



Audio Equipment

Release 12.1

User Guide

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Table of Contents

1	About This Document	1
	1.1 References	1
2	PAC II Operation	3
	2.1 Modes of Operation	4
	2.1.1 911 Call Taking Mode	4
	2.1.2 Radio Integration Mode	4
	2.1.3 Port status during Call Taker and Radio Integration Modes	8
	2.1.4 External Radio Integration Mode	10
	2.2 PAC II Module Interfaces	11
	2.2.1 Front Panel Connectors	11
	2.2.2 Configuration Switches	13
	2.2.3 Status LEDs	13
	2.2.4 Jack box IV	14
	2.3 Voice Recording on PAC II	16
	2.4 Voice Recording on Guardian.	17
	2.5 PAC II Configuration	17
	2.5.1 Equipment	17
	2.5.2 Connections	19
	2.5.3 Cable Pin Assignments and Audio Specifications	20
	2.5.4 PAC II Jumper settings	30
	2.5.5 Dual-prong Connector	32
	2.5.6 Configuration	32
	2.5.7 Adjust Volume	40
	2.5.8 Adjust side tone	41
	2.5.9 PAC II troubleshooting	42

3	Installation	45
	3.1 Planning checklist	45
	3.2 Required equipment	45
	3.3 Optional Equipment	46
	3.4 Equipment for installing the PAC II	46
	3.5 Location Requirements	46
	3.6 Grounding Options	46
	3.7 Mounting the PAC II	47
	3.8 Mounting the Jackbox IV	48
4	PAC I Operation	51
	4.1 Radio Bypass Mode	52
	4.2 Call Taking Mode	54
	4.3 Voice Recording	54
	4.4 PAC I Module Interface	55
	4.4.1 Front Panel Connectors	56
	4.4.2 DIP Switches	57
	4.4.3 Status LEDs	57
	4.4.4 Rear Panel Connectors	58
	4.5 PAC I Installation	58
	4.5.1 Equipment	59
	4.5.2 Connection	60
	4.5.3 Cable Pin Assignments	62
	4.5.4 Jack Box Type I Pin Assignments	67
	4.5.5 Configuration	69
5	Position Audio Adapter Operation	75
	5.1 Headset/Handset Sensing	76
	5.2 Audio Sensing	76
	5.3 Audio and I/O Adapter and Jack Box Type III Interfaces	77
	5.3.1 Audio and I/O Adapter Connectors	77
	5.3.2 Jack Box Type III Connectors	78
	5.4 Installation	79
	5.5 Equipment	79
	5.6 Configuration	80

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The Center offers a complete range of support and services, including:

- answering queries and providing information
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- dispatching qualified field support personnel for training, installation, configuration, QoS audits, personalized requirements, and more.

You may request support and service online or by phone:

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Normal business hours are Monday to Friday from 09:00 to 17:00 ET.

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specific information about the document for which you are commenting, for example document part number (located on the back cover) and section number.

Safety Summary

The following general safety precautions must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. Solacom assumes no liability for the customer's failure to comply with these requirements.

This equipment meets all applicable requirements of both the CSA C22.2 No.60950 and UL 60950.

Ground the equipment

To minimize shock hazard, the equipment switch must be connected to an electrical ground. The equipment has a three-conductor AC power cable. This power cable must be plugged into an approved three-contact electrical outlet with the grounding wire (green) firmly connected to an electrical ground at the power outlet. The power cables meet International Electrotechnical Commission (IEC) safety standards.

The following precautions should also be observed when installing equipment:

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when working with telephone lines.

Keep away from live circuits

Operating personnel must not remove modules or otherwise tamper with the equipment switch or related components. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with the power cable connected unless the component is hot-

swapable. To avoid injuries, always disconnect power and discharge circuits before removing equipment shelves or making major modifications.

Only qualified persons should service the system

The installation and service of this hardware is to be performed by service personnel having appropriate training and experience necessary to be aware of hazards to which they are exposed in performing a task and of measures to minimize the dangers to themselves and others.

Do not service or adjust alone

Do not attempt major component replacement, internal service, or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

Replacement of modules

Replacement of modules should be performed by qualified maintenance personnel (those who have been trained and certified by Solacom).

Electrostatic discharge (ESD)

This product contains components that can be damaged by electrostatic discharge. You must take precautions when handling modules. As a minimum precaution, use grounded wrist straps at all times when handling modules.

Radio-frequency Interface

This equipment generates, uses, and can radiate radio-frequency energy. If not installed and used in accordance with the installation manual, it may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Part 15 of the FCC Rules and with ICES.003, CLASS A Canadian EMI Requirements. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his, or her own expense, will be required to take whatever measures may be required to correct the interference.

Do not modify the product

Do not install substitute parts or modify the product. To ensure that product integrity is maintained, contact the Solacom Customer System Support & Services Centre for any service or repair.

Power surge advisory

Electrical surges (typically lightning transients) are very destructive to customer terminal equipment connected to AC power sources. We recommend that you install AC surge arrestors in outlets to which any equipment is connected.

1

About This Document

This document provides information on the Position and Audio Control (PAC I and PAC II) modules. This document is of interest to you if you are adding or configuring a PAC module for your system.

1.1 References

Some common industry acronyms are used in this document. For reference, Appendix A contains a list of the acronyms used and their expanded form.

Other Solacom documents may also be useful. For information about

- using the Guardian client application in call taking role, see the *Guardian Intelligent Workstation User Guide*;
- managing the objects within the application, see the *Administration Reference* or click the Help button in the Guardian Administration window; and
- specific hardware and software, default IP addresses, user names, and passwords, cable connections, see the *System Configuration Manual*.

2 PAC II Operation

The Solacom PAC II (Position and Audio Control) module is a device that enhances audio functionality at operator positions. The PAC II supports multiple input and output ports to monitor and control audio devices.

2.1 Modes of Operation

The PAC II supports three modes of operation:

- 9-1-1 Call Taking;
- Radio Integration; and
- External Radio Integration.

2.1.1 911 Call Taking Mode

In 9-1-1 Call Taking Mode, there is no radio connection. The PAC II delivers the following functionality:

- Three relay closures to:
 - indicate ringing
 - indicate an active call
 - activate recording
- Two separate jack box ports in 4W mode (TX/RX) supporting carbon or electret headset/handset and independently configurable.
- Two audio recording ports
 - PC REC records caller and operator(s) audio
 - REC ALL records caller, operator(s), administrative phone, radio, ringer and auxiliary port (if used)
- Three auxiliary audio input ports (MONO, standard 3.5mm TRS audio jack)
- Port for administrative phone with On Hook / Off Hook activation

To adjust and calibrate volume settings for audio input and output devices, refer to *Guardian Intelligent Workstation User Guide*.

2.1.2 Radio Integration Mode

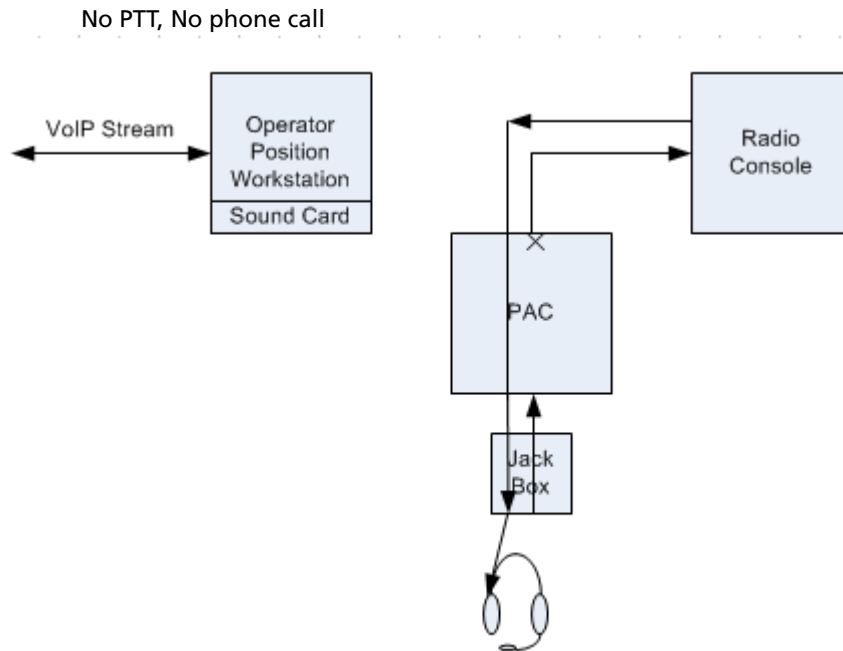
In Radio Integration mode, the PAC II module allows an operator (plus an optional operator), using separate headsets or handsets, to take phone calls and radio calls from a radio dispatch console. Radio Integration mode provides the following features:

- Three relay closures to:
 - indicate ringing
 - indicate an active call
 - activate recording
- Two separate jack box ports in 6W mode (TX/RX and PTT) supporting carbon or electret headset/handset and independently configurable.
- Foot switch for PTT signal (jack box 1)
- Two audio recording ports
 - PC REC records caller and operator(s) audio
 - REC ALL records caller, operator(s), administrative phone, radio, ringer and auxiliary port (if used)
- Three auxiliary audio input ports (MONO, standard 3.5mm TRS audio jack)
- Port for administrative phone with On Hook / Off Hook activation
- Port for radio console with radio sense relay output and keying relay output

The following diagrams show the radio and phone connections in four operating scenarios. Refer to Table 1, “PAC II port status,” on page 9 for a description of the activity on the PAC II when a position is idle, ringing, active, and during incoming and outgoing radio transmission.

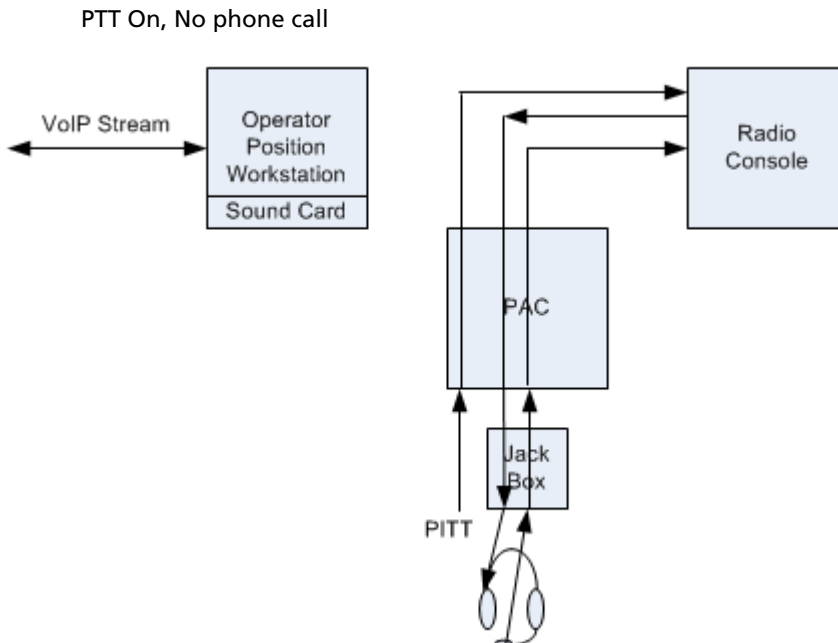
In Figure 1, a 9-1-1 call is not present. Radio audio is transmitted to the headsets. Since PTT is not on, the microphones cannot transmit audio to the radio.

Figure 1



In Figure 2, a 9-1-1 call is not present. Radio audio is transmitted to the headsets. Since PTT is on, the microphones can transmit audio to the radio.

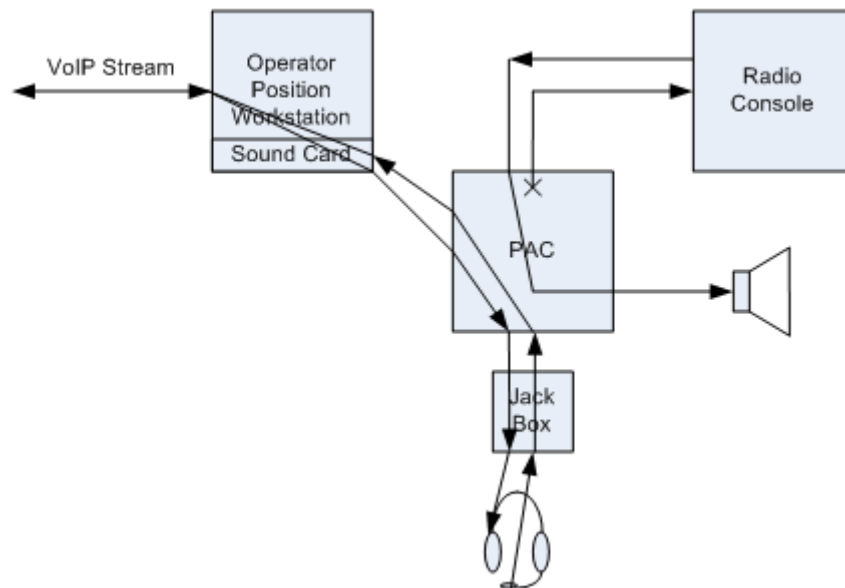
Figure 2



In Figure 3, a 9-1-1 call is present. Caller audio is transmitted to headsets. Microphones transmit audio to the 9-1-1 caller. Radio audio is transmitted to the speaker. Since PTT is off, the microphones cannot transmit audio to the radio.

Figure 3

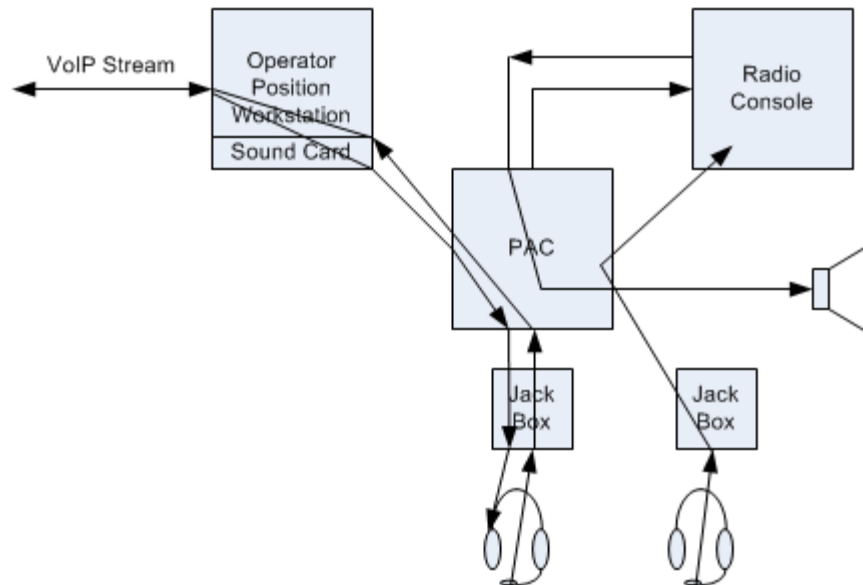
No PTT, Active phone call



In Figure 4, a 9-1-1 call is present. Both headsets and microphones can transmit audio to and receive audio from the caller. When PTT is on, the operator with PTT on can transmit audio to the radio. Radio audio is transmitted to the speaker.

Figure 4

Sense ON, PTT On, Active phone call



Refer to Table 1, “PAC II port status,” on page 9 for a description of the activity on the PAC II when a position is idle, ringing, active, and during incoming and outgoing radio transmission.

2.1.3 Port status during Call Taker and Radio Integration Modes

The following describes the activity on the PAC II when a position is idle, ringing, active, and during incoming and outgoing radio transmission.

Table 1

PAC II port status

Position Status	Activity on the PAC II interface
Position is idle	• Ringing call indication relay is inactive. • Active call indication relay is inactive. • Recorder trigger relay inactive. • Auxiliary port audio is connected to both jack box ports (if auxiliary input option is used). • No audio is present at recorder port PC REC. • Auxiliary and operator(s) microphone audio is present at recorder port REC ALL.
Call is ringing	• Ringing call indicator relay is active. • Active call indicator relay is inactive. • Recorder trigger relay is inactive. • Auxiliary port audio is disconnected from both jack box ports (if auxiliary input option is used). • No audio is present at recorder port PC REC. • Operator(s) microphone audio and PAC II integrated ringer tone is present at the recorder port REC ALL. • Guardian generated ringer is connected to Guardian Position PC speaker (if configured). • Guardian generated ringer is connected to both PAC II jack box ports (if configured). • PACII integrated ringer tone is connected to PAC II speaker port.
Admin or Emergency Call is active	• Ringing call indicator relay is inactive. • Active call indicator relay is active. • Recorder trigger relay is active. • Auxiliary port audio is disconnected from both jack box ports (if auxiliary input option is used). • Caller and operator(s) audio is present at the recorder port PC REC. • Caller and operator(s) audio is present at the recorder port REC ALL.

