

PS ENGINEERING[®] INCORPORATED

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PM1000// Specialty Panel Mounted Intercoms

Part No. 11906, 11908 (with Internal Recorder System)
Operator's and Installation Manual

PS ENGINEERING, INCORPORATED
9800 Martel Road
Lenoir City, TN 37772
Phone (865) 988-9800 FAX (865) 988-6619

www.ps-engineering.com

NOTICE: Warranty is not valid unless this product is installed by an Authorized PS Engineering dealer, or a professionally made wiring harness is obtained from PS Engineering or an authorized dealer.

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Section I General Information

1.1 Introduction

The **PM1000II**, is a panel mounted, 4-place monaural intercom system (ICS). Please read this manual completely before installation to minimize the risk of damage to the unit and to become familiar with all the features.

1.2 Scope

This manual contains installation and operational instructions for the following PS Engineering units:

Part Number	Description
11906	w/Pilot ISO and Internal Recorder System (IRS)
11908	Same as above w/internal crew function



PM1000II, p/n 11908, Front Panel

1.3 Description

The **PM1000II** is a 4-place, panel mounted intercom with individual volume and squelch controls for the pilot and copilot. The copilot's squelch control adjusts the trip level of the copilot and passengers.

A front panel mode switch allows the pilot to select multiple intercom configurations:

"ISO" mode isolates the pilot from the intercom and connects to the aircraft radio. The passengers can continue to communicate with each other and listen to entertainment without distracting the pilot. They do not hear radio communications.

"ALL" mode places all headsets on a party line. Each one hears aircraft radio, entertainment and can use the intercom.

"CREW" (11908 only) allows the pilot and copilot positions to hear the aircraft radios and use the intercom, while the rear passengers can have their own intercom conversation without disturbing the crew. This also activates music 2 input.

The **PM1000II** has an automatic fail-safe interconnect to the aircraft radio. If power to the intercom is disrupted, an internal relay will connect the pilot's headset to the aircraft radio. This allows

continuous radio communications. Note: The copilot will no longer hear aircraft radio when power is removed.

The 2-color LED shows green when power is on and red during radio transmissions. This functions as a stuck mic indicator.

An auxiliary input is provided, allowing the pilot, copilot and passengers the option to listen to music during flight. During intercom or aircraft radio activity, this music is automatically muted to allow communications without distraction. When the activity ceases, the Soft Mute circuit will gradually return the music to the original listening volume.

The **"ISO"** mode provides uninterrupted aircraft radio communications for the Pilot. Because the pilot's intercom volume control does not affect the aircraft radio volume, it is possible to select various balances of volume level between the ICS and the aircraft radio while in the ALL mode. Reducing the intercom volume, the pilot places the aircraft radio in the foreground while the ICS is in the background.

Both pilot and copilot have transmit capabilities over the radio. The **PM1000II** allows only the person who presses their PTT to be heard over the aircraft radio. If both pilot and copilot press the PTT at the same time, the copilot will override (Ideally suited for training environments). Pilot regains priority by switching the unit off.

1.4 Approval Basis ***None***

The **PM1000II**, part numbers 11906 and 11908 are NOT FAA Approved. It is the installer's responsibility to determine suitability for use.

1.5 Specifications

Input power:	13.8 - 27.5 Volts DC
Current Drain:	< 250 mA (Externally fused at 1 Amp)
Headphone Impedance:	150-1000 ohms typical
Audio Distortion:	<10% @ 75 mW into 150 Ω load
Aircraft Radio Impedance:	1000 Ω typical
3 dB Music Frequency Response:	200 Hz to 15 kHz
Unit weight:	12 Ounces (0.342 kg)
Dimensions:	1.25" H x 2.60" W x 5.50" D (3.2 x 6.6 x 14 cm)
Temperature	-20°C to +55°C
Altitude	50,000 ft.

1.6 Equipment required but not supplied

- A. Headphones, 150Ω monaural, up to four as required
- B. Microphones, up to four, as required
- C. Interconnect wiring

D.Circuit Protection 1 Amp.

