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PRD60

Remote Digital Recorder and
Aural Warning System

DRAWS

Installation and Operation Manual

Document P/N 200-160-0200
Revision 2, Feb. 2007

*In certified aircraft, warranty is not valid unless this product is installed by
an Authorized PS Engineering dealer.*

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Record of revisions:

Revision	Date	Reason
1	April 2005	Corrected section 2.4.3
2	February 2007	Clarified Section 2.4.6, wiring C

Section I - GENERAL INFORMATION

1.1 INTRODUCTION

The PRD60 is an accessory device designed to improve the safety of flight by providing an aural annunciation of out of limit conditions. In a critical situation this directs the pilot's attention to the proper indicator. This system does not replace any existing annunciation, but adds an additional layer of vigilance.

In addition, the recorder function will aid in cockpit resource management by repeating the last communications.

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 PRD60.

1.2 SCOPE

This manual provides detailed installation and operation instructions for the PS Engineering PRD60-series of Audio Selector Panel/Intercom Systems. This includes the following units:

Model	Description	Part Number
PRD60	Remote Digital Recorder Aural Warning System	050-160-0200
PRD60	Remote DRAWS with custom messages	050-160-xxxx

1.3 EQUIPMENT DESCRIPTION

The unit is a remote-mounted device with input for up to six (6) discrete, ground seeking annunciations, and a 60-second digital recorder. Message one is also gated with the frequency input.

The messages are pre-programmed by the factory to meet the customers requirements.

The unit also provides audio summing for up to four unswitched inputs.

1.4 APPROVAL BASIS - None

None

NOTE: The message annunciations contained in the PRD60 are not FAA-approved, and the installer must determine the relevant approval basis prior to installation. Contact PS Engineering for information regarding FAA approval.

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:	
Temperature Range:	
Operating:	-15° C to 55° C
Storage:	-40° C to 85° C
Altitude:	Up to 50,000 feet in an unpressurized area of the aircraft.
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:	750 mA (Externally protected by a 1 Amp circuit breaker.)
<i>Audio Specifications</i>	
Audio selector panel input impedance:	510 Ω
Receiver input for recorder	1
Input Isolation:	-60 dB (min.)
Unswitched Audio:	4 inputs
Headphone Impedance:	150 - 1000 Ω
Headphone Output:	38 mW into headset, no clipping into 150Ω
Distortion:	<1% THD @ 38 mW into 150Ω
Audio Freq. Response, 3 dB:	300 Hz - 6000 Hz

1.6 EQUIPMENT SUPPLIED

1 ea. of the following units:

Model	Part Number
PRD60	050-160- ()

PRD60 Installation Material:

Part Number	Description	Quantity
425-025-0010	DB25 Female Shell	1
425-025-0001	Back shell	1
425-020-5090	Crimp Pins	25
200-160-0200	Operator's and Installation Manual	Internet Availability

1.7 EQUIPMENT REQUIRED BUT NOT SUPPLIED

Circuit Breaker: 1 ea. 1 amp.

Input system (I.e. engine monitoring system)

Aircraft radio with headphone output.

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 PRD60 Remote Digital Recorder and Aural Warning System.

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 digital audio warning 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 PRD60 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 PRD60 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 PRD60 close to high current devices or systems with high-voltage pulse type outputs, such as DME or transponders.

To install the PRD60, 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 unit connector is a male DB25 connector. This is a crimp-type connector. These are crimp-type connectors. The AMP Contact Crimping Tool, AMP 601966-1 (or MS22520 equiv.), with Positioning Tool 601966-5 must be used to ensure good quality harness.

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 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 PRD60-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 minimum #20 AWG pair. Connect airframe power ground to Pin 13 only.

2.4.3 Audio Message Installation

The audio message installation requires inputs from an external source, such as an engine gage system. A falling edge (input pulled low) when applied to the appropriate pin of the connector will cause the message to be played, repeating every two seconds, until the acknowledge (“ACK”) button is pushed.

The message input trigger should have no more than 28 VDC in the high (open) state, and must be pulled to < 1.0 VDC (but not below ground) in the low, or triggered state. Maximum sink current, 5 mA.

Install the “ACK” button in a location convenient to the pilot and copilot position. This switch is a momentary SPST switch between Pin 24 and ground.