Position Status	Activity on the PAC II interface
Incoming radio transmission	• Auxiliary port audio is disconnected from both jack box ports (if auxiliary input option used) when VOX is detected. • Radio incoming transmission is connected to both jack box ports when VOX is detected or connected to speaker while an active call is present. • Incoming Radio transmission audio is present at the recorder port REC ALL.
Outgoing radio transmission (PTT or foot switch is on)	• Operator(s) microphone is disconnected from the caller (if active call present) and connected to radio console. • Operator(s) microphone audio is present at the recorder port REC ALL. • Operator(s) microphone audio is not present at the recorder port PC REC (while PTT is on).
Operator earpiece audio priority	• Active call state will automatically cut auxiliary audio. • Active call state will automatically cut administrative phone audio. • Off Hook indication on administrative phone input will automatically cut auxiliary audio. • When PTT is on: • Active call state will automatically reroute incoming radio transmission to PAC II speaker port. • Off Hook indication on Administrative Phone input will automatically reroute incoming radio transmission to PAC II speaker port.

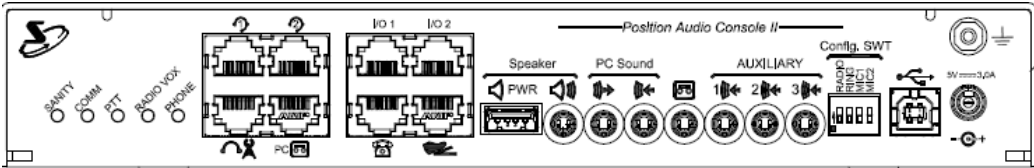
2.1.4 External Radio Integration Mode

External Radio Integration mode is used when a site has an existing call director in place. In this case the PAC II is configured in call taking mode and provides 9-1-1 call taking functionality. The PAC II connects to an external call director through jack box 1 and feeds the 9-1-1 calls to the external call director.

2.2 PAC II Module Interfaces

The PAC II housing is suitable for mounting at operator positions. This section explains the front panel connectors, switches, and indicators. For ease of use, all connections are accessible from the front panel.

Figure 5 Front Panel



2.2.1 Front Panel Connectors

The front panel consists of eight RJ-45 connectors, one type A USB connector and one type B USB connector, seven 3.5mm TRS audio ports, four DIP switches, and five LED indicators.

Table 2 RJ-45 Connectors

Item	Description	Modes		
		Call Taking	Radio Integration	External Radio
	Connect to Jack box 1 to enable sense for an operator headset/handset or an external call director.	x	x	x
	Connect to Jack box 2 to enable sense for an operator headset/handset.	x	x	
	Connect to a radio console when Radio Integration mode is configured.		x	
PC 	Connects to customer provided analog recorder and provides caller and operator(s) audio and recorder trigger relay output.	x	x	
I/O 1	For future use.			
I/O 2	Provides ringer indication relay and active call indication relay.	x	x	x

Item	Description	Modes		
		Call Taking	Radio Integration	External Radio
	Provides administrative phone port with On Hook / Off Hook detection.	x	x	x
	Connects to a foot switch for PTT signal. The foot switch replaces or can be used along PTT functionality of jack box 1.		x	

Table 3

Speaker Connectors

Item	Description	Modes		
		Call Taking	Radio Integration	External Radio
 PWR	Type B USB connector. 5V power is present at this port.	x	x	x
	PAC II output - connect to speaker audio.	x	x	x

Table 4

3.5 mm Jack Connectors

Item	Description	Modes		
		Call Taking	Radio Integration	External Radio
	PAC II output - connect to Line In on the operator position sound card.	x	x	x
	PAC II input - connect to Line Out on the operator position sound card.	x	x	x
	Record All. Connect to a customer provided analog recorder and provides caller, operator(s), radio, administrative phone, auxiliary and ringer audio.	x	x	x
	Connect to an audio feed, such as an Ipod, MP3, TV audio.	x	x	x
	Connect to an audio feed, such as an Ipod, MP3, TV audio.	x	x	x
	Connect to an audio feed, such as an Ipod, MP3, TV audio.	x	x	x

Table 5

USB Connector, Power and Ground

Item	Description
	Type B USB connector that connects to the operator position workstation to enable communication between the PAC II and the Guardian Operator Position software.
	5V DC power supply connections to the external power supply.
	Connection post for the grounding cable.

2.2.2 Configuration Switches

Four front panel DIP switches are used to select options for operation. Anytime a switch is changed, the PAC should be reset.

Table 6

DIP Switches

Item	Description
RADIO	Controls whether radio bypass is used. - UP (On) – enables radio integration mode. - Down (Off)– enables Call Taking mode.
RING	Sets where a call will ring; either on speakers or the handset/headset. - UP (On) – enable integrated PAC II ringer; or - Down (Off)– disable integrated PAC II ringer.
MIC1	Sets the type of headset/handset microphone used for jack box 1. - UP (On) – carbon; or - Down (Off)– electret.
MIC2	Sets the type of headset/handset microphone used for jack box 2. - UP (On) – carbon; or - Down (Off)– electret.

2.2.3 Status LEDs

Five LEDs on the front panel indicate PAC II status.

Table 7

Status LEDs

Item	Description
SANITY	Flashing green LED indicates good sanity. Solid red indicates maintenance mode.
COMM	Green LED indicates communication between the PAC II and the operator position. No LED indicates no communication between the PAC II and the operator position.
PTT	Green LED indicates foot switch or PTT button on headset has been pressed and the microphone is connected to the radio port. No LED indicates the foot switch or PTT button on headset has not been pressed and the microphone is not connected to the radio port.
RADIO VOX	Green LED indicates audio has been detected on radio input. No LED indicates no audio has been detected.
PHONE	Green LED indicates administrative phone Off Hook detection. No LED indicates administrative phone On Hook detection.

2.2.4 Jack box IV

The jack box type IV is located at the operator position and can be mounted on the desk using the under-desk mounting brackets. This section describes the front and rear panel connectors.

The front panel consists of a dual prong jack and a volume control dial.

Figure 6

Front Panel



Table 8

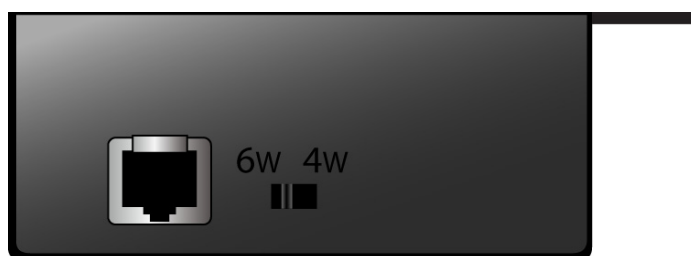
Front Panel; Connector

Item	Description
Dual-prong jack	Connects to the headset or handset. For electret polarized handsets, match the  icon located on the side of the handset cable dual prong housing to the left side of the jack box.
Volume control	Allows the operator to adjust the volume on the headset or handset.

The rear panel consists of one RJ-45 connector and a switch.

Figure 7

Rear Panel

**Table 9**

Rear Panel; Connectors

Item	Description
RJ-45	Connects to the ① or ② interfaces on the PAC II and provides headset audio and PTT signals. When the handset or headset is unplugged from the dual prong socket or the RJ-45 cable is unplugged, the position is busied out.
Switch	Select 6w (6 wires) when the headset/handset has a PTT switch installed, for example Radio Integration mode. Select 4w (4 wires) when the headset/handset does not have a PTT switch installed, for example 9-1-1 Call Taker mode.

2.3 Voice Recording on PAC II

There are 2 ways to record audio when a PAC II is configured, local recording and record all.

Local recording captures the audio of caller and operators' phone calls and sends it to a local recorder. Operators can then access portions of the recording (Instant Retrieval) on demand. Caller audio is sent along with a signal that triggers on the presence of an active call so that recording takes place only when a call is answered.

Record all, records all audio including, caller, operator(s), radio, administrative phone, auxiliary, and ringer audio.

2.4 Voice Recording on Guardian

When an IRR application is installed and configured on a operator position, the application is continually recording and saving files at preset intervals so an operator can quickly play back portions of a current or previous recording. An Instant Replay Recorder button on the Guardian user interface provides access to all the voice communications that passed through the operator position and replays the recordings through the PAC II to the operator headset/handset.

» Configure IRR interaction for PAC II...

- 1 Navigate to “C:\EdgeIQ\LibertyShield”.
- 2 Open the file “LibertyShield.exe.config” in a text editor.
- 3 Ensure PAC2 IRRInteraction parameter is set to “yes”.

For more information about IRR Interaction mode and active call and recorder audio signal management, refer to *Guardian Operator Position Workstation Setup Guide*.

2.5 PAC II Configuration

Solacom systems are shipped with all components pre installed and configured. However, for upgrades or reconfigurations, it may be necessary to have a PAC II module added on site. The information in this section is meant to help you install and configure a PAC II module for your system.

2.5.1 Equipment

The external equipment associated with the PAC II module consists of the following:

- Jack box type IV - contains dual-prong jacks and under-desk mounting brackets.
- Speakers:
 - PAC speaker - external speaker for radio Rx audio and PAC II ring tone.
 - PC speakers (customer-supplied) - external speaker for caller audio, IRR playback audio, and phone ring tone.
- Power Supply - transformer capable of providing 30W from an DC source.
- Foot switch (optional) - alternative device for keying PTT.

- Customer provided admin phone - to answer admin calls.
- Customer provided radio console - to answer and monitor radio calls.
- Customer provided recorder - to record the audio of phone calls and radio communication and/or record all audio output.
- Auxiliary audio - to support TV, Ipod or MP3 audio.
- Cables - for interconnecting the components.

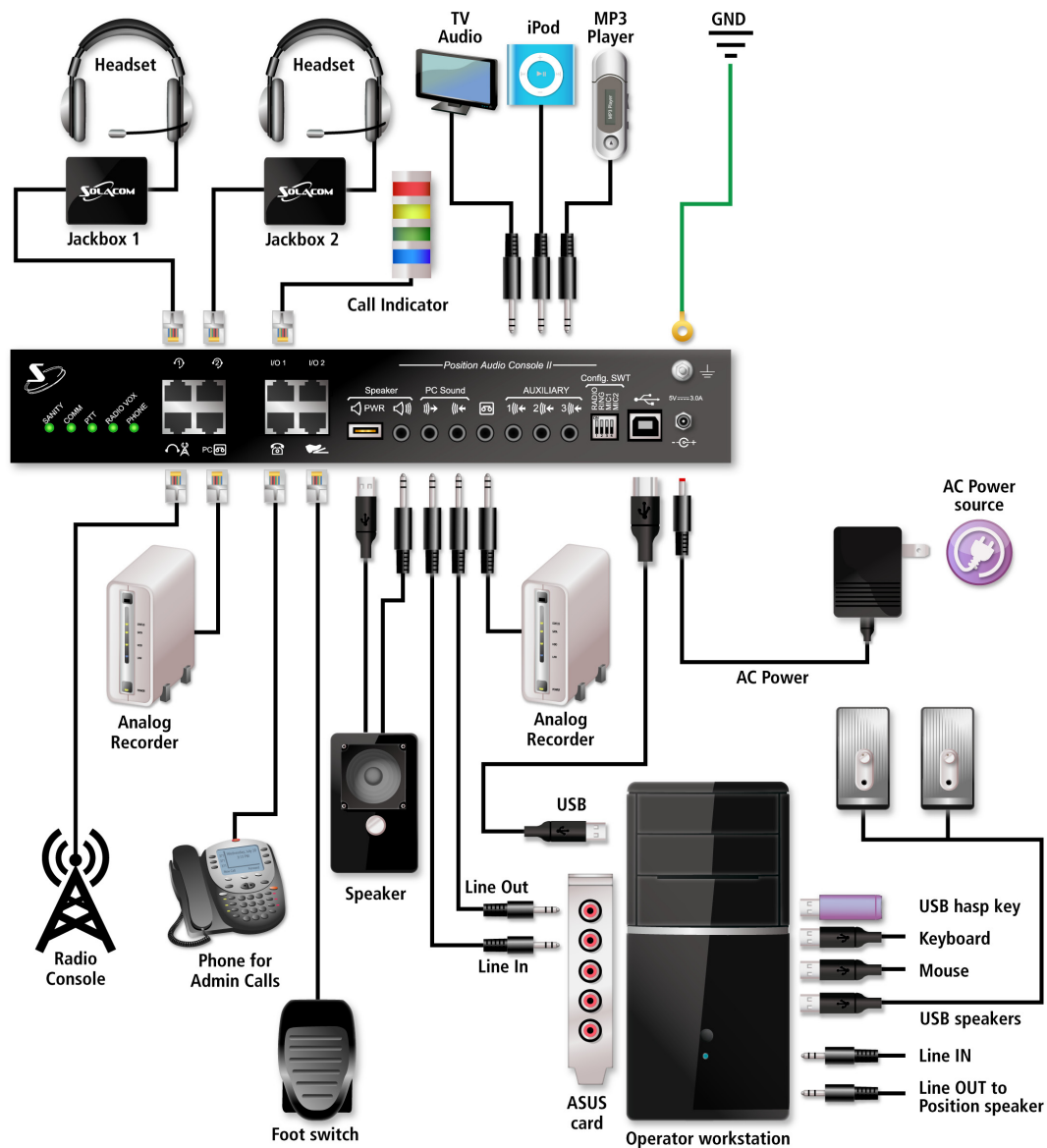
2.5.2 Connections

The PAC II module connects to the external equipment and operator position workstation in the following manner. Interfaces not used are not displayed.



Note: In the example below, devices such as recorders, auxiliary devices, admin phones and indicator devices are customer provided

Figure 8 Connections



The following cables are used for interconnections:

Table 10

Cable list

Name

AC Power Cord

Grounding Cable

Jack box Cable

Speaker Cable

Sound Card Cable

RJ45 cable



Note: The Sound Card cable carries analog audio signals between the PAC II module and an operator position workstation, and uses the Line In and Line Out jacks to connect to the audio card of the computer. Therefore, any operator position speakers connected to the computer must use another audio device, such as USB speakers.

2.5.3 Cable Pin Assignments and Audio Specifications

The following tables contain the pin assignments for the data interconnection cables.

2.5.3.1 PAC II Module USB interface () to Operator Position Workstation USB

Table 11

Pin Assignments

Pin	Signal
1	Vbus (+5v)
2	D-
3	D+
5	GND

2.5.3.2 Jack box 1 interface (①)

Table 12

Audio Signal Specifications

Description	Specification
Output impedance	35Ω
Nominal Output level	47 mVrms
Input impedance	2KΩ (electret) 135Ω (carbon)
Nominal Input level	10 mVrms (electret) 25 mVrms (carbon)

Table 13

Pin Assignments

Pin	Signal
1	JB1 PTT common
2	JB1 PTT
3	JB1 microphone in+
4	JB1 speaker out +
5	JB1 speaker out -
6	JB1 microphone in-
7	unassigned
8	JB1 sense

2.5.3.3 Jack box 2 interface (②)

Table 14

Audio Signal Specifications

Description	Specification
Output impedance	35Ω
Nominal Output level	47 mVrms

Description	Specification
Input impedance	2K Ω (electret)
	135 Ω (carbon)
Nominal Input level	10 mVrms (electret)
	25 mVrms (carbon)

Table 15

Pin Assignments

Pin	Signal
1	JB2 PTT common
2	JB2 PTT
3	JB2 microphone in+
4	JB2 speaker out +
5	JB2 speaker out -
6	JB2 microphone in-
7	unassigned
8	JB2 sense

2.5.3.4 Radio Handset/Headset interface ()

Table 16

Audio Signal Specifications

Description	Specification
Output impedance	600 Ω
Nominal Output level	26 mVrms
Input impedance	600 Ω
Nominal Input level	47 mVrms
VOX detect threshold	25 mVrms or -30 dBm

Table 17

Pin Assignments

Pin	Signal
1	PTT/Jack box sense common
2	PTT output
3	Radio headset in+
4	Radio headset out+
5	Radio headset out-
6	Radio headset in-
7	unassigned
8	Jack box sense

2.5.3.5 PC Recorder interface ()

Table 18

Audio Signal Specifications

Description	Specification
Output impedance	600Ω
Output level	122 mVrms

Table 19

Pin Assignments

Pin	Signal
1	Recorder relay common
2	Recorder relay normally open
3	unassigned
4	9-1-1 call record output+
5	9-1-1 call record output-
6	unassigned
7	unassigned
8	unassigned

2.5.3.6 Admin Phone interface ()

Table 20

Audio Signal Specifications

Description	Specification
Output impedance	600Ω
Nominal Output level	26 mVrms
Input impedance	600Ω
Nominal Input level	47 mVrms

