JRAC-090

Remote Audio Controller - Dual ICS Input

Installation and Operating Manual

Rev. A

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IMPORTANT:

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www.jupiteravionics.com

RECORD OF REVISIONS

Revision	Rev Date	Description	ECR
A	Mar 2024	Initial release, Serial number 1001 and higher.	9507

Prepared:	Checked:	Approved:
MPB	JAC 10-23-24 KDV	JAC 10-23-24 MQS

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SECTION 1 - DESCRIPTION

1.1 System Overview

The JRAC-090 Remote Audio Controller – Dual ICS Input 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-090 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-090 design.

1.2 Features Overview

The JRAC-090 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, several audio paths are selectable, and alert audio analogue waveforms can be loaded 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 alert audio feature is intended for use as a secondary alerting system where another device provides the primary annunciation.

The JRAC-090 supports up to six transceivers and five receivers.

The JRAC-090 has individual VOX gating.

The JRAC-090 supports two Direct Audio inputs to provide audio at a fixed level to the users.

The JRAC-090 supports a CVR output.

The JRAC-090 supports two unidirectional ICS inputs and one output.

The JRAC-090 supports transmit access for three crew members (Pilot, Co-pilot and Passenger 1).

The JRAC-090 supports a two channel Alert Generator. Each alert has a separate key input.

The JRAC-090 provides intercom functions for up to seven users.

1.3 Inputs and Outputs

Refer to the JRAC-090 connector maps for the mating connector designators and pin assignments for the input and output signals.

1.3.1 Inputs

Name	Qty	Type
ALERT ENABLE	1	Active high discrete
ALERT KEY	2	Active low discrete (configured via ProCS)
CALL	1	Active low discrete (configured via ProCS)
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
ICS INPUT 1 HI/LO	1	Audio signal
ICS INPUT 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
PAX 1 TX PTT	1	Active low discrete
PILOT ICS PTT	1	Active low discrete
PILOT/COPILOT 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	9	Audio signal (6 COM, 3 NAV)
RX MUTE	1	Active low discrete

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
ICS OUTPUT 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

1.4 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%
ICS Input 1 rated input level	7.75 Vrms ±10%
ICS Input 2 rated input level	1.20 Vrms ±10%
Music rated input level	400 mVrms ±10%
Microphone input level	250 mVrms ±10%
ICS INPUT 1 & 2 min input level	1 Vrms ±10%
ICS INPUT 1 & 2 max input level	11 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%
ICS OUTPUT min output level	340 mVrms ±10%
ICS OUTPUT max output level	3.87 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 ± Ω10%
Direct Audio 1 input Impedance	1000 ± Ω10%
Direct Audio 2 input Impedance	100 ± Ω10%
Receive Audio input Impedance	1000 ± Ω10%
Music Audio input Impedance	1000 ± Ω10%

ICS INPUT 1 Impedance	1000 Ω ±10%
ICS INPUT 2 Impedance	1000 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
ICS 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%
ICS OUTPUT rated load	1000 Ω ±10%
ICS OUTPUT maximum load	150 Ω max

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
ICS INPUT HI / LO Circuitry Type	differential
ICS OUTPUT 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
ALERT ENABLE signal is active when the input signal is	≥ +9 Vdc
ALERT ENABLE signal, when active, sinks	0.1 to 10 mA
ALERT ENABLE signal is inactive when the input signal is	≤ +3 Vdc

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 lbs [0.88kg] 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-090 configuration connector communication standard for CONFIG DATA TO JRAC-090 data input signal and CONFIG DATA FROM JRAC-090 data output signal is RS-232.

1.4.4 Product Configuration Software Version

Configuration of the JRAC-090 requires the Product Configuration Software (ProCS) version v0.74.0 or later. Refer to the release notes from http://www.jupiteravionics.com/productsoftware.php or contact Jupiter Avionics to ensure the correct version is used.

1.4.5 Environmental Specifications

The JRAC-090 Remote Audio Controller has been tested to the environmental conditions listed in the Environmental Qualification Form in Appendix B of this manual.

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-090 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 conditions and tests for CAN TSO approval of the JRAC-090 are minimum performance standards.
Those installing the JRAC, on or in a specific type or class of aircraft, must determine that the aircraft installation conditions are within TSO standards. The JRAC-090 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-090 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 **16** for +28 Vdc relative to ground (alert power).
b) Check P2 pin **17** for +28 Vdc relative to ground.
c) Check P2 pin **34** for continuity to ground (less than 0.5 Ω).
d) Check P2 pins **7 thru 10** for continuity to ground (less than 0.5 Ω) when the relevant switch is closed.
e) Check P2 pins **11 and 12** (optional connections) for continuity to ground (less than 0.5 Ω) when the relevant switch is closed.
f) Check P3 pin **4** (optional connection)for continuity to ground (less than 0.5 Ω).
g) Check P3 pin 1**5** for continuity to ground (less than 0.5 Ω) when the relevant switch is closed.
h) Check all pins for shorts to ground or adjacent pins.

2.4.5.2 Configuration

Ensure that the JRAC-090 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-090 internal adjustments are set from the Product Configuration Software ProCS™. Configuration data is sent to the JRAC-090 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-090, 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-090 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

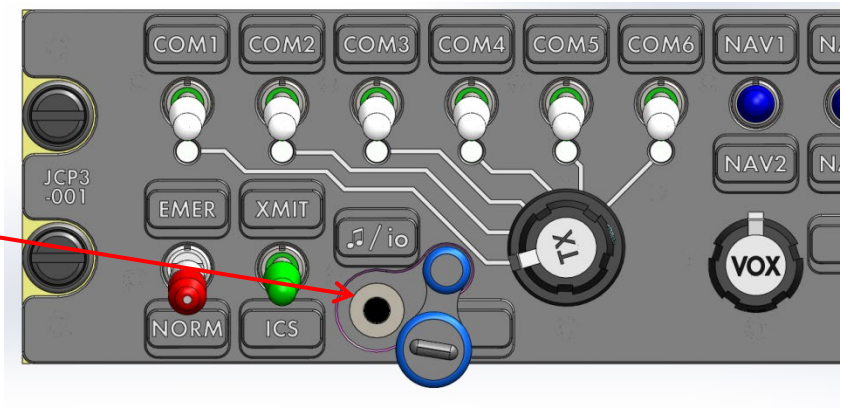
Cabling option 2: (Configuration without Alert Audio file loading)

Quantity	Description	JAC Part #
1	USB A Male to RS232 3.5mm Plug Cable	CAB-USB-0006

2.5.2 ProCS™ Setup

The JRAC-090 menu items 'ProCS Setup' provide setup drawings showing the cabling arrangements for connecting the JRAC-090 to a computer to allow configuration using ProCS™, and to allow control of an attached JRAC-090 (see also section 2.6 – Virtual Control panel).

The JRAC-090 is typically configured via the J4 connector, but if the JRAC-090 is installed in a system with a Jupiter Avionics Corporation JCPx-xxx Control Panel, the JRAC-090 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-090 is connected.

2.5.3 JRAC-090 ProCS Connection

Selecting COM ports:

JRAC-090 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.

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.

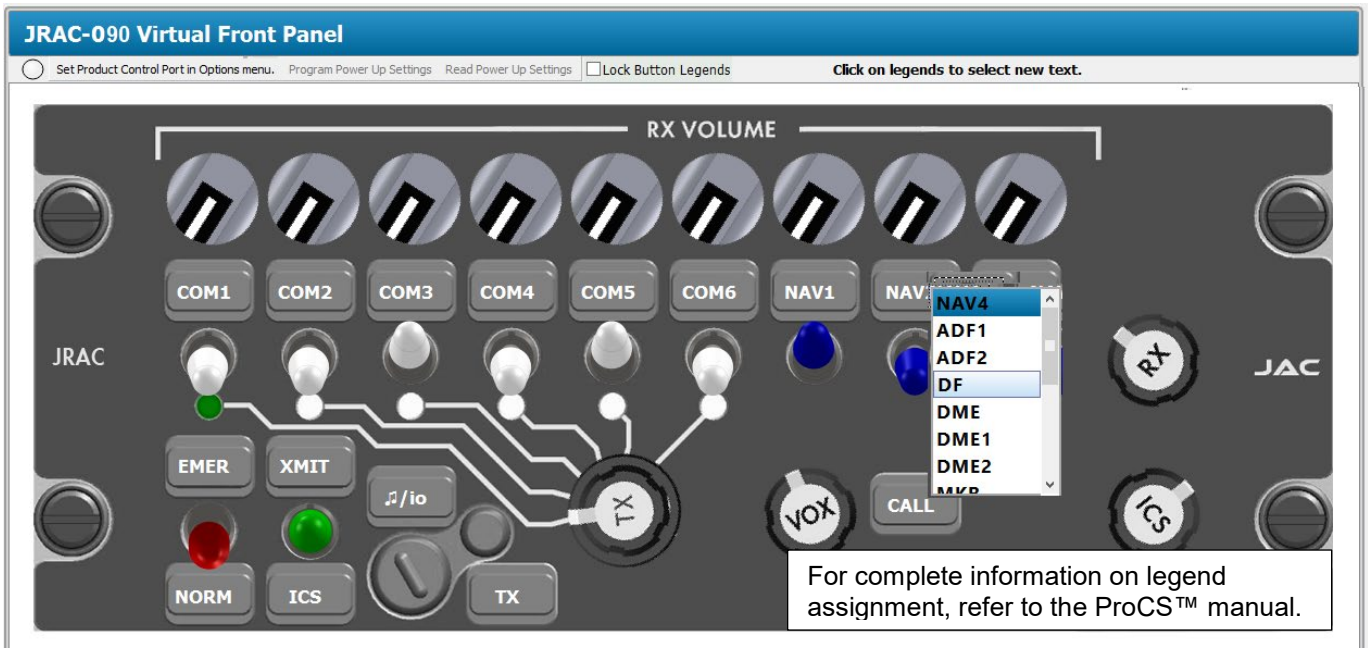
The Product Control COM Port is also set from this window.

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:

