PS ENGINEERING® INCORPORATED

Sound Quality. Sound Engineering.

PMA450

**Audio Selector Panel
Marker Beacon Receiver
Stereo Intercom System
USB Charging System
with Bluetooth® Connectivity**
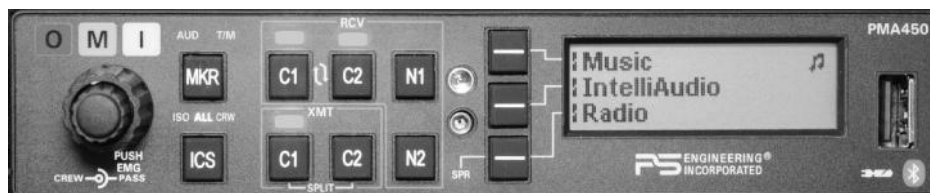
Pilot's Guide
and
Operation Manual

Covered under one or more of the following Patents
4,941,187; 5,903,227; 6,160,496; 6,493,450;
7,391,877
FAA-Approved: TSO C139a, C35d, C71

Flying never sounded so good ®

This section provides detailed operating instructions for the PS Engineering PMA450, Audio Selector Panel/Marker Beacon Receiver/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 sections covering the basic operating areas of the PMA450 systems. They are Communications Transceiver Selection, Audio Selector, Intercom, Marker Beacon Receiver and special functions, including the Bluetooth® functionality in the PMA450.
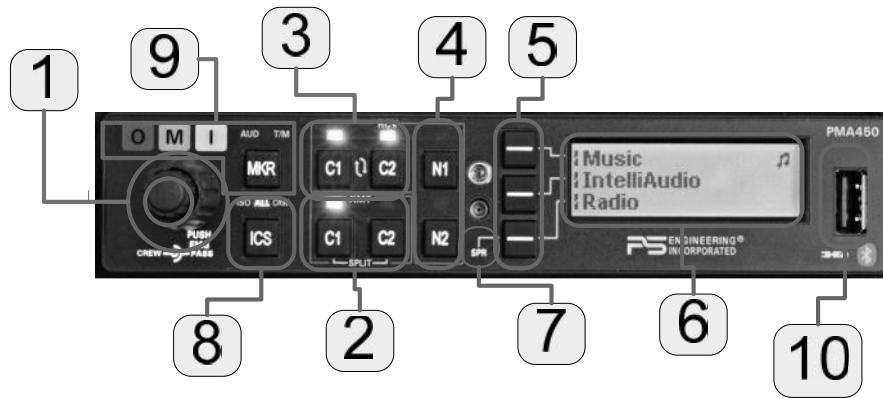
PMA450 Operating Controls

Power Switch (1) (On/Off and EMG-Fail Safe Operation)

Unit power is turned on and off by pushing the volume knob (1). There is a built in delay to prevent accidental shut off while adjusting the intercom volume in turbulent conditions. In the OFF or "**EMG**" position, the pilot headset is connected directly to Com 1 as well as unswitched input #1. This allows communication capability regardless of unit condition. Any time power is removed or turned OFF, the audio selector will revert to fail-safe mode.

The power switch controls all audio selector panel functions, intercom and marker beacon receiver. All transceiver and receiver selections will be remembered and return to the last state when turned on.

Menu Display (6)

The PMA450 uses a Liquid Crystal Display and three line-select buttons to access advanced functionality in a very logical manner. Press the line select key to select a specific item on each menu. Items are toggled on and off by pressing the line select key as well.

When navigating the menus, the screen will automatically return to this

"home" screen after a period of inactivity. This delay time is configurable for between 1 and 30 seconds, on the initialization menu. A long press (>1 second) will back-up one menu level.

