FlightMax™ Entegra

Primary Flight Display

Installation Manual

700-00006-XXX-() PFD
700-00011-XXX-()
Magnetometer/OAT

P/N 600-00080-000
Rev 11

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Revision Table

Date	Revision No.	Description
1/17/03	00	Release Per ECO 03-021
2/10/03	01	Revised Per ECO 03-055
6/13/03	02	Revised per ECO 03-160
7/31/03	03	Revised per ECO 03-194
9/2/03	04	Revised per ECO 03-210
11/10/03	05	Revised per ECO-03-269
12/16/03	06	Revised per ECO 03-290
12/17/03	07	Revised per ECO 03-294
3/16/04	08	Revised per ECO-04-044
6/30/04	09	Revised per ECO-04-115
8/16/04	10	Revised per ECO-04-181
9/07/04	11	Revised per ECO-04-169

Table of Contents

Table of Figures

Table of Tables

1. General Information

This manual contains information about the physical, mechanical, and electrical characteristics of the Avidyne FlightMax™ Entegra PFD and Magnetometer/OAT Sensor, and provides installation instructions for these units. Follow the installation instructions carefully to obtain maximum performance from the PFD system.

This installation manual applies to Avidyne 700-00006-XXX-() PFD's with software part numbers:

530-00123-000,

530-00128-000,

530-00131-000,

530-00133-000,

530-00138-000,

530-00159-000,

and 700-00011-XXX-() Magnetometer/OAT Sensors with Software P/N 530-00124-000.

Operating information is contained in the Pilot's Guide, which is supplied with the unit.

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.

1.1 Equipment Description

The PFD is a panel-mounted, Primary Flight Display (PFD).

The PFD system consists of the following components:

- FlightMax™ Entegra PFD
- Magnetometer and OAT Sensor including pigtail cable
- Pilot's Guide
- Installation Manual (optional)

1.2 Technical Specification

1.2.1 PFD Unit

Specification	*Description/Requirement*
Standard Features	
Display	High Brightness Sunlight Readable Color Active Matrix LCD
Diagonal size	10.4 inches
Resolution	SVGA 800 X 600

Specification	*Description/Requirement*	
Interfaces	ARINC 429 (to GPS/VHF navigators), TTL and Analog (to Autopilot)	
Physical Characteristics		
Weight	12.40 lbs (Landscape)	12.65 lbs (Portrait)
Height	8.5 inches (Landscape)	10.1 inches (Portrait)
Width	10.7 inches (Landscape)	8.5 inches (Portrait)
Depth	9.4 inches (Landscape)	9.3 inches (Portrait)
Electrical Requirements		
Voltage	18-32 VDC, negative ground	
Current	3.0 Amps Max @ 28 VDC	
Dimming Bus	0-28VDC	
Cooling Requirement	No special venting required. Maintain at least 2 inch clearance on top and bottom of PFD to permit adequate air flow	
Operating Limits	See APPENDIX A - Environmental Qualification Form	
TSO's	TSO-C2d, TSO-C3d, TSO-C4c, TSO-C6d, TSO-C8d, TSO-C10b, TSO-C106, TSO-C113, TSO-C43c, TSO-C44b[1], TSO-C45a[1], TSO-C47[3], TSO-C49b[1], TSO-C52b[2]	
ETSO's[4]	ETSO-C2d, ETSO-C3d, ETSO-C4c, ETSO-C6d, ETSO-C8d, ETSO-C10b, ETSO-C106, ETSO-C113, ETSO-C43c, ETSO-C44b, ETSO-C45a, ETSO-C47, ETSO-C49b, ETSO-C52b	

Notes:

1. TSO's applicable to software part number 530-00128-000 & 530-00138-000 only
2. TSO applicable to software part number 530-00131-000 & 530-00138-000 & 530-00159-000 only
3. TSO applicable to software part number 530-00138-000 only
4. ETSOs applicable to software part number 530-00138-000 only

1.2.2 Magnetometer/OAT Sensor

Specification	*Description/Requirement*
Standard Features	
Interfaces	RS-422 (to/from PFD)
Physical Characteristics	
Weight	0.52 lbs
Height	2.53 inches
Width	3.75 inches
Depth	3.75 inches

Specification	*Description/Requirement*
Electrical Requirements	
Voltage	24 VDC supplied by PFD
Current	Included in PFD value
Cooling Requirement	None
Operating Limits	See APPENDIX A - Environmental Qualification Form
TSO's	TSO-C6d
ETSOs	ETSO-C6d

2. Installation Instructions

2.1 General Information

This section contains information for installing and wiring the PFD and Magnetometer/OAT Sensor. All installation procedures should follow the acceptable practices, methods, and techniques of avionics installations as described in FAA Advisory Circulars.

2.2 Unpacking and Inspection

The shipping cartons of the PFD contains the following components and parts:

Part Number	*Description*	*Pilot's Guide Part Number*	*Description*
700-00006-000 or	Entegra Primary Flight Display (PFD), Landscape, S-Tec 55X Compatible, 0-28 VDC Dimming	600-00081-000 or 600-00093-000	Pilot's Guide for software part number 530-00123-000 and 530-00159-000 or Pilot's Guide for software part number 530-00133-000
700-00006-100 or	Entegra Primary Flight Display (PFD), Portrait, S-Tec 55X Compatible, 0-28 VDC Dimming	600-00093-000	Pilot's Guide for software part number 530-00131-000
700-00006-001	Entegra Primary Flight Display (PFD), Landscape, KAP-140 Compatible, 0-28 VDC Dimming	600-00093-000	Pilot's Guide for software part number 530-00128-000
700-00006-002	Entegra Primary Flight Display (PFD), Portrait, S-Tec 55X Compatible, 0-28 VDC Dimming	600-00104-000	Pilot's Guide for software part number 530-00138-000
600-00080-000	PFD Installation Manual (Optional)		
700-00011-000	Magnetometer/OAT probe with interconnect cable		

Make sure that all the parts listed above were received and sustained no shipping damage. If there is evidence of shipping damage, save the shipping carton and packing material to 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.

During system checkout the installer will need to verify the software revision listed below (or later) is installed in the unit.

Unit	*Software Number*	*Software Level*
PFD	530-00123-000	Version 05
PFD	530-00128-000	Version 02
PFD	530-00131-000	Version 00 & Sub
PFD	530-00133-000	Version 00 & Sub
PFD	530-00138-000	Version 00 & Sub.
PFD	530-00159-000	Version 00
Magnetometer/OAT Sensor	530-00124-000	Version 01

2.3 Installation

2.4 Installation Considerations

Prior to installing the PFD, carefully assess the most effective positioning of the PFD based on space availability, viewing angle, cooling, and wiring considerations. Prior to starting, develop a strategy by carefully reviewing all installation documentation, including mechanical and electrical instructions. One recommended technique is to install the PFD with the MFD uninstalled to provide better access. The pilot and static lines should be installed after the PFD has been installed into the panel to avoid kinking the hoses.

Use appropriate appendices found in this manual for guidance with PFD dimensions and panel cutout requirements.

The Magnetometer should be located a minimum of 3 feet away from electromagnetic field generating disturbances that can be produced by equipment such as motors and pumps.

The OAT probe shall be installed a minimum of 36 inches inboard from the wing tip and located underneath the wing in free-air stream.

The Entegra PFD contains software developed in accordance with DO-178B Level B and C requirements. The Entegra Magnetometer contains software developed in accordance with DO-178B Level B requirements.

Structural aspects of the installation should be performed in accordance with AC43.13-2A, Chapter 1.

The PFD can only be installed when done so in conjunction with a system(s) which has (have) independent sensing and display of altitude, airspeed, attitude and heading.

The secondary attitude indicator shall be powered (electrically or pneumatically) separate of the PFD in event of loss of primary power source to the PFD.

2.5 Location and Viewing Angle

The PFD is designed to be panel-mounted and held in place by four captive 10-32 screws. A standard slotted screwdriver (Landscape) or hex driver (Portrait) is required, and each screw should be installed with 30 +/− 0.5in-lb of torque. Locate the PFD in the panel such that the pilot can easily reach all the knobs and controls.

The PFD and secondary instruments (airspeed indicator, altimeter, and attitude indicator) are to be located in the pilot's primary field of view. The pilot's primary field of view is defined as +/- 30° horizontal cone measured from the centerline of the pilot's seat forward, with the seat adjusted for the pilot's nominal eye position. Installation location approval should be sought from the FISDO.

Other avionics, required for approved flight operations, relocated as a result of this installation, must remain readily accessible to the pilot.

The resulting flightdeck design must include supplemental caution and warning means (visual or audio) consistent with FHA.

The panel assembly must include placard content equivalent to that existing prior to the modification.

An aircraft specific electrical load analysis must be performed to assure adequate generating system margins post-PFD installation (15%).

2.6 Cooling

The PFD uses two internal fans; an inlet and outlet fan, which provide adequate cooling. The PFD should have approximately 2 inches clearance, top and bottom to allow for proper air circulation.

2.7 Mounting the PFD

To install the PFD, a cutout hole must be made in the cockpit panel. Refer to Appendix F and G for PFD Landscape and Portrait Cutout Dimensions. The PFD is held in place with four captive socket head cap screws with 10-32 thread size. These require a panel thickness of 0.080" for proper engagement and proper nut plate. Hole patterns and placements are illustrated in the corresponding appendices. A positive ground path must be established between the PFD chassis and airframe ground (< 0.5 Ohm).

Note: Do not attempt to install a PFD into a panel that is oriented more than 10° (+/- 1°) from vertical. Refer to section 2.5 for primary viewing guidance.

2.8 Electrical and Sensor Interfaces

Power to the PFD is provided directly from the aircraft, there is no on/off switch. The PFD primary voltage is nominally 28 VDC. Refer to Appendix section of this manual for wiring interface instructions. The PFD should be wired to the aircraft dimming bus (if equipped) to control front panel LED brightness via the cockpit panel brightness control. Refer to Appendix

section of this manual for wiring interface instructions for GPS/Navigation radios and autopilot.

Wiring aspects of the design, including wire type and size selection must conform to Advisory Circular AC 43.13-1B, Section 5, *Electrical Wire Rating*. Wire conforming to MIL-W-22759/16 or MIL-C-27500 satisfies the burn requirements stated in 14 CFR 23.1359.

2.9 Pitot-Static Interface

The PFD connects directly to the aircraft pitot-static system. Use the following pressure connectors:

Qty	Part Number	Description	Supplier
2	PMC1703	3/16" tube ID, barb style, quick clip, Acetal	Colder Products

The Pitot (Pt) and Static (Ps) connections on the PFD are marked accordingly. In addition, the Pt connector on the PFD is color-coded red. It is recommended that the aircraft pitot connector also be color coded red to help assure proper connection. The installer must assure that the pitot and static connectors are fully seated. This is indicated by the engagement of the connector mounted locking bracket.

Pitot-static pneumatic lines must be installed so as to provide positive drainage (inhibit water entrapment at the low point(s) of the tubing runs).

3. System Setup and Checkout

3.1 System Setup Page Access

Apply power to all the sensors that interface with the PFD, including: the GPS and the autopilot. System Setup Page will allow you to configure the PFD. The System Setup Page can only be accessed by pressing the line select keys in a specific manner.

The System Setup Page is accessible as follows:

1. Turn on the PFD by applying power to the aircraft via the battery switch.
2. The system will begin its normal start up sequence.
3. Simultaneously press and hold the top left (L1), and third down from top left (L3) Line Select Keys until the countdown timer in the lower left corner of the display indicates zero seconds (See Figure 1. for depiction of Line Select Keys)
4. At the end of a displayed countdown clock adjacent to the L4 line select key, the System Setup Page will appear (See Figure 2).

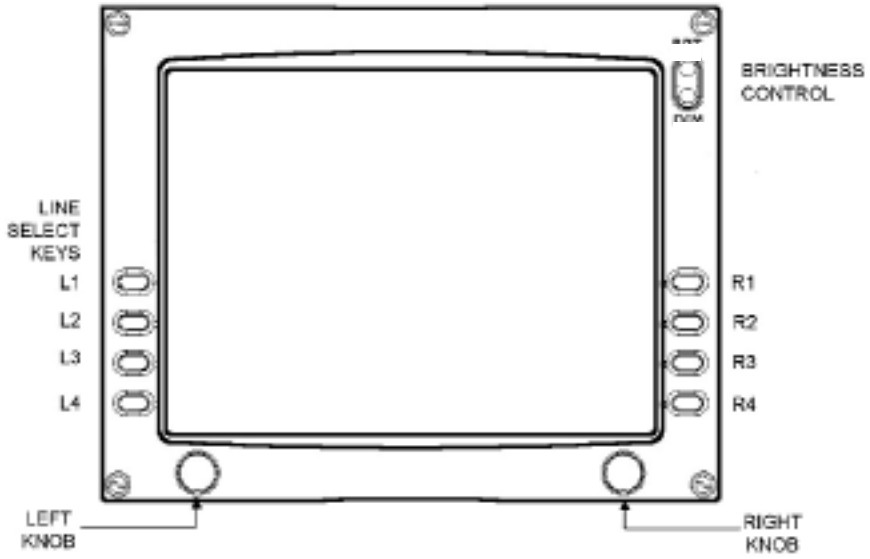


Figure 1 PFD Controls

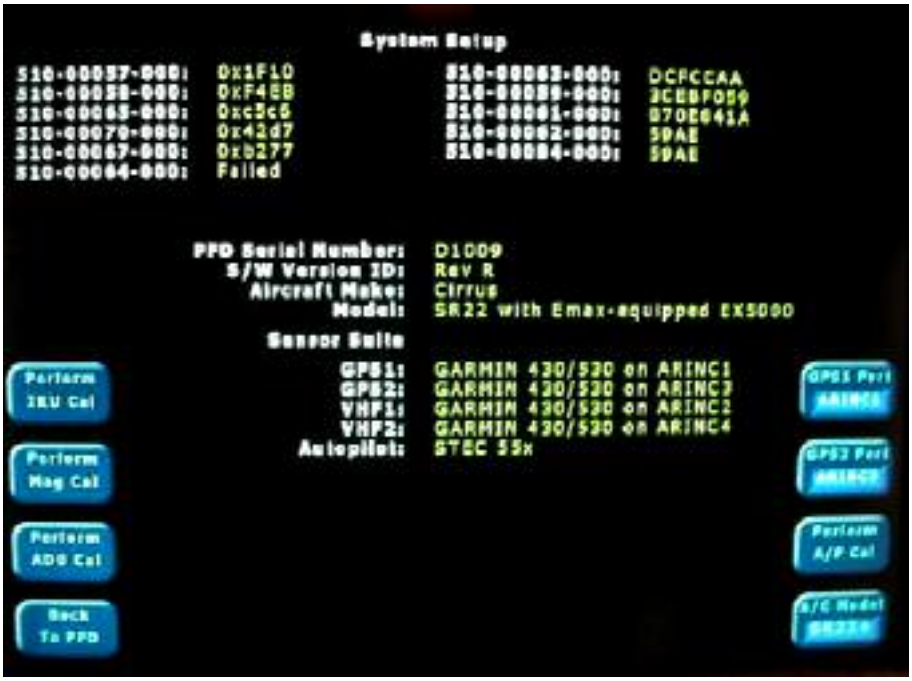


Figure 2 System Setup Page (Example)

3.2 GNS-430 Nav/Com Setup

3.2.1 PFD Unit

Software Part Numbers Other Than 530-00123-000 Rev 02 and subsequent revisions:

The ARINC 429 ports on the PFD come hard-wired and pre-assigned. GNS-430 Unit #1 must be connected to ARINC port 1 (GPS output line) and port 2 (VLOC output line). GNS-430 Unit #2 (if installed) must be connected to ARINC port 3 (GPS output line) and port 4 (VLOC output line). Use the line select keys R1, R2 to configure the PFD in the following manner:

Line Select Key (**LSK**) R1: GPS1 Port: ARINC 1;

LSK R1: GPS1 Port: NONE, if GNS-430 No.1 not installed;

LSK R2: GPS2 Port: ARINC 3, if GNS-430 No.2 installed;

LSK R2: GPS2 Port: NONE, if GNS-430 No. 2 not installed.

