



9800 Martel Road
Lenoir City, TN 37772

www.ps-engineering.com



PMA6000	PMA6000S
PMA6000M	PMA6000M-S
PMA6000C	PMA6000S-C
PMA6000M-C	PMA6000M-S-C

Audio Selector Panel with Intercom System
and
Audio Selector Panel with High-fidelity Stereo Intercom System
Installation and Operation Manual

Flying never sounded so good™

FAA-Approved TSO C35d

TSO C50c

Document P/N 200-066-0006
Revision 6, March 2005

Patent No. 5,903,227 & 6,160,496

PS Engineering, Inc. 2005 ©
Copyright Notice
Any reproduction or retransmittal of this publication, or any portion thereof, without the expressed written permission of PS Engineering, Inc. is strictly prohibited. For further information contact the Publications Manager at PS Engineering, Inc., 9800 Martel Road, Lenoir City, TN 37772. Phone (865) 988-9800

Table of Contents

Section I	GENERAL INFORMATION.....	1-1
1.1	INTRODUCTION.....	1-1
1.2	SCOPE	1-1
1.3	EQUIPMENT DESCRIPTION.....	1-1
1.4	APPROVAL BASIS - FAA	1-2
1.5	SPECIFICATIONS	1-3
1.6	EQUIPMENT SUPPLIED	1-4
1.7	EQUIPMENT REQUIRED BUT NOT SUPPLIED	1-4
1.8	LICENSE REQUIREMENTS.....	1-4
Section II	-Installation	2-1
2.1	GENERAL INFORMATION	2-1
2.1.1	SCOPE.....	2-1
2.2	Unpacking and Preliminary Inspection	2-1
2.3	Equipment Installation Procedures.....	2-1
2.3.1	Cooling Requirements	2-1
2.3.2	Mounting Requirements	2-2
2.3.3	Mounting Rack Installation	2-2
2.3.4	Connector Assembly.....	2-2
2.4	Cable Harness Wiring	2-2
2.4.1	Noise.....	2-2
2.4.2	Entertainment Input	2-3
2.4.3	External Push-to-Talk.....	2-4
2.4.4	Transmit Interlock	2-4
2.4.5	Power.....	2-4
2.4.6	Existing KMA-24 Installation	2-5
2.4.7	"Swap" Mode.....	2-5
2.4.8	Backlighting	2-5
2.4.9	Speaker Loads	2-5
2.4.10	PA Mute.....	2-5
2.4.11	Middle Marker Sense.....	2-5
2.4.12	Unswitched Inputs	2-5
2.4.13	Intercom.....	2-6
2.4.14	Digital recorder (-IRS units only).....	2-6
2.5	Adjustments.....	2-6
2.6	Marker Antenna Installation.....	2-7
2.7	Communications Antenna Installation Notes	2-7
2.8	Unit Installation.....	2-7
2.9	Post Installation Checkout.....	2-8
2.9.1	Required Test Equipment	2-8
2.9.2	Power Test.....	2-8
2.9.3	Operational Checkout, 6000, 6000C 6000S, 6000M, 6000M-S	2-8
2.10	Marker Checkout, 6000M, 6000M-C, 6000M-S Only.....	2-9
2.10.1	Operational Checkout, 6000C, 6000M-C and 6000M-S-C	2-9
2.11	Final Inspection.....	2-10
Section III	OPERATION.....	3-1
3.1	SCOPE	3-1
3.2	Audio Selector (All models).....	3-1
3.2.1	Speaker Amplifier.....	3-1
3.3	Mic Selector Switch (Fail Safe Operation)	3-2
3.3.1	Mic Selector Switch, Com3 (6000C, 6000MC 6000SC and 6000MSC only).....	3-2
3.3.2	Swap Mode (Switch from Com 1 to Com 2 remotely).....	3-2
3.4	Split Mode (6000, 6000M, 6000S, 6000MS).....	3-2

PS Engineering
PMA6000 Series Audio Selector Panel and Intercom System
Installation Manual

3.5 Split Mode (6000C, 6000MC, 6000SC, 6000MSC) 3-3

3.6 Intercom 3-3

 3.6.1 Volume Control, Monaural (6000, 6000M, 6000C, 6000MC)..... 3-3

 3.6.2 Volume Control, Stereo, (6000S, 6000MS, 6000SC, 6000MSC) 3-3

 3.6.3 Adjusting the VOX-Squelch control, Monaural (6000, 6000M, 6000MC) 3-3

 3.6.4 Adjusting the VOX- Squelch control, Stereo (6000S, 6000MS, 6000SC 6000MSC) 3-4

 3.6.5 Intercom Modes (All versions)..... 3-4

 3.6.6 Push to talk intercom mode 3-5

 3.6.7 Internal Recorder System (Option 1, only)..... 3-5

3.7 Marker Beacon (PMA6000M, PMA6000M-S, PMA6000M-C, PMA6000M-S-C)..... 3-6

 3.7.1 Middle Marker Sense..... 3-6

 3.7.2 External Marker Lights (6000, 6000S, 6000C, 6000SC) 3-6

 3.7.3 Receiver Sensitivity 3-6

Section IV- Warranty and Service 4-1

4.1 Warranty 4-1

4.2 Factory Service..... 4-1

Appendix A External PTT Hook Up..... A

Appendix B- Installation Drawing B

Appendix D Top Connector wiring (Mono), PMA6000, PMA6000C, PMA6000M, PMA6000M-C D

Appendix E Top Connector wiring, (Stereo) PMA6000S, PMA6000MS, PMA6000MS-C E

Appendix F -Instructions for Continuing Airworthiness and FAA Form 337 F

Appendix G RTCA DO160B Environmental Qualification FormG

Table of Figures

Figure 1-1 PMA6000 Mono units 1-2

Figure 1-2 PMA6000S Stereo units 1-2

Figure 1-3 PMA6000SC Stereo w/Com 3 1-2

Figure 2-1 Adjustments 2-7

Figure 3-1 Audio Selector 3-1

Figure 3-2 Mic Selector..... 3-2

Figure 3-3 Volume Controls Mono 3-3

Figure 3-4 Volume Control Stereo 3-3

Tables

Table 3-1 Intercom Modes 3-5

Revision History

Rev	By	Date	Change
2	GLP	May 1999	Rewrite to add all models
3	GLP	April 2000	Clarified headphone jack phase
4	GLP	November 2000	Corrected dimension in Appendix B, added keying notes
5	GLP	November 2002	Changed warranty to 1-year
6	GLP	March 2005	Added list of required test equipment

Section I GENERAL INFORMATION

1.1 INTRODUCTION

The PMA6000 family of Audio Selector Panels are revolutionary products. Never before has there been so much capability and utility in such a compact package. These units are designed for ease of use and installation, as well as to facilitate cockpit resource management and improve passenger entertainment.

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.

1.2 SCOPE

This manual provides detailed installation and operation instructions for the PS Engineering PMA6000-series of Audio Selector Panel/Intercom Systems. This includes the following units:

<u>Model</u>	<u>Description</u>	<u>Part Number</u>
PMA6000	Audio Selector Panel	6000
PMA6000S	Stereo Audio Selector Panel	6000S
PMA6000M	Audio Selector Panel with Marker Receiver	6000M
PMA6000M-S	Stereo Audio Panel with Marker	6000MS
PMA6000C	Audio Panel with Com 3	6000C
PMA6000S-C	Stereo Audio Selector Panel with Com 3	6000SC
PMA6000M-C	Audio Panel w/MKR and Com 3	6000MC
PMA6000M-S-C	Stereo Audio Panel w/MKR and Com 3	6000MSC
-IRS	Digital Recorder added to any PMA6000	-IRS
Option 2	No silver trim around the bezel	Opt. 2

Where the functions are identical to all units, it will be referred to herein as a PMA6000. Otherwise, the applicable units will be specified.

1.3 EQUIPMENT DESCRIPTION

The PMA6000-series is a state of the art audio isolation amplifier and audio selector that contains a voice activated (VOX) intercom system. It can switch up to three transceivers (Com 1, Com 2 and TEL) and six receivers (Nav 1, Nav 2, ADF, DME, MKR and AUX). In addition, there are two unswitched inputs, for telephone ringer and altimeter warning. Push buttons select the receiver audio source provided to the headphones. A SPR button allows the user to listen to the receiver(s) selected on the cabin speaker. Except for the unswitched inputs, all speaker audio is muted during transmit. A rotary switch selects one of the three transceivers for the pilot and copilot position in transmit. In "Split Mode" the PMA6000 has the ability to allow the pilot and copilot to operate different transmitters independently and simultaneously.

A fail-safe mode connects the pilot headphone and microphone to COM 1 if power is removed for any reason, or if the Mic Selector switch is turned to the Off position.

A six-station voice activated (VOX) intercom is included in the PMA6000. pilot isolate and crew modes, two mono (or stereo depending on unit) music inputs with "Soft Mute," and a 2-color Light Emitting Diode for power and transmit indications. Intercom control is through front panel mounted knobs. Monaural units have dual concentric knobs that control pilot volume and intercom squelch, and copilot/passenger volume and squelch. In the stereo versions, there is a single volume and squelch control for all on board.

An optional 3-light Marker Beacon receiver is integral to the PMA6000M, PMA6000MS PMA6000MC and PMA6000M-S-C. This provides the necessary Marker Beacon light and audio indications necessary for an Instrument Landing System (ILS) approach.