A vertical **bar** next to a button, indicates the button can perform a function on that menu.
A **split bar** indicates that a secondary function is available when that button is held for more than 1 second. These functions are:

- Pilot Music on/off (top Button)
- Public Address (PA – middle button)
- Speaker (SPR – lower button)

Communications Transmit (XMT) Selection (2)

The PMA450 has four buttons to select communications transceiver functions, two each C1 and C2. C1 refers to VHF COM 1, and C2, to VHF COM 2. To select a VHF COM for transmit; push the lower button in the XMT (transmit) section. The radio is automatically selected to receive incoming radio calls when the XMT is selected. With a PMA450, you will *never* transmit on a radio that you are not receiving.
To select a VHF COM radio to listen only, push the C1 or C2 button in the RCV (Receive) section.
The PMA450 will remember when you have selected a radio for receive only, and then switch to it for transmission and switch back to receive only.

Split Mode
In the SPLIT mode, the pilot position transmits and receives on COM 1, and the copilot can transmit and receive on COM 2 independently.
Pressing the C1 and C2 XMT buttons together (above the SPLIT legend), puts the PMA450 into SPLIT com mode.

- The intercom is deactivated automatically when you enter SPLIT mode.
  - o Push the ICS button until the green LED lights up CRW to restore intercom between pilot and copilot.
  - o Intercom between crew and passengers is not possible in split mode
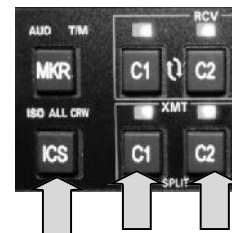
The spatial component of IntelliAudio ® is defeated in split mode.
To exit SPLIT mode, simply select C1 or C2 XMT button.

COM Audio Selector (3)

Communication audio from the other radio, not selected for transmit, can be heard by pressing the associated RCV button. You will <u>always</u> hear the audio from the selected transceiver.

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

With an optional yoke mounted, normally open momentary switch, the pilot can change from the current Com transceiver to the other by pressing this switch. To cancel "Swap Mode," either press the yoke mounted switch again, or select a different Com with the XMT buttons.

IntelliAudio® Dimensional Audio

Various audio signals are presented to the DSP and processed to "appear" in a different location to the crew. "Multi-Talker" (US Patent #7,391,877) specifies up to nine locations. This helps the crew to better comprehend speech by locating it in a manner easier differentiated by the human brain.

Intercom and other audio is not spatially processed, only the pilot and copilot VHF COM audio. Stereo headphones, in stereo mode, are **required**

The spatially processed dimensional sound in the PMA450 can be adjusted to accommodate the user preferences.
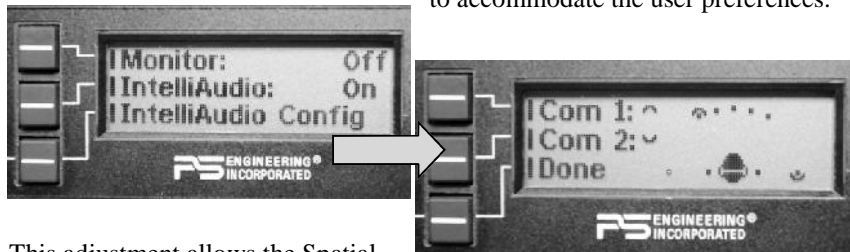
This adjustment allows the Spatial Audio inputs to be "relocated" on any of nine (9) defined "Head Related Transfer Function" (HTRF) locations. Push **IntelliAudio   IntelliAudio Config** to access. In the IntelliAudio® mode, repeated pressing of the COM 1 or COM 2 line select buttons moves the corresponding half-circle cursor to the locations relative to the listener graphic in sequence.

Pressing the **Done** button exits the configuration setting mode. This setting is recalled at system power up.

Com Monitor Mode

The PMA450 is equipped with a Monitor function, which allows a secondary com radio audio to be muted by the primary radio (selected for transmit).

To toggle the Monitor mode on and off, Press **IntelliAudio   MONITOR**

NOTE: Monitor Mode and Spatial Audio Processing (IntelliAudio) are mutually exclusive – entering one mode will cancel the other.

Navaid Selection (4)

VHF Navigation receivers can be selected directly from the front panel with the N1 and N2 (VHF Navigation receiver 1 and 2) buttons. The selected source is indicated by a green LED.

Additional navigation aid or other audio sources can be selected using the LCD menus.

Press the lower line select **RADIO   SWITCHED INPUTS,** and desired audio source.

NOTE: Switched Inputs can be re-named at the configuration set up. See page 13 for more information.