NOTE: GNS-430 and GNS-530 are electrically identical and are treated as one in the same when integrating with the *Entegra* PFD.

Once complete, verify the displayed configuration in the sensor suite section of the System Setup page accurately reflects actual configuration.

Software Part Numbers 530-00123-000 Rev 02 and subsequent revisions or 530-00159-000 Rev 00 and subsequent revisions:

The ARINC 429 ports on the PFD come hard-wired and pre-assigned. GNS-430 Unit #1 must be connected to ARINC port 1 (GPS output line) and port 2 (VLOC output line). GNS-430 Unit #2 (if installed) must be connected to ARINC port 3 (GPS output line) and port 4 (VLOC

output line). When GNC-420 units are to be installed, they must be connected to ARINC port 1 (or 3 if serving as the 2nd navigator), leaving port 2 (or 4 if serving as the 2nd navigator) vacant. Use the line select keys R1, R2 to configure the PFD in the following manner:

Line Select Key (LSK) R1: Nav 1: 430/530, 420, or None as appropriate;

LSK R2: Nav 2: 430/530, 420, or None as appropriate.

NOTE: GNS-430 and GNS-530 are electrically identical and are treated as one in the same when integrating with the *Entegra* PFD.

Once complete, verify the displayed configuration in the sensor suite section of the System Setup page accurately reflects actual configuration.

3.2.2 GNS-430 Unit(s)

NOTE: Refer to the GNS 430 users guide for GNS 430 detailed operations.

Place the GNS 430 unit(s) into Maintenance Mode via the following steps:

1. Ensure GNS 430 unit(s) off
2. Depress the "ENT" button as the power to the GNS 430 unit(s) is applied
3. Continue to depress the ENT button until the GNS 430 self -test is completed
4. Depress the ENT button twice to display the "MAIN ARINC 429 CONFIG" page
5. Configure the GNS 430 unit(s) to have the following mandatory settings (See Table 1):

Field	GNS-430/530 in slot #1	GNS-430/530 in slot #2 (if installed)
IN 1	Low, Sandel EHSI	Low, Sandel EHSI
IN 2	Low, OFF	Low, OFF
Out	Low, GAMA 429 Graphics	Low, GAMA 429 Graphics
SDI	LNAV1	LNAV2

Table 1 Main ARINC 429 Configuration Page

6. Turn the right inner knob until the "MAIN RS232 CONFIG" page is displayed.
7. Configure the GNS 430 unit(s) to have the following mandatory settings (See Table 2):

Field	GNS-430 in slot #1		GNS-430 in slot #2 (if installed)	
	Input	Output	Input	Output
CHNL 1	Off (1)	Aviation	Off (1)	Aviation
CHNL 2	Off (1)	Off (1)	Off (1)	Off (1)
CHNL 3	Crossfill(2)	Crossfill(2)	Off (1)	Off (1)

Field	GNS-430 in slot #1		GNS-430 in slot #2 (if installed)	
	Input	Output	Input	Output
CHNL 4	Off (1)	Off (1)	Off (1)	Off (1)

Table 2 Main RS232 Configuration Page

Note 1: Unless other equipment installed (i.e., Stormscope)

Note 2: Applies when two GNS-430's are installed, otherwise ignore.

8. Turn the right inner knob until the "MAIN INPUTS 2" page is displayed. Verify CDI = "GPS"
9. Turn the right inner knob until the "MAIN DISCRETE OUTPUTS" page is displayed. Verify Discrete Toggle = "APR"
10. Turn the right inner knob until the "VOR/LOC/GS ARINC 429 CONFIG" page is displayed
11. Configure the GNS 430 unit(s) to have the following mandatory settings (See Table 3):

Field	GNS-430 in slot # 1	GNS-430 in slot #2 (if installed)
Speed	Low - Low	Low – Low
IN 2	VOR/ILS1	VOR/ILS2
DME Mode	Directed Freq. 1	Directed Freq. 2

Table 3 VOR/LOC/GS ARINC 429 Configuration Page

Note: Ensure GNS430 Lighting is set-up appropriately and that night lighting is balanced with the PFD, other avionics and aircraft systems.

3.2.3 GNC-420 Unit(s)

NOTE: GNC-420 interface support is only available for PFD software part numbers 530-000123-000 Revision 02 and subsequent revisions ***or 530-00159-000 Rev 00 and subsequent revisions***

NOTE: Refer to the GNC 420 users guide for GNC 420 detailed operations.

Place the GNC 420 unit(s) into Maintenance Mode via the following steps:

1. Ensure GNC 420 unit(s) off
2. Depress the "ENT" button as the power to the GNC 420 unit(s) is applied
3. Continue to depress the ENT button until the GNC 420 self -test is completed
4. Depress the ENT button twice to display the "MAIN ARINC 429 CONFIG" page
5. Configure the GNC 420 unit(s) to have the following mandatory settings (See Table 4):

Field	*GNC-420 in slot #1*	*GNC-420 in slot #2 (if installed)*
IN 1	Low, Sandel EHSI	Low, Sandel EHSI
IN 2	Low, OFF	Low, OFF
Out	Low, GAMA 429 Graphics	Low, GAMA 429 Graphics
SDI	LNAV1	LNAV2

Table 4 Main ARINC 429 Configuration Page

6. Turn the right inner knob until the "MAIN RS232 CONFIG" page is displayed.
7. Configure the GNC 420 unit(s) to have the following mandatory settings (See Table 5):

Field	*GNC-420 in slot #1*		*GNC-420 in slot #2 (if installed)*	
	Input	Output	Input	Output
CHNL 1	Off (1)	Aviation	Off (1)	Aviation
CHNL 2	Off (1)	Off (1)	Off (1)	Off (1)
CHNL 3	Crossfill(2)	Crossfill(2)	Off (1)	Off (1)
CHNL 4	Off (1)	Off (1)	Off (1)	Off (1)

Table 5 Main RS232 Configuration Page

Note 1: Unless other equipment installed (i.e., Stormscope)

Note 2: Applies when two GNC-420's are installed, otherwise ignore.

Note: Ensure GNC420 Lighting is set-up appropriately and that night lighting is balanced with the PFD, other avionics and aircraft systems

3.3 Aircraft Model Setup

The following steps shall be performed to configure the PFD for the correct aircraft model.

1. Enter the System Setup Page (see section 3.1).

Press LSK R4, labeled "A/C Model", as required until the appropriate aircraft model is displayed on the button label. Note that the model field in the middle of the page reflects the model selected. For those aircraft models that have a "+" suffix displayed in the LSK R4 button label, OAT will be suppressed from the display.

3.4 Autopilot Setup

3.4.1 PFD Unit

The following steps shall be performed to configure the autopilot interface.

1. Enter the System Setup Page (see section 3.1) and press the line select key R3, labeled "Perform A/P Cal" and depress line select key R1 " A/P Type" to select the appropriate autopilot.

For Software Part Numbers other than 530-00123-000 Rev 02:

2. Select line select key L4 labeled "Back to PFD" and reenter the System Setup Page. Verify the displayed autopilot configuration in the sensor suite section of the System Setup page accurately reflects actual configuration.

For Software Part Number 530-00123-000 Rev 02 and subsequent revisions or 530-00159-000 Rev 00 and subsequent revisions:

3. Select line select key L3 labeled "Back to Setup" to return to the System Setup Page. Verify the displayed autopilot configuration in the sensor suite section of the System Setup page accurately reflects actual configuration.

3.4.2 Autopilot Unit – Bendix-King KAP-140 autopilots

If the autopilot installed in the aircraft is a Bendix-King KAP-140, perform the standard autopilot installation calibration steps as outlined in the KAP-140 installation and maintenance manuals. A computer with serial input and terminal application and a serial adapter cable are required. (see KAP-140 documentation) Be sure to make note of the following factors during the autopilot calibration:

a) When calibrating the autopilot, ensure that the PFD has completely initialized and heading is valid before performing the calibration steps.

b) For calibrating the deviation signals for VOR, localizer, and glideslope, ensure that the PFD NAV source (top left line select) is set to VLOC (1 or 2, corresponding to the nav radio in use).

c) For calibrating GPS NAV mode, ensure that the PFD NAV source (top left line select) is set to GPS (1 or 2, corresponding to unit in use).

d) If the autopilot exhibits some roll bias from the turn gyro input, consult the KAP-140 documentation for instructions on how to adjust the unit for this bias.

3.4.3 Autopilot Unit – STEC autopilots

If the autopilot installed in the aircraft is an S-Tec System 55X or 55SR, ensure it is configured as a KCS-55 compatible unit. Refer to the S-Tec System 55X or 55SR Installation Manual for details.

Note: The following steps are to be performed in-flight in smooth air for aircraft equipped with an S-Tec 55X or 55SR autopilot.

1. While NAV (without GPSS) mode is engaged on the System 55X or System 55SR, using a GNS-4XX GPS source, insert an appropriately sized screwdriver into the slotted hole to perform the alignment procedures in accordance with the System 55X or 55SR Installation Manual.
2. Perform a NAV course alignment by slowly adjusting the screw until the aircraft closely tracks the GPS course. Allow the aircraft to stabilize between adjustments. This may take several minutes and require several adjustments.

For aircraft equipped with flight director enabled PFDs and S-Tec 55X equipped:

3. Select AP/FD or AP ON position on the aircraft Autopilot Master switch
4. Engage the 55X in HDG and ALT mode and allow aircraft to "settle on heading bug" The heading bug and flight director may be offset from the lubber line by several degrees.
5. Turn off all GPS/NAV systems
6. Enter System Setup mode on the PFD by following steps 1 through 4 in the System Setup Page Access section.
7. Turn on all GPS/NAV systems.
8. Select "Perform A/P Cal".
9. Select "Sync HDG". Autopilot should immediately command the aircraft to turn toward the heading bug.
10. Select "Back to PFD".
11. Verify HDG mode accurately tracks heading bug.
12. Verify the Flight Director Command Bars are above the aircraft reference symbol with no gap between the two.
13. Engage NAV (without GPSS) mode on the autopilot.
14. Verify NAV mode accurately tracks flight plan (Flight plan or waypoint will need to be entered).
15. A/P calibration is complete.
16. If autopilot does not track the heading bug or NAV mode correctly, repeat steps in this procedure.

For aircraft equipped with non flight director enabled PFDs and S-Tec 55X equipped:

3. Engage the 55X or 55SR in HDG mode and allow aircraft to "settle on heading bug" (If heading bug agrees with aircraft heading stop procedure here, other wise continue calibration steps below).
4. Turn off all GPS/NAV sources.
5. Enter System Setup mode on the PFD by following steps 1 through 4 in the System Setup Page Access section.
6. Turn on all GPS/NAV sources.
7. Select "Perform A/P Cal".
8. Select "Sync HDG". Autopilot should immediately command the aircraft to turn toward the heading bug.
9. Select "Back to PFD".
10. Verify HDG mode accurately tracks heading bug.
11. Engage NAV (without GPSS) mode on the autopilot.
12. Verify NAV mode accurately tracks flight plan (Flight plan or waypoint will need to be entered).
13. A/P calibration is complete.

14. If autopilot does not track the heading bug or NAV mode correctly, repeat steps in this procedure.

3.5 Barometric Units Setting

The following steps shall be performed to configure the PFD for desired barometric units.

Note: This section does not apply to PFDs with software part number 530-00123-000, Version 00.

1. Enter the System Setup Page (see section 3.1).
2. Press LSK R3, labeled "Perform A/P Cal", button to enter the Autopilot Calibration page.
3. Press LSK R4, labeled "Baro Unit", button to cycle through barometric pressure units (inHg, hPa, Mb).
4. Once the desired units have been selected and appear in the button label, press the "Back to PFD" button (LSK L4).

3.6 PFD System Calibrations

The PFD and Magnetometer require calibrations upon initial installation, when replaced, or bi-annual periodic inspection. The following two aircraft level calibration procedures are listed below:

Calibration	*When Performed*	*Notes*	*Periodic Calibration*
IRU	Initial installation and replacement	Must be performed first upon initial installation with Magnetometer	None
Magnetometer	Initial installation, replacement, replacement of PFD, or bi-annual inspection	Must be performed after IRU calibration upon initial installation or replacement of PFD	Every 24 months

Note: The IRU calibration must be completed prior to the Magnetometer calibration

3.6.1 IRU Calibration Procedure

Approximate duration: Approximately 20 Minutes

Required Equipment: Digital Level, Resolution: 0.25°, Accuracy: +/- 0.25°

Recommended Personnel: One avionics technician

Procedure:

1. Avionics power applied.
2. Allow the PFD to align (approximately 3 minutes) until the ADAHRS countdown timer expires and the Gyro Warm-up box is removed.
3. Wait in the aligned state for an additional 10 minutes.
4. Enter System Setup mode on the PFD by following steps 1 through 4 in the System Setup Page Access section.
5. Press the IRU Install line select key (L2).