Figure 1-1 PMA6000 Mono with marker



Figure 1-2 PMA6000SC Stereo, Com 3, no trim ring



Figure 1-3 PMA6000M-S Stereo units



Figure 1-4 PMA6000M-S-C Stereo w/Com 3 and no trim ring

1.4 APPROVAL BASIS - FAA

TSO Approval.

The PMA6000, PMA6000S, PMA6000C and PMA6000S-C Audio Selector Panels are FAA approved under TSO C50c (Audio Amplifiers).

The PMA6000M, PMA6000M-S, PMA6000M-C, and PMA6000M-S-C are FAA approved under TSO C50c and TSO C35d (Marker Beacon Receivers).

All systems comply with RTCA DO-143, DO-160b and DO-170.

Operation is subject to the following conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

1.5 SPECIFICATIONS

GENERAL SPECIFICATION	CHARACTERISTIC	TSO COMPLIANCE:
<i>Marker Beacon:</i>		C35d, Class A
<i>Audio Selector/Intercom:</i>		C50c, Class A
APPLICABLE DOCUMENTS:	RTCA DO-160b, RTCA DO-170 and RTCA DO-143	
ENVIRONMENTAL Qualifications:	A1D1/CAMXXXXXXXXBBBBBAAAX	
<i>Temperature Range:</i>	Operating: -20°C to +55°C	Storage: -40°C to +85°C
<i>Altitude:</i>	Up to 50,000 feet in a non-pressurized area of the cockpit.	
DIMENSIONS: Height: 1.3 in. (3.3 cm) Width: 6.25 in. (16.9 cm) Depth: 6.8 in. (17.3 cm)		
WEIGHT (With Rack & Connectors) :	1.5 Lb. (0.68 kg.)	
POWER REQUIREMENTS (Including Internal Lighting):		
<i>Voltage:</i>	13.75 or 27.5 VDC*	
<i>Maximum Current:</i>	1 Amp (Externally protected by a 2 Amp circuit breaker.)	
<i>Typical operating current:</i>	speaker off:	350 mA
	speaker on:	600 mA

NOTICE: To reduce the amount of heat dissipated in the audio selector panel, when used in a 28 Volt aircraft, the 15 Ω , 15 Watt dropping resistor (P/N 701-015-1501) must be installed in series with the power input.

<i>Audio selector panel input impedance:</i>	510 Ω
<i>Input Isolation:</i>	-70 dB (min.)
<i>Speaker Muting:</i>	-60 dB (min.)
<i>Speaker Output (into 4 Ω):</i>	3 Watts (min.) with no clipping
<i>Switched Receiver Inputs:</i>	8
	(Com 1, Com 2, Nav 1, Nav 2, ADF, DME, MKR, AUX)
<i>Unswitched Inputs:</i>	2
	(TEL Ringer, Altimeter DH)
<i>Transmitter Selections:</i>	5
	(Com 1, Com 2, Com1/2, Com2/1, TEL/Com1)
	on PMA6000, PMA6000S, PMA6000M, PMA6000M-S
	(Com 1, Com 2, Com1/2, Com2/1, Com 3)
	on PMA6000C, PMA6000S-C, PMA6000M-C, PMA6000M-S-C
<i>Speaker Impedance:</i>	4 Ω
<i>Headphone Impedance:</i>	150 - 1000 Ω
<i>Headphone Output:</i>	45 mW each headset with no clipping
<i>Microphone Impedance:</i>	150 - 600 Ω
<i>Intercom Positions:</i>	6 places
<i>Music Inputs:</i>	2
<i>Music Muting:</i>	>50 dB "Soft Mute" when Com or intercom active.
<i>Distortion:</i>	<1% THD @ 45 mW into 150 Ω
<i>Mic Freq. Response, ± 3 dB:</i>	350 Hz - 6000 Hz
<i>Music Freq. Response, ± 3 dB:</i>	200 Hz - 15 kHz
MARKER BEACON RECEIVER: (PMA6000M, PMA6000M-S, PMA6000M-C, PMA6000M-S-C Only)	
<i>Frequency:</i>	75 MHz Crystal Controlled
<i>Sensitivity:</i>	
Low:	450 μ Volts (Hard) Factory adjusted to 1400 μ V (Soft)
High:	160 μ Volts (Hard) Factory adjusted to 150 μ V (Soft)
<i>Selectivity:</i>	-6 dB at 110 kHz -40 dB at 120 kHz
<i>External Lamp Output:</i>	9.0 (+/- 0.5) VDC Positive when active, max. current 125 mA
<i>MM Sense:</i>	Active high (4.7 VDC +/- 0.5V) during Middle Marker acquisition, for autopilot use.

1.6 EQUIPMENT SUPPLIED

A. 1 ea. of the following units:

Model	Part Number
PMA6000	6000
PMA6000S	6000S
PMA6000M	6000M
PMA6000M-S	6000MS
PMA6000C	6000C
PMA6000S-C	6000SC
PMA6000M-C	6000MC
PMA6000M-S-C	6000MSC
Tray	430-004-0001

B. PMA6000 Installation Kit:

Part Number	Description	Quantity Stereo	Quantity Mono
120-425-4402	Top Connector, Stereo (key 4/5)	1	x
120-425-4401	Top Connector, Mono (key 2/3)	x	1
120-425-4400	Bottom Connector (key 7/8)	1	1
425-001-0001	Gold Plated Crimp Pins	75	75
701-015-0015	15 Watt Dropping Resistor (Recommended for 28 Volt Systems)	1	1
200-066-0003	Operator's and Installation Manual	1	1

1.7 EQUIPMENT REQUIRED BUT NOT SUPPLIED

- A. Speaker, 4 Ω
- B. Headphones, 150 Ω stereo (6000S) or mono (6000), up to 6 as required
- C. Microphones, up to 6 as required
- D. Marker Antenna (75 MHz, VSWR <1:1.5, and appropriate for the airspeed)
- E. Interconnect Wiring
- F. Headphone Jacks (As Required)
- G. Microphone Jacks (As Required)
- H. Circuit Breaker: 1 ea. 2 amp.

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 PMA6000-Series Audio Selector Panel/Intercom System and PMA6000M-Series Audio Selector Panel/Intercom System with internal Marker Beacon.

With the exception of the internal marker beacon receiver, the PMA6000, PMA6000S, PMA6000C and PMA6000SC are identical to the PMA6000M, PMA6000M-S, PMA6000M-C, PMA6000M-S-C. All units will be identified hereafter as the PMA6000, where the information applies to all.

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. The equipment **must** be installed by an appropriately rated Certified Aircraft Repair Station, in accordance with applicable regulations.

NOTE: The PMA6000-Series-S requires specialized knowledge and tools for an effective installation. 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.

2.2 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 (B). 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 PMA6000 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.

NOTICE: To reduce the amount of heat dissipated in the audio selector panel, when used in a 28 Volt aircraft, it is required that the 15 Ω , 15 Watt dropping resistor (p/n 701-015-1501) be installed in series with the power input.

If the PMA6000/M-S is installed in a 27.5 VDC aircraft system, a 15 Ω , 15 Watt dropping resistor (p/n 701-015-1501) should be installed. Failure to do so will generate unnecessary heat inside the unit and may void PS Engineering's warranty.

2.3.2 Mounting Requirements

The PMA6000 must be rigidly mounted to the instrument panel of the aircraft structure and within view and reach of the pilot position(s). 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.

NOTE: The mounting hole configuration for the PMA6000 is identical to the KMA-24 Audio Selector Panel. See Appendix B

2.3.3 Mounting Rack Installation

2.3.3.1 Monaural (6000, 6000M, 6000C, 6000MC)

Remove the unit from the mounting tray by first removing the copilot volume and squelch knobs (the knobs are press-fit on the shaft) and then unscrew the 3/32-inch hex-head screw that is to the right of the copilot control knob shaft. Carefully slide the unit free of the tray. Set the unit aside in a safe location until needed. Install the tray using six FHP 6-32 x 1/2-inch screws. The audio selector panel must be supported at front and rear of the mounting tray.

2.3.3.2 Stereo (6000S, 6000MS, 6000SC, 6000MSC)

Remove the unit from the mounting tray by unscrewing the 3/32" hex-head screw that is to the right of the squelch knob shaft. It is not necessary to remove the squelch knob. Carefully slide the unit free of the tray. Set the unit aside in a safe location until needed. Install the tray using six FHP 6-32 x 1/2" screws. The audio selector panel must be supported at front and rear of the mounting tray.

2.3.4 Connector Assembly

The unit connectors mate directly with the circuit boards in the PMA6000. The connectors are a Molex crimp-type, and require the use of a Molex hand crimp tool, EDP P/N 11-01-0203, CR6115B (or equiv.). The connector is mounted to the unit tray with #4-40 screws, from the inside of the tray. Ensure that proper strain relief and chafing precautions are made during wiring and installation.

2.4 Cable Harness Wiring

Referring to appropriate Appendix C, D, E and F, assemble a wiring harness as required for the installation. All wires must be MIL-SPEC in accordance with current regulations. Two- and three-conductor with shield 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.