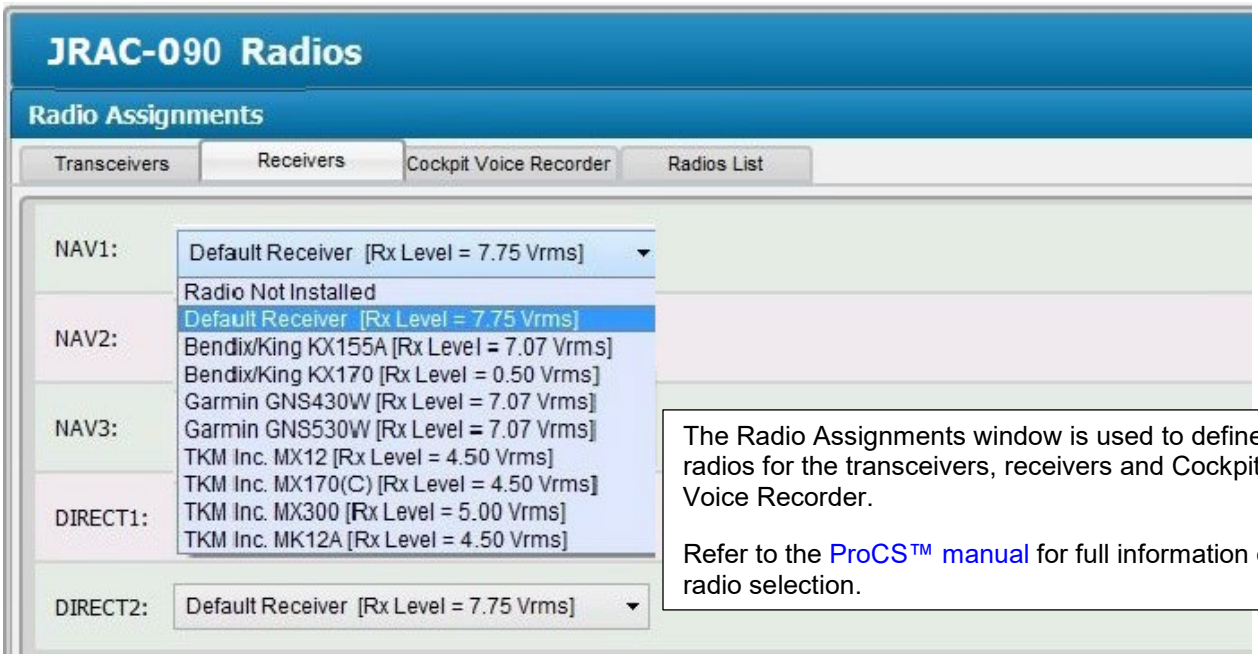
2.5.4.1 JRAC-090 Virtual Front Panel



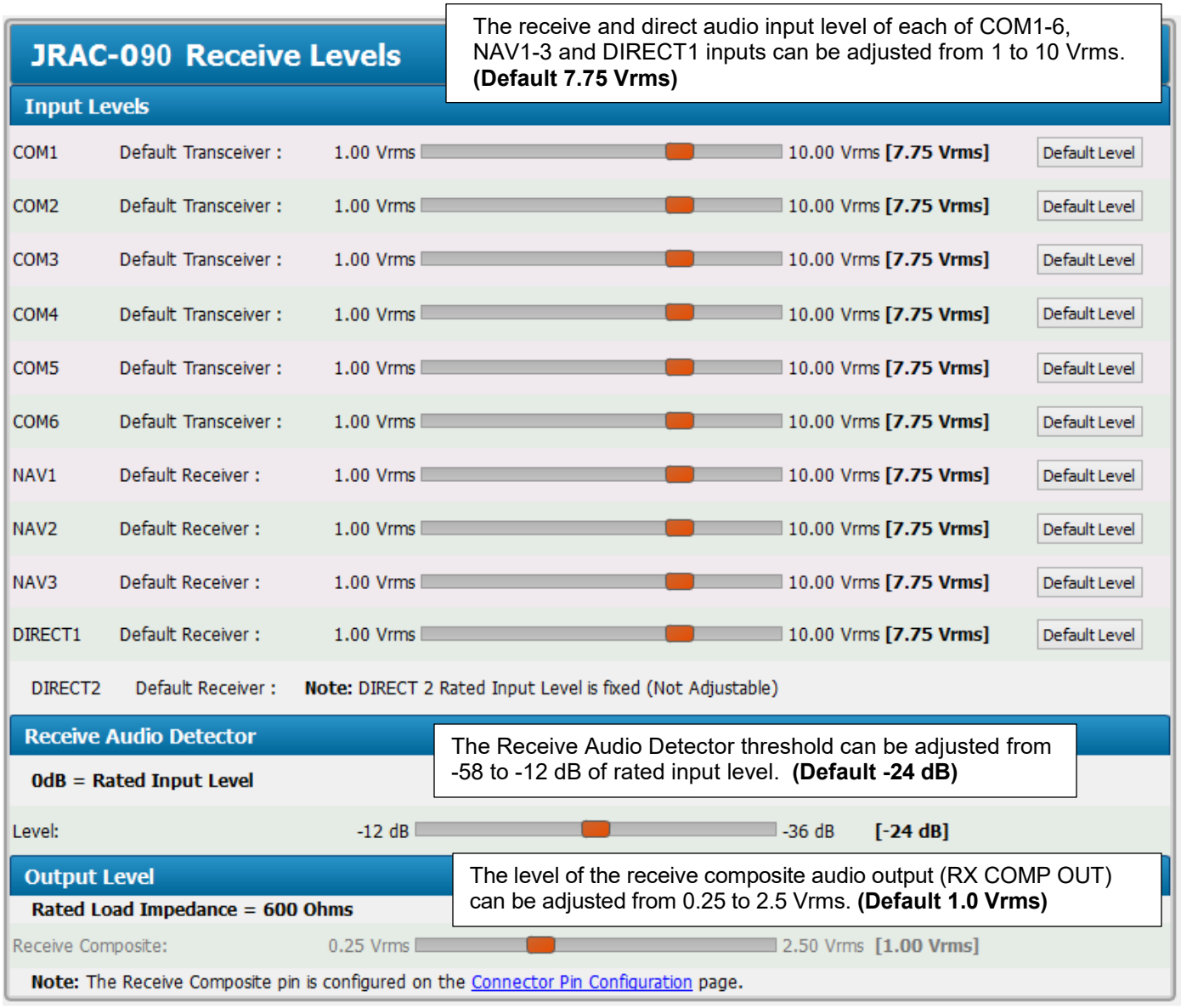
This Virtual Front Panel is used to define the 'names' associated with the control legends. The selected name will be used in all subsequent references to the associated transceiver/receiver, and will be used on the custom-generated Connector Maps and Interconnects. Also see section 2.6 (Virtual Control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

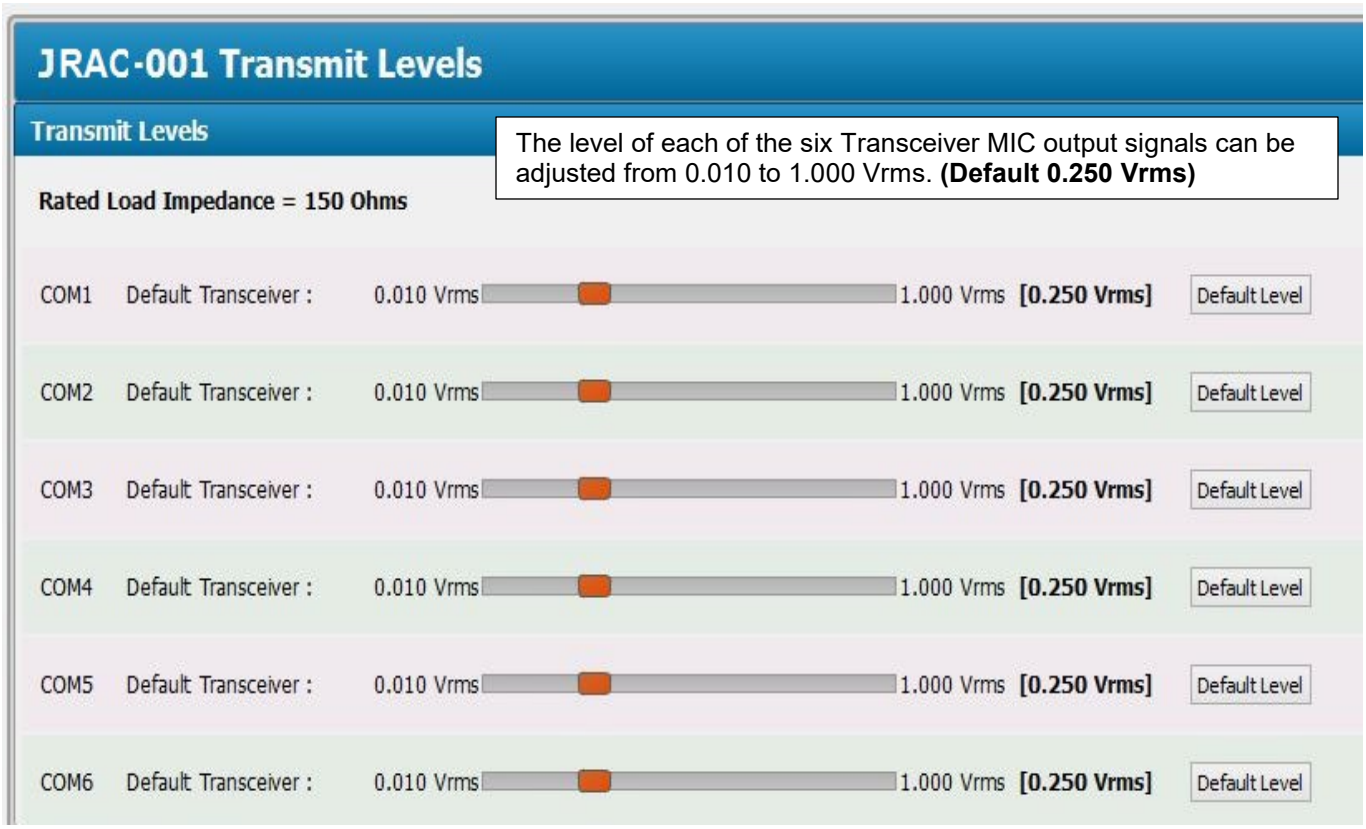
2.5.4.2 JRAC-090 Radios



2.5.4.3 JRAC-090 Receive Levels



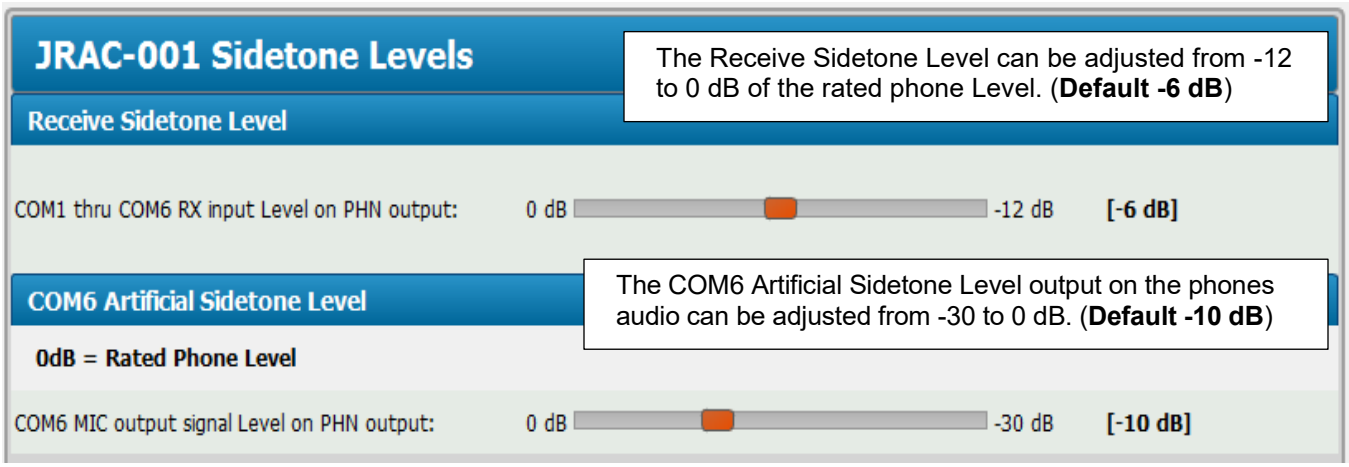
2.5.4.4 JRAC-090 Transmit Levels



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)

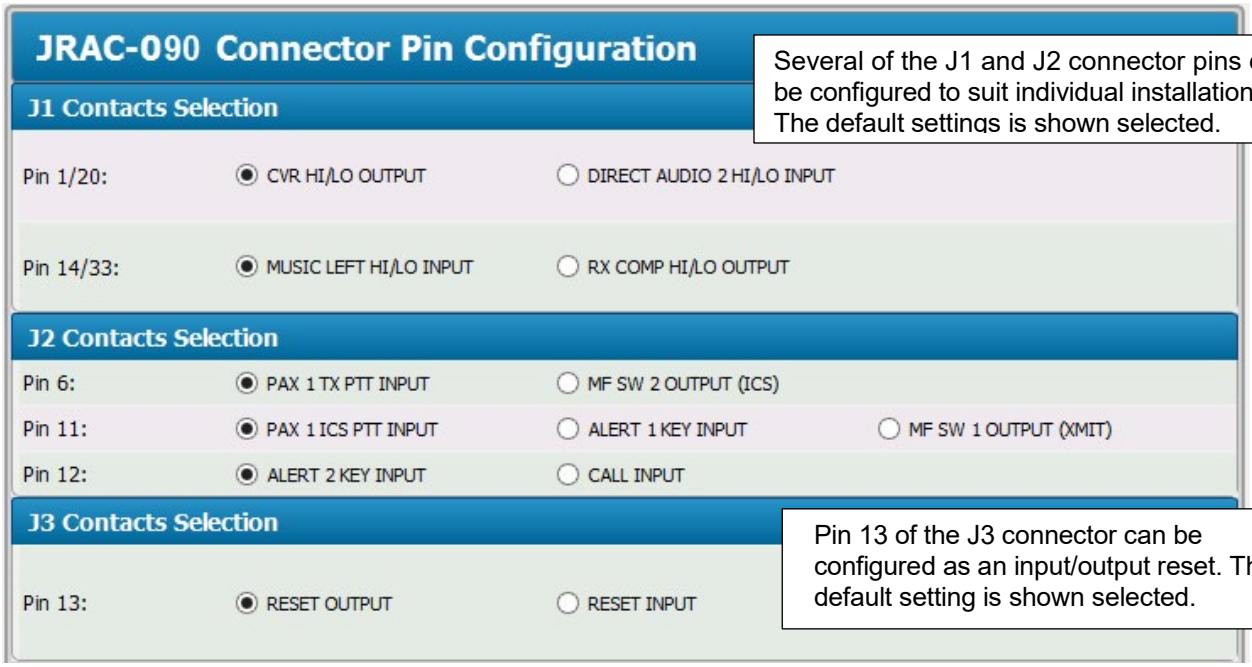
2.5.4.5 JRAC-090 Sidetone Levels



2.5.4.6 JRAC-090 Connector Pin Configuration

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

Refer to JRAC-090 Interconnect sheets 5 and 6.