Table 21

Pin Assignments

Pin	Signal
1	GND
2	unassigned
3	Headset phone output +
4	Headset phone input +
3	Headset phone output -
4	Headset phone input -
7	Off hook detect +
8	Off hook detect -



Caution: When the input voltage to the optocoupler (Off hook detect +) is provided internally by the PAC do not connect a device to Pin 7. When the input voltage to the optocoupler is provided externally by a Customer, disconnect JP 4 (refer to Table 40, “Jumper Settings,” on page 31) and connect device to Pin 7

2.5.3.7 Foot switch interface ()

Table 22

Pin Assignments

Pin	Signal
1	Common
2	Foot switch PTT
3	unassigned
4	unassigned
3	unassigned
4	unassigned
7	unassigned
8	unassigned

2.5.3.8 Input/Output 1 interface (I/O 1)

Table 23

Pin Assignments

Pin	Signal
1	GUI control 1 relay - common
2	GUI control 1 relay - normally closed
3	GUI control 1 relay - normally open
4	GUI control 2 relay - common
3	GUI control 2 relay - normally closed
4	GUI control 2 relay - normally open
7	Input 1+
8	Input 1-



Caution: When the input voltage to the optocoupler (Input 1+) is provided internally by the PAC do not connect a device to Pin 7. When the input voltage to the optocoupler is provided externally by a Customer, disconnect JP 7 (refer to Table 40, “Jumper Settings,” on page 31) and connect device to Pin 7

2.5.3.9 Input/Output 2 interface (I/O 2)

Table 24

Pin Assignments

Pin	Signal
1	Phone indicator relay - common
2	Phone indicator relay - normally closed
3	Phone indicator relay - normally open
4	Ring indicator relay - common
3	Ring Indicator relay - normally closed
4	Ring Indicator relay - normally open
7	Input 2+
8	Input 2-



Caution: When the input voltage to the optocoupler (Input 2+) is provided internally by the PAC do not connect a device to Pin 7. When the input voltage to the optocoupler is provided externally by a Customer, disconnect JP 10 (refer to Table 40, “Jumper Settings,” on page 31) and connect device to Pin 7

2.5.3.10 Speaker interface ()

Table 25

Audio Signal Specifications

Description	Specification
Output impedance	600Ω
Nominal Output level	450 mVrms

Table 26

Pin Assignments

Pin	Signal
Tip	Speaker output +
Ring	Speaker output +
Sleeve	Speaker output -

2.5.3.11 Speaker Power interface (^{PWR})

Table 27

Pin Assignments

Pin	Signal
1	Vbus (+5v)
2	unassigned
3	unassigned
4	GND



Note: Typically the PAC II provides the power for the speaker. When power is provided from an alternate source this connection is not required

2.5.3.12 PC Sound Output to Sound Card Line In ()

Table 28

Audio Signal Specifications

Description	Specification
Output impedance	600Ω
Output level	122 mVrms

Table 29

Pin Assignments

Pin	Signal
Tip	PC sound output +
Ring	unassigned
Sleeve	PC sound output -

2.5.3.13 PC Sound Input to Sound Card Line Out ()

Table 30

Audio Signal Specifications

Description	Specification
Input impedance	20KΩ
Nominal Input level	122 mVrms

Table 31

Pin Assignments

Pin	Signal
Tip	PC sound input +
Ring	unassigned
Sleeve	PC sound input -

2.5.3.14 Recorder (record all) interface ()

Table 32

Audio Signal Specifications

Description	Specification
Output impedance	600Ω
Nominal Output level	122 mVrms

Table 33

Pin Assignments

Pin	Signal
TIP	Record all +
Ring	unassigned
Sleeve	Record all -

2.5.3.15 Auxiliary 1 interface ()

Table 34

Audio Signal Specifications

Description	Specification
Input impedance	20KΩ
Nominal Input level	122 mVrms

Table 35

Pin Assignments

Pin	Signal
TIP	Auxiliary 1 input +
Ring	unassigned
Sleeve	Auxiliary 1 input -

2.5.3.16 Auxiliary 2 interface (2🔊)

Table 36 Audio Signal Specifications

Description	Specification
Input impedance	20KΩ
Nominal Input level	122 mVrms

Table 37 Pin Assignments

Pin	Signal
TIP	Auxiliary 2 input +
Ring	unassigned
Sleeve	Auxiliary 2 input -

2.5.3.17 Auxiliary 3 interface (3🔊)

Table 38 Audio Signal Specifications

Description	Specification
Input impedance	20KΩ
Nominal Input level	122 mVrms

Table 39 Pin Assignments

Pin	Signal
TIP	Auxiliary 3 input +
Ring	unassigned
Sleeve	Auxiliary 3 input -

2.5.4 PAC II Jumper settings

Jumper settings enable or disable system-level features. The following table describes the function and default for each setting:

Table 40

Jumper Settings

Jumper	IN	OUT	Description
JP1		x	Used for debugging
JP3		x	Used for debug (Tx and Rx)
JP3	B	A	When A is enabled - Speaker audio and ring sent to recorder When B is enabled - Speaker audio sent to recorder
JP4	x		OFF_Hook optocoupler (5 V) provided by the PAC II
JP5	x		RING Indicator Relay common to ground, provided by the PAC II.
JP6	x		Phone Activation Indicator Relay common to ground, provided by the PAC II.
JP7	x		INPUT 1 optocoupler (5 V) provided by the PAC II
JP8	x		GUI control Relay #2 common to ground, provided by the PAC II
JP9	x		GUI control Relay #1 common to ground, provided by the PAC II
JP10	x		INPUT 2 optocoupler (5 V) provided by the PAC II
JP11	x		Recorder Relay common to ground, provided by the PAC II
JP12	x		Handset/Headset Radio PTT/Jacksense common to ground, provided by the PAC II
JP13		x	Used during processor programming
JP14		x	Used during processor programming



Note: Settings are based on the assumption that the voltage and the GND on input/output is provided by the PAC II.

2.5.5 Dual-prong Connector

Headsets or handsets that connect to the jack box contain dual TRS plugs with the following connections:

Figure 9

Headset/Handset Connection with PTT

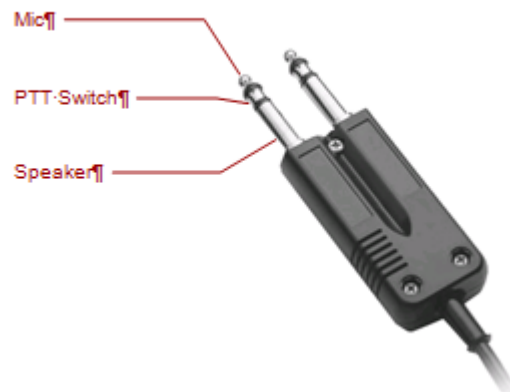


Figure 10

Headset/Handset Connection without PTT



2.5.6 Configuration

For integration with the Guardian IWS (Emergency Call Taking), the application needs to be aware of the PAC II module, and this requires that the PAC II plug-in be installed and configured at each operator position. A device driver must also be installed.

» **To install the PAC II device driver...**

- 1 Ensure the PAC II device is connected to the operator position through the USB connection. The Guardian system detects the hardware device and displays the device as unknown in the Device Manager window.
- 2 From the operator position, click Start > Control Panel > System > Device Manager. The Device Manager window opens.
- 3 Expand Ports (COM & LPT).
- 4 Right-click on the device labeled unknown. A dropdown menu opens.
- 5 Select Update Driver... A Hardware Update Wizard opens.
- 6 Browse to the folder where the driver is located.
- 7 Click OK The driver is downloaded.
- 8 Exit the Hardware Update Wizard.

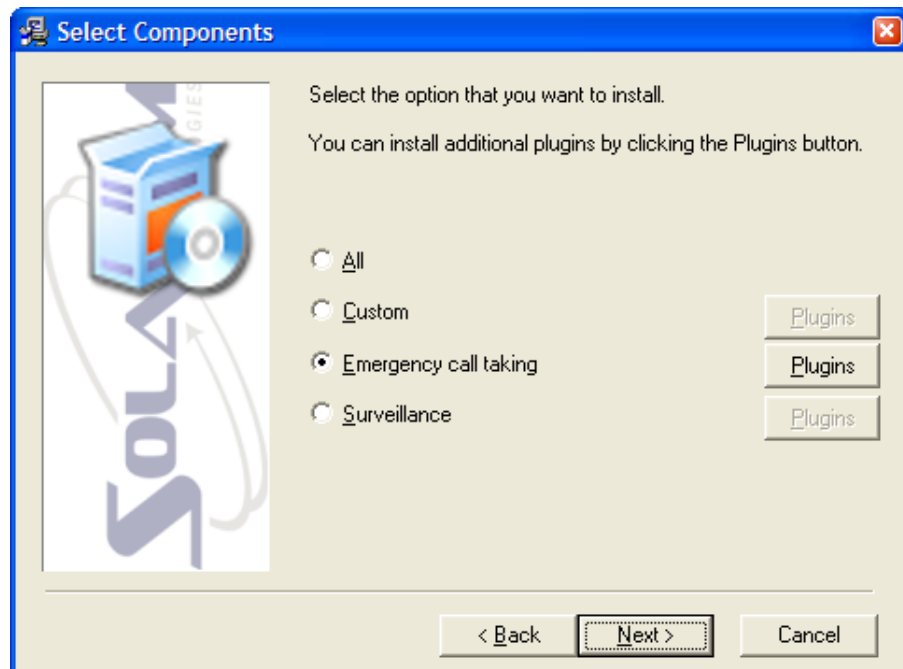


» **To install and configure the PAC II...**

- 1 Run the Guardian client installation program “LibertySHIELD_Setup.exe”.
- 2 Run through the installation until you get to the Select Components page.
- 3 Ensure that the Emergency Call Taking option is selected, and click the corresponding plug-in button.

Figure 11

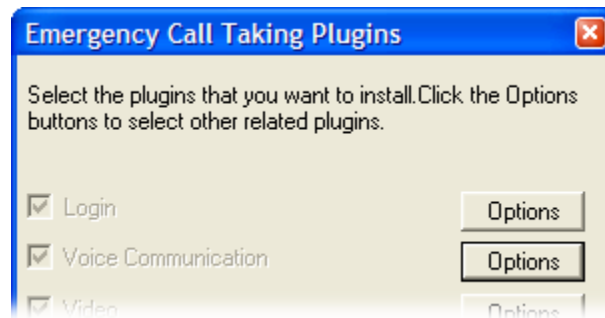
Select Components window



- 4 In the Emergency Call Taking Plugins dialog box, click the Options button to the right of the Voice Communication check box

Figure 12

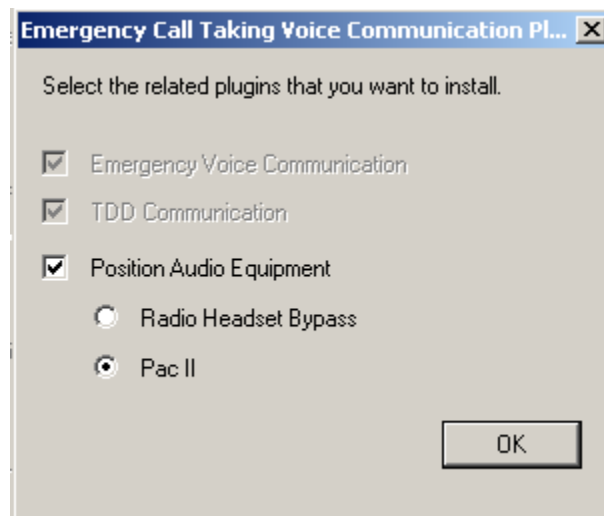
Plugins window



- 5 In the Emergency Call Taking Voice Communication Options dialog box, check Position Audio Equipment. Two options appear with radio buttons.

Figure 13

.Plugins window



- 6 Select Pac II.
- 7 Click OK in the dialog boxes until you return to the installation program.
- 8 Click Next and then continue with the installation until finished.
- 9 Launch Guardian on the operator position.
- 10 Log in, and then log out again. This adds new options to the Audio configuration file.
- 11 From the installed application folder, edit the file "LibertyShield.exe.config" and make the following modifications:

- Set the `<Headset Device="(device name)" RTPport="4000">` and the `<Microphone device="(device name)">`.



Note: For Windows 7, use the exact device name in brackets. To ensure you have the exact device name, refer to the Controller Information on the device properties dialog box.

These are the computer audio out and audio in devices that the Radio Headset Bypass device will use.

- Set the `<Speaker Device="device name" RTPport=4002">` value to the name of the device that connects to the position speakers.

This is typically the USB speakers.

When a PAC II is not installed perform the following:

- Comment out the line by adding leading `<!--` at the beginning of the PAC2 element (`<!--<PAC2>`) and ending with `-->` characters.

When a PAC II is installed perform the following:

- Locate the `<PAC2>` `<InputSetting>` element and view the following settings. Values are configured in the View > Volume Settings menu option in the Guardian application

To adjust and calibrate volume settings for audio input and output devices, refer to the *Guardian Intelligent Workstation User Guide*.

Item	Description
JB1Mic	Headset/handset microphone connected to jack box 1.
JB2Mic	Headset/handset microphone connected to jack box 2.
PhoneMic	External phone microphone
RadioMic	Radio console microphone
AUX1	Auxiliary 1 control. One AUX1 can be enabled at a time.
AUX2	Auxiliary 2 control. One AUX1 can be enabled at a time
AUX3	Auxiliary 3 control. One AUX1 can be enabled at a time
PCLineOut	PC Line Out for PC sound

- Locate the <PAC2> <OutputSetting> element and view the following parameters. Values are configured in the View > Volume Settings menu option in the Guardian application...

Item	Description
JB1RX	Headset/handset receiver connected to jack box 1.
JB2RX	Headset/handset receiver connected to jack box 2.
PhoneRX	External phone receiver
RadioRX	Radio console receiver
RecAll	Record All control
PCRec	PC recorder
PCLineIn	PC Line In for PC sound

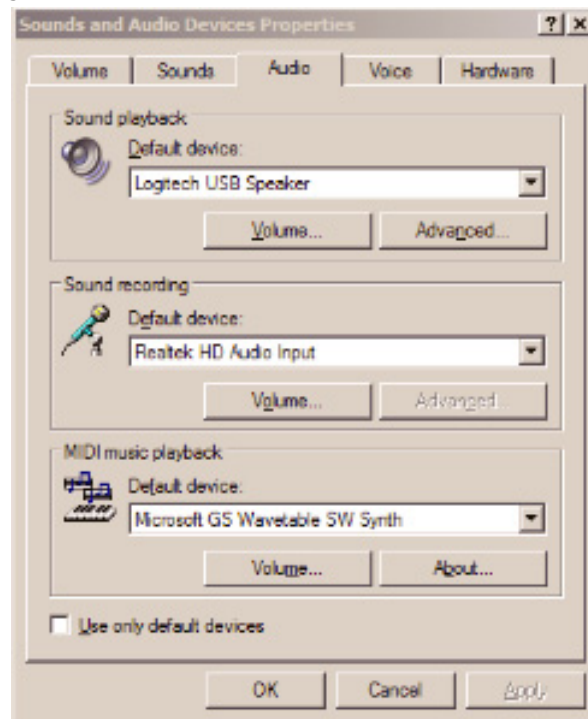
- 12** In a Windows XP environment, from the Windows Control Panel, double click Sounds and Audio Devices.
- 13** In the Audio and Voice tabs, ensure that the playback and recording devices are set to the sound card.
- 14** To configure Line in, click on the Audio tab. The following window appears.



Note: Configure Line-In and not Microphone Input.

Figure 14

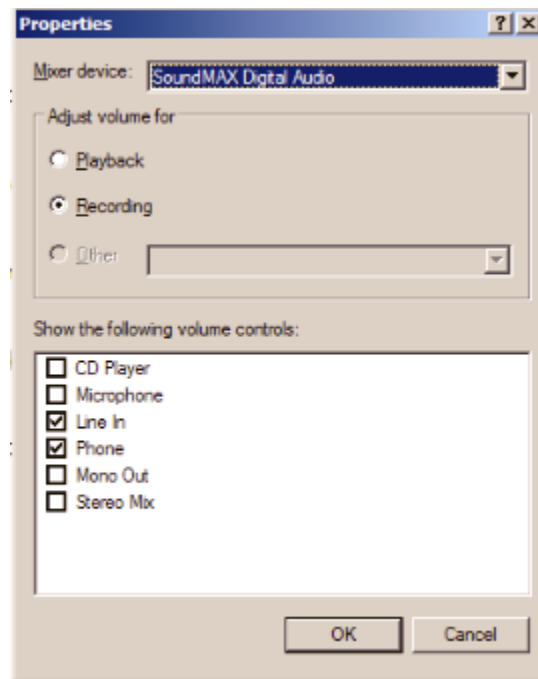
Configure Line in



- 15** Click on the Volume button for Sound Recording.
- 16** Click on Options from the toolbar. A dropdown menu appears.
- 17** Choose Properties. A Properties window appears.