The PMA6000 power supply is specifically designed to reduce conducted electrical noise on the aircraft power bus by at least 50dB. Although this is a large amount of attenuation, it may not eliminate all noise, particularly if the amplitude of noise is very high. There must be at least 13.0 VDC present at the bottom connector, pin 20, of the PMA6000 for the power supply to work in its designed regulation. Otherwise, it cannot adequately attenuate power line noise. Shielding can reduce or prevent radiated noise (i.e., beacon, electric gyros, switching power supplies, etc.) However, installation combinations can occur where inter-

ference is possible. The PMA6000s were designed in a RFI hardened chassis and have internal Electro-magnetic Interference (EMI) filters on all inputs and outputs.

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). Under no circumstances combine a microphone and headphone wiring into the same shielded bundle. Always use a 2- or 3-conductor, shield wire as shown on the installation wiring diagram.

Radiated signals can be a factor when low level microphone signals are "bundled" with current carrying power wires. Keep these cables physically separated. It is very important that you use insulated washers to isolate the ground return path from the airframe to **all** headphone and microphone jacks.

Adding a high-performance audio control system, particularly in conjunction with active noise canceling headsets, cannot improve on older avionics that were designed for cabin-speaker use. PS Engineering makes no claim that the audio panel will provide a noise-free audio quality under all installation conditions, particularly with older avionics.

2.4.2 Entertainment Input

2.4.2.1 Monaural (6000, 6000M, 6000C, 6000MC)

Two entertainment devices (CD player, cassette player, etc.) can be connected to the unit. Install two 1/8-inch stereo jacks in a convenient location so that the pilot can plug in the entertainment devices into the system.

For a stereo input, we recommend tying the left and right channels (tip and ring) together, so both stereo channels are provided to the monaural audio panel, and the audio amplitude available to the audio panel is increased. Audio signal at the entertainment input must be a minimum of 500 mV P-P for optimum music performance. We have noticed that the portable devices using 4 batteries seem to work better than the 2-cell types. Also we have found that some cigarette-lighter adapters introduce noise into the system due to the dropping power supply.

NOTE: The Soft Mute must be enabled in the 6000, 6000M, 6000C, 6000MC either by connecting top connector pins N and 12 together in the harness, or through an external Soft Mute Enable switch.

2.4.2.2 Stereo (6000S, 6000MS, 6000SC, 6000MSC)

Two stereo entertainment devices (CD player, cassette player, etc.) can be connected to the unit. Install two 1/8-inch stereo jacks in a convenient location so that the pilot can plug in the entertainment devices into the system. The audio signal at the entertainment input must be a minimum of 500 mV P-P per channel for optimum music performance. We have noticed that the portable devices using 4 batteries seem to work better than the 2-cell types. Also we have found that some cigarette-lighter adapters introduce noise into the system due to the dropping power supply.

2.4.2.3 Soft Mute

The PMA6000-system incorporates a "Soft Mute" system. This will mute the entertainment devices during ICS or radio traffic. While in the ALL or ISO modes, entertainment #1 is heard by everyone (except by the pilot in ISO mode). While in the CREW mode, pilot and copilot will hear entertainment #1 while the passengers will hear entertainment #2.

Entertainment inputs #1 and #2 can be paralleled so a single entertainment source can serve both the passengers and the crew in "crew" mode. It is suggested however, that a switch (DPDT) be installed between the single entertainment device and entertainment input #1. This will allow the pilot and copilot to

the single entertainment device and entertainment input #1. This will allow the pilot and copilot to decide if they hear entertainment while in the Crew mode.

Local oscillators and internal signals from some entertainment equipment can cause undesired interference with other aircraft systems. Before takeoff, operate the entertainment devices to determine if there is any adverse effect within the aircraft systems. If any unusual operation is noted in flight, immediately switch off the entertainment devices.

NOTE: Use the low level output of any entertainment device to connect to the audio panel. Maximum signal level is **2 VAC** p-p. **DO NOT** use a speaker-level output, this will cause internal damage in the audio panel.

To use a line level, install an AudioLink PowerLink 101PL2 adapter, available from Crutchfield at 1-800-955-3000 (804)-817-1000, sales@crutchfield.com

2.4.2.4 Soft Mute (Stereo only)

Entertainment #1 input has a "Soft Mute" inhibit switch that is part of the volume control located on the front panel. By pressing it once, the entertainment device will not be muted, push it again and it will be muted by intercom and radio conversation.

On PMA6000 stereo units with serial numbers above "G" series on the intercom board (second set of serial numbers) have an Entertainment #2 Karaoke mode capability. This "Soft Mute" inhibit switch is part of the squelch control located on the front panel. By pressing it once, the entertainment device will not be muted, push it again and it will be muted by intercom and radio conversation.

2.4.3 External Push-to-Talk

An important part of the installation is the PTT (Push-To-Talk) switches that allow the use of your aircraft communications radio for transmissions. There are three typical configurations that can be used. Select the case that best fits the installation. Only the person who presses their PTT switch will be heard over the radio. If the pilot and copilot both use the PTT, the copilot position has access to the radio. The pilot position will have PTT control regardless of the copilot when the PMA6000 is in the FAIL-SAFE mode.

CASE I: PTT is built into both pilot and copilot yokes.

CASE II: PTT is in pilot yoke only. This configuration requires a modified external PTT switch plugged into the copilot's microphone jack. (See Appendix A). When the copilot's PTT is pressed, the intercom switches the mic audio from pilot to copilot mic.

CASE III: No built in PTT. This requires two built in PTTs to be installed, or modified external PTT switches to be used. Modify external PTT as required (See Appendix A).

2.4.4 Transmit Interlock

Some communications transceivers use a transmit interlock system. In order to fully utilize the Split Mode feature, this function must be disabled. Consult that manufacturer's installation manual.

2.4.5 Power

The PMA6000-Series are compatible with both 13.8 and 28 Volt DC systems. A two (2) Amp circuit breaker is required. Power and ground wires must be a twisted #18 AWG pair.

Included with this product is a power dropping resistor to be connected in series with the power input, bottom connector, pin 20. This dropping resistor is supplied for 28 volt systems so that unnecessary heat dissipation inside the PMA6000 can be avoided.

NOTICE: To reduce the amount of heat dissipated in the audio selector panel, when used in a 28 Volt aircraft, a 15 Ω , 15 Watt dropping resistor (p/n 701-015-1501) must be installed in series with the power input.

2.4.6 Existing KMA-24 Installation

If the installation replaces a KMA-24 (series -01, -02 or -03), the existing 44 pin connector can be used for the bottom connector of the PMA6000 tray as it is, if it is properly installed and wired. A dropping resistor must be in series with the power in a 28V KMA 24 installation. No other changes are required except for external marker lights (see Section 3.7.2 for details). The "key" in the existing connector must be located between pins 7 and 8. This connector will be used in the bottom connector position. (See appropriate Appendix for complete wiring harness details.)

2.4.7 "Swap" Mode

When a normally-open, momentary, push-button switch is connected between pin 10 on the top connector and aircraft ground, the user can switch between Com 1 and 2 by depressing this switch without having to turn the mic selector switch. This yoke mounted switch eliminates the need of removing your hands from the yoke to change transceivers.

NOTICE: Some older model radios may cause the Swap mode to activate on the release of the PTT switch, due to the excessive back EMF from the collapsing relay coil field. Verify that back EMF suppression, in the form of a diode across the T/R relay coil, is present if un-commanded Swap occurs.

2.4.8 Backlighting

The PMA6000 has an automatic back-lighting system controlled by a photodetector. Additional control can be gained by the aircraft avionics dimmer control. Connect the dimmer control line to bottom connector pin D for 14 volt systems, and to bottom connector pin F for 28 volt systems. Pin E is light ground. This installation provides the ability to bring the back-lighting level to zero. If dimmer control is not used, a constant low level back light illumination has been established for night-time viewing. The photocell located at the lower right hand side of the unit face will automatically adjust the backlight of the push-button lamps as well as the rotary mic selector switch light intensity.

2.4.9 Speaker Loads

Certain VHF Nav/Comms, such as King KX170-series have internal speaker amplifiers. These are not used with a PMA6000, but must be loaded to prevent unit failure. Connect the speaker output from the Nav/Com to the appropriate load on the PMA6000 (bottom connector 19 and L for COM 1, etc).

2.4.10 PA Mute

Bottom connector pin 18 is a TTL logic output that is pulled low during PTT operation. This serves as an input to external public address system to prevent feedback during transmissions.

2.4.11 Middle Marker Sense

The MM Sense output is connected to specific autopilots, and goes high only when a middle marker signal is received, not in test.

2.4.12 Unswitched Inputs

The PMA6000 has two unswitched inputs. Bottom connector pin 17 is unswitched, but muted by transmissions. This signal can be used for less critical inputs such as airborne telephone ringer.

Bottom connector pin T is an unswitched and unmuted audio input. This audio is always presented to the headphones and speaker, regardless of the audio panel audio selections. This input can be use for critical warnings, such as radio altimeter warnings.

2.4.13 Intercom

The top connector is for the intercom function. All mic and headphone jacks must have insulating washers, the cable must be Teflon coated, twisted-shielded wire, and the shield must only be connected to the ground return wire **only** at the intercom connector. NOTE: This harness can be custom made by PS Engineering, Inc. Simply call the factory and obtain a wire harness work-sheet. The harness will be made to your specifications and fully functionally tested. All hardware is included. (See Appendix C (mono) and E (stereo) for intercom connection configurations).