J3 Contacts selection - Pin 13 Reset

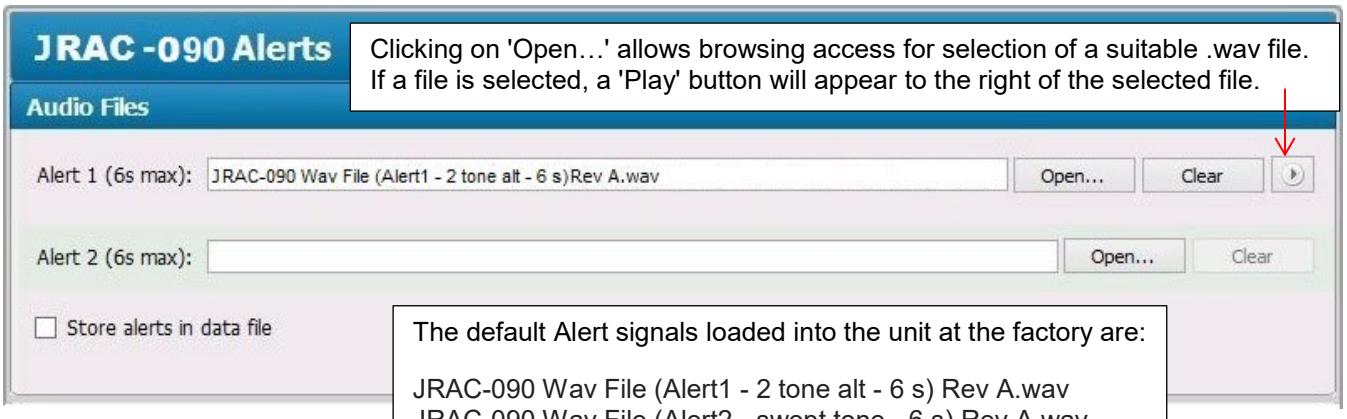
If Pin 13 is selected as Reset Input, it can be wired to accept an external reset signal.

If Pin 13 is selected as Reset Output, if communication from the control panel is lost the Reset Output signal is activated to reset the control panel.

2.5.4.7 JRAC-090 Alerts

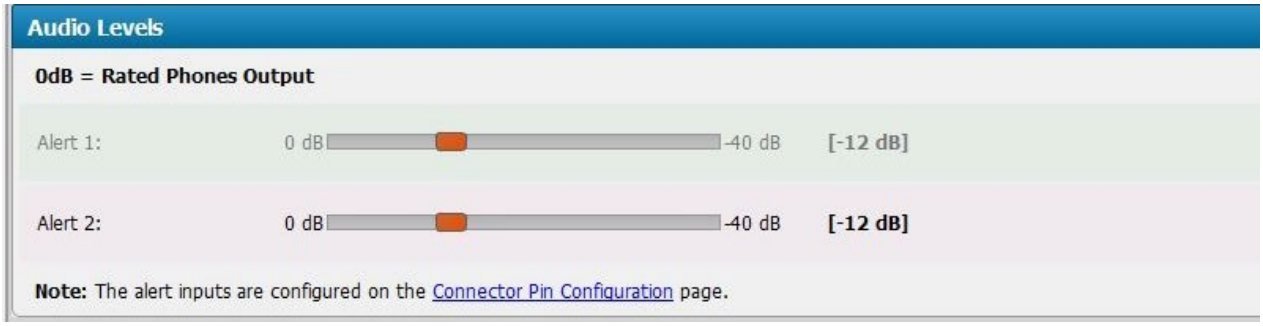
WARNING: **The internal audio alerts are intended only to supplement, NOT replace, airframe alerts such as 'low rotor RPM', 'engine out' or 'decision height alerting'. The alert audio feature is intended for use as a secondary alerting system where another device provides the primary annunciation.**

The JRAC-090 has standard audio signals for each of the two alerts, and the audio files window allows these signals to be customized with other recordings during the configuration process.



Audio Levels

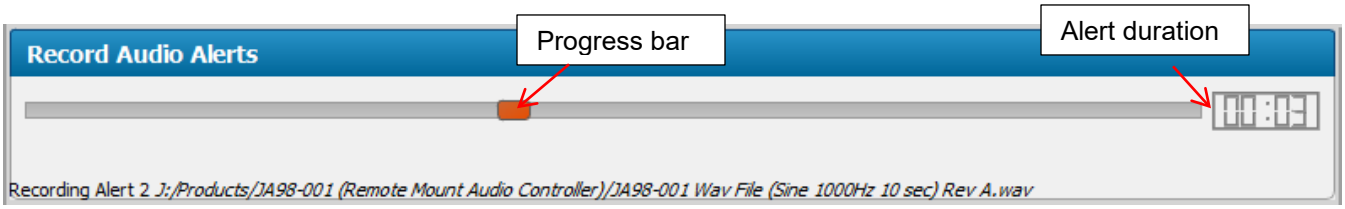
The levels of the two Alert Audio signals are individually adjustable from -40 to 0 dB of the rated phone level. (**Default -12 dB**)

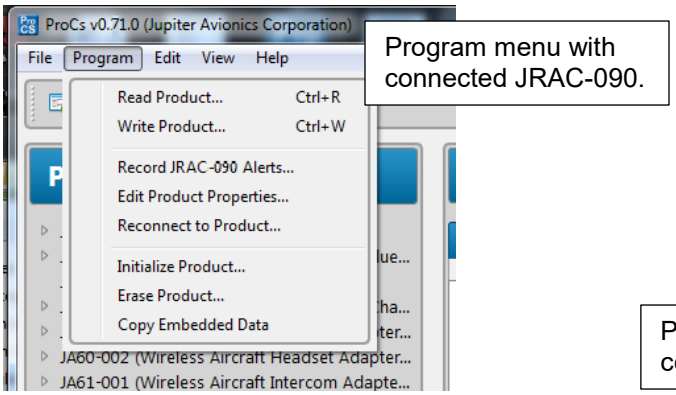


Record Audio Alerts

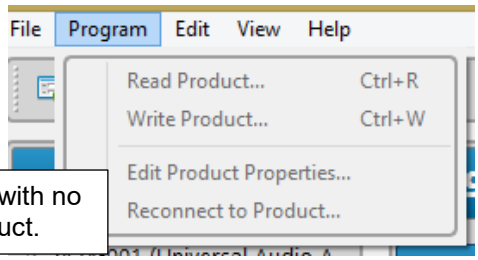
When a JRAC-090 is connected to ProCS™ a Record Audio Alerts window will be available.

If 'Record JRAC-090 Alerts …' is selected from the Program menu, a red bar will show the progress of the recording, and the meter to the right of the bar will show the duration of the alert.





Program menu with connected JRAC-090.



Program menu with no connected product.

2.5.4.8 JRAC-090 Audio Muting (During Transmit)

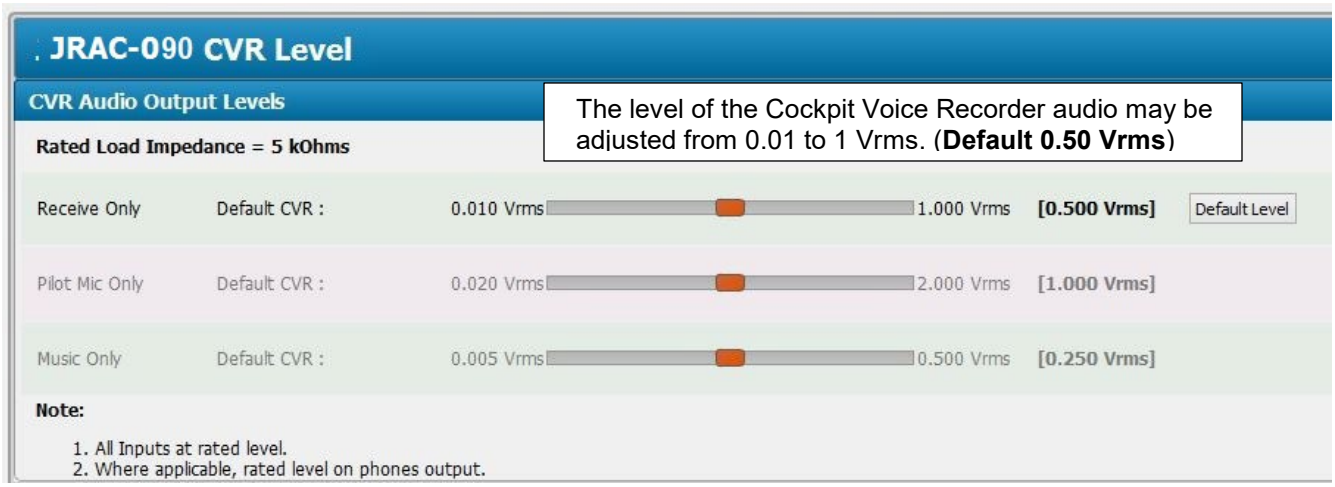
When the Mute RX Audio check box is checked the Receive Audio is muted during transmit (**Default checked**)

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

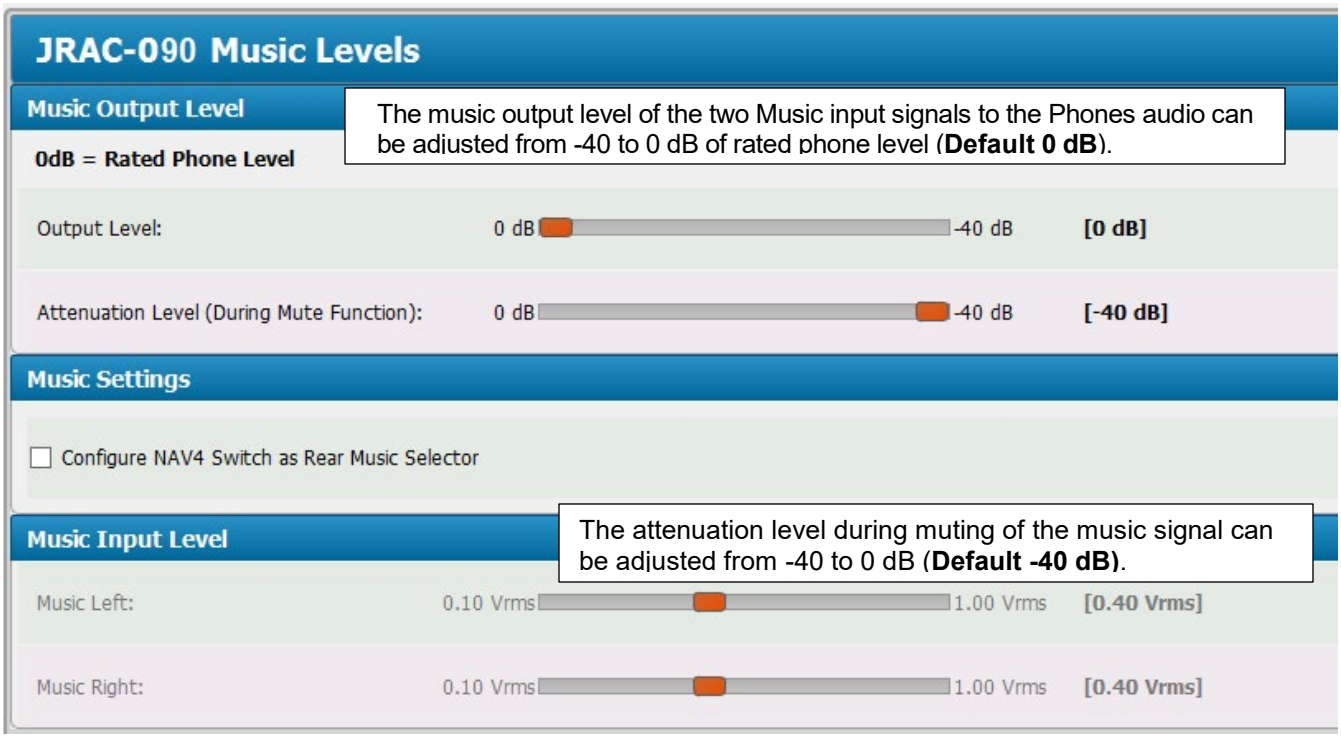
When the Mute Alert Audio check box is checked the Alert Audio is muted during transmit (**Default not checked**)

