

# PS ENGINEERING<sup>®</sup> INCORPORATED

Sound Quality. Sound Engineering.

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Lenoir City, TN 37772

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## PAC45 System

With MultiTalker<sup>®</sup>

*Flying Never Sounded So Good!<sup>®</sup>*



## Pilot's Guide and Operation Manual

FOR SINGLE SYSTEMS

202-045-0100

Revision 2

July 2019

Serial Number GH01139 and above

FAA TSO C139a

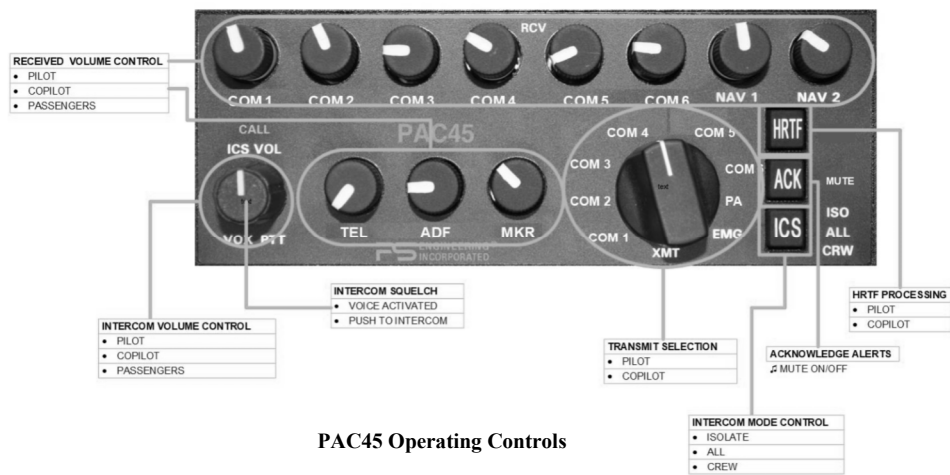


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This section provides detailed operating instructions for the PS Engineering PAC45, Audio Selector Panel/Intercom Systems. Please read it carefully before using the equipment so that you can take full advantage of its capabilities.

This section is divided into sections covering the basic operating areas of the PAC45 systems. They are Communications Transceiver Selection, Audio Selector, Intercom, and special functions, including the Bluetooth<sup>®</sup> functionality in the PAC45.

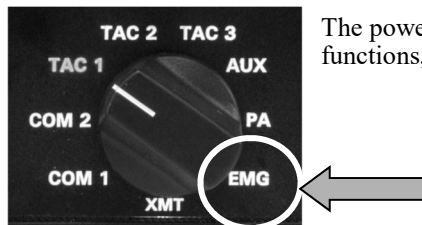


PAC45 Operating Controls

### Power and Fail Safe

Unit power is controlled by the transmitter (XMT) selector knob. In the "EMG" or off (fully clockwise) position, the pilot headset is connected directly to COM 1 as well as alerts and unswitched input #1. This allows communication capability regardless of unit condition. NAV1 audio is also provided to the pilot in the other ear of a stereo headset.

Any time power is removed or turned off, the audio selector will revert to fail-safe mode. If fail-safe audio is present in both ears of a stereo headset, or completely absent, verify that a stereo headset is used and is selected for stereo mode.

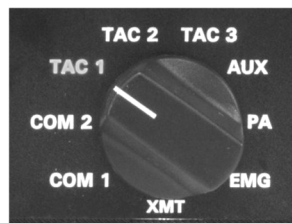


The power controls all audio selector panel functions, and intercom.

## Communications Transmit (XMT) Selection

The PAC45 has a rotary control knob to select communications transceiver functions. To select a transceiver for transmit; turn the knob to select the desired radio from the six available.

The radio is automatically selected to receive incoming radio calls when the XMT is selected. With a PAC45, you will never transmit on a radio that you are not receiving. The selected audio is indicated by both knob position and the green text.



## COM Audio Selector

The communications receiver audio sources are controlled by a combination push-on-push-off switch/volume control. Communication audio from another radio, not selected for transmit, can be heard by pressing the associated RCV switch, which will place it in the OUT position. The selected audio is indicated by both knob position and the green nomenclature text.



You will always hear the audio from the selected transceiver, even if the selected comm audio is turned all the way down on the audio controller because it cannot turn the selected receive audio all the way off.

The volume of the received source is adjusted by rotating the knob. PS Engineering recommends a lower volume *at the radio and higher audio panel setting* to minimize noise.

## Receiver Activity Indication (-RXI)

PAC45 systems (HUB45 Serial Number DH1069 and above) have a Receive Activity Indicator that flashes the *selected* receiver indicator when a signal is present on that receiver. This allows the user to spot an active radio, even if the volume is turned down. *This function is activated at the factory at the installer's request, and can be changed at the factory.*

## MultiTalker® Head Related Transfer Function (HRTF)

Communication receiver audio signals are presented to the DSP and processed to “appear” in a different location to the crew.