Note: The IRU Installation page is displayed (see Figure 3).

6. Place a digital level in accordance with aircraft ICA (An aircraft ICA is required by Federal Aviation Regulations (FAR) Part 23, Appendix G. Chapter 4) instructions for lateral leveling of the aircraft.
7. Following the directions on the IRU installation page, adjust the "IRU Installed Roll Attitude" counter to be equal to the digital level reading. (if the right wing is low, as viewed by the pilot, enter a positive number.)
8. Place a digital level in accordance with aircraft ICA instructions for longitudinal leveling of the aircraft.
9. Following the directions on the IRU installation page, adjust the "IRU Installed Pitch Attitude" counter to be equal to the digital level reading ± 0.25degrees.

Note: The only two axis that are changed via installation calibration input is the pitch axis and roll axis

Note: The pitch attitude as determined by the digital level should have a resolution of at least ¼°. This applies to the roll axis also.

10. Press the Install IRU line select key (R4) when proper pitch and roll is displayed.
11. After the display indicates the IRU calibration is done wait 10 seconds and then cycle power on the PFD in order for the IRU calibration to take effect.

Figure 3 IRU Installation Page.

3.6.2 Magnetometer Calibration Procedure

Approximate duration:	20 minutes (assuming airplane is free to rotate 360° without magnetic disturbances)
Required equipment:	Installed PFD Installed magnetometer Reference Compass: Resolution: 1°, Accuracy: +/- 1°
Recommended personnel:	2 avionics technicians (one in the aircraft to push required bezel buttons, one on the wing to push the aircraft to new headings and read the marine compass)

Note: Ensure the IRU install calibration procedure has been completed.

Procedure:

1. Aircraft doors closed.
2. Flaps in retracted position.
3. Engine off.
4. Airplane in level flight attitude.
5. Install the marine compass onto the top surface of the left tail surface.
6. Position lubber line to be parallel with longitudinal axis of the airplane.
7. Position marine compass to be approximately ½ chord length back from leading edge of tail and 43 inches outboard from fuselage.
8. Turn battery switch to on. (Consider attaching an external power cart until ready for step 11.) PFD may already be on and aligned from IRU install. If so, skip to step 11. All other aircraft equipment shall be operating.

9. Allow the PFD to align (approximately 3 minutes) until the ADAHRS countdown timer expires and is removed from the display.
10. Wait in the aligned state for an additional 10 minutes.
11. Enter System Setup mode on the PFD by following steps 1 through 4 in the System Setup Page Access section.
12. Press the Perform Mag Cal line select key (L1).

    Note: The Magnetometer Calibration page is displayed (See Figure 4)

13. Align centerline of airplane on magnetic north heading as indicated by tail mounted compass by pushing the aircraft as required. Ensure this is being done clear of magnetic disturbances in the pavement or immediate vicinity.
14. Follow the directions on the Magnetometer Calibration page (press the Calibrate Heading button and wait until "Done" is displayed, see note).

    Note: On the last heading calibration point (330°), it may take up to a minute for "Done" to be displayed.

15. Align centerline of airplane on consecutive 30° headings as indicated by the tail-mounted compass by pushing the aircraft as required and continue following the directions of the Magnetometer Calibration page until complete. (see Figures 4 and 5).

Figure 4 Initial Magnetometer Calibration Page

Figure 5 Final Magnetometer Calibration Page

Note: Pressing (R3) "Redo Previous" provides an "undo" capability.

Note: Aborting the calibration process (i.e., by exiting the Magnetometer Calibration Page or shutting off power to the PFD) prior to completion will result in the loss of stored calibration parameters. Restarting the calibration process over from the beginning will be required.

16. After the last heading point of 330° is calibrated the PFD will present a text message "Magnetometer Calibration Complete". After this message appears, wait approximately 10 seconds and cycle power to the PFD.
17. Align the centerline of the airplane with consecutive 90° headings as indicated on the tail-mounted magnetic compass and verify the accuracy of the PFD heading display is within +/- 4° of the tail mounted magnetic compass.
18. Calibration complete.

4. Post Installation Check

4.1 Lighting Check

Rotate the "INST" instrument lighting control rheostat through its full range of motion. Ensure the PFD LED lights around all bezel keys and knobs come on and match the MFD LED lighting.

Note: An approximate 1 second lag to full brightness is normal.

4.2 GPS NAV-COMM Check

4.2.1 Dual GPS-NAV-COM (2 x GNS-430/530) Combination:

1. PFD Nav Button- Ensure GPS1 displayed. Observe that the GNS-430 No. 1 CDI button label displays GPS.
2. GNS-430 No. 1 CDI button- Press once and observe CDI button displays VLOC label. Observe the PFD Nav button changes to VLOC1.
3. GNS-430 No.1 CDI button- Press once and observe the CDI button label displays GPS. Note that the PFD Nav button changes to GPS1.
4. PFD Nav button- Press once and observe VLOC1 is displayed. Observe the GNS-430 No. 1 CDI button changes to VLOC.
5. PFD Nav button- Press once and note GPS2 is displayed. Observe the GNS-430 no. 2 CDI button displays GPS.
6. GNS-430 No. 2 CDI button- Press once and observe the CDI button label displays VLOC. Observe the PFD Nav button changes to VLOC2.
7. GNS-430 No. 2 CDI button- Press once and observe the CDI button label displays GPS. Observe the PFD Nav button changes to GPS2.
8. PFD Nav button- Press once and observe VLOC2 is displayed. Observe the GNS-430 No. 2 CDI button changes to VLOC.

4.2.2 Single GPS-NAV-COM and Single GPS-COM Combination (1 x GNS-430/530, 1 x GNC-420):

1. PFD Nav Button- Ensure GPS1 displayed. Observe that the GNS-430 No. 1 CDI button label displays GPS.
2. GNS-430 No. 1 CDI button- Press once and observe CDI button displays VLOC label. Observe the PFD Nav button changes to VLOC1.
3. GNS-430 No.1 CDI button- Press once and observe the CDI button label displays GPS. Note that the PFD Nav button changes to GPS1.
4. PFD Nav button- Press once and observe VLOC1 is displayed. Observe the GNS-430 No. 1 CDI button changes to VLOC.

5. PFD Nav button- Press once and note GPS2 is displayed. Observe the GNC-420 no. 2 CDI button displays GPS.

4.2.3 Single GPS-COM Configuration (1 x GNC-420):

1. GNS 420 No. 1 OBS button – Press once and observe the OBS label is present on the GNC-420 and that the left knob on the PFD is now labeled "CRS SET/CENTER".
2. GNS 420 No. 1 OBS button – Press once and observe the OBS label is not displayed on the GNC-420 and that the left knob on the PFD has no label.

Note: Two-way communication between the PFD and both GNS-430 units has just been demonstrated.

4.3 Pitot-Static Leak Check

The pitot-static leak check shall be performed anytime time the pitot-static ports are disconnected from the PFD. The pitot-static leak check shall be performed in accordance with the specific Aircraft Maintenance Manual.

4.4 EMI Check

Verify that no interference is noted through the use of the PFD on other systems in the aircraft. The operation of the PFD should not result in Nav flags, constant location lightning strikes on the WX-500 sensor, noise on COMM channels, or other phenomena.

1. Comm Radios - Scan through radio channels to ensure there is no interference caused by the PFD. Check random frequencies from 118MHZ through 136.975MHZ as well as your local ground and tower frequencies to ensure there is no break in squelch due to the installation.
2. GPS - Ensure that correct position is displayed and that there is no change in satellite signal strength with the PFD powered off.
3. Autopilot - Ensure that autopilot self-test passes OK with the PFD powered on.
4. Other Instruments - Verify there is no adverse effect on other instruments with the PFD powered on.

4.5 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.

5. Policies & Appendices

5.1.1 Factory Service Policies

5.1.2 Technical Support

Avidyne's web site contains information that may assist the operator and installer with questions or problems with their FlightMax Entegra Primary Flight Display.

- 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 8:00 AM to 5:00 PM Eastern Time, Monday through Friday.

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.

5.1.3 General Service Procedures

Repair of the Primary Flight Display and Magnetometer/OAT Sensor Assembly are performed at the factory, and includes a complete checkout and recalibration.

Prior to returning a 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.

Appendix A - Environmental Qualification Forms

PFD RTCA/DO-160D ENVIRONMENTAL QUALIFICATION FORM

NOMENCLATURE: PFD
PART NO: 700-00006-000, 700-00006-001, & 700-0006-100
MANUFACTURER: AVIDYNE CORPORATION
ADDRESS: 55 OLD BEDFORD ROAD, LINCOLN, MA 01773

DO-160D ENVIRONMENTAL QUALIFICATION TESTS		
CONDITIONS	***RTCA/DO-160D Section***	***Conducted Test Category***
Temperature and Altitude		
Low Temp	4.5.1	Equipment qualified to Category B1
High Temp	4.5.2 & 4.5.3	Equipment qualified to Category B1
In-Flight Loss of Cooling	4.5.4	Equipment qualified to Category W
Altitude	4.6.1	Equipment qualified to Category B1
Decompression	4.6.2	Equipment qualified to Category B1
Overpressure	4.6.3	Equipment qualified to Category B1
Temperature Variation	5.0	Equipment qualified to Category B
Humidity	6.0	Equipment qualified to Category A
Operational Shocks & Crash Safety	7.0	Equipment qualified to Category B
Vibration	8.0	Equipment qualified to Category S, Curve M
Explosion Proofness	9.0	Equipment identified as Category X, no test performed
Waterproofness	10.0	Equipment identified as Category X, no test performed
Fluids Susceptibility	11.0	Equipment identified as Category X, no test performed
Sand and Dust	12.0	Equipment identified as Category X, no test performed
Fungus Resistance	13.0	Equipment identified as Category X, no test performed
Salt Spray	14.0	Equipment identified as Category X, no test performed
Magnetic Effects	15.0	Equipment Class qualified to Z
Power Input	16.0	Equipment qualified to Category B (except Engine Start Undervoltage)

DO-160D ENVIRONMENTAL QUALIFICATION TESTS		
CONDITIONS	***RTCA/DO-160D Section***	***Conducted Test Category***
Voltage Spike	17.0	Equipment to be qualified to Category A
Audio Frequency Conducted Susceptibility	18.0	Equipment qualified to Category B
Induced Signal Susceptibility	19.0	Equipment qualified to Category Z
Radio Frequency Susceptibility	20.0	Equipment qualified to Category W (conducted)/Q (radiated)
Emission of Radio Frequency Energy	21.0	Equipment qualified to Category M
Lightning Induced Transient Susceptibility	22.0	Equipment qualified to levels greater than ZZZZ
Lightning Direct Effects	23.0	Equipment identified as Category X, no test performed
Icing	24.0	Equipment identified as Category X, no test performed
Electrostatic Discharge	25.0	Equipment qualified to Category A

PFD RTCA/DO-160D ENVIRONMENTAL QUALIFICATION FORM

NOMENCLATURE: PFD

PART NO: 700-00006-002

MANUFACTURER: AVIDYNE CORPORATION

ADDRESS: 55 OLD BEDFORD ROAD, LINCOLN, MA 01773

DO-160D ENVIRONMENTAL QUALIFICATION TESTS		
CONDITIONS	***RTCA/DO-160D Section***	***Conducted Test Category***
Temperature and Altitude		
Low Temp	4.5.1	Equipment qualified to Category C1
High Temp	4.5.2 & 4.5.3	Equipment qualified to Category C1
In-Flight Loss of Cooling	4.5.4	Equipment qualified to Category W
Altitude	4.6.1	Equipment qualified to Category C1
Decompression	4.6.2	Equipment qualified to Category C1
Overpressure	4.6.3	Equipment qualified to Category C1
Temperature Variation	5.0	Equipment qualified to Category B
Humidity	6.0	Equipment qualified to Category A

DO-160D ENVIRONMENTAL QUALIFICATION TESTS		
CONDITIONS	***RTCA/DO-160D Section***	***Conducted Test Category***
Operational Shocks & Crash Safety	7.0	Equipment qualified to Category B
Vibration	8.0	Equipment qualified to Category S, Curve M
Explosion Proofness	9.0	Equipment identified as Category X, no test performed
Waterproofness	10.0	Equipment identified as Category X, no test performed
Fluids Susceptibility	11.0	Equipment identified as Category X, no test performed
Sand and Dust	12.0	Equipment identified as Category X, no test performed
Fungus Resistance	13.0	Equipment identified as Category X, no test performed
Salt Spray	14.0	Equipment identified as Category X, no test performed
Magnetic Effects	15.0	Equipment Class qualified to Z
Power Input	16.0	Equipment qualified to Category B (except Engine Start Undervoltage)
Voltage Spike	17.0	Equipment to be qualified to Category A
Audio Frequency Conducted Susceptibility	18.0	Equipment qualified to Category B
Induced Signal Susceptibility	19.0	Equipment qualified to Category Z
Radio Frequency Susceptibility	20.0	Equipment qualified to Category W (conducted)/Q (radiated)
Emission of Radio Frequency Energy	21.0	Equipment qualified to Category M
Lightning Induced Transient Susceptibility	22.0	Equipment qualified to levels greater than ZZZZ
Lightning Direct Effects	23.0	Equipment identified as Category X, no test performed
Icing	24.0	Equipment identified as Category X, no test performed
Electrostatic Discharge	25.0	Equipment qualified to Category A

MAGNETOMETER/OAT SENSOR RTCA/DO-160D ENVIRONMENTAL QUALIFICATION FORM

NOMENCLATURE: MAGNETOMETER/OAT SENSOR
PART NO: 700-00011-000
MANUFACTURER: AVIDYNE CORPORATION
ADDRESS: 55 OLD BEDFORD ROAD, LINCOLN, MA 01773

