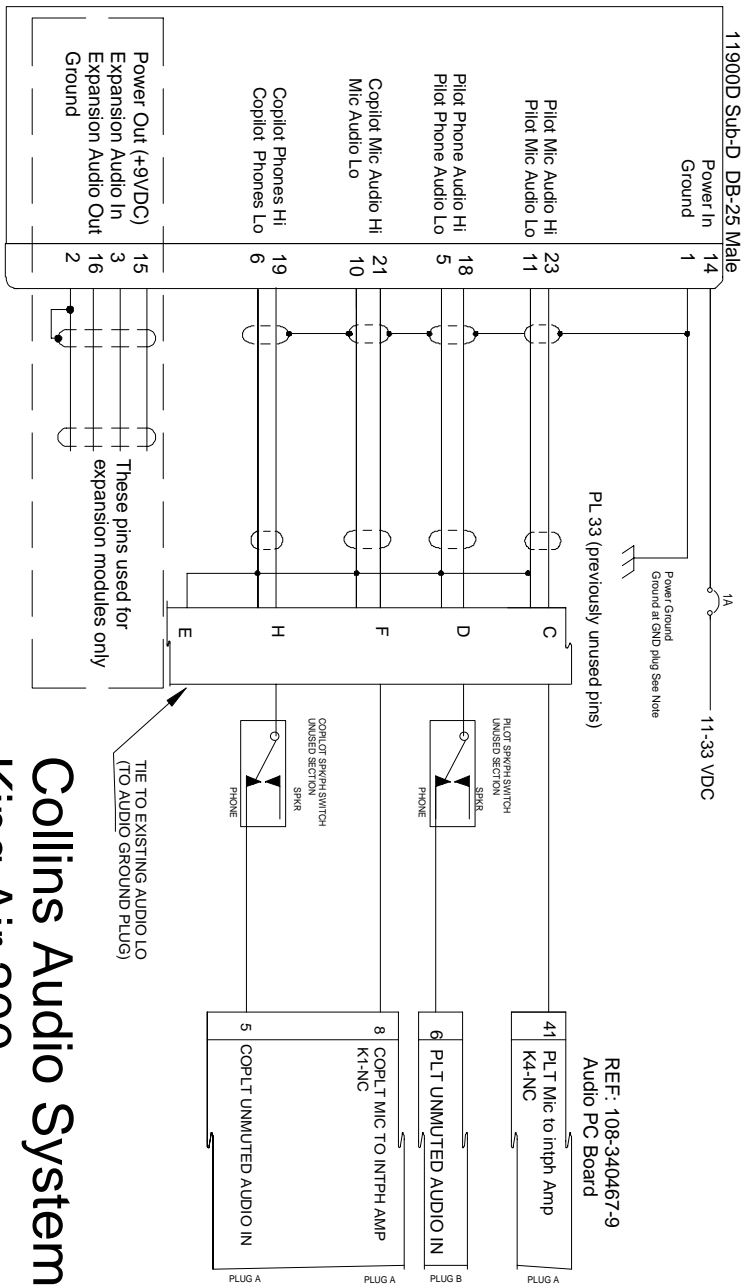


# PM1000-DAP Wiring, Collins



NOTES: 1. INTERCOM SYSTEM MUST BE ORDERED SPECIFICALLY FOR USE WITH DUAL AUDIO SYSTEM

- CAUTION: This wiring diagram was drawn for King Air 200, Serial BB422. It is intended solely as a guide. You must check wiring diagrams supplied with the airplane to determine that the system will be compatible.
- This diagram is based on Beechcraft diagram "Audio System, COLLINS, 356C-4 & 365F-3 #K401642."
- All wire must conform to MIL-22759 or 27500. Minimum 24 gauge shielded wire as indicated.
- Use 2-, 3-, and 4-conductor with shield as indicated.
- PL33 Pins are previously unused pins.
- Power and ground may be picked up at PL33 if wire size permits.
- This configuration is for 2-places only.
- Contact the factory for information on expanding this system.