2.4.13.1 Push-to-talk intercom

PMA6000-series units with intercom board (second series of numbers on data plate) serial number above a "G" series in stereo, or "MO series in mono, include a push-to-talk intercom capability.

In some extremely high noise environments, it may be desirable to have a push to talk (PTT) intercom, instead of relying on voice-activation (VOX).

To operate the PTT, simply rotate the PMA6000 squelch control to maximum (fully CW). Grounding the appropriate pin on the top connector through a momentary switch will open only that intercom channel.

The pilot and copilot are individually controlled (Top connector, pins 22 and 21, respectively). All passenger mics are controlled with pin 20.

The same pins are used for both mono and stereo PMA6000 Systems.

This applies **ONLY** to units with applicable serial numbers. If a unit with serial number below that indicated is installed in a position wired for the PTT, no damage will occur, only the ICS PTT function will not function.

2.4.14 Digital recorder (-IRS units only)

If the PMA6000-series unit is identified with Option 1, there is an internal recorder built into the unit. This stores the last 60 seconds of radio traffic from the selected Comm transceiver (the one selected for transmit).

To use this function, a normally-open momentary switch is installed between the top connector Pin 19 and aircraft ground. A low-current switch is recommended.

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 slightly.

2.5 Adjustments

The PMA6000 is factory adjusted to accommodate the typical requirements for most aircraft configurations. There are three adjustments however, that will allow the installer to tailor the specific functions. The numbers correspond to identification numbers stamped on some trays.

<u>Adjustment</u>	<u>Clockwise Results In</u>
Cabin Speaker Level	Increase Speaker Volume
Marker Beacon Level	Decrease Marker Volume
MKR Gain	Increase overall sensitivity
MKR High Sense	Increase sensitivity
MKR Low Sense	Increase Sensitivity
Pass. Headphone (Mono or L & R)	
Louder	

To make the necessary adjustments, use a small jeweler's slotted screwdriver.

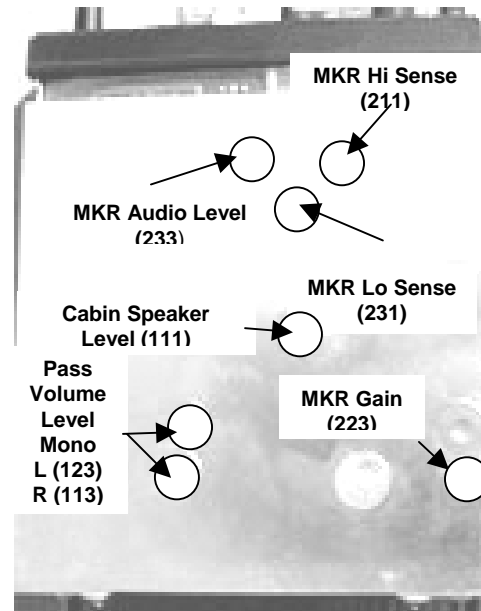


Figure 2-1 Adjustments

2.6 Marker Antenna Installation

Refer to aircraft and antenna manufacturer's installation instructions, as well as AC43.13-2A (or later revision), Chapter 3, for information on proper antenna installation techniques. The marker beacon antenna must be mounted on the bottom of the aircraft.

2.7 Communications Antenna Installation Notes

For best results while in Split Mode, it is suggested that the one VHF communications antenna be located on top of the aircraft while the other communications antenna be on the bottom. Any antenna relocation must be accomplished in accordance with AC 43.13-2A, aircraft manufacturers' recommendations and FAA-approved technical data.

Warning: It is probable that radio interference will occur in the split mode when the frequencies of the two aircraft radios are adjacent, and/or the antennas are physically close together. PS Engineering makes no expressed or implied warranties regarding the suitability of the PMA6000 in Split Mode.

2.8 Unit Installation

2.8.1.1 Monaural (6000, 6000M, 6000C, 6000MC)

To install the monaural PMA6000, remove the copilot volume and squelch knob. Gently slide the unit into the mounting rack until the hold-down screw is engaged. While applying gentle pressure to the face of the unit, tighten the 3/32" hex-head screw next to the copilot control shaft until the unit is secure. **DO NOT OVER TIGHTEN.** Reinstall the knobs removed in step 2.3.3.1.

2.8.1.2 Stereo (6000S, 6000MS, 6000SC, 6000MSC)

To install the stereo PMA6000S, gently slide the unit into the mounting rack until the hold-down screw is engaged. While applying gentle pressure to the face of the unit, tighten the 3/32" hex-head screw next to the squelch control shaft until the unit is secure. **DO NOT OVER TIGHTEN.**

Warning: Do not over-tighten the lock down screw while installing the unit in tray.
Internal damage will result.

2.9 Post Installation Checkout

2.9.1 Required Test Equipment

In order to return an aircraft to service after installation of the PMA6000-series with marker beacon receiver, the installer must have access to a Marker Beacon signal generator:

- a. IFR NAV401L, NAV402AP, IFR4000
- b. TIC T-30D, T-36C

Equivalent test equipment is acceptable as long as the testing requirements can be met.

2.9.2 Power Test

After wiring is complete, verify power is **ONLY** on pin 20 of the bottom connector, and airframe ground on bottom connector pin Z. Failure to do so will cause serious internal damage and void PS Engineering's warranty.

2.9.3 Operational Checkout, 6000, 6000C 6000S, 6000M, 6000M-S

1. Apply power to the aircraft and avionics.
2. Plug headsets into the pilot, copilot and passenger positions.
3. With avionics on, and the audio panel off, verify that the pilot can transmit and receive on COM 1, through the headset, indicating proper "fail-safe" operation. On stereo units, the audio is present in the right ear only.
4. Rotate the Mic Selector Switch to the Com 1 position.
5. Verify that the C1 light comes on. Verify that the power LED (Light Emitting Diode) in the intercom section illuminates green. If the LED is red, stop testing and troubleshoot the microphone PTT installation.
6. Verify proper transmit and receive operation on the copilot position, noting that the copilot PTT switch allows proper transmission on the selected transceiver.
7. Verify that pushing the C2 button causes the button to illuminate, and the Com 2 receiver to be heard. Verify operation on Com 1 from the pilot position.
8. Repeat for Com 2 and TEL, (if installed).
9. Rotate the mic selector switch to the COM 1/2 position. Verify that the pilot communicates on Com 1 and the copilot on Com 2.
10. Rotate the mic selector switch to the COM 2/1 position. Verify that the pilot communicates on Com 2 and the copilot on Com 1.
11. Rotate the mic selector switch to the TEL/COM 1 position. Verify that the pilot communicates on the transceiver in the TEL position and the copilot on Com 1.
12. Verify proper operation of all receiver sources by selecting them using the keypad. Note that the button for the receiver sources stays in, and the button illuminates to show which source is in use.
13. Push in the S (SPR) button. Verify that all selected audio is heard in the cockpit speaker. Verify that the audio mutes when the mic is keyed.
14. Verify that the LED in the intercom changes from green to red when a microphone is keyed. NOTE: LED does not change color in "Split Mode".
15. Verify proper Intercom system operation in the ALL, ISO And CREW modes.
16. Verify that the audio selector panel 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.

2.10 Marker Checkout, 6000M, 6000M-C, 6000M-S Only

1. Connect a ramp generator at the antenna end of the marker coax. With the unit under test in HI sensitivity, verify that a 150 μ Volts, modulated 95% with 1300 Hz signal will illuminate the amber (M) marker light, and that marker audio is present in the headphones when the Marker Audio (M) push-button has been depressed. Select "S" for speaker to verify marker audio availability on the cabin speaker. Verify that the white (A) and blue (O) lights will illuminate within \pm 3dB of the amber lamp, with 3000 HZ and 400 Hz applied, respectively.
2. Repeat with the unit in LOW sensitivity, with 1400 μ Volts applied.
3. Connect the marker antenna and verify proper operation.

2.10.1 Operational Checkout, 6000C, 6000M-C and 6000M-S-C

1. Apply power to the aircraft and avionics.
2. Plug headsets into the pilot, copilot and passenger positions.
17. With avionics on, and the audio panel off, verify that the pilot can transmit and receive on COM 1, through the headset, indicating proper "fail-safe" operation. On stereo units, the audio is present in the right ear only.
3. Rotate the Mic Selector Switch to the COM 1 position.
4. Verify that the C1 light comes on. Verify that the power LED (Light Emitting Diode) in the intercom section illuminates green. If the LED is red, stop testing and troubleshoot the microphone PTT installation.
5. Verify proper transmit and receive operation on the copilot position, noting that the copilot PTT switch allows proper transmission on the selected transceiver.
6. Verify that pushing the C2 button causes the button to illuminate, and the Com 2 receiver to be heard. Verify operation on Com 1 from the pilot position.
7. Repeat for Com 2 and Com 3, (if installed).
8. Rotate the mic selector switch to the COM 1/2 position. Verify that the pilot communicates on Com 1 and the copilot on Com 2.
9. Rotate the mic selector switch to the COM 2/1 position. Verify that the pilot communicates on Com 2 and the copilot on Com 1.
10. Rotate the mic selector switch to the COM 3 position. Verify that the pilot communicates on the transceiver in the Com3 position and the copilot on Com 1.
11. Verify proper operation of all receiver sources by selecting them using the keypad. Note that the button for the receiver sources stays in, and the button illuminates to show which source is in use.
12. Push in the S (SPR) button. Verify that all selected audio is heard in the cockpit speaker. Verify that the audio mutes when the mic is keyed.
13. Verify that the LED in the intercom changes from green to red when a microphone is keyed. NOTE: LED does not change color in "Split Mode".
14. Verify proper Intercom System operation in the ALL, ISO and CREW modes.
15. Verify that the unit under test 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.