*In SPLIT mode, only the pilot will hear selected navigation audio.*

Speaker Amplifier (7)

To activate the PMA450 cockpit speaker output, press and hold the bottom line-select button (**SPR**) for 1 second or until **SPR** appears in the display.

In "Split Mode" audio that the pilot hears will also be present in the speaker.

Unswitched audio #1 & #2, (the inputs dedicated to autopilot disconnect, altimeter warning, etc.) will come through the speaker regardless of the speaker button position. *Use of a cell phone will mute the radio audio over the speaker.*

Depending on installation, important audio annunciations such as radar altimeter or autopilot disconnect will come over the speaker even if it is not selected, while other unswitched, but muted inputs, such as GPS alerts, will only be present if the SPR button is selected. Consult your professional avionics installer for these important configuration details.
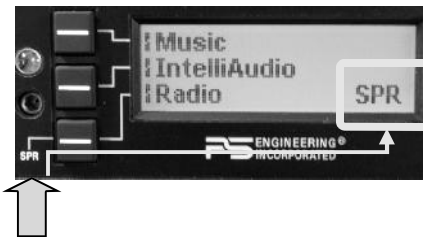
Public Address Function

To access PA function, press and hold the center line select button for more than 1 second, until the display changes to PUBLIC AD-DRESS.

When the pilot is speaking on the PA, all microphones except for the Pilot will be disabled for complete and uninterrupted announcements.

The pilot microphone will be heard on the speaker and headsets when the pilot PTT is used.

The copilot can continue to use the selected com radio while the pilot will be heard over the speaker.

To exit PA mode, push and hold the middle line-select button again until PUBLIC ADDRESS is off or cycle power on the audio panel.

Marker Beacon Operation (9) (p/n 050-450-0100, only)

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

The audio from the Marker Beacon Receiver can be heard by pushing the "**MKR**" button. AUD will light up green.

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

Holding the **MKR** button for 1 second activates marker test lamp, labeled "**T/M**" and illuminates all three lamps simultaneously to assure the lamps (internal and external) are in working order. Test mode does not activate MM autopilot sense output. Releasing the button returns to the last sensitivity.

Pressing the marker mode select ("**MKR**") for one second, while beacon audio is active, will also cause the marker audio to mute for that beacon. The next beacon received will re-activate the audio.

The marker beacon receiver audio volume

can be adjusted from the menu. Press **RADIO   VOLUMES
MARKER**, and turn the small knob to adjust the marker beacon volume. The
green volume bar and numerical readout
will indicate the receiver volume in this
menu. NOTE: marker volume cannot be
turned completely off. Units without
marker receiver will not have a MKR
Volume menu.

Marker Beacon sensitivity is changed
from Low to High sensitivity by pressing and holding the MKR button for 2
seconds, or until "**H**" appears in the display, indicating High sensitivity is
activated.

Intercom Operation (8)

No adjustment of the *IntelliVox®* squelch control is necessary. Through indi-
vidual signal processing, the ambient noise appearing in all six microphones
is constantly being sampled. Non-voice signals are blocked. When someone
speaks, only their microphone circuit opens, placing their voice on the inter-
com.

The system is designed to block continuous tones; therefore people humming
or whistling in monotone may be blocked after a few moments.

For consistent performance, any headset microphone **must** be placed within
¼-inch of your lips, preferably against them. (ref: *RTCA/DO-214A, 1.3.1.1
(a)*).

NOTE

It is also a good idea to keep the microphone out of a direct wind path. Mov-
ing your head through a vent air stream may cause the *IntelliVox®* to open
momentarily. This is normal.

The *IntelliVox®* is designed to work with normal aircraft cabin noise levels
(70 dB and above). It loves airplane noise! Therefore, it may not recognize
speech and clip syllables in a quiet cabin, such as
in the hangar, or without the engine running.
This is normal.

For optimum microphone performance, PS Engi-
neering recommends installation of a Micro-
phone Muff Kit from Oregon Aero (1-800-888-
6910). This will not only optimize VOX per-
formance, but will improve the overall clarity of
all your communications.