The following table contains information regarding various inputs:

Function	EGT or CHT	Fuel Flow or Level	Oil Pressure or temperature	Volt/ Amp	RPM	Manifold Pressure
Message Number	1	2	3	4	5	6
PRD60 Pin	23	11	9	10	21	8
Message Text Part number -0200 only	“Check temperature”	“Check fuel”	“Check oil”	“Check battery”	“Check engine speed”	“Check boost”

Other combinations can be created at additional cost.

NOTE: PS Engineering can only provide input information at this time. Approval basis is the responsibility of the installer. Contact PS Engineering for more information.

2.4.4 Com Radio Input (Pin 2 WRT 1)

The Com radio input (Pin 2) has an input impedance of 510Ω. This is the only input that will be recorded.

2.4.5 Playback Installation (Pin 12)

To activate the IRS playback, a momentary push button switch is required. This switch can be located any where in cockpit convenient to the pilot's reach. The switch must be connected to pin 12 of the PRD60.

2.4.6 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.

2.4.7 Headset wiring

The output of the PRD60 is usually presented to the pilot's headset only, and only the left ear in a stereo installation. 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 PRD60 is factory adjusted to accommodate the typical requirements for most aircraft configurations. The output volume can be adjusted using pot R57. 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 air-frame 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 aural alerts are all off. There is a five second delay in the system after power up, during this time the unit will ignore any input triggers. This allows aircraft systems to "settle" after power-up, without nuisance alerts.

2.6.2 Digital Annunciation Checkout

If interfaced with an annunciation system, verify that all alert messages play at the appropriate time, and that they are silenced by the "ACK" button.

2.6.3 Recorder Checkout

With headset plugged into pilot's side jacks, tune COM 1 to local frequency, such as FSS or ATC ground.

Select Com 1 on mic selector switch, and record at least five incoming radio transmissions.

This audio should only appear in the pilot's headset, and only be incoming transmissions from the transceiver selected in the mic select switch.

Depress the panel or yoke mounted playback switch, and verify that all five messages play, in the order received.

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 log book entry, FAA Form 337, weight and balance computation and other documentation as required. Sample text for FAA Form 337, and instructions for continuing airworthiness can be found in Appendix F.

Return completed warranty registration application to PS Engineering.

Section III OPERATION

GENERAL INFORMATION

3.1 Scope

This section provides detailed operating instructions for the PS Engineering PRD60, Part Number 050-160-0100, Remote Aural Warning System and PRD60 050-160-0200 Digital Recorder Aural Warning System. Please read it carefully before using the equipment so that you can take full advantage of its capabilities.

3.2 Audio Messaging system

The PRD60 contains six stored messages. An outside annunciator, such as an engine gage system triggers these messages. When there is an announcement, it will be repeated every two seconds until the remote-mounted ACK button is pushed. This stops the played announcement, until the next announcement is required (the next falling edge).

3.3 Internal Recorder System (-0200 only)

The Intercom Recording System (referred to here as the IRS) is a digital recording system allowing automatic storage and immediate playback of all incoming aircraft radio receptions.

Operating as a continuous loop recorder, (first message received will be the last heard), the recorder has one minute of recording time and up to 16 messages. With its own built in VOX circuit, there are no buttons to press to start recording. The system automatically begins to record the instant the radio becomes active.

3.3.1 Operation

Recording is automatic; there is no action required by the pilot. To play back the last recorded message, simply press the momentary switch associated with the IRS. Each additional press of the button will play the preceding recorded message.

To **stop** the playback, hold the button for 2 seconds. The next time the button is pushed, it will play the next earlier message, unless another message is received.

3.3.1.1 Concurrent Messages

When a recorded message or audio annunciation is playing, the other audio source is momentarily inhibited. For instance, if an IRS message is being played, the audio annunciation will not begin until the IRS message is finished. Conversely, the IRS recording cannot be played as long as there is an aural alert being played. There is no recording made if playing a recording or annunciation.

Section IV- Warranty and Service

4.1 Warranty

In order for the factory warranty to be valid, the installations in a certified aircraft 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 sale. 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