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

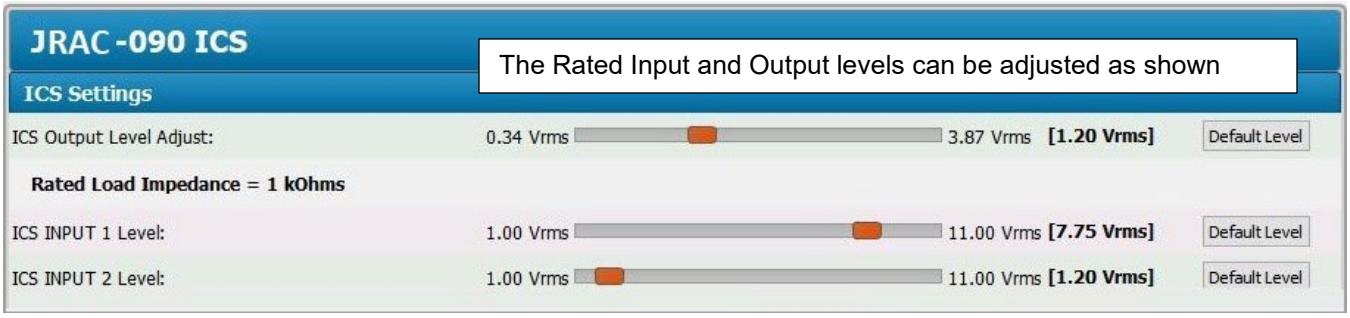
2.5.4.9 JRAC-090 CVR Level



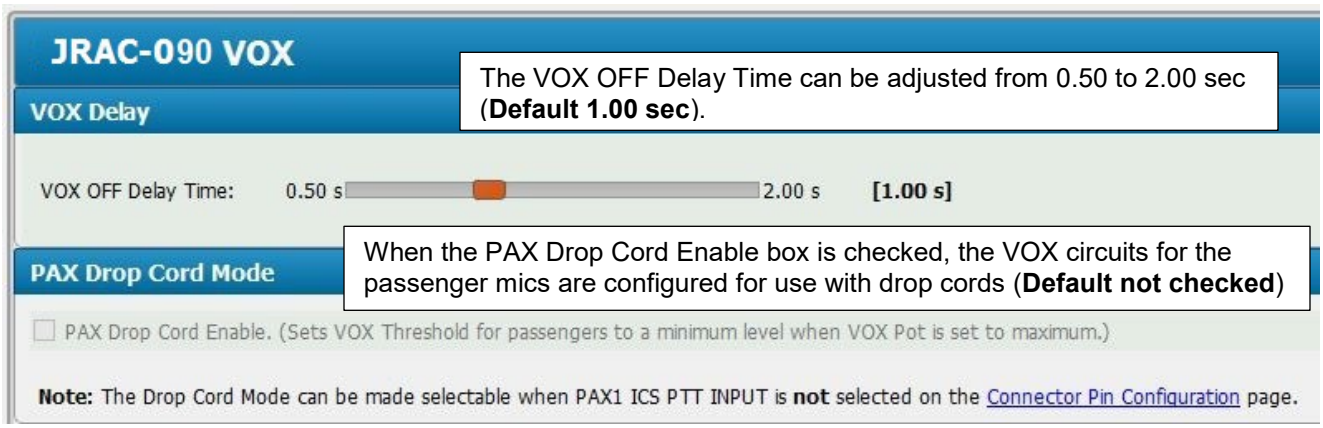
2.5.4.10 JRAC-090 Music Levels



2.5.4.11 JRAC-090 ICS Tie Line

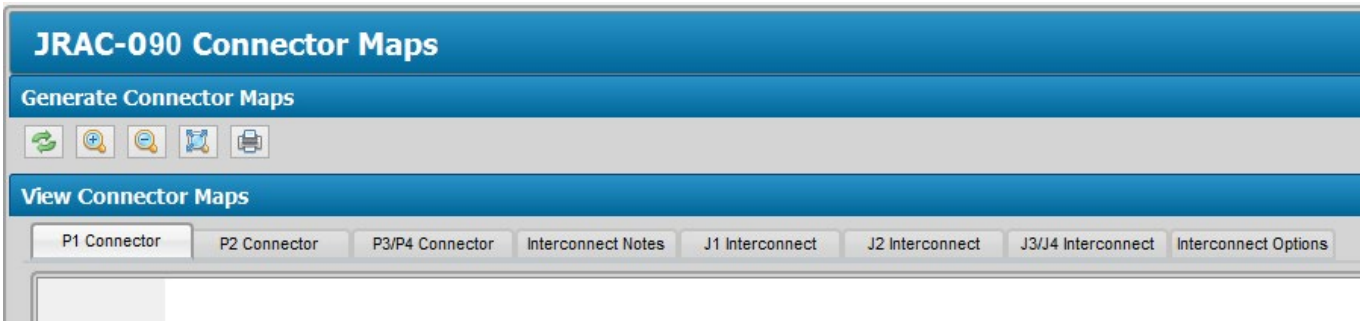


2.5.4.12 JRAC-090 VOX



2.5.4.13 JRAC-090 Connector Maps

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



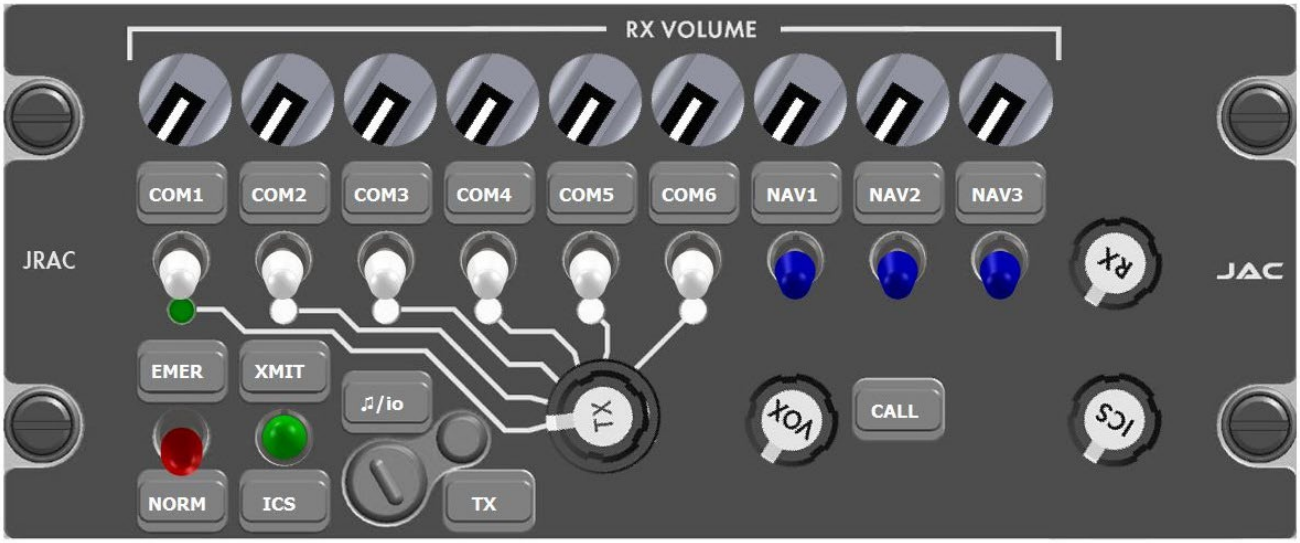
2.5.5 Other Configuration Features

In the JRAC-090 Product Information Window, the model number, serial number, MOD status and check sum of the JRAC-090 audio panel can be stored and viewed.

2.6 Virtual Control Panel

The Virtual Control Panel for the JRAC-090 is a computer application that is part of the ProCS™. The JRAC-090 Virtual Front Panel can be used to temporarily select and control an attached JRAC-090. The Virtual Control Panel communicates with the JRAC-090 via the Product Control Serial Port (see section 2.5.2). Control data is sent to the JRAC-090 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

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 XMIT/ICS selection

The XMIT/ICS selection control is a two position centre-off that acts as the pilot's 'Press-to-talk' (PTT) button. The unit will transmit on the selected transceiver when the switch is in the 'up' position, and when in the 'down' position, it will transmit on the intercom.

2.6.1.6 XMIT/ICS 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.

2.6.1.7 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.

2.6.1.8 CALL Annunciator

This annunciator is activated by an external switch.

When enabled, it will illuminate when a ground is applied to the CALL input from another user's audio controller or by a remote 'call' button within the aircraft.

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-090. 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-090.

The JRAC-090 is a remotely mounted audio controller. The operator controls the functions of the JRAC-090 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-090 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-090 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. When the configuration setting Mute RX Audio is enabled, the receive audio is muted during transmit.

3.2.2 Transmit Operation

The control device determines which transceiver is selected for transmit. When the user'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 Inputs 1 & 2 from other audio controllers.

The JRAC-090 shall output to the ICS OUTPUT HI / LO the sum of all MIC audio inputs which have corresponding ICS KEY inputs active and those MIC audio inputs with levels greater than the VOX Threshold level.

The ICS audio is muted during transmit (if selected via ProCS – see section 2.5.4.8).

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.

3.2.8 Alert Operation

WARNING: **The internal audio alerts are intended only to supplement, NOT replace, airframe alerts such as 'low rotor RPM', 'engine out' or 'decision height alerting'. The alert audio feature is intended for use as a secondary alerting system where another device provides the primary annunciation.**

At the time of installation/configuration, two alert audio waveforms can be selected. Each alert can have a duration of up to 8 seconds.

If an alert is triggered, the appropriate alert will play continuously in the selected operator headphones until the alert event ceases. The alerts may be muted during transmission, unless transmitting and muting of alert audio during transmit is disabled.

Note: The ALERT ENABLE input is normally connected to the alert power in the aircraft and is used to disable the alert tones during engine start-up.

3.3 Emergency Operation Mode

The JRAC-090 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-090 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-090, 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-090 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.

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Installation and Operating Manual

Appendix A - Installation Drawings

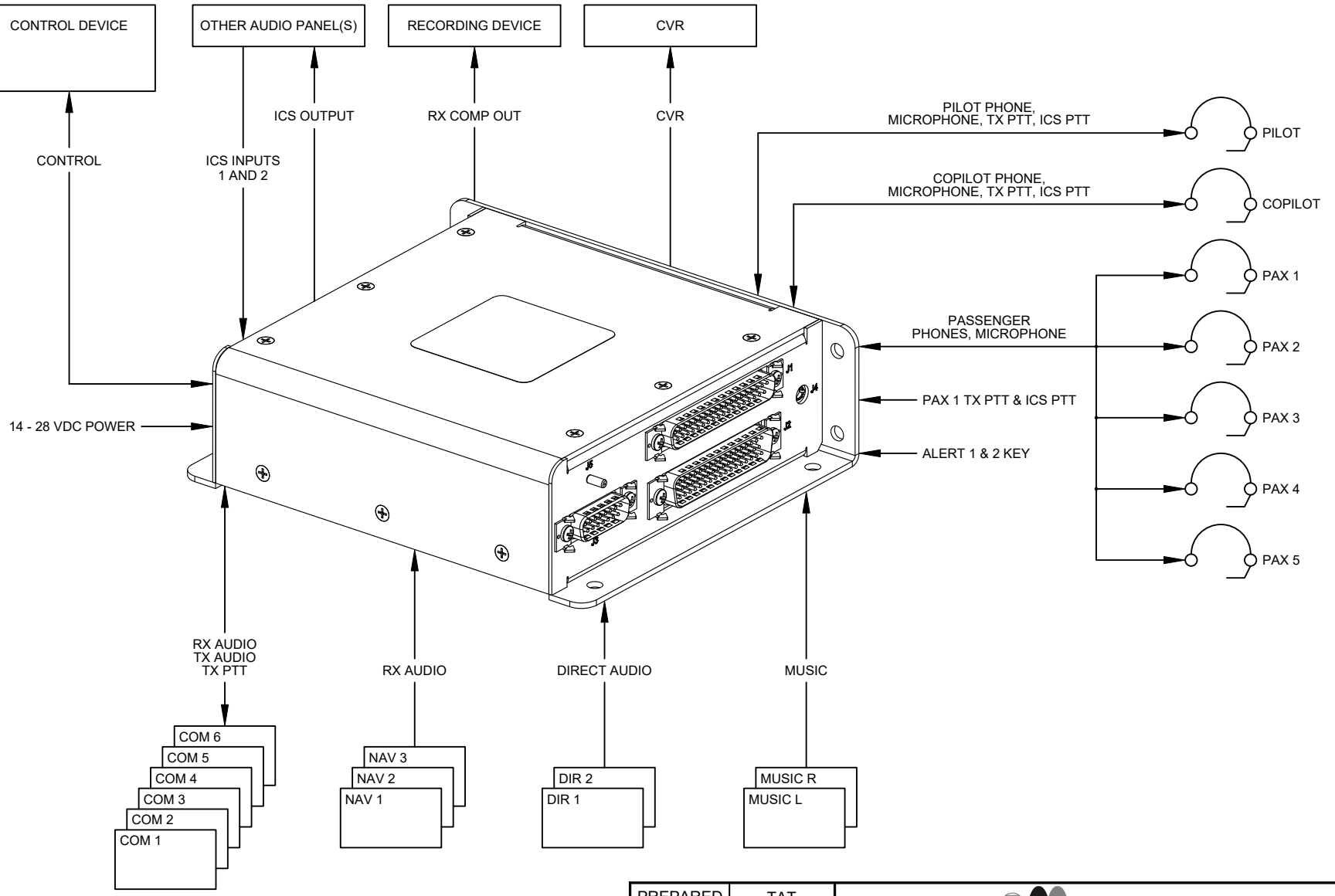
A1 Introduction

The drawings necessary for installation and troubleshooting of the JRAC-090 Remote Audio Controller 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-090 Equipment Block Diagram	A
JRAC-090 Connector Map	A
JRAC-090 Interconnect	A
JRAC-090 Mechanical Installation	A



PREPARED	TAT
CHECKED	
APPROVED	
CONFIDENTIAL & PROPRIETARY TO JUPITER AVIONICS CORP.	

