# JRAC-002 Remote Audio Controller - Discrete COM Select & TX PTT

## Installation and Operating Manual

**Rev. A**

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**RECORD OF REVISIONS**

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# Table of Contents

**SECTION 1 - DESCRIPTION ..... 1**
1.1 System Overview ..... 1
1.2 Features Overview ..... 1
1.3 Inputs and Outputs ..... 2
1.3.1 Inputs ..... 2
1.3.2 Outputs ..... 2
1.3.3 Bi-directional Ports ..... 2
1.4 Specifications ..... 3
1.4.1 Electrical Specifications ..... 3
1.4.2 Mechanical Specifications ..... 5
1.4.3 Configuration Connector ..... 5

**SECTION 2 – INSTALLATION ..... 6**
2.1 Introduction ..... 6
2.2 Continued Airworthiness ..... 6
2.3 Unpacking and Inspecting Equipment ..... 6
2.3.1 Warranty ..... 6
2.4 Installation Procedures ..... 6
2.4.1 Installation Limitations ..... 6
2.4.2 Cabling and Wiring ..... 6
2.4.3 Mechanical Installation ..... 7
2.4.4 In-Line PTT Cordsets ..... 7
2.4.5 Post Installation Checks ..... 7
2.5 Adjustments and Configuration using ProCS™ ..... 8
2.5.1 Configuration Cabling Requirements ..... 8
2.5.2 ProCS™ Setup ..... 9
2.5.3 JRAC-002 ProCS Connection ..... 9
2.5.4 Configurable Settings ..... 9
2.5.5 Other Configuration Features ..... 15
2.6 Virtual Control Panel ..... 16
2.6.1 Virtual Controls ..... 16
2.7 Installation Kit ..... 17
2.7.1 Recommended Crimp tools ..... 17
2.8 Installation Drawings ..... 17
2.8.1 Generation of Custom Drawings ..... 17

**SECTION 3 – OPERATION ..... 18**
3.1 Introduction ..... 18
3.2 Normal Mode of Operation ..... 18
3.2.1 Receiving ..... 18
3.2.2 Transmit Operation ..... 18
3.2.3 COM5 PTT Operation ..... 18
3.2.4 VOX Operation ..... 18
3.2.5 Passenger Dropcord Mode Operation ..... 18
3.2.6 ICS Operation ..... 19
3.2.7 Music Operation ..... 19
3.3 Emergency Operation Mode ..... 19
3.3.1 Auto Emergency Mode ..... 19
3.3.2 Selected Emergency Mode ..... 19
3.3.3 EMER RADIO SELECT ..... 19

**Appendix A - Installation Drawings ..... A1**
A1 Introduction ..... A1
A2 Installation Drawings ..... A1

**Appendix B - Installation Documents ..... B1**
B1 Airworthiness Approval ..... B2
B2 Instructions for Continued Airworthiness ..... B2

# SECTION 1 - DESCRIPTION

## 1.1 System Overview

The JRAC-002 Remote Audio Controller - Discrete COM Select & TX PTT is part of an aircraft audio system consisting of a control device and the remote audio controller.

The remote audio controller distributes and controls all transceiver, receiver and alert audio in an aircraft. It routes transmission of microphone audio to a selected transceiver and distributes all intercom audio.

The user operates the remote audio controller by the via the control device where control commands are sent to the remote audio controller via a serial data signal. The control commands manage all user selectable functions of the audio system.

The remote audio controller can be used in a stand-alone configuration (one remote audio controller and one control device) or a multiple configuration (multiple remote audio controllers and multiple control devices) to provide redundancy. An emergency operating mode connects the primary user (pilot) to the COM1 or COM2 transceiver, NAV1 or NAV 2 receiver and Direct audio 1 and 2 sources.

The JRAC-002 is set up on a per-installation basis using a configuration cable and a PC running the product configuration application to download system configuration settings via the configuration connector. To facilitate future customizations and certification, neither software nor complex electronic devices will be used in the JRAC-002 design.

## 1.2 Features Overview

The JRAC-002 features a 37 pin D-Min connector, which interfaces to the radio receive audio and crew phones, a 15 pin D-Min connector which interfaces to the control head, a 50 pin D-Min connector which interfaces to the power and passenger headset connections and a 3.5mm connector for the configuration application. This layout minimizes crosstalk and follows industry standard interconnect for multi-user single transmit selector.

Numerous input and output levels are adjustable and several audio paths are selectable, using the configuration application ProCS™ (Product Configuration Software) to write configuration commands via the JA99-001 configuration cable to the configuration connector. The configuration commands set the level of non-volatile digital control potentiometers to control audio signal levels and to non-volatile expander latches which are connected to audio gates to control the audio signal routing. The audio analogue waveforms are stored in non-volatile voice record and playback devices.

The JRAC-002 supports up to six transceivers and five receivers.

The JRAC-002 supports COM 1 and COM 2 transmit select and PTT for the Pilot.

The JRAC-002 supports COM 1 and COM 2 transmit select and PTT for the Co-pilot.

The JRAC-002 has individual VOX gating.

The JRAC-002 supports two Direct Audio inputs to provide audio at a fixed level to the users.

The JRAC-002 supports a CVR output.

The JRAC-002 supports transmit access for two crew members (Pilot and Co-pilot).

The JRAC-002 provides intercom functions for up to seven users.

## 1.3 Inputs and Outputs

Refer to the JRAC-002 connector maps for the mating connector designators and pin assignments for the input and output signals.

### 1.3.1 Inputs

| Name | Qty | Type |
|---|---|---|
| CONFIG DATA TO JRAC | 2 | Data signal |
| CONTROL DATA TO JRAC | 1 | Data signal |
| CONTROL PANEL MUSIC L/R | 2 | Audio signal |
| COPILOT ICS PTT | 1 | Active low discrete |
| DIRECT AUDIO 1 HI/LO | 1 | Audio signal |
| DIRECT AUDIO 2 HI/LO | 1 | Audio signal |
| EMER RADIO SELECT | 1 | Two state discrete |
| MIC HI/LO (Seven users) | 7 | Audio signal |
| MODE SELECT / CONFIG AUDIO | 1 | Multi format signal |
| MUSIC LEFT/RIGHT HI/LO | 2 | Audio signal |
| NORM MODE SELECT | 1 | Active low discrete |
| PAX ICS PTT | 1 | Active low discrete |
| PILOT ICS PTT | 1 | Active low discrete |
| PILOT/COPILOT TX PTT | 2 | Active low discrete |
| PILOT COM 1&2 SELECT & TX PTT | 4 | Active low discrete |
| COPILOT COM 1&2 SELECT & TX PTT | 2 | Active low discrete |
| POWER/GROUND INPUT | 1 | 14 to 28 Vdc power supply |
| RESET IN | 1 | Active low discrete |
| RX HI/LO | 11 | Audio signal (6 COM, 5 NAV) |

### 1.3.2 Outputs

| Name | Qty | Type |
|---|---|---|
| CALL ANNUNCIATOR | 1 | Active low discrete |
| COM MIC HI/LO | 6 | Audio signal (transceiver Mic) |
| COM PTT | 6 | Active low discrete |
| CONFIG DATA FROM JRAC | 2 | Data signal |
| CONTROL DATA FROM JRAC | 1 | Data signal |
| CVR HI/LO | 1 | Audio signal |
| PHN HI/LO | 6 | Audio signal (6 outputs for driving 7 phones.) |
| POWER/GROUND FROM JRAC | 1 | Power output |
| RX COMP OUT HI/LO | 1 | Audio signal (configured via ProCS) |
| TIME OUT RESET | 1 | Active low momentary discrete |
| TX ACTIVE | 1 | Active low discrete |

### 1.3.3 Bi-directional Ports

| Name | Qty | Type |
|---|---|---|
| ICS TIE HI/LO | 1 | Audio signal |

## 1.4 Specifications

### 1.4.1 Electrical Specifications

Power Input

| | |
|---|---|
| Primary nominal voltage | 28 Vdc |
| Secondary nominal voltage | 14 Vdc |
| Maximum voltage | 32.2 Vdc |
| Minimum voltage | 10.2 Vdc |
| Emergency voltage | 9.0 Vdc |
| Input current at 28 Vdc | ≤ 0.71 A |
| Input current at 14 Vdc | ≤ 1.45 A |
| Input current at 9 Vdc | ≤ 2.4 A |

#### 1.4.1.1 Audio Performance

Rated Input Level

| | |
|---|---|
| Receive audio rated input level | 7.75 Vrms ±10% |
| Direct audio 1 rated input level | 7.75 Vrms ±10% |
| Direct audio 2 rated input level | 2.50 Vrms ±10% |
| Music rated input level | 400 mVrms ±10% |
| Microphone input level | 250 mVrms ±10% |
| Intercom Tie Line type 1 input level | 340 mVrms ±10% |
| Intercom Tie Line type 2 input level | 1.20 Vrms ±10% |
| CONFIG AUDIO input level | 400mVrms ±10% |

Rated Output Power

| | |
|---|---|
| Phone rated output | 7.75 Vrms±10% |
| Pilot Phone rated output, in emergency mode or with power input ≤6 Vdc Or from DIR AUDIO 2 input | 2.10 Vrms±10% |
| Phone rated output power, with MUSIC input | 3.88 Vrms±10% |
| Microphone rated output | 250 mVrms±10% |
| CVR rated output | 500 mVrms±10% |
| CVR rated output with input as MUSIC | 250 mVrms±10% |
| CVR rated output with input as PILOT MIC | 1.00 Vrms±10% |
| CVR rated output, in emergency mode, | 500 mVrms ±20% |
| Receive Composite rated output | 2.5 Vrms ±10% |
| Intercom Tie Line type 1 rated output | 340 mVrms ±10% |
| Intercom Tie Line type 2 rated output | 1.2 Vrms ±10% |

Audio Frequency Response

| | |
|---|---|
| Audio output audio frequency response | ≤3dB from 300 to 6000 Hz |

Distortion Characteristics

| | |
|---|---|
| Audio output distortion at rated power | ≤10% |
| Audio output distortion at 10% of rated power | ≤3% |

Input Impedance

| | |
|---|---|
| Microphone input Impedance | 150 Ω ±10% |
| Direct Audio 1 input Impedance | 1000 Ω ±10% |
| Direct Audio 2 input Impedance | 100 Ω ±10% |
| Receive Audio input Impedance | 1000 Ω ±10% |
| Music Audio input Impedance | 1000 Ω ±10% |
| Intercom Tie Line Audio input Impedance | 2000 Ω ±10% |

Output Impedance

| | |
|---|---|
| Headphone output Impedance | ≤ 60 Ω |
| Transceiver Microphone output Impedance | ≤ 80 Ω |
| CVR output Impedance | ≤ 80 Ω |
| Receive Composite Audio output Impedance | ≤ 80 Ω |
| Intercom Tie Line output Impedance | 2000 Ω ±20% |

Output Load

| | |
|---|---|
| Headphone load | 600 Ω ±10% |
| Transceiver Microphone load | 150 Ω ±10% |
| CVR load | 5000 Ω ±10% |
| Receive Composite Audio load | 600 Ω ±10% |
| Intercom Tie Line type 1 rated load | 2000 Ω ±10% |
| Intercom Tie Line type 2 rated load | 2000 Ω ±10% |
| Intercom Tie Line type 1 maximum load | 666 Ω max (3 loads) |
| Intercom Tie Line type 2 maximum load | 285 Ω max (7 loads) |

Volume Controls

| | |
|---|---|
| Receive Audio control variation | 32 ±3dB |
| Master Receive Audio control variation | 32 ±3dB |
| ICS Audio control variation | 40 ±3dB |

Input to Output Crosstalk and Bleed-through Level

| | |
|---|---|
| Input to Output crosstalk | ≤55 dB |

Input to Input Crosstalk Level

| | |
|---|---|
| Input to Input crosstalk | ≤60 dB |

Audio Noise Level without Signal

| | |
|---|---|
| Noise level below the rated output | ≥60 dB |

1.4.1.2 Audio Performance, Other

| | |
|---|---|
| CVR HI / LO output circuitry type (Normal) | differential |
| CVR HI / LO output circuitry type (Emergency) | single ended |
| Microphone inputs designed for microphone type | amplified dynamic / electret |
| Microphone inputs bias voltage | 12 Vdc ±10% |
| Microphone inputs circuitry type | single ended |
| MUSIC LEFT / RIGHT HI / LO audio input circuitry type | differential |
| MUSIC attenuation | 38 dB min |
| RECEIVE AUDIO input circuitry type | differential |
| PHN HI / LO output circuitry type | single ended |
| MIC output circuitry type | differential |
| RX Composite Audio output circuitry type | differential |
| ICS TIE HI / LO Circuitry Type | differential |
| PHN HI / LO output music fade in duration | 2.5 ± 1.0 seconds |
| VOX Threshold level range relative to rated MIC input | -30 to +12 dB |
| VOX Off Delay Time accuracy | ± 0.25 s |
| VOX Delay Time range | 0.5 to 2.0 seconds |
| Transmit Timer duration | 90 ± 30 seconds |

#### 1.4.1.3 Discrete Signals

| | |
|---|---|
| Active low control input, active signal level | ≤ +3 Vdc |
| Active low control input shall be inactive when the signal is | ≥ +10 Vdc |
| Active low control input signals, when active, sources | 0.1 to 10 mA |
| Active low control input signals have an internal pull-up resistor | |
| Active low control output, active output | ≤ +2 Vdc |
| Active low control output signals, when active, sinks | ≤ 1 A |

### 1.4.2 Mechanical Specifications

| | | |
|---|---|---|
| Height | | 1.97 in [50.0 mm] max |
| Depth | | 6.79 in [172.5 mm] max |
| Width | | 5.87 in [149.1 mm] max |
| Weight | | 1.94 lb [0.88 kg] max |
| Enclosure Material | | brushed aluminum with conversion coating |
| Connectors (4): | J1 | One 37-pin D-Sub male V5 locking |
| | J2 | One 50-pin D-Sub male V5 locking |
| | J3 | One 15-pin D-Sub male V5 locking |
| | J4 | One 4 pole 3.5mm stereo jack |
| | J5 | One 4-40 stud, 0.5 in max. |
| Mounting (2 axes) | | 4 x 10-32 fasteners |
| Bonding | | ≤ 2.5 mΩ |
| Installation kit part number | | INST-JRAC |

### 1.4.3 Configuration Connector

The JRAC-002 configuration connector communication standard for CONFIG DATA TO JRAC-002 data input signal and CONFIG DATA FROM JRAC-002 data output signal is RS-232.