**Collins Audio System**  
**King Air 200**

REF: 108-340467-9  
Audio PC Board



## PM1000-DAP

### Panel Mounted Intercom for Dual Audio Panel Aircraft

Part No. 11900D  
FAA-TSO C50c

### Operator's and Installation Manual

PS ENGINEERING, INCORPORATED  
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200-191-0000

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April 2008

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## Section I General Information

### 1.1 Introduction

The PM1000-DAP, is a panel mounted, 2-place intercom system (ICS) designed for installation in aircraft with existing dual audio control panels (ACP). 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 unit:

Part Number	Description
11900D	w/Pilot ISO for Dual ACP Installation

### 1.3 Description

The PM1000-DAP is a 2-place, panel mounted intercom with individual volume and squelch controls for the pilot and copilot. This unit is specifically designed to provide voice-activated intercom in a dual audio control panel aircraft.

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

"ISO" mode isolates the pilots from the intercom and connects to the aircraft radio. This mode defeats the intercom capability. The copilot retains all radio functions.

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

"CREW" (only if equipped with optional expansion unit) 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.

The LED shows green when power is on, and is not a transmit indicator. The PM1000-DAP does not have a direct interconnection with the aircraft audio, and therefore will not affect operation if power is removed.

Because the crew'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 pilots can place the aircraft radio in the foreground while the ICS is in the background.

### 1.4 Approval Basis FAA-TSO

The PM1000-DAP, part is FAA Approved under TSO-C50c. It is the installer's responsibility to determine approval basis (Part 91, 121, Part 135, etc.) and suitability for use.

### 1.5 Specifications

Input power: 13.8 - 27.5 Volts DC  
 Current Drain: < 250 mA (Externally fused at 1 Amp)  
 Audio Distortion: <10% @ 70 mW into 150 Ω load  
 3 dB mic Frequency Response: 300 Hz to 6.0 kHz

Unit weight: 12 Ounces (0.34 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: 15,000 ft.

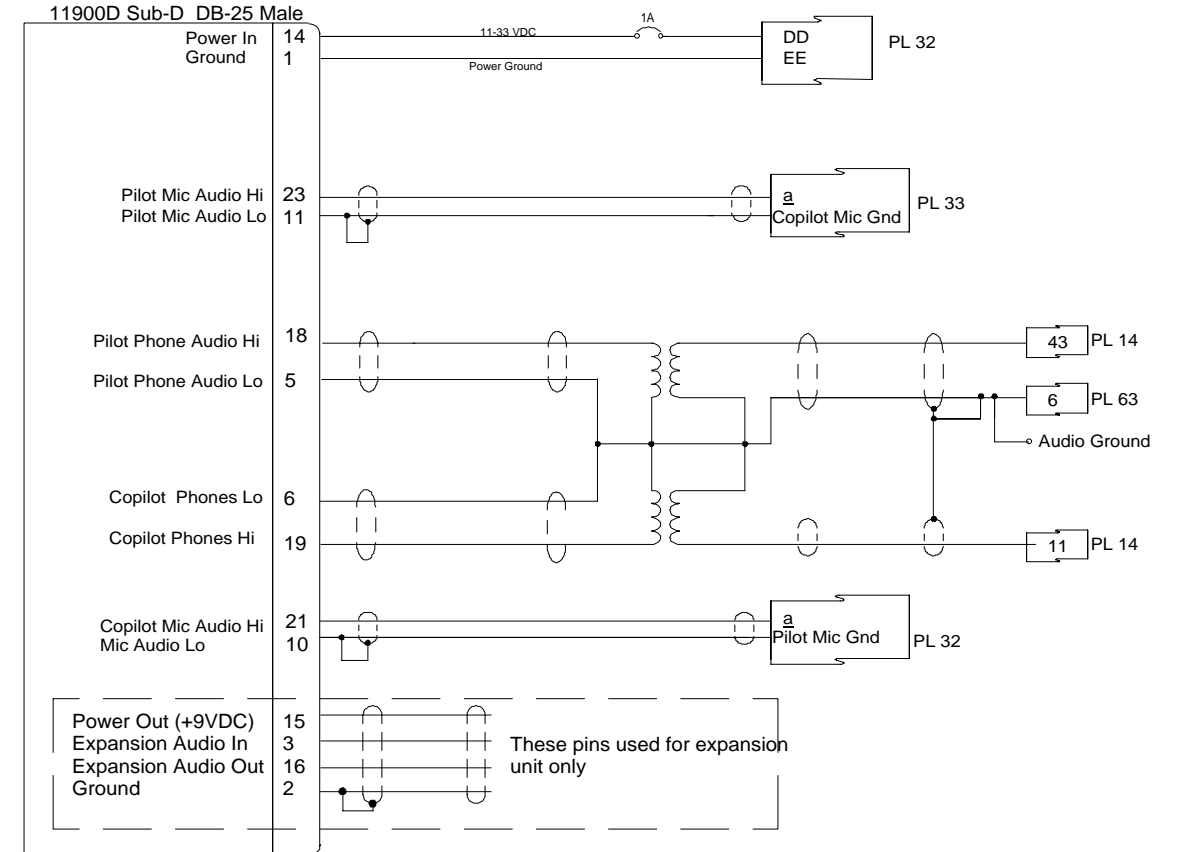
### 1.6 Equipment required but not supplied