Intercom Volume Control (1)

The smaller inner volume control knob adjusts the loudness of the intercom
for the pilot and copilot. It has no effect on selected radio levels, music input
levels or passengers' volume level.

The outer, larger volume control knob controls intercom volume for the passengers. It has no effect on radio or music levels. (Music can be adjusted independently from a dedicated music menu) When the volume knobs are moved, the green volume bar indicator will show the level of the changing intercom volume.

⚠ Adjust the radios (at the radio itself) and intercom volume for a comfortable listening level. ⚠

Mono headsets in Stereo Installation

Not recommended, because the benefit of IntelliAudio is lost. However, if desired, the PMA450 can be installed monaurally by using the LEFT audio connections only (left side contains Fail-Safe audio). Do NOT short left and right together.

NOTE: Mono headsets that short the tip and ring (i.e. older models) will introduce some audio distortion when used. Modern, stereo headsets are recommended in all positions.

Intercom Modes (8)

The "**ICS**" pushbutton switch on the panel provides the selection of the three intercom modes.

This button cycles through the intercom modes, from left to right, then right to left as: **ISO**, **ALL**, **CRW** and **CRW**, **ALL**, **ISO**. A green indicator shows which mode is currently active. This description of the intercom mode function is valid only when the unit is not in the "Split" mode.

In the split mode, the pilot and copilot intercom is controlled by the **ICS** button selecting **CRW**.

ISO (Pilot Isolate): The pilot is isolated from the intercom and is connected only to the aircraft radio system. He will hear the aircraft radio reception (and sidetone during radio transmissions). Copilot will hear passengers' intercom and Music, while passengers will hear copilot intercom and Music. Neither will hear aircraft radio receptions or pilot transmissions. The pilot can hear music if desired.

ALL: All parties will hear the aircraft radio and intercom. Crew and passengers will hear selected Music. During any radio or intercom communications, the music volume automatically decreases. The music volume increases gradually back to the original level after communications have been completed. The music muting can be activated by radio only, radio and intercom, or nothing, for a Karaoke mode.

CRW (CREW): Pilot and copilot are connected on one intercom channel and have exclusive access to the aircraft radios. They may also listen to Music. Passengers can continue to communicate with themselves without interrupting the crew and may listen to music as configured.

Alternate Intercom Mode

The PMA450 includes an Alternate Intercom Mode. This mode allows intercom communications between crew and passengers, without interrupting the crew's radio communications. The passengers do not hear the aircraft radio audio. The passenger microphones are muted, such that the crew cannot hear the passengers' microphone audio while the radio is active. Passengers can still talk to each other.

To enable the Alternate Intercom Mode, press **RADIO** **Intercom**: to toggle between Standard and Alternate modes. This state is remembered during power cycles.
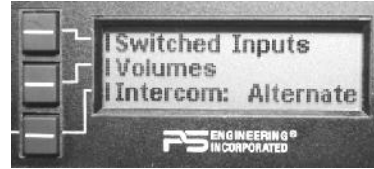
Music Control, Distribution and Muting

The top menu, top line select button toggles the music on or off for the pilot. When music is active, a music icon ( ) appears in the display.

The PMA450 has two independent music inputs at the rear connector. The PMA450 also has the ability to receive streaming music from a Bluetooth-enabled device which will be connected as Music #1.

The Music 1 and Music 2 inputs can be selectively delivered to the pilot, copilot and/or passengers using the music distribution menu.

Streaming Bluetooth® Music is in parallel with Music 1.

Press **Music** **Music Distribution** and select desired combination.

NOTE:

All music devices should be turned off for takeoff, landing, or any critical phase of flight. FAA Regulation 14 CFR 91.21 restricts the use of portable electronic devices.

§91.21 "(a) Except as provided in paragraph (b) of this section, no person may operate, nor may any operator or pilot in command of an aircraft allow the operation of, any portable electronic device on any of the following U.S.-registered civil aircraft. . .
"(b)(5) Any other portable electronic device that the operator of the aircraft has determined will not cause interference with the navigation or communication system of the aircraft on which it is to be used."

You can refer to Advisory Circular 91.21-1A for more information, at www.faa.gov.