# SECTION 2 – INSTALLATION

## 2.1 Introduction

This section contains unpacking and inspection procedures, installation information, and post-installation checks.

## 2.2 Continued Airworthiness

Maintenance of the JRAC-002 is on condition only. Scheduled inspection and/or periodic maintenance of this unit is not required.

## 2.3 Unpacking and Inspecting Equipment

Unpack the equipment carefully. Check for shipping damage and report any problems to the relevant carrier. Confirm that the Authorized Release Certificate or Certificate of Conformance is included. Complete the on-line warranty card from the Jupiter Avionics Corporation (JAC) website – www.jupiteravionics.com/warranty.

### 2.3.1 Warranty

This product manufactured by JAC is warranted to be free of defects in workmanship or performance for 2 years from the date of installation by an approved JAC dealer or agency. This warranty covers the cost of all materials and labour to repair or replace the unit, but does not include the cost of transporting the defective unit to and from JAC or its designated warranty repair centre, or of removing and replacing the defective unit in the aircraft. This warranty does not cover failures due to abuse, misuse, accident, or unauthorized alteration or repairs.

THIS WARRANTY IS VOID IF THE PRODUCT IS NOT INSTALLED BY AN AUTHORIZED JAC DEALER. If the on-line warranty card is not completed, the product will be warranted from the date of manufacture.

Contact JAC for return authorization, and for any questions regarding this warranty and how it applies to your unit(s). JAC is the final arbiter concerning warranty issues.

## 2.4 Installation Procedures

WARNING**: Loud noise can cause hearing damage. Set the headset volume to minimum before conducting tests, and slowly increase the volume to a comfortable listening level.**

CAUTION**:** The power input circuitry of the unit may be damaged if the installation does not conform to the wiring instructions in this manual.

### 2.4.1 Installation Limitations

The JRAC-002 may be installed only by following the applicable airworthiness requirements.

### 2.4.2 Cabling and Wiring

All wire shall be selected in accordance with the original aircraft manufacturer's maintenance instructions, or AC43.13-1B Change 1, Paragraphs 11-76 through 11-78. Unshielded wire types shall qualify to MIL-W-22759 as specified in AC43.13-1B Change 1, Paragraphs 11-85, 11-86, and listed in Table 11-11. For shielded wire applications, use Tefzel MIL-C-27500 shielded wire with tag ring or equivalent (for shield terminations) to make the most compact and easily terminated interconnect. Follow the Connector Map in Appendix A of this manual.

Allow 3" from the end of the shielded wiring to the shield termination to allow the connector hood to be easily installed. Refer to the Interconnect drawing in Appendix A of this manual for shield termination details. Note that this unit has a 'clamshell' hood that is installed after the wiring is complete.

Maintain wire segregation and route wiring in accordance with the original aircraft manufacturer's maintenance instructions.

Unless otherwise noted, all wiring shall be a minimum of 24 AWG, except power and ground lines, which shall be a minimum of 22 AWG. Refer to the Interconnect drawing for additional specifications. Check that the ground connection is clean and well secured, and that it shares no path with any electrically noisy aircraft accessories such as blowers, turn-and-bank instruments, or similar loads.

### 2.4.3 Mechanical Installation

The JRAC-002 can be mounted in any attitude and location with sufficient clearance for the connector and wiring harness. It requires no direct cooling.

### 2.4.4 In-Line PTT Cordsets

If in-line PTT cordsets (drop cords) are used, be aware that incorrectly configured or improperly shielded in-line PTT cordsets can lead to significant audio problems.

### 2.4.5 Post Installation Checks

#### 2.4.5.1 Voltage/Resistance checks.

Do not attach this unit until the following conditions are met:

a) Check P2 pin **17** for +28 Vdc relative to ground.
b) Check P2 pin **34** for continuity to ground (less than 0.5 Ω).
c) Check P2 pins **6 thru 12** for continuity to ground (less than 0.5 Ω) when the relevant switch is closed.
d) Check P3 pin **15** for continuity to ground (less than 0.5 Ω) when the relevant switch is closed.
e) Check P3 pin **10** for continuity to ground (less than 0.5 Ω).
f) Check P5 (optional connection) for continuity to ground (less than 0.5 Ω).
g) Check all pins for shorts to ground or adjacent pins.

#### 2.4.5.2 Configuration

Ensure that the JRAC-002 contains the correct configuration settings. This may be done at the factory, on the maintenance bench or in the aircraft before the power on checks are performed. Refer to section 2.5.

#### 2.4.5.3 Power on Checks.

Power up the aircraft's systems and confirm normal operation of all functions of the JRAC. Refer to Section 3 (Operation) for specific operational details.

a) Begin with only the pilot's headset attached. Confirm correct ICS and radio operation for both receive and transmit. Check yoke or cyclic switch action. Check the radio selection and inputs. Do not proceed until the radios are functioning correctly.
b) If there is a music source in the system, turn it on and check for proper mute operation.
c) Unusual buzzes, hums or other background audio are symptomatic of multiple grounds, or noisy external systems such as blowers or pumps sharing wiring with the audio system. If a transmitter fails to key or correctly modulate it is often the result of not connecting all required grounds to the radio or external audio system.
d) Check the ICS operation and Emergency operation.
e) Plug in the co-pilot's headset. Check for correct ICS operation. Check yoke or cyclic switch functions.
f) Plug in any remaining headsets, and check for correct ICS operation. Note that an incorrect cordset (drop cord) or improper jack wiring may cause a wide range of problems, from loss of audio to a tone heard in the headset.

g) Check that all configuration settings are correct.

When all performance checks are satisfied, complete the necessary regulatory documentation before releasing the aircraft for service. Refer to Appendix B.

## 2.5 Adjustments and Configuration using ProCS™

All the JRAC-002 internal adjustments are set from the Product Configuration Software ProCS™. Configuration data is sent to the JRAC-002 via configuration connector J4 using the Configuration Cables and a computer running the ProCS™ software. For configuration requirements, see section 2.5.1.

For full information on the configuration process, and for installation of ProCS™ on your computer, refer to the ProCS™ manual on the Jupiter Avionics website - www.jupiteravionics.com/productsoftware.

### 2.5.1 Configuration Cabling Requirements

To configure the JRAC-002, it is necessary to load the Product Configuration Software ProCS™ onto a Windows-based computer as described in the ProCS™ manual.

The cables required to configure the JRAC-002 are not included with the unit.

The following Setup cabling options are shown in ProCS™:

**Cabling option 1: (Standard Configuration)**

| Quantity | Description | JAC Part # |
|---|---|---|
| 1 | USB A to RS232 9-Pin Cable | CAB-USB-0002 |
| 1 | Configuration Cable | JA99-001 |

**Cabling option 2: (Configuration for Product Control)**

| Quantity | Description | JAC Part # |
|---|---|---|
| 1 | USB A Male to RS232 3.5mm Plug Cable | CAB-USB-0008 |

**Cabling option 3: (Configuration for use with JCP3)**

| Quantity | Description | JAC Part # |
|---|---|---|
| 1 | USB A to RS232 9-Pin Cable | CAB-USB-0002 |
| 1 | Configuration Cable | JA99-001 |

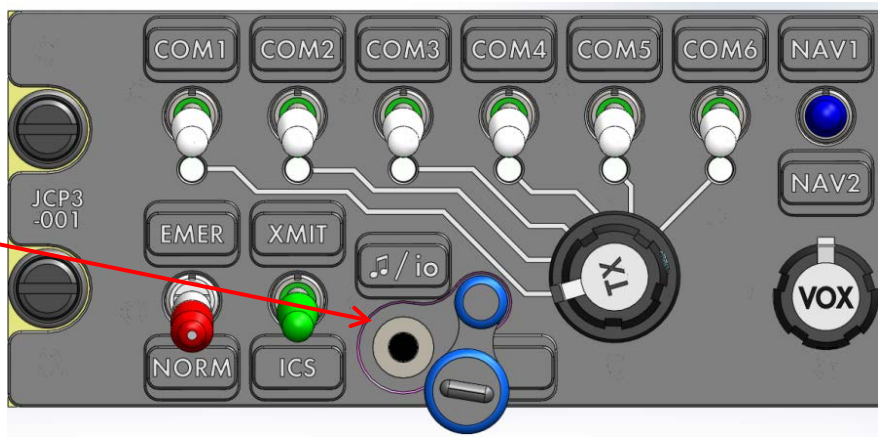
## 2.5.2 ProCS™ Setup

The JRAC-002 menu items 'ProCS Setup' provide setup drawings showing the cabling arrangements for connecting the JRAC-002 to a computer to allow configuration using ProCS™, and to allow control of an attached JRAC-002 (see also section 2.6 – Virtual Control panel).

The JRAC-002 is typically configured via the J4 connector, but if the JRAC-002 is installed in a system with a Jupiter Avionics Corporation JCPx-xxx Control Panel, the JRAC-002 may be configured via the front panel ♫/io connector on the control panel.

Refer to **ProCS Setup – JCP3-001**.

The connector is located under a port cover which may be lifted clear or rotated to one side, as shown.



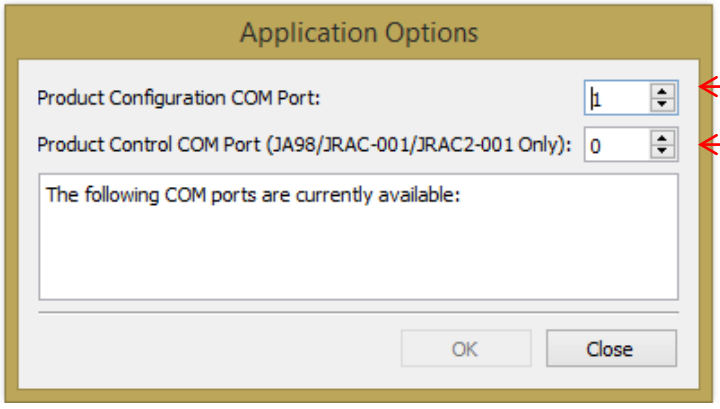

Refer to the ProCS™ manual for complete information on the configuration process.

**Note:** It is important to be aware that some of the screens shown may appear slightly differently, depending on whether or not a JRAC-002 is connected.

## 2.5.3 JRAC-002 ProCS Connection

Selecting COM ports:

JRAC-002 configuration requires one COM port connected to a configuration connector via the JA99-001 Configuration cable. The COM ports are selected from Edit > Options in the main ProCS menu. The Application Options window will open.




Configuration Port Selection

Control COM Port Selection

The designated Product Configuration COM Port confirmed during ProCS installation (see ProCS Installation and Operation Manual section 2.4.2) can be selected through this window.

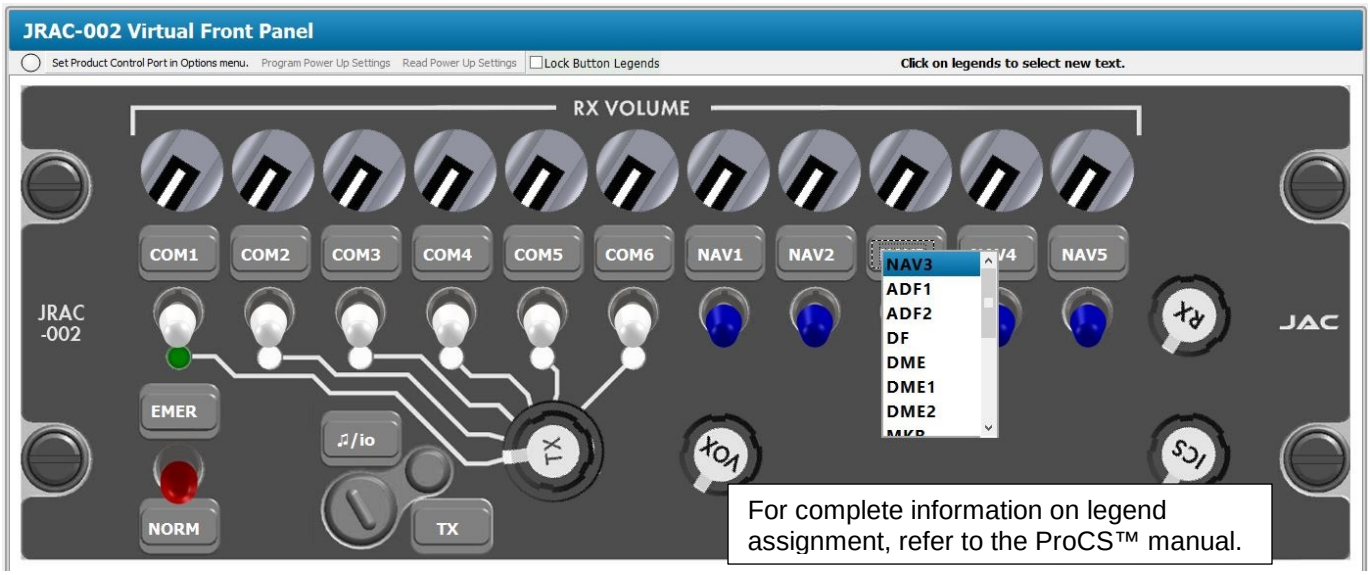
The Product Control COM Port is also set from this window.

## 2.5.4 Configurable Settings

A standard unit is shipped from the factory with all internal adjustments configured to the default levels. At installation, it may be desirable to change some of these settings to suit the local operating environment.

