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PA50

4-Channel Audio Summing Amplifier Installation and Operation Manual

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Record of revisions:

Revision	Date	Reason
New Release	October 2006	New Release
Revision 1	August 2015	Add ICAW Appendix D

Section I - GENERAL INFORMATION

1.1 INTRODUCTION

The PA50 is an accessory device designed to accept four audio inputs and present a single summed output. This accommodates the proliferation of unswitched priority audio signals in aviation, and the limited availability of unswitched audio inputs to the aircraft system.

Before installing and/or using this product, please read this manual completely. This will ensure that you will take full advantage of all the advanced features in the PA50.

1.2 SCOPE

This manual provides detailed installation and operation instructions for the PS Engineering PA50-series of Audio Selector Panel/Intercom Systems. This includes the following units:

Model	Description	Part Number
PA50	Audio Summing Amplifier	14100

1.3 EQUIPMENT DESCRIPTION

The unit provides audio summing for up to four unswitched inputs, into a single headphone level output.

1.4 APPROVAL BASIS - None

FAA Approval. **None**

NOTE: The installer must determine the relevant approval basis prior to installation.

Operation is subject to the following conditions:

This device may not cause harmful interference.

This device must accept any interference received, including interference that may cause undesired operation.

1.5 SPECIFICATIONS

<i>Specifications</i>	
ENVIRONMENTAL CONDITIONS:	
DIMENSIONS:	Height: 1.25 in. Length: 5.5 in Width: 4.0 in . (w/ mounting flanges)
WEIGHT (With Connector):	8.5 Oz. (0.34 kg)
POWER REQUIREMENTS	
Voltage:	11 to 33 VDC
Maximum Current:	Not more than 100 mA (Externally protected by a 0.5 Amp circuit breaker.)
<i>Audio Specifications</i>	
Audio selector panel input impedance:	510 Ω
Input Isolation:	-60 dB (min.)
Unswitched Audio:	4 inputs
Audio Output:	38 mW, no clipping into 150 Ω
Distortion:	<1% THD @ 38 mW into 150 Ω
Audio Freq. Response, 3 dB:	300 Hz - 6000 Hz

1.6 EQUIPMENT SUPPLIED

1 ea. of the following units:

Model	Part Number
PA50	14100

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PA50 Installation Kit:

Part Number	Description	Quantity
425-025-0006	DB25 Female	1

1.7 EQUIPMENT REQUIRED BUT NOT SUPPLIED

Circuit Breaker: 1 ea. 1 amp.

Input signal source, (in ex TAWS alert signal)

Aircraft audio system to accept the summed signals

Interconnect Wiring

1.8 LICENSE REQUIREMENTS

None

Section II - Installation

2.1 GENERAL INFORMATION

2.1.1 SCOPE

This section provides detailed installation and interconnect instructions for the PS Engineering PA50. Please read this manual carefully before beginning any installation to prevent damage and post-installation problems. Installation of this equipment requires special tools and knowledge.

NOTE: An appropriately rated Certified Aircraft Repair Station must install this equipment in accordance with applicable regulations. PS Engineering, Incorporated warranty is not valid unless the equipment is installed by an authorized PS Engineering, Incorporated dealer. Failure to follow any of the installation instructions, or installation by a non-certified individual or agency will void the warranty, and may result in an unairworthy installation.

2.1.2 Certification Requirements

When the PA50 system is installed in a certified aircraft, certification basis is the installer's responsibility. Due to the variety and options available for interface, PS Engineering, will only provide manufacturers data for our equipment interface. Contact PS Engineering for more details.

2.2 Unpacking and Preliminary Inspection

Use care when unpacking the equipment. Inspect the units and parts supplied for visible signs of shipping damage. Examine the unit for loose or broken buttons, bent knobs, etc. Verify the correct quantity of components supplied with the list in Section 1.6. If any claim is to be made, save the shipping material and contact the freight carrier. Do NOT return units damaged in shipping to PS Engineering. If the unit or accessories shows any sign of external shipping damage, contact PS Engineering to arrange for a replacement. Under no circumstances attempt to install a damaged unit in an aircraft. Equipment returned to PS Engineering for any other reason should be shipped in the original PS Engineering packaging, or other UPS approved packaging.