- Interconnect wiring
- Existing Dual Audio Control Panel System
- Circuit Protection, 1 Amp.
- Headsets

### 1.7 License Requirements

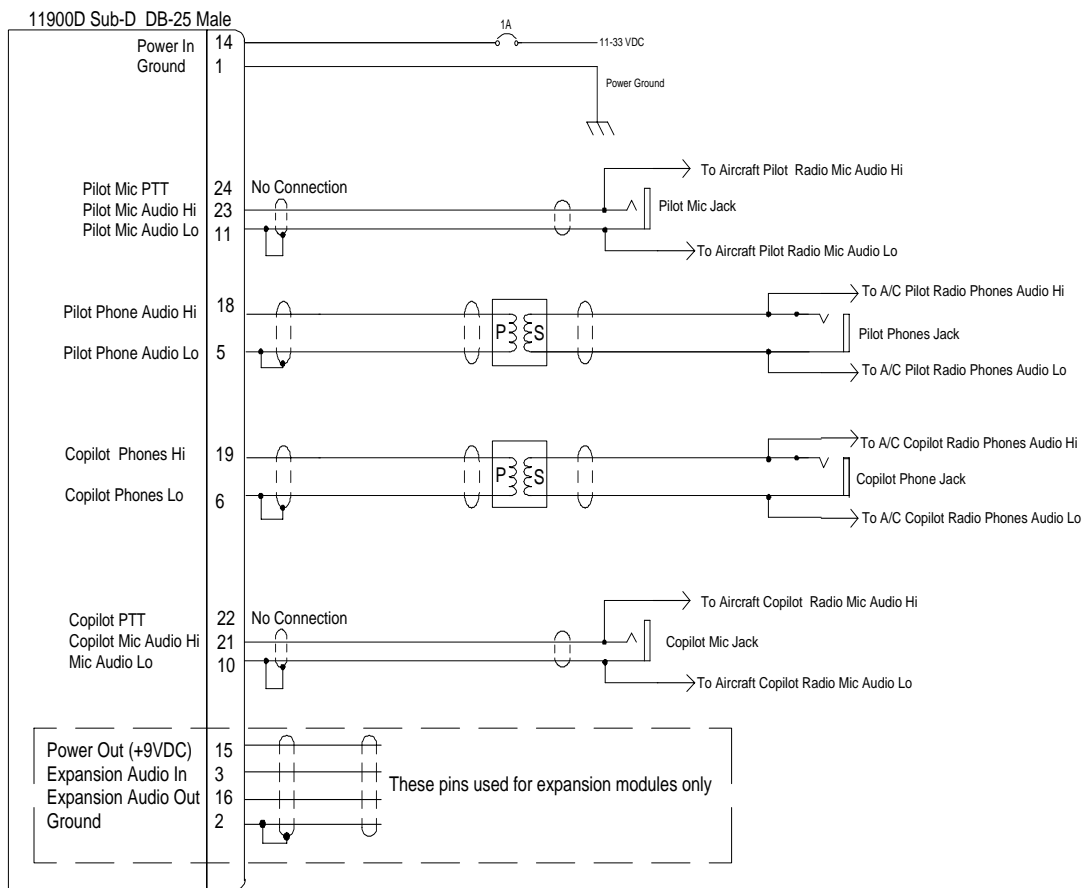
None

## King Air 200 w/ dB Systems



- NOTES:
- INTERCOM SYSTEM MUST BE ORDERED SPECIFICALLY FOR USE WITH DUAL AUDIO SYSTEM
  - CAUTION: This wiring diagram was drawn for King Air 200, Serial BB973. It is intended solely as a guide. You must check wiring diagrams supplied with the airplane to determine that the system will be compatible.
  - This diagram is created from Beechcraft diagram "Audio System, Dual System, 415 #R402845."
  - All wire must conform to MIL-22759 or 27500. Minimum 24 gage shielded wire.
  - Use 2-, 3-, and 4-conductor with shield as indicated.
  - PL33 Pins are previously unused pins.
  - Power and ground may be picked up at PL33 if wire size permits.
  - This configuration is for 2-places only. Contact the factory for information on expanding this system.

# PM1000-DAP Wiring, Generic



- NOTES:
- INTERCOM SYSTEM MUST BE ORDERED SPECIFICALLY FOR USE WITH DUAL AUDIO SYSTEM
  - CAUTION: This wiring diagram was drawn for reference only. You MUST verify proper operation using the Dual Audio Panel Test Box available from PS Engineering to determine that the system will be compatible.
  - PS Engineering DOES NOT guarantee compatibility or is responsible for providing technical support for dual audio panel installations.
  - All wire must conform to MIL-22759 or 27500. Minimum 24 gage shielded wire.
  - Use 2-, 3-, and 4-conductor with shield as indicated.
  - THIS SYSTEM IS NOT COMPATIBLE WITH CESSNA CITATION MODELS.
  - Use insulation washers at all jacks. Ground shields at one end only.
