# *Apollo*®

# Model SL15-CD Audio Selector Panel and
# Model CD-15 Remote CD Player

# Installation Manual

**UPS Aviation Technologies**

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Ordering Information

To receive additional copies of the Apollo SL15-CD Installation Guide, order part #560-0980-00 and for the Apollo SL15-CD/CD-15 User's Guide, order part #560-0981-00.

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# Section I GENERAL INFORMATION

## 1.1    INTRODUCTION

The SL15-CD Audio Control Panel and CD-15 Remote CD Player represents the next step in cockpit audio control and intercommunications utility. Using proprietary *IntelliVox®* design, this unit eliminates the requirements for intercom squelch adjustments. The unit is designed for outstanding ergonomics and visually defined mode annunciation and selection. By providing control for a remote compact disc (CD) player, the system simplifies installation and operation of entertainment sources for the cockpit and crew.

Before installing and/or using this product, please read this manual completely. This will ensure that you will take full advantage of all the advanced features in the SL15-CD and CD-15 Remote CD Player.

## 1.2    SCOPE

This manual provides detailed installation and operation instructions for the UPS Aviation Technologies Apollo SL15-CD Audio Selector Panel/Intercom System. This includes the following units:

| Model | Description | Part Number |
|---|---|---|
| SL15-CD Audio Control Panel | Stereo Audio Panel with Marker | 435-6065-50 |
| CD-15 Remote CD Player | Remotely Controlled Compact Disc player | 435-6065-60 |
|  |  |  |
| Other options may be applied for exclusive use by specific aircraft manufacturers, under Type Certification. Call for information. | | |

## 1.3    EQUIPMENT DESCRIPTION

The SL15-CD Audio Control Panel is a state of the art audio isolation amplifier and audio selector that contains an automatic voice activated (VOX) intercom system. It can switch up to three transceivers (Com 1, Com 2 and Com 3) and six receivers (Nav 1, Nav 2, ADF, DME, MKR and AUX).

A duplex COM 3 mode (selectable at installation) allows the SL15-CD to act as an audio interface between aircraft headphone and microphones and specific aircraft <u>approved</u> (FAA/FCC) cellular telephone equipment.

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**Warning**: Use of non-aviation approved cellular telephone equipment may be prohibited by regulation. UPS Aviation Technologies is not responsible for unauthorized airborne use of cellular telephones. For airborne use, the SL15-CD must be interfaced with an approved system.

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There are two unswitched inputs, for autopilot disconnect, and/or radar altimeter warning. Push buttons select the receiver audio source provided to the headphones. A SPR button allows the user to listen to the receiver(s) selected on the cabin speaker. Except for the unswitched inputs, all speaker audio is muted during transmit.

Push button switches selects one of the communication transceivers for the pilot and copilot position, and allows radio transmission. In "Split Mode" the SL15-CD has the ability to allow the pilot and copilot to operate different transceivers independently. The Com 3/TEL mode (selected at installation) allows the pilot to use the audio panel for duplex operation, such as with aviation-specific cellular telephones. External switches permit telephone operation for the copilot and passengers.

A fail-safe mode connects the pilot headphone and microphone to COM 1 if power is removed for any reason, or if the power switch is placed in the Off (Fail-safe) position.

A six-station voice activated (VOX) intercom is included in the SL15-CD. This system has PS Engineering's exclusive *IntelliVox®* circuitry that eliminates manual adjustments. The system contains six separate VOX mic circuits, and only opens the microphone channel in use.

The intercom system incorporates pilot isolate and crew modes, two stereo music inputs with "Soft Mute," and flashing LED indicators for transmit indications. Intercom control is through front panel-mounted knob and 3 position mode switch. A concentric volume controls the music level, and intercom level for the pilot and copilot. Passenger headphone volume is factory set, and adjusted in flight with headset-mounted volume controls. Passenger volume control is further adjustable through screwdriver access in the top of the unit. Intercom squelch is automatic.

An optional 3-light Marker Beacon receiver is integrated in the SL15-CD. This provides the necessary Marker Beacon lights and audio indications necessary for an Instrument Landing System (ILS) approach.

## *1.4     APPROVAL BASIS*

**TSO Approval**

The SL15-CD Audio Selector Panel is FAA approved under TSO C50c (Audio Amplifiers) and TSO C35d (Marker Beacon Receivers). In addition, they are approved by the Joint Airworthiness Authorities under JTSO C50C and JAR-TSO 2C35d.

All systems comply with relevant portions of EUROCAE RTCA MPS WG No. 7/70, DO-143 and (*Marker Beacon Receivers*), ED-14C/DO-160C (*Environmental Conditions and Test Procedures for Airborne Equipment*), ED12B/DO-178B (*Software Considerations for Airborne Equipment*) and ED- 18/DO-214 (*Audio Systems Characteristics and Minimum Operational Performance Standards for Aircraft Audio Systems*).

The CD-15 is FAA TSO approved under TSO C50c and JAA approved under JAR TSO C50c.

Operation is subject to the following conditions:
This device may not cause harmful interference.
This device must accept any interference received, including interference that may cause undesired operation.

## 1.5    *SPECIFICATIONS*

| TSO COMPLIANCE | |
|---|---|
| *Marker Beacon*: | C35d, Class A |
| *Audio Selector/Intercom*: | C50c, Class A |
| APPLICABLE DOCUMENTS: | RTCA/DO-214 RTCA/DO-143 RTCA/DO-160C RTCA/DO-178B |
| **ENVIRONMENTAL Qualifications**: | A1D1/CA(MN)XXXXXXBBBBTBKXX |
| *Operating Temperature Range*: | -15º C to 55ºC |
| *Altitude*: | Up to 50,000 feet in an non-pressurized area |
| DIMENSIONS: | Height: 1.3 in. (3.3 cm) Width: 6.25 in. (16.9 cm) Depth: 6.8 in. (17.3 cm) |
| WEIGHT (With Rack & Connectors): | 1.5 lb. (0.54 kg) |
| **POWER REQUIREMENTS** (Including Internal Lighting): | |
| *Voltage*: | 11 to 33 VDC |
| *Maximum Current*: | 2.5 Amp (Externally protected by a 3A pull-type breaker) |
| **Audio Selector Specifications** | |
| *Audio selector panel input impedance*: | 510 Ω |
| *Input Isolation*: | -60 dB (min.) |
| *Speaker Muting*: | -60 dB (min.) |
| *Speaker Output*  (into 4 Ω) with no clipping 14 VDC: 28 VDC: | 3 Watts (min.) 10 Watts (min.) |
| *Receiver Inputs*: | 9 (Com 1, Com 2, Com 3, Nav 1, Nav 2, ADF, DME, MKR, AUX) |
| *Unswitched Inputs*: | 4 |
| *Transmitter Selections*: | 6 (Com 1, Com 2, Com 3 Com1/2, Com1/3, Duplex Telephone) |
| *Speaker Impedance*: | 4 Ω |
| *Headphone Impedance*: | 150 – 1000 Ω |
| *Headphone Output*: | 38 mW each headset, no clipping <1% THD |
| *Microphone Impedance*: | 150 - 600 Ω |
| **Intercom Specifications** | |
| *Intercom Positions*: | 6 places (with individual *Intelli*Vox® circuits) |
| *Music Inputs*: | 2 (Stereo) |
| *Music Muting*: | >-30 dB "Soft Mute" when Com or intercom active. |
| *Distortion:* | <1% THD @ 38 mW into 150Ω |
| *Mic Freq. Response, 3 dB:* | 300 Hz - 6000 Hz |
| *Music Freq. Response, 3 dB*: | 20 Hz - 18kHz |
| **MARKER BEACON RECEIVER:**SL15-CD only | |
| *Frequency*: | 75 MHz Crystal Controlled |
| *Sensitivity*: Low: High: | Capable of: (preset at factory for field application) 1000 μVolts (Hard) (360 to 570 μV soft) 200 μVolts (Hard) (130 to 200 μV soft) |
| *Selectivity*: | -6 dB at ±10 kHz -40 dB at ±120 kHz |
| *External Lamp Output*: | 7.5 (±4 VDC unloaded, at maximum brightness) VDC positive when active, max. current 125 mA |
| *MM Sense*: | Active high (4.5 ± 1.0VDC) |

| Compact Disc Player | |
|---|---|
| TSO Compliance | C50c, Class A |
| Environmental Compliance | B1CABSRXXXXXXABBBBTMXXE2 |
| *Operating Temperature Range:*: | -15º C to 55ºC |
| *Altitude*: | Up to 25,000 feet in a non-pressurized area |
| DIMENSIONS: | Height: 1.5 in. (3.8 cm) Width: 6.25 in. (15.9 cm) Depth: 7.8 in. (19.8 cm) |
| WEIGHT (With Rack & Connectors): | 1.9 lb. (.54 kg) |

## 1.6    EQUIPMENT SUPPLIED

1 ea. of the following units:

| Model | Description | Part Number |
|---|---|---|
| SL15-CD | SL15-CDAudio Panel with Marker Beacon and Stereo intercom for use with PCD7100-R.  Silver trim ring. | 435-6065-50 |
| CD-15 | Remotely Controlled Compact Disc Player for use with SL15-CD | 435-6065-60 |

SL15-CDInstallation Kit: 250-007-3613

| Description | Quantity | Part Number |
|---|---|---|
| SL15-CD installation rack assembly | 1 | 120-430-0420 |
| Top Molex Connector Shell w/key, 44 pin, key 4/5 | 1 | 120-425-4402 |
| Bottom Molex Connector Shell w/key, 44 pin, key 7/8 | 1 | 120-425-4400 |
| Gold Plated Crimp Pins | 88 | 425-001-0002 |
| 4 40 X 7/16 screw w/nylon patch | 4 | 475-440-0007 |
| Grounding bar | 1 | 430-007-0001 |
| 6-32 X 3/4 pan head Phillips screw | 2 | 475-632-0038 |
| 6-32 Nut Flat | 2 | 475-632-0003 |
| 6-32 Lock Nut | 2 | 475-632-0004 |
| Cable Clamp | 1 | 625-001-0002 |
| #6-32 x ½" Flat head Phillips screw | 6 | 475-632-0012 |
| #6-32 Clip Nut | 6 | 475-630-0002 |
| Parts identification sheet | 1 | 002-250-7028 |

Remote Player (11955) Installation Kit

| Part Number | Description | 250-795-0005 |
|---|---|---|
| 430-795-0020 | Tray | 1 |
| 425-016-0001 | DB 15 Pin Solder Connector | 1 |
| 425-015-0003 | DB 15 Connector Back shell | 1 |
| 475-002-0002 | Thumbscrew, DB connector | 2 |
| 475-632-0012 | #6-32 x ½" Phil screw. | 4 |
| 475-630-0002 | 6-32 Clip Nut | 4 |

## 1.7     EQUIPMENT REQUIRED BUT NOT SUPPLIED

a)     Circuit Breaker: 1 ea; 3 amp PULL TYPE REQUIRED for SL15-CD
b)     Circuit Breaker: 1 ea; 1 amp PULL TYPE REQUIRED for CD-15
c)     Speaker, 4 Ω
d)     Headphone Jacks (Stereo, as Required)
e)     Microphone Jacks (as Required)
f)     Headphones, 150 Ω (Stereo), up to 6 as required
g)     Microphones, up to 6 as required
h)     Marker Antenna (75 MHz, VSWR <1:1.5, and appropriate for the airspeed)
i)     Interconnect Wiring

## 1.8     LICENSE REQUIREMENTS

None

# Section II - Installation

## 2.1    GENERAL INFORMATION

### 2.1.1    SCOPE

This section provides detailed installation and interconnection instructions for the UPS Aviation Technologies SL15-CD Audio Selector Panel/Intercom/Compact Disc System with internal Marker Beacon.