Conditions	*RTCA DO-160D Section*	*Conducted Test Category*
Low Temp	4.5.1	Equipment qualified to Category B2
High Temp	4.5.2 & 4.5.3	Equipment qualified to Category B2
In-Flight Loss of Cooling	4.5.4	Equipment identified as Category X, no test performed
Altitude	4.6.1	Equipment qualified to Category B2
Decompression	4.6.2	Equipment qualified to Category B2
Overpressure	4.6.3	Equipment qualified to Category B2
Temperature Variation	5.0	Equipment qualified to Category B
Humidity	6.0	Equipment qualified to Category B
Operational Shocks & Crash Safety	7.0	Equipment qualified to Category D
Vibration	8.0	Equipment qualified to Category S, Curve M
Explosion Proofness	9.0	Equipment qualified to Category E
Waterproofness	10.0	Equipment identified as Category X, no test performed
Fluids Susceptibility	11.0	Equipment identified as Category X, no test performed
Sand and Dust	12.0	Equipment identified as Category X, no test performed
Fungus Resistance	13.0	Equipment identified as Category X, no test performed
Salt Spray	14.0	Equipment identified as Category X, no test performed
Magnetic Effects	15.0	Equipment qualified to Category C
Power Input	16.0	Equipment qualified to Category B (except Engine Start Undervoltage)
Voltage Spike	17.0	Equipment qualified to Category A
Audio Frequency Conducted Susceptibility	18.0	Equipment qualified to Category B
Induced Signal Susceptibility	19 .0	Equipment qualified to Category Z
Radio Frequency Susceptibility	20.0	Magnetometer qualified to Category W (conducted)/Q (radiated), OAT Sensor qualified to R and T
Emission of Radio Frequency	21.0	Equipment qualified to Category H

Conditions	*RTCA DO-160D Section*	*Conducted Test Category*
Energy		
Lightning Induced Transient Susceptibility	22.0	Equipment qualified to levels greater than ZZZZ
Lightning Direct Effects	23.0	Equipment identified as Category X, no test performed
Icing	24.0	Equipment identified as Category X, no test performed
Electrostatic Discharge	25.0	Equipment qualified to Category A

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: support@ avidyne.com
- Web: www.avidyne.com