1.7 License Requirements

None

Section 2 Installation

2.1 General Information

The **PM1000II** comes with all necessary hardware for installation.

Installation of the **PM1000II**, using hardware supplied, and the wiring available separately from PS Engineering or approved sources, does not require special tools or knowledge other than described in FAA Advisory Circular 43.13-2B. It is the installer's responsibility to determine the approval basis for this installation.

2.2 Unpacking and inspection

The **PM1000II** was carefully inspected mechanically and thoroughly tested electronically before shipment. It should be free of electrical or cosmetic defect.

Upon receipt, verify that the parts kit includes the following:

2.3 Equipment installation procedures

- Using the template, drill six holes in the instrument panel in a location convenient to the pilot position(s).
- Insert the **PM1000II** from behind the instrument panel, aligning the holes for the knobs, LED, and

Part Number	Description	Quantity
475-442-0002	#4-40 Machine screws, black	2
625-002-0001	Concentric inner knobs	2
625-002-0002	Outer knobs w pointer	2
425-025-0095	25 pin Sub-d Shell	1
425-020-5089	Male Pins—Crimp	25
625-025-0001	Connector hood	1
575-002-0004	Reversible aluminum face plate	11906
575-002-0002	Reversible face plate w/crew	11908
11910	4-place mono jack kit (incl. phones and mic jack, insulating washers and 1/8" music jack)	1
200-124-0100	Operator's and Installation Manual	WEB
122-102-0001	Drill Template	1

May 2010

switch.

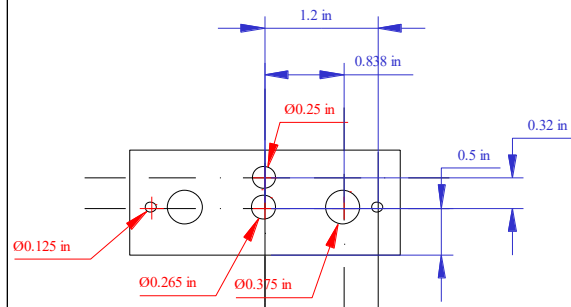
3. Place the aluminum face-plate over the knob shafts and secure, using the two # 4-40 round head screws provided.

4. Install the knobs over the volume and squelch control shafts.

2.2 Cable harness wiring

To complete the installation, a wire harness must be made as shown in Appendix D.

PS Engineering can make a custom-tailored wiring harness for the installer. All harnesses use Mil-spec quality components with professional techniques, and are fully tested before shipment. Contact PS Engineering for



PM1000II Hole spacing (Not to scale)

more information.

If the aircraft already has pilot and copilot headset jacks installed, you may re-use them. Remove and discard all wires from the copilot headset jacks. You may use the existing pilot headset jacks as the Auxiliary Aircraft Radio Headset Jacks, but they should be moved to a new location to avoid confusion with the pilot's headphone jacks. In the event the intercom has to be removed for any reason, these jacks provide access to the aircraft radio system.

To connect intercom into the aircraft audio system, parallel the appropriate set of cables from the intercom to the Auxiliary Aircraft Radio Headset Jacks. Finally, install new headset jacks into the aircraft and connect them directly to the appropriate pins of the **PM1000II**. See the wiring diagram for all details of the wire harness interconnects.

2.2.1 Electrical Noise Issues

WARNING: You must use separate shielded cables for the microphone and headphone jacks. Combining these two wires WILL cause loud oscillations and degrade the intercom function. The oscillation is caused

NOTE: Auxiliary microphone and headset jacks are **required** for a complete installation. These provide troubleshooting and a back-up access to the aircraft radios.

by the cross-coupling between the large headphone signal and the small microphone signal. The resulting feedback is a high-pitched squeal that varies with the volume controls.

Due to the variety of the radio equipment found in today's general aviation aircraft, there is the potential of both radiated and conducted noise interference. The **PM1000II** has a specially designed power supply to reduce conducted electrical noise on the power bus of the aircraft by at least 50dB. Although this is a very large amount of attenuation, it does not eliminate all noise when the amount is excessive. There must be at least 12 Volts DC present at the **PM1000II** for the power supply to work within its designed regulation. Otherwise, it will not be able to attenuate noise properly.