Within ProCS™, the configurable settings are grouped together into the following sections:

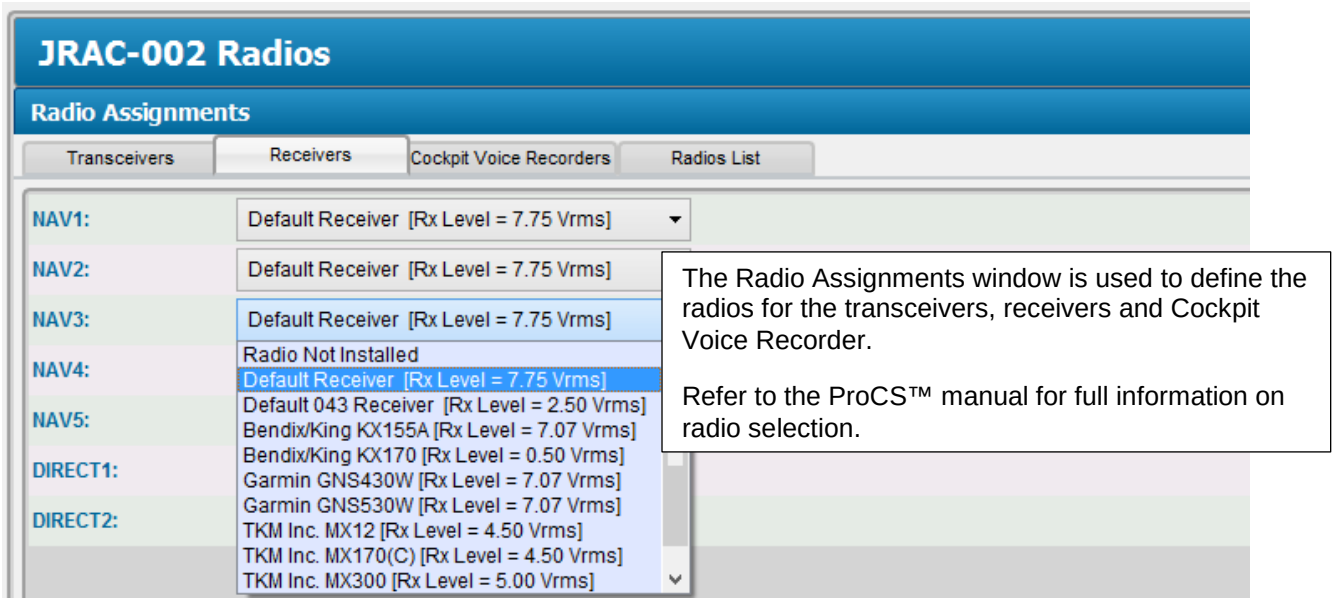
### 2.5.4.1 JRAC-002 Virtual Front Panel




This Virtual Front Panel is used to define the 'names' associated with the control legends. The selected name will be used in all subsequent references to the associated transceiver/receiver, and will be used on the custom-generated Connector Maps and Interconnects. Also see section 2.6 (Virtual Control Panel).

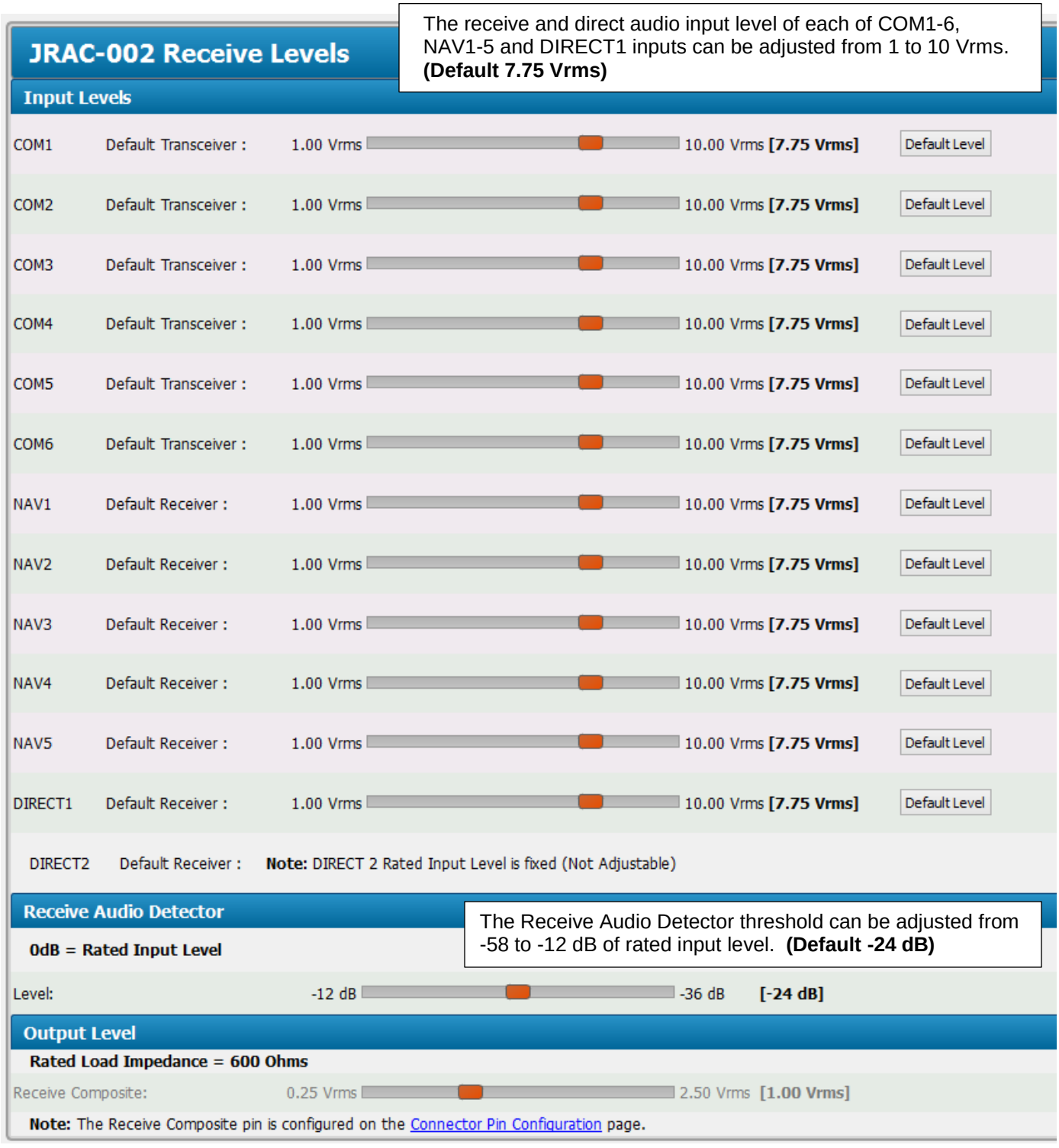
Note: If the name of a front panel switch is changed using this software, the change will be incorporated in every other section that refers to that switch name, including the connector maps, to give truly customized installation diagrams.

### 2.5.4.2 JRAC-002 Radios



### 2.5.4.3 JRAC-002 Receive Levels

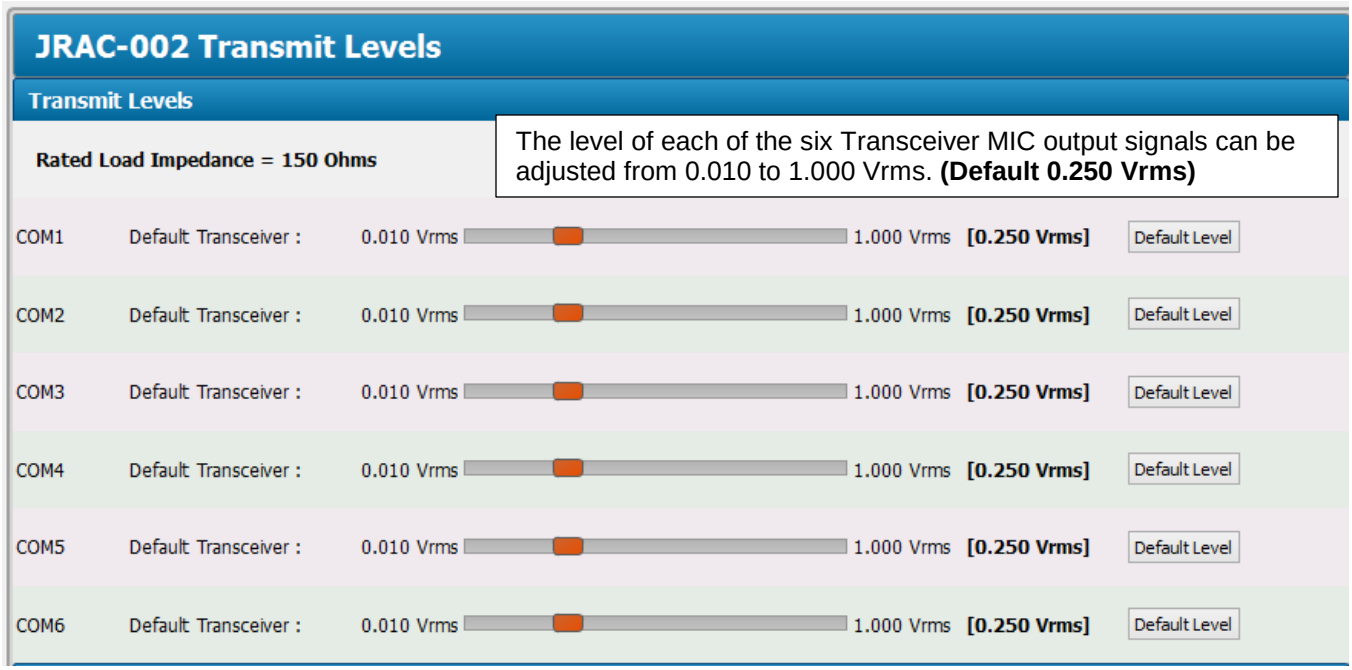
The receive and direct audio input level of each of COM1-6, NAV1-5 and DIRECT1 inputs can be adjusted from 1 to 10 Vrms. **(Default 7.75 Vrms)**




The Receive Audio Detector threshold can be adjusted from -58 to -12 dB of rated input level. **(Default -24 dB)**

If configured, the level of the receive composite audio output (RX COMP OUT) can be adjusted from 0.25 to 2.5 Vrms. **(Default 1.0 Vrms)**

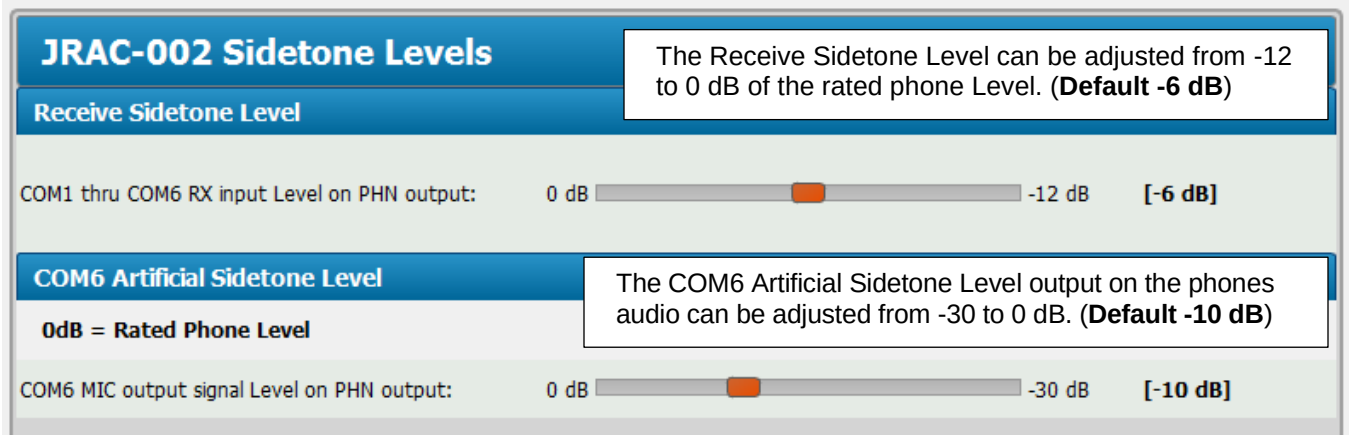
### 2.5.4.4 JRAC-002 Transmit Levels




When the Transmit Timeout check box is checked the transmit time-out is enabled (**Default not checked)**

When the COM5 Duplex check box is checked the COM5 radio is set to duplex operation (**Default not checked)**
(see section 3.2.3)

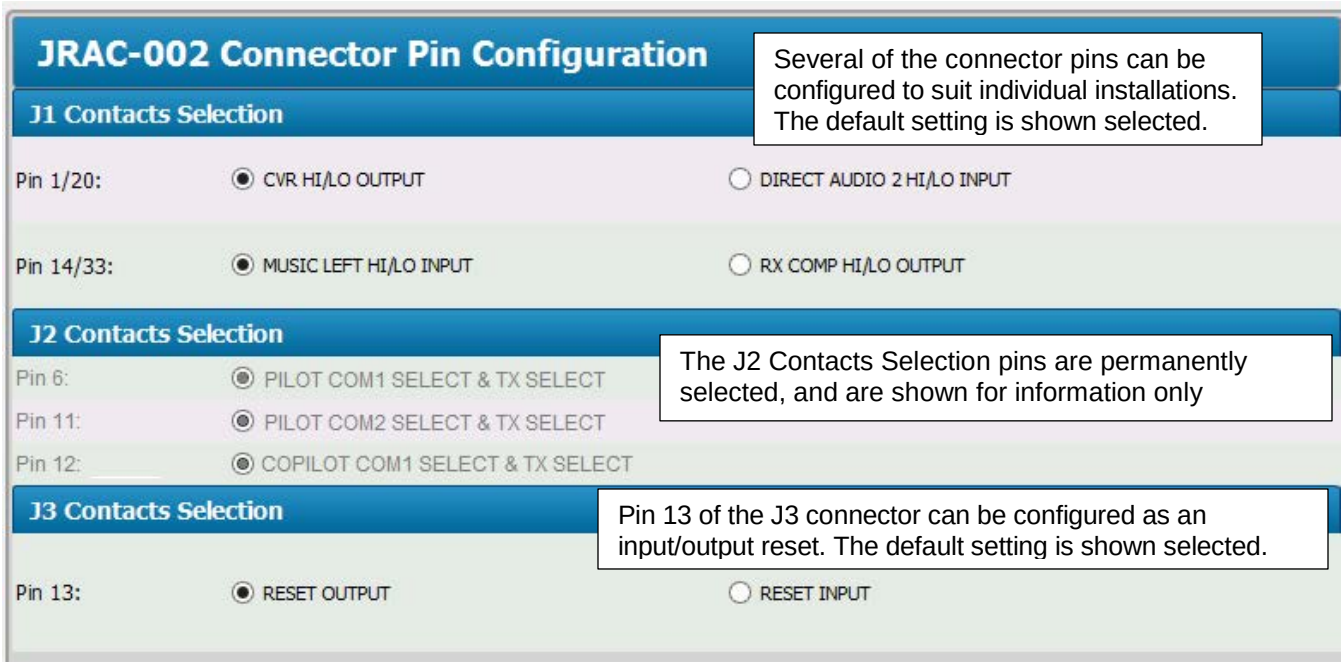
### 2.5.4.5 JRAC-002 Sidetone Levels



### 2.5.4.6 JRAC-002 Connector Pin Configuration

Several of the connector pins can be configured to meet the requirements of specific installations.