  - This configuration is for 2-places only. Contact the factory for information on expanding this system.
  - No connection to the PTT is necessary.

## Section 2 Installation

### 2.1 General Information

The PM1000-DAP comes with hardware necessary for installation.

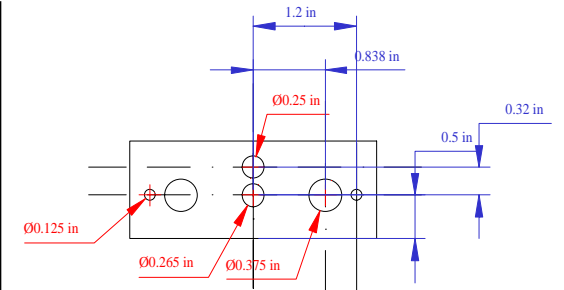
Installation of the PM1000-DAP, using the available wiring and hardware supplied, requires special avionics installation knowledge other than described in FAA Advisory Circular 43.13-2. It is the installer's responsibility to determine the approval basis for this installation. An FAA Form 337, or other approval may be required. See Appendix B for example of FAA Form 337.

### 2.2 Unpacking and inspection

The PM1000-DAP 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 P/N 250-003-0001, includes the following:

Part Number	Description	Quantity
475-440-0003	#4-40 Machine screws, black	2
625-002-0001	Large inner knobs	2
625-002-0004	Small knobs w pointer	2
425-025-0009	25-pin Sub-D male connector shell	1
625-025-0001	Connector hood	1
425-020-5089	Sub D pins. Male	25
475-002-0002	Thumbscrews	2
575-002-0004	Faceplate, Reversible	1
200-191-0000	Operator's and Installation Manual	1
122-102-0001	Drill Template	1
561-011-0001	Audio Transformers, 200 mW	2



PM1000-DAP Hole spacing (Not to scale)

### 2.3 Equipment installation procedures

- Using the template, drill six holes in the instrument panel in a location convenient to the pilot positions.
- Insert the PM1000-DAP from behind the instrument panel, aligning the holes for the knobs, LED, and switch.
- Place the faceplate over the knob shafts and secure, using the two # 4-40 round head screws provided.
- Install the knobs over the volume and squelch control shafts.

