

ACE-RIU



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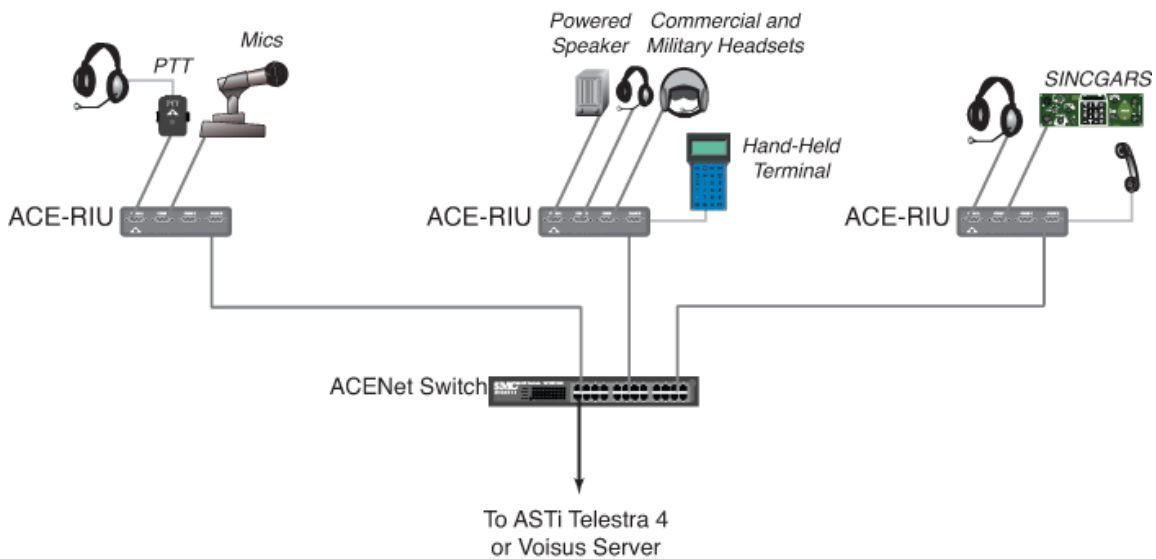
1 Introduction

The ACE-RIU is a compact 48kHz digital and audio distribution module that connects remotely located operator stations and live radios to the ACENet¹ network. The ACE-RIU is compatible with the Telestra and Voisus platforms. The ACE-RIU provides low-noise analog-digital conversion and low-latency audio distribution.

The ACE-RIU integrates PTT units, volume controls, simulated communications panels, Hand-Held Terminals, and live radios into the simulated communications environment.

1.1 Features

- (4) Digital Inputs (1 per channel, 4 channels total)
- (4) Digital Outputs (1 per channel, 4 channels total)
- (2) RS-422 serial ports



2 Physical Description

2.1 Dimensions

7.5 long x 5.55 wide x 1.55 high

¹acenet_ug.pdf

2.2 Weight

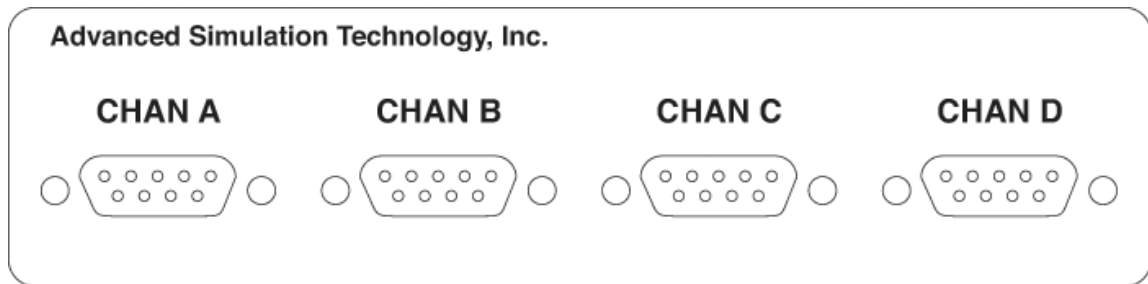
A packaged ACE-RIU weighs 1.5 lbs. The power supply included with the ACE-RIU weighs 0.5 lbs.

2.3 Installation

Allow at least 2 of space in front of and behind the module for cable access and clearance.