“MultiTalker” (US Patent #7,391,877) specifies up to nine locations. This helps the crew to better comprehend speech by locating it in a manner more easily differentiated by the human brain.

Intercom and other audio is not spatially processed, only the six communications transceivers.

***You must use stereo headsets, in stereo mode for this feature.***



This adjustment allows the six Spatial Audio inputs to be “relocated” on any of nine (9) pre-defined “Head Related Transfer Function” (HTRF) locations.

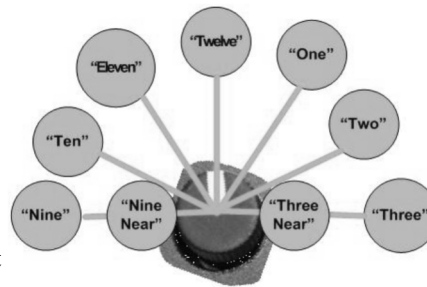
MultiTalker<sup>®</sup> places the communications receiver audio in one of nine apparent locations in the crew’s headset. This has been scientifically shown to allow the brain to focus on multiple conversations and improve comprehension for the listener.

Pressing the HRTF button toggles the PAC45 MultiTalker spatial function on (receiver sources distributed) or off (receiver audio sources neutral).

**Audio Location**

The pilot panel can control the locations for the six receive audio locations. Press and hold the HRTF button for > 1 second on the pilot’s panel until the HRTF button and all COM nomenclature start blinking green.

Rotate the COM receive volume knob so the pointer indicates the approximate location of the desired location. A voice announcement will accompany the knob rotation with the clock positions. Received audio shall then be presented from that location.



Press the HRTF button again to exit the mode. The audio Controller will remember last state through power cycles.

**Navaid Audio Selection**

Navigation receivers are selected in the same manner as the communication receiver, push on/push off the knob associated with the desired navigational aid, and rotate to adjust the receiver volume.



**Telephone control**

The volume control selector connects the audio controller to either a Bluetooth-enabled cell phone or a wired cellular/satellite phone.



Push to pop out the volume control to select (answer or make phone call) and adjust the receive audio volume.

To hear the ringer of the Bluetooth phone, the volume control should be around the 12 o’clock position. Selecting the TEL switch in the OUT position is not required.



## Intercom Operation

### IntelliVox® Intercom VOX-Squelch

No adjustment of the IntelliVox® squelch control is necessary. Through three individual signal processors, 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 intercom.

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. Moving your head through a vent air stream may cause the IntelliVox® to open momentarily. This is normal.

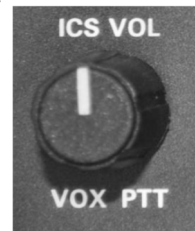
The IntelliVox® is designed to work with normal aircraft cabin noise levels (70 dB and above). It loves aircraft noise! Therefore, it may not recognize speech and clip syllables in a quiet cabin, such as in the hangar, or without the engine running. This is normal.

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

### Push to talk intercom (PTT ICS)

Pressing the intercom volume knob (ICS VOL) will place the system into the Push-to-talk (PTT for Inter-com use) mode. This will disable the voice activation (VOX) and require that the external push to talk intercom buttons for each position be used to speak on the intercom.

Push the knob again and the systems toggles back to voice activation. The mode is shown by the green indication in the text.



### Intercom Volume Control

The intercom volume control knob adjusts the loudness of the intercom for the intercom stations(s) connected to the audio controller panel. It has no effect on selected radio levels, or music input levels.

In a single control panel installation the volume control adjusts pilot, copilot, and any passengers.

### **Monaural headsets**

The pilot and copilot positions work with stereo or mono headsets. However, MultiTalker will not be presented correctly unless stereo headsets are used, and oriented correctly on the head, left and right.

NOTE: For the full effect of MultiTalker<sup>®</sup> Dimensional Sound, stereo headsets must be used, and the left/right orientation observed.

All passenger headsets are connected in parallel. Therefore, if a monaural headset is plugged in to a PAC45 Stereo installation, one channel will be shorted. Although no damage to the unit will occur, all passengers with stereo headsets will not hear one channel, unless they switch to the “MONO” mode on their headset.

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**

The “ICS” pushbutton switch on the panel provides the selection of the intercom modes



The intercom mode defaults to “ALL” at power up. Then the button cycles through the intercom modes, from top to bottom, then bottom to top as: ISO, ALL, CRW and CRW, ALL, ISO. A green indicator shows which mode is currently active.