### 2.4 Cable harness wiring

To complete the installation, a wire harness must be made as shown in wiring diagrams.

There are many variation of dual ACP installation. Although there are many successful installations, PS Engineering cannot supply technical advice in any case other than as described in these appendices.

The PM1000-DAP is connected to the existing jacks. To connect intercom into the aircraft audio system, parallel the appropriate set of cables from the intercom to the Aircraft Radio Headset Jacks. See the wiring diagram for all details of the wiring.

## 2.4.1 Electrical Noise Issues

**WARNING:** You must use separate shielded cables for the microphone and headphone connections to the PM1000-DAP. 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.

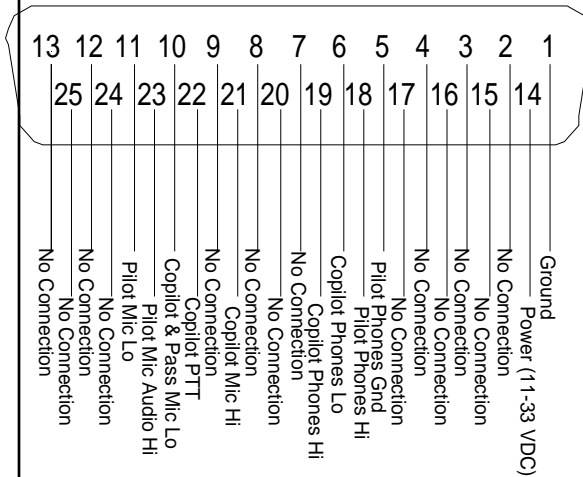
Due to the variety of the radio equipment found in today's general aviation aircraft, there is the potential of both radiated and conducted noise interference. The PM1000-DAP has a specially designed power supply to reduce conducted electrical noise on the power bus of the aircraft by at least 50dB. 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 PM1000-DAP 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 PM1000-DAP 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.

## 2.4.2 Power Requirements

The PM1000-DAP was designed to work with either 12/28 volt DC negative ground systems. The PM1000-DAP must be externally protected with a one ampere (1A) circuit breaker or fuse.



11900D Connector layout, viewed from rear

## 2.5 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 and copilot positions.
3. Verify that both pilot positions can transmit and receive with the PM1000-DAP in

## Environmental Qualification Form

Nomenclature: **Aircraft Audio Selector Panel and Amplifiers**

Model Number: **PM1000**

Manufacturer's Specification:

Technical qualifications:

PS Engineering Incorporated

FAA TSO Number: **C50c**

RTCA/DO-170 Class II

9800 Martel Road Lenoir City TN 37772 Telephone (865) 988-980

Conditions	Section	Conducted Tests
Temperature and Altitude	4.0	
Low Temperature	4.5.1	
High Short Time Temp	4.5.2	Equipment tested to CAT A1
High operating Temp	4.5.4	
Altitude	4.6.1	
Temperature variation	5.0	Equipment tested to Category C
Humidity	6.0	
Standard Humidity Environment	6.3.1	Equipment tested to Category A
Operational Shocks/Safety	7.0	Equipment tested to DO-160B, no category
	7.2.1	
Vibration	8.0	
Standard Vibration Test	8.3	Equipment tested to DO-160B, Category S
Sinusoidal Test	8.3.1	
Critical Frequency Survey	8.3.2.1	
Explosion Proofness	9.0	Category X, not tested
Waterproofness	10.0	Category X, not tested
Fluids Susceptibility	11.0	Category X, not tested
Sand and Dust	12.0	Category X, not tested
Fungus	13.0	Category X, not tested
Salt Spray	14.0	Category X, not tested
Magnetic Effect Test	15.0	Equipment tested to Category X
Power input	16.0	Equipment tested to Category B
Voltage Spike	17.0	Equipment tested to Category B
Audio Frequency Susceptibility	18.0	Equipment tested to Category B
Induced Frequency Susceptibility	19.0	Equipment tested to Category B
Radio Frequency Susceptibility	20.0	Equipment tested to Category T
Radio Frequency Emission	21.0	Equipment tested to Category B
Lightning Induced Transient Susceptibility	22.0	Category X, not tested

Instructions for Continuing Airworthiness		
Section	Item	Information
1	Introduction	Installation of intercommunications system
2	Description	2-place crew interphone system, voice activated.
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	In the event of a unit problem, place the unit into "off,." Because the PM1000D The crew will remain connected to the aircraft radios. 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	To remove the PM1000-DAP, 1. Remove four (4) knobs by pulling straight off. 2. Remove two (2) countersunk Phillips screws. 3. The unit will now be loose from the panel. 4. Release the unit connector using the thumbscrews.
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	None
16	Revision	To be determined by installer

the OFF position (left hand volume knob fully counterclockwise).