Figure 15

Properties window

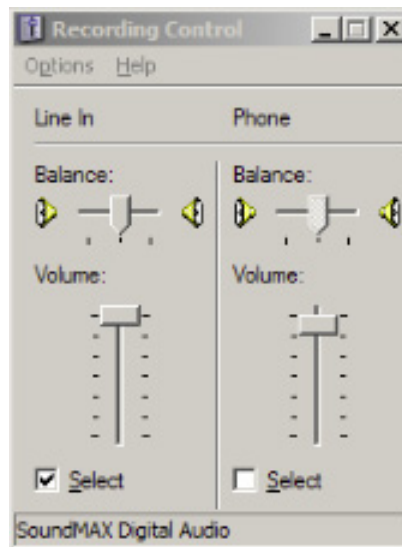


18 Select Line In.

19 Click on the OK button. The Recording Control window opens.

Figure 16

Recording Control window

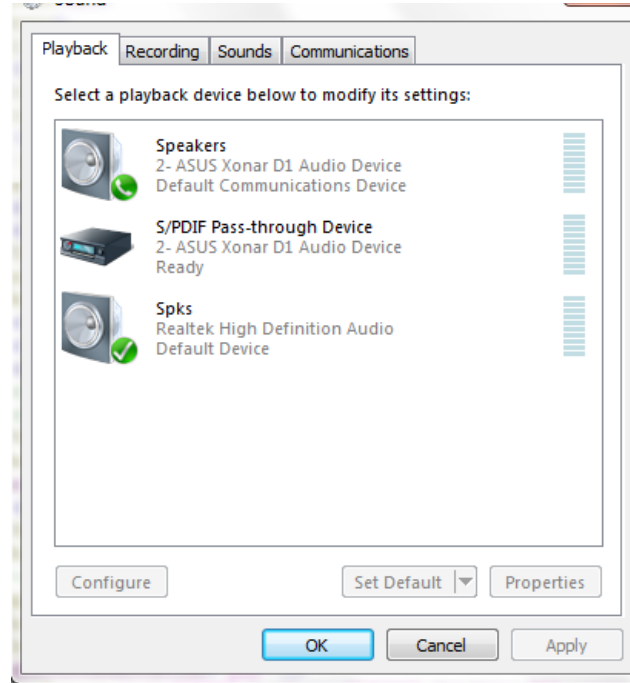


20 Check the Select box and use the slider to ensure that volume settings are set to maximum for all audio options.

21 In a Windows 7 environment, from the Windows Control Panel, double click Sound; the following window appears.

Figure 17

Sound window



- 22 Right-click on the ASUS Speaker option; a dropdown list appears.
- 23 Choose Set as Default Communication Device.
- 24 Right-click on the workstation speaker option; a dropdown list appears.
- 25 Choose Default Device.
- 26 To configure Line in, navigate to the Windows Control Panel, click Sound
A Sound window opens.
- 27 Click on the Recording tab.
- 28 Right-click on the Line In option.
- 29 Choose Set as Default Device.
- 30 Click OK to close the Sound window.
- 31 Launch Guardian and verify that the Sense indicators are listed on the status bar.

JB1 - Sense: ON PTT: OFF JB2 - Sense: OFF PTT: OFF



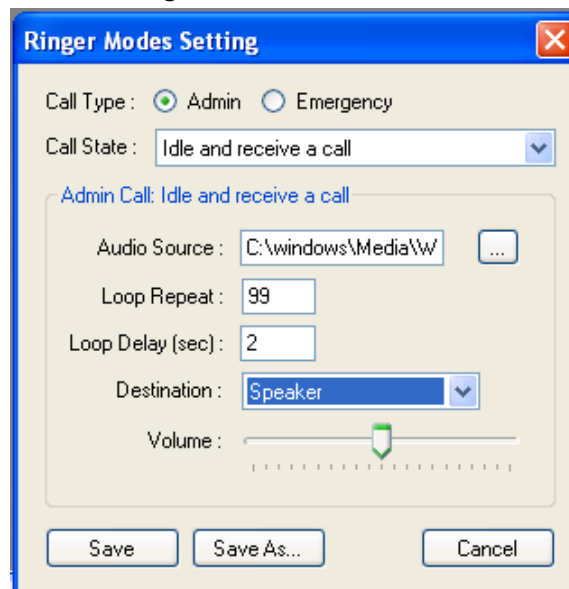
Note: Information for both jack boxes is displayed on the status bar.

- 32 From the menu, click Tools > Ringer Modes > Ringer Modes Setting.

- 33 In the Ringer Modes Setting dialog box, ensure that, for each combination of Call Type and Call State, Destination is set to Speaker

Figure 18

Ringer Modes Setting window



- 34 Perform test calls on emergency and admin lines, and check that the audio (two-way) and PTT signals are working properly.

2.5.7 Adjust Volume

An operator or administrator's ability to adjust and set volumes for specific devices is based on the users assigned access privileges. Volumes can be adjusted in the following manner:

When no access privilege is assigned, a user can:

- adjust headset volume using the volume button on the jack box
- adjust speaker and headset speaker volume from View > Volume Control g

When PAC II > Auxiliary Audio Selection privilege is assigned, a user can:

- adjust the volume for an auxiliary device without performing a full calibration

When PAC II> Volume Calibration privilege is assigned, a user can adjust and calibrate the volume for the following input and output audio devices connected to the PAC II:

- operator headset/handset
- radio console audio
- analog recorder
- admin handset/headset
- audio feed for auxiliary devices such as, Ipod, TV, radio

2.5.8 Adjust side tone

Side tone is defined as the sound that is picked up from the microphone mouth piece and sent back to the earpiece. A small amount of side tone is useful when speaking into a telephone or radio. It allows the speaker to hear their own voice at low levels through the earpiece and assures them that their voice is being transmitted. When side tone is too low, it may cause the speaker to question if the telephone is working. Too much side tone may cause the speaker to think they are speaking too loud, and as a result lower their voice.

In a Guardian system the following devices provide side tone:

- radio console connected to the radio port of the PAC II (when in radio mode)
- administrative phone connected to the phone port of the PAC II; and
- position PC when an Admin or 911 call is present.

Refer to Appendix C for a description of audio behavior when the operator is communicating with a radio, admin phone or position PC.

From the Guardian position, the user is able to adjust the level of side tone generated by the PC. To adjust side tone generated from the other devices, the user should refer to the documentation for the specific device.

» To adjust side tone on the position PC sound card...

Perform the following steps to ensure the communication device and default device are set to ASUS Line In.



- 1 Right-click on the volume icon in the taskbar; a menu appears.
- 2 Select Recording devices; a Sound window opens with the Recording tab displayed.
- 3 Select Line In.
- 4 Click on the Properties button; a Line In Properties window opens.

- 5 Click on the Listen tab.
- 6 Check Listen to this device.
- 7 Click OK.



Perform the following steps to adjust side tone volume.

- 8 Right-click on the volume icon in the taskbar; a menu appears.
- 9 Select Open Volume Mixer.
- 10 Adjust the Line In volume using the slider.
- 11 Close the window.

2.5.9 PAC II troubleshooting

These troubleshooting procedures allow you to solve problems with PAC II configuration. Where more than one procedure is given, the procedures represent different options from which you should select one.

Symptom	Action
LED for the Admin phone is not lit when a call arrives.	Green LED indicates administrative phone Off-Hook detection. No LED indicates administrative phone On Hook detection. See “Status LEDs” on page 13.
Cannot hear IRR playback in headset.	You must enable IRR interaction in the LibertyShield.exe.config file. See “Voice Recording on Guardian” on page 17.
Headset receives audio only, no microphone	Check DIP switches for MIC1 and MIC2. See “Configuration Switches” on page 13.
Headset microphone is too hot	Ensure the ASUS sound card audio is set to line in. Refer to <i>Guardian Operator Position Setup Guide</i> . Adjust microphone volume accordingly. See “Adjust Volume” on page 40.
PTT is not working	Check the switches located at the rear of the Jackbox IV. Ensure 6w is selected. See “Jack box IV” on page 14. Check Radio switch on PAC II. See “Configuration Switches” on page 13.

Symptom	Action
No audio to the headset when a MP3 player is connected to the AUX1 port.	Ensure Auxiliary 1 is selected from the Auxiliary Selection window. Refer to <i>Guardian Intelligent Workstation User Guide</i> .
Audio side tone is too loud when two headsets are connected to one position PC.	You can adjust the side tone when a headset/handset is connected to the PC sound card. See “Adjust side tone” on page 41.

3

Installation

This Chapter provides installation information for the PAC II module and Jackbox IV. Configuration information is located in the PAC II Operation chapter. The PAC II replaces the PAC and supports multiple input and output ports to monitor and control audio devices.

3.1 Planning checklist

- Verify that you have all the equipment and supplies needed to install the PAC II and Jackbox IV.
- Determine the location of the PAC II and Jackbox IV.

3.2 Required equipment

- PAC II device
- PAC II mounting brackets
- multiple tie plate
- tie wraps to bundle cables
- Jackbox type IV
- Power Supply - transformer capable of providing 30W from a DC source.

3.3 Optional Equipment

The external equipment associated with the PAC II module consists of the following:

- Speaker - external speaker for radio Rx audio and PAC II ringer tone.
- Foot switch (optional) - alternative device for keying PTT.
- Customer provided admin phone - to answer admin calls.
- Customer provided radio console - to answer and monitor radio calls.
- Customer provided recorder - to record the audio of phone calls and radio communication and/or record all audio output.
- Auxiliary audio - to support TV, Ipod or MP3 audio.
- Cables - for interconnecting the components.

3.4 Equipment for installing the PAC II

- Phillips screwdriver
- Three 6.4 mm (1/4 in.) screws for mounting the Multiple Tie Plate.
- Four 6.4 mm (1/4 in.) screws for the mounting the brackets
- Four #4 tooth lock washers for mounting the brackets
- Four screws for mounting the PAC II to the wall or desk (customer supplied)

3.5 Location Requirements

- temperature between 5° to 40°C (41° to 104°F)
- humidity between 20% to 80% non-condensing

3.6 Grounding Options

The PAC II can be grounded in the following ways:

- Ground lug terminal on the PACII - The ground lug terminal is connected to the position PC chassis. Ensure a ground resistance of .1 ohm or less to the

computer AC ground. This is the preferred method since it limits ground loop hazards.

- non-isolated power supply
- USB cable shield - Grounding is accomplished through the USB cable used to enable the communication between the PACII and the position PC. Since this cable can be easily disconnected it is useful as a secondary ground.

3.7 Mounting the PAC II

The PAC II can be mounted on a wall or to the underside of a desk, depending on the required location, perform the following steps.

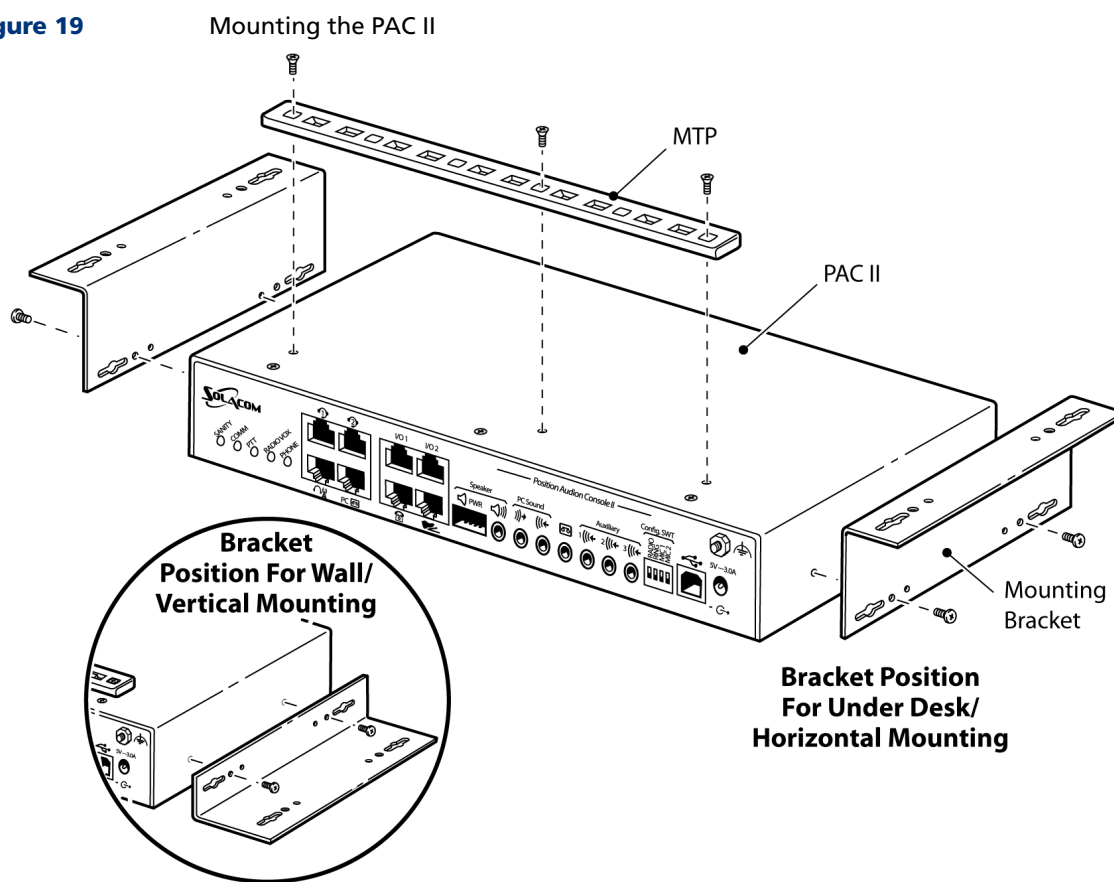
- 1 Using a Phillips screw driver and the screws provided, attach the Multiple Tie Plate to the top side of the PAC II.



Note: It is important to place the MTP with the deep grooves side down, otherwise there is no room to slide the tie wrap straps under the MTP.

- 2 Perform one of the following, depending on the bracket size.
 - If you have 2" brackets, attach a bracket to each side of the PAC II, so that the top of the bracket is flush with the top of the PAC.
 - If you have a 4" bracket, attach a bracket to each side of the PAC II, so that the top of the bracket is 2 inches higher than the top of the PAC.
- 3 Perform one of the following, depending on where the PACII is mounted:
 - Attached the PAC II to the underside of the desk, refer to Figure 19; or
 - Attached the PAC II to a wall, refer to Figure 19.
- 4 If you installed an MTP, route the cables through the space between the wall or desk and the top of the PAC II.
- 5 Bundle the cables with cable ties and secure them to the Multiple Tie Plate to support their weight.
- 6 Connect external equipment cables to the appropriate ports on the PAC II. Refer to Section 2.5.2 "Connections".

Figure 19



Refer to Appendix B for more PAC II installation options.

3.8 Mounting the Jackbox IV

The Jackbox IV can be mounted to the underside of a desk, depending on the required location, perform the following steps.

- 1 Using a Phillips screw driver, attach the Jackbox IV to the underside of the desk, refer to Figure 20.

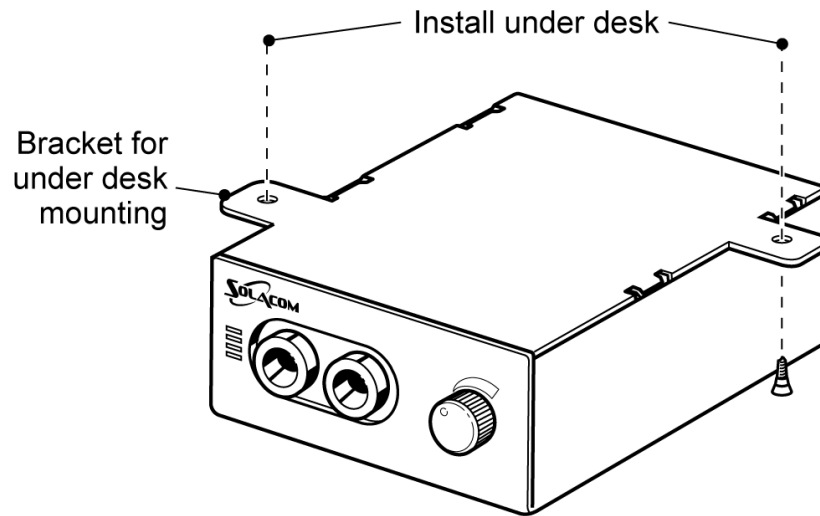


Note: It is important to place the Jackbox IV so that you can easily access the volume control and the dual-prong jack.

