

PS ENGINEERING[®] INCORPORATED

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PM1000 II

Specialty Panel Mounted
Intercoms

Part No. 11909 (PTT ICS For open cockpit)

Operator's and Installation Manual

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



PM1000II, p/n 11909, Front Panel

1.2 Scope

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

Part Number	Description
11909	Push to talk intercom for use in noisy cockpits

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 two 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.

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.

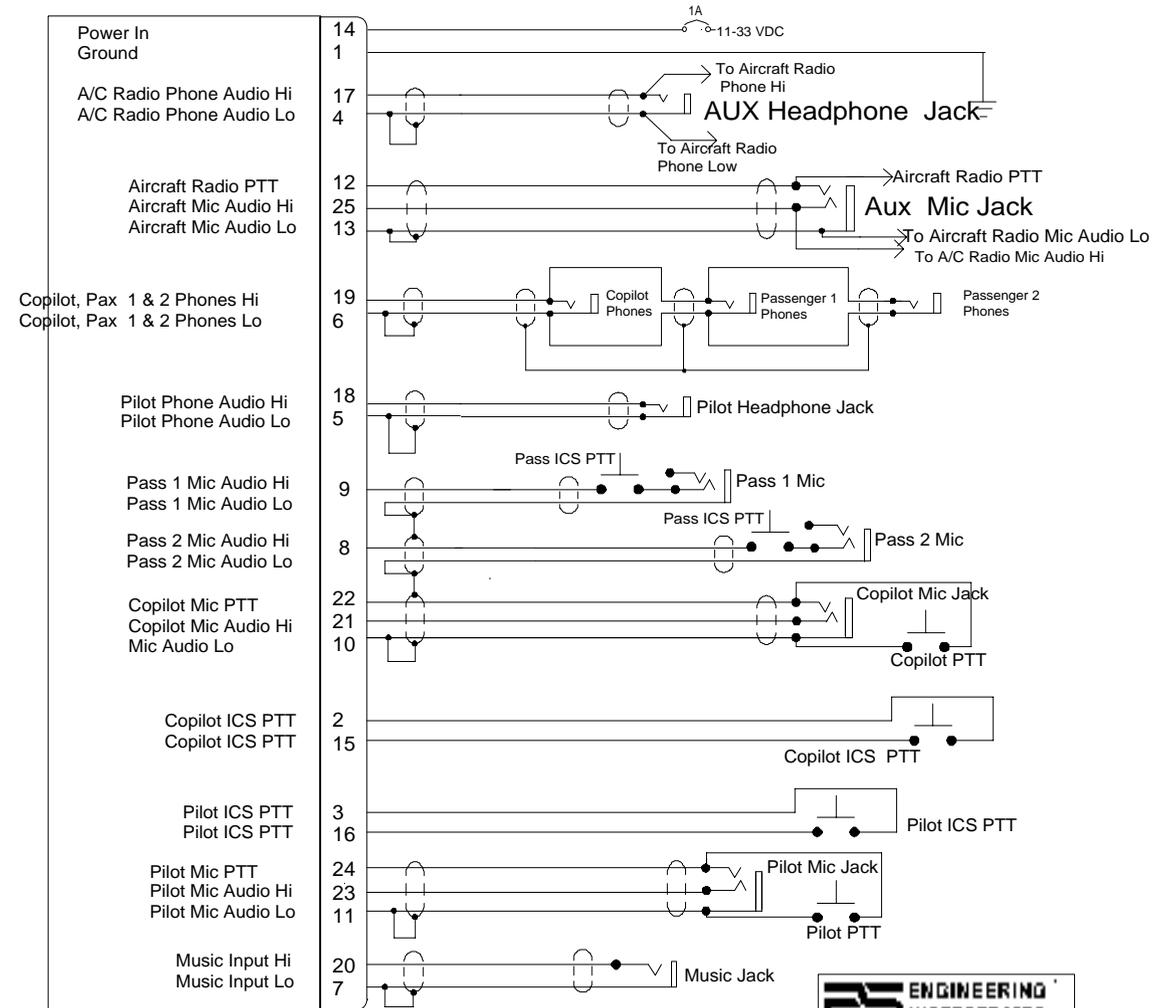
The 2-color LED shows green when power is on and red during radio transmissions. This functions as a stuck mic indicator.

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

PM1000II with PTT-ICS, p/n 11909



- NOTES: 1. All wire must conform to MIL-22759 or 27500. Minimum 24 gage shielded wire.
 2. Use 2- and 3-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.
 6. If a VOX operation is desired, a SPST switch can be wired across the PTT momentary switches, or a mom-Off-On toggle switch..

PS ENGINEERING INCORPORATED	
8800 MARTEL ROAD, LENOIR CITY, TN 37772	
TITLE: PM1000II w/PTT-ICS (11909) WIRING	
SIZE	DOCUMENT NUMBER: 120-129-0000
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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 service technician to provide any other suggestions for identifying the problem and recommend possible solutions.

