heading
350	TCAS Faults Summary
357	Intruder Files
377	Equipment Identifier

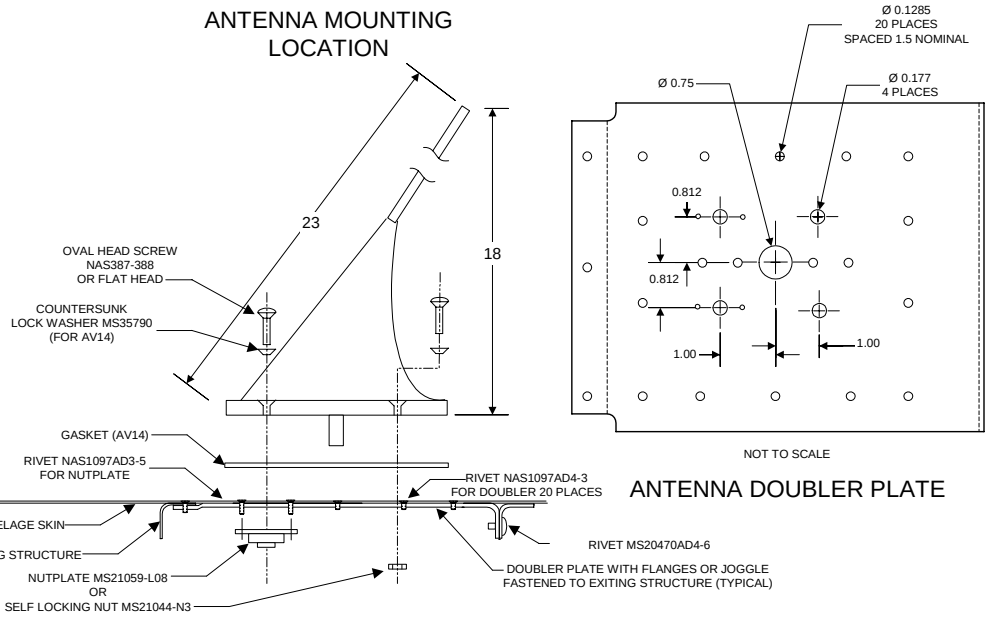
Table 33: TAWS ARINC 429 Transmit Messages

Label	Message
011	Query Response
012	Key Press/Display Mode
271	Range Data

Appendix R: ORBCOMM Datalink Antenna Mounting



ANTENNA MOUNTING LOCATION



NOT TO SCALE

ANTENNA DOUBLER PLATE

ANTENNA INSTALLATION CROSS SECTION

NOTES:

1. ANTENNA: COMANT 177-4 (250 KNOTS).
2. INSTALL IN ACCORDANCE WITH AC 43.13, ANTENNA MFG GUIDANCE, AND TSO STANDARDS.
3. ANTENNA LOCATION: TOP OF AIRCRAFT. DISTANCE FROM TRANSMITTING ANTENNA: 36 IN. MIN. DISTANCE FROM VERTICAL STABILIZER: 36 IN. MIN. ALLOWABLE HEIGHT OF VERTICAL STRAKE NEXT TO ANTENNA BASE: 2 IN MAX.
4. GROUND PLANE REQUIRED, 12 IN RADIUS MIN FOR NON METALLIC FUSELAGE.
5. ANTENNA DOUBLER PLATE FOR ALUMINUM FUSELAGE TYPICAL. DOUBLER SPANNING 2 STRINGERS, 0.125 MIN. DIA. RIVET SPACED 1.5 ON ALL EDGES OF DOUBLER. PREP AND COAT WITH CONDUCTIVE CHROMATE OR ALIDYNE.
6. ANTENNA GROUND CONNECTION MADE VIA INSIDE SURFACE OF FASTENER COUNTERSINK. REMOVE PAINT FROM COUNTERSINK SURFACES AND COAT WITH CONDUCTIVE SEALANT OR INSTALL COUNTERSUNK LOCK WASHERS PER MFG GUIDANCE.
7. MOUNTING HARDWARE: TORQUE EVENLY. SEAL EXPOSED SURFACE AND COUNTERSINK SURFACE.
8. RESISTANCE: ANTENNA GROUND TO MOUNTING HARDWARE TO DOUBLER TO AIRFRAME/GROUND PLANE MAX < 0.5 OHM
9. ANTENNA CABLE: RG-400/U COAX, STRANDED CORE. ROUTE COAX ANTENNA CABLE TO MFD WITH NO KINKS OR BENDS GREATER THAN 2 IN. RADIUS. SECURE ALONG LENGTH, AVOID CHAFING.
10. FIBER REINFORCED PLASTIC (COMPOSITE) FUSELAGE INSTALLATION ONLY IN ACCORDANCE WITH AIRFRAME MFG GUIDANCE, APPROPRIATE SIMILAR STC BASIS, OR DER APPROVAL.
11. AIRCRAFT PRESSURE VESSEL INSTALLATION ONLY IN ACCORDANCE WITH AIRFRAME MFG GUIDANCE, APPROPRIATE SIMILAR STC BASIS, OR DER APPROVAL.
12. ANTENNA SPECIFICATIONS: FREQUENCY:138-151 MHz,
    VSWR: 2.0 to 1 MAX, IMPEDANCE: 50 OHM,
    POLARIZATION PATTERN: VERTICAL OMNI-DIRECTIONAL,
    RF POWER: 5 W, HEIGHT:18 IN MAX,
    TSO C37d, C38d,
    RTCA/DO-160c, ENV.CAT. D2-AC SXSXDFSXXXXXXXXXX
13. ALTERNATE ANTENNA FOR COMPOSITE AIRCRAFT INTERNAL MOUNTING IS ADVANCED AIRCRAFT ELECTRONICS VHF-6T FLEXIBLE DIPOLE.

AVIDYNE CORPORATION

INSTALLATION MECHANICAL
DATA LINK ANTENNA

Appendix S: ORBCOMM Datalink Antenna Coupler Installation

The ORBCOMM Datalink installation can also be done using a shared antenna for both VHF voice communications and Datalink, using the Avidyne DC50 antenna coupler, part number 700-00015-000.

The Datalink Coupler is a Radio Frequency (RF) device that allows two transceivers (a VHF communications radio and a Datalink radio) to share a single wide-band VHF antenna. The coupler contains filters that allow the signals intended for the comm to reach the VHF comm port, while routing the ORBCOMM Datalink frequencies to the ORBCOMM datalink port.

For information on installing the 700-00015-000 antenna coupler, see the DC50 installation manual, (document 600-00082-000, *Antenna Combiner Installation Manual*), available from Avidyne.

Note: The DC50 Datalink Coupler is not for MLX770 Iridium Datalink Transceiver installations.

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