- 2 Connect external equipment cables to the appropriate ports on the Jackbox IV. Refer to Section 2.2.4 "Jack box IV".

Figure 20

Mounting the Jackbox IV (must be updated)



4

PAC I Operation

The Solacom PAC I (Position and Audio Control) module is a device that enhances the audio functionality of LibertyIntelligence applications at operator position workstations. It also connects headsets or handsets via dual-prong jack box type I, offering superior durability compared with USB devices. The PAC provides two modes of operation: Radio Bypass mode, and Call Taking mode.

4.1 Radio Bypass Mode

In Radio Bypass mode, the PAC I module allows an operator (plus an optional supervisor) to take phone calls from a LibertyIntelligence application and radio calls from a radio dispatch console with a single headset or handset. The audio and PTT signals are sensed and the shared headset/handset is managed as follows:

- Radio is usually continuously connected to the headset/handset.
- When an operator headset/handset is removed (Sense OFF) and the supervisor headset/handset is present (Sense ON), the supervisor's microphone is automatically connected. There is no need to use the PTT.
- Phone is also usually connected to the headset/handset, although ring and audio can be switched to speakers by the operator or the LibertyIntelligence application.
- When there is an active phone call, audio from the radio bypasses the headset and instead connects to an auxiliary PAC I speaker for continuous monitoring. The headset/handset remains connected to the active phone call, but when the operator presses the PTT switch, the microphone on the headset/handset temporarily switches to the radio, and the telephone call is monitored via USB speakers.

Table 41

Radio Bypass Mode

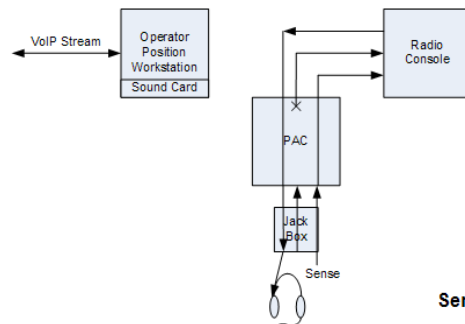
	Headset/Handset	USB Speakers	PAC I Speakers
Radio only	Radio		
Phone only	Phone		
Radio & phone	Phone		Radio
Radio PTT & phone	MIC radio; ear off	Phone	

The following diagram shows the radio, phone, and sense connections in four operating scenarios.

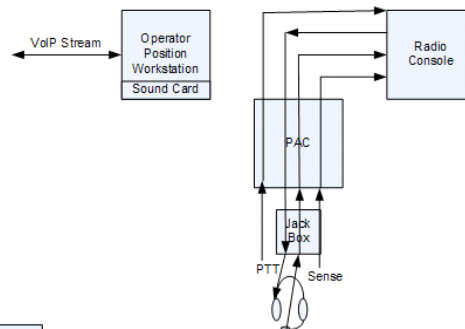
Figure 21

Audio Paths.

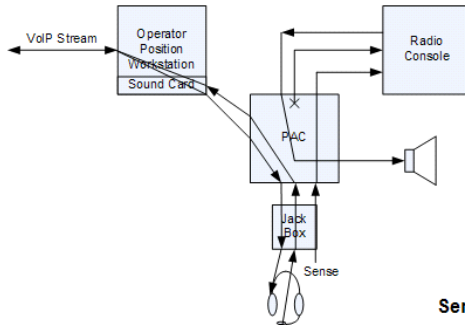
Sense ON, No PTT, No phone call



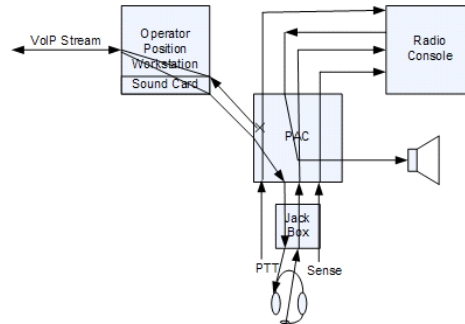
Sense ON, PTT ON, No phone call



Sense ON, No PTT, Phone call active



Sense ON, PTT ON, Phone call active



4.2 Call Taking Mode

In Call Taking Mode, there is no radio connection. A signal is sent to the PAC I module to trigger a relay closure whenever a phone call is answered. The audio is also available at the recorder port for local voice recording.

In addition to indicating an active call, the PAC I module feeds audio to the operator headset. For example, an operator can listen to an IRR recording, active call, or another audio feed such as music.

Windows volume control can be used to adjust the PAC I volume settings.

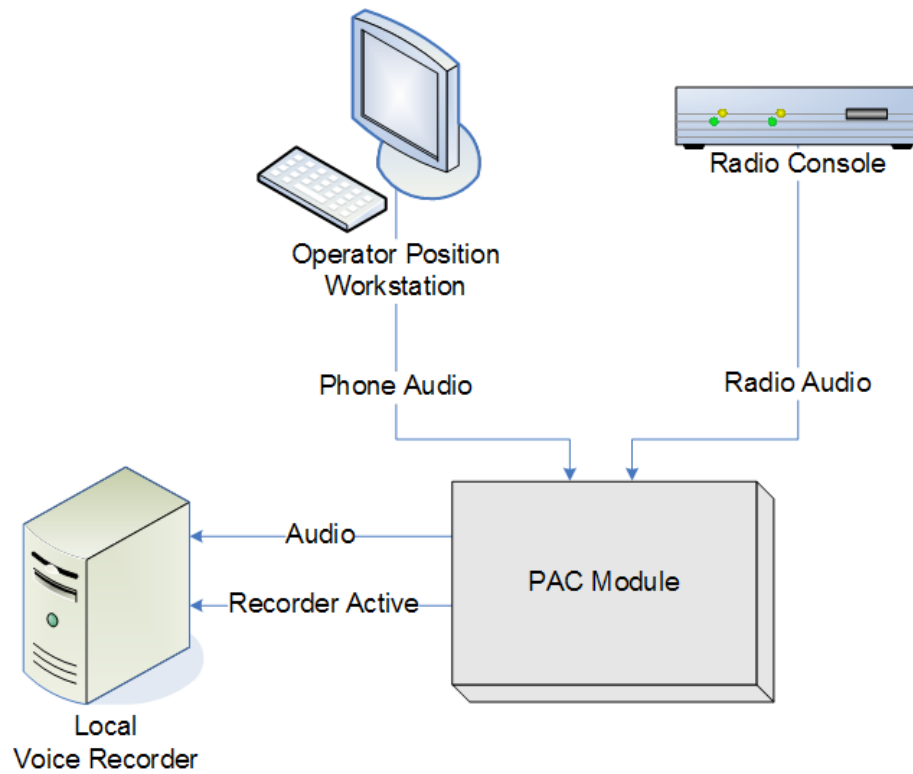
4.3 Voice Recording

Voice recording is achieved by capturing the audio of phone calls (and, if available, radio communication) and sending it to a local recorder. Operators can then access portions of the recording (Instant Retrieval) on demand.

Phone audio is sent along with a signal that triggers on the presence of a phone call so that recording takes place only when a call is answered. Radio audio is sent continuously and must rely on VOX detection within the recorder.

Figure 22

Voice Recording



4.4 PAC I Module Interface

The PAC I is a single module card installed in a PAC I housing suitable for locating at operator positions. This section explains the front and rear panel connectors, switches, and indicators.

Figure 23 Front Panel

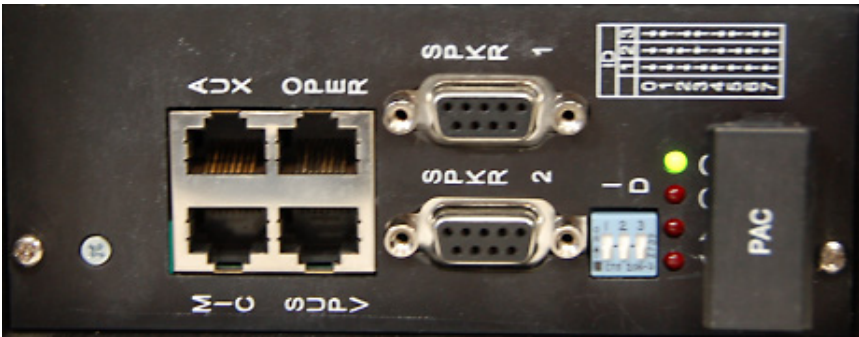
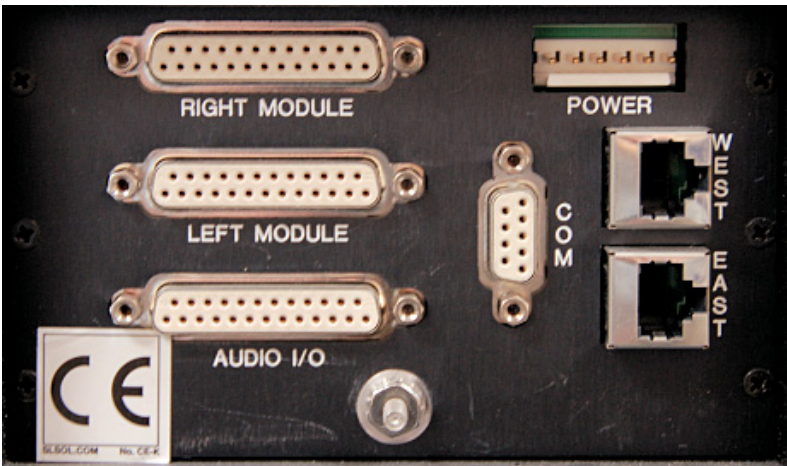


Figure 24 Rear Panel



4.4.1 Front Panel Connectors

The front panel consists of four RJ-45 connectors, two DB9 connectors, three DIP switches, and four LED indicators.

Table 42 Front Panel Connectors

Item	Description
MIC	Currently not used.
AUX	Currently not used.
SUPV	An RJ-45 connector that connects to a Supervisor jack box type I and provides audio, sense, and PTT signals. Sense and PTT are monitored and displayed for the user in the LibertyIntelligence application status bar.

Item	Description
OPER	An RJ-45 connector that connects to an Operator jack box type I and provides audio, sense, and PTT signals. Sense and PTT are monitored and displayed for the user in the LibertyIntelligence application status bar.
SPKR1	A DB9 connector that connects to a PAC I speaker for radio monitoring by the operator.
SPKR2	A DB9 connector that connects to a PAC I speaker for radio monitoring by the operator.

4.4.2 DIP Switches

Three front panel DIP switches are used to select options for operation.

Table 43

DIP Switches

Item	Description
Switch 1	Controls whether radio bypass is used. Off – enables radio bypass (can receive radio calls). Use for Radio Bypass mode. On – disables radio bypass (cannot receive radio calls). Use for Call Taking mode.
Switch 2	Sets the type of headset/handset microphone used. Off – carbon; On – dynamic.
Switch 3	Currently not used.

4.4.3 Status LEDs

There are four LEDs on the front panel.

Table 44

Status LEDs

Item	Description
☺	Controls whether radio bypass is used. Off – enables radio bypass (can receive radio calls). Use for Radio Bypass mode. On – disables radio bypass (cannot receive radio calls). Use for Call Taking mode.
☹	Sets the type of headset/handset microphone used. Off – carbon; On – dynamic.
➤	Currently not used.
➤	Currently not used.

4.4.4 Rear Panel Connectors

Table 45

Rear Panel Connectors

Item	Description
Right Module	Currently not used.
Left Module	Currently not used.
Audio I/O	A DB25 connector that splits and connects to several components.
Power	DC connection to the external power supply.
COM	A DB9 connector for an RS232 cable that connects to the operator position workstation.
GND	Connection post for the grounding cable.
West	Currently not used.
East	Currently not used.

4.5 PAC I Installation

Solacom systems are shipped with all components pre installed and configured. However, for upgrades or reconfigurations, it may be necessary to have a PAC I

module added on site. The information in this section is meant to help you install and configure a PAC I module for your system.

4.5.1 Equipment

The external equipment associated with the PAC I module consists of the following:

- Jack box type I – contains dual-prong jacks and under-desk mounting brackets.
- PAC I Speaker – external speaker for radio Rx audio.
- Power Supply – transformer capable of providing 60W from an AC source.
- Foot switch (optional) – alternative device for keying PTT.
- Cables – for interconnecting the components.

Figure 25

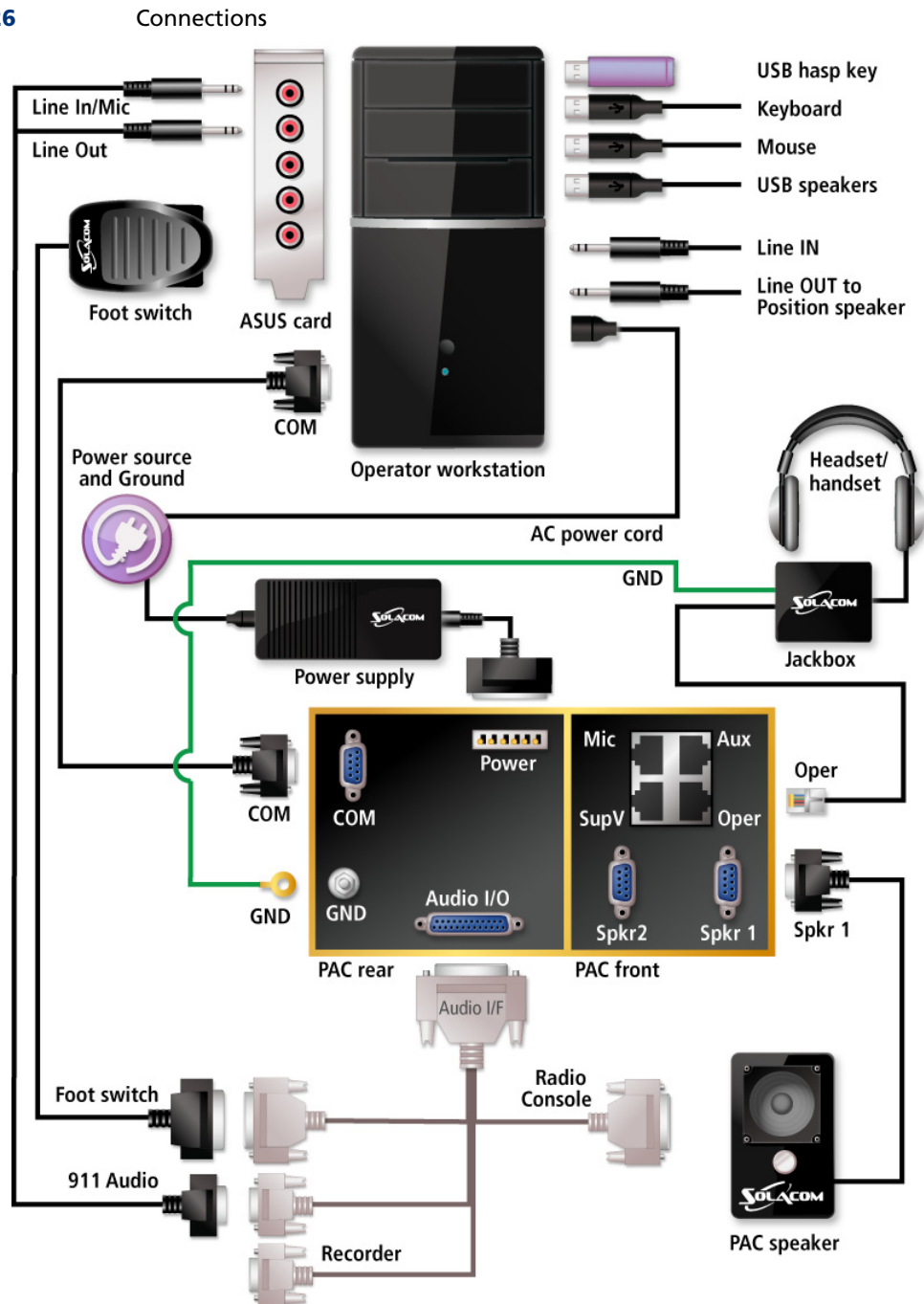
Equipment



4.5.2 Connection

The PAC I module connects to the external equipment and operator position workstation in the following manner. Interfaces not used are not displayed.

Figure 26



Note: The operator workstation and PAC I power supply must be connected to the same circuit/ground.

The following cables are used for interconnections:

Table 46

Cable list

Name

AC Power Cord

Grounding Cable

Jack box Cable

RS232 Cable

Speaker Cable

Sound Card Cable

Radio Bypass Cable



Note: The Sound Card cable carries analog audio signals between the PAC I module and an operator position workstation, and uses the Line In and Line Out jacks to connect to the audio card of the computer. Therefore, any operator position speakers connected to the computer must use another audio device, such as USB speakers.

4.5.3 Cable Pin Assignments

The following tables contain the pin assignments for the data interconnection cables. Pins not listed are unassigned.

