PS ENGINEERING® INCORPORATED

Sound Quality. Sound Engineering.

9800 Martel Road

Lenoir City, TN 37772

www.ps-engineering.com

PAC45D System

With MultiTalker®
Flying Never Sounded So Good!®

Pilot's Guide
and
Operation Manual

❖ Bluetooth®

This section provides detailed operating instructions for the PS Engineering PAC45D 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 PAC45D systems. They are Communications Transceiver Selection, Audio Selector, Intercom, and special functions, including the Bluetooth® functionality in the PAC45D.

PAC45D Operating Controls
NOTE: Actual nomenclature varies by user
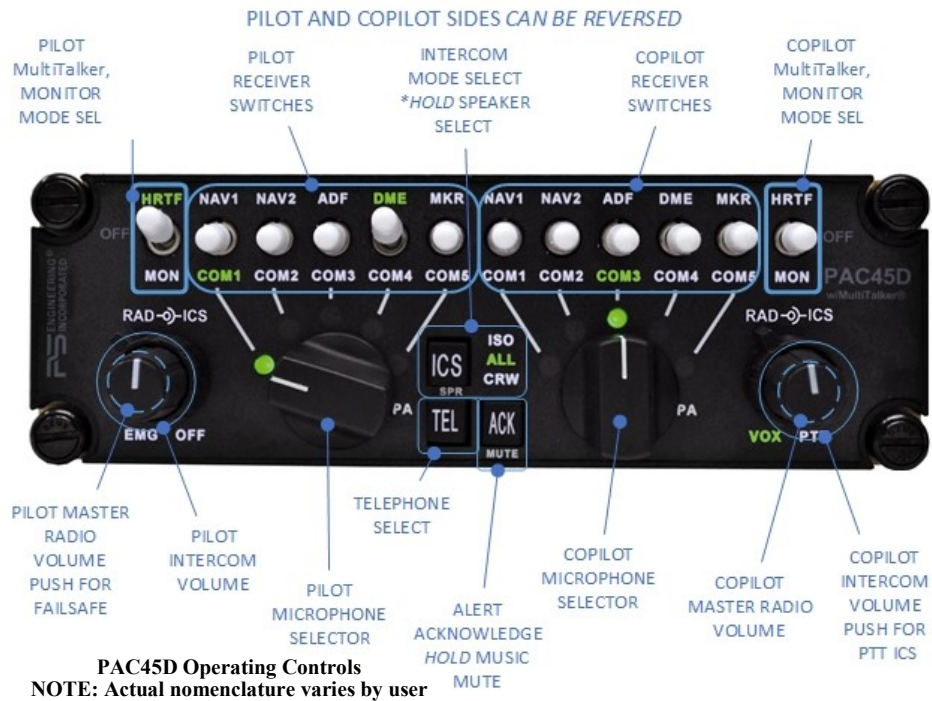
Power and Fail Safe

Unit power is controlled by push on/push off of the pilot side volume control knob. In the "EMG" or off condition, 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 PAC45D has two rotary control knobs to select communications transceiver functions for pilot and copilot. To select a transceiver for transmit; turn the knob to select the desired radio from the five available.

The radio is automatically selected to receive incoming radio calls when the XMT is selected. With a PAC45D, you will never transmit on a radio that you are not receiving. The selected audio is indicated by both knob position and the green LED indicator.

COM Audio Selector

The communications receiver audio sources are controlled by toggle switches on the pilot and copilot side of the CTL45D. These are shared with the navigational receiver audio (up position). Communication audio from another radio, not selected for transmit, can be heard by flipping the associated RCV switch, which will place it in the down 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 all receivers is adjusted by rotating the RAD (inner) knob for pilot or copilot. PS Engineering recommends a higher volume *at the radio and lower audio panel setting* to minimize noise.

Cockpit Speaker

The PAC45D has an optional cockpit speaker output. If installed, (SPR on label) this will be activated by pushing and holding the ICS button for 3 seconds.
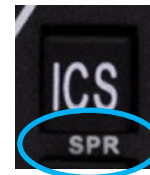
Receiver Activity Indication (-RXI)

PAC45D systems have an optional 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.*

PS ENGINEERING® INCORPORATED

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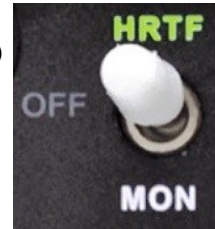
Intercom and other audio is not spatially processed, only the communications transceivers.

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

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

MultiTalker® 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.

Setting the HRTF switch toggles the PAC45D MultiTalker spatial function on (receiver sources distributed) or off (receiver audio sources neutral).

Audio Location

The pilot section of the panel controls the locations for the five communications receive audio locations. Press and hold the TEL button for three (3) seconds on the audio panel until the TEL button and all COM nomenclature start blinking green. Set the pilot mic selector to the COM to be adjusted.

Then rotate the RAD 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. Rotate the pilot mic selector to the next radio to be adjusted and repeat until all locations have been set as desired.

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

Monitor Mode

With the toggle switch in the "down" position, the PAC45D is in Monitor Mode. In this mode, the audio from the COM radio that is selected for transmit will mute the other COM audio when it is active. For example, if COM 1 is selected to transmit to ATC, but COM 2 is receiving weather information; the ATC will mute the audio from the weather while ATC is transmitting. In Monitor mode, the RCV COM indicator will blink every few seconds as a status indication.