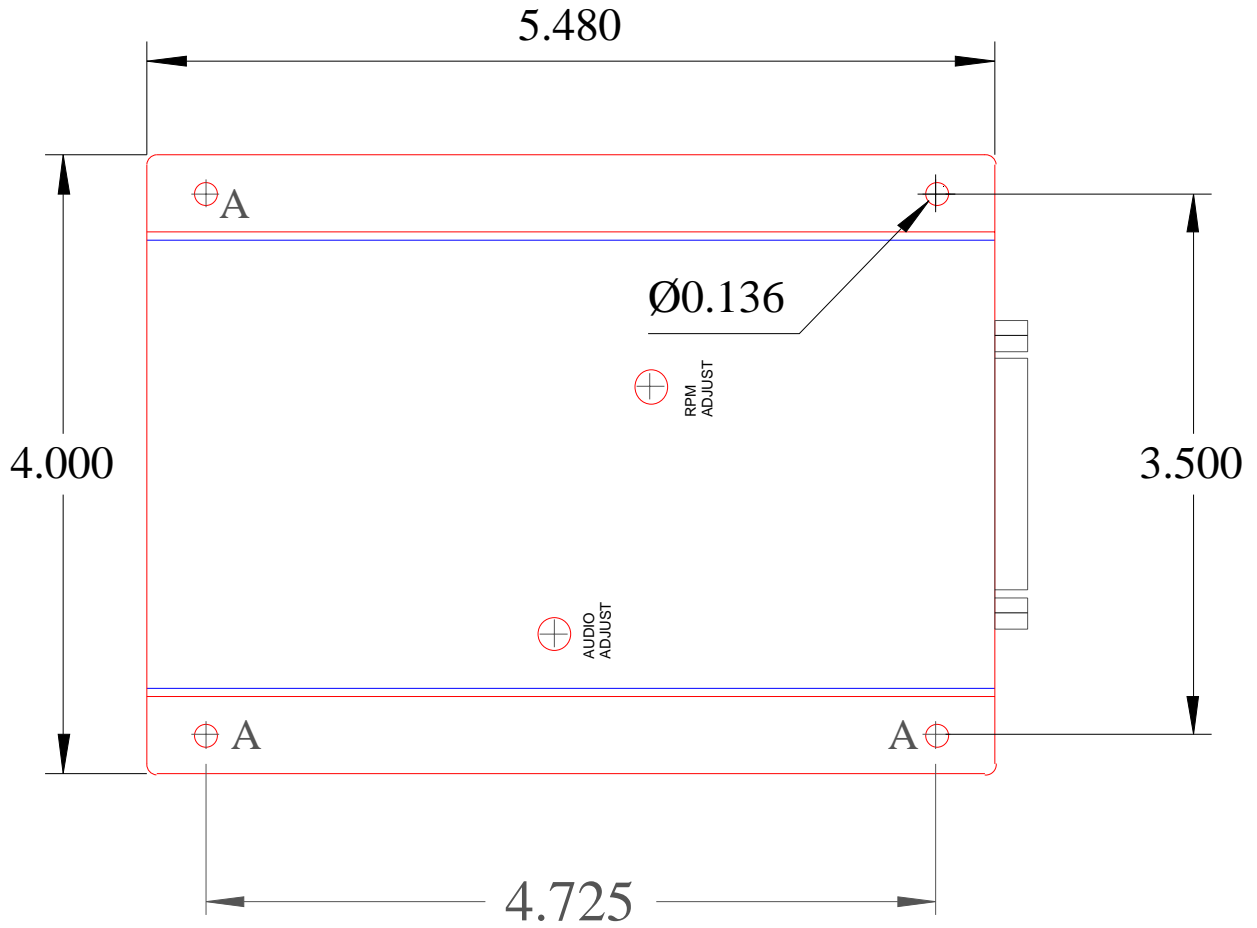
The unit is covered by a one-year limited warranty. See warranty information. Call PS Engineering, Inc. at (865) 988-9800 before you return the unit. This will allow the service technician to provide any other suggestions for identifying the problem and recommend possible solutions.

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

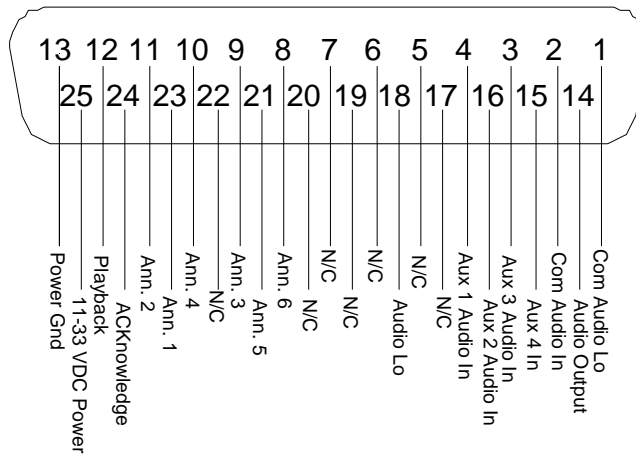
[Note: PS Engineering will not be responsible for items shipped in US Mail.]