Please read this manual carefully before beginning any installation to prevent damage and post-installation problems. Installation of this equipment requires special tools and knowledge.

### 2.1.2    Certification Requirements

> **NOTE:** The SL15-CD requires specialized knowledge and tools for an effective installation. An appropriately rated Certified Aircraft Repair Station **must** install this equipment in accordance with applicable regulations. UPS Aviation Technologies, Incorporated warranty is not valid unless the equipment is installed by an authorized UPS Aviation Technologies, Incorporated dealer.
> Failure to follow any of the installation instructions, or installation by a non-certified individual or agency will void the warranty, and may result in an **unairworthy** installation.

## 2.2    Unpacking and Preliminary Inspection

Use care when unpacking the equipment. Inspect the units and parts supplied for visible signs of shipping damage. Examine the unit for loose or broken buttons, bent knobs, etc. Verify the correct quantity of components supplied with the list in Section 1.6 (B). If any claim is to be made, save the shipping material and contact the freight carrier. Do NOT return units damaged in shipping to UPS Aviation Technologies. If the unit or accessories shows any sign of external shipping damage, contact UPS Aviation Technologies to arrange for a replacement. Under no circumstances attempt to install a damaged unit in an aircraft. Equipment returned to UPS Aviation Technologies for any other reason should be shipped in the original UPS Aviation Technologies packaging, or other UPS approved packaging.

## 2.3    Equipment Installation Procedures

### 2.3.1    Cooling Requirements

Forced air-cooling of the SL15-CD or the CD-15 remote player is not required. However the units should be kept away from heat producing sources (i.e. defrost or heater ducts, dropping resistors, heat producing avionics) without adequate cooling air provided.

### 2.3.2    Mounting Requirements

The SL15-CD must be rigidly mounted to the instrument panel of the aircraft structure and within view and reach of the pilot position(s). Installation must comply with FAA Advisory Circular AC 43.13-2A. The unit may be mounted in any area where adequate clearance for the unit and associated wiring bundle exist.

The CD-15 CD Player may be located in any convenient location for access to the disc slot. However, it should be mounted to keep the interconnecting bundle within approximately six feet (2 meters). The unit must be installed within ±30° of horizontal along the pitch axis, and ±10° of horizontal along the roll axis in level flight.

Avoid installing the units close to high current devices or systems with high-voltage pulse type outputs, such as DME or transponders. Avoid running the interconnecting bundles near any high current wires.

### 2.3.3    Audio Panel Mounting Rack Installation

Remove the unit from the mounting tray by unscrewing the 3/32" hex-head screw that is in the center of the unit. Use caution to avoid hitting the photo-detector lens. Carefully slide the unit free of the tray. Set the

unit aside in a safe location until needed.  Install the tray using six clip nuts (475-630-0002), and six FHP 6-32 x ½" screws (475-632-0012). The audio selector panel must be supported at front and rear of the mounting tray.

### 2.3.4    Remote Unit Mounting Rack Installation

Remove the unit from the mounting tray by unscrewing the 3/32" hex-head screw that is in the left side of the unit. Carefully slide the unit free of the tray. Set the unit aside in a safe location until needed.  Install the tray using six clip nuts (475-630-0002), and six FHP 6-32 x ½" screws (475-632-0012). The audio selector panel must be supported at front and rear of the mounting tray.

### 2.3.5    Audio Panel Tray and Connector Assembly

The unit connectors mate directly with the circuit boards in the SL15-CD. The connectors are a Molex crimp-type, and require the use of a Molex hand crimp tool, EDP P/N 11-01-0203, CR6115B (or equiv.). The connectors are mounted to the unit tray with #4-40 screws (475-440-0007), from the inside of the tray. Ensure that proper strain relief and chafing precautions are made during wiring and installation, using the cable clamp (625-001-0002). Secure the ground bar (430-630-0002), if desired using, #6-32 nuts (475-632-0003) and #6-32 lock nuts (475-632-0004).
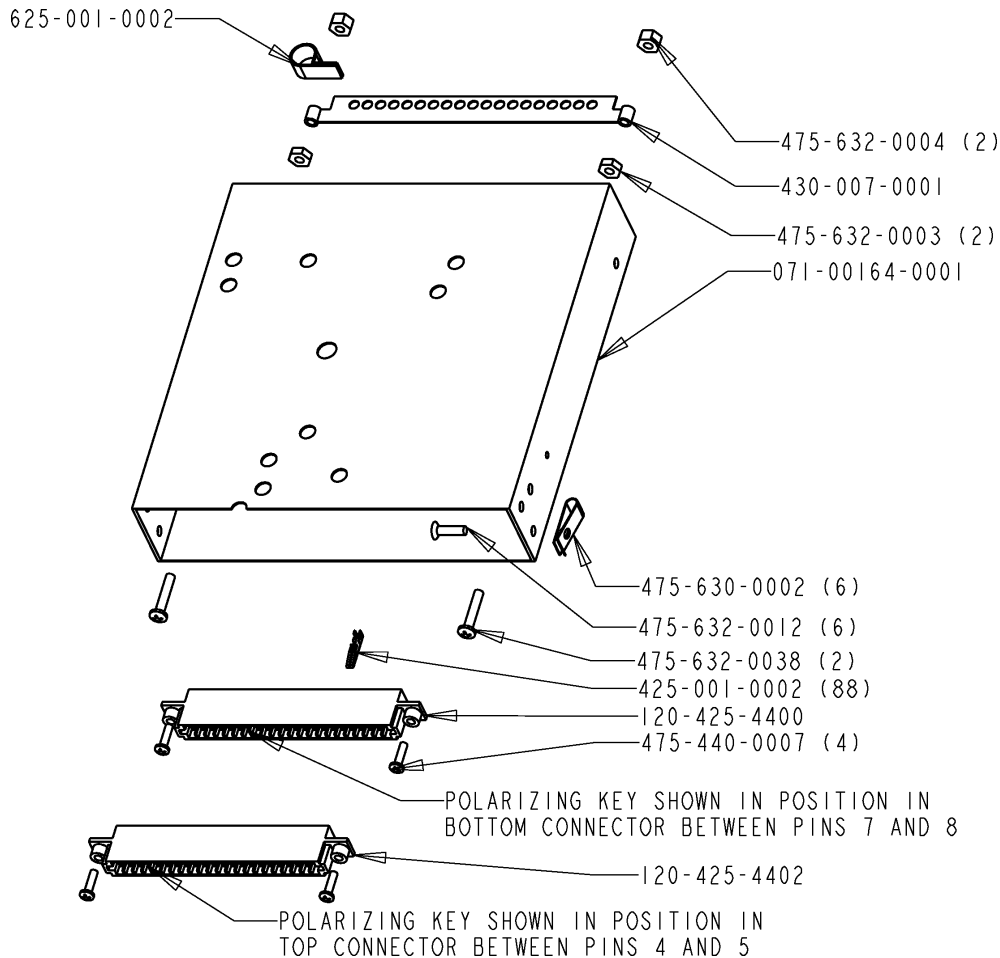


**Figure 2-1 Audio Panel Tray Assembly Drawing**

### *2.4      Remote Unit Connector*

The remote unit uses a 15-pin Sub-D solder type connector on the player. This passes through the mounting tray.

## *2.5 Cable Harness Wiring*

Referring to the appropriate Appendix, assemble a wiring harness as required for the installation. All wires must be MIL-SPEC in accordance with current regulations. Two- and three-conductor shielded wire must be used where indicated, and be MIL-C-27500 or equivalent specification. Proper stripping, shielding and soldering technique must be used at all times. It is imperative that correct wire be used.

The 6-conductor cable for the remote CD-15 is available from PS Engineering as part number 800-022-0609.

Refer to FAA Advisory Circular 43.13-2A for more information. Failure to use correct techniques may result in improper operation, electrical noise or unit failure. Damage caused by improper installation will void the UPS Aviation Technologies warranty.

NOTE: PS Engineering can make a custom wiring harness for the intercom and CD player portion. Call 1-800-ICS-AERO or see www.ps-engineering.com for details.

### 2.5.1 Noise

Due to the variety and the high power of radio equipment often found in today's general aviation aircraft, there is a potential for both radiated and conducted noise interference.

The SL15-CD power supply is specifically designed to reduce conducted electrical noise on the aircraft power bus by at least 50 dB. Although this is a large amount of attenuation, it may not eliminate all noise, particularly if the amplitude of noise is very high. There must be at least 13.8 VDC present at the bottom connector, pin 20, of the SL15-CD for the power supply to work in its designed regulation. Otherwise, it cannot adequately attenuate power line noise. Shielding can reduce or prevent radiated noise (i.e., beacon, electric gyros, switching power supplies, etc.) However, installation combinations can occur where interference is possible. The SL15-CD was designed in a RFI hardened chassis and has internal Electromagnetic Interference (EMI) filters on all inputs and outputs.

Ground loop noise occurs when there are two or more ground paths for the same signal (i.e., airframe and ground return wire). Large cyclic loads such as strobes, inverters, etc., can inject noise signals onto the airframe that are detected by the audio system. Follow the wiring diagram very carefully to help ensure a minimum of ground loop potential. Use only Mil Spec shielded wires (MIL-C-275000, or better). Under no circumstances combine a microphone and headphone wiring into the same shielded bundle. Always use a 2- or 3-conductor, shield wire as shown on the installation wiring diagram.

Radiated signals can be a factor when low level microphone signals are "bundled" with current carrying power wires. Keep these cables physically separated. It is very important that you use insulated washers to isolate the ground return path from the airframe to **all** headphone and microphone jacks.

> Adding a high-performance audio control system, particularly in conjunction with high-performance active noise-canceling headsets, cannot improve on older avionics that were designed for cabin-speaker use. UPS Aviation Technologies makes no claim that the audio panel will provide a noise-free audio quality under all installation conditions, particularly with older avionics.

### 2.5.2 Existing KMA-24 Installation

If the installation replaces a KMA-24 (series -01, -02 or -03), the existing 44-pin connector can be used for the bottom connector of the SL15-CD tray as is, providing it is properly installed and wired. No other changes are required except for external marker lights (see Section 3.7.2 for details). The "key" in the existing connector must be located between pins 7 and 8. This connector will be used in the bottom connector position. (See Appendix for complete wiring harness details.)

The existing ground bus may be reused for radio shield connections, if it was constructed so it can be relocated to the SL15-CD tray.

### 2.5.3 Existing SL10/SL15 installations

In 28-Volt aircraft, the dropping resistor may be removed, however, the 2 Amp breaker should be changed to 3 Amp. If the old unit is stereo (SL10S or SL15), no rewiring is necessary except to add additional features.