2.3 Equipment Installation Procedures

2.3.1 Cooling Requirements

Forced air-cooling of the PA50 is not required. However the unit should be kept away from heat producing sources (i.e. defrost or heater ducts, dropping resistors, heat producing avionics) without adequate cooling air provided.

2.3.2 Mounting Requirements

The PA50 must be rigidly mounted to the aircraft structure. Installation must comply with FAA Advisory Circular AC 43.13-2A. The unit may be mounted in any area where adequate clearance for the unit and associated wiring bundle exist. The unit may be mounted in any position or orientation.

Avoid installing the PA50 close to high current devices or systems with high-voltage pulse type outputs, such as DME or transponders.

To install the PA50, select a location convenient to the warning panel providing the output, and the audio panel. The unit may be installed in any position, on a surface that will allow for installation in accordance with AC43-13.

2.3.3 Connector Assembly

The rear of the PA50 contains a male DB25 connector. In the parts kit is a female shell with qty. 12 crimp type pins. The appropriate crimper is Paladin PA1440. Ensure that proper strain relief and chafing precautions are made during wiring and installation.

2.4 Cable Harness Wiring

Referring to the Appendix, assemble a wiring harness as required for the installation. All wires must be MIL-SPEC in accordance with current regulations. Two- and three-conductor shielded wire must be used where indicated, and be MIL-C-27500 or equivalent specification. Proper stripping, shielding and soldering technique must be used at all times. It is imperative that correct wire be used.

Refer to FAA Advisory Circular 43.13-2A (or later revision) for more information. Failure to use correct techniques may result in improper operation, electrical noise or unit failure. Damage caused by improper installation will void the PS Engineering warranty.

2.4.1 Noise

Due to the variety and the high power of radio equipment often found in today's general aviation aircraft, there is a potential for both radiated and conducted noise interference.

Ground loop noise occurs when there are two or more ground paths for the same signal (i.e., airframe and ground return wire). Large cyclic loads such as strobes, inverters, etc., can inject noise signals onto the airframe that are detected by the audio system. Follow the wiring diagram very carefully to help ensure a minimum of ground loop potential. Use only Mil Spec shielded wires (MIL-C-275000, or better).

Radiated signals can be a factor when low level audio signals are "bundled" with current carrying power wires. Keep these cables physically separated.

2.4.2 Power (Pin 25)

The PA50-Series are compatible with both 14 and 28 Volt DC systems. A one (1) Amp circuit breaker is required. Power and ground wires must be a twisted minimum #20 AWG pair. Connect airframe power ground to Pin 13 only.

2.4.3 Unswitched Inputs (Pins 3, 4, 15, and 16)

Four 510Ω unswitched inputs are provided for audio summing on pins 3, 4, 15, and 16 with respect to (WRT) pin 18. These can be used to add audio capability such as TAWS, autopilot audio, etc, to an audio panel that only has two inputs. The output is on Pin 14.

2.4.4 Output wiring

The output on Pin 14 (WRT Pin 18) of the PA50 is usually presented to the unswitched audio panel or intercom input. It is critical to the proper operation of this system to have this connector wiring made in accordance with these diagrams. Use 2- and 3-conductor, MIL-spec cable as shown. Connect the shields at one end only, and tie to the audio low inputs as shown.

2.5 Adjustments

The PA50 is factory adjusted to accommodate the typical requirements for most aircraft configurations. The output volume can be adjusted by turning "VOL ADJ" clockwise to increase the volume or counter-clockwise to decrease. The gain adjust affects all four inputs. See Appendix B for locations

2.6 Post Installation Checkout

After wiring is complete, verify power is ONLY on pin 25 of the J1 connector, and airframe ground on pin 13. Failure to do so will cause serious internal damage and void PS Engineering's warranty.

2.6.1 Operational Checkout

Apply power to the aircraft and avionics. Verify that the audio signal connected to the PA50 are provided to the aircraft's audio system. Verify that the unit is fully functional and in condition for safe operation.

2.7 Final Inspection

Verify that the wiring is bundled away from all controls and no part of the installation interferes with aircraft control operation. Move all controls through their full range while examining the installation to see that no mechanical interference exists. Verify that the cables are secured to the aircraft structure in accordance with good practices, with adequate strain relief. Ensure that there are no kinks or sharp bends in the cables and coaxial cables. Verify that the cables are not exposed to any sharp edges or rough surfaces, and that all contact points are protected from abrasion.