Appendix C – Entegra 700-00006-000 PFD Dimensions

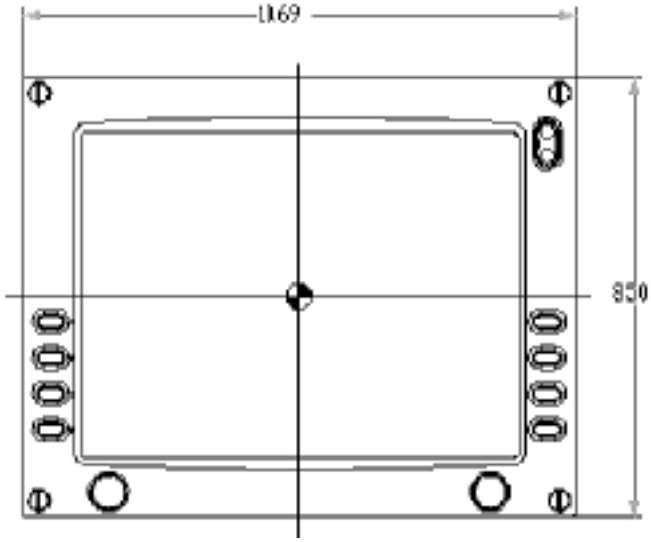


Figure 6 PFD Front View

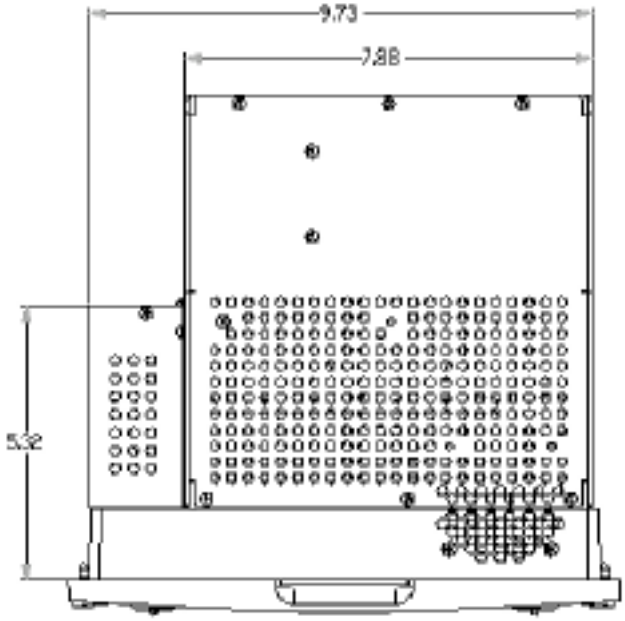


Figure 7 PFD Top View

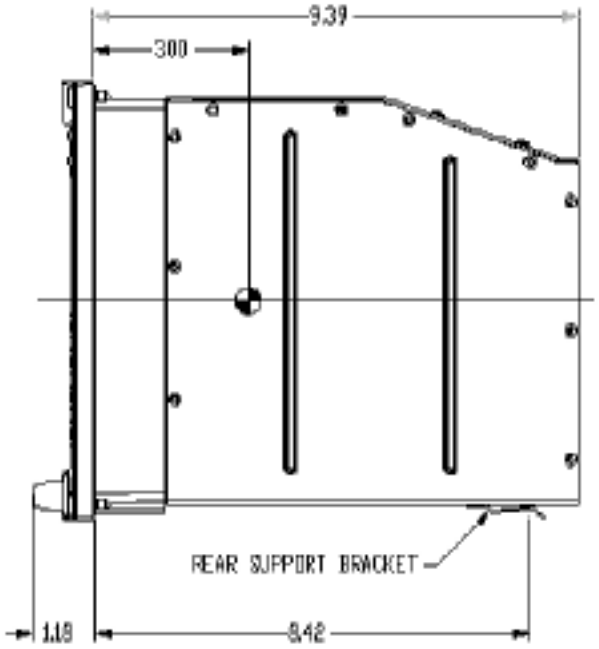


Figure 8 PFD Right Side

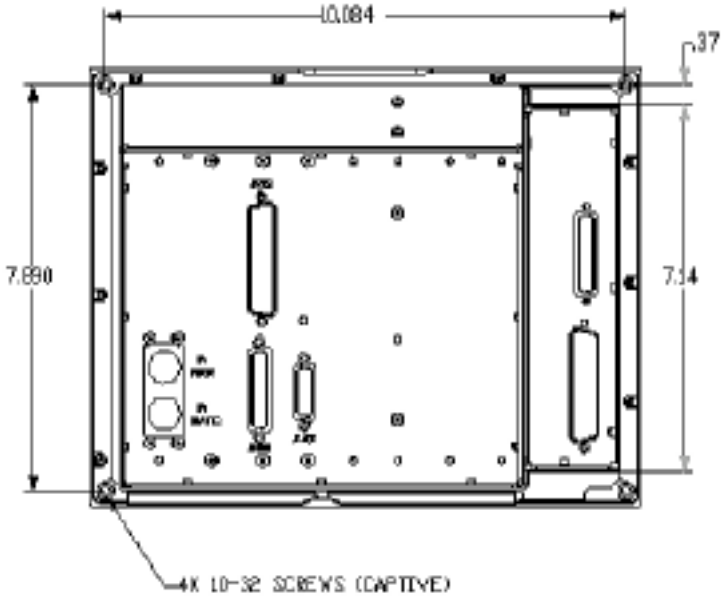


Figure 9 PFD Rear View

Appendix D – Entegra 700-00006-001 PFD Dimensions

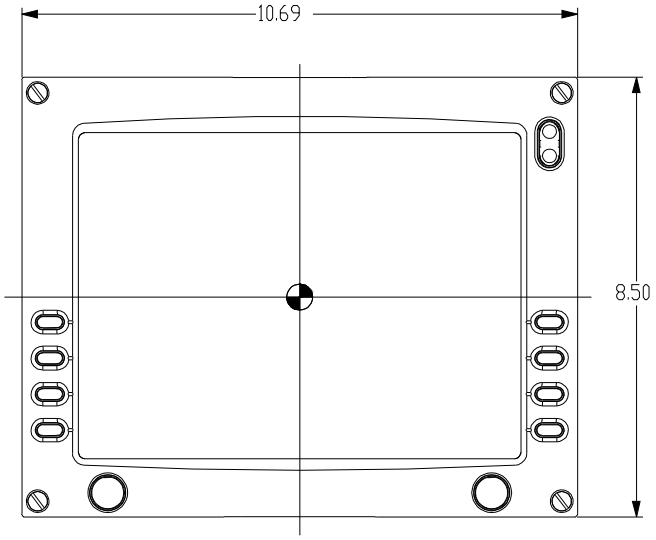


Figure 10 PFD Front View

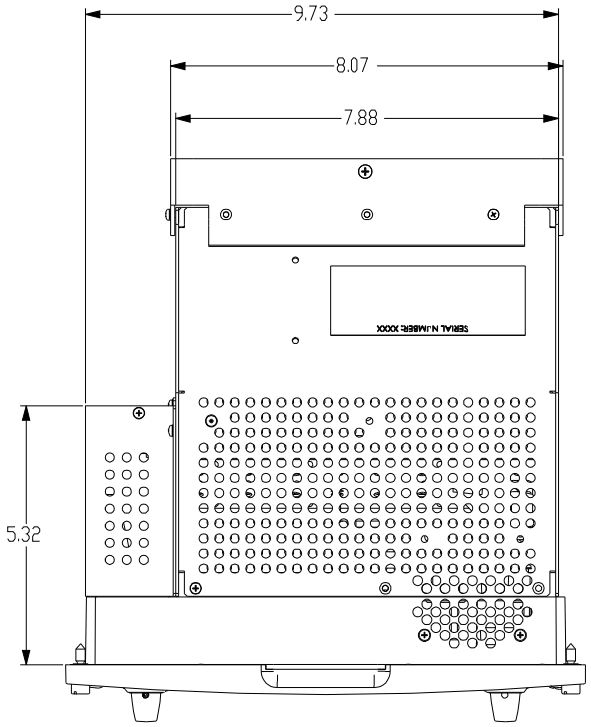


Figure 11 PFD Top View

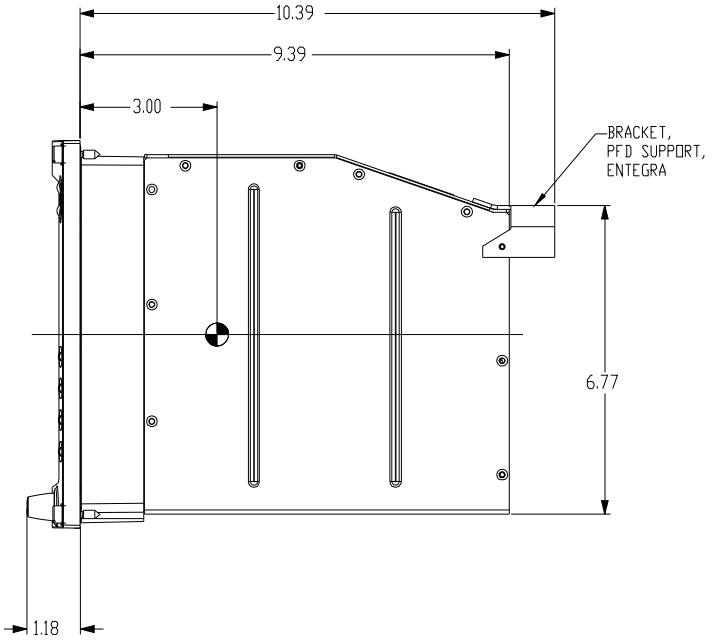


Figure 12 PFD Right Side

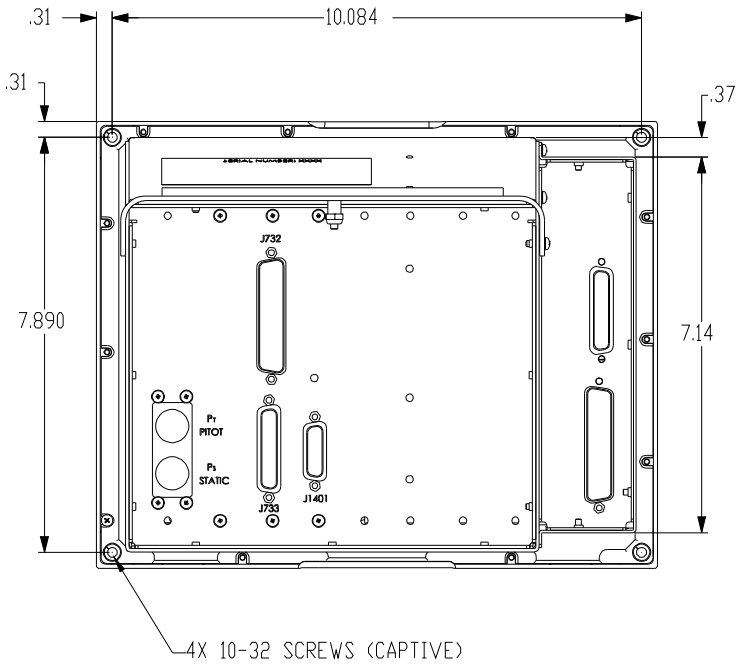


Figure 13 PFD Rear View

Appendix E – Entegra 700-00006-002 PFD Dimensions

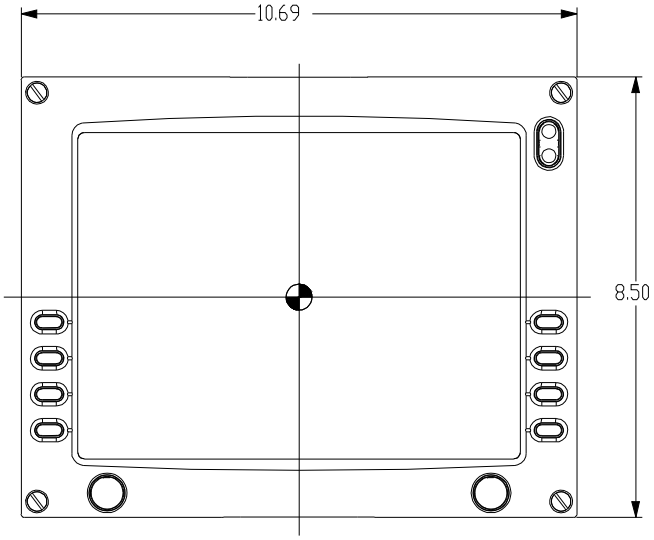


Figure 14 PFD Front View

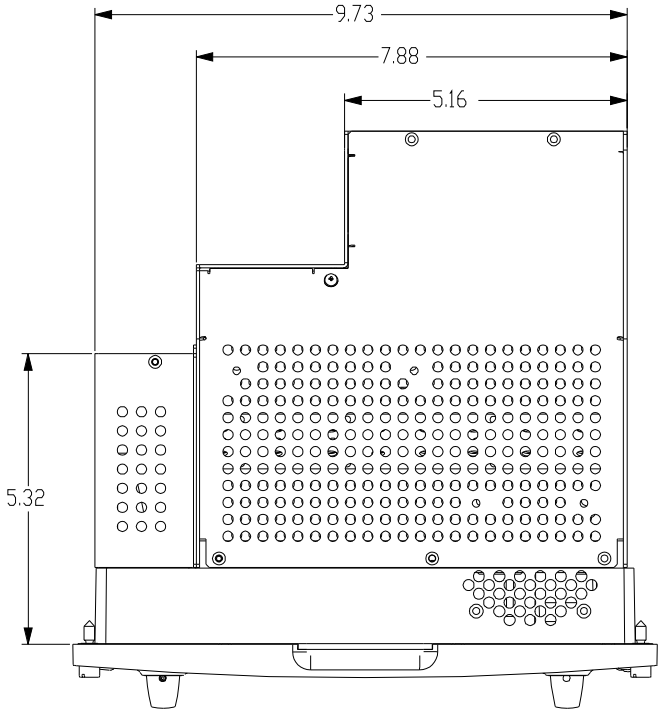


Figure 15 PFD Top View

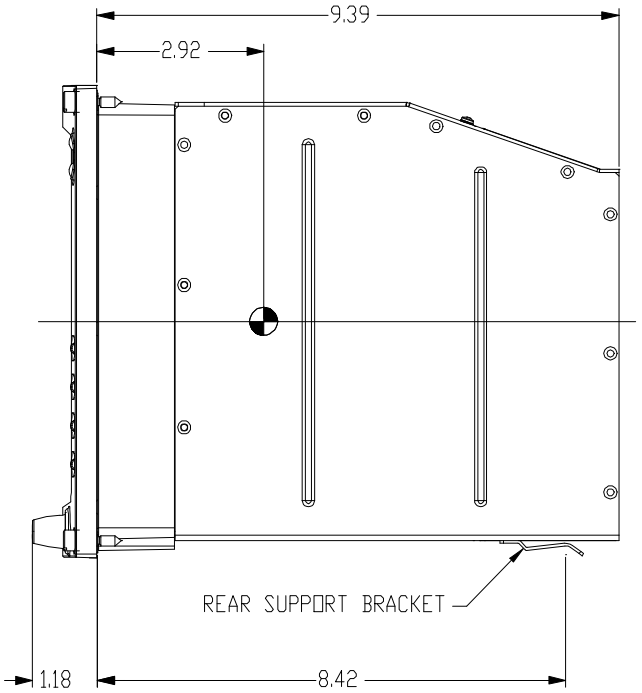


Figure 16 PFD Right View

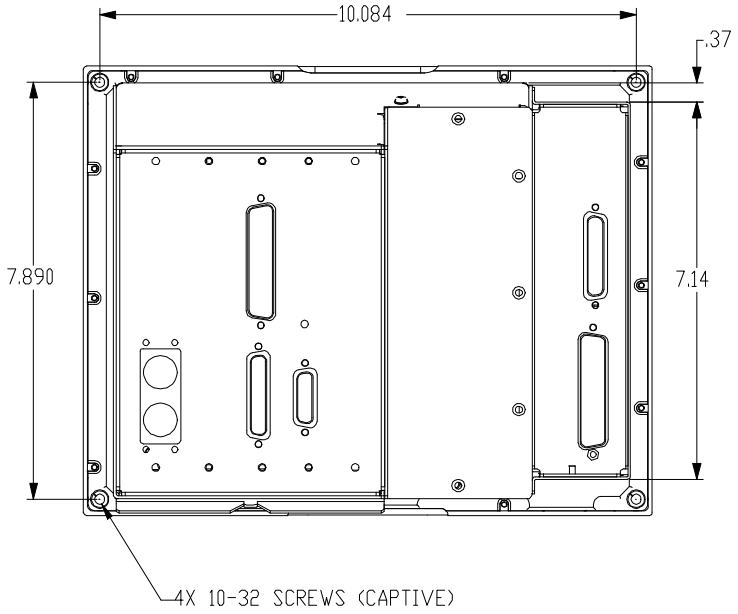


Figure 17 PFD Rear View

Appendix F – Entegra 700-00006-100 PFD Dimensions

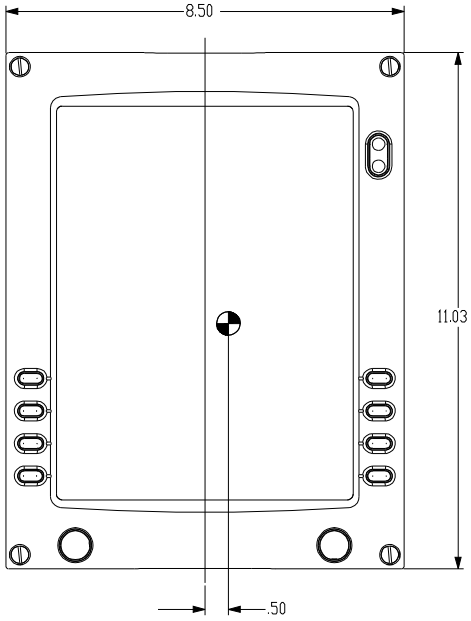


Figure 18 Portrait PFD Front View

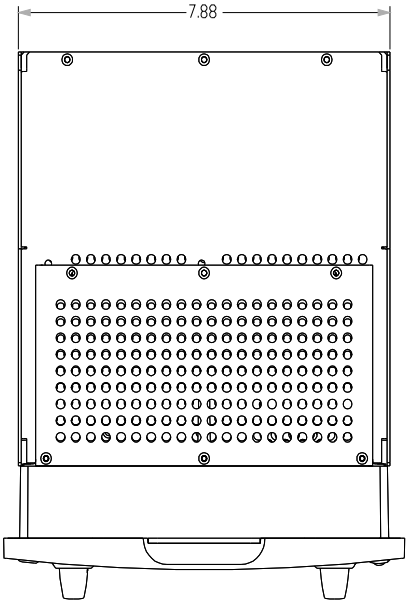


Figure 19 Portrait PFD Top View

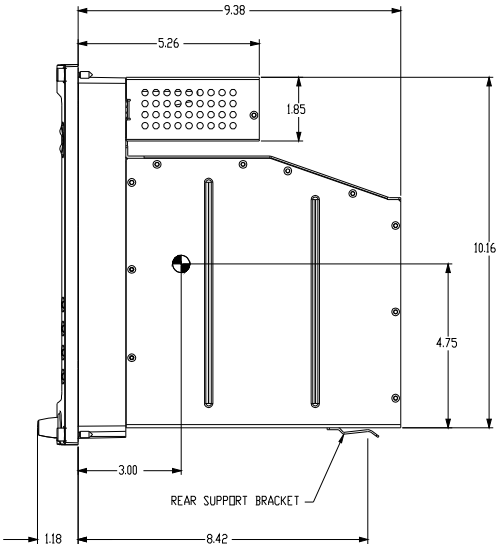


Figure 20 Portrait PFD Side View

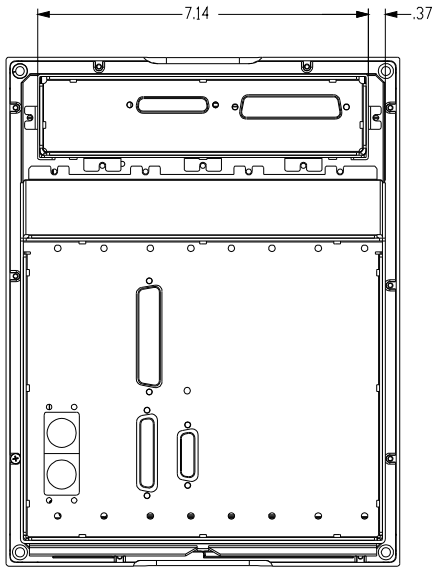


Figure 21 Portrait PFD Rear View

Appendix G – Magnetometer/OAT Sensor Dimensions

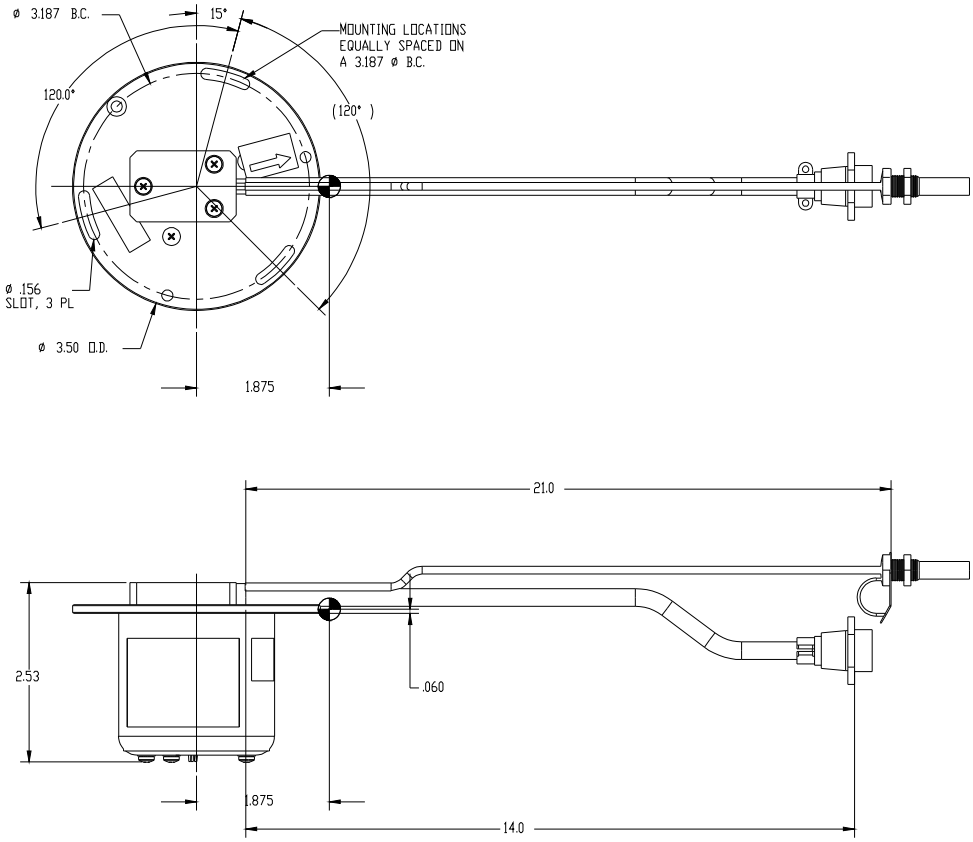


Figure 22 Magnetometer/OAT Sensor Dimensions

NOTES:

1. ARROW INDICATES FORWARD INSTALLATION DIRECTION
2. CG SHOWN AS CABLES ARE SHOWN
3. INSTALL OAT PROBE WITH NUT AND WASHER PROVIDED WITH ASSEMBLY AND LOCATE IN FREE AIR STREAM
4. MOUNT MAGNETOMETER WITH BRASS HARDWARE AS FOLLOWS:
   - SCREWS: MS51957-28, QTY 3

   WASHERS: AN960C6, QTY 3

   LOCK NUTS: MS21044C06, QTY 3

5. OAT SENSOR AND MAGNETOMETER SHALL BE PHYSICALLY ISOLATED FROM AIRCRAFT GROUND. UNITS RECEIVE CHASSIS GROUNDING THROUGH WIRING HARNESS

Appendix H – PFD Cutout Dimensions, Landscape

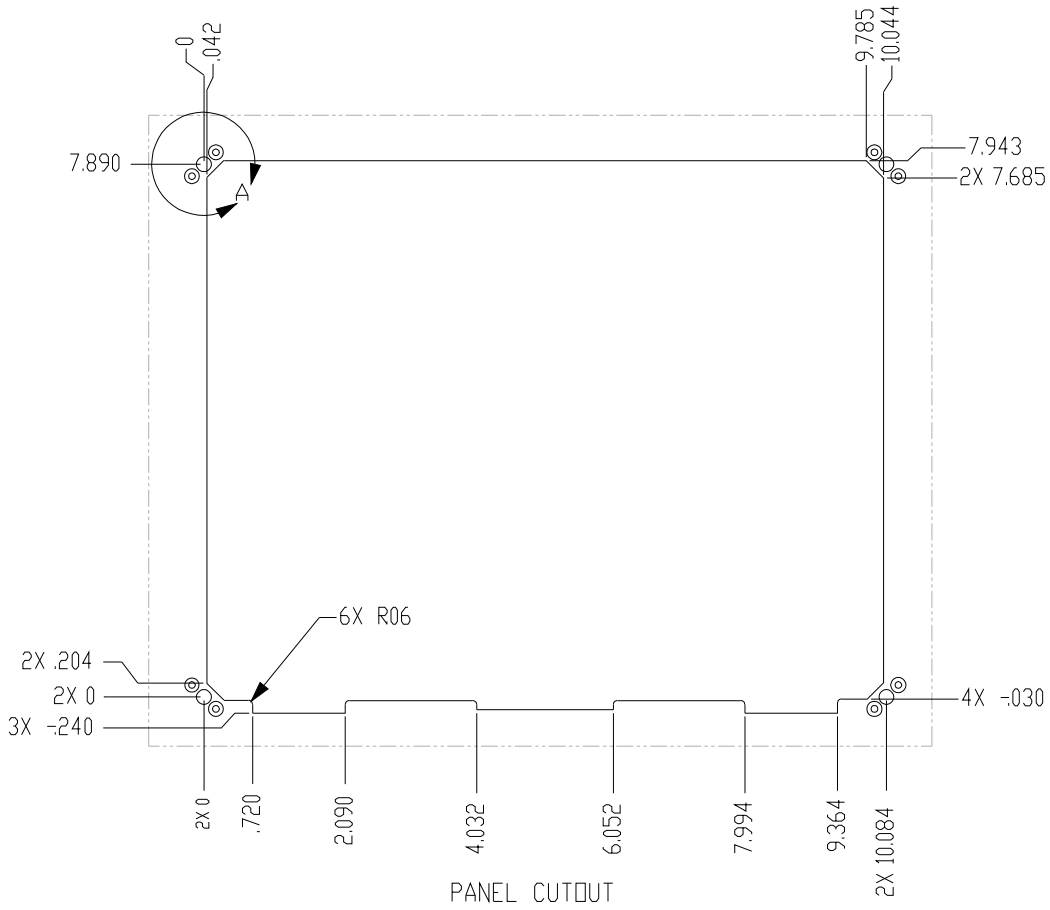


Figure 23 PFD Cutout Dimensions (Landscape)