Music Muting

The SoftMute™ circuit will mute the music whenever there is conversation on the radio, the intercom, or both, depending on the "Mute" mode selected. When that conversation stops, the music returns to the previous level over a second or so.

The mute mode functions are controlled through Music Mute Menu which has **three** modes for music inputs, **ALL**, **Karaoke** & **Radio** mute.

- **ALL** – music **will** mute with *either* intercom *or* radio
- **Karaoke** – music will *not* mute except during outgoing radio transmissions.
- **Radio** – *Radio* will mute music, but intercom will **not** mute music.

The PMA450 always defaults to *Mute ALL* when turned on.

In addition to the panel mute menu, a remote switch may be installed to allow the passengers local access to their Karaoke mode. When this switch is grounded, the menu choice is overridden.

Music Volume

The volume of the music inputs can also be adjusted from the menu of the PMA450:

Press **Music   Music Volume** set desired music input. The LED Volume bar and the numeric volume will show the volume level.

Music in Pilot ISO mode

When the isolate (ISO) mode is activated, the music for the pilot is automatically disabled. If desired, the pilot can elect to hear Music #1 or #2, in the ISO mode by toggling the Music line select with a long press or holding the ICS button, while in the ISO mode.

Bluetooth® connection

The PMA450 has a Bluetooth interface. The audio panel is always "discoverable," so you just need to search for the PMA450 from your Bluetooth-equipped phone or music source. The default access code is 0000.

If the audio panel is turned on be-

fore the Bluetooth device, you will have to turn the audio panel off and back on to automatically connect.

When Bluetooth is active, a Bluetooth icon and the battery status of the device is displayed in the upper right corner of the home display.

Pairing and unpairing Bluetooth devices

The PMA450 can be paired with up to eight individual devices. When that number is exceeded, the PMA450 will randomly drop a device to allow the new device to be added.

Hint, if your old phone is not recognized by the PMA450, you may need to reset from the Bluetooth menu.

Pairing separate music and telephone devices

It is possible to use a different music source (iPad, iPod with Bluetooth adapter, Bluetooth enabled laptop, etc) and telephone. However, only one music source can be streaming at a time.

Bluetooth® Telephone Mode

The PMA450 serves as a full duplex interface for telephone systems such as portable cellular phones with Bluetooth connectivity.

Warning:

United States FCC Regulations contained in 47 CFR § 22.925 currently contain prohibition on airborne operation of cellular telephones. "Cellular telephones installed in or carried aboard airplanes, balloons or any other type of aircraft must not be operated while such aircraft are airborne (not touching the ground). When any aircraft leaves the ground, all cellular telephones on board that aircraft must be turned off."
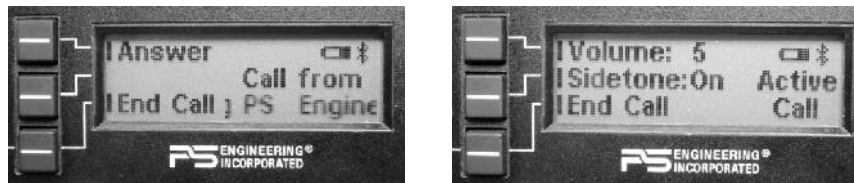
When the Bluetooth-enabled cell phone rings, an incoming call menu opens, showing caller ID, and the call can be answered by pushing the top line-select button.

In **ALL** intercom mode, all crew and passengers will be heard on the phone when they speak. All will hear selected audio. Com audio is automatically heard in the headsets.

In **CREW** mode, the pilot and copilot are connected to the telephone. The pilot and copilot will have transmit capability on the other selected transceiver Com 1 or 2, simply by using their respective PTT switch.

In **ISO** intercom mode, when the PMA450 is in the **TEL** mode, the pilot position is in the "Phone Booth." Only the pilot will hear the telephone, and only he will be heard. There will not be telephone sidetone in ISO. The pilot will also have access to Com 1 or 2, and will transmit on that radio using the PTT. All other selected audio is provided.

NOTE

Because the cell phone uses an intercom circuit, all stations on that circuit will lose intercom capability when the cell phone is in use. Intercom conversations will still be present if the cell phone provides sidetone, or if the audio panel is configured for telephone sidetone.