JUPITER AVIONICS CORPORATION

TITLE
Remote Audio Controller - Dual ICS Input
Equipment Block Diagram

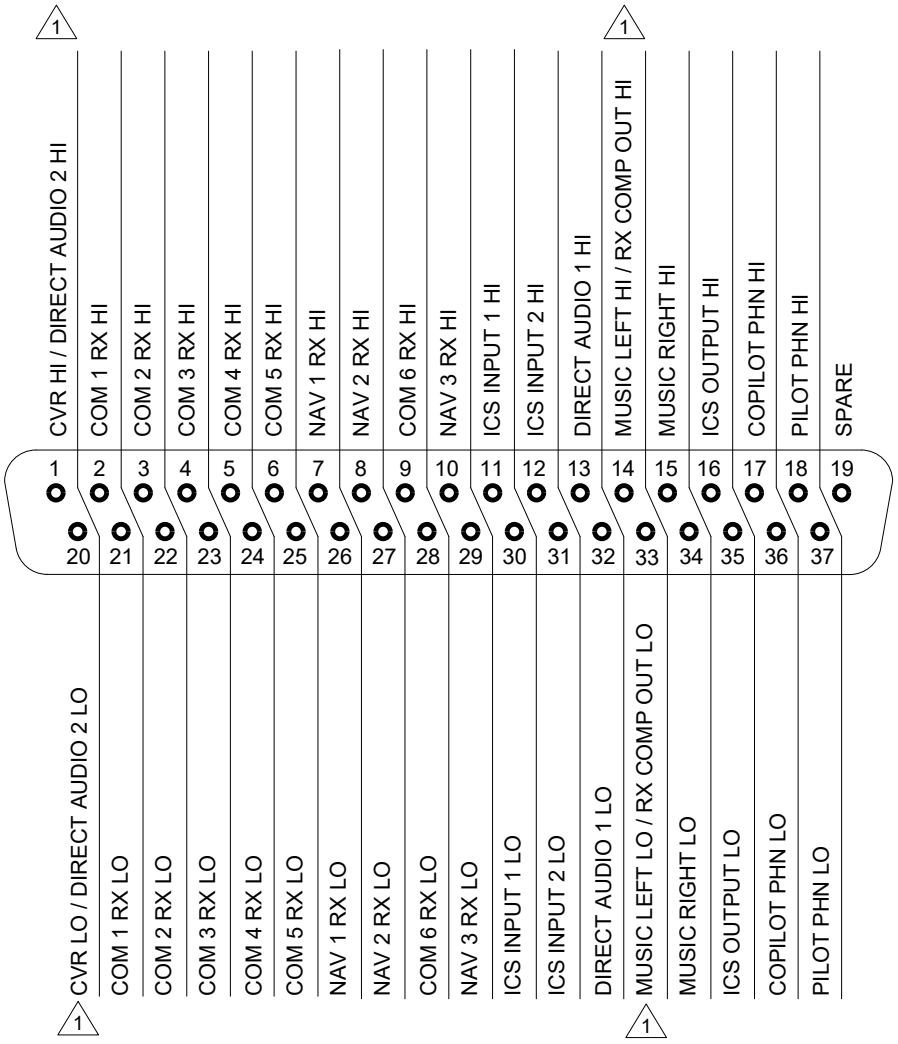
NCAGE CODE	PART NO.	SHEET
L00N3	JRAC-090	1/1

DOC NO.
JRAC-090 Equipment Block Diagram Rev A.dwg

RECEIVE CONNECTOR

P1

37 PIN FEMALE DMIN
MATING CONNECTOR



VIEW IS FROM REAR OF MATING CONNECTOR

NOTE:

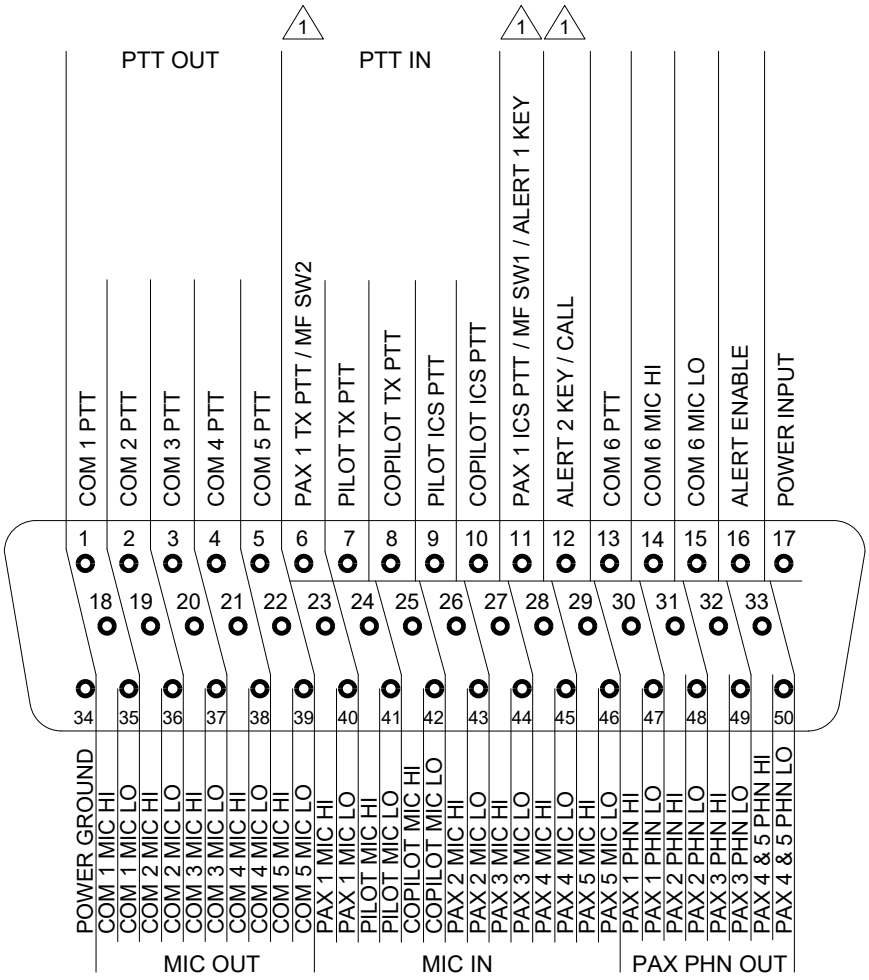
1 CONFIGURABLE CONTACT

PREPARED	TAT	JUPITER AVIONICS CORPORATION		
CHECKED	JAC 03-14-24 AH	TITLE: Remote Audio Controller - Dual ICS Input P1 Connector Map		
APPROVED	JAC 05-22-24 KDV	NCAGE CODE: L00N3	PART NO.: JRAC-090	SHEET: 1/3
CONFIDENTIAL & PROPRIETARY TO JUPITER AVIONICS CORP.		DOC NO.: JRAC-090 Connector Map Rev A.dwg		

TRANSMIT CONNECTOR

P2

50 PIN FEMALE DMIN
MATING CONNECTOR



VIEW IS FROM REAR OF MATING CONNECTOR

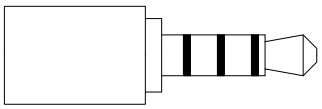
PREPARED	TAT	JUPITER AVIONICS CORPORATION		
CHECKED	JAC 03-14-24 AH	TITLE: Remote Audio Controller - Dual ICS Input P2 Connector Map		
APPROVED	JAC 05-22-24 KDV	NCAGE CODE: L00N3	PART NO.: JRAC-090	SHEET: 2/3
CONFIDENTIAL & PROPRIETARY TO JUPITER AVIONICS CORP.		DOC NO.: JRAC-090 Connector Map Rev A.dwg		

CONFIGURATION CONNECTOR

P4

ACCEPTS THE FOLLOWING PLUG FORMATS

JA99 CONFIGURATION CABLE
4 POLE MALE 3.5MM STEREO



MATING PLUG NAMES

TIP: TX DATA
1ST RING: RX DATA
2ND RING: GROUND
3RD RING: CONFIG AUDIO

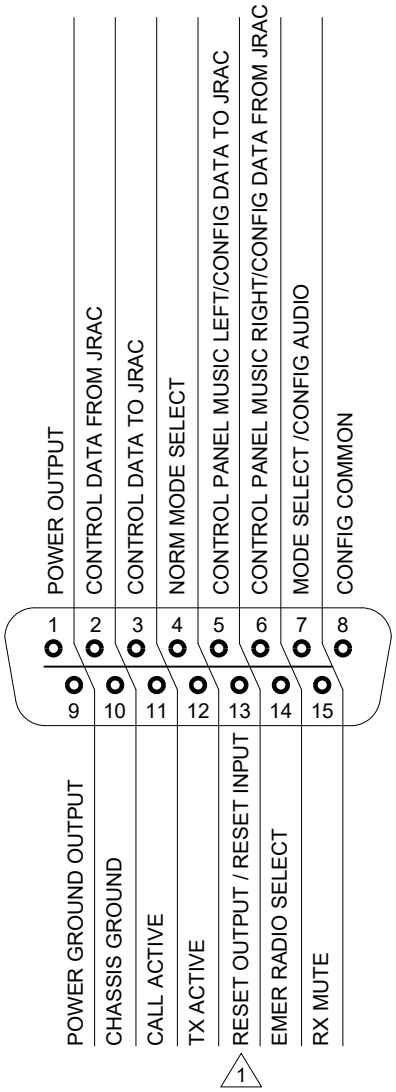
JRAC SIGNAL NAMES

CONFIG DATA TO JRAC
CONFIG DATA FROM JRAC
CONFIG COMMON
MODE SELECT / CONFIG AUDIO

CONTROL CONNECTOR

P3

15 PIN FEMALE DMIN
MATING CONNECTOR



PREPARED	TAT	JUPITER AVIONICS CORPORATION		
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APPROVED	JAC 05-22-24 KDV	NCAGE CODE: L00N3	PART NO.: JRAC-090	SHEET: 3/3
CONFIDENTIAL & PROPRIETARY TO JUPITER AVIONICS CORP.		DOC NO.: JRAC-090 Connector Map Rev A.dwg		

JRAC-090 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 GROUND PIN TO MUTE ALL RECEIVE AUDIO EXCEPT FROM THE TRANSCEIVER SELECTED TO TRANSMIT.

△10 CALL ACTIVE J3 PIN 11 OUTPUTS A GROUND WHEN THE CALL J2 PIN 12 IS ACTIVATED. OUTPUT IS OPEN COLLECTOR.

△11 MOMENTARILY GROUND PIN TO RESET REMOTE AUDIO CONTROLLER

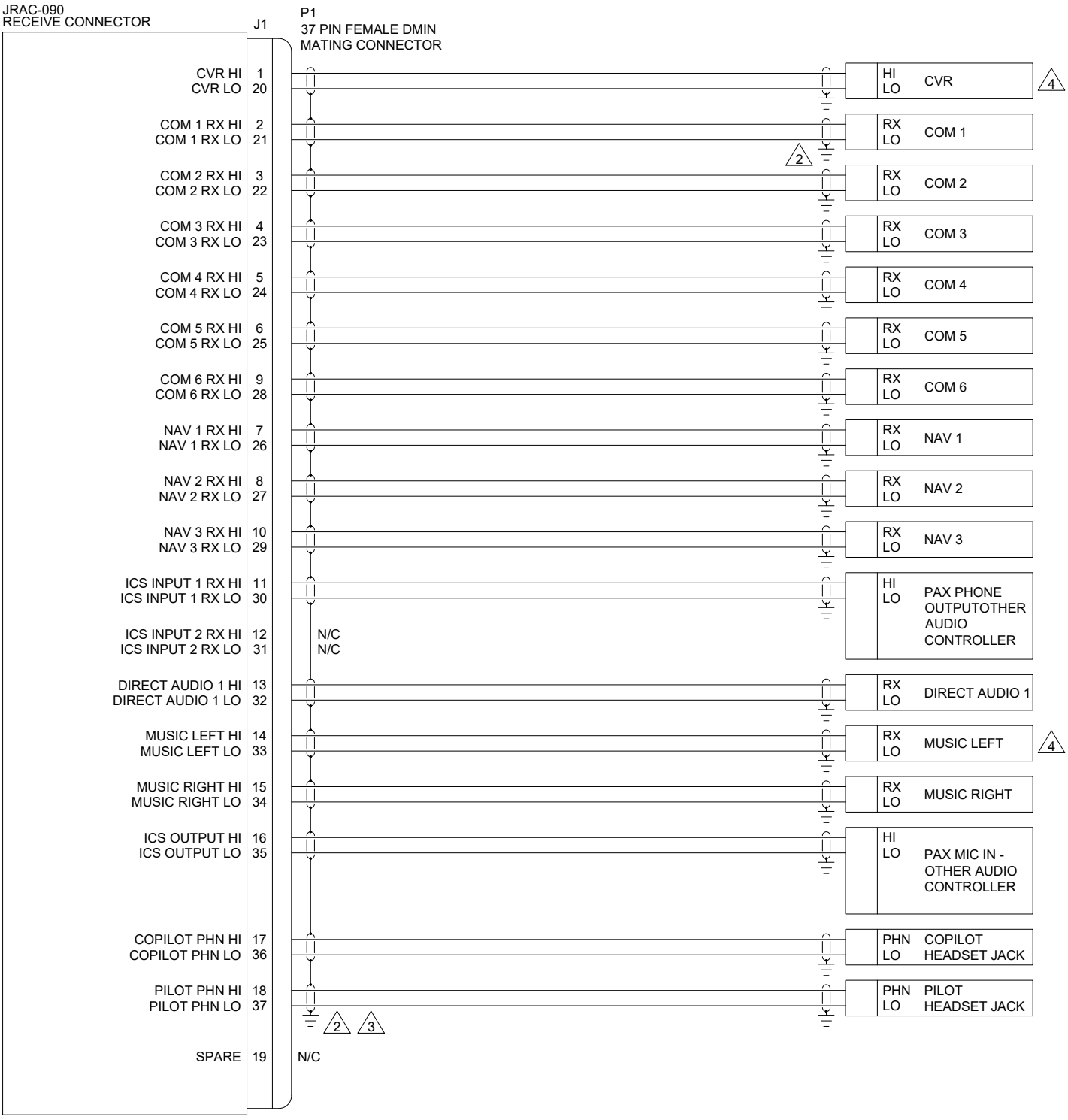
△12 THE CONTROL PANEL MUSIC LEFT & RIGHT SOURCE AND THE DIRECT AUDIO 2 SOURCE SHALL NOT BE CONNECTED TO ANY OTHER AUDIO INPUT.