4.5.3.1 PAC I Module COM to Operator Position Workstation COM

Table 47

Pin Assignments

Pin	Signal
1	Chassis GND
2	PAC I Rx data
3	PAC I Tx data
5	GND

4.5.3.2 PAC I Module AUDIO I/O to Various Devices

This cable contains five connectors:

- P1 “AUDIO I/F” (male DB25)
- P2 “Radio Console” (female DB25)
- P3 “Foot Switch” (female DB25)
- P4 “911 Audio” (female DB9)
- P5 “Recorder” (female DB9)

Figure 27

Radio Bypass Cables

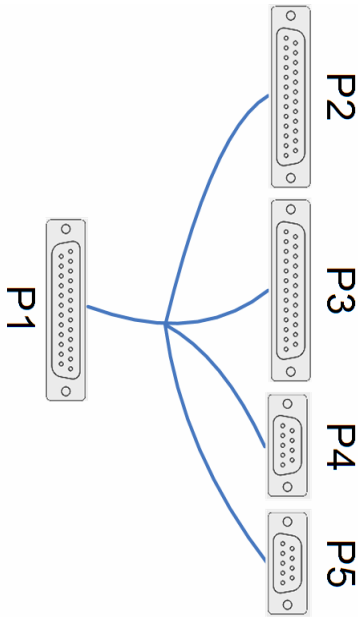


Table 48

Pin Assignments

Pin (P1)	Signal	Pin (P2)	Pin (P3)	Pin (P4)	Pin (P5)
1	Chassis GND	1	1	1	1
2	Tel Mic			2	
3	Tel Hdset			3	
4	Radio Hdset	2			
5	Radio Mic	3			
7	Recorder Audio				2
8	Recorder Active CM				3

Pin (P1)	Signal	Pin (P2)	Pin (P3)	Pin (P4)	Pin (P5)
9	Radio Bypass CM	4			
10	GND		10		
11	Radio PTT CM	5			
12	Radio Sense CM	8			
13	Foot switch		13		
14	Tel Mic			6	
15	Tel Hdset			7	
16	Radio Hdset	14			
17	Radio Mic	15			
19	Recorder Audio			6	
20	Recorder Active NO			7	
21	Radio Bypass NO	16			
23	Radio PTT NO	17			
24	Radio Sense NO	20			

4.5.3.3 P4 Connection to Workstation Line In/Out

Table 49

Pin Assignment

Pin	Signal	Line In Plug	Line Out Plug
2	Tel Mic + (Line in)	Tip	
3	Tel Hdset + (Line out)		Tip
6	Tel Mic - (Line in)	Sleeve	
7	Tel Hdset - (Line out)		Sleeve

4.5.3.4 Telephone Audio Signal Specifications

The following signals are present on the “911 Audio” DB9 connector:

Output measured on pins 2 and 6:

- **Output impedance:** 600Ω balanced
- **Typical level:** ~180mV (-15dBV) for a termination impedance of 10kΩ with an operator micLevel setting of -10 in the “LibertyShield.exe.config” file.

Input measured on pins 3 and 7:

- **Input impedance:** 600Ω balanced
- **Expected level:** ~300mV (-10.5dBV) for a source impedance of 10Ω to 400Ω

4.5.3.5 P2 Connection to Radio Dispatch

Table 50

Radio Connections Pin Assignments

Pin	Signal
1	Chassis GND
2	Radio Hdset
3	Radio Mic
4	Radio Bypass CM
5	Radio PTT CM
8	Radio Sense CM
14	Radio Hdset
15	Radio Mic
16	Radio Bypass NO
17	Radio PTT NO
20	Radio Sense NO

4.5.3.6 Radio Dispatch Signal Specifications

The following signals are present on the “Radio Console” DB25 connector:

Output measured on pins 3 and 15:

- **Output impedance:** 600Ω balanced
- **Typical level:** ~100mV (-20dBV) for a termination impedance of 600Ω with an operator micLevel setting of -10 in the “LibertyShield.exe.config” file.

Input measured on pins 2 and 14:

- **Input impedance:** 600Ω balanced
- **Expected level:** ~100mV (-20dBV) for a source impedance of 600Ω

Radio Bypass on pins 4 and 16:

- **Maximum rating:** 250mA @ 30V

Radio Sense on pins 8 and 20:

- **Maximum rating:** 1A @ 30V

Radio PTT on pins 5 and 17:

- **Maximum rating:** 1A @ 30V

4.5.3.7 P5 Connection to Voice Recorder

Table 51

Voice Recorder Pin Assignments

Pin	Signal
1	Chassis GND
2	Recorder Audio
3	Recorder Active CM
6	Recorder Audio
7	Recorder Active NO

4.5.3.8 Recorder Signal Specifications

The following signals are present on the “Recorder” DB9 connector:

Output measured on pins 2 and 6:

- **Output impedance:** 600Ω balanced
- **Typical level:** ~700mV (-3dBV) for a termination impedance of 600Ω with an operator micLevel setting of -10 in the “LibertyShield.exe.config” file.

Recorder Activate Relay on pins 3 and 7:

- **Maximum rating:** 250mA @ 30V

4.5.4 Jack Box Type I Pin Assignments

Table 52

J1 Pin Assignments

Pin (J1 back of unit)	Signal
1	GND
2	Mic
3	PTT
4	Sense
5	+5V
6	Hdset
7	Pot
11	Shield
12	Shield

Table 53

P1 Connections

Pin (P1 left jack)	Signal
Tip	Mic
Ring	PTT
Sleeve	Hdset

Table 54

P2 Connections

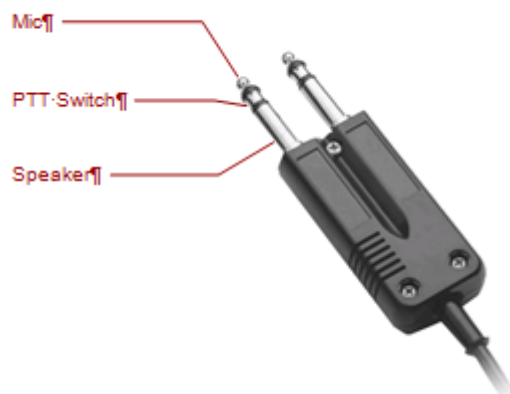
Pin (P2 right jack)	Signal
Tip	GND
Ring	GND
Sleeve	GND
Switch Contact	Sense

4.5.4.1 Dual-prong Connector

Headsets or handsets that connect to the jack box type I contain dual TRS plugs with the following connections:

Figure 28

Headset/Handset Connection



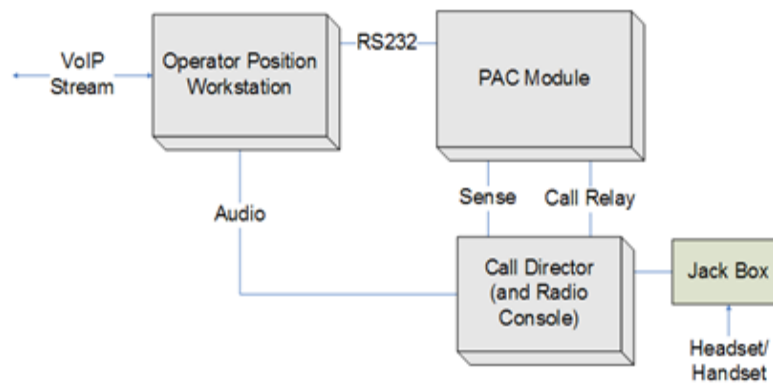
4.5.4.2 Connecting with a Call Director

A radio vendor's Call Director may be incorporated into a position and audio control system by having the VoIP stream connect directly to the Call Director and using a Call Relay connection to the PAC I. This connection signals to the Call Director when a call is active so that the audio to the headset/handset can be switched to the call.

Ideally, Sense output from the Call Director should connect to the Sense input of the PAC I. This allows the LibertyIntelligence application to display the Sense status on the application status bar. If this connection is not possible, the Sense input on the PAC I should be shorted to GND.

Figure 29

Call Director Connection



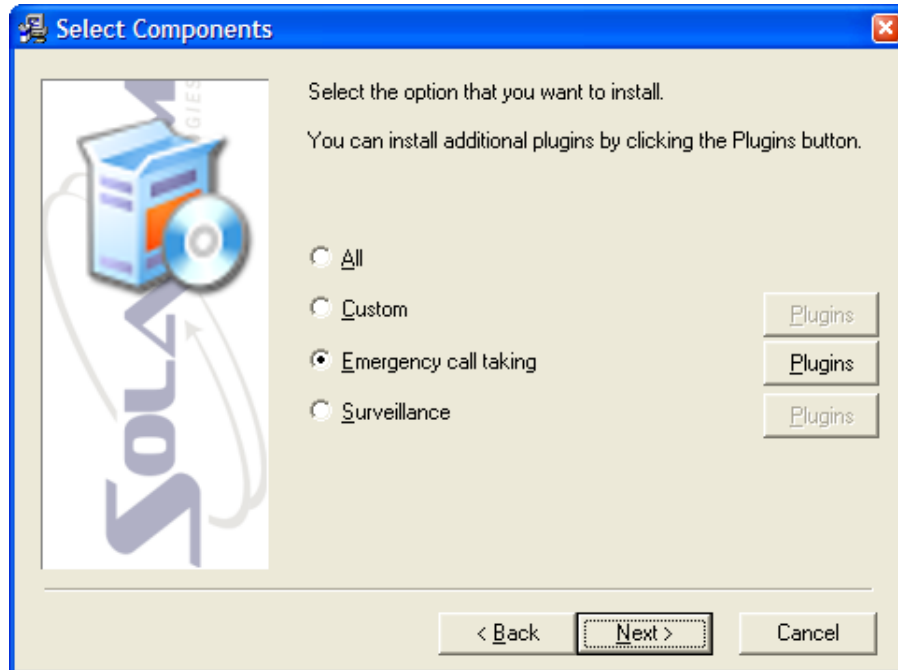
4.5.5 Configuration

For integration with the Guardian IWS (Emergency Call Taking), the application needs to be aware of the PAC I module, and this requires that the Radio Bypass plug-in be installed and configured at each operator position.

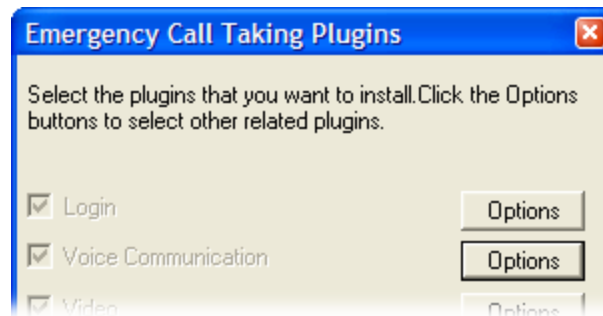


» To install and configure the radio bypass options...

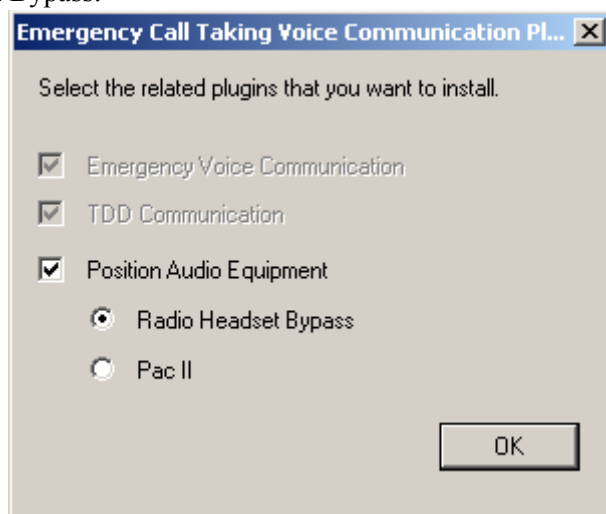
- 1 Run the Guardian client installation program “LibertySHIELD_Setup.exe”.
- 2 Run through the installation until you get to the Select Components page.
- 3 Ensure that the Emergency Call Taking option is selected, and click the corresponding plug-in button.



- 4 In the Emergency Call Taking Plugins dialog box, click the Options button to the right of the Voice Communication check box.



- 5 In the Emergency Call Taking Voice Communication Options dialog box, check Position Audio Equipment. Two options appear. Select Radio Headset Bypass.



- 6 Click OK in the dialog boxes until you return to the installation program.
- 7 Click Next and then continue with the installation until finished.
- 8 Launch Guardian on the operator position.
- 9 Log in, and then log out again. This adds new options to the configuration file.
- 10 From the installed application folder, edit the file "LibertyShield.exe.config" and make the following modifications:
 - Set the `<Headset Device="(device name)" RTPport="4000">` and the `<Microphone device="(device name)">`.



Note: For Windows 7, use the exact device name in brackets. To ensure you have the exact device name, refer to the Controller Information on the device properties dialog box.

These are the computer audio out and audio in devices that the Radio Headset Bypass device will use.

- Set the `<Speaker Device="device name" RTPport=4002">` value to the name of the device that connects to the position speakers.

This is typically the USB speakers.

Uncomment (remove the leading <!-- and --> characters) the following line beginning with <!--<RadioBypass. The line should look like this (Underscores mean continue on the same line)

```
<RadioBypass port="COM1" baudrate="19200" _  
databits="8" parity="None" stopbits="1" _  
micLevel="-10"/>
```



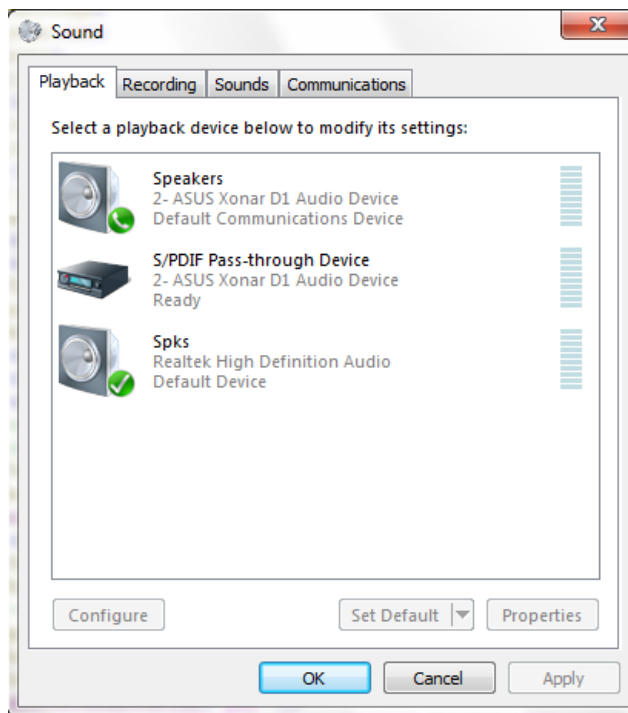
Note: Valid values for the micLevel setting are 5, 2, -1, -4, -7, -10, -13, -16, -19, -22, -25, -28, -31, -34, -37, -40, -43, and -46

When a PAC I is not installed perform the following:

- Comment (add the leading <!-- and --> characters) the following line beginning with <!--<RadioBypass. The line should look like this (Underscores mean continue on the same line).

```
<!--<RadioBypass port="COM1" baudrate= "19200" _  
databits="8" parity="None" stopbits="1" _  
micLevel= "-10">-->
```

- 11** In a Windows XP environment, from the Windows Control Panel, double click Sounds and Audio Devices.
- 12** In the Audio and Voice tabs, ensure that the playback and recording devices are set to the sound card.
- 13** In a Windows 7 environment, from the Windows Control Panel, double click Sounds; the following window appears.

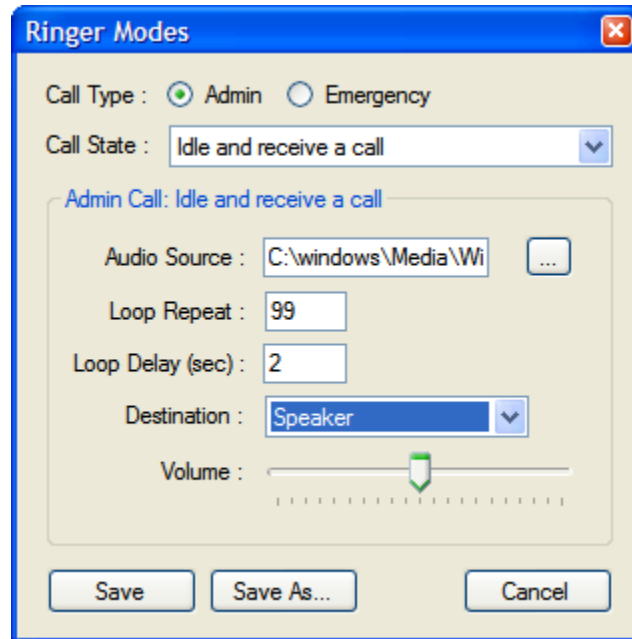


- 14** Right-click on the ASUS Speaker option; a dropdown list appears.
- 15** Choose Set as Default Communication Device.
- 16** Right-click on the workstation speaker option; a dropdown list appears.
- 17** Choose Default Device.
- 18** Launch Guardian and verify that the Sense indicators are listed on the status bar.