Complete logbook entry, and any other documentation such as FAA Form 337, weight and balance computation if required. Sample text for instructions for continuing airworthiness can be found in Appendix D.

Return completed warranty registration application to PS Engineering.

Section III OPERATION

GENERAL INFORMATION

There are no external operational controls on the PA50, only one internal volume control that affects all four audio inputs.

Section IV- Warranty and Service

4.1 Warranty

In order for the factory warranty to be valid, the installations must be accomplished by an FAA-certified avionics shop and authorized PS Engineering dealer. If the unit is being installed by a non-certified individual in an experimental aircraft, a factory-made harness must be used for the warranty to be valid.

PS Engineering, Inc. warrants this product to be free from defect in material and workmanship for a period of one (1) year from the date of installation as recorded in aircraft logbook and/or on FAA Form 337. During the **twelve (12) months** of the warranty period, PS Engineering, Inc., at its option, will send a replacement unit at our expense if the unit should be determined to be defective after consultation with a factory technician.

All transportation charges for returning the defective units are the responsibility of the purchaser. All domestic transportation charges for returning the exchange or repaired unit to the purchaser will be borne by PS Engineering, Inc. The risk of loss or damage to the product is borne by the party making the shipment, unless the purchaser requests a specific method of shipment. In this case, the purchaser assumes the risk of loss.

This warranty is not transferable. Any implied warranties expire at the expiration date of this warranty. PS Engineering SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES. This warranty does not cover a defect that has resulted from improper handling, storage or preservation, or unreasonable use or maintenance as determined by us. This warranty is void if there is any attempt to disassemble this product without factory authorization. This warranty gives you specific legal rights, and you may also have other rights, which may vary from state to state. Some states do not allow the exclusion of limitation of incidental or consequential damages, so the above limitation or exclusions may not apply to you.

All items repaired or replaced under this warranty are warranted for the remainder of the original warranty period. PS Engineering, Inc. reserves the rights to make modifications or improvements to the product without obligation to perform like modifications or improvements to previously manufactured products.

4.2 Factory Service

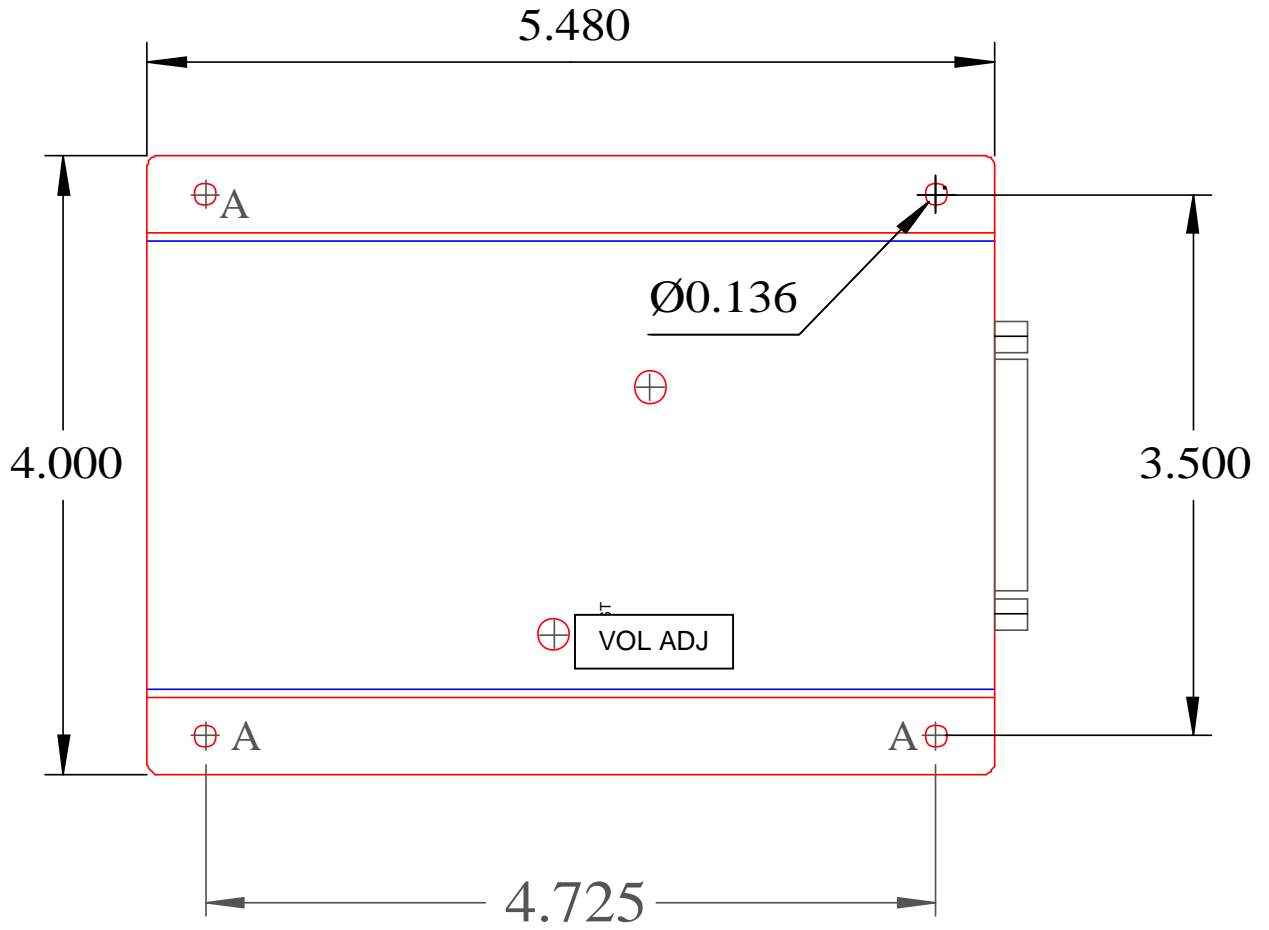
The unit is covered by a one-year limited warranty. See warranty information. Call PS Engineering, Inc. at (865) 988-9800 before you return the unit. This will allow the service technician to provide any other suggestions for identifying the problem and recommend possible solutions.