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 03-14-24 AH	TITLE: Remote Audio Controller - Dual ICS Input Interconnect Notes	
APPROVED	JAC 05-22-24 KDV	NCAGE CODE: L00N3	PART NO.: JRAC-090 / SHEET: 1/6
CONFIDENTIAL & PROPRIETARY TO JUPITER AVIONICS CORP.		DOC NO.: JRAC-090 Interconnect Rev A.dwg	



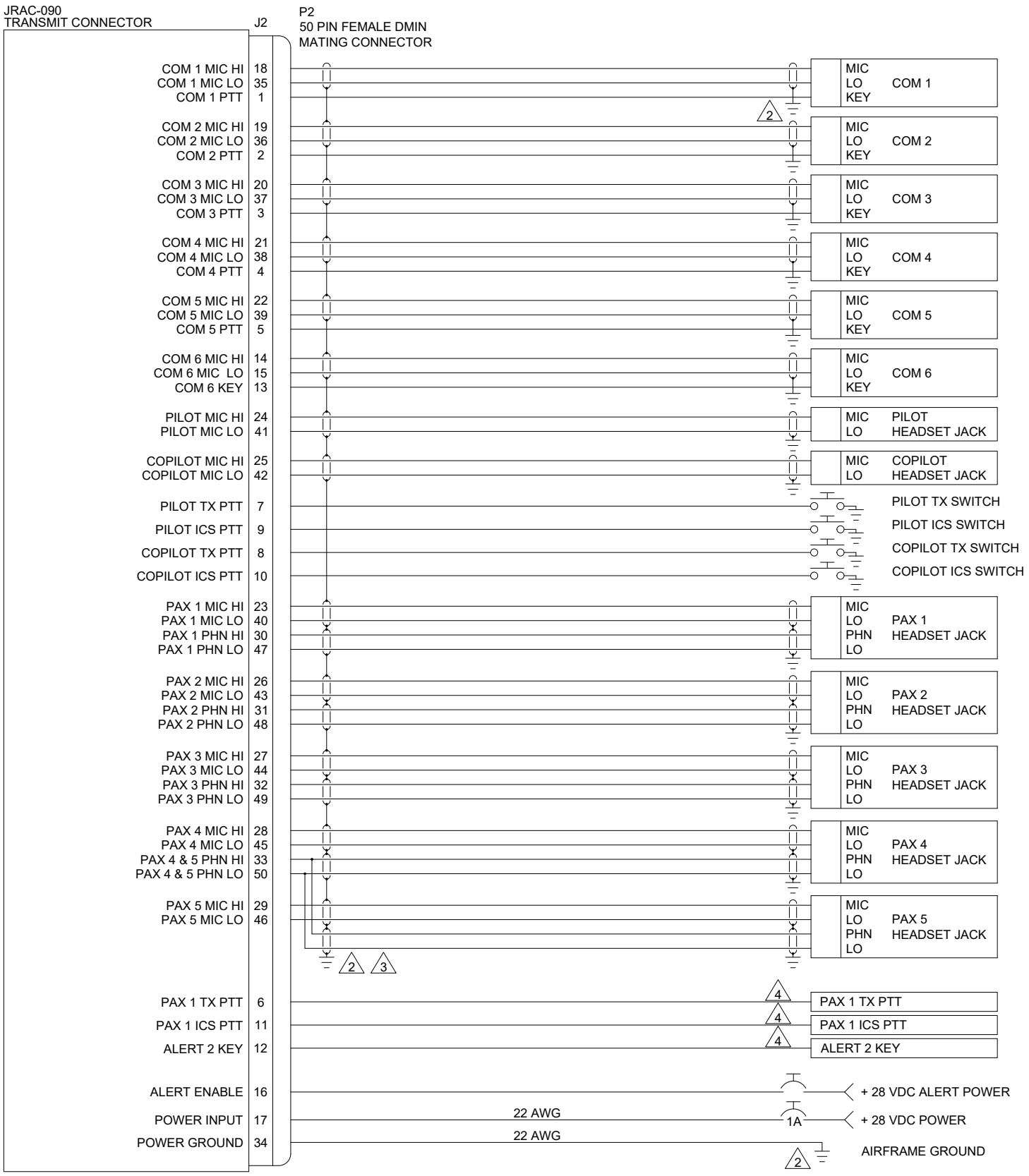
PREPARED	TAT
CHECKED	JAC 03-14-24 AH
APPROVED	JAC 05-22-24 KDV
CONFIDENTIAL & PROPRIETARY TO JUPITER AVIONICS CORP.	

JUPITER AVIONICS CORPORATION

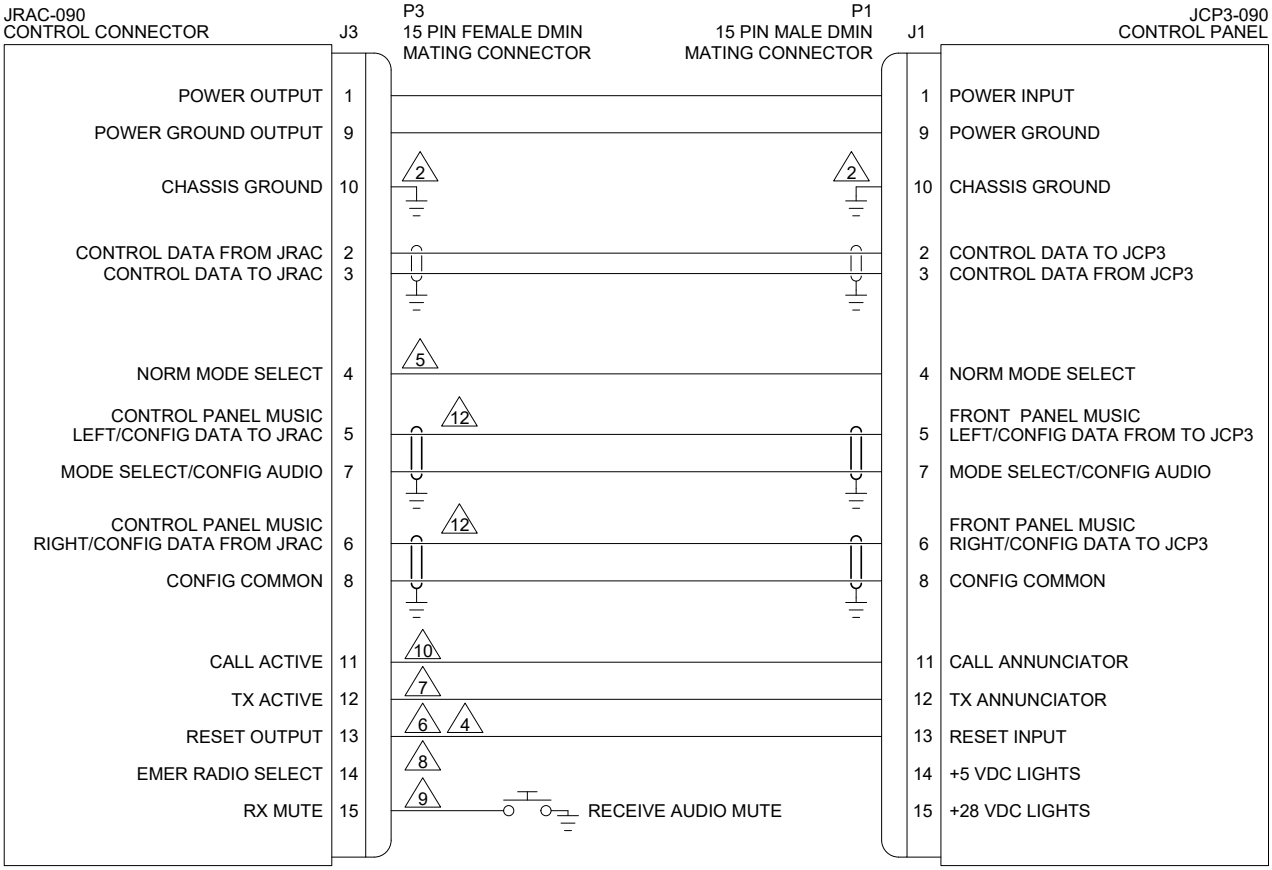
TITLE
Remote Audio Controller - Dual ICS Input
J1 Interconnect

NCAGE CODE	PART NO.	SHEET
L00N3	JRAC-090	2/6

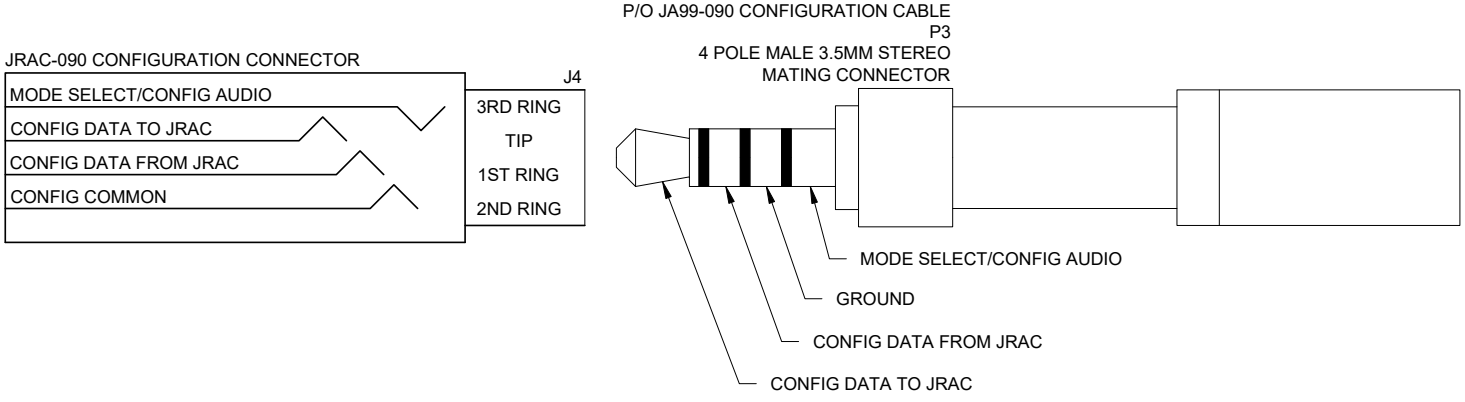
DOC NO.
JRAC-090 Interconnect Rev A.dwg



PREPARED	TAT	JUPITER AVIONICS CORPORATION
CHECKED	JAC 03-14-24 AH	TITLE: Remote Audio Controller - Dual ICS Input J2 Interconnect
APPROVED	JAC 05-22-24 KDV	NCAGE CODE: L00N3 / PART NO.: JRAC-090 / SHEET: 3/6
CONFIDENTIAL & PROPRIETARY TO JUPITER AVIONICS CORP.		DOC NO.: JRAC-090 Interconnect Rev A.dwg