Op Sense: ON Op PTT: ON Sp Sense: ON Sp PTT: ON

- 19** From the menu, click Tools > Ringer Modes.

- 20** In the Ringer Modes dialog box, ensure that, for each combination of Call Type and Call State, Destination is set to Speaker.



- 21** Perform test calls on emergency and admin lines, and check that the audio (two-way) and PTT signals are working properly.

5

Position Audio Adapter Operation

A Position Audio Adapter module can be configured to detect:

- headset/handset off/on hook; or
- an active call.

When headset/handset detection is required, an Audio and I/O Adapter and a jack box type III are connected to the operator position. The device detects when a headset or handset is connected via a dual-prong connector to a jack box type III.

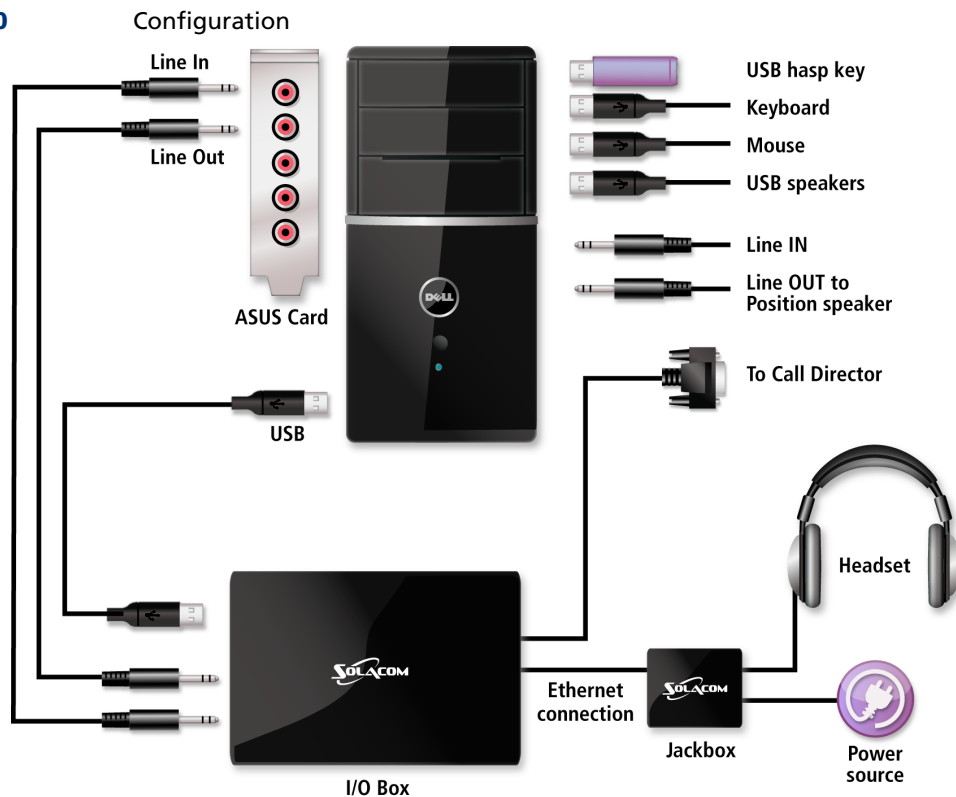
When an operator position is connected to a call director, and requires active call detection, an Audio and I/O Adapter is connected to the operator position and call director. Since the headset/handset is connected to the call director, a jack box type III is not required.

5.1 Headset/Handset Sensing

The headset sensing function of the Position Audio Adapter module detects whenever a headset is unplugged from or plugged into the jack box type III. Additionally the Guardian Controller polls the system every second to detect whether or not the headset/handset is plugged in, or the RJ-45 and USB cables are disconnected.

The Position Audio Adapter module connects to the external equipment and operator position workstation in the following manner:

Figure 30



5.2 Audio Sensing

The audio sensing of the Audio and I/O Adapter opens or closes a call relay whenever a call is answered on the Guardian system. By default, the call relay is closed. Once a call is received on the Guardian system the relay opens and signals to the call director that a call is eligible for recording.

5.3 Audio and I/O Adapter and Jack Box Type III Interfaces

The Audio and I/O Adapter and jack box type III are located at the operator position. This section explains the front and rear panel connectors and indicators for each device.

5.3.1 Audio and I/O Adapter Connectors

The front panel consists of one USB connector and two line in and line out connectors.

Figure 31

Front Panel



Table 55

Audio and I/O Adapter Front Panel; Connector

Item	Description
USB	Connects to the Operator Position Workstation and provides headset sense and off/on hook detection to the Guardian Controller. 5V DC power is supplied by the Operator Position Workstation through the USB port.
Line in/Line out	Connects to the Operator Position Workstation sound card to provide sound to the headset/handset.

There is one LED on the front panel.

Table 56

Status LED

Indicator	Description
Green Light	Steady on – voltage is applied through the USB port. Off – no power is applied through the USB port.

The rear panel consists of one RJ-45connector and one DB9 connector.

Figure 32

Rear Panel



Table 57

Audio and I/O Adapter Rear Panel; Connectors

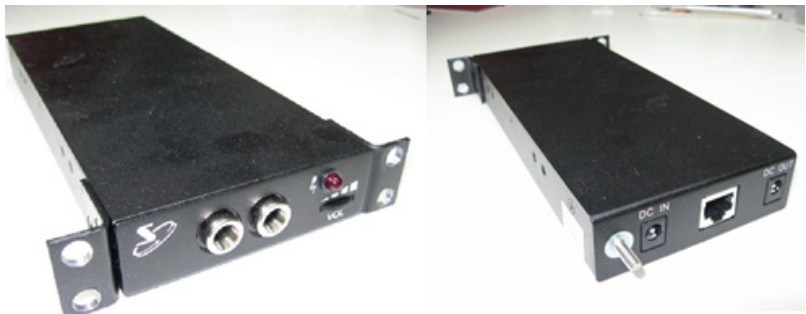
Item	Description
RJ-45	Connects to a jack box type III and provides headset sense and signals. When the handset or headset is unplugged, the operator position is busied out.
DB9	Connects to a call director for sensing and monitoring active calls.

5.3.2 Jack Box Type III Connectors

The jack box type III at the operator position is maintenance free and can be mounted on the desk using the under-desk mounting brackets.

Figure 33

Jack Box Type III Connectors



The front panel consists of one TRS plug and volume control dial.

Table 58

Jack Box Type III Front Panel Connectors/Features

Item	Description
Dual-prong jacks	Connects to the headset or handset.
Volume control	Allows the operator to adjust the volume on the headset or handset.

The rear panel consists of an RJ-45 and a DC connector.

Table 59

Jack Box Type III Rear Panel Connectors

Item	Description
Power	DC connection to external power supply.
RJ-45	A RJ-45 connector for jack box type III cable that connects to the Audio and I/O Adapter.

5.4 Installation

Solacom systems are shipped with all components pre installed and configured. However, for upgrades or reconfigurations, it may be necessary to have a Position Audio Adapter module added on site. The information in this section is meant to help you install and configure a Position Audio Adapter module on your system.

5.5 Equipment

The external equipment associated with the Position Audio Adapter consists of the following:

- Jack Box type III – contains dual-prong jacks and under-desk mounting brackets.
- Audio and I/O Adapter – contains a circuit to detect on/off hook and headset sense.
- Power Supply – transformer capable of providing 60W from an AC source
- Cables – for interconnecting the components.

5.6 Configuration

For integration with the Guardian IWS (Emergency Call Taking), the application needs to be aware of the Position Audio Adapter module.

- 1 From the installed application folder, edit the file “LibertyShield.exe.config” and make the following modifications:
- 2 In a Windows XP environment, edit the device attributes of the <Headset>, <Speaker>, and <Microphone> elements to specify the exact name of the devices. Specify 2 unique RTP ports for audio streaming. For example:

```
<Headset device="PLTDA60" RTPport="4000"/>
<Speaker device="Logitech USB Speaker" RTPport="4002"/>
<Microphone device="PLTDA60" />
<!--<RadioSpeaker device="RadioSpeaker"/>-->
<!--<RingerSpeaker device="RingerSpeaker" />-->
```

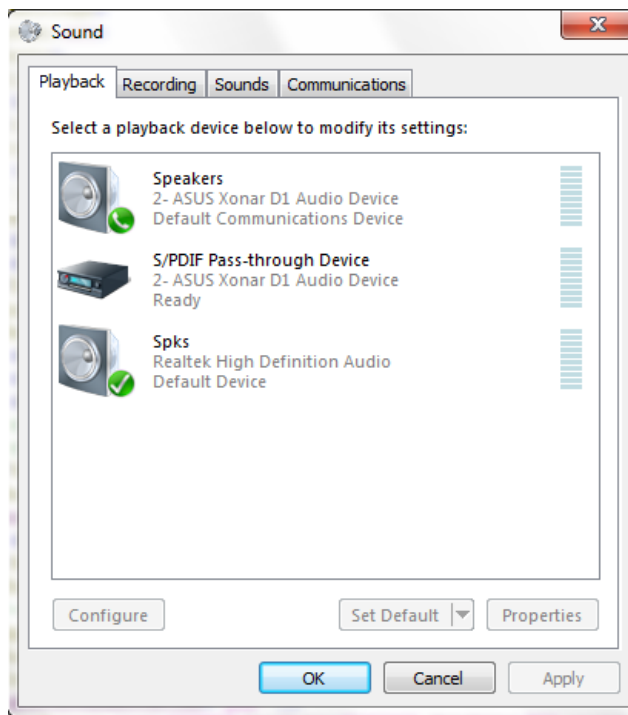
- 3 In a Windows 7 environment, edit the device attribute of the <Headset>, <Speaker>, and <Microphone> elements to specify the devices and specify 2 unique RTP ports for audio streaming. For example:

```
<Headset device="Speakers (ASUS Xonar D1 Audio Device)"
RTPport "4000"/>
<Speaker device="Speakers_PC (High Definition Audio
Device)" RTPport "4002"/>
<Microphone device="Line In2 (ASUS Xonar D1 Audio
Device)"/>
<!--<RadioSpeaker device="RadioSpeaker"/>-->
<!--<RingerSpeaker device="RingerSpeaker"/>-->
```



Note: For Windows 7, the device name must be enclosed in brackets., For example, <Speaker device="Speakers (Logitech USB Speaker)" />.

- 4 From the Windows Control Panel, double click Sound and Audio Devices.
- 5 In the Audio and Voice tabs, ensure that the playback and recording devices are set to the sound card.
- 6 In a Windows 7 environment, from the Windows Control Panel, double click Sounds; the following window appears.



- 7** Right-click on the ASUS Speaker option; a dropdown list appears.
- 8** Choose Set as Default Communication Device.
- 9** Right-click on the workstation speaker option.
- 10** Launch Guardian and verify that the Sense indicators are listed on the status bar.

A List of Acronyms

The following table lists the common acronyms used in this document.

Acronym	Expanded From
AC	Alternating Current
COM	Communications
DIP	Dual Inline Package
GND	Ground
I/O	Input/Output
IRR	Instant Retrieval
IWS	Intelligent WorkStation
LED	Light Emitting Diode
PAA	Position Audio Adapter
PAC	Position and Audio Control
PTT	Push To Talk
Rx	Reception
TRS	Tip Ring Sleeve
Tx	Transmission
USB	Universal Serial Bus
VOX	Voice

B

PAC II installation options

The PAC II can be mounted on a wall or to the underside of a desk, depending on the required location, perform the following steps.

Figure 1 Under desk mount

Under Desk Mounting (Multi-tie Plate attached to desk)