Shielding can protect the system from radiated noise (rotating beacon, electric gyros, switching power supplies, etc.). However, installation combinations can occur where minor interference is possible. The **PM1000II** was designed in an interference -protected chassis and has internal filter capacitors on all input lines.

Ground loop noise occurs when there are two different return paths for the same signal, such as airframe and ground return wire. Large cyclic loads such as strobes, inverters, etc., can inject audible signals onto the airframe return path. Follow the wiring diagram very carefully to help insure a minimum of ground loop potential. Radiated signals can be a factor when low level mic signals are bundled with current carrying power wires. Keep these cables separated.

Insulating washers are required on all mic and headphone jacks to isolate them from aircraft ground. The use of a conductor instead of a shield for ground return eliminates these ground loop paths.

2.2.2 Power Requirements

The **PM1000II** was designed to work with either 12 or 28 volt DC negative ground systems. The **PM1000II** must be externally protected with a one ampere (1A) circuit breaker or fuse.

2.2.4 IRS Playback wiring

PM1000II part number 11906 and 11908 have an internal recorder that stores recent incoming radio messages. A 3.5 mm jack is provided on the rear of the intercom unit to interface this function. Install a momentary, normally open (NO), switch in a location convenient to the pilot, and wire to the 3.5 mm plug (included) across the tip and sleeve contacts. Closing this switch will activate the playback. A low-current rated switch is recommended.

2.2.3 Entertainment Input

Entertainment devices can be connected to the **PM1000II**. Install the 1/8" jack convenient the pilot to connect the entertainment device into the system. A "Soft Mute" system is installed in the **PM1000II** that will mute the music during intercom or radio activity.

Since the PM1000II is mono, and music jack is stereo, it may be desirable to combine left and right input channels at the jack, for connection to the music input. Some devices may require a 10 Ω resistor in series with the left and right channels to isolate the output amplifiers

The PM1000II w/Crew, 11908 has **two (2)** entertainment inputs. In the ALL or ISO modes, Music #1 is heard by everyone (except by the pilot in ISO mode). In the CREW mode, pilot and copilot will hear Music #1 while the passengers will hear entertainment #2.

WARNING: Local oscillators and other internal signals from CD or radio equipment can cause undesired interference with VHF navigation and communication equipment. Before takeoff, operate the entertainment device to determine if there is any adverse effect on aircraft systems. If any unusual operation is noted in flight, immediately switch the entertainment device off.

2.3 Post installation checkout

After wiring is complete, verify power is ONLY on pin 14 of the connector, and airframe ground on pin 1. Failure to do so will cause internal damage and

Note: Use the low level (or line) output from any music device to connect to the PM1000II. Maximum input level is 2 V peak-to-peak.
DO NOT USE SPEAKER OUTPUT.
These levels will cause internal damage.

void the warranty.

1. Apply power to the aircraft and avionics.
2. Plug headsets into the pilot, copilot and passenger positions.
3. Verify that the pilot can transmit and receive with the **PM1000II** in the OFF position (pilot volume knob fully counterclockwise).
4. Rotate the pilot volume clockwise, about half way. Verify that the Pwr/Xmt light comes on, and shows green. If the LED is red, stop testing and trouble-shoot the microphone PTT installation.
5. Verify that the pilot can transmit and receive on the com transceivers.
6. Verify that the LED in the intercom changes from green to red when a microphone is keyed.
7. Verify proper intercom operation for pilot, copilot and passengers. For more information,

consult Section III.

8. Verify proper transmit and receive operation on the copilot position, noting that the copilot PTT switch allows proper transmission on the selected transceiver.
9. Verify Intercom operation in the ALL, ISO and CREW (if equipped) modes.
10. Verify that the intercom system does not adversely affect any other aircraft system by systematically switching the unit on and off, while monitoring the other avionics and electrical equipment on the aircraft.
11. **Recorder Check Out** Tune a communications radio to an active 2-way channel, (not AWOS or ATIS). Listen for a radio transmission. When it is concluded, press the "Playback" button and verify that the last message plays in the pilot headset.