Refer to JRAC-002 Interconnect sheets 5 and 6.




J3 Contacts selection - Pin 13 Reset

If Pin 13 is selected as Reset Input, it can be wired to accept an external reset signal.

If Pin 13 is selected as Reset Output, any loss of communication from the control panel will activate the Reset Output signal to reset the control panel.

### 2.5.4.7 JRAC-002 Audio Muting (During Transmit)

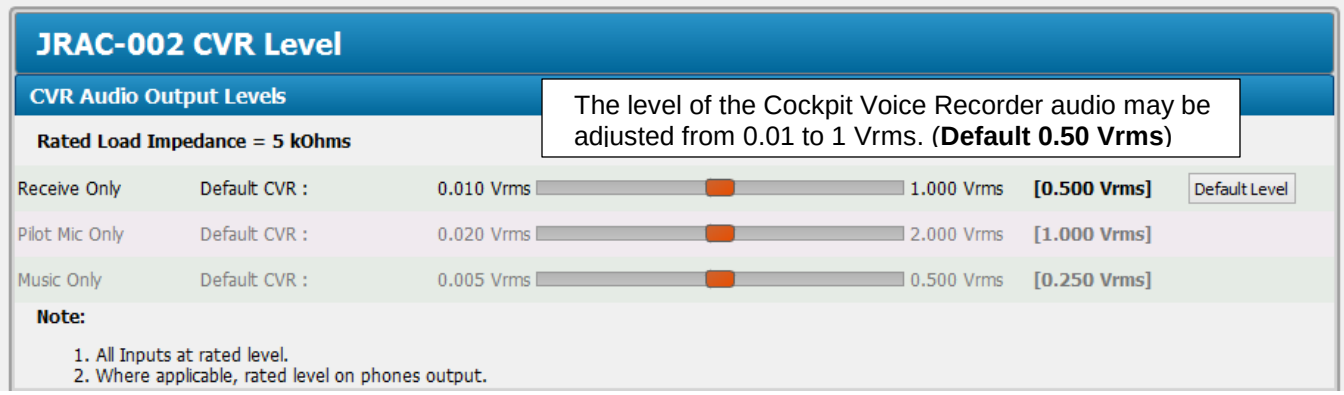
When the Mute RX Audio check box is checked the Receive Audio is muted during transmit (**Default checked**)

When the Mute ICS Audio check box is checked the ICS Audio is muted during transmit (**Default checked**)

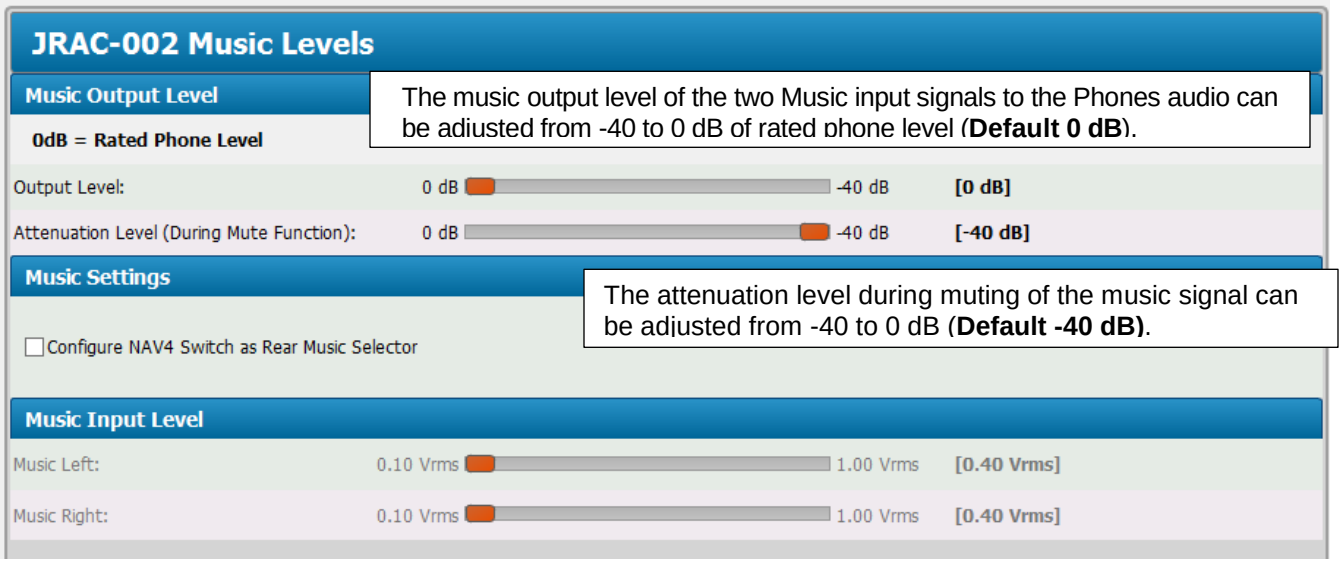
When the Mute Alert Audio check box is checked the Alert Audio is muted during transmit (**Default not checked**)

The Mute Music Audio check box is checked and Music Audio is always muted during transmit.

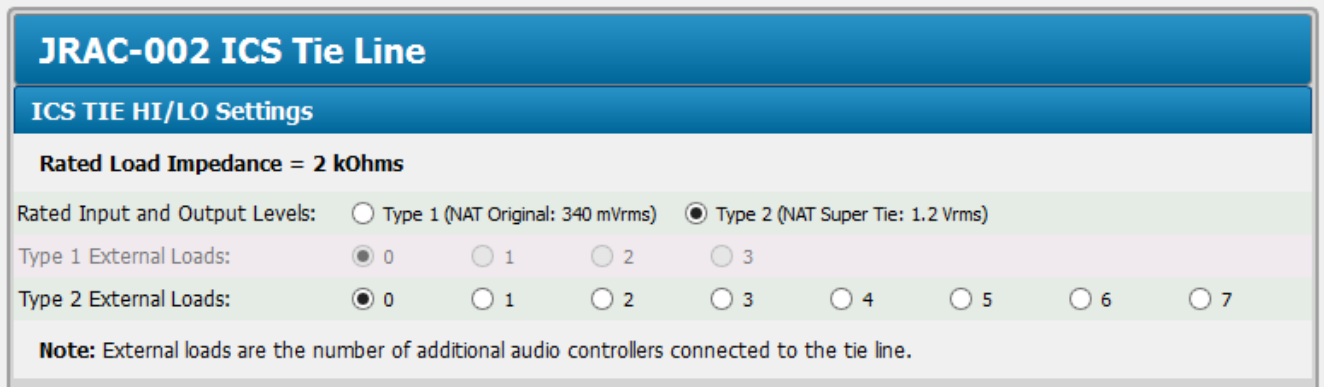
### 2.5.4.8 JRAC-002 CVR Level




### 2.5.4.9 JRAC-002 Music Levels




### 2.5.4.10 JRAC-002 ICS Tie Line

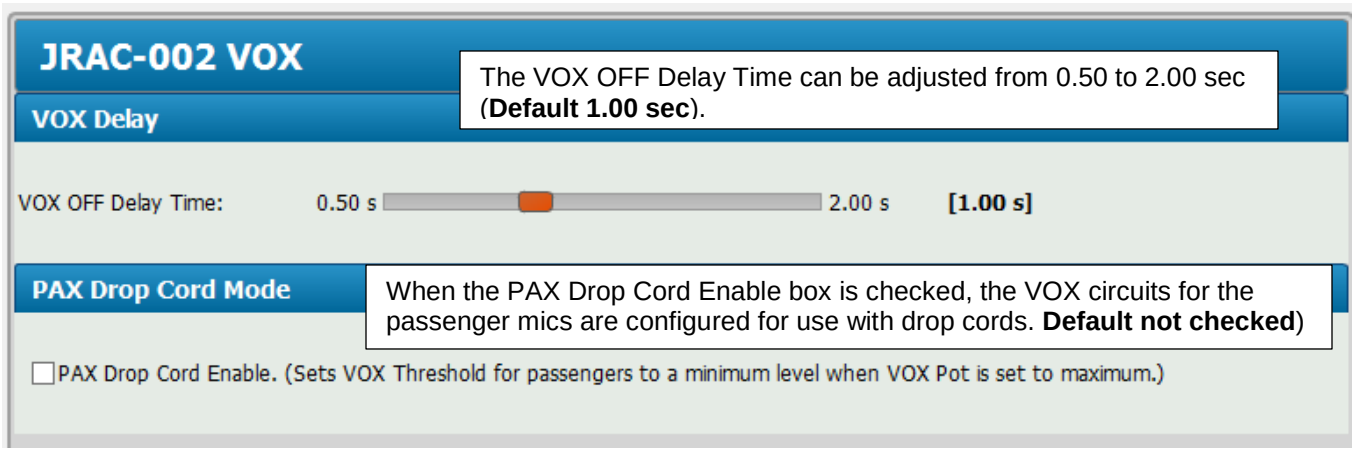



The rated input and output levels of the intercom tie line can be selected as Type 1 or Type 2 (**Default Type 2**).

The quantity of external loads for a type1 intercom tie line can be selected from 0 to 3 (**Default 0**).

The quantity of external loads for a type 2 intercom tie line can be selected from 0 to 7 (**Default 0**).

### 2.5.4.11 **JRAC-002 VOX**




### 2.5.4.12 **JRAC-002 Connector Maps**

The Connector Maps section is used to generate custom Connector Maps and Interconnects for use by the installing agency.

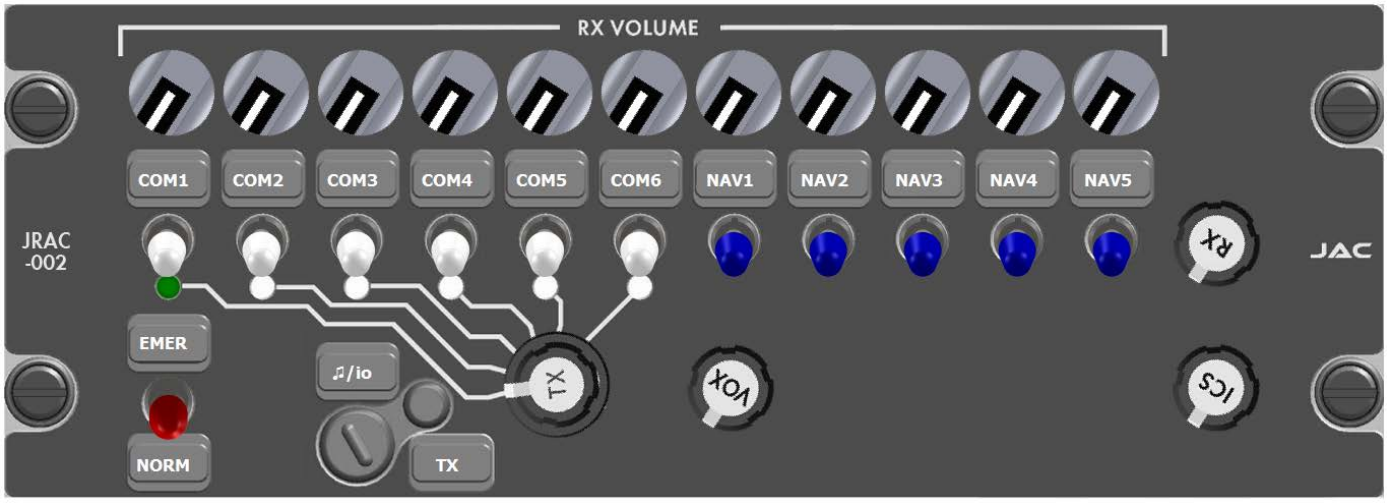
## 2.5.5 Other Configuration Features

In the JRAC-002 Product Information Window, the model number, serial number, MOD status and check sum of the JRAC-002 audio panel can be stored and viewed.

## 2.6 Virtual Control Panel

The Virtual Control Panel for the JRAC-002 is a computer application that is part of the ProCS™. The JRAC-002 Virtual Front Panel can be used to temporarily select and control an attached JRAC-002. The Virtual Control Panel communicates with the JRAC-002 via the Product Control Serial Port (see section 2.5.2). Control data is sent to the JRAC-002 via the control connector (J12) using cable CAB-USB-0008.

### 2.6.1 Virtual Controls




From the Virtual Control Panel it is possible to adjust the switches 'on' and 'off' by clicking on them, and to adjust the rotary controls by 'dragging' them round.

#### 2.6.1.1 Transceiver and Receiver Controls

The COM and NAV controls can be selected ON (up) or OFF (down) by clicking on them. Above each selector switch is an individual rotary volume control which is rotated clockwise (cw) to increase and counterclockwise (ccw) to reduce the volumes.

#### 2.6.1.2 Master Receive Volume Control (RX)

The Master Receive Volume Control is a rotary volume control that rotates clockwise to increase and counterclockwise to reduce all the receive volumes simultaneously.

#### 2.6.1.3 Transmit Selection

When the TX control is rotated, the annunciator below the 'selected' legend will turn green (COM 1 shown above).

#### 2.6.1.4 Mode Selection

The mode selection control is a two position switch used to select NORM (normal mode - down) or EMER (emergency mode - up).

#### 2.6.1.5 VOX Threshold selection

This is a rotary knob that is used to select the VOX threshold of the unit.

When rotated fully cw, the threshold will be at maximum and VOX ICS operation is disabled and ICS PTT input is required for ICS operation.

When rotated fully ccw, the threshold will be at minimum (almost live).

To adjust the unit for **VOX** (Voice activated) use, the VOX control should be set fully ccw and then slowly rotated cw to the point where no intercom audio can be heard. The VOX control should be adjusted for proper operation according to the ambient noise.