#### 2.5.3.1 Stereo SL15-CD installations into monaural SL10 or SL10M

Installations replacing SL10 or SL10M require re-wiring of the top connector to accommodate the stereo configuration. See appendixes for detailed interconnect information.

### 2.5.4 Power

The SL15-CD is compatible with both 14 and 28 Volt DC systems. A two (2) Amp circuit breaker is required for 14 VDC installations, and a three (3) Amp breaker for 28 VDC aircraft. Power and ground wires must be a <u>twisted</u> #18 AWG pair. Connect airframe power ground to J1 (bottom connector) Pin Z only. No dropping resistors are required.

### 2.5.5 Communications Push-to-Talk

An important part of the installation is the PTT (Push-To-Talk) switches that allow the use of your aircraft communications radio for transmissions. There are three typical configurations that can be used. Select the case that best fits the installation. Only the person who presses their PTT switch will be heard over the radio. If the pilot and copilot both use the PTT, only the pilot position has access to the radio. The pilot position will have PTT control regardless of the mic selector switch or copilot PTT when the SL15-CD is in the OFF/EMG mode.

*CASE I*: PTT is built into both pilot and copilot yokes.

*CASE II:* PTT is in pilot yoke only. This configuration requires a modified external PTT switch plugged into the copilot's microphone jack. (See Appendix A). When the copilot's PTT is pressed, the intercom switches the microphone audio from pilot to copilot mic.

*CASE III*: No built in PTT. This requires two built in PTTs to be installed, or modified external PTT switches to be used. Modify external PTT as required. See Appendix A.

### 2.5.6 Audio Panel interface

The SL15-CD is designed to interface with standard aircraft avionics, and presents a 500Ω receiver impedance. For best results, a twisted-shielded cable is recommended from the avionics audio source to the audio panel, with the shield grounded at the audio panel end.

Some avionics do not provide a separate audio low, and may introduce additional electrical noise into the system. For best results, connect the audio low from the audio panel to the radio ground, using one conductor of the twisted-shielded cable.

#### 2.5.6.1 Speaker Load

The SL15-CD contains a speaker amplifier. Some units with internal speaker amplifiers, such as the King Radio KX170-series, require a resistive load to prevent damage if their speaker amplifier is not used. Connect the speaker output from the unit to the load input on the SL15-CD (J1, pins 19 and L, 16 and M. The speaker load is 16 Ω, 3W.

### 2.5.7 Com 3 Duplex (TEL) Function

As installed in the standard configuration, the SL15-CD Com 3 function operates conventionally. Pushing the Com 3 Xmt button places the receive audio from Com 3 in the headset and applies the pilot or copilot microphone to the Com 3 when the appropriate PTT is activated.

If J2, Pin J is connected to aircraft ground, the SL15-CD is forced into Com 3-Duplex mode. This mode is designed to operate with telecommunications systems, such as the AirCell AGM.01. Audio streams selected by hook switches are provided to the COM 3 output, the PTT for Com 3 is inactive, and audio from Com 3

is presented to the headset. This allows a telephone-like audio interface. The COM 3 input and output are compatible with aviation radios.

> **Unauthorized use of unapproved cellular telephone devices in aircraft is subject to FCC enforcement action, which may include a $10,000 fine per incident. UPS Aviation Technologies, Inc. does not endorse using unapproved cellular telephone equipment in flight, and takes no responsibility for the user's action.**

### 2.5.8 Transmit Interlock

Some communications transceivers use a transmit-interlock system. To fully utilize the Split Mode feature, this function must be disabled. Consult that manufacturer's installation manual.

### 2.5.9 "Swap" Mode

When a momentary, normally open, push-button switch is connected between pin 10 on the top connector and aircraft ground, the user can switch between Com 1 and 2 by depressing this switch without having to turn the mic selector switch. This yoke-mounted switch eliminates the need to remove your hands from the yoke to change transceivers. The transfer of TX indication from Com 1 to Com 2 shows that the swap has been initiated, there is no dedicated swap indicator.

### 2.5.10 Backlighting

The SL15-CD has an automatic dimming of the pushbutton annunciator LEDs and marker lamps controlled by a photocell. Control of the unit backlighting is through the aircraft avionics dimmer. Connect the dimmer control line to J1 pin D for 14 volt systems, and to J1 pin F for 28 volt systems. Pin E is light ground.

If an external dimmer control is **not** used, a constant low level back light illumination can be established for nighttime viewing. Pin D or F (depending on system voltage) must be tied to power (J1, pin 20) for the back lighting system to work. The photocell mounted in the unit face will automatically adjust the intensity of the push-button annunciator LEDs.

### 2.5.11 Unswitched inputs

J1, pin T is the unswitched input number 1 and J1 pin 17 is unswitched input 2. These inputs are presented to the pilot and copilot regardless of the audio configuration, and will always mute the entertainment inputs. These 510Ω inputs can be used for altimeter DH audio, GPS waypoint audio, autopilot disconnect tones, air-to-ground (Flitefone) telephone ringer or any other critical audio signal. This input is not related to the cellular telephone interface.

### 2.5.12 PA Mute (J1, Pin 18)

Pin 18 of J1 is a TTL logic output that is pulled low during PTT operation. This serves as an input to external public address system to prevent feedback during transmissions.

### 2.5.13 Public Address Function (J2, Pin 18)

By connecting the top connector (J2), Pin 18 to ground, the pilot's microphone audio is placed on the cabin speaker output. When the pilot's PTT is activated, his voice is heard over the speaker. The copilot can continue to use the selected com.

We recommend installing a toggle switch to connect the cabin speaker output (pin W, bottom connector) to a rear or public address speaker instead of the cockpit speaker close to the pilot. This will prevent feedback.

### 2.5.14 Control Output (J2, Pin A)

Pin A of the top connector is pulled to ground whenever the AUX button is depressed. This serves as a control line for external devices, such as a entertainment system that the pilot wishes to control.

This could be used in conjunction with a PA to control J2, Pin 18, as well as an external relay to change to the cabin speaker from the cockpit.

### 2.5.15 Intercom wiring

The top connector (J2) is for the intercom, CD interface and additional functions. See Appendix for inter-com connection configurations. It is critical to the proper operation of this system to have this connector wiring made in accordance with these diagrams. Use 2- and 3-conductor, MIL-spec cable as shown. Con-nect the shields at the audio panel end only, and tie to the audio low inputs as shown.

> **NOTE:** The top connector harness can be custom made by PS Engineering, Inc. Simply call the factory and obtain a wire harness work sheet. The harness will be made to your specifications and fully functionally tested. All hardware is included.

### 2.5.16 Remote CD wiring

The remote CD-15 Player is powered from the avionics bus through a 1 A PULL TYPE Breaker.

The CD-15 is interfaced to the SL15-CD through a 6-conductor data cable and a 3-conductor audio cable. These cables must conform to the MIL-C-27500.

#### 2.5.16.1 Entertainment Input

The remote compact disc player is designed to interface with the audio panel as input number 1 J2 pins 15 (left channel) and 16 (right channel), WRT pin T, and is provided to the pilot and copilot. Entertainment number 2 is provided to the passengers at all times.

In order to use the remote player to provide music to the passengers, it must be interfaced to Entertainment 2 input pins 13 (right), 14 (left), WRT pin R. We recommend installing a DPDT switch to allow isolation of the music sources if desired.

> **NOTE**: Use the <u>low level</u> output of any additional entertainment device to connect to the audio panel. Maximum signal level is **2 VAC** p-p.
>
> **DO NOT** use a speaker-level output, this will cause internal damage in the audio panel.

##### 2.5.16.1.1 Entertainment muting

The SL15-CD incorporates a "Soft Mute" system. This will mute the entertainment devices during ICS or radio conversation.

Any signal appearing in the unswitched audio inputs will always mute the entertainment sources, even though the passengers may not hear the audio tone itself.

> **Caution:** Local oscillators and internal signals from entertainment equipment other than the CD-15 can cause undesired interference with other aircraft systems. Before takeoff, operate the entertainment devices to determine if there is any adverse effect within the aircraft systems. If any unusual operation is noted in flight, immediately switch off the entertainment devices.

All additional entertainment devices must be switched off for both takeoff and landing.

##### 2.5.16.1.2 Entertainment 2 Mute (Pin V)

The ICS button on the SL15-CD controls the muting ("Karoake mode") of entertainment source #1.

Connecting J2 pin V to ground through a SPST switch places the entertainment #2 music source into the Karoake Mode. In this mode, incoming music and intercom conversation will not mute the music for the passengers' intercom net. This allows uninterrupted music during casual conversation and at times when radio communications are of lesser importance.

### 2.5.17 SL15-CD Intercom expansion (J2, Pins P, S, and C)

The SL15-CD contains a 6-place intercom. In applications where more intercom positions are needed, PS Engineering can provide intercom expansion units, such as the IntelliPAX, part number 11606, 11606R, etc. These can add up to six additional stereo intercom stations, plus independent music input. Interface to the expansion unit is through J2, pins P (audio input from expansion unit), S (audio output to expansion unit) and C (9 VDC expansion power).

### 2.6    Marker Beacon Installation

The marker beacon receiver is an option included in the SL15-CD.

### 2.6.1 Marker Antenna Installation

A marker beacon antenna, appropriate to the type and speed of the aircraft, is required (not included). Refer to aircraft and antenna manufacturer's installation instructions, as well as AC43.13-2A (or later revision), Chapter 3, for information on proper antenna installation techniques. The marker beacon antenna must be mounted on the bottom of the aircraft.

### 2.6.2 External Marker Lights

For installations that require external marker beacon lights, there are three outputs that can drive 12-Volt lamps only. The external output lamps are driven high (typically +9 VDC ±1.5 VDC unloaded, at MAX brightness) when active.  Maximum source current per lamp is 125 mA. Voltage varies with photocell dimming.

### 2.6.3 Middle Marker Sense

A Middle Marker Sense output signal is available from the SL15-CD to flight control systems. This function will not operate during the test mode. This output will go to +4.5 VDC (± 1.0 VDC) when a valid Middle Marker signal is received. This output is J1, pin 2.

### 2.6.4 Marker Audio Input

If using an external marker receiver, the audio input is J1, pin 21 (MKR input).