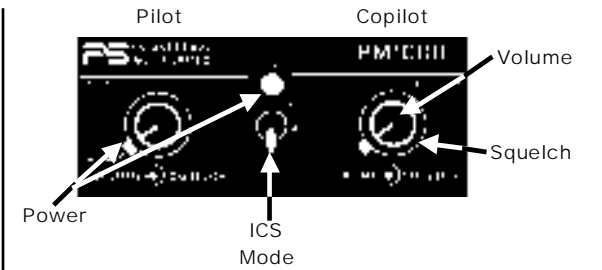
4. Rotate the pilot volume clockwise, about half way. Verify that the Pwr light comes on, and shows green.
5. Verify that the pilot can transmit and receive on the com transceivers.
6. Verify proper intercom operation for pilot, and copilot. For more information, consult Section III.
7. Verify proper transmit and receive operation on the copilot position, noting that the copilot PTT switch allows proper transmission on the selected transceiver.
8. Verify proper Intercom system operation in the ALL, ISO and CREW (if equipped) modes.
9. 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.

## Section III OPERATION

With the installation complete, turn the PM1000-DAP on by rotating pilot's volume control. The intercom 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 for the pilot's headset only. The copilot's volume control only adjusts the intercom volume for the copilot. These have no effect on aircraft radio volume level.



PM1000-DAP Front Panel Controls

### 3.2 Squelch Control

The PM1000-DAP 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 PM1000-DAP has squelch circuits 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 crew to tailor the intercom function to suit flight conditions. Regardless of configuration, the crew will always hear 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). The Copilot will also hear his selected radios, but not the pilot on the intercom.

**ALL** (Middle position): Pilot and copilot hear the intercom. Passengers (if equipped with expansion unit) will not hear aircraft radio sources.

**CREW** (Down Position) (ONLY present with expansion unit installed): 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 their aircraft radio. Passengers can continue to communicate with themselves without disturbing the pilot and copilot and may listen to music (if connected to expansion unit).

## 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.

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 sale by 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 DAM-

AGES. 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 PM1000-DAP 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.

The installer is responsible for determining if the PM1000 installation is a major alteration.

### Instructions for FAA Form 337 and Continuing Airworthiness

One method of airworthiness approval is through an FAA Form 337, *Major Repair and Alteration (Airframe, Powerplant, Propeller, or Appliance)* In the case of the PM1000 you may use the following text as a guide.

Installed 2-place intercom, PS Engineering PM1000-DAP, part number 11900D in ( *location* ) at station \_\_\_\_\_. Installed per AC43.13-2, Chapter 2, paragraph 23 (Instrument Panel Mounting). Installed per PS Engineering *Installation Operators Manual* p/n 200-191-XXXX, revision X, dated \_\_\_\_.

This unit is FAA-Approved under TSO C50c for audio amplifiers, and meets environmental tests outlined in RTCA DO-160B as appropriate for this aircraft.

Interface to existing aircraft radios in accordance with manufacturer's installation manual and in compliance with practices listed in AC43.13-2, Chapter 2. All wires are Mil-Spec 22759 or 27500. No connection to the aircraft dimmer bus is required. Power is supplied to the unit through a 1A circuit breaker (*type and part number*), and total electrical load does not exceed \_\_\_\_% of the electrical system capacity with the PM1000 added.

Aircraft equipment list, weight and balance amended. Compass compensation checked. A copy of the operation instruc-

tions, contained in PS Engineering document 200-191-xxxx, revision (x), (date) , is placed in the aircraft records. All work accomplished listed on Work Order \_\_\_\_\_.