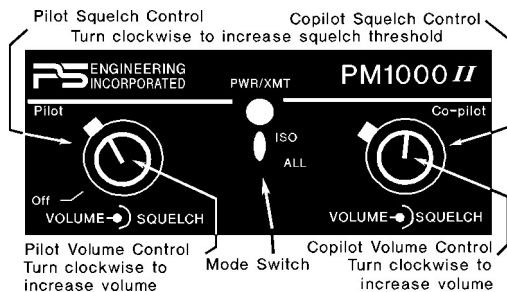
Section III OPERATION

With the installation complete, turn the **PM1000II** on by rotating pilot's volume control. This also engages the automatic fail-safe system. The pilot's volume control does not control the volume of the aircraft radio, allowing an additional degree of aircraft radio listening flexibility.

3.1 Adjusting the Volume

The pilot's volume control knob adjusts the loudness of the intercom and music for the pilot's headset only. It has no effect on aircraft radio volume level. The copilot's volume control adjusts the volume for the copilot and passengers (11906).

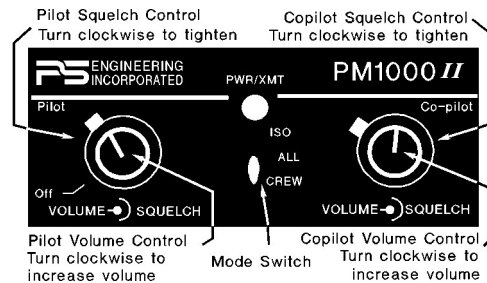
In the 11908 (crew) units, the volume level for both passengers can be adjusted by a screwdriver adjusted potentiometer located on the left hand side of the intercom as viewed from the front. It is possible to adjust the overall output volume to the passenger headsets by changing this potentiometer. Rotating the potentiometer counterclockwise increases the passenger volume.



PM1000II, p/n 11906

3.2 Squelch Control

The **PM1000II** provides individual VOX circuits for the pilot and copilot. The ability to adjust the trip level of these VOX circuits (squelch control) allows the use of dissimilar headsets without the frustration of clipping the first syllables. The **PM1000II** has three squelch circuits, one for the pilot, copilot, and one for the passengers. With individual VOX circuits, background noise is dramatically reduced.



PM1000II with crew, p/n 11908

With the engine running, set the squelch control knob by slowly rotating the squelch control knob clockwise until you no longer hear the background noise in the earphones. When the microphone is positioned properly near the lips, normal speech levels should open the channel. When you have stopped talking, there is a delay of about one second before the channel closes. This prevents squelch closure between words, and helps eliminates choppy intercom conversations.

3.3 Intercom Mode Select

The center switch is a three position mode control that allows the pilot to tailor the intercom function to suit flight conditions. Regardless of configuration, the pilot will always hear the aircraft radio. NOTE: If there is a power failure to the **PM1000II**, or if the power switch is turned off, the copilot will not hear the aircraft radio. Only the pilot is connected directly to the aircraft radio.

ISO (Up Position): The pilot is isolated from the intercom and is connected only to the aircraft radios. He will hear the aircraft radio reception (and sidetone during radio transmissions). Copilot and passengers will hear themselves and music but not the aircraft radio traffic.

ALL (Middle position): All parties will hear the aircraft radio, intercom, and music. However, during any ICS or radio communications, the music volume automatically mutes. The music volume increases gradually back to the original level after communications have been completed.

CREW (Down Position) (ONLY version with

crew, part number 11908): Pilot and copilot are connected on one intercom channel while the passengers are on a separate and independent channel. The pilot and copilot are connected to the aircraft radio and may listen to Music #1. Passengers can continue to communicate with themselves without disturbing the pilot and copilot and may listen to Music #2.