### 2.7    Adjustments

The SL15-CD is factory-adjusted to accommodate the typical requirements for most aircraft configurations. There are five adjustments however, that will allow the installer to tailor the specific functions.
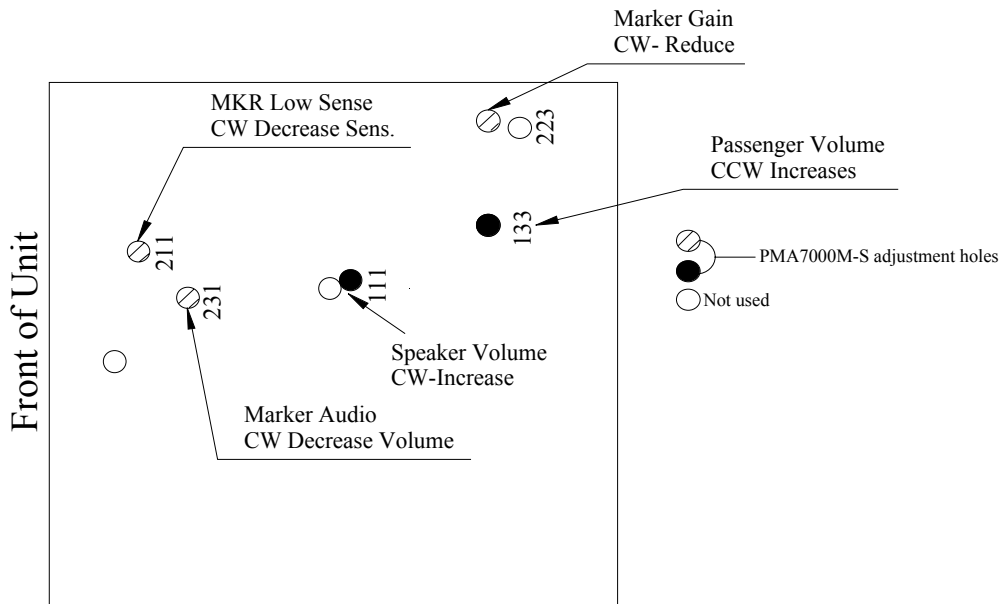


**Figure 2-2- SL15-CD Adjustments**

## 2.8    Communications Antenna Installation Notes

For best results while in Split Mode, it is recommended that the one VHF communications antenna is located on <u>top</u> of the aircraft while the other communications antenna is installed on the <u>bottom</u>. Any antenna relocation must be accomplished in accordance with AC 43.13-2A, aircraft manufacturers' recommendations and FAA-approved technical data.

---

**Warning**:
It is probable that radio interference will occur in the split mode when the frequencies of the two aircraft radios are adjacent, and/or the antennas are physically close together. **UPS Aviation Technologies makes no expressed or implied warranties regarding the suitability of the SL15-CD in Split Mode.**

---

### 2.8.1    Hook Switches

While the mic selector button acts as the hook switch for the pilot, additional hook switches must be installed to have full access to the cell phone system. The copilot hook switch is a SPST switch that connects pin L of J2 on the SL15-CD to ground to place the copilot mic audio on the Com 3 audio in duplex mode for cell phone operation.

SL15-CD J2, pin M is the passenger hook switch. Install a SPST switch in a location adjacent to each passenger headset where cell phone use is desired. When pin M is connected to ground through any switch, the passenger microphones are all on the Com 3/duplex system.

The hook switches are not active or required unless the audio panel is in Com 3 /Duplex mode, with pin J, J2 grounded.

The wireless communication "tel" system utilizes an intercom loop. Therefore, any time the cell phone is in use from the pilot or copilot side, pilot and copilot will lose intercom capability. In the ALL mode, when the passengers' activate the cell phone, the pilots will have intercom, and continue to hear and transmit over the avionics normally. However the passengers will not have intercom, because they are on the telephone.

## 2.9    SL15-CD Pin assignments (Opt CD Version Only)

J1 Bottom Connector

| Pin | Signal |
|-----|--------|
| 1 | Chassis Ground |
| A | MKR Coax Shield |
| 2 | MM Sense Output |
| B | MKR Antenna |
| 3 | Pilot Headphones (rt) |
| C | White Lamp Output |
| 4 | Amber Lamp Out |
| D | 14 V Light Hi |
| 5 | Blue Lamp Out |
| E | Light Lo |
| 6 | DME Audio Hi |
| F | 28V Lights Hi |
| 7 | |
| H | Com 2 Mic Audio Hi |
| 8 | Pilot Mic Audio Hi In |
| J | Com 3 Audio Hi |
| 9 | Com 1 Audio Hi |
| K | Com 3 Mic Audio Hi |
| 10 | Com 2 Audio Hi |
| L | Com 1 Spkr Load |
| 11 | AUX Audio Input Hi |
| M | Com 2 SPKR Load |
| 12 | Nav 1 Audio Hi |
| N | |
| 13 | Nav 2 Audio Hi |
| P | Com 1 Mic Audio Hi |
| 14 | |
| R | Com 1 Mic Key |
| 15 | Com 3 Mic Key |
| S | ADF Audio Hi |
| 16 | Com 2 SPKR load |
| T | Unswitched Audio In #1 |
| 17 | Unswitched Audio In #2 |
| U | Unswitched Audio In #3 |
| 18 | PA Mute |
| V | Com 2 Mic Key |
| 19 | Com 1 SPKR load |
| W | Cabin Spkr Out |
| 20 | Aircraft Power 11-33 VDC |
| X | |
| 21 | Ext. Marker Audio Hi |
| Y | Pilot Mic PTT |
| 22 | Cabin Spkr Lo |
| Z | Aircraft Ground |

J2 Top Connector

| Pin | Signal |
|-----|--------|
| 1 | Pilot Phone Audio Hi  (Left) |
| A | AUX Control Out |
| 2 | Copilot Phone Audio (Lt) |
| B | Copilot Phone Audio Lo |
| 3 | Copilot Phone Audio (Rt) |
| C | Expansion Power Out (+9 VDC) |
| 4 | Pass 1 Mic Audio  Hi |
| D | Pass 1 Mic Audio Lo |
| 5 | Pass 2 Mic Audio Hi |
| E | Pass 2 Mic Audio Lo |
| 6 | Pass 3 Mic Audio Hi |
| F | Pass 3 Mic Audio Lo |
| 7 | Pass 4 Mic Audio Hi |
| H | Pass 4 Mic Audio Lo |
| 8 | Copilot Mic Audio Hi |
| J | Com 3 Duplex Enable |
| 9 | Copilot Mic PTT |
| K | Copilot Mic Audio Lo |
| 10 | Swap Switch |
| L | Copilot Off Hook |
| 11 | Passenger Headphone Audio (R) |
| M | Pass Off Hook |
| 12 | Passenger Audio (L) |
| N | Passenger Headphone Audio Lo |
| 13 | Entertainment #2 in (R) |
| P | Expansion Input |
| 14 | Entertainment #2 In (L) |
| R | Ent. # 2 Low |
| 15 | CD Audio Input (R) |
| S | Expansion Output |
| 16 | CD Audio Input (L) |
| T | CD Audio Lo |
| 17 | Ground |
| U | IntelliVOX Over ride |
| 18 | PA Activate |
| V | Mute 2 |
| 19 | Playback |
| W | CRST |
| 20 | INSRT |
| X | SCL |
| 21 | SDA |
| Y | CRQ |
| 22 | |
| Z | CD Digital Gnd |

### 2.10 Post Installation Checkout

After wiring is complete, verify power is ONLY on pin 20 of the J1 (bottom connector), and airframe ground on bottom connector pin Z. Failure to do so will cause serious internal damage and void UPS Aviation Technologies's warranty.

### 2.11 Unit Installation

To install the SL15-CD and CD-15, gently slide the units into the mounting racks until the hold-down screws are engaged. While applying gentle pressure to the face of the unit, tighten the 3/32" hex-head in the center of the unit until it is secure. DO NOT OVER TIGHTEN.

> **Warning**: Do not over-tighten the lock down screw while installing the unit in tray. **Internal damage will result.**

### 2.11.1  Operational Checkout

> NOTE: The *IntelliVox®* is designed for ambient noise levels of 80 dB or above. Therefore some clipping may occur in a quiet cabin, such as without the engine running, in a hangar. This is normal.

1. Apply power to the aircraft and avionics.
2. Plug headsets into the pilot, copilot, and occupied passenger positions.
3. Verify fail-safe operation by receiving and transmitting on com 1 from the pilot position, <u>with the audio panel power off</u>. The Com audio will be present in the right ear cup only.
4. Switch on the unit by pressing the volume (VOL) knob.
5. Check intercom operation.
6. Push the Com 1 Xmt select button (lower row).
7. Verify that both of the **Com 1** buttons light. Verify that transmit button LED (Light Emitting Diode) near the mic selector is <u>not</u> blinking. If the LED is blinking, stop testing and troubleshoot the microphone PTT installation.
8. Verify proper transmit and receive operation from the copilot position, noting that the copilot PTT switch allows proper transmission on the selected transceiver. Verify that the Com 1 Xmt button blinks when transmitting.
9. Verify that pushing the **COM 2** button causes the button to illuminate, and the Com 2 receiver to be heard. Verify operation on Com 1 from the pilot position.
10. Repeat for Com 2 and standard Com 3, (if installed).
11. Press and hold the Com 1 Xmt button. While holding the Com 1 button, press the Com 2 Xmt button. This places the unit in "split Mode;" Verify that the pilot can transmit and receive on Com 1, while the copilot transmits and receives on Com 2.
12. If the audio panel is installed with J2, pin J grounded, it is configured for duplex operation on Com 3. Verify that the pilot headset is connected to the cellular telephone system (if installed). Verify that by using the pilot side PTT, the pilot can transmit on the other selected radio (Com 1 or Com 2). Verify that the Com 3 Xmt LED blinks at about twice the rate of com 1, to indicate a duplex mode. The copilot has radio transmit capability in Com3 duplex mode, on the selected Com ( 1 or 2). However, he will have Com 3 capability if the copilot hook switch is grounded.
13. Verify proper operation of all receiver sources by selecting them using the appropriate button. The button illuminates to show which source is in use.
14. Push the SPR button. Verify that all selected audio is heard in the cockpit speaker. Verify that the audio mutes when the mic is keyed.
15. Verify that the appropriate LED in the lower right side blinks when either push to talk is keyed.
16. Verify proper Intercom system operation in the **ALL, ISO** and **CREW** modes (see Table 3-1).

17. Verify that the audio selector panel system does not adversely affect any other aircraft system by systematically switching the unit on and off, while monitoring the other avionics and electrical equipment on the aircraft.

### 2.11.1.1    Marker Checkout

1. Connect a ramp generator at the antenna end of the marker coax. With the unit under test in HI sensitivity, verify that a 160 µV, modulated 95% with 1300 Hz, signal will illuminate the amber (M) marker light, and that marker audio is present in the headphones when the Marker Audio (M) push-button has been depressed. Select SPR for speaker to verify marker audio availability on the cabin speaker. Verify that the white (I) and blue (O) lights will illuminate within ± 3dB of the amber lamp, with 3000 HZ and 400 Hz applied, respectively.

2. Repeat with the unit in LOW sensitivity, with 430 µVolts applied.

3. Connect the marker antenna and verify proper operation.

### 2.11.2  Receiver Sensitivity

Although the SL15-CD meets FAA TSO-C35d sensitivity specifications, the sensitivity of the receiver has been adjusted to meet real world requirements (150µV and 430µV, soft). This will usually eliminate the need for the avionics shop to reduce the sensitivity in the field so as to prevent early detection of the marker beacons. If your particular installation requires more or less sensitivity, see adjustment section 2.6, and figure 2-1.

### *2.12    Final Inspection*

Verify that the wiring is bundled away from all controls and no part of the installation interferes with aircraft control operation. Move all controls through their full range while examining the installation to see that no mechanical interference exists. Verify that the cables are secured to the aircraft structure in accordance with good practices, with adequate strain relief. Ensure that there are no kinks or sharp bends in the cables and coaxial cables. Verify that the cables are not exposed to any sharp edges or rough surfaces, and that all contact points are protected from abrasion.

Complete logbook entry, FAA Form 337, weight and balance computation and other documentation as required. Sample text for FAA Form 337, and instructions for continuing airworthiness can be found in Appendix F.