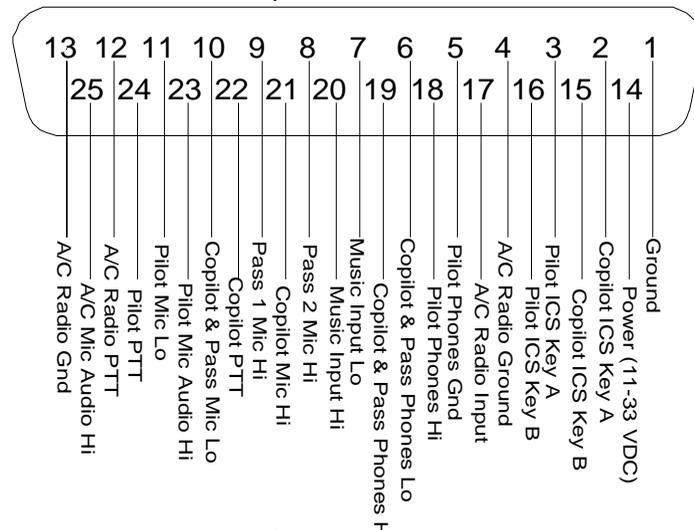
After discussing the problem with the technician and you obtain a **Return Authorization Number**, ship product to:

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.



11909 Connector layout, viewed from rear

the unit off.

1.4 Approval Basis *None*

The **PM1000II**, part number 11909 is NOT FAA Approved. It is the installers 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

- Headphones, 150Ω monaural, up to four as required
- Microphones, up to four, as required
- Interconnect wiring
- 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 the available wiring and hardware supplied, does not require special tools or knowledge other than described in FAA Advisory Circular

43.13-2. 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.

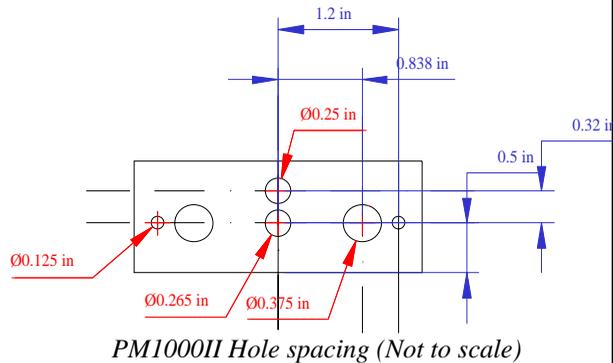
Upon receipt, verify that the parts kit includes the following:

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	1
11910	4-place mono jack kit (incl. phones and mic jack, insulating washers and 1/8" music jack)	1
200-125-0100	Operator's and Installation Manual	WEB
122-102-0001	Drill Template	1

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 switch.
- 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.
 - 5.



PM1000II Hole spacing (Not to scale)

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 more information.

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

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.

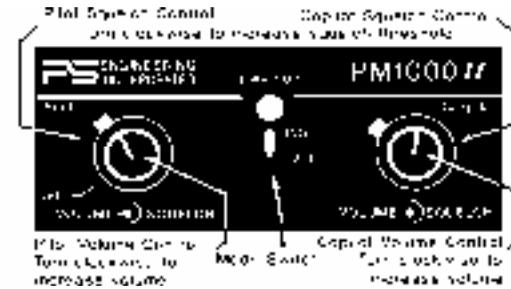
To connect intercom into the aircraft audio system, parallel the appropriate set of cables from the intercom to the Auxiliary Aircraft Radio Headset Jacks. Finally, install new headset jacks into the aircraft and connect them directly to the appropriate pins of the **PM1000II**. See the wiring diagram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



PM1000II, p/n 11909

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.

3.5 PTT-ICS (11909 only)

The **11909** provides positive control over the intercom through a separate intercom key switch that is installed convenient to the pilot or copilot. When this switch is open, no microphone audio is passed to the intercom. For best results, turn the intercom squelch fully CCW and use the PTT-ICS switch to talk on the

intercom.

In many cases it is possible to revert to VOX intercom if ambient noise is reduced (such as during cruise). Place the PTT-ICS switch in latched position (if equipped).

Section 4 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 installation. 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.

3. Verify that the pilot position can transmit and receive with the **PM1000II** in the OFF position (left hand 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 proper Intercom system operation in the ALL and ISO 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. **PTT ICS**– Verify that the mic audio is heard when the intercom push to talk switch is activated. Ensure that the squelch is turned to the full counterclockwise position to prevent missed syllables in flight.

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.

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.

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 Mode Select

The center switch is a three position mode control that allows the pilot to tailor the intercom

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.

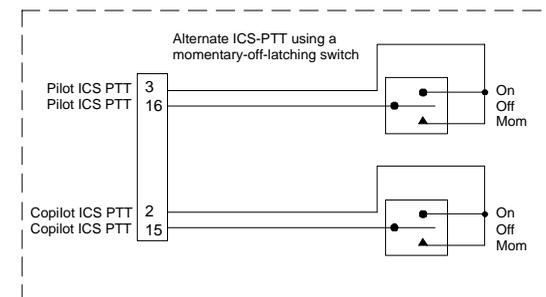
Insulating washers are required on all mic and headphone jacks to isolate them from aircraft ground. The use of a conductor instead of a shield for ground return eliminates these ground loop paths.

2.2.2 Power Requirements

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

2.2.3 PTT-ICS (11909 only)

The part number 11909 is designed for noisy installations, such as open cockpit aircraft. In this part number unit, no pilot mic audio is passed to the intercom unless pin 3 or 16, or copilot mic



Alternate ICS-PTT Switching for VOX operation

audio unless pins 2 and 15 are connected together.

It may be desirable to install a On-off-mom switch, which will allow the PTT ICS to "latch" and give VOX operation. In this mode, the VOX adjustment operates conventionally

2.2.5 Auxiliary Input

Entertainment devices can be connected to the **PM1000II**. Install 1/8" jacks 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.

In the ALL or ISO modes, Music #1 is heard by everyone (except by the pilot in ISO mode).

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 void PS Engineering's warranty.

1. Apply power to the aircraft and avionics.
2. Plug headsets into the pilot, copilot and passenger positions.

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.