PS ENGINEERING® INCORPORATED

9800 Martel Road

Lenoir City, TN 37772

IntelliPAX Intercom Expansion Unit

Unit Part Number

11645R
for use with HUB45R, HUB45AR, HUB50
Passenger Intercom Expansion System
With IntelliVox®

Installation and Operation Manual

US Patent No. 6,493,450

Table of Contents

Rev	Date	Change
New	Feb 2024	Release dedicated 11645R manual
1	August 2024	Correct Pass. 2 phones output designation

Section I – General Information

1.1 Introduction

The **IntelliPAX** is a panel mounted, multi-place intercom expansion unit used to add up to six extra stations to an intercom system. Please read this manual completely before installation to minimize the risk of damage to the unit and to become familiar with all the features.

1.2 Scope

This manual contains installation and operational instructions for the following PS Engineering units:

Model	Description	Part Number
IntelliPAX Remote	Blind- mount intercom expansion unit for HUB45R, HUB45AR, HUB50	11645R

1.3 Description

The **IntelliPAX** (11645R) is a remote, or blind mounting intercom expansion unit with intercom volume control for the passengers. This unit is designed to work in combination with the PAC45 system.

1.4 Approval Basis **NONE**

None. It is the installer's responsibility to determine the applicable approval basis for this installation. This unit is not designed for use in any flight crew situations, and has no effect on any critical aircraft systems. There is no significant weight or electrical load presented to the aircraft.

1.5 Specifications

Input power:	11 – 33 VDC, 1A Max.
Headphone Impedance:	150 – 1000 Ω typical
Audio Distortion:	<10% @ 35 mW into 150 Ω load
Aircraft Radio Impedance:	1000 Ω typical
3 dB Mic Frequency Response:	350 Hz to 6000 Hz
3 dB Music Frequency Response:	200 Hz to 15 kHz
Unit weight:	7.2 Ounces (0.20 kg)
Dimensions:	1.25" H x 3.00" W x 5.50" D (3.2 x 6.6 x 14 cm)

1.6 Equipment required but not supplied

A. Headphones, 150Ω stereo, up to six as required

B. Microphones, up to six, as required

C. Interconnect wiring

D. Audio System, HUB45R, HUB45AR, HUB50 primary unit

E. Headphone and microphone jacks (up to 6 per module, as required)

Section II – Installation

2.1 General Information

The **IntelliPAX** comes with all necessary hardware for a typical installation. The unit is installed remote mounted blindly. The unit can be mounted nearly anywhere. The 11606R and 11616R volume control for the passengers is factory set for a balanced output, but can be field adjusted through the holes in the side of the unit.

Installation of the **IntelliPAX**, using the available wiring and hardware supplied, does not require special tools or knowledge other than described in 14 CFR 65.81(b) and FAA Advisory Circular 43.13-2B

It is the installer's responsibility to determine the approval basis for this installation. An FAA Form 337, or other approval <u>may</u> be required. See Appendix B for example of FAA Form 337.

2.2 Unpacking and preliminary inspection

The **IntelliPAX** was carefully inspected mechanically and thoroughly tested electronically before shipment. It should be free of electrical or cosmetic defect.

Upon receipt, verify that the parts kit includes the following:

250-250-0001 IntelliPAX Remote Mount Installation Kit

		250-250-0001
Part Number	Description	11645R
475-442-0002	#4-40 Machine screws, black	
625-003-0001	Soft Touch Knob "D" shaft	
575-250-0001	IntelliPAX Faceplate	
425-025-0009	25 pin Sub-D connector shell	1
425-020-5089	Male Crimp Pins	25
625-025-0001	Connector hood	1
475-002-0002	Connector Thumbscrews	2

2.3 Equipment installation procedures

Remote mounting: (11645R)
1. Install the unit on an avionics shelf or other appropriate structure.
2. If desired, the volume can be adjusted at installation, there are two holes in the side of the unit, one for left, and another for right channel.
3. If desired, a remote switch (not included) can be installed to override the SoftMute™ function. This should be located convenient to the passengers.