Return completed warranty registration application to UPS Aviation Technologies.

# Section III OPERATION

## GENERAL INFORMATION

### *3.1    SCOPE*

This section provides detailed operating instructions for the UPS Aviation Technologies SL15-CD Audio Selector Panel/Intercom Systems. Please read it carefully before using the equipment so that you can take full advantage of its capabilities.

This section is divided into four sections covering the basic operating areas of the SL15-CD systems. They are Audio Selector, Transceiver Selection, Intercom, and Marker Beacon Receiver.
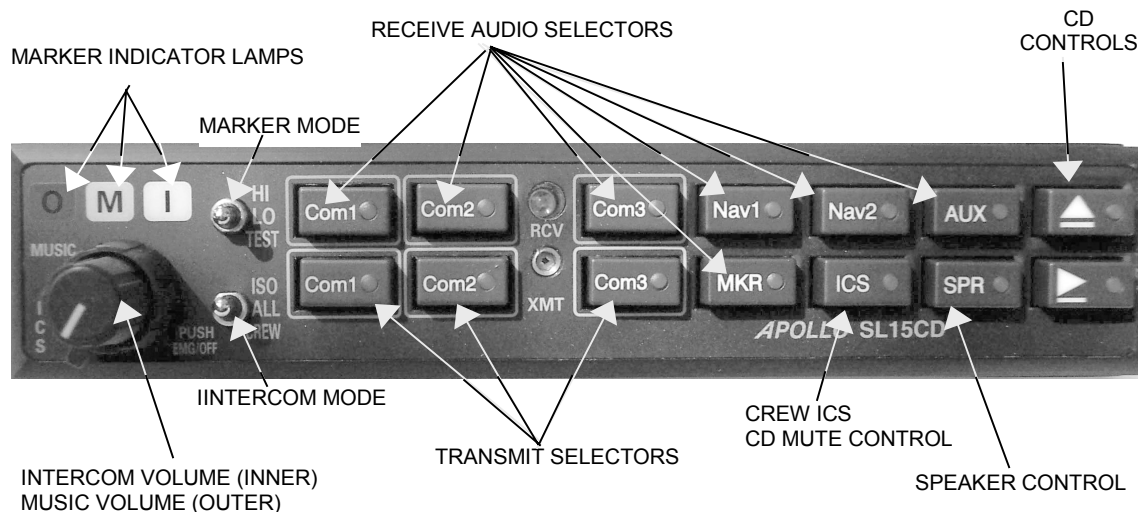


**Figure 3-1 SL15-CD Controls**

### *3.2    Power Switch (EMG-Fail Safe Operation)*

Unit power is turned on and off by pushing the volume knob. In the OFF or **"EMG"** position, the pilot is connected directly to Com 1. This allows communication capability regardless of unit condition. Any time power is removed or turned OFF, the audio selector will be placed in the fail-safe mode.

The power for the CD player (CD-15) is controlled by the audio panel. When the audio panel is on, it auto-matically activates the player. If it is necessary to disable the CD player, hold the two CD buttons (far right) in for more than 2 seconds. This removes power from the CD-15 circuits. To re-enable the CD-15, cycle power on the SL15-CD.

The power switch also controls the audio selector panel functions, intercom, CD player, and marker beacon receiver.

### *3.3    Microphone (XMT) Selection (All models)*

There are six pushbuttons associated with the communications transceivers. The lower buttons control which transceiver is selected for transmit.

The SL15-CD gives priority to the pilot's PTT. If the copilot is transmitting, and the pilot presses his PTT, the pilot's microphone will be heard over the selected com transmitter.

The SL15-CD has an automatic selector mode. Audio from the selected transceiver is automatically heard in the headsets and speaker (if selected). You can check this function by switching from COM 1 to COM 2 and

watch the selected audio light on the selector change from COM 1 to COM 2. This ensures the pilot will *always* hear the audio from the transceiver he is transmitting on.

When switching from COM 1 to COM 2, while COM 2 audio had been selected, Com 1 audio will continue to be heard. This eliminates the pilot having to switch Com 1 audio back on, if desired.

When switching from COM 1 to COM 2 while Com 2 has NOT been selected, Com 1 audio will be switched off. In essence, switching the mic selector will not effect the selection of Com receiver audio.

When the duplex, or TELEPHONE, mode is implemented, Com 3 becomes the "TEL" position . This is the pilot's "hook" switch, when the system is interfaced to an appropriate approved wireless telecommunication system, such as the AirCell system. Placing the mic selector in Com 3 places the pilot microphone and headphones on the cell phone. The pilot PTT will switch the pilot mic to the other selected com transceiver, and allow continued aircraft communications as well. The copilot will also be able to transmit with his PTT as well.

> **NOTE:** Placing the mic selector switch in the COM 3 –TEL– mode will disable pilot and copilot intercom, as the intercom circuit is transferred to the telephone use. In crew or ISO mode, placing the switch in TEL mode removes the passengers access to the telephone.

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

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

### *3.4      Audio Selector (All models)*

Receiver audio is selected through seven momentary, push-button, backlit switches. You will <u>always</u> hear the audio from the transceiver that is selected for transmit.

The users can identify which receivers are selected by noting which of the green switch LEDs are illuminated. Push buttons labeled **Nav 1**, **Nav 2**, **MKR** (Marker), **AUX** (auxiliary), and **SPR** (Speaker) are "momentary type switches. When one of these buttons is pressed, it will be active, and the LED will illuminate. Press the switch again and it will be in the "off" position and remove that receiver from the audio.

If the aircraft is equipped with a DME or ADF, these audio sources can be selected with the AUX button.

### 3.4.1   Speaker Amplifier

The "**SPR**" in the push-button section stands for speaker. This switch will place all selected audio on the cockpit speaker when this switch is selected.

**NOTE:** Except for the unswitched audio, the speaker amplifier is not active in the "Split Mode."

Unswitched audio, (autopilot disconnect, altimeter warning, etc.) will come through the speaker regardless of the speaker button position.

#### 3.4.1.1   Public Address Function

To access PA function, a switch is installed to connect the top connector, pin 18, to ground. This places the *pilot* microphone on the speaker output (Pin W) when the PTT is pushed. The copilot can continue to use the selected com radio.

We recommend that the switch transfer the audio from the cockpit speaker to a cabin speaker for public address. This will prevent feedback.

### 3.4.2   Key "Click"

The SL15-CD is equipped with a "click" function that provides an aural feedback to the user in addition to the tactile button push. This sound can be enabled or disabled by simultaneously holding the COM 1 and COM 2 buttons in for at least 5 seconds. Any person hearing the radios will also hear the key click.

Allow at least 20 seconds between turning the key click on and off.

### *3.5      Split Mode*

The split mode can be activated at any time by pressing the desired combination of XMT buttons. For instance, to activate a Com 1/Com 2 split, press and hold the com 1 button, and then press the Com 2 button while holding the Com 1 button. This places the pilot on Com 1 and the Copilot on Com 2.

Split mode for Com 3, in normal (not TEL/Duplex) is possible with pilot on Com 1, copilot on Com 2 or 3.

Pilot on Com 2 or Com 3 and Copilot on Com 1 is not possible.

---

**Note**

Due to the nature of VHF communications signals, and the size constraints in general aviation aircraft, it is probable that there will be some bleed-over in the Split mode, particularly on adjacent frequencies. UPS Aviation Technologies makes no warranty about the suitability of Split Mode in all aircraft conditions.

---

**Note**

Split Mode does <u>not</u> turn off other (Nav, ADF, etc.) selected audio to **pilot**. However, the copilot will only hear the selected communications receiver.

---

### 3.5.1   Split Mode ICS

In split mode, the pilot and copilot are usually isolated from each other on the intercom, simultaneously using their respective radios. Depressing the **ICS** button in Split Mode will activate VOX intercom between the pilot and copilot positions. This permits intercommunication when desired between the crew. Pressing the ICS button again disables this crew intercom function.

### *3.6      Intercom Operation*

### 3.6.1   *IntelliVox®* **VOX-Squelch**

No adjustment of the *IntelliVox®* squelch control is necessary. There is no field adjustment. Through three individual signal processors, the ambient noise appearing in all six microphones is constantly being sampled. Non-voice signals are blocked. When someone speaks, only their microphone circuit opens, placing their voice on the intercom.

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

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

---

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

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

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

**Table 3-1 Mic Muff™ Part Numbers**

| Manufacturer | Model | Mic Muff™ Part Number |
|---|---|---|
| Bose | Dynamic<br>Electret<br>M87 Dynamic | 90010<br>90015<br>90020 |
| David Clark | H10-30<br>H10-20, H10-40<br>H10-13.4 | 90010<br>90015<br>90015 |
| Lightspeed | 15K & 20K | 90015 |
| Peltor | 7003<br>7004 | 90010<br>90015 |
| Pilot | 11-20 & 11-90 | 90015 |
| Sennheiser | | 90015 |
| Telex | Airman 750<br>AIR3000 | 90015<br>90010 |

### 3.6.2 Intercom Volume Control

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

Adjust the radios and intercom volume for a comfortable listening level for the pilot. Most general aviation headsets today have built-in volume controls; therefore, passenger volume can be adjusted at the headset. If desired, passenger volume level can be adjusted by a screwdriver adjustment at the top of the tray (see figure 2-1).

#### 3.6.2.1 Mono headsets in Stereo Installation

All passenger headsets are connected in parallel. Therefore, if a monaural headset is plugged in to a SL15-CD Stereo installation, one channel will be shorted. Although no damage to the unit will occur, all passengers will lose one channel, unless they switch to the "MONO" mode on the headset. PS Engineering modifies headsets to add stereo capability, using high-fidelity speakers. Contact factory for details.

### 3.6.3 Intercom Modes

The lower switch on the left side is a 3-position mode switch that allows the pilot to tailor the intercom function to best meet the current cockpit situation. The description of the intercom mode function is valid only when the unit is not in the "Split" mode. Then, the pilot and copilot intercom is controlled with the ICS button.

**ISO:** (Up Position): The pilot is isolated from the intercom and is connected only to the aircraft radio system. He will hear the aircraft radio reception (and sidetone during radio transmissions). Co-pilot will hear passengers' intercom and Entertainment 1, while passengers will hear copilot intercom and Entertainment 2. Neither will hear aircraft radio receptions or pilot transmissions.

**ALL:** (Middle Position): All parties will hear the aircraft radio and intercom. Crew will hear Entertainment 1, passengers will hear Entertainment 2. During any radio or intercom communications, the music volume automatically decreases. The music volume increases gradually back to the original level after communications have been completed.

**CREW** (Down Position): Pilot and copilot are connected on one intercom channel and have exclusive access to the aircraft radios. They may also listen to Entertainment 1. Passengers can continue to communicate with themselves without interrupting the Crew and also may listen to Entertainment 2.

Anytime the SL15-CD is in either the COM 1/COM 2, COM 2/COM 1 ("Split Mode"), the pilot and copilot intercom is controlled with the ICS button. The passengers will maintain intercommunications, but never hear aircraft radios.

### 3.6.3.1   Entertainment Input

The audio selector panel has provisions for two separate entertainment input devices. The CD-15 remote CD player is usually installed as Music 1, and feeds the pilot and copilot positions. They operate independently in the SL15-CD. The music volume control affects the CD-15 music level only in the pilot and copilot positions.