Appendix I – PFD Cutout Dimensions, Portrait

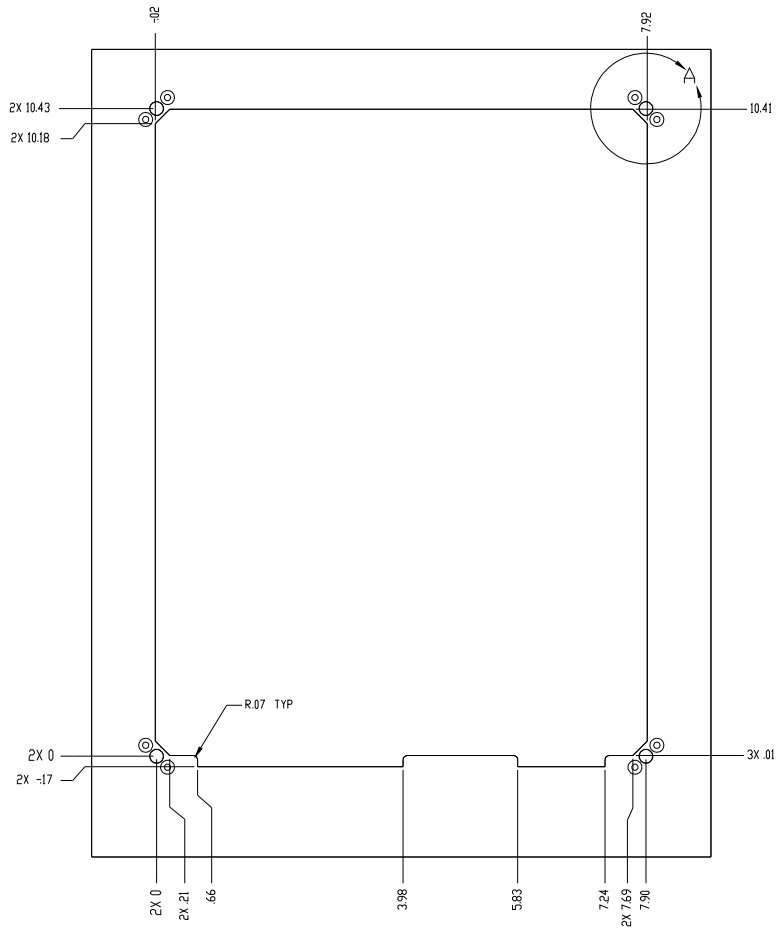
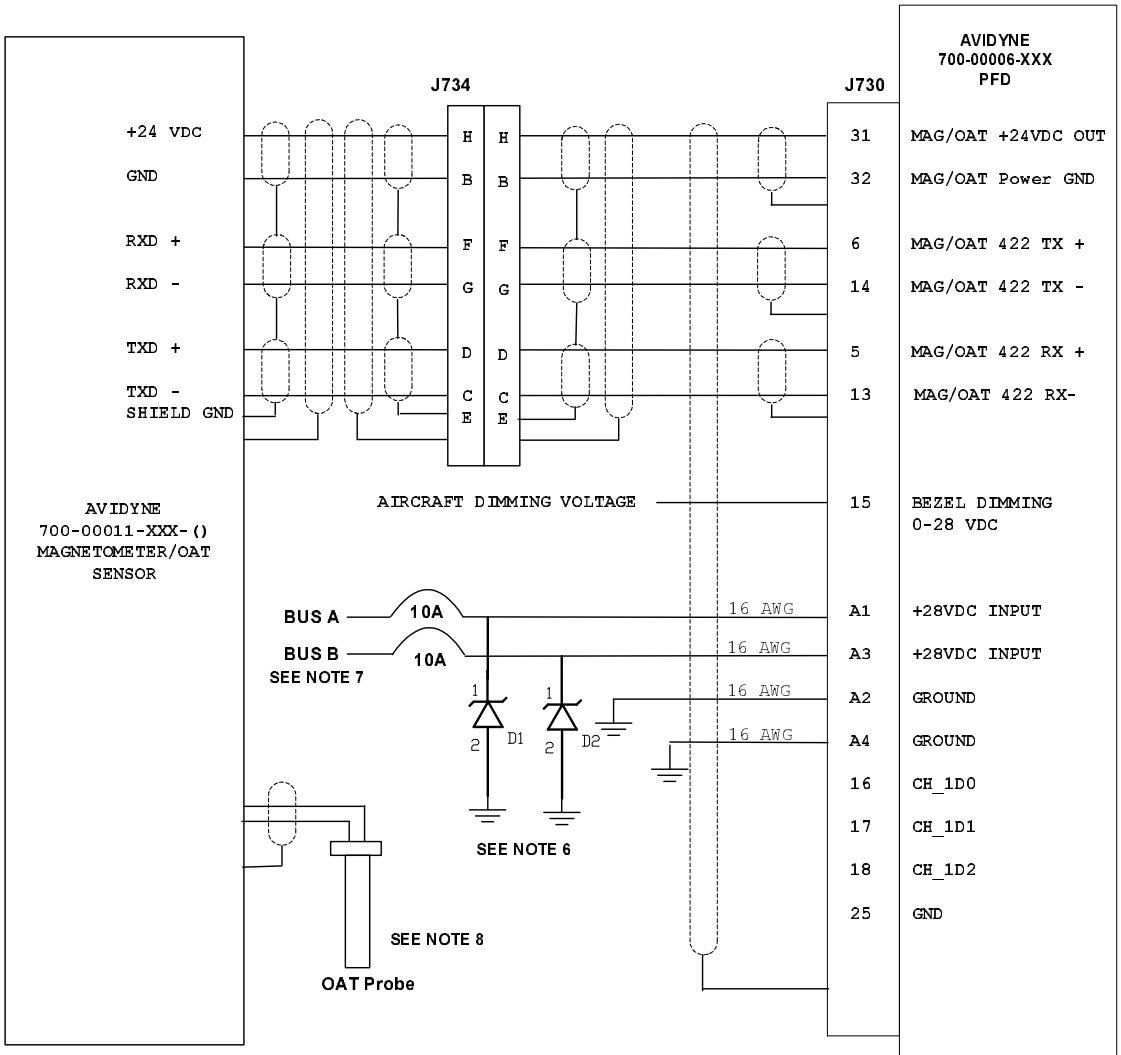


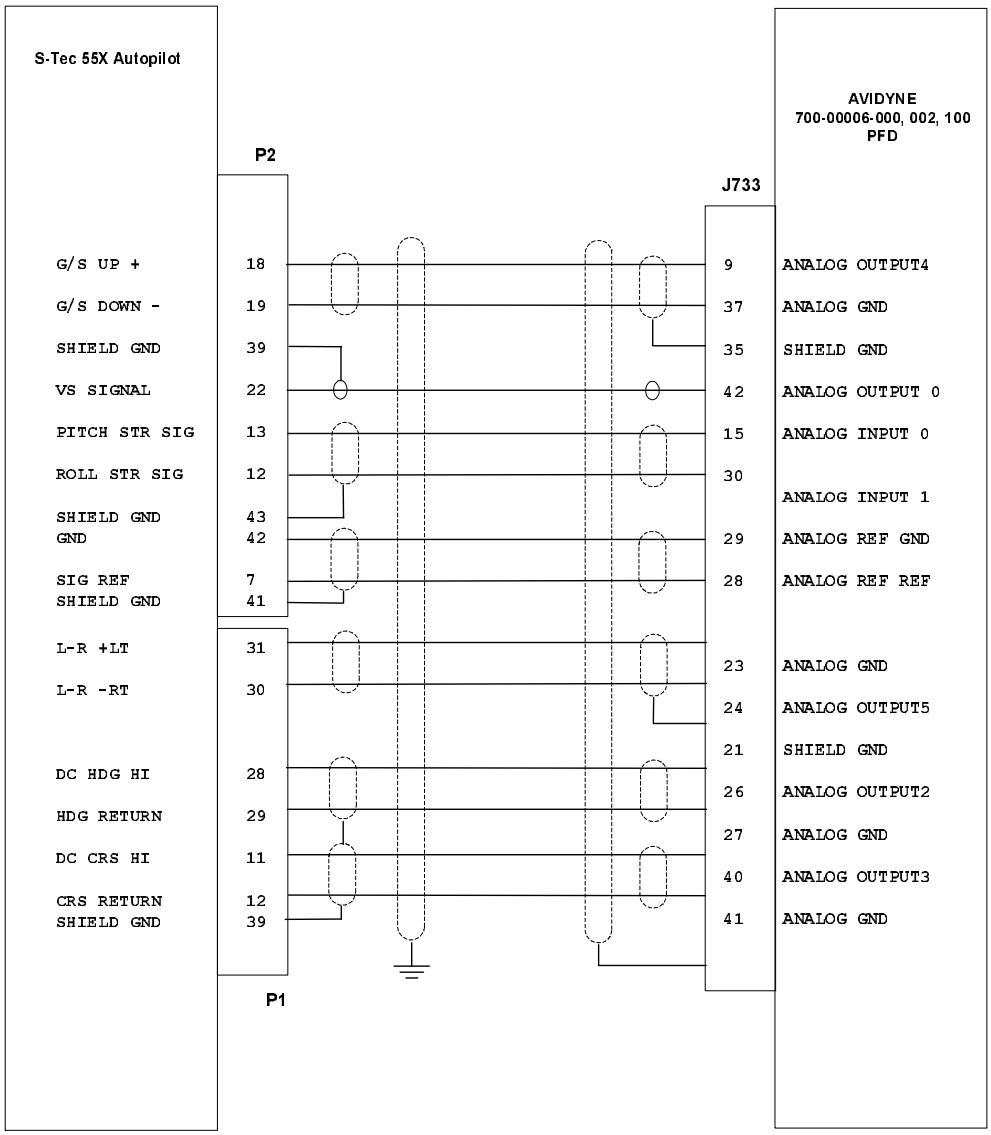
Figure 24 PFD Cutout Dimensions (Portrait)

Appendix J – Wiring Diagram (Power, Lighting, & Magnetometer)



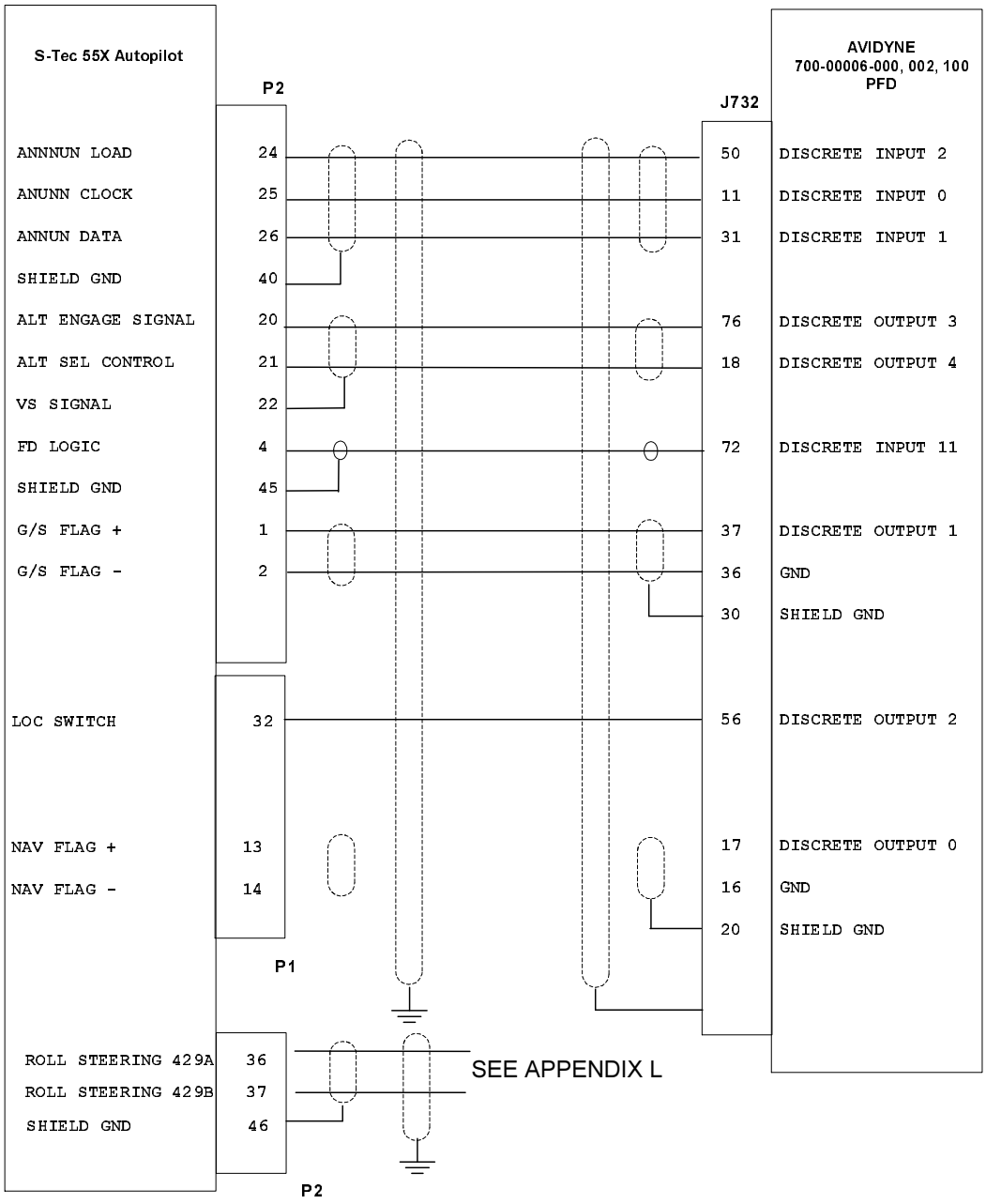
NOTES:
1. ALL WIRES ARE 22 AWG MIN UNLESS OTHERWISE NOTED
2. ⌒ THIS SYMBOL INDICATES TWISTED AND SHIELD WIRES
3. J734 MATING CONNECTOR PART NUMBER:MS3126F12-10S
4. J730 MATING CONNECTOR PART NUMBER:CBC36W4F120GE0 (POSITRONICS)
5. OVERBRAID SPECIFICATION:
   MATERIAL: 36 AWG TINNED COPPER PER ASTM-B-33
   COVERAGE: 90% OPTICAL
   Recommended Overbraid: Part Number: A-A-59569A-XXXX (XXXX indicates diameter) or equiv.
   Supplier: Continental Cordage
6. D1 and D2 Voltage Suppressor Part Number 70415K36 or equiv., Mfg: Protek
7. Bus B Power Input and D2 Voltage Suppressor to be installed in dual voltage bus aircraft