2.4   Cable harness wiring

To complete the installation, a wire harness must be made as shown in Appendix C. PS Engineering can make a custom-tailored wiring harness for the installer. All harnesses use Mil-spec quality components with professional techniques, and are fully tested before shipment. Contact PS Engineering for more information. The IntelliPAX connects to the main unit through a 4- or 5-conductor, shielded cable.

2.4.1 Electrical Noise Issues

> WARNING: You must use separate shielded cables for the microphone and headphone jacks. Combining these two wires WILL cause loud oscillations and degrade the intercom function. The oscillation is caused by the cross-coupling between the large headphone signal and the small microphone signal. The resulting feedback is a high-pitched squeal that varies with the volume controls.

Shielding can protect the system from radiated noise (rotating beacon, power supplies, etc.). However, installation combinations occur where minor interference is possible. The **IntelliPAX** was designed in an interference -protected chassis and has internal filter capacitors on all input lines.

Ground loop noise occurs when there are two different return paths for the same signal, such as airframe and ground return wire. Large cyclic loads such as strobes, inverters, etc., can inject audible signals onto the airframe return path. Follow the wiring diagram very carefully to help insure a minimum of ground loop potential. Radiated signals can be a factor when low level mic signals are bundled with current carrying power wires. Keep these cables separated.

Insulating washers are **required** on all mic and headphone jacks to isolate them from aircraft ground.

2.4.2 Power Requirements

The IntelliPAX 11645 is connected through a 1A breaker to the avionics bus (2A for dual).

2.4.3 Interconnection with main unit

Interface between the IntelliPAX and the main intercom is through a 3-wire shielded cable.

Function	*Intelli*PAX	PAC45 HUB45	PAC45A HUB45AR	HUB50
Expansion Power	1	Aircraft Power	Aircraft Power	Aircraft Power
Expansion Ground	14	Aircraft Ground	Aircraft Ground	Aircraft Ground
Audio Input (rt)	2	J451-33	P452-25	P452-25
Audio Input (lt)	15	J453-15 J453-16	P452-25	P452-25
Audio Output	3	J451-29	P452-26	P452-26

2.4.4 Auxiliary Inputs

An entertainment device can be connected to the **IntelliPAX**. Install a 1/8" music jack convenient to the passengers to connect the stereo entertainment device into the system. A "Soft Mute" system is installed in the **IntelliPAX** that will mute the music during conversation on the local intercom. Radio traffic or conversation on the main intercom will not mute the music.

A soft mute inhibit switch (not included) can be installed between IntelliPAX connector pins 12 and 24. Closing this switch places the IntelliPAX into Karaoke mode.

> WARNING: Local oscillators and other internal signals from CD or radio equipment can cause undesired interference with VHF navigation and communication equipment. Before takeoff, operate the entertainment device to determine if there is any adverse effect on aircraft systems. If any unusual operation is noted in flight, immediately switch the entertainment device off.

2.4.5 Digital Audio HUB settings for expansion.

2.4.5.1   HUB45

None

2.4.5.2   HUB45A

DIP switch setting. See PAC45A Installation Manual, 200-045-1000, HUB45A Logic Switch Options, §2.7.4.

2.4.5.3   HUB50

Set up in Application. See HUB50 Installation Manual, 200-545-1000, §2.8.8.15, iOS Application, Expansion

2.5   Post Installation Checkout

After wiring is complete, verify power is ONLY on pin 1 of the connector, and ground on pin 14. Failure to do so will cause serious internal damage and void PS Engineering's warranty. With all units plugged in and operating, verify that all active stations can communicate on the intercom, and that any music sources are present, and the SoftMute inhibit control operates correctly (if installed).

Section III – OPERATION

3.1   Power

Switching on the intercom or audio panel automatically activates the IntelliPAX unit. The Stand Alone unit is active when power is applied to the Avionics Bus.