While in the ISO (Isolate) mode, the copilot will hear Entertainment 1 while the four passengers will hear Entertainment #2. The pilot will hear entertainment 1, at a muted level. In normal operation, whenever a person speaks, or if the aircraft radio becomes active, the music will automatically mute and then will gradually return to the original listening level when the intercom or radio conversation ceases.

When in the ALL mode, pilot and copilot will hear Entertainment 1 input while all passengers will hear the Entertainment 2 source. While in the CREW mode, pilot and copilot will hear entertainment input #1 while the passengers may listen to entertainment input #2.

It is also possible to use just the CD-15 as entertainment input device for both entertainment inputs. However, we suggest that a switch (DPDT) be installed between CD-15 entertainment input #1. This will allow the pilot to direct the music as desired.

### 3.6.3.2  Soft Mute and Soft Mute inhibit

The Soft Mute feature assures that the aircraft radio transmissions will not be missed due to entertainment playing. When there is radio reception or intercom conversation, the music level is dropped to a low, or background level. When the radio or intercom traffic ceases, the level gradually returns to normal.

The front panel ICS switch controls muting of entertainment source #1 (for pilot and copilot). Pushing this button places the ICS in Karoake (or sing along) mode, which inhibits the soft mute feature. This allows the music to continue uninterrupted by intercom or radio traffic when cockpit workload is appropriate. Pushing the button again will release the mute inhibit function.

The passenger music, source #2, can be placed in the Karoake mode if a remote switch is installed in the aircraft. See wiring information for details.

**Table 3-2 Intercom Modes**

| Mode | Pilot Hears | Copilot Hears | Passenger Hears | Telephone | Comments |
|---|---|---|---|---|---|
| Isolate | A/C Radios<br>Pilot Sidetone<br>(during radio transmission)<br>Entertainment 1 is Muted | Copilot and passenger intercom<br>Entertainment #1 | Passenger and Copilot intercom<br>Entertainment #2 | "Phone Booth" mode<br>Pilot has exclusive use of the telephone.<br>In TEL, Pilot & Copilot connected to Com 1 for PTT TX and receive. Others hear Tel if off hook. | This mode allows the pilot to communicate without the others bothered by the conversations. Copilot and passengers can continue to communicate and listen to music |
| All | Pilot<br>Copilot<br>A/C Radio<br>Passengers<br>Entertainment #1 | Copilot<br>Pilot<br>A/C Radio<br>Passengers<br>Entertainment #1 | Passengers<br>Pilot<br>Copilot<br>A/C Radio<br>Entertainment #2 | All have access to phone through Hook Switch. Pilot access through TEL switch. All hear telephone audio if off hook. | This mode allows all on board to hear radio reception as well as communicate on the intercom. Music and intercom is muted during intercom and radio communications |
| Crew | Pilot<br>Copilot<br>A/C Radio<br>Entertainment #1 | Copilot<br>Pilot<br>A/C Radio<br>Entertainment #1 | Passengers<br>Entertainment #2 | Pilot and copilot don't have phone access, unless mic sel in TEL. Passengers have phone through Hook Switch, Passengers hear phone audio. | This mode allows the pilot and copilot to concentrate on flying, while the passengers can communicate amongst themselves. |

### 3.7   Telephone Mode

The Com 3 mode can serve as a full duplex interface for telephone systems if the installation is correctly configured. When interfaced with an approved airborne telecommunications system, the SL15-CD can serve as a audio control and distribution center. Each intercom position has a "hook switch." The pilot's hook switch is the "Com 3" button on the audio panel, the others are discrete switches mounted adjacent to the headset jacks. When Com 3 is active in the duplex mode, the TX button will blink about twice as fast as the normal transmit rate.

When the intercom is in **ALL** mode, the pilot can speak on the phone only if the **Com 3 is selected for transmit (Com 3 Xmt button activated).** All intercom positions will hear the telephone conversation. If any passenger places his or her switch into the "off-hook" position all passengers will also be heard on the phone. All will hear selected audio. Com 1 audio is automatically heard in the headsets. The pilot and co-pilot will have transmit capability on the other selected transceiver Com 1 or 2, simply by using their respective PTT switch.

In **CREW** mode, the pilot and copilot are may use the telephone, with their respective hook switch (the pilot selects Com 3 on the Xmt selector). Any passenger who places their switch into the off-hook position will also have access to the phone, and all four passengers will hear the conversation.

In **ISO** intercom mode, when the SL15-CD is in the **Com 3** mode, the pilot position is in the "Phone Booth." Only the pilot will hear the telephone, and only he will be heard. He will also have access to Com 1 or 2, and will transmit on that radio using the PTT. All selected audio is provided. If any other passenger goes "off hook" they will hear the phone.

---

> **Note**
>
> **Because the cell phone uses an intercom circuit, all stations on that circuit will lose intercom capability when the cell phone is in use.**

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### 3.8 Compact Disc Operation

The two push buttons at the far right of the SL15-CD Option CD control the compact disk operation. Inserting the disc into the CD-15 remote player unit will automatically begin play.

The lower button (play/pause/advance) is used to play the disc from stop, pause play, and advance the track. When the disc is stopped, pushing the button starts play. A short push will pause play. A longer press advances the track. Holding the button acts as a intro/scan, playing the first two seconds of each track until released.

The top button is used to stop and eject the disc. Press momentarily to stop, press and hold to eject.

**Figure 3-3 Play/Pause Advance Button**

**Figure 3-2 Stop/Eject Button**

Pushing BOTH buttons momentarily will cause the CD to "back up." If pushed in mid song, it will back up to the beginning of the track. At the beginning of a song, it will go back to the previous track.

This "back-up" feature implemented with Software Release **BBBB** for units without IRS and **FBBBB** for units with IRS and later. The software version is found on the side of unit by serial label.

Holding **BOTH** buttons in for more than __two seconds__ will cause the CD player to power down.

**NOTE: In order to restore CD operation you must cycle power on the SL15-CD.**

### 3.9 Marker Beacon

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

The Blue lamp, labeled "O," is the Outer Marker lamp and has an associated 400 Hertz 'dash' tone. The lamp and tone will be keyed at a rate of two tones/flashes per second when the aircraft is in the range of the Outer Marker Beacon.

The Amber lamp, labeled "M," is the Middle Marker lamp and is coupled with a 1300 Hertz tone. It is keyed alternately with short 'dot' and long 'dash' bursts at 95 combinations per minute.

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

The audio from the Marker Beacon Receiver can be heard by selecting the "MKR" push-button switch. To adjust the volume level, there is a service adjustment located on the top of the unit.

A three-position switch is used to set the receiver sensitivity and to test the indicator lamps. Use "**HI**" sensitivity initially. This allows you to hear the outer marker beacon about a mile out. Then select the "**LO**" sensitivity to give you a more accurate location of the Outer Marker. The momentary down switch position is marker test, labeled "T/M" and illuminates all three lamps simultaneously to assure the lamps (internal and external) are in working order. TST does not activate MM sense output.

Pressing the marker mode select down (to "T/M") will cause the marker audio to mute for that beacon. The next beacon received will re-activate the audio.

Notes

# 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 an FAA-certified avionics shop and authorized UPS Aviation Technologies dealer. If the unit is being installed by a non-certified individual in an experimental aircraft, a factory-made harness must be used for the warranty to be valid. This harness may be purchased directly from PS Engineering (865-988-9800). UPS Aviation Technologies, Inc. warrants this product to be free from defect in material and workmanship for a period of 26-months from the date of installation as recorded in aircraft logbook and/or on FAA Form 337.

UPS Aviation Technologies, Inc. warrants this product to be free from defect in material and workmanship for a period of 26-months from the date of installation. During this 26-month warranty period, UPS Aviation Technologies, Inc. at its option, will send a replacement unit at our expense if the unit should display any unusual behavior.

*All transportation charges for returning the defective units are the responsibility of the purchaser.* All domestic transportation charges for returning the exchange or repaired unit to the purchaser will be borne by UPS Aviation Technologies, Inc. The risk of loss or damage to the product is borne by the party making the shipment, unless the purchaser requests a specific method of shipment. In this case, the purchaser assumes the risk of loss. This warranty is not transferable. Any implied warranties expire at the expiration date of this warranty. UPS Aviation Technologies SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES. This warranty does not cover a defect that has resulted from improper handling, storage or preservation, or unreasonable use or maintenance as determined by us. This warranty is void if there is any attempt to dissemble this product without factory authorization. This warranty gives you specific legal rights, and you may also have other rights, which may vary from state to state. Some states do not allow the exclusion of limitation of incidental or consequential damages, so the above limitation or exclusions may not apply to you.

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

## 4.2    Factory Service

The unit is covered by a 26-month limited warranty. See warranty information. Call UPS Aviation Technologies, Inc. at (800) 525-6726 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 the product to:


UPS Aviation Technologies, Inc.
2345 Turner Road, S.E.
Salem, OR 97302

U.S.A. Toll Free  800.525.6726


**NOTE:** UPS Aviation Technologies will not be responsible for any product returned to us by US Mail, or in other than the original or UPS approved equivalent packaging.

# Appendix A External PTT Hook Up

Part of the installation includes the installation of PTT (Push To Talk) switches that allow the use of your aircraft radio for communications transmissions.

There are three configurations that can be used, you must select the case that best fits your installation.

| **NOTE** |
| --- |
| Only the person who presses their PTT switch will be heard over the radio. |

## CASE I

*The PTT is built into the pilot and copilot yokes*

Simply install the plugs from the headset into the aircraft headphone jacks. Then use the yoke mounted PTT to transmit. No other action is required.

## CASE II

*Built in PTT only on the pilot side only*

This configuration requires a modified external PTT switch plugged into the copilot's mic jack. (See Details Below) When the copilot's PTT is depressed, this activates an internal relay that switches the mic audio to the aircraft radio from the pilot to the copilot.

## Case III

*No built in PTT switch at all*

Two built-in PTT must be installed, or two external, modified PTT switches will be required for both the pilot and copilot. Modifications to the PTT are required. (See details below)

| **Push To Talk Modifications** |
| --- |

When received from the manufacturer, an after-market PTT switch opens the mic audio path to the "ring" connection of the PTT mic plug until the button is pressed. When the PTT is between the intercom and the headset, the intercom function will not work unless the PTT switch is depressed. A simple modification can be performed to allow proper intercom operation. NOTE: This mod does not alter normal operation.

Below are some examples of typical modifications. Contact the PTT manufacturer for more details if necessary.

**Procedures For David Clark PTT**
Unscrew the round black plastic cover from the jack.
Connect the joined black wires to the red wire.
Replace the round black plastic cover.

**Procedures for Telex PT-200**
Unscrew the round black plastic cover from the jack.
Cut the red wire in the middle of the wire.
Strip both ends of the insulation.
Solder the two ends to the ground lug to the PTT jack.
Replace the round black plastic cover.