2.10.1.1 Marker Checkout, 6000M-C, 6000M-S-C Only

1. Connect a ramp generator at the antenna end of the marker coax. With the unit under test in HI sensitivity, verify that a 150 μ Volt signal, modulated 95% at 1300 Hz, will illuminate the amber (M) marker light, and that marker audio is present in the headphones when the Marker Audio (M) push-button has been depressed. Select "S" for speaker to verify marker audio availability on the cabin speaker. Verify that the white (A) and blue (O) lights will illuminate within \pm 3dB of the amber lamp, with 3000 HZ and 400 Hz applied, respectively.
2. Repeat with the unit in LOW sensitivity, with 1400 μ Volts applied.
3. Connect the marker antenna and verify proper operation.

2.11 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. Return completed warranty registration application to PS Engineering or register online at www.ps-engineering.com.

Section III OPERATION

GENERAL INFORMATION

3.1 SCOPE

This section provides detailed operating instructions for the PS Engineering PMA6000, PMA6000S, PMA6000M, PMA6000M-S, PMA6000C, PMA6000S-C, PMA6000M-C, and PMA6000M-S-C Audio Selector Panel/Intercom Systems. Please read it carefully before using the equipment so that you can take full advantage of its capabilities.

This section is divided into four sections covering the basic operating areas of the PMA6000 systems. They are: Audio Selector, Transceiver Selection, Intercom, and Marker Beacon Receiver (6000M, 6000M-C 6000M-S and 6000M-S-C only).

3.2 Audio Selector (All models)

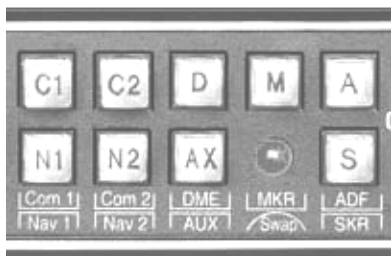


Figure 3-1 Audio Selector

Through the use of two momentary and seven latched, push-button, back-lit switches, it is possible to select any or all receiver audio. C1 and C2 are momentary switches.

When selected, an internal backlight will illuminate indicating which audio source is selected. Because the rotary switch controls what transceiver is being heard by the pilot and copilot (the crew), "C1" (Com 1) and "C2" (Com 2) push-buttons are of the momentary type and do not remain in when selected. This is also part of the "auto function." You will always hear the audio from the transceiver that is selected by the rotary mic selector switch.

The users can identify which receivers are selected by noting which push-button switches are illuminated. Push buttons labeled **N1** (Nav 1), **N2** (Nav 2), **D** (DME), **M** (Marker), **A** (ADF), **AX** (auxiliary), and **S** (Speaker) are "latched" type switches. When one of these buttons is pressed, it will stay in the "in" position. Press the switch again and it be in the "out" position and remove that receiver from the audio. While selected, the switch will also be annunciated by an internal lamp.

NOTE: In Split Mode, no pushbuttons will be active. The only audio selected is the com 1 and two, as indicated by their respective lamps.

3.2.1 Speaker Amplifier

The "S" in the push-button section stands for speaker. This switch will place all selected audio on the cockpit speaker when this switch is selected. NOTE: with the exception of unswitched unmuted inputs (Altimeter warning), the speaker amplifier is not active in the "Split Mode." To reduce power consumption and internal heat buildup in the avionics stack, switch off the speaker amplifier when not in use.

3.3 Mic Selector Switch (Fail Safe Operation)



Figure 3-2
Mic Selector

Unit power is turned on and off by the Mic selector switch. In the OFF or "FAIL-SAFE" position, the pilot is connected directly to Com 1 allowing transmit and receive capability regardless of unit condition. Any time power is removed or turned OFF, the audio selector will be placed in the fail-safe mode. The first position clockwise from OFF is COM 1. Both pilot and copilot will be connected to the Com 1 transceiver. While in the COM 1 or COM 2 mode, the intercom functions normally. Both the pilot and copilot have transmit capabilities on the selected transceiver. All hear the selected audio if the intercom is in the ALL mode. Only the person who presses their Push To Talk (PTT), will be heard over the aircraft radio. Turning the rotary switch to the COM 2 position will place pilot and copilot on Com 2.

The PMA6000-Series has an automatic selector mode. Audio from the selected transceiver is automatically heard in the headsets and speaker (when selected). You can check this function by switching from COM 1 to COM 2 and watch the selected audio light on the selector change from C1 to C2. This ensures the pilot will never transmit on a radio is is not listening to.

In PMA6000-series units, Serial Number **T03092 and above**, when switching the mic selector rotary switch from COM 1 to COM 2, while COM 2 audio had been selected, Com 1 audio will continue to be heard. This eliminates the pilot having to switch Com 1 audio back on, if desired.

When switching from COM 1 to COM 2 while Com 2 has NOT been selected, Com 1 audio will be switched off. In essence, switching the mic selector will not effect the selection of Com audio.

Important: When the mic selector is in the full counter clockwise position, the PMA6000 power is removed, and it is in the FAIL-SAFE mode. The pilot headset and microphone is connected directly to Com 1.

3.3.1 Mic Selector Switch, Com 3 (6000C, 6000MC 6000SC and 6000MSC only)

In units designed to accommodate a third communications transceiver, placing the mic selector switch in the COM 3 position connects the pilot and copilot to that radio. This is similar to COM 1 and COM 2, except that the swap mode is not active.

3.3.2 Swap Mode (Switch from Com 1 to Com 2 remotely)

With a yoke mounted, momentary switch, the pilot can change from the current Com transceiver to the other by depressing this switch. When "Swap Mode" is active, an LED annunciator will illuminate, indicating that the Mic Selector switch position is no longer valid. To cancel "Swap Mode," the pilot may either press the yoke mounted switch again, or turn the Mic Selector Switch to the Com that is active.

3.4 Split Mode (6000, 6000M, 6000S, 6000MS)

Turning the rotary switch to COM 1/COM 2 places the PMA6000 into "Split Mode". This places the pilot on Com 1 and the copilot on Com 2. Pilot and copilot are isolated from each other on the intercom, but can use their respective radios simultaneously. An example of this useful feature is when the pilot may want to talk to Air Traffic Control, while the copilot may be speaking to Flight Watch.

The "Split Mode" radio selection can be reversed by switching to COM 2/COM 1. The pilot will be on Com 2 and the copilot will be on Com 1. A third "Split Mode" selection is TEL/COM 1. This will place the pilot on airborne radiotelephone, HF or other transceiver (if installed), while the copilot will be on Com 1.

3.5 Split Mode (6000C, 6000MC, 6000SC, 6000MSC)

Operation is identical to section 3.4 (above) except turning the mic selector clockwise to the COM 3 position places both pilot and copilot on Com 3, and exits the split mode. All selected audio inputs and intercom function return.

Note: In all PMA6000s, Split Mode turns off all other (Nav, ADF, etc.)selected audio to pilot and copilot. Additionally, there is no intercom function between pilot and copilot. Passengers still have intercom capability among themselves.

3.6 Intercom

3.6.1 Volume Control, Monaural (6000, 6000M, 6000C, 6000MC)



The pilot volume control knob adjusts the loudness of intercom and music in the pilot's headphones only. It has no effect on selected radio audio levels. The copilot volume control adjusts the loudness of the intercom and music in the copilot headset only. The passenger volume is factory set at a comfortable level. This is a service adjustment that can be accessed by the avionics technician. Most general aviation headsets have a built-in volume control, so volume can be adjusted "locally."

3.6.2 Volume Control, Stereo, (6000S, 6000MS, 6000SC, 6000MSC)



Figure 3-4 Volume Control Stereo

The volume control knob adjusts the loudness of the intercom and music for the pilot and copilot only. It has no effect on selected radio levels or passengers' level. The passenger volume level is factory set for a comfortable listening level. Most general aviation headsets today have a built-in volume controls, therefore, volume can be adjusted at the headset. There is a service adjustment that can be accessed by the avionics technician. This will allow adjustment of the passenger's volume for a comfortable listening level.

3.6.2.1 Mono headsets in Stereo Installation

All passenger headsets are connected in parallel. Therefore, if a monaural headset is plugged in to a PMA6000 Stereo installation, one channel will be shorted. Although no damage to the unit will occur, all passengers will lose one channel.

PS Engineering modifies monaural headsets to add stereo capability, using high-fidelity speakers. Contact factory for details.

3.6.3 Adjusting the VOX-Squelch control, Monaural (6000, 6000M, 6000MC)

The PMA6000 provides adjustable VOX squelch controls for the pilot and copilot (the copilot's VOX control also adjusts the passengers VOX squelch) Since the number of microphones open at any one time is reduced, the amount of background noise is diminished. This also allows the use of dissimilar headsets

with the same intercom. The user can adjust the trip level of the VOX to fit the individual's voice and mic, which helps eliminate the frustration of clipping the first syllables.