3.4 Internal Recorder System (IRS)

This records the last radio messages, storing up to 60 seconds of received radio phrases. Only the pilot will hear the playback. The last message received will be the first one played back. This function is intended to help the pilot determine if a radio call was meant for him, and not to store clearance or ATIS.

To play back the last recorded message, press the switch labeled "Playback" installed in the aircraft. To cancel the playback, press and hold the playback button for two seconds. The next time the button is pressed, the earlier message will be heard. If the radio becomes active while a message is playing, the message playback will stop. The new audio will not be stored. Press play to restart the message you were playing.

A radio signal of more than 1 VRMS is needed to trigger the IRS. Therefore, if the IRS does not seem to be recording, increase the aircraft radio volume.

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 year from the date of purchase from an authorized PS Engineering Dealer. During this one year 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. The customer is responsible for return shipment costs.

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 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.

4.2 Factory Service

The **PM1000II** 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 technician to provide any other suggestions for identifying the problem and recommend possible solutions.

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

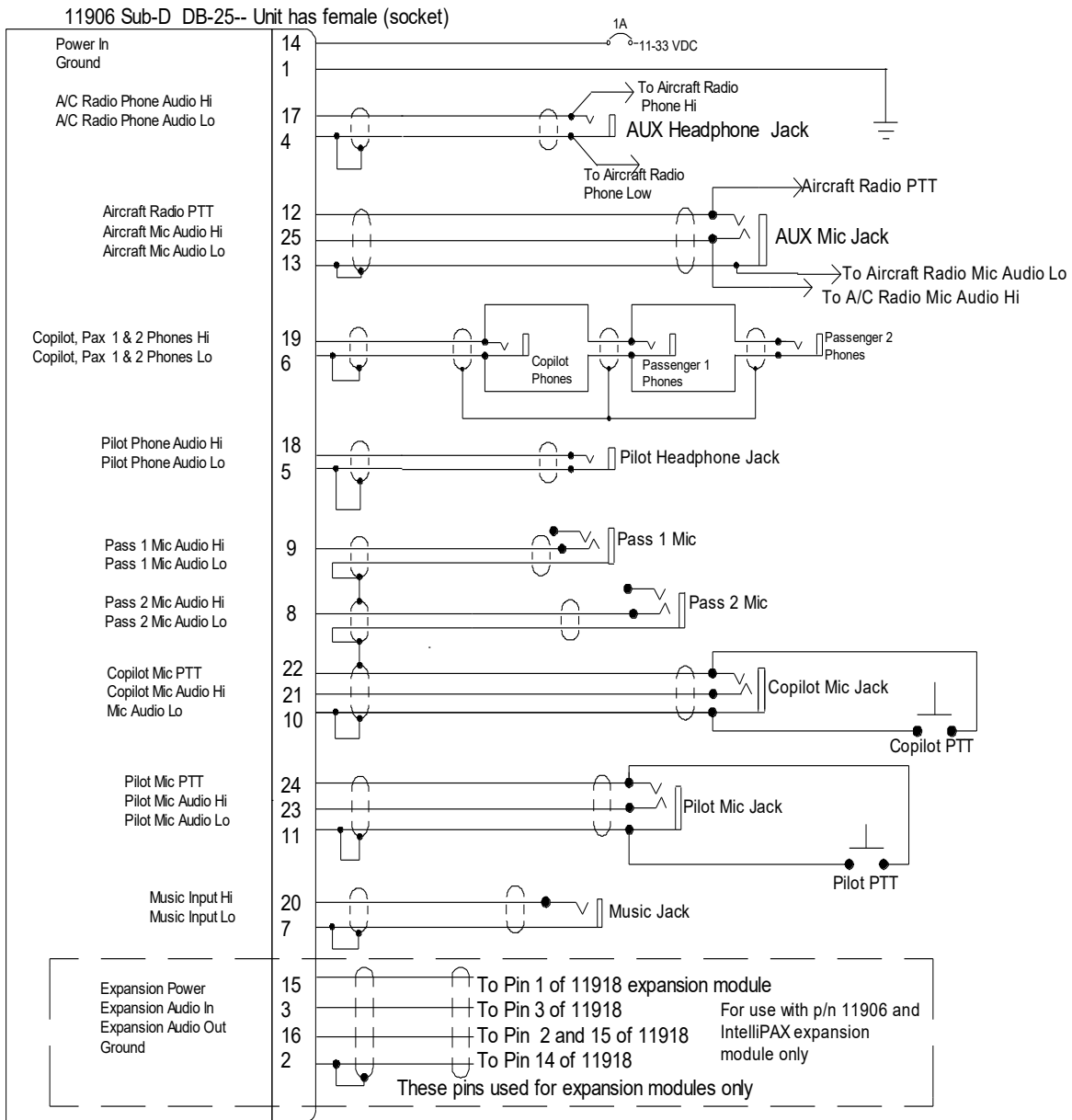
PS Engineering, Inc.
Attn: Service Department
9800 Martel Road
Lenoir City, TN 37772
(865) 988-9800 FAX (865) 988-6619.