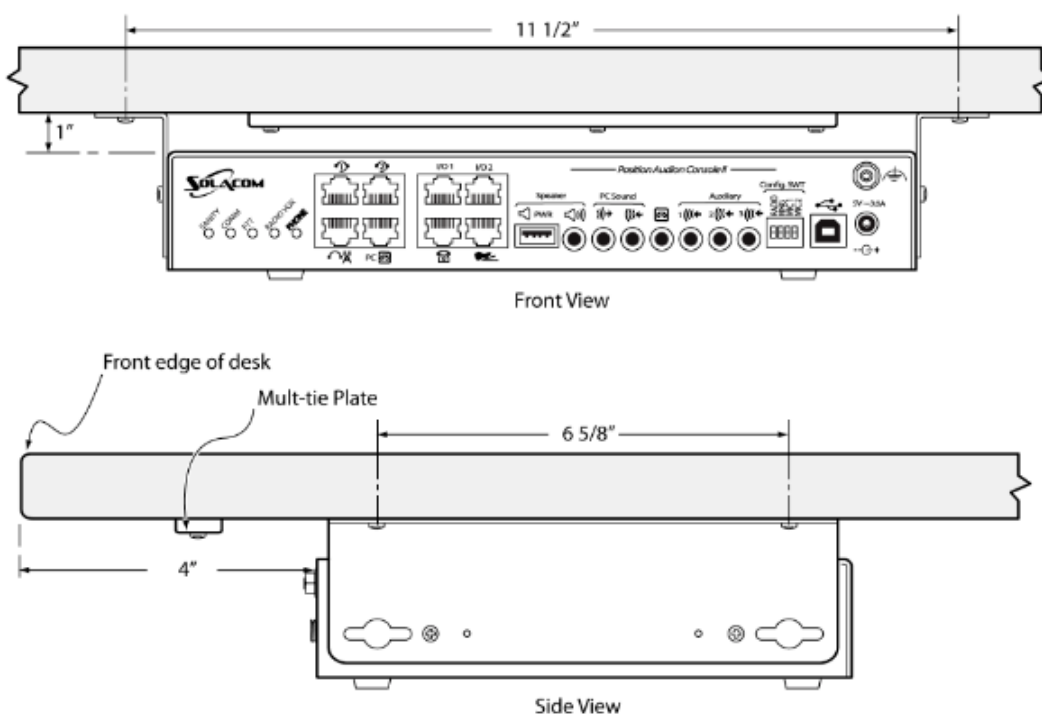


Figure 2 Side of desk mount with MTP mounted

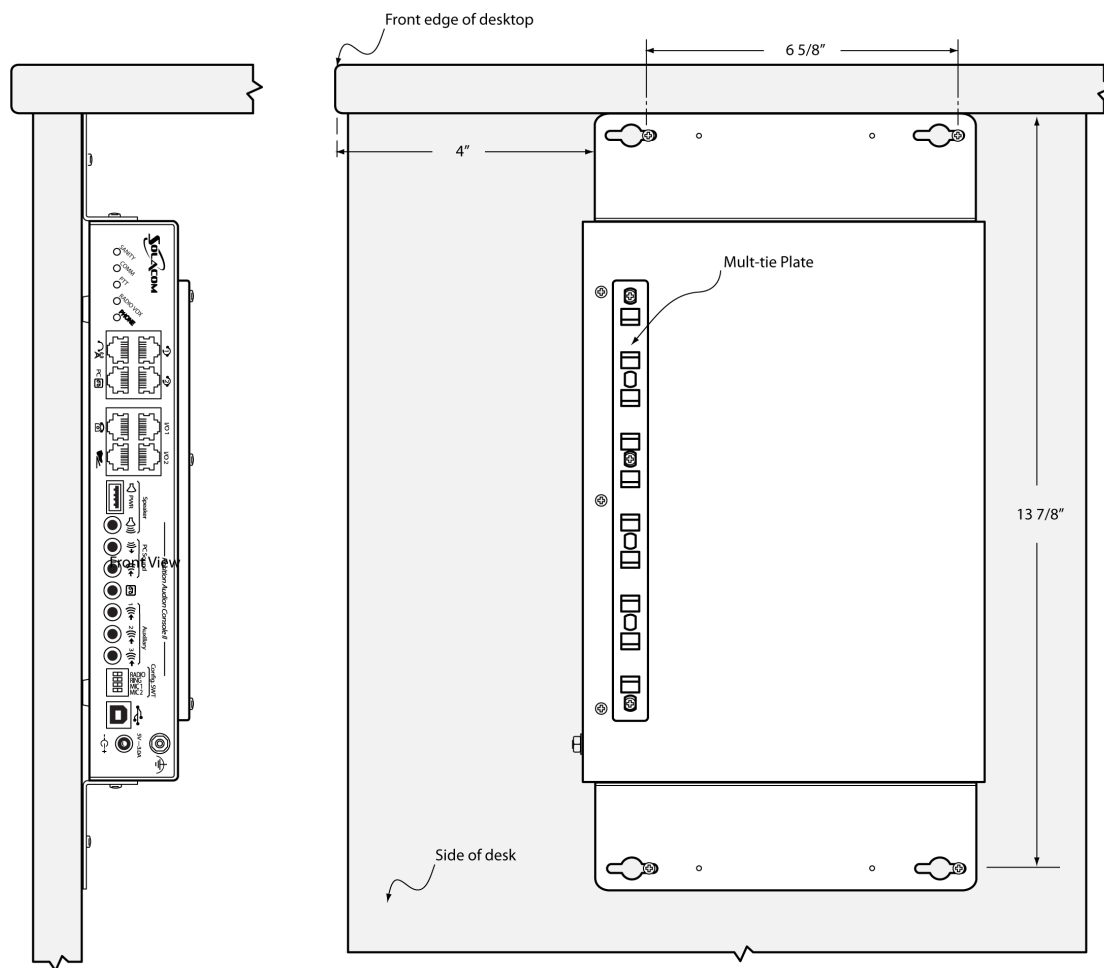
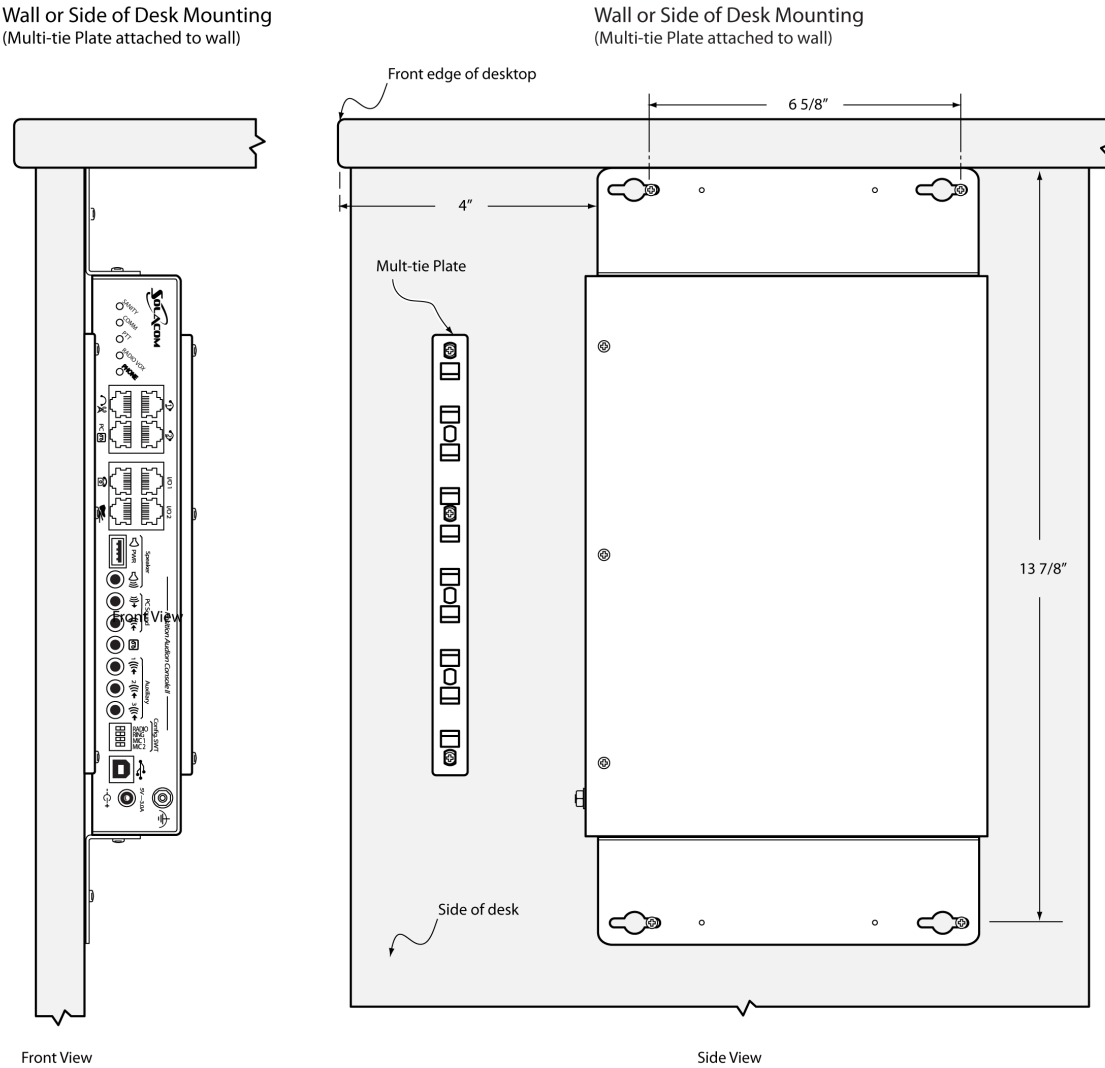


Figure 3 Side of desk with separate MTP mount



C

Sources of Side Tone

In a Guardian system the following devices provide side tone:

- radio console connected to the radio port of the PAC II (when in radio mode)
- administrative phone connected to the phone port of the PAC II; and
- position PC when an Admin or 911 call is present.

The following figures show three side tone sources.

Figure 4 shows the audio behavior when the operator is communicating with the Radio (PTT). The green path shows the audio captured by the microphone and then sent to the radio console. The red path shows the side tone provided by the radio and transmitted to both ear pieces. During a call, the side tone is sent to the PAC II speaker. To adjust side tone level on the radio console, refer to the documentation included with your device.

Figure 4

Side Tone from a radio device

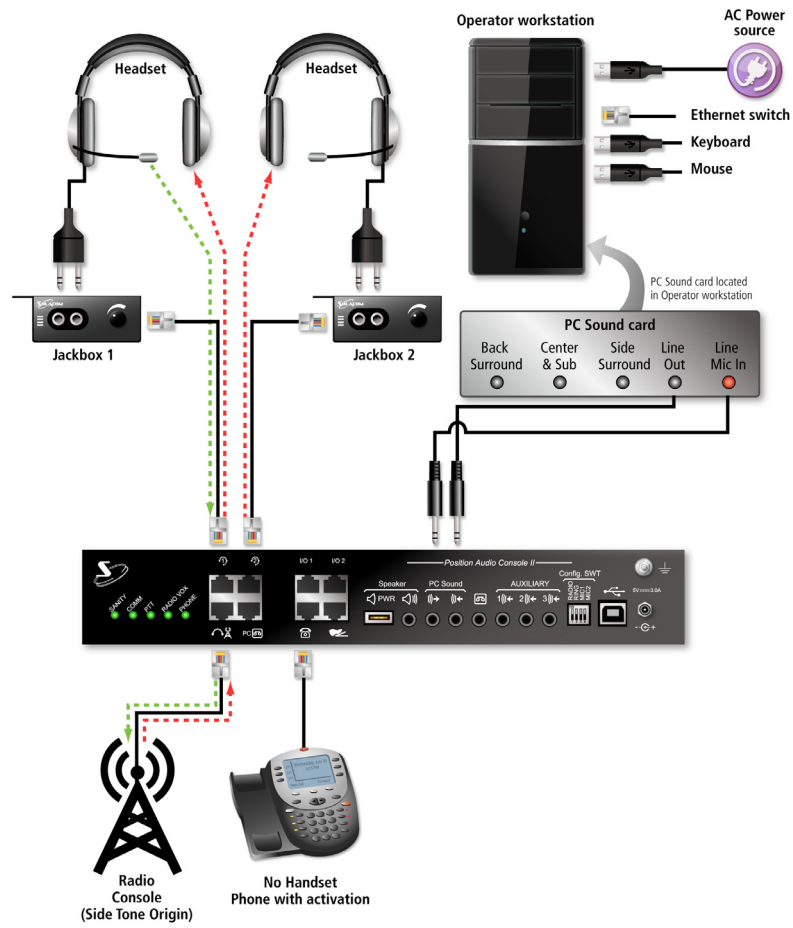


Figure 5 shows the audio behavior when the operator is communicating with an admin phone. The green path shows the audio captured by the microphone and then sent to the admin phone. The red path shows the side tone provided by the admin phone and transmitted to both ear pieces. To adjust side tone level on the admin phone, refer to the documentation included with your device.

Figure 5

Side Tone from a phone

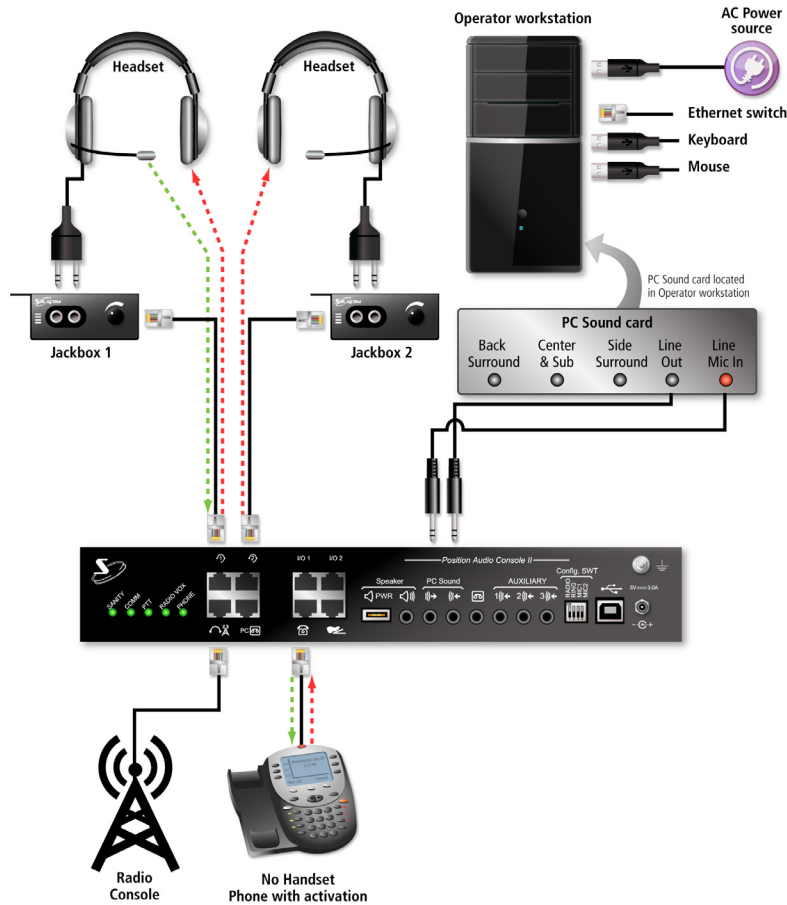
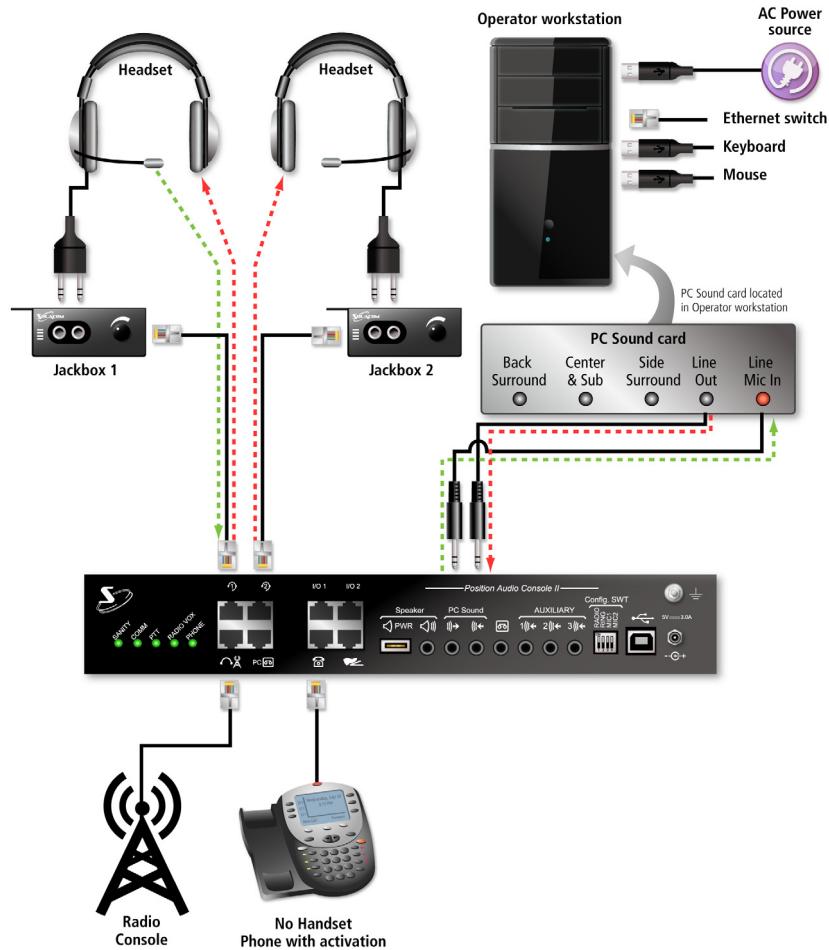


Figure 6 shows the audio behavior when the operator is communicating using a position PC. The green path shows the audio captured by the microphone and then sent to the position PC sound mixer. The red path shows the side tone provided by the position PC sound mixer and transmitted to both ear pieces. Side tone is available when a 911 or admin call is active. To adjust side tone level on the PC sound mixer, refer to “Adjust side tone” on page 41.

Figure 6

Side Tone from a position PC



Index

A

- audio recording 4
 - PC REC 4
 - REC ALL 4
- auxiliary audio 18

C

- cable pin assignments 20
- cable requirements for PAC II 20
- call director 10, 68
- call taking 4, 54
- configuration
 - PAA module 80
 - PAC I 69
 - PAC II 17
- configuration switches 13
- connectors
 - dual-prong 32
 - front panel 11
 - headset/handset 32
 - jacks 12
 - PAC I 56, 58
 - RJ-45 11
 - speakers 12

D

- device driver, installing 33
- DIP switches 13, 57
- dual-prong connector 32, 68

E

- external radio integration mode 10

F

- foot switch 17, 59
- Front 15

G

- ground 13, 62

H

- headset 13

- headset/ handset
 - connections 32
- headset/handset
 - carbon 5
 - electret 5

I

- ide 92
- installation
 - PAA 79
 - PAC I 58
 - PAC II 45
- interface
 - admin phone 24
 - aux 1 29
 - aux 2 30
 - aux 3 30
 - foot switch 25
 - input/output 25
 - input/output 2 26
 - jack box I 21
 - jack box II 21
 - PAA 77
 - PAC I module 55
 - PAC II 11
 - PAC II module 11
 - PC recorder 23
 - PC sound input 28
 - PC sound output 28
 - radio handset/headset 22
 - record all 29
 - speaker 27
 - speaker power 27
 - USB 20
- IRR interaction 17
- IRR recording 54

J

- jack box I 59
- jack box III 78
- jack box IV
 - overview 14
 - connectors 15, 16
- jack connectors 12
- jumper settings 30

L

- LEDs

- COMM 14
 - phone 14
 - PTT 14
 - radio VOX 14
 - sanity 14
- line in, configure 36
- local recording 16

M

- mounting the jack box IV 48
- mounting the PAC II 47

O

- operating scenarios
 - PAC I 52
 - PAC II 5

P

- PAA module 75
 - overview 75
 - audio sensing 76
 - configuration 80
 - equipment 78, 79
 - headset/handset sensing 76
- PAC I module
 - cable pin assignment
 - pin assignments 62
 - cables 62
 - configuration 69
 - connections 60
 - equipment 59
 - installation 58
 - operation 51
- PAC II module 3
 - configuration 17, 32
 - connections 19
 - equipment 17
 - install and configure 33
 - interfaces 11
 - location requirements 46
 - modes of operation 4
 - mounting the PAC II 47
 - optional equipment 46
 - required equipment 45
- pin assignments 20
- planning checklist 45

- ports
 - administrative phone 5
 - audio input 5
 - audio recording ports 5
 - jack box 5
 - radio console 5
 - status during call taker mode 8
 - status during radio integration mode 8
- Position Audio Adapter 75
- power 13, 17, 59

R

- radio bypass
 - mode 52
 - options 69
- radio integration mode 4
- record all 16
- recorder signal specifications 66
- relay closures 5
- RJ-45 connectors 11

S

- side tone
 - overview 41
 - adjust on position PC 41
 - from a phone 91
 - from a position PC 92
 - from a radio device 90
- speaker
 - connectors 12
 - PAC I 59
 - PAC II 17
 - PC 17
- status LEDs 13, 57
- switches, front panel 11

T

- troubleshooting 42

V

- voice recording 16, 54
 - Guardian 17
 - PAC 16
- volume
 - adjust 40
 - settings 35



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