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

Appendix A – Installation Drawing

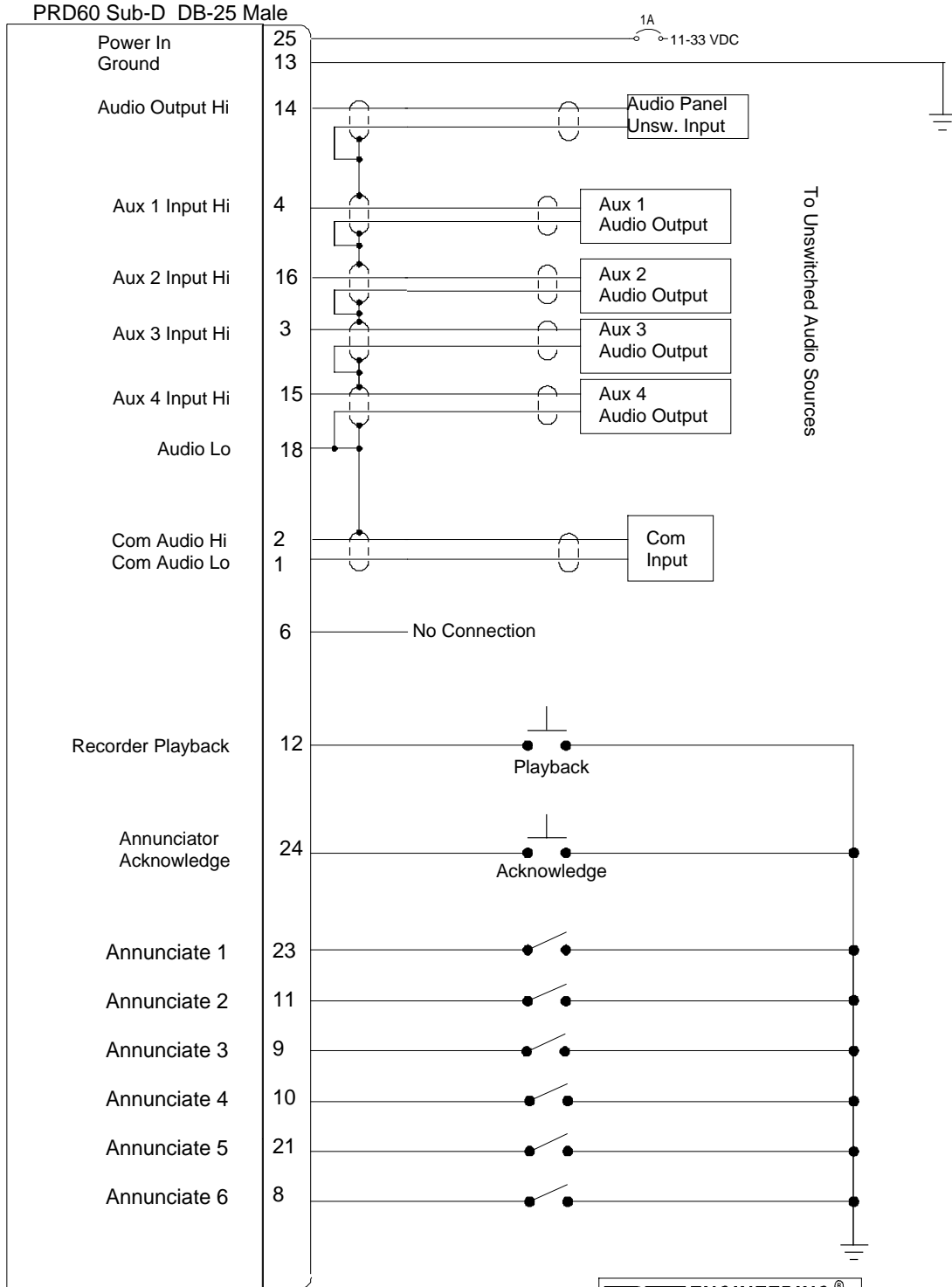


Not to scale
Appendix B Connector Interconnect




Connector Map, viewed from front of connector

PS Engineering
PRD60 Remote DRAWS Unit
Installation and Operator's Manual



- 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
 5. No connection Pins 5, 6, 7, 17, 19, 20, 22.

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	120-161-0000	1
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