NOTE:

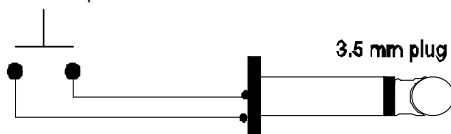
PS Engineering is not responsible for units shipped US Mail.

If no method of payment is provided, the units will be returned COD. If no RMA or description of problem is present, the shipment will be refused.

PM1000II NO crew, p/n 11906

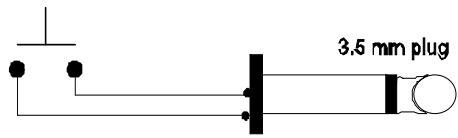
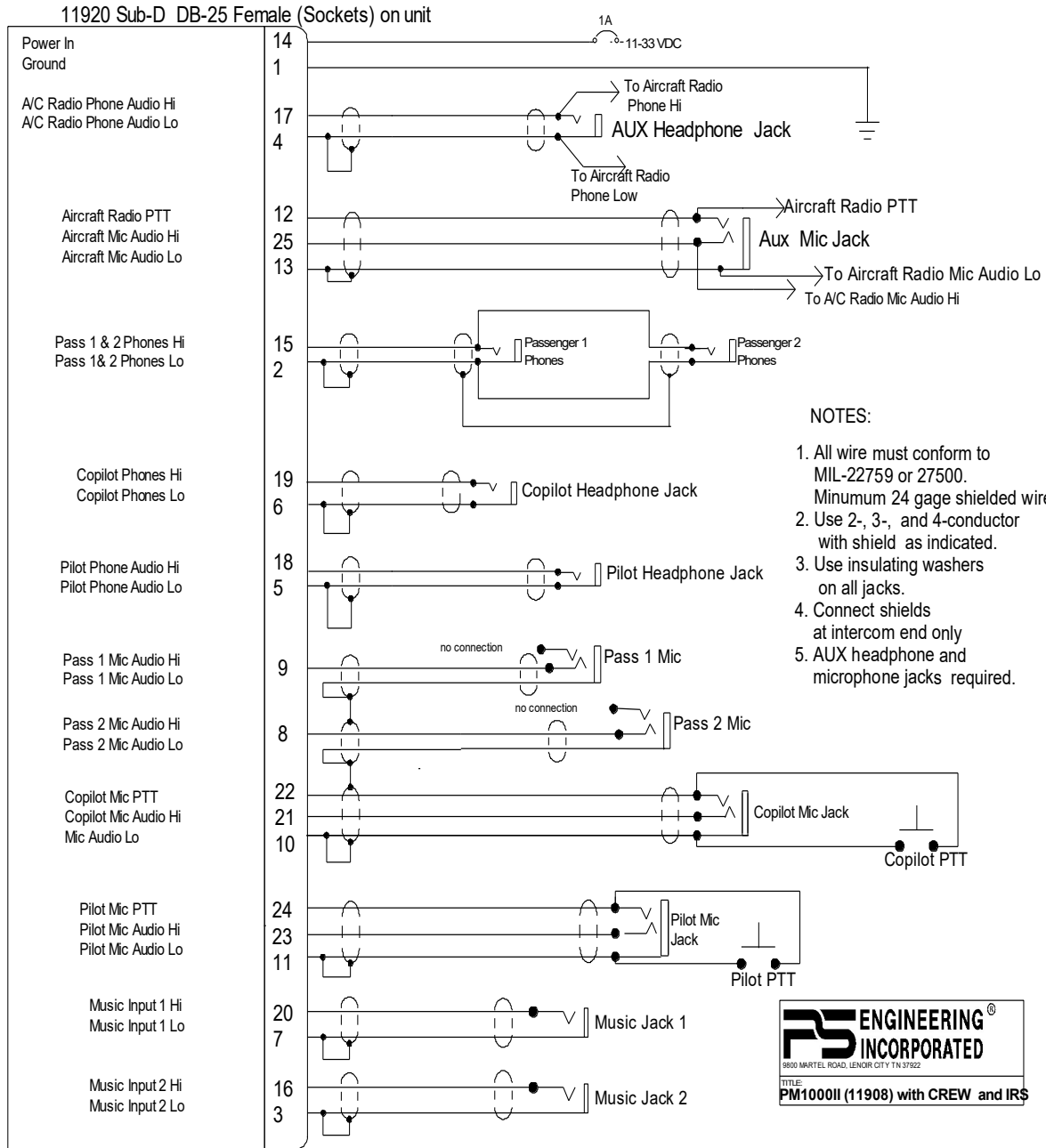