Appendix K - Wiring Diagram (S-Tec 55X AP configuration)



NOTES:
1. ALL WIRES ARE 22 AWG MIN UNLESS OTHERWISE NOTED
2. THIS SYMBOL INDICATES TWISTED AND SHIELD WIRES

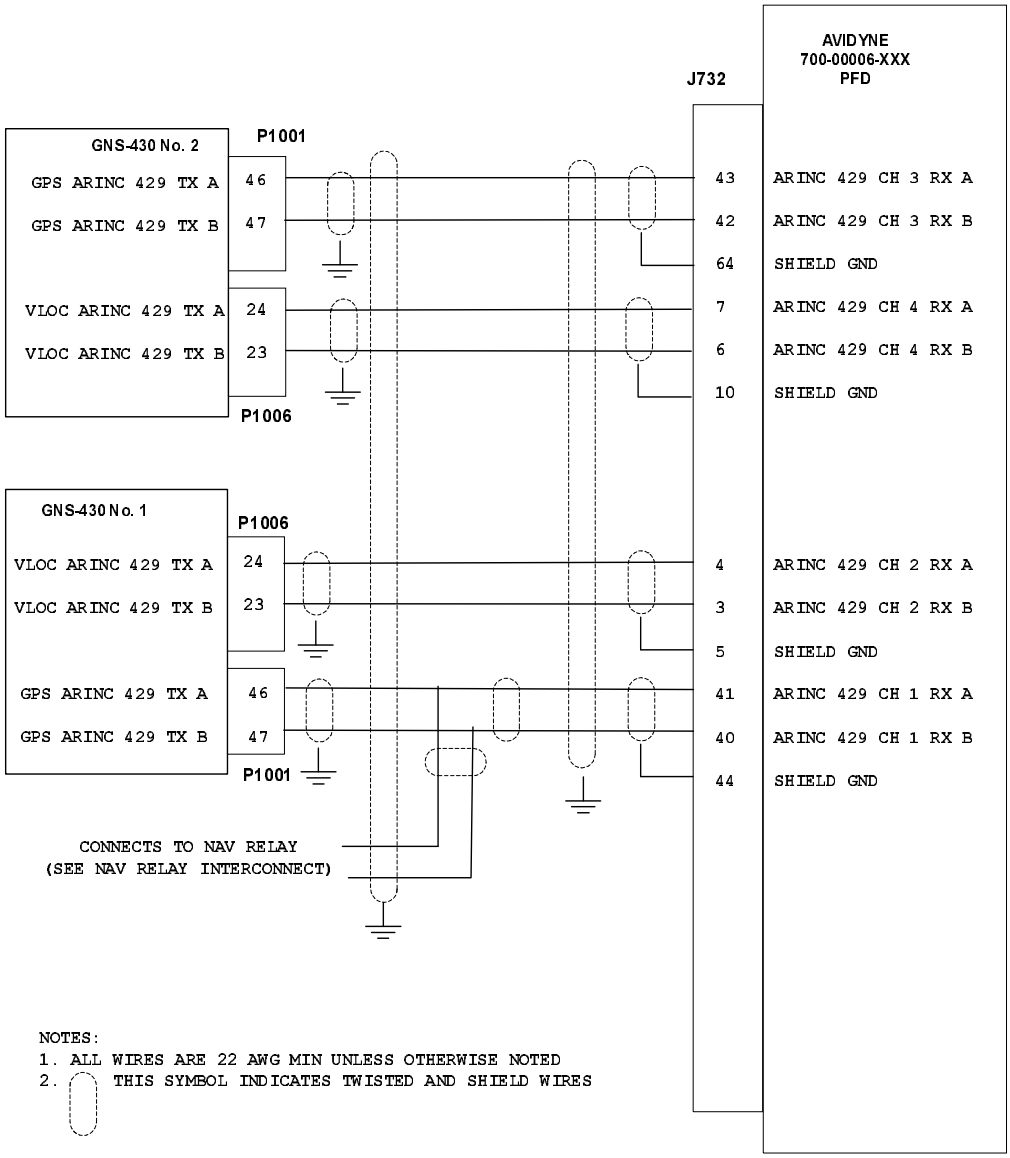
3. J733 MATING CONNECTOR PART NUMBER:DD44F10GE0 (POSITRONICS)
4. REFER TO 55X INSTALLATION INSTRUCTIONS FOR CONNECTOR PART NUMBERS
5. IF AUTOPILOT INSTALLED, ASSURE AP COMPUTER IS CONFIGURED TO INTERFACE TO KCS-55A (DC) HEADING SYSTEM



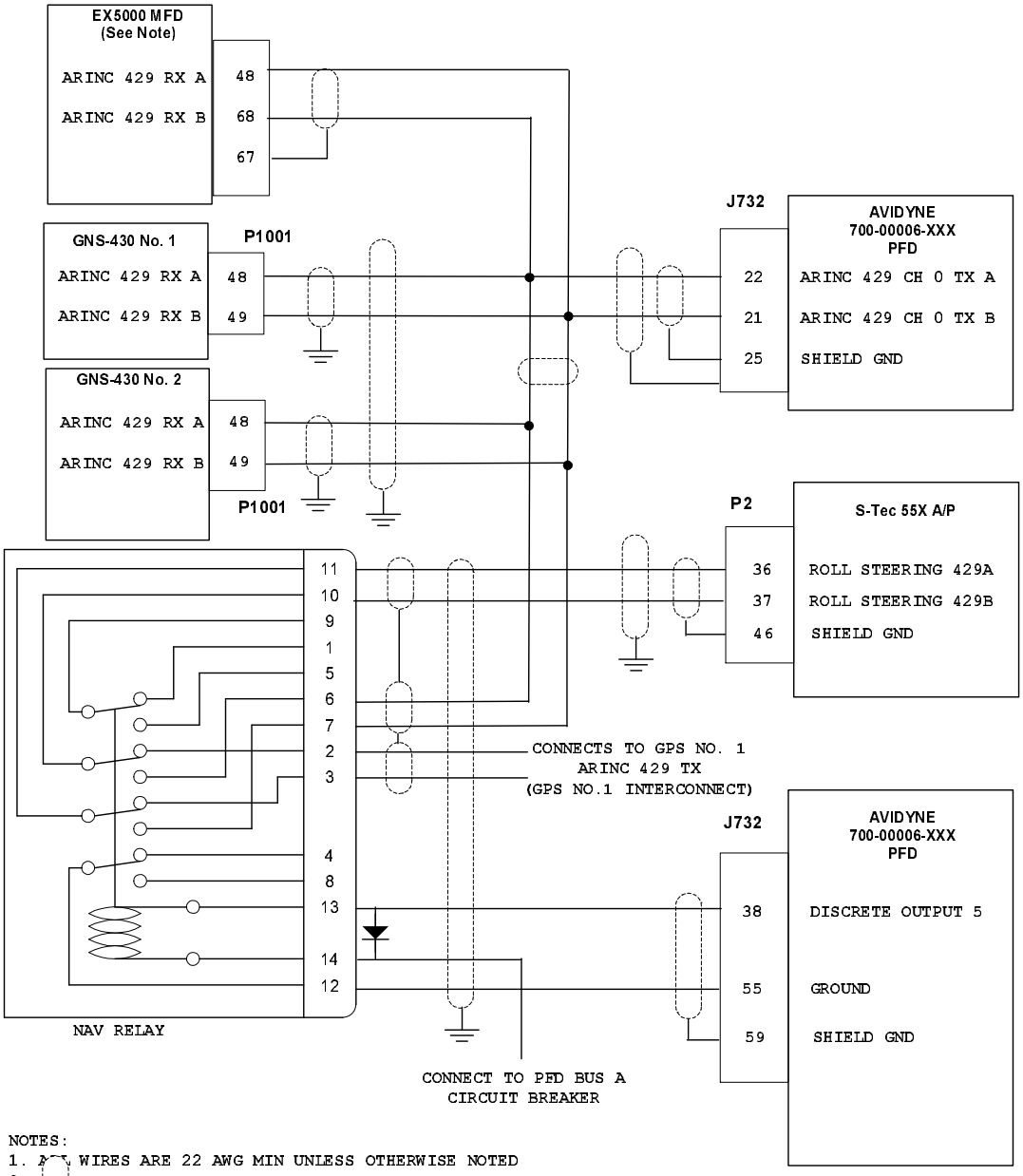
NOTES:
1. ALL WIRES ARE 22 AWG MIN UNLESS OTHERWISE NOTED
2. ( ) THIS SYMBOL INDICATES TWISTED AND SHIELD WIRES

3. J732 MATING CONNECTOR PART NUMBER:DD78F10GE0 (POSITRONICS)
4. REFER TO 55X INSTALLATION INSTRUCTIONS FOR CONNECTOR PART NUMBERS

Appendix L - Wiring Diagram (Comm/Nav Rradios)



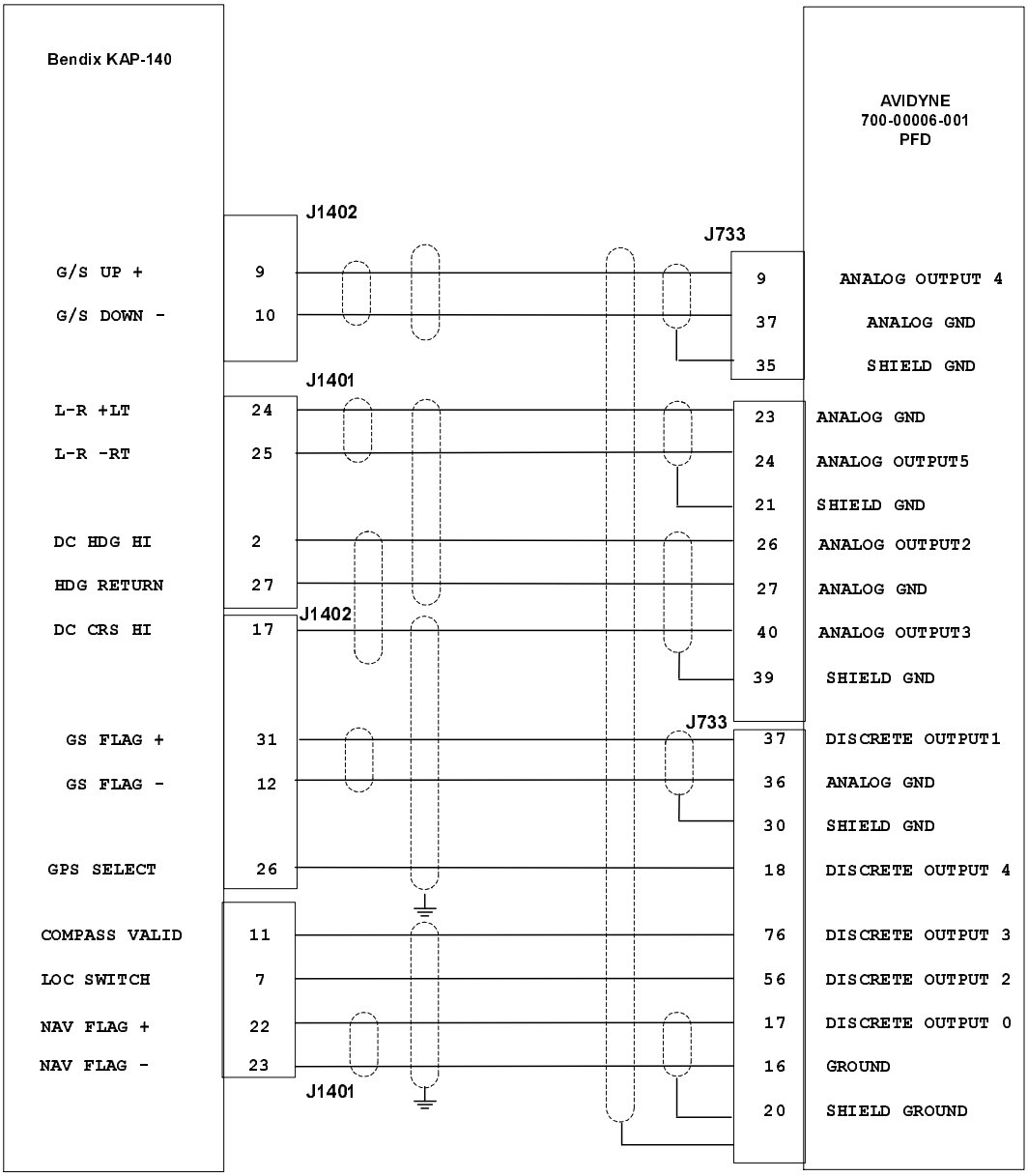
NOTES:
1. ALL WIRES ARE 22 AWG MIN UNLESS OTHERWISE NOTED
2. ( ) THIS SYMBOL INDICATES TWISTED AND SHIELD WIRES
3. REFER TO GNS-430 AND 55X INSTALLATION INSTRUCTIONS FOR CONNECTOR PART NUMBERS
4. OVERBRAID SPECIFICATION:
   MATERIAL: 36 AWG TINNED COPPER PER ASTM-B-33
   COVERAGE: 90% OPTICAL
   Recommended Overbraid: Part Number: A-A-59569A-XXXX (XXXX indicates diameter) or equiv.
   Supplier: Continental Cordage
5. FOR PFDs WITH SOFTWARE PART NUMBER 530-000123-000 REV 02 AND SUBSEQUENT IT IS PERMITTED TO INSTALL A GNS-420 IN PLACE OF THE GNS-430. REFER TO SECTION 3.2.1 OF THIS MANUAL FOR GNS/GNC-4XX ARRANGEMENTS.
6. WHEN INSTALLING GNC-420'S PFD ARINC 429 CHANNELS 2 AND 4 ARE NOT USED