3.2   Adjusting the Volume

The unit has a service adjustable volume, which is accessible through a pair of openings on the side of the unit. These are 20-turn potentiometers, so may require many turns to make a difference. The volume is set to maximum at the factory. Users can reduce the volume at individual stereo headsets.

3.3   IntelliVox® *Squelch*

No adjustment of the *IntelliVox®* squelch control is required or possible. Through independent processors on each microphone, 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.

For best performance, the headset microphone **must** be placed within ¼ inch of your lips, preferably against them. 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.

PS Engineering, Inc. recommends installation of a Microphone Muff Kit from Oregon Aero (1-800-888-6910). This will optimize *IntelliVox®* performance.

3.4   Music Mute

If a remote switch is installed between pins 12 and 24, the "SoftMute" will be enabled. When the switch is closed, the music will mute whenever there is intercom conversation in the IntelliPAX. Audio coming from the main unit, such as radio or intercom, will not mute the IntelliPAX music.

Opening the switch places the unit music, "Karaoke Mode," and music muting is inhibited.

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 a FAA- certified avionics shop and authorized PS Engineering dealer. If the unit is being installed by a non-certified individual in an experimental aircraft, a dealer-made 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 one year from the date of sale. 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 dissemble this product without factory authorization. This warranty gives you specific legal rights, and you may also have other rights that 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 **IntelliPAX** is covered by a one-year limited warranty. See warranty information.

Contact PS Engineering, Inc. at (865) 988-9800 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 via an approved carrier (do not ship U.S. Mail) to:

PS Engineering, Inc.
Customer Service Department
9800 Martel Road
Lenoir City, TN 37772
(865) 988-9800 FAX   (865) 988-6619

Appendix A Instructions for FAA Form 337 and Airworthiness

5.1 Sample text 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 IntelliPAX part number 116( ), you may use the following text as a guide.