PS Engineering does not guarantee compatibility with personal cellular telephones.

Cellular telephone sidetone

Some cell phones do provide sidetone, and when combined with audio panel sidetone audio distortion may occur. In PMA450 Telephone sidetone can be enabled or disabled on the Telephone menu which is active when a call is in progress.

Bluetooth Reset

If the Bluetooth devices have trouble connecting, it may be necessary to reset the Bluetooth Module. The PMA450 Bluetooth Reset function is accessible from the setup menu. (See also User Setup Menu, next page)

During the unit boot up process (while the version numbers appear on the screen), hold the lower line select button until the setup screen appears.

This places the unit into the "User Setup Mode- home screen", and allows resetting the Bluetooth Module

When **Unpair All** is pushed, the Bluetooth Module is reset and *ALL* Bluetooth devices are erased from the audio panel. Cycle the PMA450 power to exit setup screen.

Wired telephone/Satcom mode

The PMA450 can accommodate a wired telephone input as well as a Bluetooth connection. However, only one can be active at a time. The Bluetooth symbol is absent from wired menu.

The wired telephone screen menu is activated when audio is detected from the phone. Sidetone and telephone volume can be controlled from this menu. The telephone audio distribution is the same as Bluetooth, above.

This menu will switch off 25 seconds after the *incoming* conversation ends, or press End Call.

NOTE: The PMA450 does NOT answer or hang up the wired phone from this menu.

Internal Recorder and playback

The PMA450 comes equipped with an internal recorder. This digital system stores the last incoming audio from the radio you have selected for transmit. It can store as many as 8 incoming messages, and up to 45 seconds of audio. The pilot and copilot hear the playback. Recording is automatic.
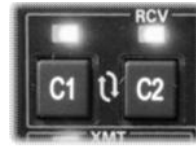
To play back the last recorded message, press and hold the COM Receive pushbutton associated with the selected radio transmitter for about one 1 second. You can either wait for the message to finish playing before accessing the prior message, or cancel the current playback and step backward. To cancel the playback, press and hold the COM receive button for two seconds. The next time the button is pressed for one second the next earlier message is received.

The screen displays a status message to indicate that playback is in progress. The playback will stop whenever there is more incoming selected COM audio, and the message can be replayed from the beginning by pressing the selected COM receive button again for 1 second.

User Setup menus

The PMA450 has several user adjustable functions accessible from a setup menu.

During the unit boot up process, press the lower line select button until the setup screen appears. This will place the unit into the "User Configurable Mode- home screen". This allows adjustment for:

- Adjust Screen (LCD)
- Rename Switched Inputs
- Bluetooth

Cycle the PMA450 power to exit setup screen.

LCD Screen Adjustment

The first items are adjustments to the Liquid Crystal Display, allowing the installer or user to tailor the contrast and backlight intensity to suit the cockpit conditions.
There are two modes: LCD Brightness & LCD Contrast.

LCD will vary in real time while adjustments are made. LED bar & numeric indication will vary.

Adjusting either the Brightness or Contrast level requires selecting either of the two smaller buttons and then turning the inner knob. Counter clockwise to lower the number (level of Brightness & Contrast) and clockwise to increase the number (level of Brightness & Contrast).

To change the display:

> Press the line select for the desired item

> Turn the small, inner knob to change the contrast or brightness as desired.

Cycle the PMA450 power to exit setup screen.

Display Timeout

This is a feature that allows the user to adjust how quickly the screen menus timeout (revert to main menu).

This allows adjustment of the timeout screen and can be configured from 1 second to 30 seconds by turning the inner knob.

For a user who is unfamiliar with the product, this will give them enough time to learn the system. After becoming more familiar the user can speed up the menu screen timeout as desired. A long press of the line select will also back up a menu level.

Cycle the PMA450 power to exit setup screen.

Rename "Switched" Inputs

The system is factory set to default as ADF, DME & AUX as shown.