**ISO:** 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 and passengers will have radios, intercom and music.

**ALL:** All parties will hear the aircraft radio, intercom and 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.

**Crew (CRW):** Pilot and copilot are connected on one intercom channel and have exclusive access to the aircraft radios. The passengers will be able to talk to each other.

### **Remote ICS Mode Control**

An optional external switch can act as a remote intercom mode selector. Pressing the switch will increment the intercom mode selector from ISO-ALL-CRW-ISO-ALL, etc. each time the button is pressed.



## **Bluetooth® connection**

The PAC45 has a internal Bluetooth module, no external boxes required. The audio controller is always “discoverable,” so you just need to search for the PAC45 from your Bluetooth-equipped phone or music source. Default access code is not required. Once the PAC45 has been “paired” with your Bluetooth device, the TEL distribution will act as described below.

## **Pairing and un-pairing Bluetooth devices**

The PAC45 can be paired with up to eight individual devices, but will only connect to one at a time. When that number is exceeded, the PAC45 will drop a device to allow the new device to be added.

If the audio controller is turned on before the Bluetooth device, you will have to manually connect from your Bluetooth device. Otherwise once paired, the audio controller should connect automatically.

Hint, if your devices are not recognized by the PAC45, you may need to reset the Bluetooth module, Press and hold HRTF and ICS buttons for more than three (>3) seconds.

## **Bluetooth® Telephone Mode**

The PAC45 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.”*

To answer an incoming call, or initiate a call from the PAC45, select the TEL volume control to the out position.

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 selected transceiver, simply by using their respective PTT switch.

In ISO intercom mode, when the PAC45 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. He will also have access to Com 1 or 2, and will transmit on that radio using the PTT. All selected audio is provided.

NOTE

PS Engineering does not guarantee compatibility with personal cellular telephones.

**Bluetooth Reset**

To reset the Bluetooth module, clearing out the connected devices, press HRTF and ICS for more than three seconds.

**Music Muting Control**

The PAC45 incorporates PS Engineering’s trademark “SoftMute. The SoftMute™ circuit will mute the music whenever there is conversation on the radio or the intercom. When that conversation stops, the music returns to the previous level comfortably, over a second or so.



Holding down ACK button for three (3) seconds will turn the music muting on/off.

When in mute off mode, the intercom, radio & PTT will not mute the music. The music muting will reset to mute on mode at each power cycle. *Any* control head will switch the muting on or off for *all* users.

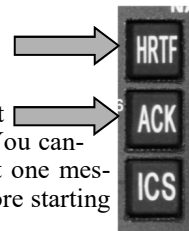
**Wired Satcom/Cell Phone input**

The PAC45 can accommodate a wired telephone input as well as a Bluetooth connection. This operates the same as the Bluetooth Telephone .

The PAC45 incorporates an independent alert audio system that can store three audio messages recorded by the user, and played back when triggered by an external source.

Once triggered, the alert audio will continue until the ACK button (front panel or external) on the CTL45 control panel is pushed, or the trigger input returns to normal.

**Storing Alert Audio**



The PAC45 systems can store three audio alerts. You must record all three when the unit is in audio program mode. You cannot change only one at a time. If you wish to replace just one message, we recommend you write down all the messages before starting the procedure.

To record messages from the pilot’s headset:

1. Press & Hold “ACK” and “HRTF” for 3 seconds, until a chime is heard in the headset, and then release the button.





2. COM1 will blink, to indicate the recording of ALERT #1.
3. Start speaking message.
4. When finished with Alert #1, press the “ACK”.
5. Now COM2 will blink, to indicate the recording of ALERT #2.
6. Speak message.
7. When finished with Alert #2, press the “ACK”
8. Now COM3 blinks, to indicate the recording of ALERT #3.
9. Speak message.
10. When finished with Alert #3, press the “ACK”
11. A chime indicates that recording is now finished.

*NOTE: If ACK is **not** pressed to indicate end of recording, it will record for five seconds, and then advance to next alert. After all three time slots are timed out, the PAC45 will exit the alert recording mode.*

### **Stereo Helmet Conversion**

For optimum performance, and for any effective Head Related Transfer Function, stereo headphones must be used.

Several companies modify flight helmets to add stereo capability, and change the microphone to high impedance civil aviation if it is military, or low impedance.

Companies Include:

acousticom

Phone: 574-293-0534

[www.acousticom.com](http://www.acousticom.com)

FLIGHTHELMET.COM

Phone: (800) 531-4898

[www.FlightHelmet.com](http://www.FlightHelmet.com)

Headsets Inc.

Phone: 800-876-3374

[www.headsetsinc.com](http://www.headsetsinc.com)



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## 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 date of retail sale by authorized PS Engineering dealer. During the first **twelve (12) months** of the two-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. 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.

All transportation charges for returning the defective units are the responsibility of the purchaser. 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 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.

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](mailto: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.**

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