With the engine running, set the VOX control knob by slowly rotating the SQL control knob clockwise until you no longer hear the engine noise in the headphones. When the microphone is positioned properly near your lips, normal speech levels should open the channel. When you have stopped talking, there is a delay of about ½ second before the channel closes. This helps prevent choppy communications.

3.6.4 Adjusting the VOX- Squelch control, Stereo (6000S, 6000MS, 6000SC 6000MSC)

The stereo versions of the PMA6000 incorporate a single VOX Squelch control for all positions. Like all PS Engineering intercoms, since the number of microphones active at any one time is reduced, the unwanted background noise in the headphones is diminished. This also allows the use of dissimilar headsets with the same intercom.

With the engine running, set the VOX trip level by slowly rotating the SQUELCH control knob clockwise until you no longer hear the engine noise in the headphones. When the microphone is positioned properly near your lips, normal speech levels should open the channel. When you have stopped talking, there is a delay of about ½ second before the channel closes. This prevents closure between words and prevents choppy communications.

3.6.5 Intercom Modes (All versions)

The center switch is a 3-position mode switch that allows the pilot to tailor the intercom function to best meet the situation. The description of the intercom mode function is valid only when the unit is either in the COM 1 or COM 2 position of the Mic Selector switch. When the unit is in the "Split" mode, only the passengers have intercom function.

ISO: (Up Position): The pilot is isolated from the intercom and is connected only to the aircraft radio. He will hear the aircraft radio reception (and sidetone during radio transmissions). Copilot and passengers will hear the intercom and music on Entertainment 1, but not the aircraft radio receptions or pilot transmissions.

ALL: (Middle Position): All parties will hear the aircraft radio, intercom, and music from entertainment input #1. However, during any intercom communications, the music volume automatically decreases when SoftMute is active (See section 3.6.5.1). The music volume increases gradually back to the original level after communications have been completed.

CREW (Down Position): Pilot and copilot are connected on one intercom channel and have exclusive access to the aircraft radios. They may also listen to Entertainment 1. Passengers can continue to communicate with themselves without interrupting the Crew and also may listen to Entertainment 2. Anytime the PMA6000 is in either the COM 1/COM 2, COM 2/COM 1, or TEL/COM 1, ("Split Mode") the pilot and copilot do not have any intercom function. The passengers will maintain intercommunications.

3.6.5.1 Soft Mute (Mono)

Soft Mute must be enabled during installation by jumpering top connector pins 12 and N. A SPST switch can be installed between these pins for a pilot selectable mute mode. Without this connection, music is not muted during intercom activation. This "Karaoke Mode" prevents the music muting when a sing-along is desired. "Soft Mute" mode only applies to entertainment input #1. Entertainment #2 does not mute.

3.6.5.2 Soft Mute (Stereo)

Both entertainment devices have the "Soft Mute" mode. In units earlier than a "G" intercom board serial number (second set of numbers), only entertainment input #1 has the mute inhibit capability. "Soft Mute" mode for the Crew positions (Entertainment 1) can be selected by pressing in the Volume control knob once. In later units the SQL knob controls the Soft Mute of the passengers entertainment (#2).

3.6.5.3 Entertainment Input

The audio selector panel has provisions for up to two separate entertainment input devices. Which device is heard is determined by the position of the three position mode switch located in the center of the intercom section of the audio panel. (See Table 3-1 for overview.)

While in the ISO (Isolate) mode, only the copilot and the four passengers will hear entertainment device #1. In normal operation, whenever a person speaks or if the aircraft radio becomes active, the music will automatically mute and then will gradually return to the original listening level when the intercom or radio activity ceases.

Which entertainment device will be heard is determined by the mode selector switch. When in the ALL mode, all parties will hear the entertainment input #1. While in the CREW mode, pilot and copilot will hear entertainment input #1 while the passengers may listen to entertainment input #2.

It is also possible to use only one entertainment input device for both entertainment inputs. It is suggested however, that a switch (DPDT) be installed between the single entertainment device and entertainment input #1. This will allow the pilot and copilot decide if they hear entertainment while in the Crew mode.

Table 3-1 Intercom Modes

Mode	Pilot Hears	Copilot Hears	Passenger Hears	Comments
Isolate	A/C Radio Pilot Sidetone (during radio transmission)	Copilot and passenger intercom Entertainment #1	Passenger and Copilot intercom Entertainment #1	This mode allows the pilot to communicate with the ground without the copilot or passengers bothered by the conversations. Copilot and passengers can continue to communicate and listen to music
All	Pilot Copilot A/C Radio Passengers Entertainment #1	Copilot Pilot A/C Radio Passengers Entertainment #1	Passengers Pilot Copilot A/C Radio Entertainment #1	This mode allows all on board to hear radio reception as well as communicate on the intercom. Music and intercom is muted during intercom and radio communications
Crew	Pilot Copilot A/C Radio Entertainment #1	Copilot Pilot A/C Radio Entertainment #1	Passengers Entertainment #2	A second music source is automatically enabled for the passengers.

3.6.6 Push to talk intercom mode

PMA6000-series audio selector/intercom systems with serial number beginning with the letter “M” (monaural version) or “G” (stereo version).

In some extremely high noise environments, it may be desirable to have a push to talk (PTT) intercom, instead of relying on voice-activation (VOX).

In PMA6000 series with later configuration boards, the PTT intercom capability is added. To operate the PTT, simply rotate the PMA6000 squelch control to maximum (fully CW). Grounding the appropriate pin on the top connector through a momentary switch will open only that intercom channel. The pilot and copilot are individually. All passenger mics are controlled with pin 20.

The same pins are used for both mono and stereo PMA6000 Systems. This applies ONLY to units with applicable serial numbers.

3.6.7 Internal Recorder System (Option 1, only)

Beginning in mid 1999, PS Engineering has an available internal recorder option. This stores the last 60 seconds of radio traffic from the selected Comm transceiver (the one selected for transmit).

The recorder function is automatic. Pressing the momentary switch will cause the last message to play (incoming radio and transmit sidetone). This will be heard in the pilot headset only. To hear older messages, push the playback button repeatedly to “back up” the recorder, until the desired message is heard.

The recorder is a continuous loop, and newest ones will overwrite the oldest messages.

The IRS has an internal squelch that prevents storing ‘dead’ air. 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 slightly.

3.7 Marker Beacon (PMA6000M, PMA6000M-S, PMA6000M-C, PMA6000M-S-C)

The optional Marker Beacon Receiver uses visual and audio indicators to alert you when the aircraft passes over a 75 MHz transmitter.

The Blue lamp, labeled "O," is the Outer Marker lamp and has an associated 400 Hertz 'dash' tone. The lamp and tone will be keyed at a rate of two tones/ashes per second when the aircraft is in the range of the Outer Marker Beacon.

The Amber lamp, labeled "M," is the Middle Marker lamp and is coupled with a 1300 Hertz tone. It is keyed alternately with short 'dot' and long 'dash' bursts at 95 combinations per minute.

The White lamp, labeled "A," is the Airway/Inner marker and has a 3000 Hertz 'dot' tone. The lamp and tone will be keyed at a rate of six times per second.

The audio from the Marker Beacon Receiver can be heard by selecting the "M" push-button switch. To adjust the volume level, there is a service adjustment located on the top of the unit. See Section 2.5

A 3-position switch is used to set the receiver sensitivity and to test the indicator lamps. Use "HIGH" sensitivity initially. This allows you to hear the outer marker beacon about a mile out. Then select the “LOW” sensitivity to give you a more accurate location of the Outer Marker. The momentary down switch position is labeled "TEST" and illuminates all three lamps simultaneously to assure the lamps are in working order.

Upon first application of power to the unit, the Marker enters a self test mode. The flickering blue marker light indicates a test in process. If the test continues for more than 10 seconds, or the lamps do not extinguish, return the unit for service.

3.7.1 Middle Marker Sense

A Middle Marker sense output signal is available to automatically reduce the autopilot sensitivity after the aircraft has passed over the Middle Marker. This function will not operate during the test mode. This output will go to +4.75 VDC (± 0.25 VDC) when a valid Middle Marker signal is received.

3.7.2 External Marker Lights (6000, 6000S, 6000C, 6000SC)

For installations that require external marker beacon lights, there are three outputs that can drive 12 Volt lamps only. The external output lamps are driven high (+9 VDC ± 0.5 VDC) when active. Maximum source current per lamp is 125 mA.

If using an external marker receiver, the audio input is lower connector, pin 11 (Aux. input).

3.7.3 Receiver Sensitivity

Although the PMA6000M meets FAA TSO-C35d sensitivity specifications, the sensitivity of the receiver has been adjusted to meet real world requirements (150 μ V and 1400 μ V Soft). This will usually eliminate the need for the avionics shop to reduce the sensitivity in the field so as to prevent early detection of the marker beacons. If your particular installation requires more or less sensitivity, please call the factory for details on how to adjust the receiver sensitivity in the field.

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. An FAA Form 337 must also be accompanied by the warranty card for this warranty to be in effect. If the unit is being installed by in an experimental aircraft by the owner/builder, a factory-made harness must be installed 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 (on units shipped after Jan 1, 2003, with serial numbers starting with "Y"). 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.