**Procedures for Telex PT-300**
Unscrew the round black plastic cover from the plug jack.
Remove the heat shrink material from the joined black wires.
Solder these two wires to the lug that has a white wire already soldered to it.
Replace the round black plastic cover

## Appendix B – SL15-CD Installation Drawing

Cutout size for front mount installation

1.315 in
(33.4 mm)

6.31in (160.3 mm)

6.65 in (167 mm)

Side View

0.60 in (15.25 mm)

1.31 in
(33.27 mm)

CG

0.35 in
(8.9 mm)

3.00 in (76.2 mm)

5.25 in
(133.4 mm)

0.8 in
(20.3 mm)

6.28 in
(159.5 mm)
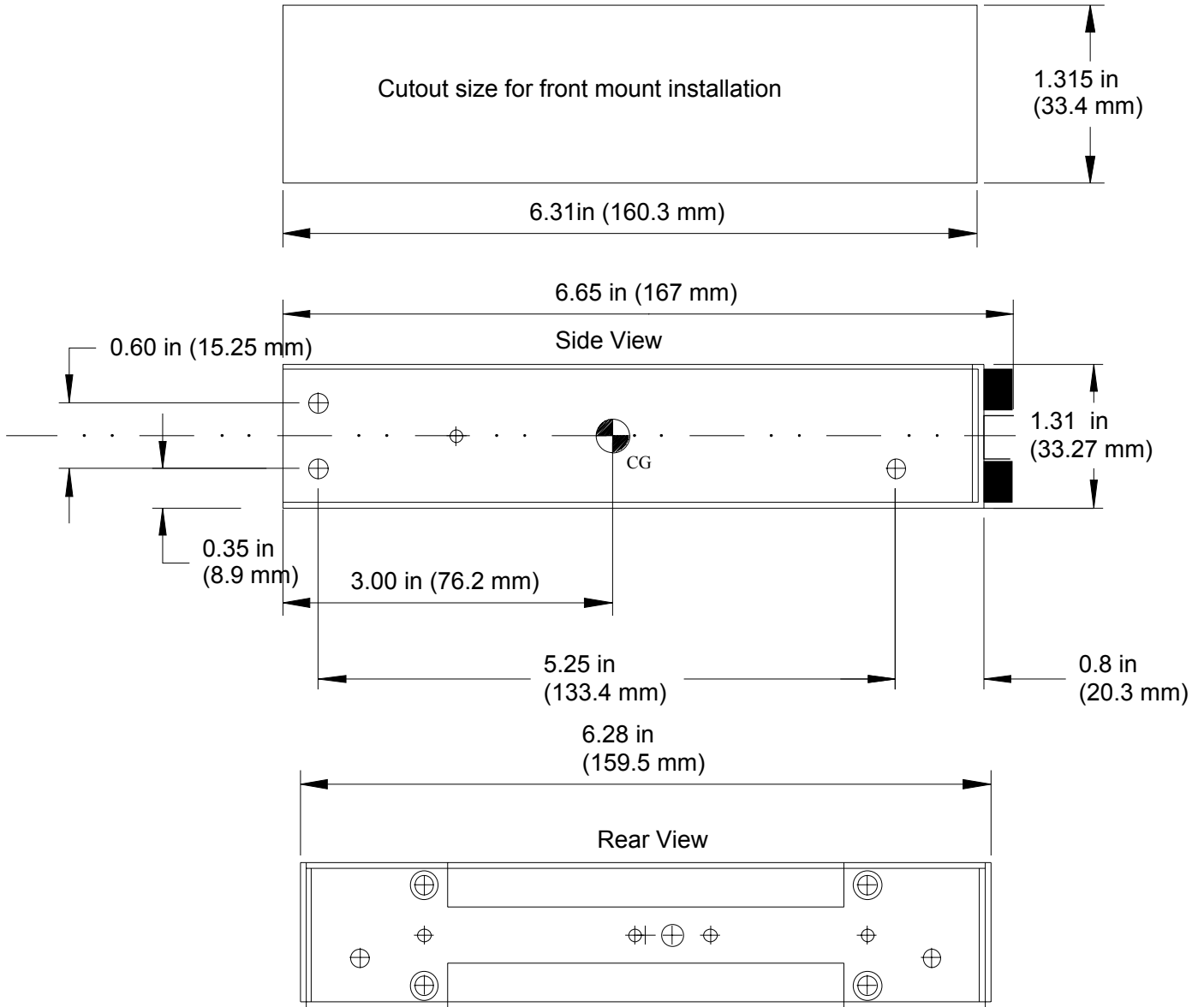
Rear View

Weight: 1.5 lb with tray and connectors ( .68 kg)

Connector viewed from the rear
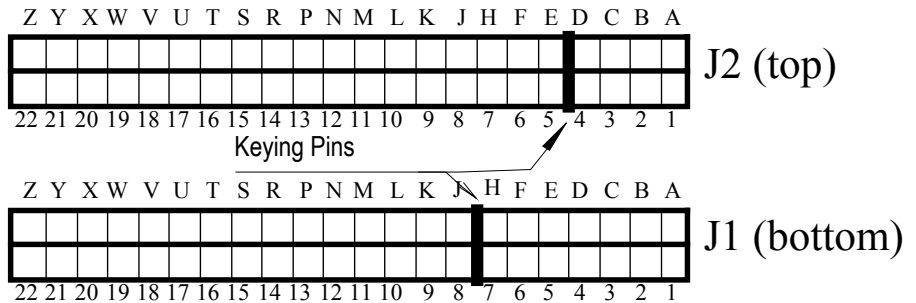
Z Y X W V U T S R P N M L K J H F E D C B A

J2 (top)

22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

Keying Pins

Z Y X W V U T S R P N M L K J H F E D C B A

J1 (bottom)

22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

**CD-15 Installation Drawing**

6.28
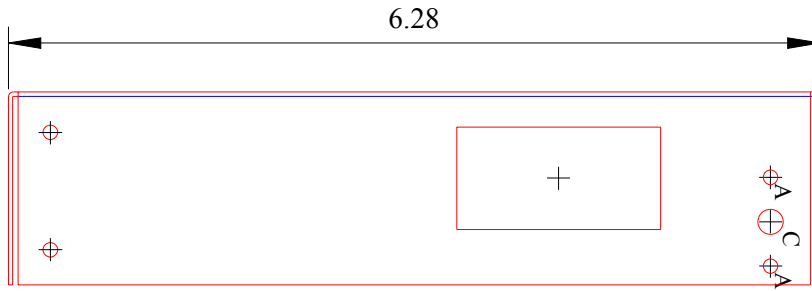
Tray Viewed from Rear

6.65

0.6

B

B

1.48

0.31

0.32

5.25
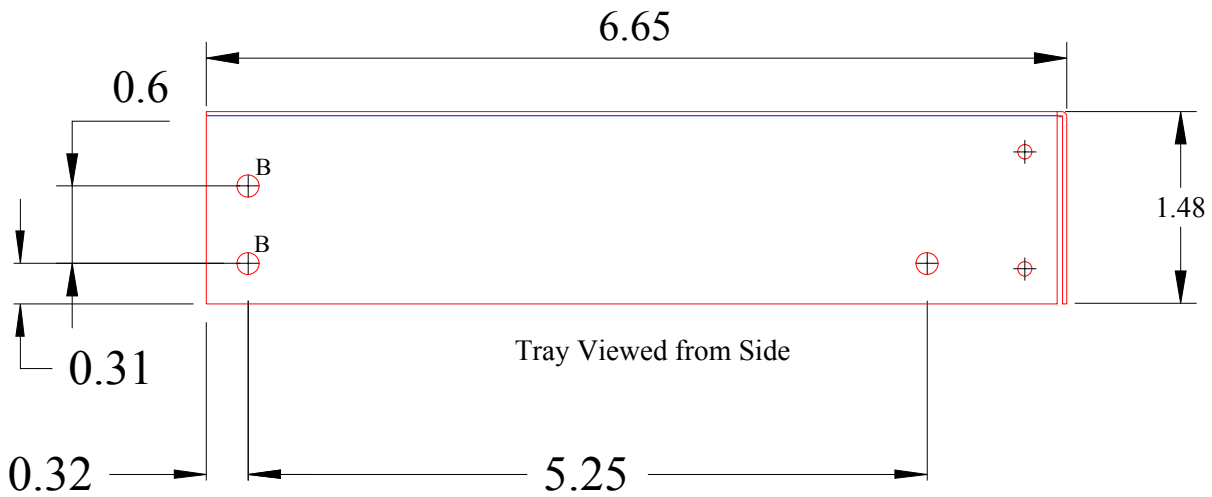
Unit Weight 2.0 lbs.

## Connector as viewed from front of unit

8  7  6  5  4  3  2  1
15 14 13 12 11 10 9

- SDA
- CRQ
- SCL
- CRST
- INSRT
- Digital Ground
- n/c
- CD Audio L
- n/c
- CD Audio Lo
- CD Audio R
- n/c
- Chassis Ground
- POWER
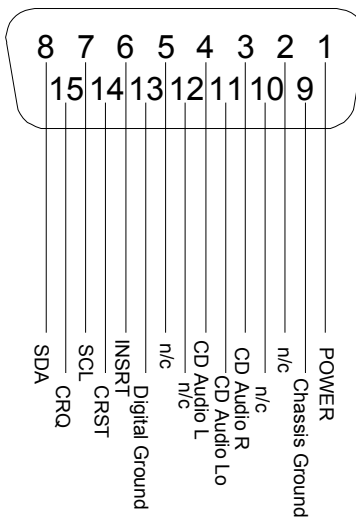
# Appendix C Bottom Connector Interconnect

Bottom Connector, J1

Notes:

1. Pin 7 is not used.
2. All shields should be grounded at audio panel only. other end remains floating.
3. Speaker and Pilot Headphone ground returns MUST be kept separate and connected to pin 22.
4. All Power, and Ground wires must be #18 gage wire Lighting #22 AWG, other wires minimum #24 AWG
5. Pilot mic and headphone jacks must be isolated from ground.
6. Pin 20 connected through a 3 A breaker.
7. PA Mute is a TTL level logic output that is pulled low when PTT active.
8. Speaker loads may be required on some transceivers. Consult manufacturer's information.
9. 28V installations require a 3 A breaker. Retrofit 28V installations may remove dropping resistor and change breaker to 3A.
10. Unswitched inputs are alwats presented to speaker and crew headphones. Ground shield at AirCell end only.
11. All shielded wires must be MIL 22750 or 27500.
12. Connect pilot headphone (L) to top connector, Pin 1, using 3-conductor wire.
13. Key pin between pin 7 and 8.
14. External marker audio input to Pin 21 for units without internal receiver.
15. Audio applied to Pins T and 17 is always presented in speaker, pilot and copilot headphones, regardless of SPR switch or PTT.
16. ADF, DME and AUX inputs are presented to audio when AUX button is activated.