#### 2.6.1.6 ICS Volume control

This is a rotary control used to adjust the volume of all ICS audio to suit the ambient conditions. Rotating the control completely cw gives rated level, and completely ccw reduces the output to minimum level.

## 2.7 Installation Kit

The kit required to install this unit is not included with the unit.

The installation kit (Part # INST-JRAC) consists of the following:

| Quantity | Description | JAC Part # |
|---|---|---|
| 1 | D-Sub 37-pin connector, hood and 37 crimp pins | CON-3420-0037 |
| 1 | D-Sub 50-pin connector, hood and 50 crimp pins | CON-3420-0050 |
| 1 | D-Sub 15-pin connector, hood and 15 crimp pins | CON-3420-0015 |
| 2 | 0.625" Inside Diameter, Hardware - Tag Ring | CON-5500-0625 |
| 2 | Heat Shrink Tubing | WIR-HTSK-1000 |

### 2.7.1 Recommended Crimp tools

| Connector Type | Hand crimp tool | Positioner | Insertion/extraction tool |
|---|---|---|---|
| Positronic | 9507 | 9502-3 | M81969/1-04 |
| Positronic | AFM8 (Daniels) | M22520/2.08 KB-1 | |

## 2.8 Installation Drawings

The drawings and documents required for Installation can be found in Appendix A of this manual.

### 2.8.1 Generation of Custom Drawings

The interconnect and connector maps in Appendix A of this manual are generic drawings based on the standard version of the JRAC-002. However, if a unit has been configured using JAC's ProCS™ software, the software can be used to generate fully customized interconnects and connector maps for use by the installer.

# SECTION 3 – OPERATION

## 3.1 Introduction

This section contains the operating instructions for the JRAC-002.

The JRAC-002 is a remotely mounted audio controller. The operator controls the functions of the JRAC-002 with a control device, such as a Jupiter Avionics JCPx Control Panel or a Multi-Function Display (**MFD**), via a serial data bus.

For selection of receivers, transceivers and other controls, refer to the control device manual.

## 3.2 Normal Mode of Operation

The JRAC-002 is in Normal mode when aircraft electrical power is applied to the unit, Normal Mode has been selected on the control device, and the external EMERGENCY/NORMAL select switch is in the NORMAL position.

### 3.2.1 Receiving

The control device determines which transceivers and receivers are selected for receive operation. When receive audio is input to the JRAC-002 on a transceiver or receiver that has been selected, the incoming audio is directed to the user's phones unless the user is transmitting and muting of receive audio during transmit has been enabled.

The control device is used to select the receive volume level.

### 3.2.2 Transmit Operation

The control device determines which transceiver is selected for transmit. When the Pilot or Co-pilot's TX PTT is activated, the unit will key the selected transceiver. The user's mic audio is routed to the selected transceiver, sidetone audio is routed to the user's phones, and music is muted for the duration of the transmission.

### 3.2.3 COM5 PTT Operation

Note: If the COM5 transceiver has been configured as duplex, it can be used with a cellphone or sat-phone. Check your configuration with the installing agency.

If the unit has been configured as duplex for cellphone or sat-phone use and COM5 has been selected for transmit, momentarily activating a TX PTT routes the microphone audio to COM5. A second momentary activation of the same TX PTT or selecting a different Transceiver from the control device will stop routing the microphone audio to COM5.

Transmit timeout operation does not operate for COM 5 when its transmit mode is set to duplex.

### 3.2.4 VOX Operation

The VOX threshold is set from the control device.

A user's MIC audio is routed to the ICS when the MIC audio level exceeds the VOX threshold.

A user's MIC audio is disconnected from the ICS after the MIC audio level falls below the VOX threshold for 0.5 to 2 seconds.

### 3.2.5 Passenger Dropcord Mode Operation

If a passenger dropcord has been configured through ProCS™, the VOX threshold for passengers is set to a minimum level when the VOX is set to maximum.

### 3.2.6 ICS Operation

ICS audio routed to the PHONES is the sum of all the MIC audio from users with ICS KEY active or with MIC audio level exceeding the VOX Threshold level.

The ICS audio routed to the PHONES also includes the audio input on the ICS TIE from other audio controllers.

The sum of all the MIC audio from users with ICS KEY active or with MIC audio level exceeding the VOX Threshold level is output on the ICS TIE line.

The ICS audio is muted during transmit (if selected via ProCS – see section 2.5.4.7).

The ICS audio level at the phones is controlled by the ICS volume control as selected from the control device.

### 3.2.7 Music Operation

Music to the phones will be muted by incoming audio (ICS, Receive, Direct or Alert Audio) or if the unit is transmitting. When the incoming audio has ended, the music will gradually return to the previous level.

## 3.3 Emergency Operation Mode

The JRAC-002 is in emergency mode when aircraft electrical power is lost, Emergency Mode has been selected on the control device, or the external EMERGENCY/NORMAL select switch is in the EMERGENCY position.

Note: During configuration via ProCS, either DIRECT AUDIO 2 or CVR is selected. In Emergency Mode, DIRECT AUDIO 2 will be sent to the Pilot's phones if selected. If CVR is selected, the pilot's phones output will also be directed to the CVR.

### 3.3.1 Auto Emergency Mode

If the unit is in emergency mode because power has been lost to the unit, the sum of the COM 1 transceiver, NAV 1 receive, DIRECT AUDIO 1 and DIRECT AUDIO 2 (when configured on) will be routed to the pilot’s phones and the CVR. The pilot's microphone and transmit key are connected to the COM 1 transceiver. No other functions in the JRAC-002 will operate when power is lost.

### 3.3.2 Selected Emergency Mode

If Emergency mode has been selected from the control device or from an external emergency/normal switch, and sufficient power is applied to the JRAC-002, the sum of the COM 1 receive, NAV 1 receive, DIRECT AUDIO 1 and DIRECT AUDIO 2 (when configured on) and Alert audio will be routed to the pilot’s phones and the CVR. The pilot's microphone and transmit key are connected to the COM 1 transceiver. The pilot is disconnected from the ICS. The COM 1 transceiver and NAV 1 receiver and DIRECT AUDIO 1 are not available to the other users. All other functions of the JRAC-002 will operate.

### 3.3.3 EMER RADIO SELECT

When the EMER MODE SELECT is grounded, the COM 2 and NAV 2 radios are connected to the PILOT's headphone and microphone instead of the COM 1 and NAV 1 radios.

.

# Installation and Operating Manual

# Appendix A - Installation Drawings

## A1 Introduction

The drawings necessary for installation and troubleshooting of the JRAC-002 Remote Audio Controller - Discrete COM Select & TX PTT are in this Appendix, as listed below.

Note: A fully customized set of Connector Maps and Interconnects can be created using the ProCS software. Refer to the ProCS™ manual for further information.

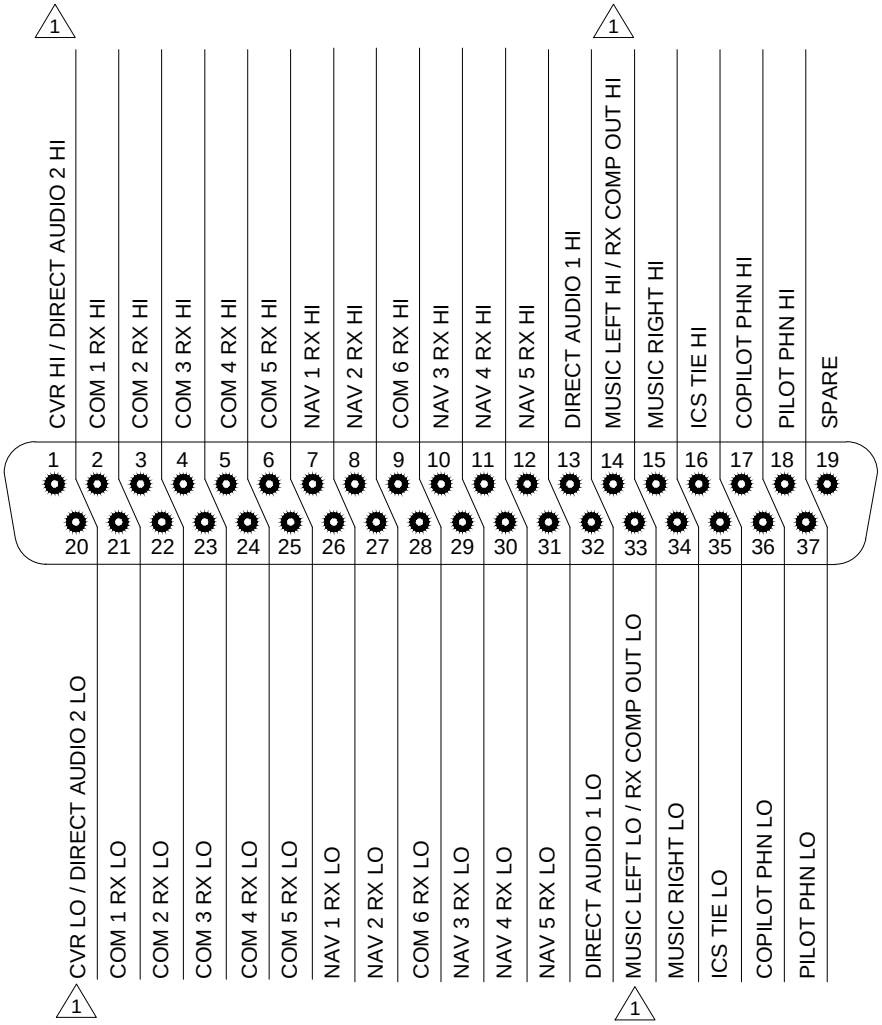
## A2 Installation Drawings

| DOCUMENT | Rev |
|---|---|
| | |
| JRAC-002 Connector Map | A |
| JRAC-002 Interconnect | A |
| JRAC-002 Mechanical Installation | A |
| | |

# RECEIVE CONNECTOR

P1

37 PIN FEMALE DMIN
MATING CONNECTOR




VIEW IS FROM REAR OF MATING CONNECTOR

NOTE:

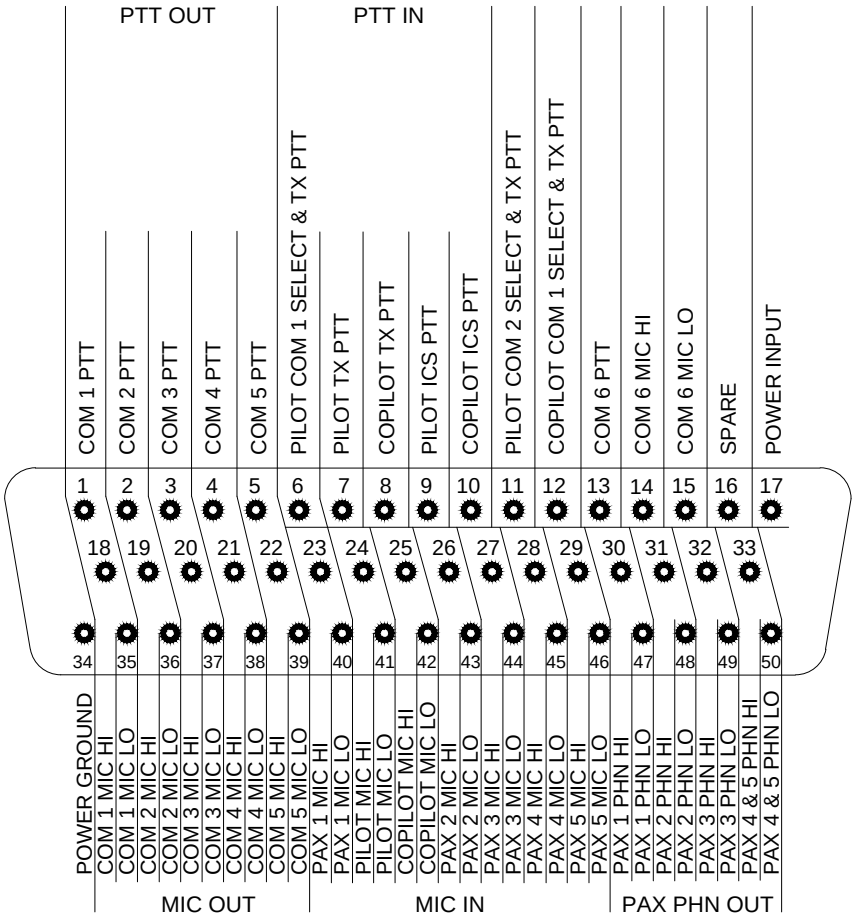
1 CONFIGURABLE CONTACT

| | | | | |
|---|---|---|---|---|
| PREPARED | TAT | JUPITER AVIONICS CORPORATION | | |
| CHECKED | JAC 06-09-17 SRM | TITLE: Remote Audio Controller - Discrete COM Select & TX PTT P1 Connector Map | | |
| APPROVED | JAC 06-09-17 KDV | NCAGE CODE: L00N3 | PART NO.: JRAC-002 | SHEET: 1/3 |
| CONFIDENTIAL & PROPRIETARY TO JUPITER AVIONICS CORP. | | DOC NO.: JRAC-002 Connector Map Rev A.dwg | | |

# TRANSMIT CONNECTOR

P2

50 PIN FEMALE DMIN
MATING CONNECTOR




VIEW IS FROM REAR OF MATING CONNECTOR

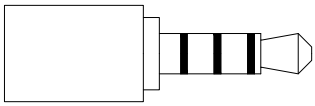
| | | | | |
|---|---|---|---|---|
| PREPARED | TAT | JUPITER AVIONICS CORPORATION | | |
| CHECKED | JAC 06-09-17 SRM | TITLE: Remote Audio Controller - Discrete COM Select & TX PTT P2 Connector Map | | |
| APPROVED | JAC 06-09-17 KDV | NCAGE CODE: L00N3 | PART NO.: JRAC-002 | SHEET: 2/3 |
| CONFIDENTIAL & PROPRIETARY TO JUPITER AVIONICS CORP. | | DOC NO.: JRAC-002 Connector Map Rev A.dwg | | |