The three inputs are from top to bottom:

- Switched input #1 J1, Pin 7 wrt Pin 8 (Default ADF)
- Switched input #2 J1, Pin 21 wrt Pin 22 (Default DME)
- Switched input #3 J1, Pin 23 wrt Pin 43 (Default AUX)

The user has access to rename these inputs. There is a maximum 9 letters per line, and A — Z, a — z and & 0 – 9 are available.

- Press the line select for desired input.
- Turn the large outer knob to select the letter to change.
- Turn the small, inner knob to increment or decrement the letter.
- You can quickly clear the whole line by turning the outer knob to move the cursor all the way to the right until the line clears.

Cycle the PMA450 power to exit setup screen.

Bluetooth Setup

There are three Bluetooth functions that can be changed in the user setup screen, Unpair All, Pair PIN code, and device ID.

Unpair All (Bluetooth Reset) When this is pushed, all Bluetooth devices are erased from the audio panel, and can then be added back as desired. This is useful in some cases where the unit or operator lose track of the devices paired, and cannot get them to connect.

PIN: The 4 digit pass code can be changed to any number desired. This is useful if the owner wants to restrict access to the audio panel Bluetooth functions.

Some phones will not pair if a Personal Identification Number (PIN) is required. To disable the PIN Enter configuration menu, select Bluetooth. Select PIN code for editing. Press PIN button one more time. "Bluetooth Reset" will appear on screen. When the menu returns, the PIN code will report "Disabled".

To re- enable the PIN code for a different device, press the PIN button."Bluetooth Reset" will appear on screen. When the menu returns, the last stored PIN code will be shown.

ID: The PMA450 can be renamed using this mode to show up on the devices with a personalized identifier.

USB Charging Port (10)

The PMA450 contains a USB charging port that is capable of providing 5 VDC, 2.0 amps of current to charge the batteries in smart phones and tablets used as Personal Electronic Devices. This is NOT a data transfer jack.

Warranty & Service

In order for the factory warranty to be valid, the installations in a certified aircraft must be accomplished by an FAA-(or other ICAO agency) certified avionics shop and authorized PS Engineering dealer. If the unit is being installed by a non-certified individual in an experimental aircraft, a factory-made intercom harness must be used for the warranty to be valid.

PS Engineering, Inc. warrants this product to be free from defect in material and workmanship for a period of two (2) years from the <u>date of retail sale by authorized PS Engineering dealer</u>. During the first **twelve (12) months** of the three-year warranty period, PS Engineering, Inc., at its option, <u>will send a replacement unit</u> at our expense if the unit should be determined to be defective after consultation with a factory technician. For the remaining **twelve (12) months** of the two-year warranty period, PS Engineering will send a no-cost replacement unit at customer shipping expense.

<u>All transportation charges for returning the defective units are the responsibility of the purchaser</u>. All domestic transportation charges for returning the exchange or repaired unit to the purchaser will be borne by PS Engineering, Inc. The risk of loss or damage to the product is

borne by the party making the shipment, unless the purchaser requests a specific method of shipment. In this case, the purchaser assumes the risk of loss.

This warranty is not transferable. Any implied warranties expire at the expiration date of this warranty. PS Engineering SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES. This warranty does not cover a defect that has resulted from improper handling, storage or preservation, or unreasonable use or maintenance as determined by us. This warranty is void if there is any attempt to dissemble this product without factory authorization. This warranty gives you specific legal rights, and you may also have other rights, which may vary from state to state. Some states do not allow the exclusion of limitation of incidental or consequential damages, so the above limitation or exclusions may not apply to you.

All items repaired or replaced under this warranty are warranted for the remainder of the original warranty period. PS Engineering, Inc. reserves the rights to make modifications or improvements to the product without obligation to perform like modifications or improvements to previously manufactured products.

Factory Service

The units are covered by a two-year limited warranty. See warranty information. Call PS Engineering, Inc. at (865) 988-9800 before you return any 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 Rd.
Lenoir City, TN 37772
(865) 988-9800   FAX (865) 988-6619
Email: contact@ps-engineering.com
Units that arrive without an RMA number, or telephone number for a responsible contact, will be returned un-repaired. PS Engineering is not responsible for items sent via US Mail.

PMA450 Serial Number: _____

Installed by:_____

Installation date: _____