Installed intercom expansion unit, PS Engineering IntelliPAX, part number 11616 in (*location*) at station _____. Installed per AC43.13-2B, Chapter 2, Installed per PS Engineering *Installation Operators Manual* p/n 200-250-xxxx, revision X, dated ( ).
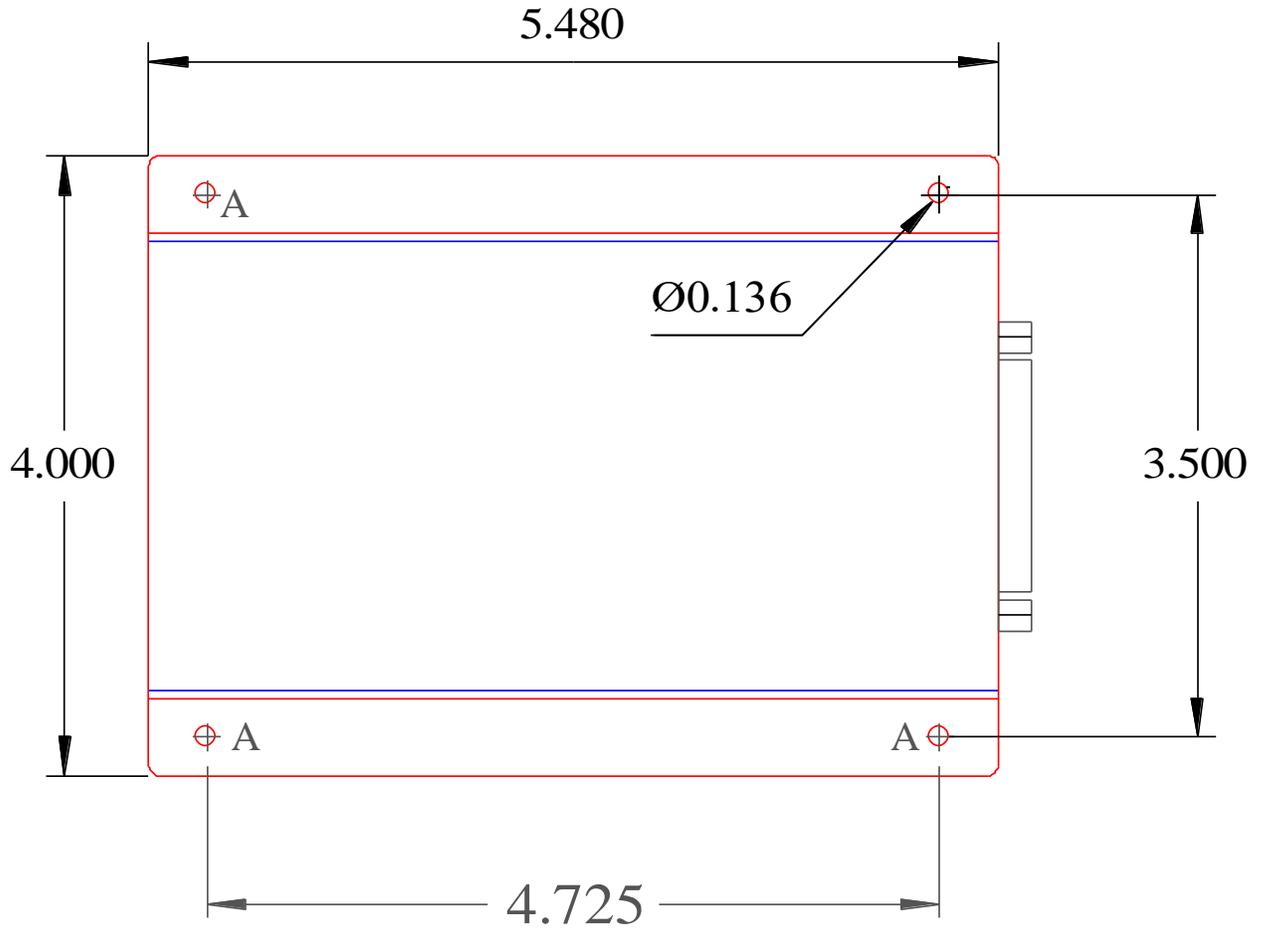
Interface to existing audio system in accordance with installation manual and in compliance with practices listed in *AC43.13-2B*, Chapter 2. All wires are Mil-Spec 22759 or 27500. No connection to the aircraft dimmer bus is required. No additional connection to aircraft power is made.

Aircraft equipment list, weight and balance amended. Compass compensation checked. A copy of the operation instructions, contained in PS Engineering document 200-250-( ), revision ( ), Dated ( ), is placed in the aircraft records. All work accomplished listed on Work Order_____.