JUPITER AVIONICS TEMPLATE AUTOCAD PORTRAIT SIZEA REV B.DWT

# CONFIGURATION CONNECTOR

**P4** ACCEPTS THE FOLLOWING PLUG FORMATS

JA99 CONFIGURATION CABLE
4 POLE MALE 3.5MM STEREO

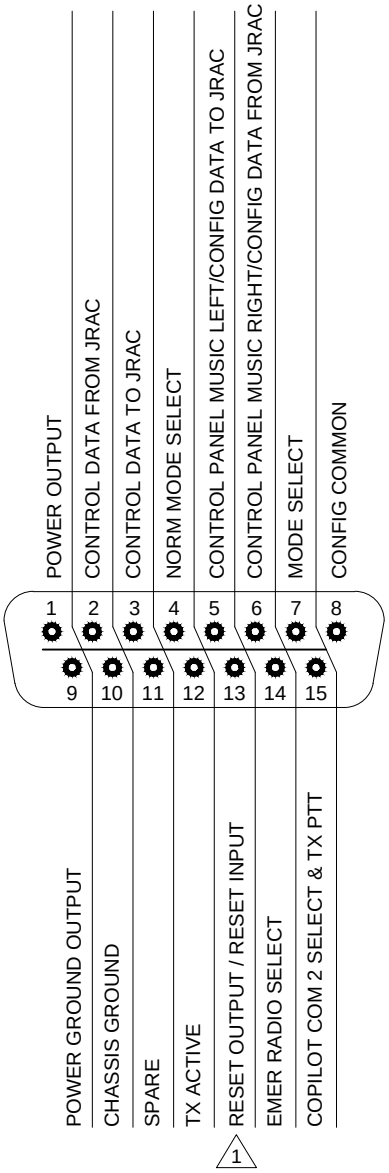


| MATING PLUG NAMES | JRAC SIGNAL NAMES |
|---|---|
| TIP: TX DATA | CONFIG DATA TO JRAC |
| 1ST RING: RX DATA | CONFIG DATA FROM JRAC |
| 2ND RING: GROUND | CONFIG COMMON |
| 3RD RING: CONFIG AUDIO | MODE SELECT / CONFIG AUDIO |

# CONTROL CONNECTOR

**P3**

15 PIN FEMALE DMIN
MATING CONNECTOR




| | | | | |
|---|---|---|---|---|
| PREPARED | TAT | JUPITER AVIONICS CORPORATION | | |
| CHECKED | JAC 06-09-17 SRM | TITLE: Remote Audio Controller - Discrete COM Select & TX PTT P3 and P4 Connector Map | | |
| APPROVED | JAC 06-09-17 KDV | NCAGE CODE: L00N3 | PART NO.: JRAC-002 | SHEET: 3/3 |
| CONFIDENTIAL & PROPRIETARY TO JUPITER AVIONICS CORP. | | DOC NO.: JRAC-002 Connector Map Rev A.dwg | | |

## JRAC-002 INTERCONNECT WIRING NOTES

NOTES

1. ALL WIRE SIZE SHOULD BE 24 AWG MIN UNLESS OTHERWISE SPECIFIED. UNSHIELDED WIRE SHOULD BE SELECTED PER FAA AC43.13-1B CHANGE 1 PARA 11-76 TO 11-78. WIRE TYPES SHOULD BE IN ACCORDANCE WITH MIL-W-22759 AS DESCRIBED IN FAA AC43.13-1B CHANGE 1 PARA 11-85 AND 11-86 AND LISTED IN TABLE 11-11 OR 11-12. ALL SHIELDED CABLE SHOULD BE IN ACCORDANCE WITH MIL-DTL-27500 (REVISION H OR LATER).

△2 CONNECTION TO AIRFRAME GROUND SHOULD BE MADE WITH 20 AWG WIRE. LENGTH NOT TO EXCEED 3 FT (0.91 M).

△3 CABLE SHIELDS AT THE CONNECTOR PINS SHOULD BE TERMINATED TO AIRFRAME GROUND USING A TAG RING P/N: MS27741-5 OR EQUIVALENT.

△4 CONNECTOR PIN HAS MORE THAN ONE FUNCTION. SEE THE OPTIONS SECTION OF THIS DRAWING FOR ALTERNATIVE INTERCONNECT WIRING.

△5 GROUND PIN FOR NORMAL OPERATION.
LEAVE UNCONNECTED FOR EMERGENCY OPERATION.

△6 RESET OUTPUT PIN OUTPUTS A MOMENTARY GROUND WHEN CONTROL DATA TO JRAC IS NOT VALID. OUTPUT IS OPEN COLLECTOR.

△7 TX ACTIVE PIN OUTPUTS A GROUND WHEN ANY USER TX PTT IS ACTIVE. OUTPUT IS OPEN COLLECTOR.

△8 LEAVE PIN UNCONNECTED FOR COM 1 AND NAV 1 OPERATION IN EMERGENCY MODE.
GROUND PIN FOR COM 2 AND NAV 2 OPERATION IN EMERGENCY MODE.

△9 MOMENTARILY GROUND PIN TO RESET REMOTE AUDIO CONTROLLER

△10 THE CONTROL PANEL MUSIC LEFT & RIGHT SOURCE AND THE DIRECT AUDIO 2 SOURCE SHALL NOT BE CONNECTED TO ANY OTHER AUDIO INPUT.

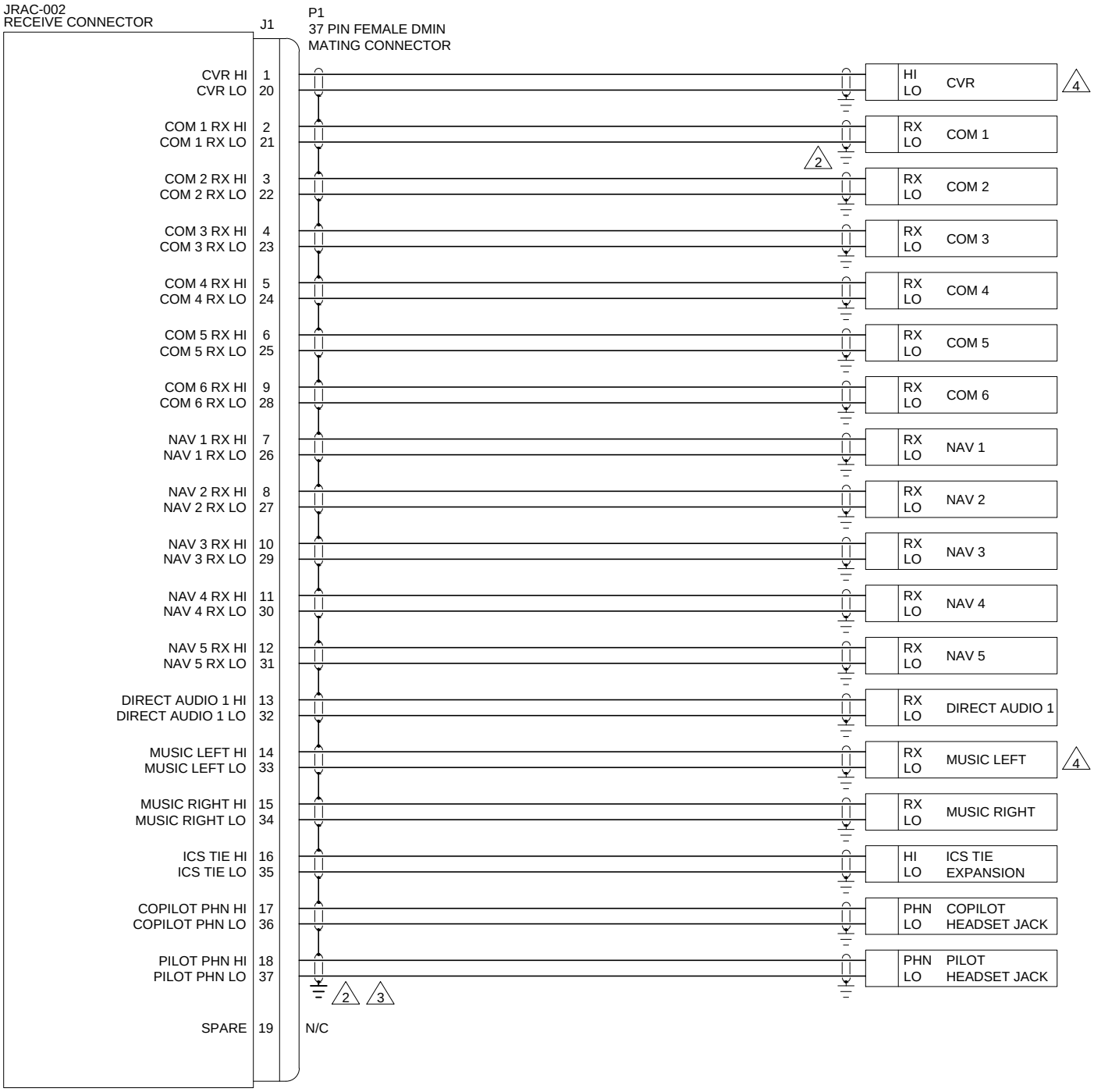
## CONNECTOR PIN LEGENDS

LEGEND

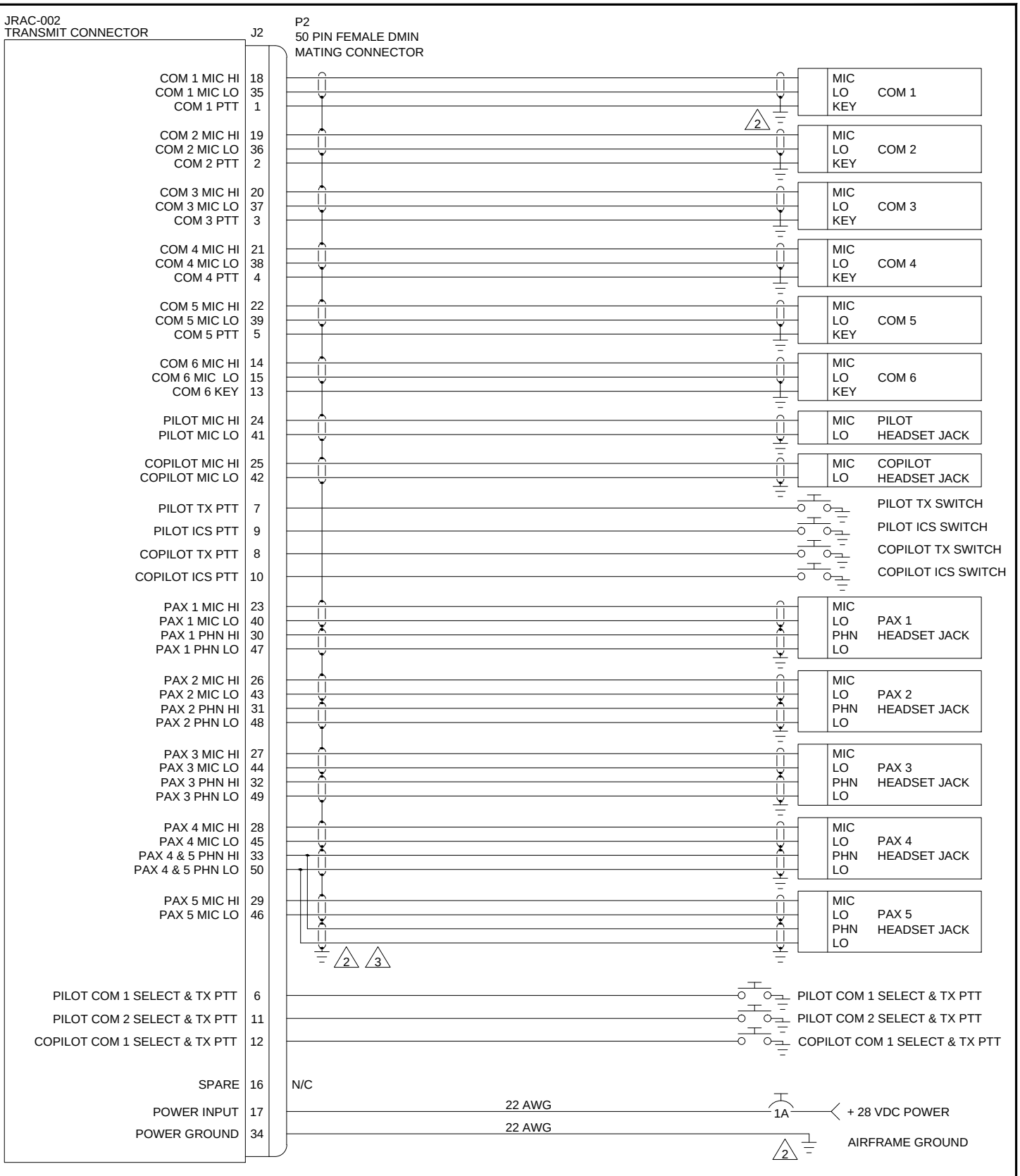
| | |
|---|---|
| SPARE | INTERNAL CIRCUITS MAY EXIST AND MAY BE ACTIVATED FOR FUTURE USE. NO EXTERNAL WIRE CONNECTION. |
| N/C | NO CONNECTION |

| | | | |
|---|---|---|---|
| PREPARED | TAT | JUPITER AVIONICS CORPORATION | |
| CHECKED | JAC 06-09-17 SRM | TITLE: Remote Audio Controller - Discrete COM Select & TX PTT Interconnect Notes | |
| APPROVED | JAC 06-09-17 KDV | NCAGE CODE: L00N3 | PART NO.: JRAC-002 / SHEET: 1/6 |
| CONFIDENTIAL & PROPRIETARY TO JUPITER AVIONICS CORP. | | DOC NO.: JRAC-002 Interconnect Rev A.dwg | |