- NOTES:
1. All wire must conform to MIL-22759 or 27500. Minimum 24 gage shielded wire.
 2. Use 2-, 3-, and 4-conductor with shield as indicated.
 3. Use insulating washers on all jacks.
 4. Connect shields at intercom end only
 5. AUX headphone and microphone jacks are required.



IRS Playback Schematic (Section 2.2.4)

PM1000II With Crew p/n 11908



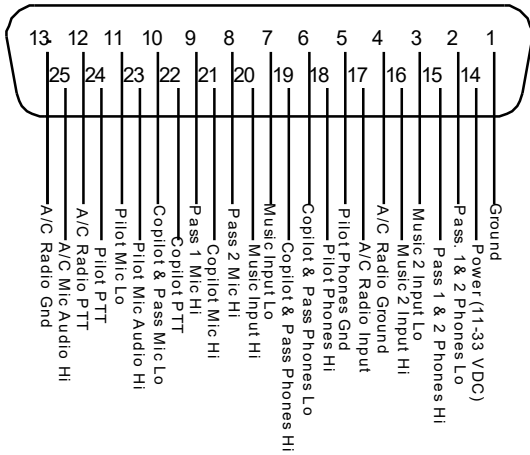
IRS Playback Schematic (Section 2.2.4)

PM1000II Part Number 11906 _____ or 11908 _____

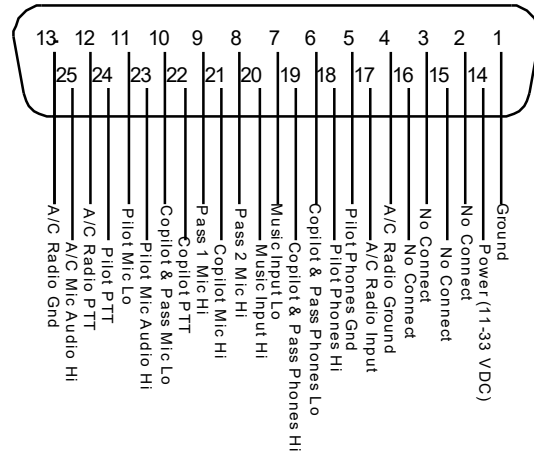
Serial Number _____

Purchase Date _____

Installed by: _____



11908 Connector layout, viewed from rear



11906 Connector layout, viewed from rear

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