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 unit is covered by a one-year limited warranty. See warranty information. Contact PS Engineering, Inc. at (865) 988-9800, fax (865) 988-6619, or www.ps-engineering.com/support.shtml 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:

Service Department
PS Engineering, Inc.
9800 Martel Rd
Lenoir City, TN 37772
(865) 988-9800 FAX (865) 988-6619
Email: intercoms@ps-engineering.com

Units that do not have either an RMA number, a complaint and/or a contact phone number reachable during business hours, will be refused from the Certified Repair Facility.

PS Engineering will not be responsible for units that are shipped vial Mail or Parcel Post.

Appendix A

External PTT Hook Up

Part of the installation includes the installation of PTT (Push To Talk) switches that allow the use of your aircraft radio for communications transmissions.

There are three configurations that can be used, you must select the case that best fits your installation. NOTE: Only the person who presses their PTT switch will be heard over the radio.

CASE I

The PTT is built into the pilot and copilot yokes

Simply install the plugs from the headset into the aircraft headphone jacks. Then use the yoke mounted PTT to transmit. No other action is required.

CASE II

Built in PTT only on the pilot side only

This configuration requires a modified external PTT switch plugged into the copilot's mic jack. (See Details Below) When the copilot's PTT is depressed, this activates an internal relay that switches the mic audio to the aircraft radio from the pilot to the copilot.

Case III

No built in PTT switch at all.

Two built-in PTT must be installed, or two external, modified PTT switches will be required for both the pilot and copilot. Modifications to the PTT are required. (See details below)

Push To Talk Modifications

When received from the manufacturer, an after-market PTT switch opens the mic audio path to the "ring" connection of the PTT mic plug until the button is pressed. When the PTT is between the intercom and the headset, the intercom function will not work unless the PTT switch is depressed. A simple modification can be performed to allow proper intercom operation. NOTE: This mod does not alter normal operation.

Below are some examples of typical modifications. Contact PS Engineering or the PTT manufacturer for more details if necessary.

Procedures For David Clark PTT

1. Unscrew the round black plastic cover from the jack.
2. Connect the joined black wires to the red wire.
3. Replace the round black plastic cover.

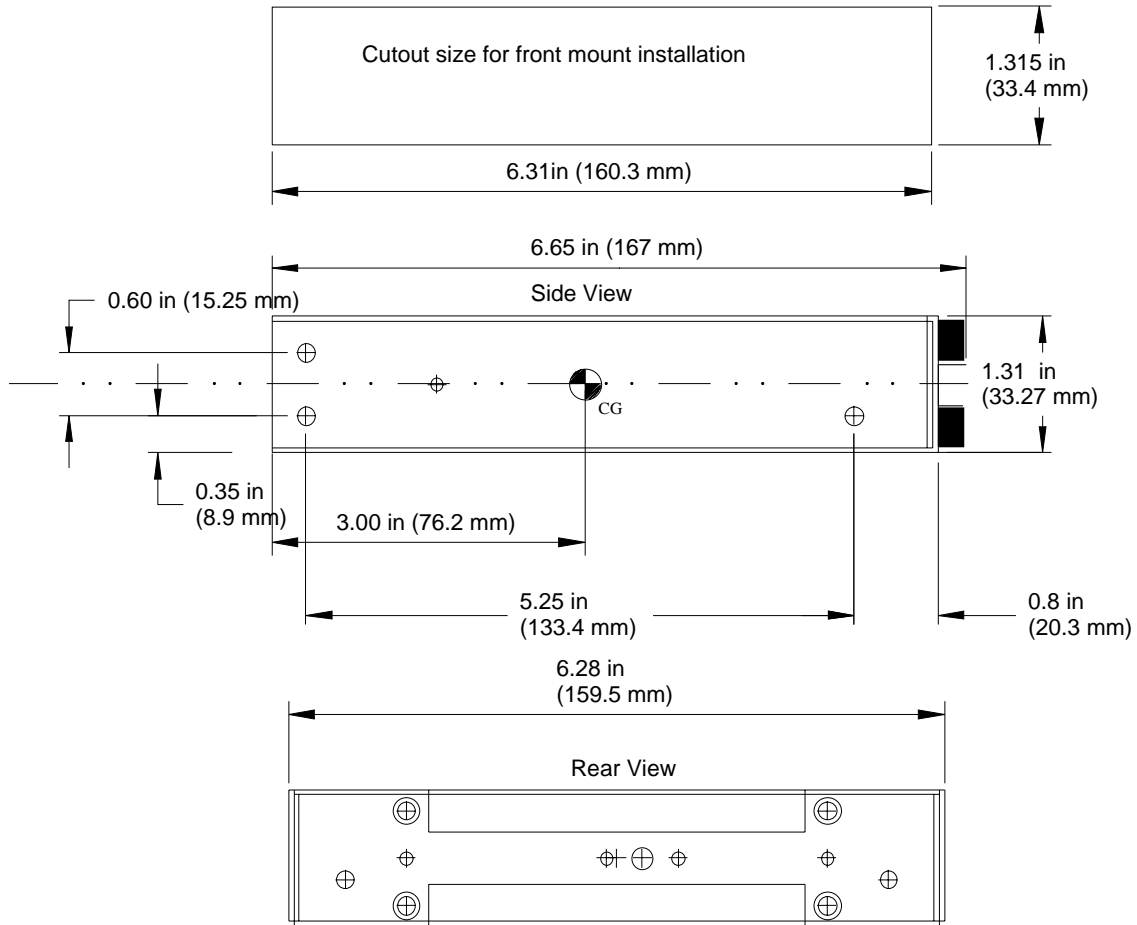
Procedures for Telex PT-200

1. Unscrew the round black plastic cover from the jack.
2. Cut the red wire in the middle of the wire.
3. Strip both ends of the insulation.
4. Solder the two ends to the ground lug to the PTT jack.
5. Replace the round black plastic cover.

Procedures for Telex PT-300

1. Unscrew the round black plastic cover from the plug jack.
2. Remove the heat shrink material from the joined black wires.
3. Solder these two wires to the lug that has a white wire already soldered to it.
4. Replace the round black plastic cover

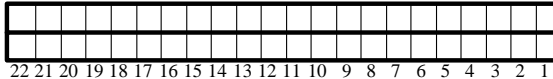
Appendix B- Installation Drawing



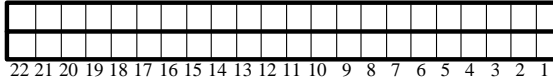
Weight: 1.5 lb with tray and connectors (.68 kg)

Connector viewed from the rear

Z Y X W V U T S R P N M L K J H F E D C B A

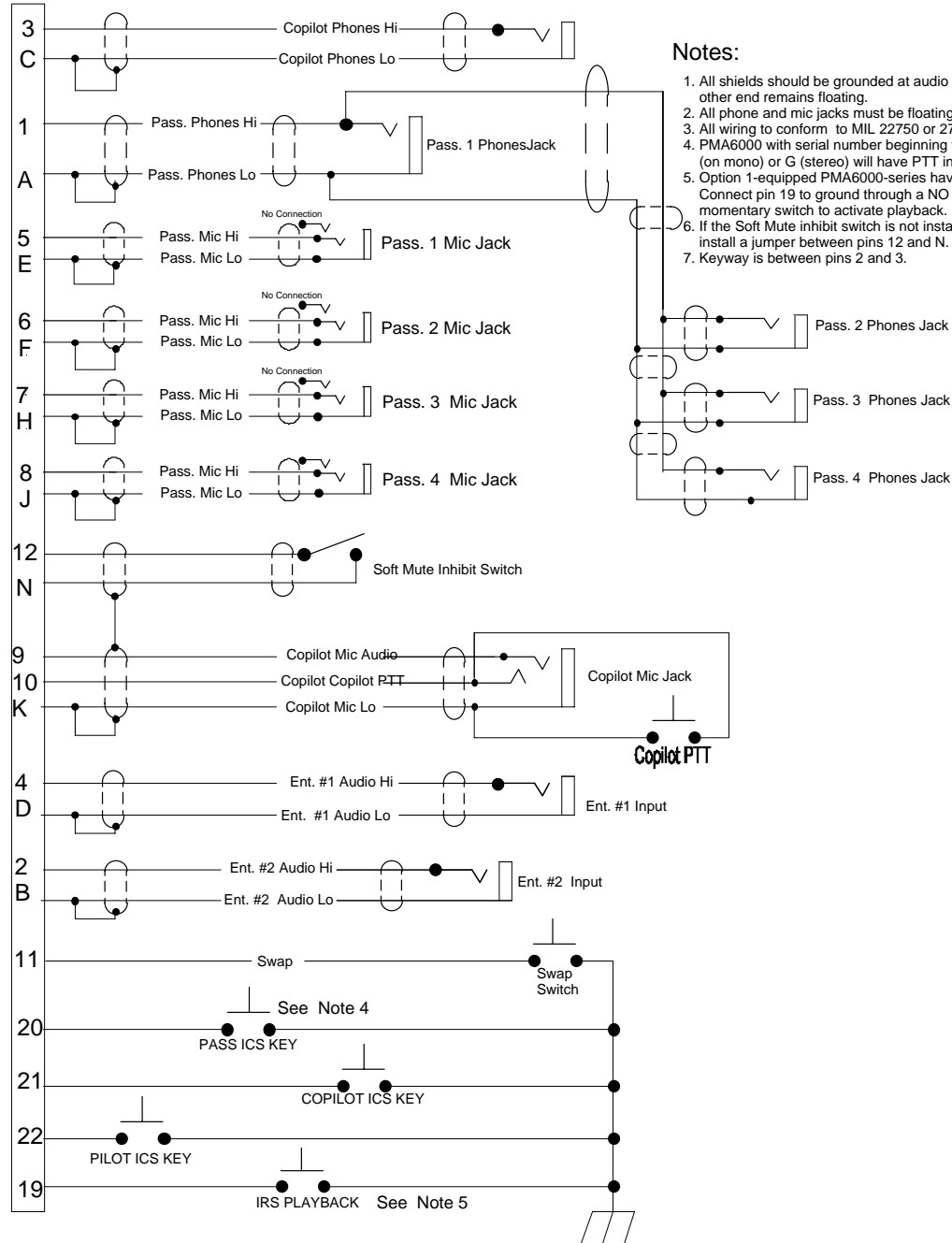


Z Y X W V U T S R P N M L K J H F E D C B A



Appendix D Top Connector wiring (Mono), PMA6000, PMA6000C, PMA6000M, **PMA6000M-C**