NOTES:
1. ALL WIRES ARE 22 AWG MIN UNLESS OTHERWISE NOTED
2. THIS SYMBOL INDICATES TWISTED AND SHIELD WIRES

3. NAV RELAY PART NUMBER:KHU-17D16-24 (TYCO)
4. NAV RELAY RETAINING SPRING PART NUMBER: 20C217 (TYCO)
4. DIODE PART NUMBER:IN4001
5. NAV RELAY SOCKET PART NUMBER:27E006 (TYCO)
6. REFER TO GNS-430 AND 55X INSTALLATION INSTRUCTIONS FOR CONNECTOR PART NUMBERS
7. OPTIONAL INTERFACE FOR SOME EMAX INSTALLATIONS
8. THE S-TEC 55SR AP DOES NOT SUPPORT ROLL STEERING, THEREFORE THE NAV RELAY OR ARINCE 429 WIRING FROM THE PFD IS NOT REQUIRED
9. NAV RELAY NOT REQUIRED WITH KAP-140 AUTOPILOTS

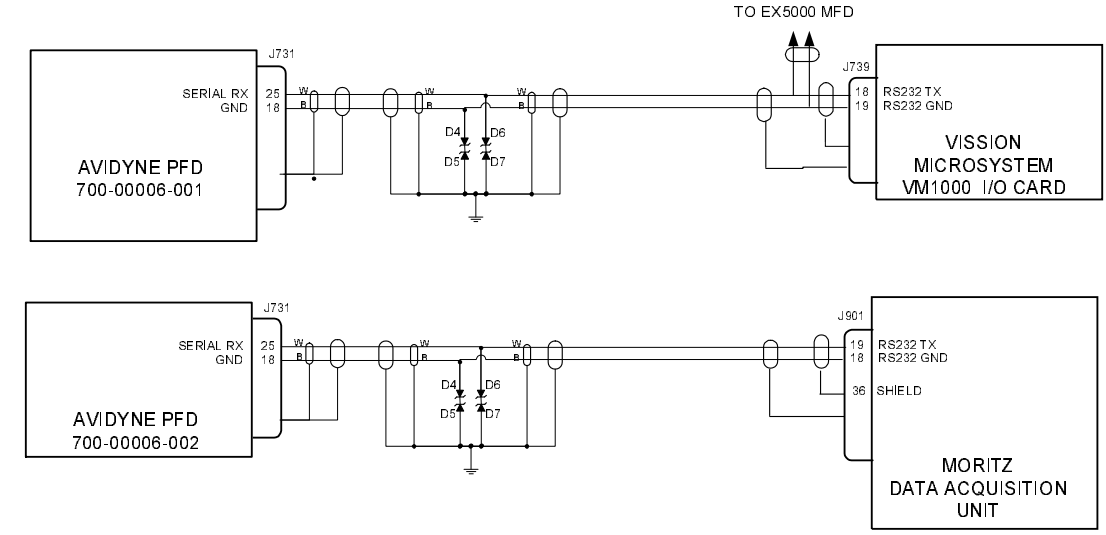
Appendix M – Wiring Diagram (Bendix KAP-140 AP)



NOTES:
1. ALL WIRES ARE 22 AWG MIN UNLESS OTHERWISE NOTED
2. THIS SYMBOL INDICATES TWISTED AND SHIELD WIRES

3. J733 MATING CONNECTOR PART NUMBER:DD44F10GE0 (POSITRONICS)
4. J732 MATING CONNECTOR PART NUMBER DD78F10GE0 (POSITRONICS)
5. REFER TO KAP-140 INSTALLATION INSTRUCTIONS FOR CONNECTOR PART NUMBERS
6. OVERBRAID SPECIFICATION:
   MATERIAL: 36 AWG TINNED COPPER PER ASTM-B-33
   COVERAGE: 98-100% OPTICAL

Appendix N – Wiring Diagram (Sensor Interface Option)



NOTES:
1. ALL WIRES ARE 22 AWG MIN UNLESS OTHERWISE NOTED
2. THIS SYMBOL INDICATES TWISTED AND SHIELD WIRES

3. TRANSIENT SUPPRESSOR D4, D5, D6, & D7 PART NUMBER:1.5KE16CA (DIODES INC.)
4. VM1000 MATING CONNECTOR PART NUMBER RD37F10GE0 (POSITRONICS)
5. REFER TO GNS-430 AND 55X INSTALLATION INSTRUCTIONS FOR CONNECTOR PART NUMBERS
6. OVERBRAID SPECIFICATION:
   MATERIAL: 36 AWG TINNED COPPER PER ASTM-B-33
   COVERAGE: 90% OPTICAL
   Recommended Overbraid: Part Number: A-A-59569A-XXXX (XXXX indicates diameter) or equiv.
   Supplier: Continental Cordage
7. REFER TO EX5000 INSTALLATION MANUAL 600-00073 FOR WIRING INFORMATION

Appendix O – System Interconnect, Garmin 430's

Pin	*Pin Name*	*I/O*
22	ARINC 429 CH 0 TX A	O
21	ARINC 429 CH 0 TX B	O
25	Shield	I
41	ARINC 429 CH 1 RX A	I
40	ARINC 429 CH 1 RX B	I
44	Shield	I
4	ARINC 429 CH 2 RX A	I
3	ARINC 429 CH 2 RX B	I
5	Shield	I
43	ARINC 429 CH 3 RX A	I
42	ARINC 429 CH 3 RX B	I
64	Shield	I
7	ARINC 429 CH 4 RX A	I
6	ARINC 429 CH 4 RX B	I
10	Shield	I

Table 6 J732 Pin Assignments

Label	*Message*	*To*
100G	SELECTED COURSE	GPS1 or GPS 2 as addressed
121	HORZ CMD	Autopilot
212	GS	Autopilot
320	MAG HDG	GPS1/GPS2/MFD
203	PRESSURE ALTITUDE	EX5000 MFD
210	TAS	EX5000 MFD
211	OAT	X5000 MFD

Table 7 CH 0 (PFD Transmit ARINC 429 Messages)

Label	*Message*
074G	DATA RECORD HEADER
075G	ACTIVE WPT TO/FROM
100G	SELECTED COURSE

113G	CHECKSUM
114	DESIRED TRACK
115	BRG
116G	XTK
121	HORZ CMD
147G	MAGVAR
251G	DTG
261G	GPS DISCRETE
275G	LRN STATUS
300G	STATION INFO
303	MSG INFO
304G	MSG CHARS 1-3
305G	MSG CHARS 4-6
306G	WPT LAT
307G	WPT LON
310	PPOS LAT
311	PPOS LAT
312	GS
313	TRK
326G	LAT SCALE FACTOR
330	CONIC ARC INBOUND CRS
331	CONIC ARC RADIUS
332	CONIC ARC CRS CHANGE

Table 8 CH 1/CH3 (GNS430 GPS ARINC429 Messages)

Label	*Message*
034G	FREQ
173	LOC DEV
174	GS DEV
222	VOR RADIAL

Table 9 CH 2/CH4 (GNS430 VHF ARINC429 Messages)

Appendix P - System Interconnect, S-Tec 55X

A/P Mode & Signal	*Wiring Source*	*Wiring Destination*	*Data Description*
Heading – Heading Bug	PFD P733-26 Analog Out 2 PFD P733-27 Analog Gnd	S55X P551-28 DC HDG HI S55X P551-29 HDG RTN	Mag Heading is combined with Heading Bug to create Heading Datum. Heading datum to the autopilot is the difference between the heading bug and current mag heading. If the heading bug and mag heading are the same, the heading datum is 0.0 VDC. As the heading bug moves right of center, the voltage increases at 550 mVDC / degree. As the heading bug moves left of center, the voltage decreases at 550 mVDC. The voltage limits at +/- 25 degrees. This emulates the Bendix-King KCS-55(A) heading system.
Nav – Course Pointer	PFD P733-40 Analog Out 3 PFD P733-41 Analog Gnd	S55X P551-11 DC CRS HI S55X P551-12 CRS RTN	Mag Heading is combined with Course Pointer to create Course Datum. Course datum to the autopilot is the difference between the course pointer and current mag heading. If the course pointer and the mag heading are the same, the course datum is 0.0 VDC. As the course pointer moves right of center, the voltage increases at 210 mVDC / degree. As the course pointer moves left of center, the voltage decreases at 210 mVDC / degree. The voltage limits at +/- 60 degrees. This emulates the Bendix-King KCS-55(A) heading system.
Nav – CDI	PFD P733-24 Analog Out 5 PFD P733-23 Analog Gnd	S55X P551-30 L-R +RT S55X P551-31 L-R +LT	The PFD transmits a DC analog signal to the autopilot that represents a course deviation. The input at the autopilot is differential and the PFD transmits the course deviation on the + side and connects signal ground on the – side. Full

A/P Mode & Signal	*Wiring Source*	*Wiring Destination*	*Data Description*
			scale deflection is +/- 150 mVDC where positive means the needle is right of center as measured from the + signal to the – signal. The course deviation is 1.0 degree per 15 mVDC so full scale deflection at 150 mVDC is 10 degree error.
Nav - CDI	PFD P733-24 Analog Out 5 PFD P733-23 Analog Gnd	S55X P551-30 L-R +RT S55X P551-31 L-R +LT	The PFD transmits the same DC analog signal for localizer deviation as it does for VOR course deviation. The autopilot interprets the CDI needle the same way as with the VOR source except with higher gain settings. Localizer deviation is measured in DDM or Difference in Depth of Modulation which is the relative signal strengths of the 90 Hz modulation left lobe and 150 Hz modulation right lobe. +0.155 DDM is full scale deflection right of center and –0.155 DDM is full scale deflection left of center.
Nav – CDI Flag	PFD P732-17 Discrete Out 0 PFD P732-16 Gnd	S55X P551-13 Nav Flag + S55X P551-14 Nav Flag -	The PFD transmits a discrete level DC signal to the autopilot that represents validity of CDI. The discrete must be greater than 200 mVDC for the autopilot to interpret the CDI as valid for navigational use. A ground on this signal means the CDI is not valid. These states come from electromechanical indicators where a voltage was necessary to pull the flag out of view. The PFD actually transmits a signal that is either near +5VDC or ground.
Nav – ILS Active	PFD P732-56 Discrete Out 2	S55X P551-32 Loc Switch	The Loc Active signal is an open collector discrete output from the PFD to the autopilot. When grounded, it indicates that the CDI is a localizer and causes the autopilot to use high gain settings for closer and more aggressive course tracking. When high impedance, it indicates that the CDI is a VOR and causes the autopilot to use lower

A/P Mode & Signal	*Wiring Source*	*Wiring Destination*	*Data Description*
			gain settings.
Approach – G/S	PFD P733-9 Analog Out 4 PFD P733-37 Analog Gnd	S55X P552-18 G/S +UP S55X P552-19 G/S +DN	The PFD transmits a DC analog signal for vertical deviation. Glideslope deviation is measured in DDM or Difference in Depth of Modulation which is the relative signal strengths of the 90 Hz modulation top lobe and 150 Hz modulation bottom lobe. +0.175 DDM is full scale deflection above center and –0.175 DDM is full scale below center.
Approach – G/S Flag	PFD P732-37 Discrete Out 1 PFD P732-36 Gnd	S55X P552-1 G/S Flag + S55X P552-2 G/S Flag -	The PFD transmits a discrete level DC signal to the autopilot that represents validity of G/S. The discrete must be greater than 200 mVDC for the autopilot to interpret the G/S as valid for navigational use. A ground on this signal means the G/S is not valid. These states come from electromechanical indicators where a voltage was necessary to pull the flag out of view. The PFD actually transmits a signal that is either near +5VDC or ground.
Altitude Hold – Alt Engage	PFD P732-76 Discrete Out 3	S55X P552-20 Alt engage	The PFD normally holds this signal at ground. When the PFD wants to tell the autopilot to hold current altitude, it pulses the signal high. The discrete output is an open collector type but a pullup to +5VDC in the autopilot biases it during the OC high impedance. The pulse width is approximately 1 second to allow monitoring with a voltmeter. The minimum and maximum pulse width allowable by the autopilot is not known.
Vertical Speed – VS Cmd	PFD P733-42 Analog Out 0	S55X P552-22 VS Signal	The PFD remotely commands a vertical rate to the autopilot with the DC analog VS Cmd signal. VS Cmd is centered on +5VDC indicating 0 fpm. VS Cmd increases 130 mV for each 100 fpm increase in vertical speed commanded up to a limit of 1600 fpm. VS Cmd decreases 130 mV for each 100 fpm decrease in

A/P Mode & Signal	*Wiring Source*	*Wiring Destination*	*Data Description*
			vertical speed commanded down to a limit of –1600 fpm.
Remote ASA – Alt Sel Ctrl	PFD P732-18 Discrete Out 4	S55X P552-21 Alt Sel Ctl	The PFD acts as a remote STEC altitude selector alerter (ASA) and indicates to the autopilot that a remote ASA has control of vertical speed and altitude capture by holding this discrete signal low. The discrete output is an open collector type but a pullup to +5VDC in the autopilot biases it during the OC high impedance state.
GPSS	PFD P732-32 A429 CH0 TX A PFD P732-21 A429 CH0 TX B	S55X P552-36 Roll Steer 429 A S55X P552-37 Roll Steer 429 B	PFD transmits messages 100G, 121, 320. Autopilot listens to message 121 for GPS Roll Steering. Autopilot ignores SDI bits but will only use messages with valid SSM
All Modes Annunciator	PFD P732-11 Discrete Input 0 PFD P732-31 Discrete Input 1 PFD P732-50 Discrete Input 2	S55X P552-25 Annun Clk S55X P552-26 Annun Data S55X P552-24 Annun Load	The annunciator data from the autopilot to the PFD is a proprietary serial 3 wire clocked data containing 17 bits. The autopilot drives the signals with open collector outputs. Pullups to +5VDC are in the MPIO.
GPSS – Relay Control	PFD P732-38 Discrete Output 5	AP Relay coil low side	Open collector output is grounded to energize GPSS relay.