Navaid Audio Selection

Navigation receivers are selected in the same manner as the communication receiver, selecting the toggle switch to the "up" position .

Telephone control

The TEL button connects the audio controller to either a Bluetooth-enabled cell phone or a wired cellular/satellite phone.

The TEL button behaves as follows:

- If TEL is "white" then an incoming call MUST be answered with the TEL button.
- If TEL is "green" then an incoming call MUST be answered with the Phone.
- If TEL is "green" and you are on a active call then pressing TEL disconnects the call.
- Active calls can also be disconnected from the phone at any time.

Intercom Operation

IntelliVox® Intercom VOX-Squelch

No adjustment of the IntelliVox® squelch control is necessary. Through individual signal processors, the ambient noise appearing in all 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.

Intercom Volume Control

The intercom volume control knob (outer 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 the PAC45D, the pilot volume control adjusts the pilot's intercom volume. The copilot's knob adjusts the copilot, and any connected passengers.

Push to talk intercom (PTT ICS)

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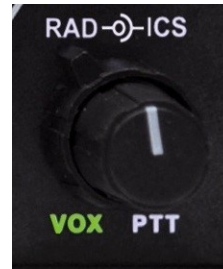
Push the knob again and the systems toggles back to voice activation. The mode is shown by the green indication in the text.

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® 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 PAC45D 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
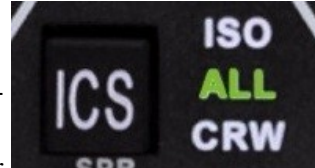
The intercom mode defaults to "ALL" at power up. Then the button cycles through the intercom modes, from top to bottom, then bottom to top as: ISO, ALL, CRW and CRW, ALL, ISO. A green indicator shows which mode is currently active.

ISO: The pilot is isolated from the intercom and is connected only to the aircraft radio system. The pilot 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 PAC45D 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 PAC45D can be paired with up to eight individual devices, but will only connect to one at a time. When that number is exceeded, the PAC45D 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 PAC45D, you may need to reset the Bluetooth module, Press and hold TEL and ICS buttons for more than three (>3) seconds. After resetting the PAC45D, you will need to "Forget" the PAC45 on your device.

Bluetooth® Telephone Mode

The PAC45D 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 PAC45D, push the TEL 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 selected transceiver, simply by using their respective PTT switch.

In ISO intercom mode, when the PAC45D 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 ALL the connected devices, press TEL and ICS for more than three seconds. After resetting the PAC45D, you will need to "Forget" the PAC45 on your device.

Music Muting Control

The PAC45D 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 PAC45D can accommodate a wired telephone input as well as a Bluetooth connection. This operates the same as the Bluetooth Telephone.

Alert Audio

The PAC45D incorporates an independent alert audio system that stores distinctive audio tones 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 CTL45D control panel is pushed, or the trigger input returns to normal.

CTL45M Mission/Observer/Tactical Flight Officer Panel

The CTL45M has the same basic operation as the crew controller, except this controller cannot make public address announcements. The CTL45M as an ICS CALL button to alert the crew that the observer positions(s) want to be on the intercom with the crew.

Power On/Off

The rotary transmit selector controls power to the CTL45M, and it is on in any position except off. Turning the witch fully clockwise places the CTL45M in the off mode. Users of this control head will not have any audio from any source in the OFF position.

Transmit Selection

To select a transceiver for transmit; turn the knob to select the desired radio from the five available.

The radio is automatically selected to receive incoming radio calls when the XMT is selected. With a PAC45D, 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 Receive Audio Selection

The communications receiver audio sources are controlled by a combination pull-on-push-off switch/volume control. Communication audio from another radio, not selected for transmit, can be heard by pulling 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 com audio is turned all the way down on the audio controller because it cannot turn off the selected receive audio completely.

HRTF On/Off

Pressing the HRTF button toggles the PAC45 MultiTalker spatial function on in stereo headsets connected to the user's CTL45M Control Head, (receiver sources distributed) or off (receiver audio sources neutral).

Navaid Selection

Navigation receivers are selected in the same manner as the communication receiver by setting the knob associated with the desired navigational aid to the out position, and rotate to adjust the receiver volume.

Volume Controls

The Intercom and Radio Master volume controls operate the same manner as the CTL45D for pilot and copilot. The intercom volume control knob (outer 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.

Telephone

To answer an incoming call, or initiate a call from the PAC45D Observer Control Head, select the TEL volume control to the out position. This is the same switch for either Bluetooth or Satellite phone connection.

Intercom

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 available intercom modes ISO and ALL. A green indicator

shows which mode is currently active.

Iso: The users on this panel are isolated from the intercom and is connected only to the aircraft radios they have selected. They will hear the aircraft radio reception (and sidetone during radio transmissions). The crew will have radios, intercom and music in their location.

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.

Music Muting

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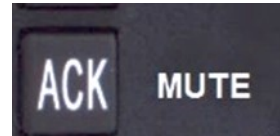
When in mute off mode, the intercom, radio & PTT will not mute the music. The music muting will reset to mute on mode at each power cycle. Any control head will switch the muting on or off for all users.

PS ENGINEERING® INCORPORATED

This page intentionally blank

PS ENGINEERING® INCORPORATED

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

FLIGHTHELMET.COM
Phone: (800) 531-4898
www.FlightHelmet.com

Headsets Inc.
Phone: 800-876-3374

www.headsetsinc.com

PS ENGINEERING® INCORPORATED

PS ENGINEERING®
INCORPORATED

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 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.