Top Connector PMA6000 (monaural)

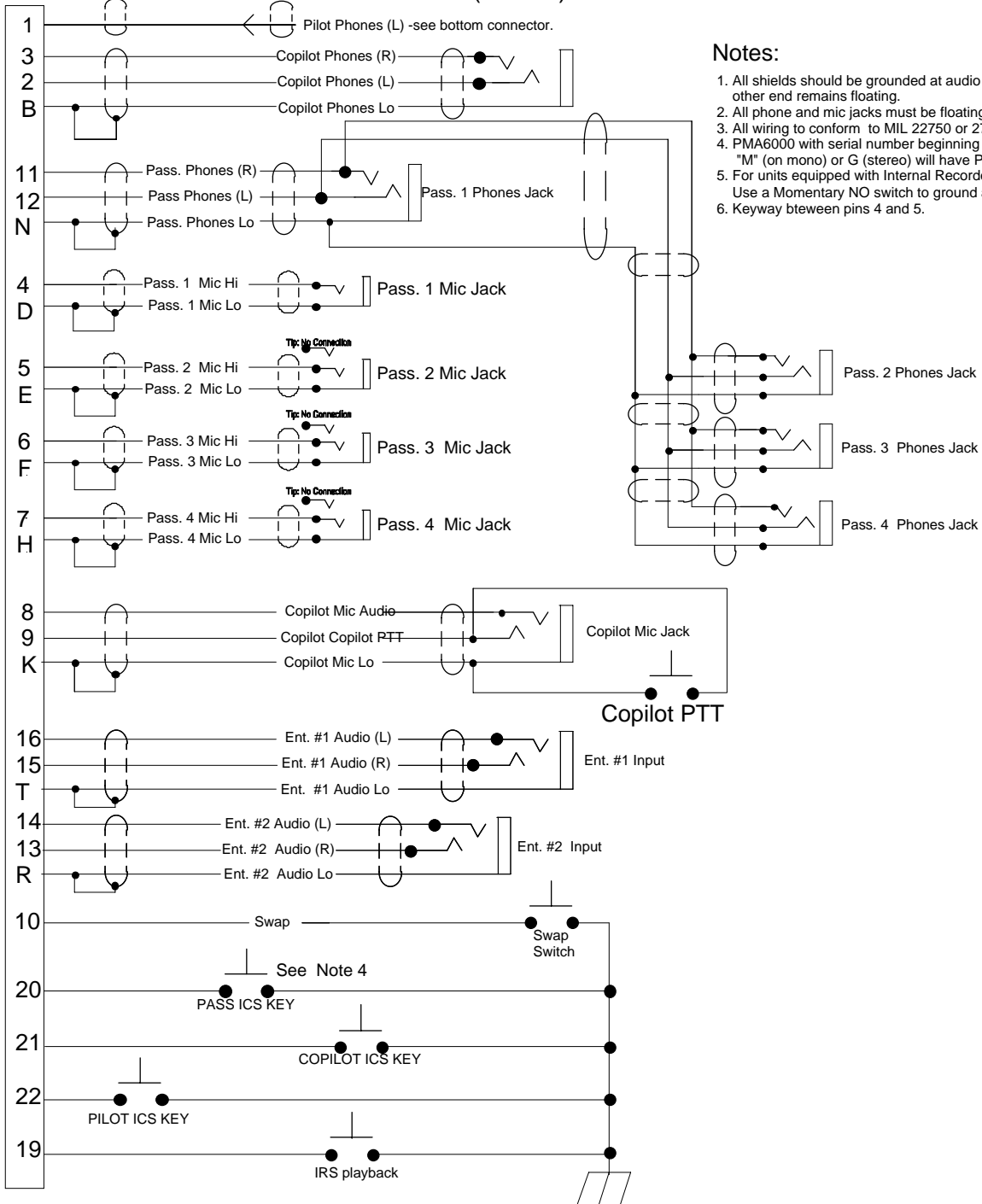


Notes:

1. All shields should be grounded at audio panel only. other end remains floating.
2. All phone and mic jacks must be floating from ground.
3. All wiring to conform to MIL 22750 or 27500.
4. PMA6000 with serial number beginning with "M" (on mono) or G (stereo) will have PTT intercom capability.
5. Option 1-equipped PMA6000-series have internal recorder. Connect pin 19 to ground through a NO momentary switch to activate playback.
6. If the Soft Mute inhibit switch is not installed, install a jumper between pins 12 and N.
7. Keyway is between pins 2 and 3.

Appendix E Top Connector wiring, (Stereo) PMA6000S, PMA6000MS, PMA6000MS-C

PMA6000M-S-C TOP CONNECTOR (Stereo)



Notes:

1. All shields should be grounded at audio panel only. other end remains floating.
2. All phone and mic jacks must be floating from ground.
3. All wiring to conform to MIL 22750 or 27500.
4. PMA6000 with serial number beginning with "M" (on mono) or G (stereo) will have PTT intercom capability. For units equipped with Internal Recorder System (IRS) Use a Momentary NO switch to ground at pin 19.
6. Keyway between pins 4 and 5.

Appendix F -Instructions for Continuing Airworthiness and FAA Form 337

Sample ICA Checklist for PS Engineering Audio Panels:

Section	Item	Information
1	Introduction	Installation of audio control panel with integrated marker beacon receiver and intercommunications system.
2	Description	Installation as described in manufacturer's installation manual 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	In the event of a unit problem, place the unit into "OFF," the fail-safe mode. This allows pilot communications using COM 1. 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	<u>Removal:</u> Using a 3/32" Allen-head wrench, carefully unscrew the locking screw located in the center of the unit. While turning the wrench CCW, gently pull on the EDGES of the bezel until the unit is free from the mounting tray. <u>Installation:</u> Engage the locking screw at the back. Turn the locking screw CW, while applying slight pressure to the edges of the bezel. Do not over tighten!
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

Example for FAA Form 337

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 PM6000 audio panel you may use the following text as a guide.

Installed 6-place intercom/audio selector panel, PS Engineering PMA6000MS, part number 6000MS in center stack instrument panel location designated for panel mounted avionics at station _____. Installed per AC43.13-2, Chapter 2, paragraph 23 (Instrument Panel Mounting). Installed per PS Engineering *Installation Operators Manual* p/n 200-066-(xxxx), revision X, dated (xx-xx).

This unit is FAA-Approved under TSO C50c for audio amplifiers, and TSO C35d for Marker Beacon Receivers, and meets environmental tests outlined in RTCA DO-170B as appropriate for this aircraft.

Interface to existing aircraft radios in accordance with installation manual and in compliance with practices listed in AC43.13-2, Chapter 2. All wires are Mil-Spec 22759 or 27500. Connection to the aircraft dimmer bus is accomplished per the installation manual and 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 PMA6000 added.

Aircraft equipment list, weight and balance amended. Compass compensation checked. A copy of the operation instructions, contained in PS Engineering document 200-066-(xxxx), revision x, Dated (), is placed in the aircraft records. All work accomplished listed on Work Order _____.

Appendix G RTCA DO160B Environmental Qualification Form

Audio Selector Panel/Intercom/Marker Beacon Receiver

Part Number: 6000, 6000M, 6000MC, 6000S, 6000MS 6000M-S-C

FAA TSO Number: C50c, C35b Class A

Manufacturer: PS Engineering Incorporated 9800 Martel Road Lenoir City TN 37772

Conditions	Section	Conducted Tests
Temperature and Altitude	4.0	Equipment tested to CAT A1
Low Temperature	4.5.1	
High Temperature	4.5.2	
Altitude	4.6.1	Equipment tested to CAT D1
Temperature variation	5.0	Equipment tested to Category C
Humidity	6.0	Equipment tested to Category A
Shock	7.0	Equipment tested to DO-160B, Par 7.1.1
Operational	7.2.1	
Crash Safety (Impulse)	7.3.1	
Crash Safety (Sustained)	7.3.2	
Vibration	8.0	Equipment tested to Category M, Standard
Explosion	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	15.0	Category X, not tested
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 A
Radio Frequency Emission	21.0	Equipment tested to Category A
Lightning Induced Transient Susceptibility	22.0	Equipment not tested