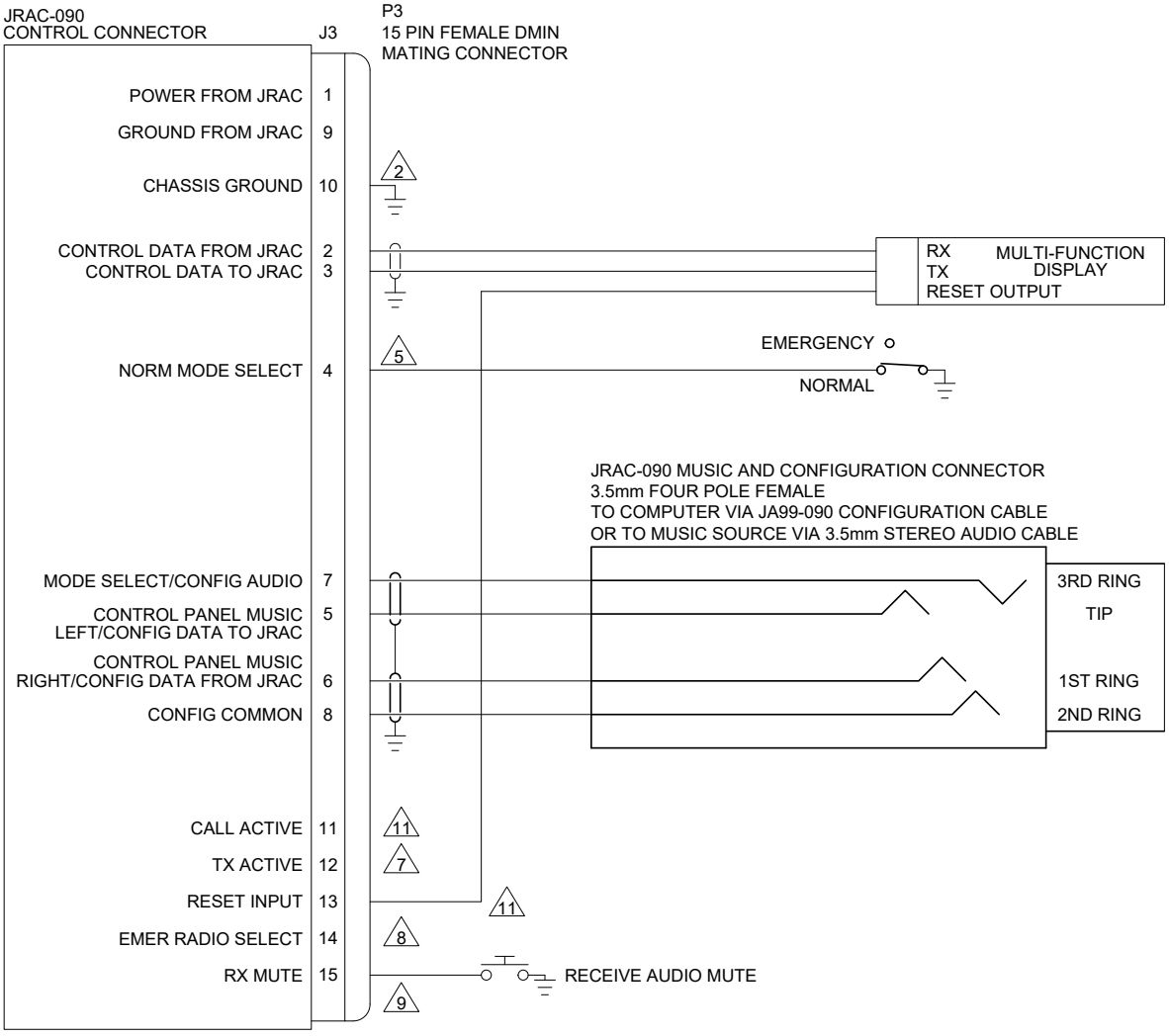


CONFIGURATION FROM ProCS APPLICATION VIA JA99-090 CABLE

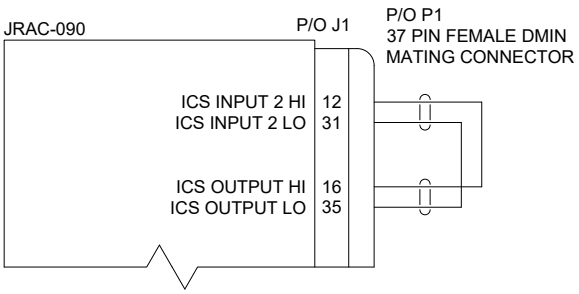


PREPARED	TAT	JUPITER AVIONICS CORPORATION	
CHECKED	JAC 03-14-24 AH	TITLE: Remote Audio Controller - Dual ICS Input J3 and J4 Interconnect	
APPROVED	JAC 05-22-24 KDV	NCAGE CODE: L00N3	PART NO.: JRAC-090 / SHEET: 4/6
CONFIDENTIAL & PROPRIETARY TO JUPITER AVIONICS CORP.		DOC NO.: JRAC-090 Interconnect Rev A.dwg	

OPTION: MULTI-FUNCTION DISPLAY CONTROL

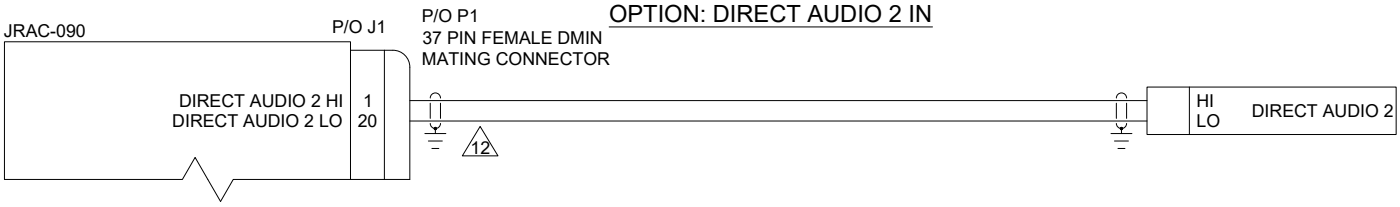


OPTION: ICS LOOP BACK

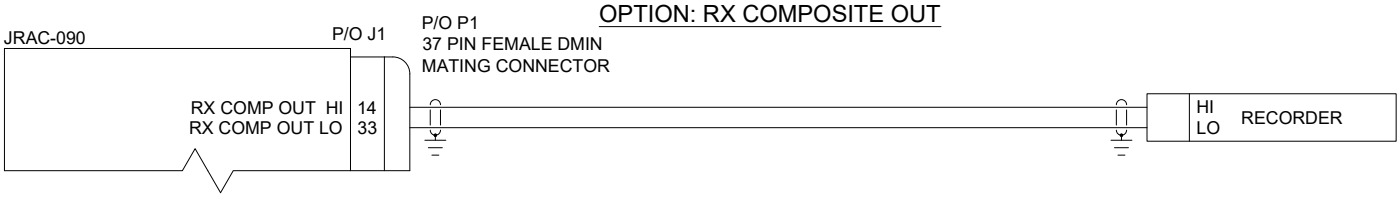


PREPARED	TAT	JUPITER AVIONICS CORPORATION
CHECKED	JAC 03-14-24 AH	TITLE: Remote Audio Controller - Dual ICS Input Interconnect Options
APPROVED	JAC 05-22-24 KDV	NCAGE CODE: L00N3 / PART NO.: JRAC-090 / SHEET: 5/6
CONFIDENTIAL & PROPRIETARY TO JUPITER AVIONICS CORP.		DOC NO.: JRAC-090 Interconnect Rev A.dwg

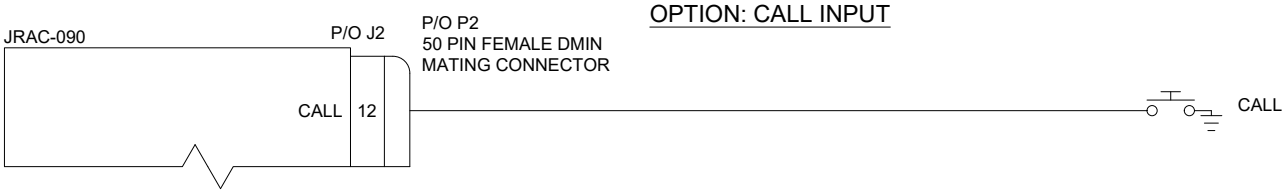
OPTION: DIRECT AUDIO 2 IN



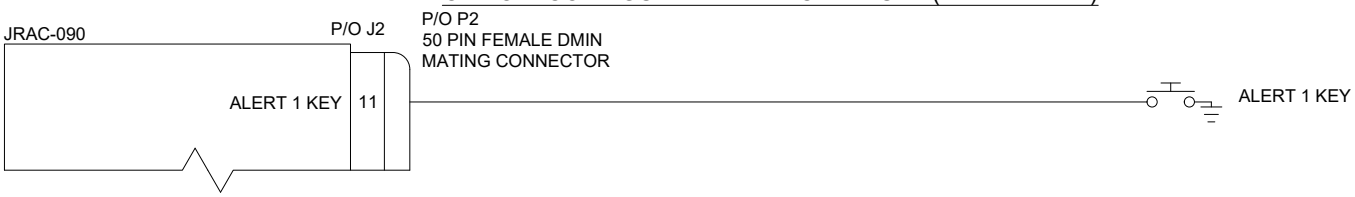
OPTION: RX COMPOSITE OUT



OPTION: CALL INPUT

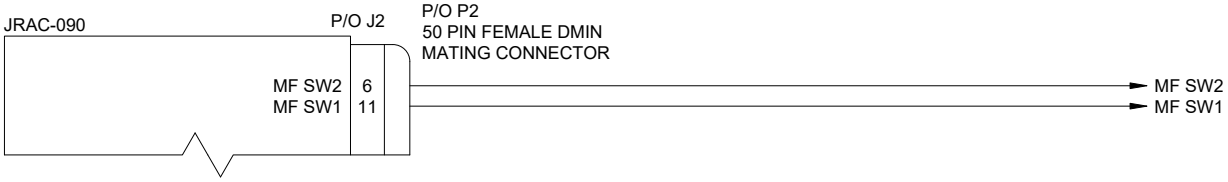


OPTION: CONFIGURABLE SWITCH INPUTS (ALERT 1 KEY)