After discussing the problem with the technician and you obtain a Return Authorization Number, ship product to:

[Note: PS Engineering will not be responsible for items shipped in US Mail.]

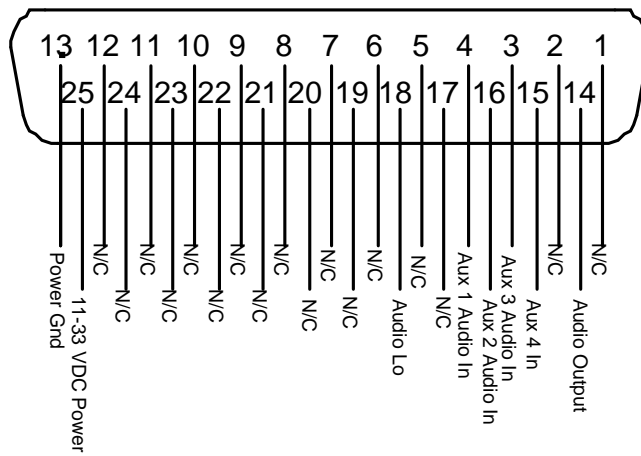
PS Engineering, Inc.
Attn: Service Department
9800 Martel Rd
Lenoir City, TN 37772
(865) 988-9800 FAX (865) 988-6619