5.2 Instructions for Continued Airworthiness:

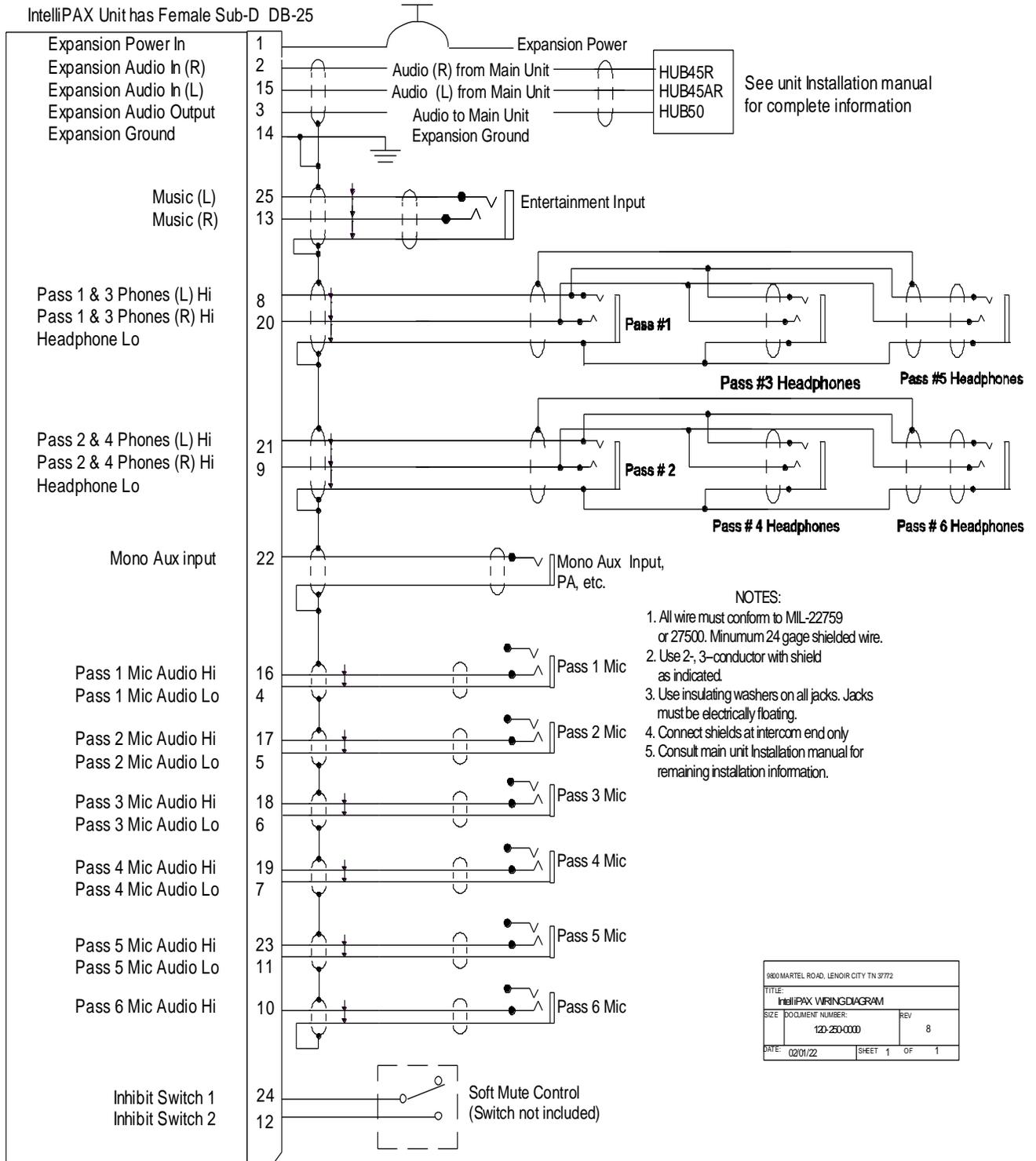| Section	Item	Information
1	Introduction	Installation of passenger intercommunications system.
2	Description	Installation as described in manufacturer's installation manual referenced on FAA Form 337, including interface with other avionics audio as required.
3	Controls	See installation and operator's 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 main unit into "OFF," the fail-safe mode. This allows normal 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	Removal: Remove Volume knob (if equipped (11606, 11616), 2 ea. then #4-40 black machine screws mounting the unit. Remove unit from behind panel. Place metal faceplate in a safe area. Installation: Align the volume knob shaft (if equipped, 11606, 11616) and the mounting holes with the panel and front plate. Secure using 2 ea. #4-40 black screws, provided.
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