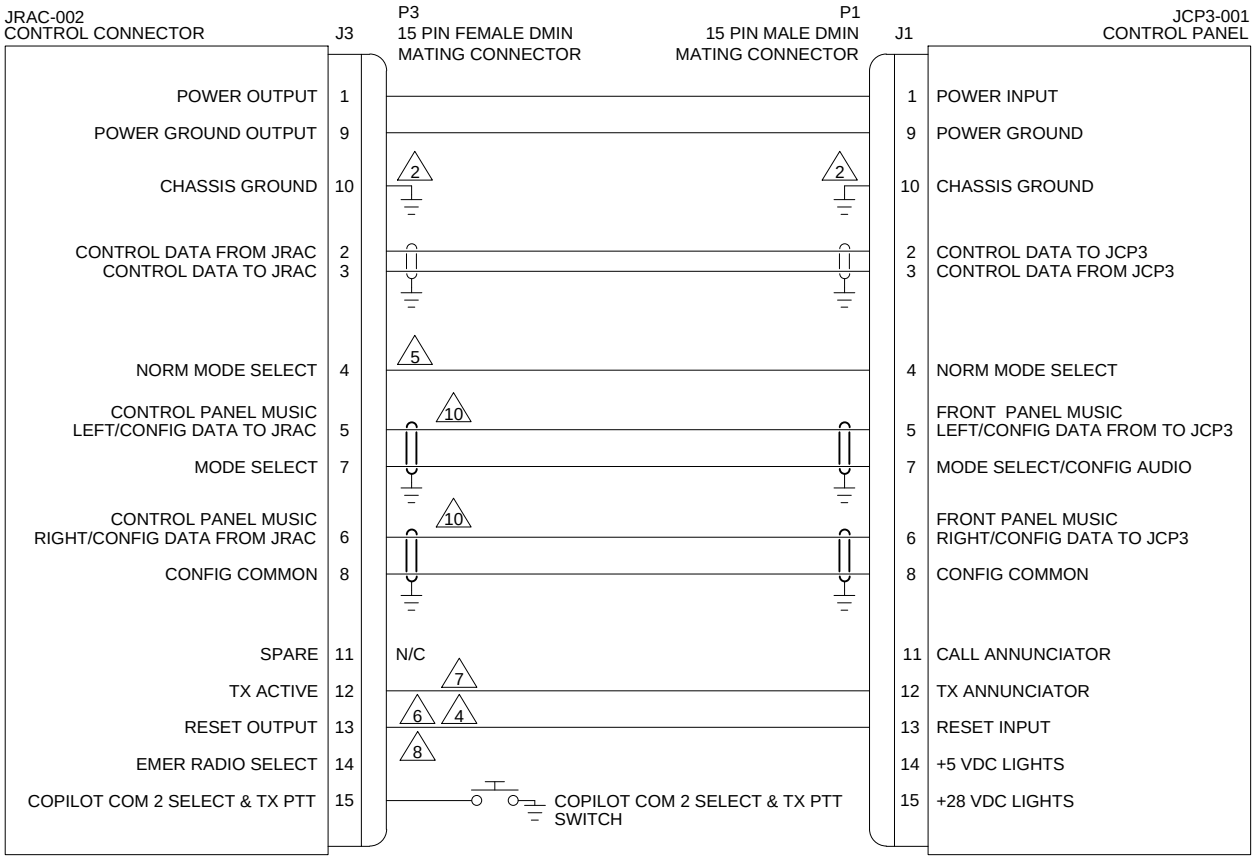
JUPITER AVIONICS TEMPLATE AUTOCAD PORTRAIT SIZEA REV B.DWT



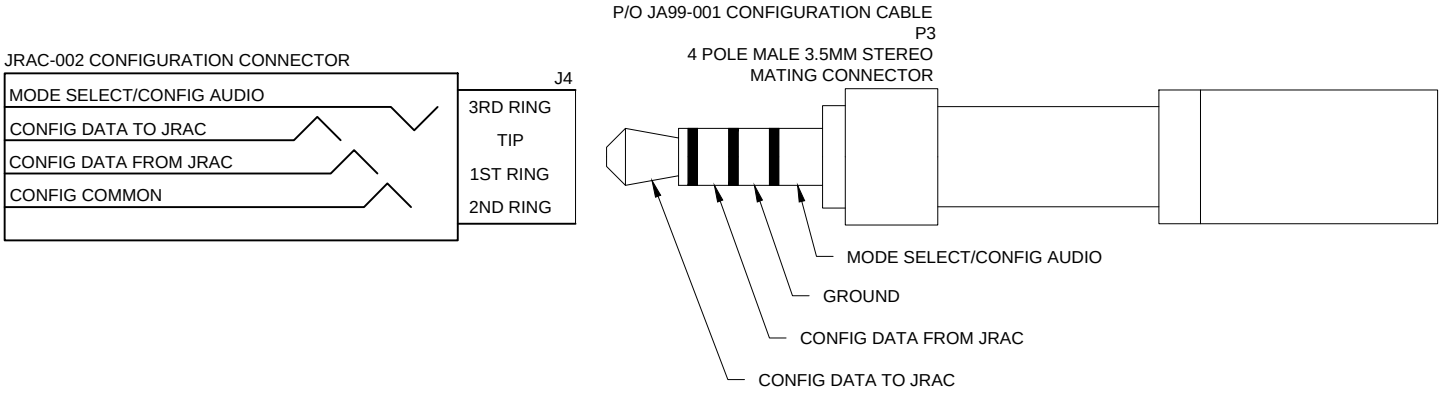

| | | |
|---|---|---|
| PREPARED | TAT | JUPITER AVIONICS CORPORATION |
| CHECKED | JAC 06-09-17 SRM | TITLE: Remote Audio Controller - Discrete COM Select & TX PTT J1 Interconnect |
| APPROVED | JAC 06-09-17 KDV | NCAGE CODE: L00N3 / PART NO.: JRAC-002 / SHEET: 2/6 |
| CONFIDENTIAL & PROPRIETARY TO JUPITER AVIONICS CORP. | | DOC NO.: JRAC-002 Interconnect Rev A.dwg |




| | | |
|---|---|---|
| PREPARED | TAT | JUPITER AVIONICS CORPORATION |
| CHECKED | JAC 06-09-17 SRM | TITLE: Remote Audio Controller - Discrete COM Select & TX PTT J2 Interconnect |
| APPROVED | JAC 06-09-17 KDV | NCAGE CODE: L00N3 / PART NO.: JRAC-002 / SHEET: 3/6 |
| CONFIDENTIAL & PROPRIETARY TO JUPITER AVIONICS CORP. | | DOC NO.: JRAC-002 Interconnect Rev A.dwg |

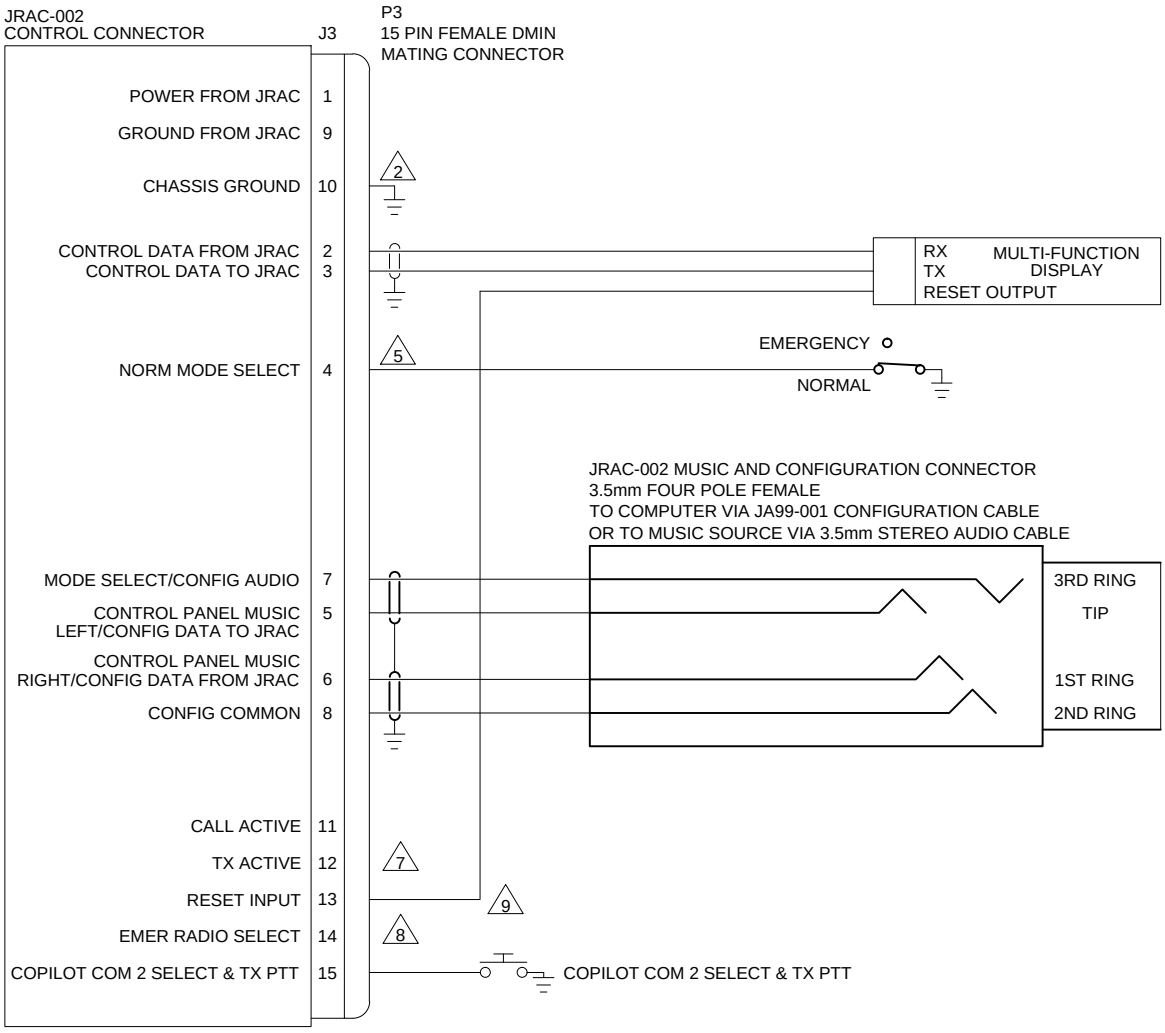



## CONFIGURATION FROM ProCS APPLICATION VIA JA99-001 CABLE



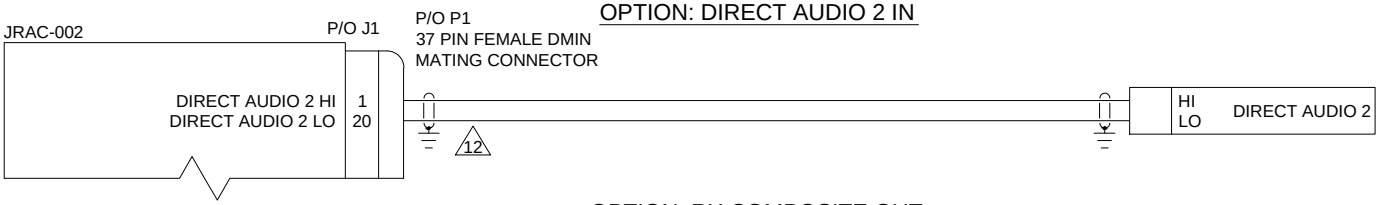

| | | | |
|---|---|---|---|
| PREPARED | TAT | JUPITER AVIONICS CORPORATION | |
| CHECKED | JAC 06-09-17 SRM | TITLE: Remote Audio Controller - Discrete COM Select & TX PTT J3 and J4 Interconnect | |
| APPROVED | JAC 06-09-17 KDV | NCAGE CODE: L00N3 | PART NO.: JRAC-002 / SHEET: 4/6 |
| CONFIDENTIAL & PROPRIETARY TO JUPITER AVIONICS CORP. | | DOC NO.: JRAC-002 Interconnect Rev A.dwg | |

## OPTION: MULTI-FUNCTION DISPLAY CONTROL

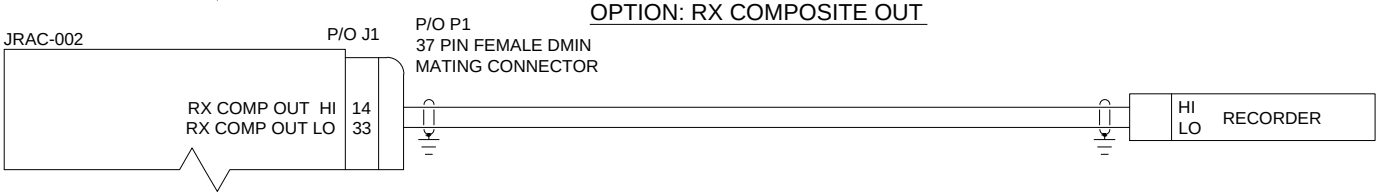



| | | | |
|---|---|---|---|
| PREPARED | TAT | JUPITER AVIONICS CORPORATION | |
| CHECKED | JAC 06-09-17 SRM | TITLE: Remote Audio Controller - Discrete COM Select & TX PTT Interconnect Options | |
| APPROVED | JAC 06-09-17 KDV | NCAGE CODE: L00N3 | PART NO.: JRAC-002 / SHEET: 5/6 |
| CONFIDENTIAL & PROPRIETARY TO JUPITER AVIONICS CORP. | | DOC NO.: JRAC-002 Interconnect Rev A.dwg | |