Appendix B – Installation Drawing



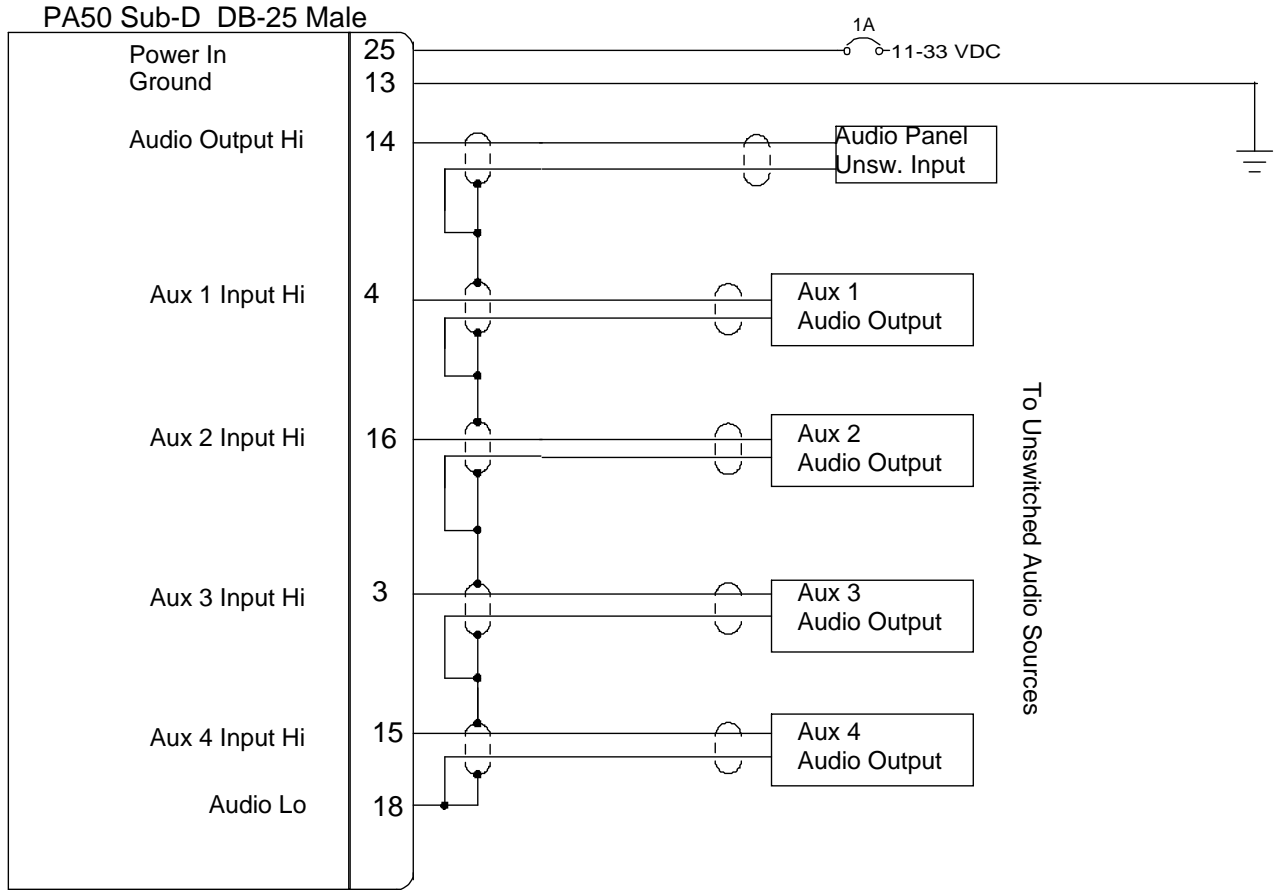
Not to scale

Appendix C Connector Interconnect



Connector Map, viewed from front of connector

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- NOTES: 1. All wire must conform to MIL-22759 or 27500. Minimum 24 gage shielded wire.
 2. Use 2-conductor with shield as indicated.
 4. Connect shields at one end only

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TITLE: PA50 WIRING DIAGRAM		
SIZE	DOCUMENT NUMBER: 120-150-0000	REV New
DATE: 10/05/06	SHEET 1 OF 1	

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6.1 Instructions for Continuing Airworthiness,

Sample ICA Checklist for PS Engineering System:

Section	Item	Information
1	Introduction	Installation audio summing amplifier.
2	Description	Installation as described in manufacturer's installation manual and referenced on FAA Form 337, including interface with other avionics audio as required.
3	Controls	See installation and operator's guide referenced on FAA Form 337.
4	Servicing	None Required
5	Maintenance Instructions	On Condition, no special instructions
6	Troubleshooting	Follow checkout instructions in the installation manual referenced on the FAA Form 337. For a specific unit fault, contact the manufacturer at (865) 988-9800 for special instructions.
7	Removal and replacement information	<i>Remote Mounted</i> — Remove 4 retaining screws. <u>Installation:</u> Reverse the Removal Instructions
8	Diagrams	Not applicable
9	Special Inspection Requirements	Not Applicable
10	Protective Treatments	Not Applicable
11	Structural Data	Not Applicable
12	Special Tools	None
13	Not Applicable	Not Applicable
14	Recommended Overhaul Periods	None
15	Airworthiness Limitations	Not Applicable
16	Revision	To be determined by installer