Appendix B Installation

5.480

Ⓐ A

Ø0.136

4.000

3.500

Ⓐ A

A Ⓐ

4.725

Appendix C Wiring Information

IntelliPAX Unit has Female Sub-D DB-25

Figure 1 IntelliPAX Wiring

IntelliPAX
11645R

NOTE: Switch must be
installed for crew isolation

HUB45

J451   J453

2	AUDIO TO EXP (LEFT)	33
15	AUDIO TO EXP (RIGHT)	
3	EXP AUD TO PAC45	29

16
15

1   +28v AIRCRAFT POWER   1A

14   AIRCRAFT GND
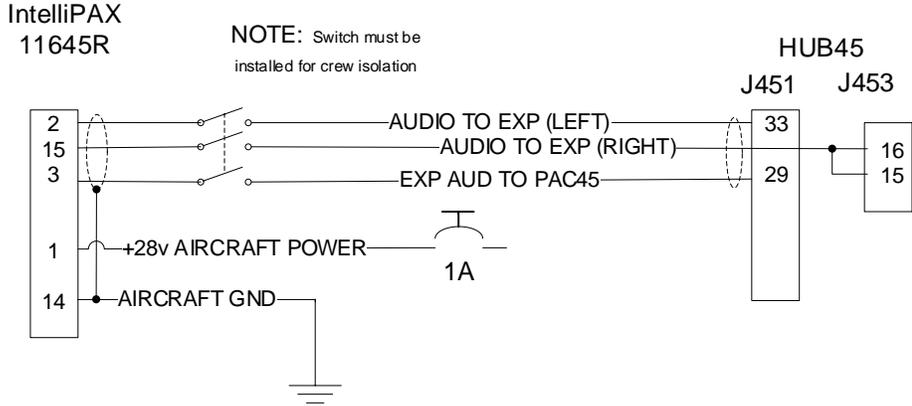
Figure 2 PAC45/HUB45R system Interface

IntelliPAX
11645R

HUB45A

P452

2	AUDIO TO EXP (LEFT)	25
15	AUDIO TO EXP (RIGHT)	
3	EXP AUD TO PAC45A	26

1   +28v AIRCRAFT POWER   1A   24

14   AIRCRAFT GND
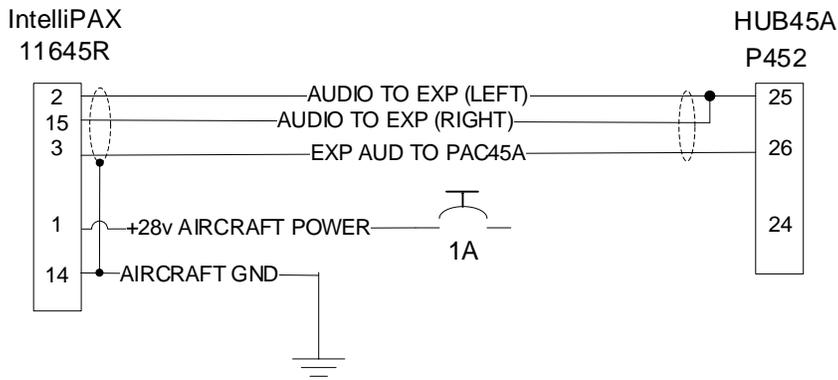
Figure 3 PAC45A/HUB45AR System Interface

IntelliPAX
11645R

HUB50

P452

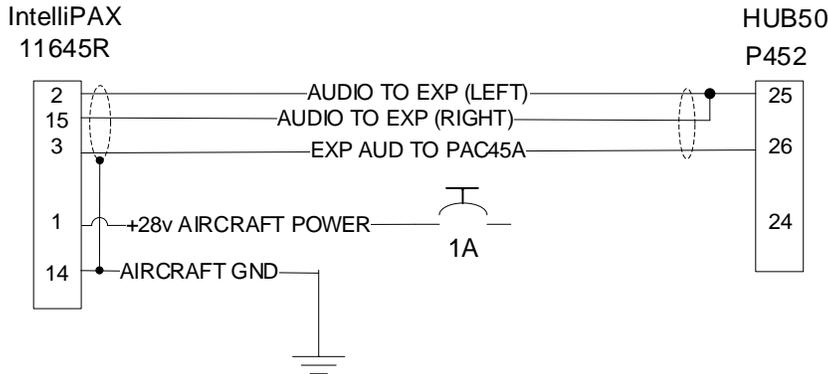| 2 | AUDIO TO EXP (LEFT) | 25 |
| 15 | AUDIO TO EXP (RIGHT) | |
| 3 | EXP AUD TO PAC45A | 26 |

1   +28v AIRCRAFT POWER   1A   24

14   AIRCRAFT GND

Figure 4 HUB50 System Interface