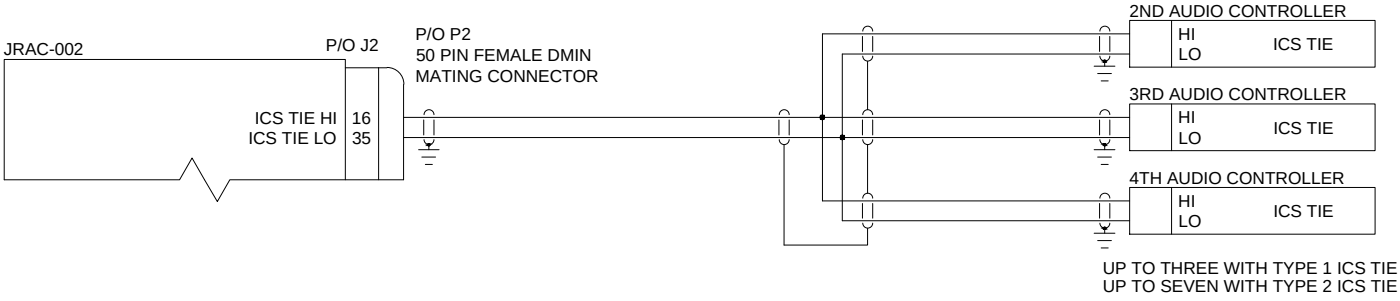
## OPTION: DIRECT AUDIO 2 IN




## OPTION: RX COMPOSITE OUT

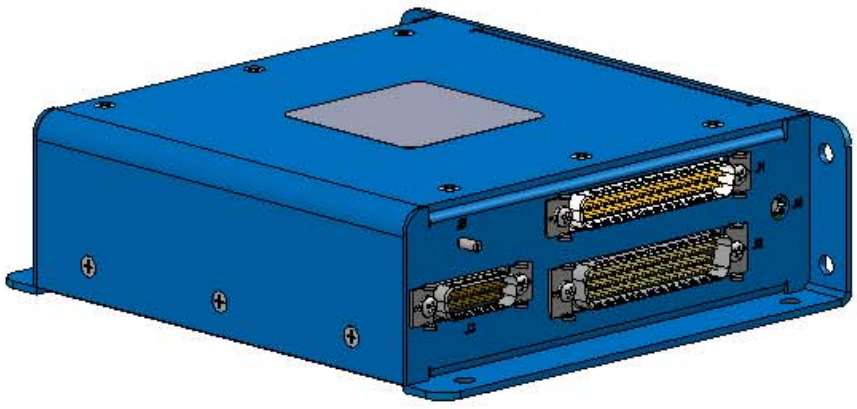


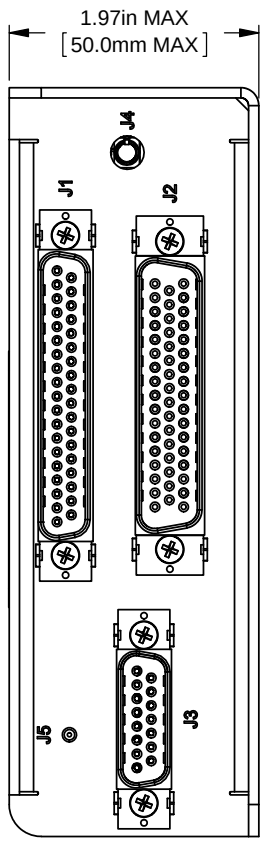

## OPTION: MULTIPLE AUDIO CONTROLLER

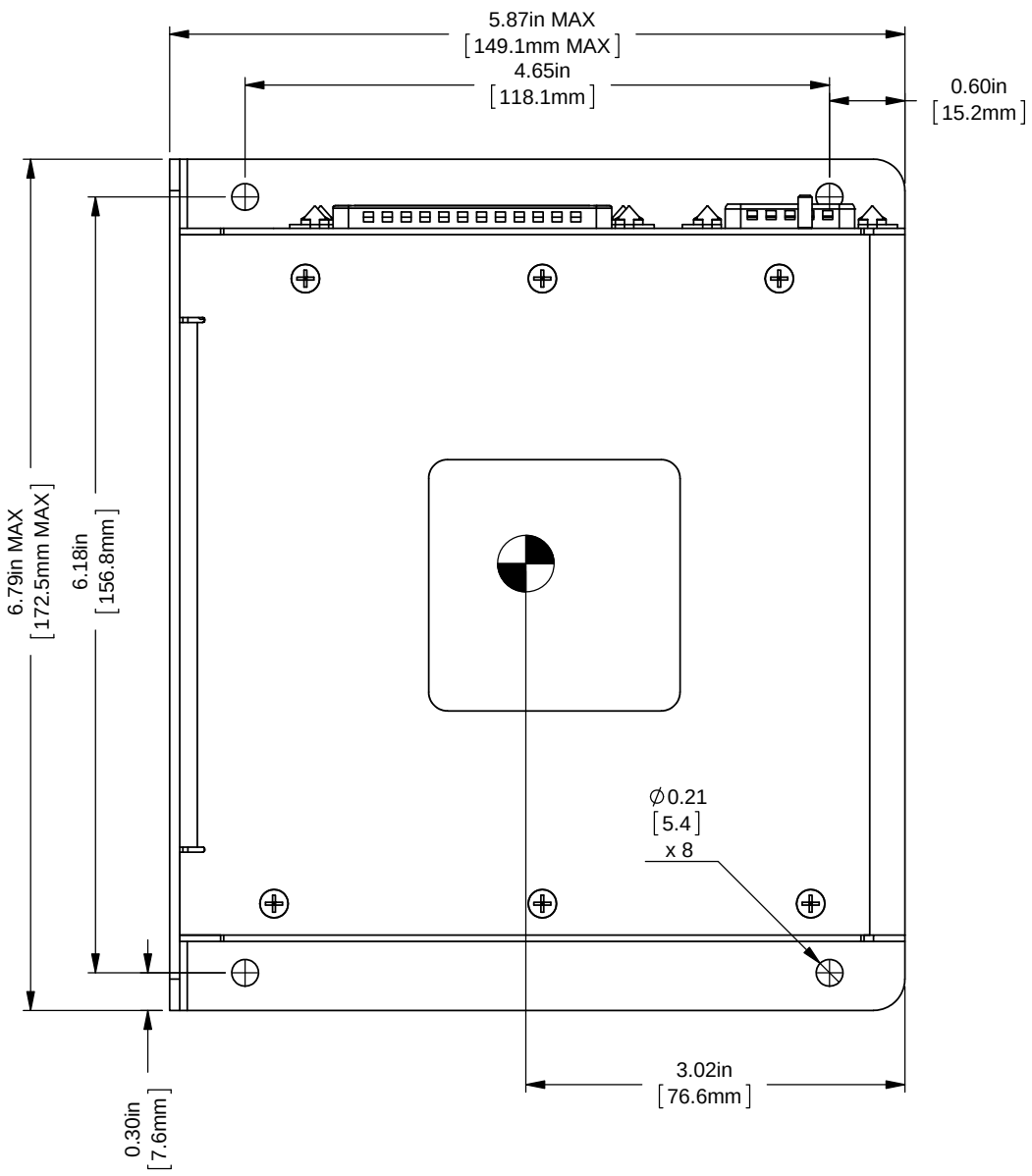


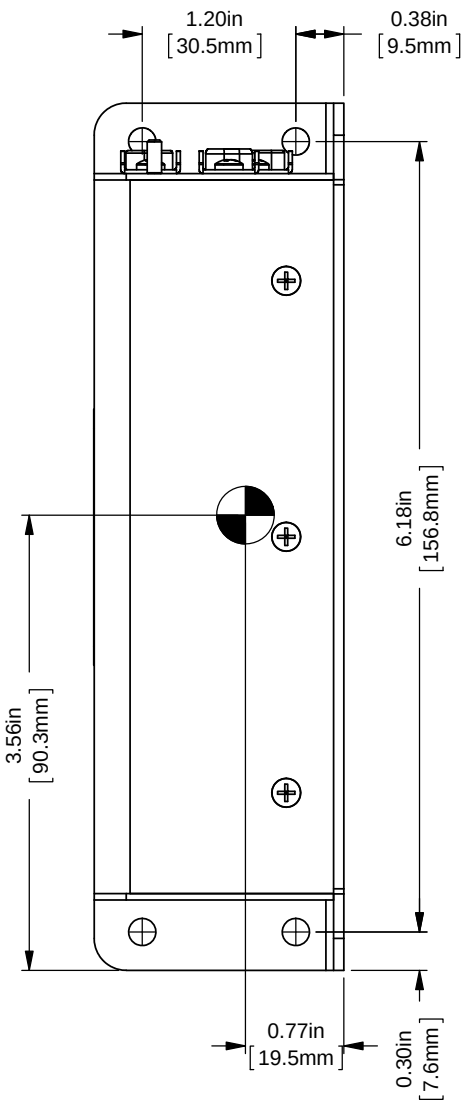

## OPTION: CHASSIS GROUND

| | | |
|---|---|---|
| PREPARED | TAT | JUPITER AVIONICS CORPORATION |
| CHECKED | JAC 06-09-17 SRM | TITLE: Remote Audio Controller - Discrete COM Select & TX PTT Interconnect Options |
| APPROVED | JAC 06-09-17 KDV | NCAGE CODE: L00N3 / PART NO.: JRAC-002 / SHEET: 6/6 |
| CONFIDENTIAL & PROPRIETARY TO JUPITER AVIONICS CORP. | | DOC NO.: JRAC-002 Interconnect Rev A.dwg |






CENTER OF GRAVITY
±0.03in [0.8mm]

WEIGHT: 1.94 lbs [0.88 kg] MAX.

| | | |
|---|---|---|
| UNLESS OTHERWISE SPECIFIED<br>DIMENSIONS ARE IN INCHES<br>ANGLES ARE IN DEGREES<br>TOLERANCES:<br>1 DEC PLACE: ± 0.1<br>2 DEC PLACE: ± 0.01<br>3 DEC PLACE: ± 0.005<br>ANGLES: ± 0.5 DEG | PREPARED | TAT |
| | CHECKED | JAC 06-09-17 SRM |
| | APPROVED | JAC 06-09-17 KDV |
| MATERIAL: N/A | CONFIDENTIAL & PROPRIETARY TO JUPITER AVIONICS CORP. | |
| FINISH: N/A | DRAWING NOT TO SCALE | |

JUPITER AVIONICS CORPORATION

TITLE
Remote Audio Controller - Discrete COM Select & TX PTT

| NCAGE CODE | PART NO. | SHEET |
|---|---|---|
| L00N3 | JRAC-002 | 1/1 |

DOC. NO.
JRAC-002 Mechanical Installation Rev A.SLDDRW

# Installation and Operating Manual

# Appendix B - Installation Documents

## B1 Airworthiness Approval

Airworthiness approval of the JRAC-002 may require completion of a TCCA Major Modification Report per CAR STD (AWM) 571 Appendix L or a FAA Form 337. The sample wording for a description of the work is provided to assist the Installing Agency in preparing Instructions for Continued Airworthiness (ICA) when replacing an existing audio panel with a Jupiter Avionics JRAC-002 Remote Audio Controller - Discrete COM Select & TX PTT. This sample may be modified appropriately for new installations. It is the installer's responsibility to determine the applicability of the method used. Installations performed outside Canada and the USA must follow the applicable aviation authority's regulations.

**Sample Wording:**

Removed the existing [model] audio controller and replaced with a Jupiter Avionics JRAC-002 Remote Audio Controller - Discrete COM Select & TX PTT in [aircraft location].

Installed in accordance with the JRAC-002 Installation Manual, Revision [ ], and AC 43.13-2, Chapters 2, and 3.

The JRAC-002 interfaces with existing aircraft radios per the Installation Manual instructions.

The JRAC-002 Installation Manual provides detailed installation instructions and wiring diagrams (Section 2, and Appendices A and B).

Power is supplied to the JRAC-002 through an existing [ ]-Amp circuit breaker that was previously used by the original audio panel. The net electrical load is unchanged.

Aircraft equipment list, weights and balance amended. Compass compensation checked and found to conform to applicable regulations.

## B2 Instructions for Continued Airworthiness

Maintenance of the JRAC-002 Remote Audio Controller - Discrete COM Select & TX PTT is "on condition" only. Refer to the JRAC-002 Maintenance Manual. Periodic maintenance of the JRAC-002 is not required.

The following sample Instructions for Continued Airworthiness (ICA) provides assistance in preparing ICA for the Jupiter Avionics JRAC-002 unit installation as part of a Type Certificate (TC) or Supplemental Type Certificate (STC) project to comply with CAR STD (AWM) 523/527/525/529.1529 or FAR 23/25/27/29.1529 "Instructions for Continued Airworthiness".

Items that may vary by aircraft make and model are shown in brackets ("[ ]") and should be filled in as appropriate. Some of the checklist items do not apply, in which case they should be marked "N/A" (Not Applicable).

# Instructions for Continued Airworthiness, Jupiter Avionics JRAC-002 Remote Audio Controller - Discrete COM Select & TX PTT in an [Aircraft Make and Model]

## 1. Introduction

[Aircraft that has been altered: Registration number, Make, Model and Serial Number]

**Content, Scope, Purpose and Arrangement**: This document identifies the Instructions for Continued Airworthiness for a Jupiter Avionics JRAC-002 installed in an [aircraft make and model].

**Applicability**: Applies to a Jupiter Avionics JRAC-002 installed in an [aircraft make and model].

**Definitions/Abbreviations**: None, N/A.

**Precautions**: None, N/A.

**Units of Measurement**: None, N/A.

**Referenced Publications**: JRAC-002 Installation and Operating Manual
JRAC-002 Maintenance Manual
STC/TC # [applicable STC/TC number for the specific aircraft installation]

**Distribution**: This document should be a permanent aircraft record.

## 2. Description of the System/Alteration

Jupiter Avionics JRAC-002 Remote Audio Controller - Discrete COM Select & TX PTT with interface to external transceivers and [include other equipment/systems as appropriate]. Refer to Appendix A of this manual for interconnect information. Refer to aircraft manufacturer approved interconnect for actual installation.

## 3. Control, Operation Information

Refer to section 3 of this manual or to the Jupiter Avionics JRAC-002 Operating Manual.

## 4. Servicing Information

N/A

## 5. Maintenance Instructions

Maintenance of the JRAC-002 is 'on condition' only. Periodic maintenance is not required. Refer to the JRAC-002 Maintenance Manual.

## 6. Troubleshooting Information

Refer to the JRAC-002 Maintenance Manual.

## 7. Removal and Replacement Information

Refer to Section 2 of this manual - the JRAC-002 Installation and Operating Manual. If the unit is removed and reinstalled, a functional check of the equipment should be conducted.

## 8. Diagrams

Refer to Appendix A of this manual - the JRAC-002 Installation and Operating Manual - for installation drawings and interconnect examples.

## 9. Special Inspection Requirements

N/A

## 10. Application of Protective Treatments

N/A

## 11. Data: Relative to Structural Fasteners

JRAC-002 and appropriate mounting hardware installation, removal and replacement should be in accordance with applicable provisions of AC 43.13-1B and AC 43.13-2A.

## 12. Special Tools

N/A

## 13. This Section is for Commuter Category Aircraft Only

A. **Electrical loads**: Refer to Section 1 of the JRAC-002 Installation and Operating Manual.
B. **Methods of balancing flight controls**: N/A.
C. **Identification of primary and secondary structures**: N/A.
D. **Special repair methods applicable to the airplane**: N/A.

## 14. Overhaul Period

No additional overhaul time limitations.

## 15. Airworthiness Limitation Section

N/A