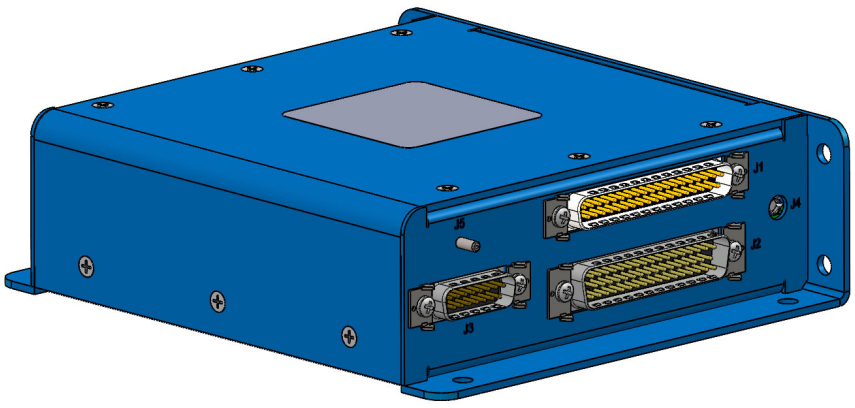


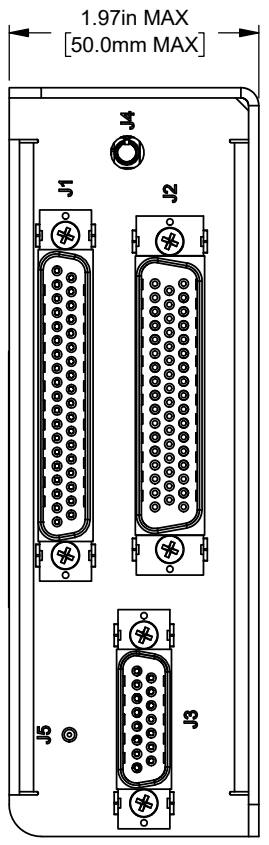
OPTION: CHASSIS GROUND

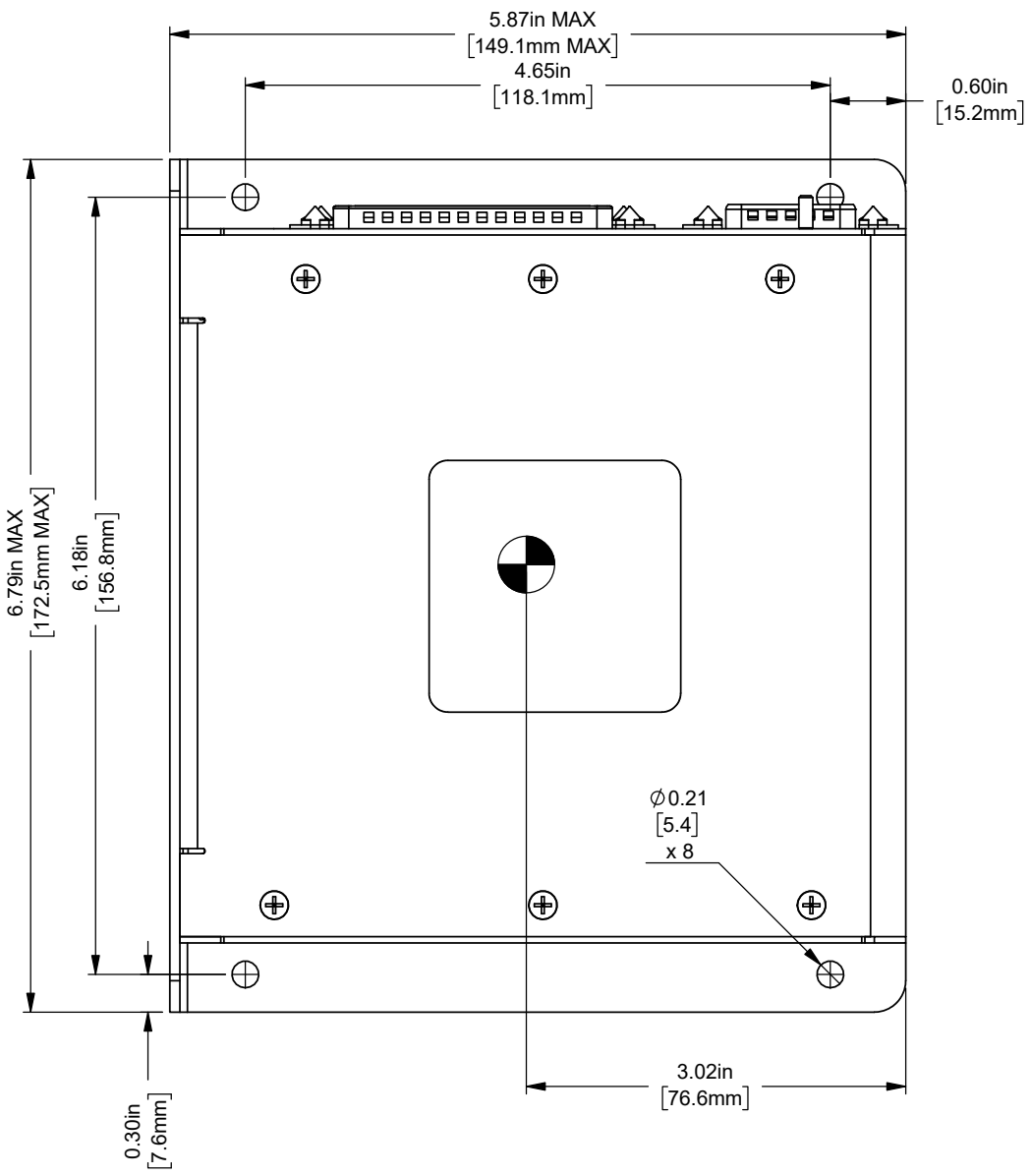
OPTION: MULTI-FUNCTION SWITCH OUTPUTS

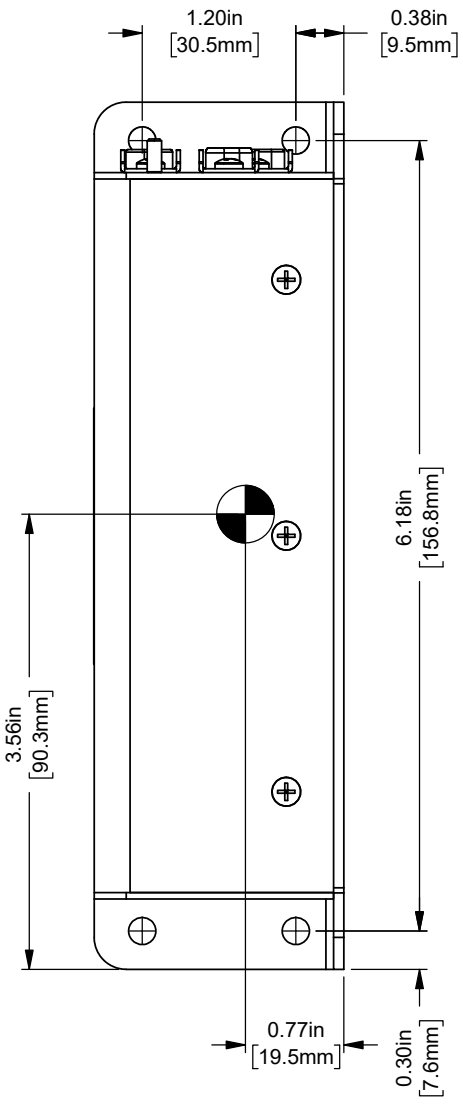


PREPARED	TAT	JUPITER AVIONICS CORPORATION	
CHECKED	JAC 03-14-24 AH	TITLE: Remote Audio Controller - Dual ICS Input Interconnect Options	
APPROVED	JAC 05-22-24 KDV	NCAGE CODE: L00N3	PART NO.: JRAC-090 / SHEET: 6/6
CONFIDENTIAL & PROPRIETARY TO JUPITER AVIONICS CORP.		DOC NO.: JRAC-090 Interconnect Rev A.dwg	









CENTER OF GRAVITY
±0.03in [0.8mm]

WEIGHT: 1.94 lbs [0.88 kg] MAX.

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES ANGLES ARE IN DEGREES TOLERANCES: 1 DEC PLACE: ± 0.1 2 DEC PLACE: ± 0.01 3 DEC PLACE: ± 0.005 ANGLES: ± 0.5 DEG	PREPARED	TAT
	CHECKED	JAC 03-05-24 TAT
	APPROVED	JAC 05-22-24 KDV
MATERIAL: N/A	CONFIDENTIAL & PROPRIETARY TO JUPITER AVIONICS CORP.	
FINISH: N/A	DRAWING NOT TO SCALE	

JUPITER AVIONICS CORPORATION

TITLE: Remote Audio Controller - Dual ICS Input

NCAGE CODE	PART NO.	SHEET
L00N3	JRAC-090	1/1

DOC. NO.
JRAC-090 Mechanical Installation Rev A.SLDDRW

Installation and Operating Manual

Appendix B - Certification Documents

B1 Airworthiness Approval

Airworthiness approval of the JRAC-090 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-090 Remote Audio Controller. 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-090 Remote Audio Controller in [aircraft location].

The JRAC-090 is approved to CAN-TSO-C139. The JRAC-090 meets RTCA DO-160G environmental qualifications for this installation. See Section 1 of the JRAC-090 Installation Manual.

Installed in accordance with the JRAC-090 Installation Manual, Revision [ ], and AC 43.13-2, Chapters 2, and 3.

The JRAC-090 interfaces with existing aircraft radios per the Installation Manual instructions.

The JRAC-090 Installation Manual provides detailed installation instructions and wiring diagrams (Section 2, and Appendices A and B).

Power is supplied to the JRAC-090 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-090 Remote Audio Controller is "on condition" only. Refer to the JRAC-090 Maintenance Manual. Periodic maintenance of the JRAC-090 is not required.

The following sample Instructions for Continued Airworthiness (ICA) provides assistance in preparing ICA for the Jupiter Avionics JRAC-090 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-090 Remote Audio Controller 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-090 installed in an [aircraft make and model].

Applicability: Applies to a Jupiter Avionics JRAC-090 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-090 Installation and Operating Manual
JRAC-090 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-090 Remote Audio Controller 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-090 Operating Manual.

4. Servicing Information

N/A

5. Maintenance Instructions

Maintenance of the JRAC-090 is 'on condition' only. Periodic maintenance is not required. Refer to the JRAC-090 Maintenance Manual.

6. Troubleshooting Information

Refer to the JRAC-090 Maintenance Manual.

7. Removal and Replacement Information

Refer to Section 2 of this manual - the JRAC-090 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-090 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-090 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-090 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

B3 Environmental Qualification Form

See next pages.

Prepared:	Checked:	Approved:
KV	JAC 05-22-24 KDV	JAC 10-23-24 MQS

Nomenclature	Remote Audio Controller – Dual ICS Input
Type/Model/ Part No.:	JRAC-090
TSO No.:	CAN-TSO-C139
Manufacturer's Build Configuration:	*JRAC-090 Build Configuration Rev A*
Manufacturer's Test Report:	*JRAC-001 Test Report (Qualification - Final) Rev A*[1] *JRAC-090 CAN-TSO Design Change Assessment Rev A*[2]
Manufacturer's Specification and/or Other Applicable Specification:	*JRAC-090 Derivative Declaration of Design and Performance Rev A*
Manufacturer:	Jupiter Avionics Corporation
Address:	1959 Kirschner Road, Kelowna, BC, Canada, V1Y 4N7
Revision & Change No of DO-160:	Rev. G dated December 8, 2010
Dates Tested:	2016 July 26 to 2017 Jan 31

CONDITIONS	SECTION	DESCRIPTION OF TESTS CONDUCTED
Temperature	4.5	Equipment tested to Category C4
Ground Survival Low Temperature	4.5.1	Equipment tested to Category C4 (-55 °C)
Short-Time Operating Low Temperature	4.5.1	Equipment tested to Category C4 (-45 °C)
Operating Low Temperature	4.5.2	Equipment tested to Category C4 (-45 °C)
Ground Survival High Temperature	4.5.3	Equipment tested to Category C4 (+85 °C)
Short-Time Operating High Temperature	4.5.3	Equipment tested to Category C4 (+70 °C)
Operating High Temperature	4.5.4	Equipment tested to Category C4 (+70 °C)
In-Flight Loss of Cooling	4.5.5	Equipment identified as Category X, no test performed
Altitude	4.6	Equipment tested to Category (A1)(D1)
Altitude	4.6.1	Equipment tested to Category D1 (55,000 ft)
Decompression	4.6.2	Equipment tested to Category A1 (8,000 to 55,000 ft)
Overpressure	4.6.3	Equipment tested to Category A1 (-15,000 ft)
Temperature Variation	5.0	Equipment tested to Category B (5 °C/min)
Humidity	6.0	Equipment tested to Category A (48 hours)
Operational Shock and Crash Safety	7.0	
Operational Shock	7.2.1	Equipment identified as Category B (6 g for 11 ms)
Crash Safety (impulse)	7.3.1	Equipment tested to Category B (20 g for 11 ms)
Crash Safety (sustained)	7.3.3	Equipment tested to Category B (20 g for 3 sec)
Vibration[3]	8.0	Equipment tested to Categories:
Fixed Wing - Sine	8.5.1	SM
Fixed Wing - Random	8.5.2	SB
Helicopter - Random, unknown	8.8.3	U2FF1

CONDITIONS	SECTION	DESCRIPTION OF TESTS CONDUCTED
Explosive Atmosphere	9.0	Equipment identified as Category X, no test performed
Waterproofness	10.0	Equipment identified as Category X, no test performed
Fluids Susceptibility	11.0	Equipment identified as Category X, no test performed
Sand and Dust	12.0	Equipment identified as Category X, no test performed
Fungus	13.0	Equipment identified as Category X, no test performed
Salt Fog Test	14.0	Equipment identified as Category X, no test performed
Magnetic Effect	15.0	Equipment tested to Category Z (≤ 0.3 m)
Power Input DC Equipment DC Current Ripple DC Inrush	16.0	Equipment tested to Category: (ZXX)(BXX) Z (+28 Vdc equipment), B (+14 Vdc and + 28 Vdc equipment) X, no test performed X, no test performed
Voltage Spike	17.0	Equipment tested to Category A (600Vp, 10 us)
Audio Frequency Susceptibility	18.0	Equipment tested to Category Z (+28 Vdc equipment) Equipment tested to Category B (+14 Vdc equipment)
Induced Signal Susceptibility Magnetic Fields into Equipment Magnetic Fields into Interconnect Electric Fields into Interconnect Voltage Spikes into Interconnect	19.0 19.3.1 19.3.3 19.3.4 19.3.5	Equipment tested to Category ZCX 20 A at 400Hz 30 A·m at 400Hz 1800 V·m at 400Hz 3.0 m
Radio Frequency Susceptibility [4] Radiated Conducted	20.0	Equipment tested to Category RR R (20 V/m CW&SW) and (150 V/m PM) R (30 mA)
Radio Frequency Emission Radiated[4] Conducted	21.0	Equipment tested to Category H
Lightning Induced Transient Susceptibility Pin Injection Cable Bundle Single and Multiple Stroke[4] Cable Bundle Multiple Burst[4]	22.0	Equipment tested to Category A3J3L3 Equipment tested to Waveform Set A, Test Level 3 Equipment tested to Waveform Set J, Test Level 3 Equipment tested to Waveform Set L, Test Level 3
Lightning Direct Effects	23.0	Equipment identified as Category X, no test performed
Icing	24.0	Equipment identified as Category X, no test performed
Electrostatic Discharge	25.0	Equipment identified as Category X, no test performed
Fire, Flammability	26.0	Equipment identified as Category C.
Other Tests	N/A	N/A

REMARKS

[1] Test information can be found in Jupiter Avionics document: *JRAC-001 Test Report (Qualification - Final) Rev A*

[2] All tests were performed on the JRAC-001 Build Configuration Rev B. A similarity analysis between the two products is detailed in the Jupiter Avionics Corp. document: *JRAC-090 CAN-TSO Design Change Assessment Rev A*

[3] During exposure to vibration test conditions the following critical resonances changed frequency greater than 1.5%:

Orientation	**Initial Freq. [Hz]**	**Final Freq. [Hz]**
Longitudinal Axis, Side Mount	1245	1225
	1750	1722
Vertical Axis, Bottom Mount	770	748
	1686	1715
Lateral Axis, Side Mount	217	225

[4] Testing performed at CKC Laboratories in Bothell, WA, USA.
See report *JRAC-001 Test Report Signed (CKC Labs - DO-160G Section 20, 21, 22 - 20161107 to 10) Rev A*