# Appendix D Top Connector Interconnect



CD J2 TOP CONNECTOR
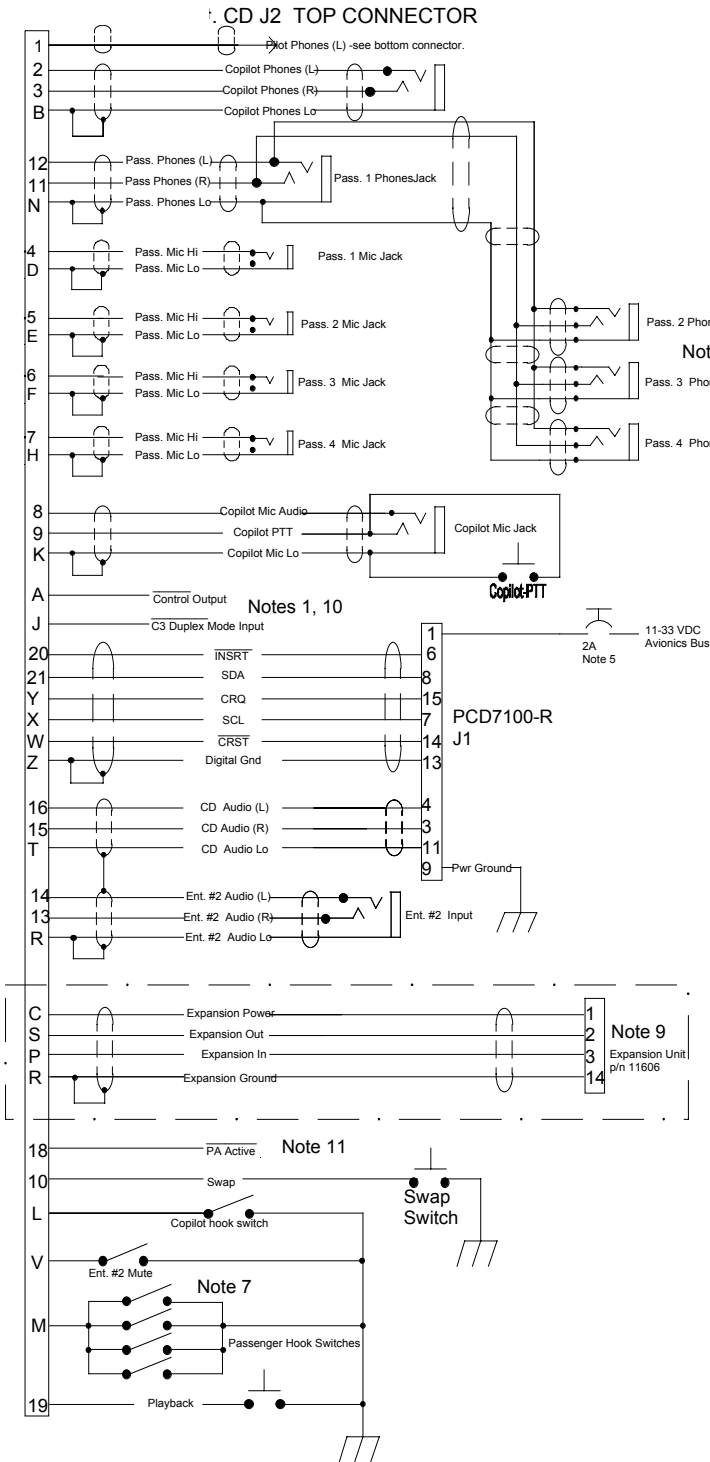
Notes:

1. Pin A is pulled low when AUX is active
2. All shields should be grounded at audio panel only. other end remains floating.
3. Interface to PCD7100-R, 11955, only
4. All phone and mic jacks must be floating from ground.
5. A pull type breaker IS REQUIRED on PCD7100-R.
6. All wiring to conform to MIL 22750 or 27500, and be sielded as shown.
7. Passenger hook switches to be located at positions where phone acess is desired. Grounding of any switch causes all passengers to be heard on the cellphone.
8. For music distribution information, see Section 3.6.3.1.
9. For expansion unit, use part number 11606 or 11606R only.
10. When Pin J is grounded, the audio panel is in Com 3 duplex mode. This is used to interface with AirCell AT.01 or AGT.01, or NavTalkPilot.
11. When pin 18 is switched to ground, the PA mode is activated, placing pilot microphone on speaker output when PTT active. See Sect 2.5.13.
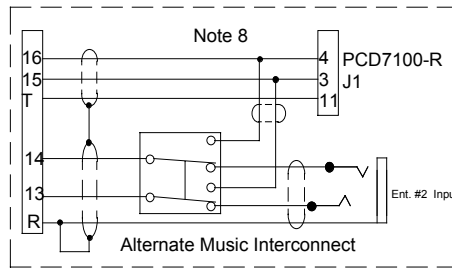
# Appendix E- Instructions for FAA Form 337 and continuing airworthiness

## 9.1    Instructions for FAA Form 337, Audio Panels

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 PMA7000M-S, you may use the following text as a guide.

Installed audio selector and 6-place intercom, PS Engineering PMA7000M-S, part number 7000 (X) in (_location_) at station __. Installed PCD7100-R, part number 11955, Installed per *AC43.13-2, Chapter 2, paragraph 23* (Instrument Panel Mounting). Installed per PS Engineering *Installation Operators Manual* p/n 200-070-(XXXX), revision (), dated ( ).

These units are FAA-Approved under TSO C50c for audio amplifiers, and/or TSO C35d for Marker Beacon Receivers, and meets appropriate environmental qualifications outlined in RTCA DO-160C (PMA7000) or DO-160D (11955) as appropriate or this aircraft.

Interface to existing aircraft radios in accordance with installation manual and in compliance with practices listed in *AC43.13-2*, Chapter 2. All wires are Mil-Spec 22759 or 27500. Connection to aircraft dimmer bus is _____. Power is supplied to the unit through a 3A circuit breaker (type and part number), and total electrical load does not exceed ____% of the electrical system capacity with the PMA7000MS added.

Aircraft equipment list, weights and balance amended. Compass compensation checked. A copy of the operation instructions, contained in PS Engineering document 200-790-( ), revision ( ), dated ( ), is placed in the aircraft records.  All work accomplished listed on Work Order_____.

## 9.2    Instructions for Continuing Airworthiness, Audio System

Sample ICA Checklist for UPS Aviation Technologies Audio System:

| Section | Item | Information |
|---|---|---|
| 1 | Introduction | Installation of audio control panel with integrated marker beacon receiver, compact disc player and 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 unit into "off," or "fail-safe" mode. This allows pilot communications using COM 1. Follow checkout instructions in the installation manual referenced on the FAA Form 337.  To remove power from the PCD7100-R, press and hold the control buttons (far right) for two seconds.  For a specific unit fault, contact the manufacturer at (865) 988-9800 for special instructions. |
| 7 | Removal and replacement information | Removal: Using a 3/32" Allen-head wrench, carefully unscrew the locking screw located in the center of the unit(s). While turning the wrench CCW, gently pull on the EDGES of the bezel until the unit is free from the tray. Installation: Engage the locking screw at the back. Turn the locking screw CW, while applying slight pressure to the edges of the bezel. Do not over tighten! |
| 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 F RTCA DO160C (EUROCAE ED-14) Environmental Qualification Form

Audio Selector Panel/Intercom/Marker Beacon Receiver

Part Number: 7000M-S

FAA TSO Number: C50c, C35d Class A, JTSO 2C35d and JTSO C50c

Manufacturer: PS Engineering Incorporated   9800 Martel Road        Lenoir City TN 37772

| Conditions | Section | Conducted Tests |
|---|---|---|
| Temperature and Altitude | 4.0 | Equipment tested to CAT A1 & D1 |
| Low Temperature | 4.5.1 | -55° C Survival, -15°C Low Operating (A1) |
| High Temperature | 4.5.2 | +85°C Survival, +70°C High Short Time Operating |
| In-flight Loss of Cooling | 4.5.4 | Not Applicable, no cooling required |
| Altitude | 4.6.1 | 50,000' unpressurized (D1) |
| Decompression | 4.6.2 | Not Applicable |
| Overpressure | 4.6.3 | Not Applicable |
| Temperature variation | 5.2 | Equipment tested to Category C |
| Humidity | 6.0 | Equipment tested to Category A |
| Shock | 7.0 | Equipment tested to Operational test only |
| Operational | 7.2 | Equipment tested to Operational test only |
| Crash Safety | 7.3 | Equipment tested to Operational test only |
| Vibration | 8.0 | Equipment tested to Category M & N |
| Explosion | 9.0 | Category X, not tested |
| Waterproofness | 10.0 | Category X, not tested |
| Fluids Susceptibility | 11.0 | Category X, not tested |
| Sand and Dust | 12.0 | Category X, not tested |
| Fungus | 13.0 | Category X, not tested |
| Salt Spray | 14.0 | Category X, not tested |
| Magnetic Effect | 15.0 | Equipment tested to Category Z |
| Power input | 16.0 | Equipment tested to Category B |
| Voltage Spike | 17.0 | Equipment tested to Category B |
| Audio Frequency Susceptibility | 18.0 | Equipment tested to Category B |
| Induced Frequency Susceptibility | 19.0 | Equipment tested to Category B |
| Radio Frequency Susceptibility | 20.0 | Equipment tested to Category T |
| Radio Frequency Emission | 21.0 | Equipment tested to Category B |
| Lightning Induced Transient Susceptibility | 22.0 | Equipment tested to Category K |
| Lightning Direct Effects | 23.0 | Category X, not tested |
| Icing | 24.0 | Category X, not tested |

Intercom/CD Player

Part Number: 11955

FAA TSO Number: C50c JAR JTSO C50c

Manufacturer: PS Engineering Incorporated   9800 Martel Road         Lenoir City TN 37772

| Conditions | Section | Conducted Tests |
|---|---|---|
| Temperature and Altitude | 4.0 | Equipment tested to CAT B1 |
| Low Temperature | 4.5.1 | -55° C Storage, -20°C Low Operating (B1) |
| High Temperature | 4.5.2 | +85°C Storage, +70°C High Operating |
| In-flight Loss of Cooling | 4.5.4 | Not Applicable, no cooling required |
| Altitude | 4.6.1 | 25,000' unpressurized |
| Decompression | 4.6.2 | Not Applicable |
| Overpressure | 4.6.3 | Not Applicable |
| Temperature variation | 5.2 | Equipment tested to Category C |
| Humidity | 6.0 | Equipment tested to Category A |
| Shock | 7.0 | Equipment tested to Operational test only |
| Operational | 7.2 | Equipment tested Category B |
| Crash Safety | 7.3 | |
| Vibration | 8.0 | Equipment tested to Category S R |
| Explosion | 9.0 | Category X, not tested |
| Waterproofness | 10.0 | Category X, not tested |
| Fluids Susceptibility | 11.0 | Category X, not tested |
| Sand and Dust | 12.0 | Category X, not tested |
| Fungus | 13.0 | Category X, not tested |
| Salt Spray | 14.0 | Category X, not tested |
| Magnetic Effect | 15.0 | Equipment tested to Category Z |
| Power input | 16.0 | Equipment tested to Category B |
| Voltage Spike | 17.0 | Equipment tested to Category B |
| Audio Frequency Susceptibility | 18.0 | Equipment tested to Category B |
| Induced Frequency Susceptibility | 19.0 | Equipment tested to Category B |
| Radio Frequency Susceptibility | 20.0 | Equipment tested to Category T |
| Radio Frequency Emission | 21.0 | Equipment tested to Category M |
| Lightning Induced Transient Susceptibility | 22.0 | Equipment tested to Category XXE2 |
| Lightning Direct Effects | 23.0 | Category X not tested |
| Icing | 24.0 | Category X, not tested |

**UPS Aviation Technologies**