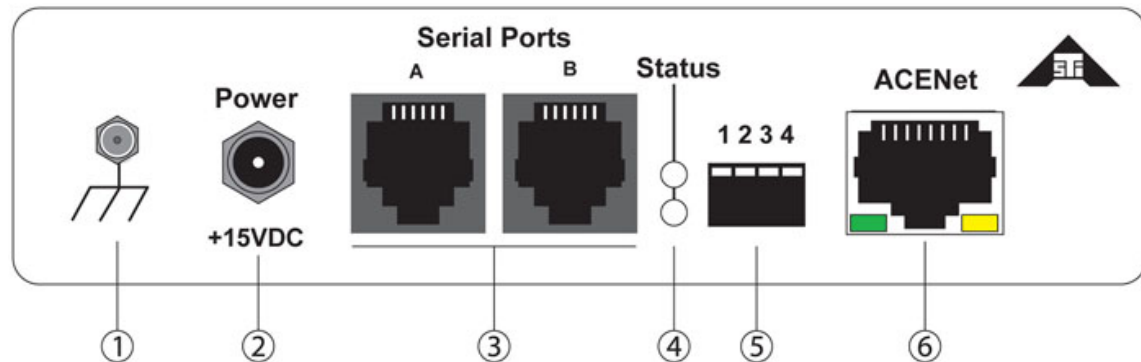
The hardware is available with a 19, 1U high rackmount kit that can hold three ACE-RIUs. See ACE-RIU Rackmounts (chapter 9) for more information.

2.4 Front Panel



The front panel features (4) DB-9 connectors that provide digital and audio input and output.

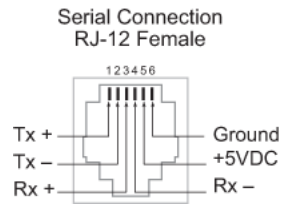
2.5 Rear Panel



1. Earth Ground
2. Power

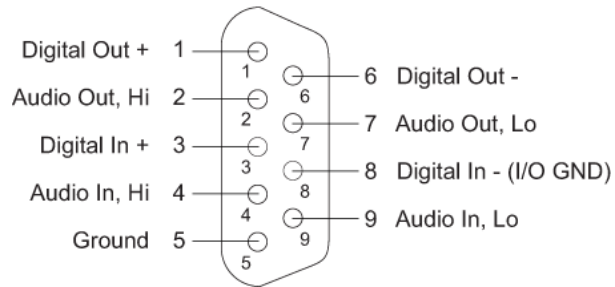
- 3. (2) RJ-12 Serial Ports
- 4. Status Indicator Lights
- 5. Dip Switches
- 6. (1) RJ-45 ACENet Connection

2.6 RJ-12 Serial Port Pinout

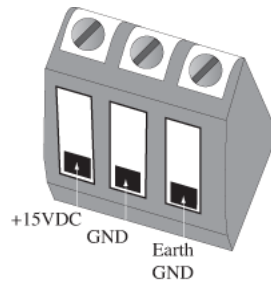


2.7 DB-9 Connector Pinout

DB-9 Connection



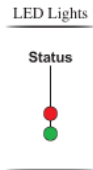
2.8 Terminal Block Pinout



2.9 Status Indicator Lights

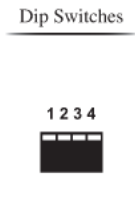
The ACE-RIU LED indicator lights display ACE-RIU status.



LED Lights	Status
Flashing Green (bottom)	Normal operation.
Solid Green (bottom)	The ACE-RIU started up properly but the ACENet connection cannot be found.
Red (top)	Internal board failure.



2.10 Dip Switch Positions

The dip switches are used to toggle between normal operation mode and firmware update mode. See Additional Information (chapter 7) for guidance regarding firmware updates.



Position	Status
	One down allows for firmware updates.
	Default position for normal operation.

3 ACENet Connection

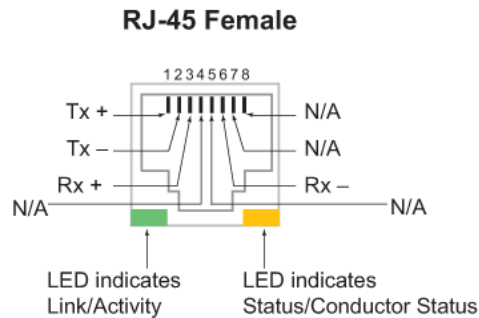
The ACE-RIUs ACENet port connects to an ACENet-compatible switch via category 5e or better cable.

Customer-made cables are the primary reason for product failure. ASTi recommends high quality, manufactured Category 5e cables.

Maximum Cable Length to ACENet Switch	
ACE-RIU	100 meters (328 feet)
Telestra or Server	100 meters (328 feet)

Alternatively, the ACE-RIU can connect directly to the Telestra or Voisus server via crossover cable. The ACE-RIU does not support daisy chaining to additional units or internal switching across networks.

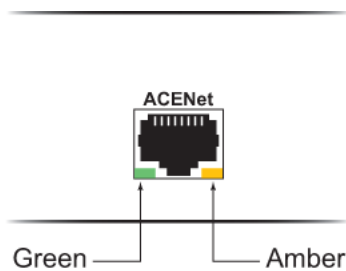
3.1 RJ-45 ACENet Connection Pinout



3.2 ACENet Indicator Lights

The ACENet LED indicator lights display the port status.

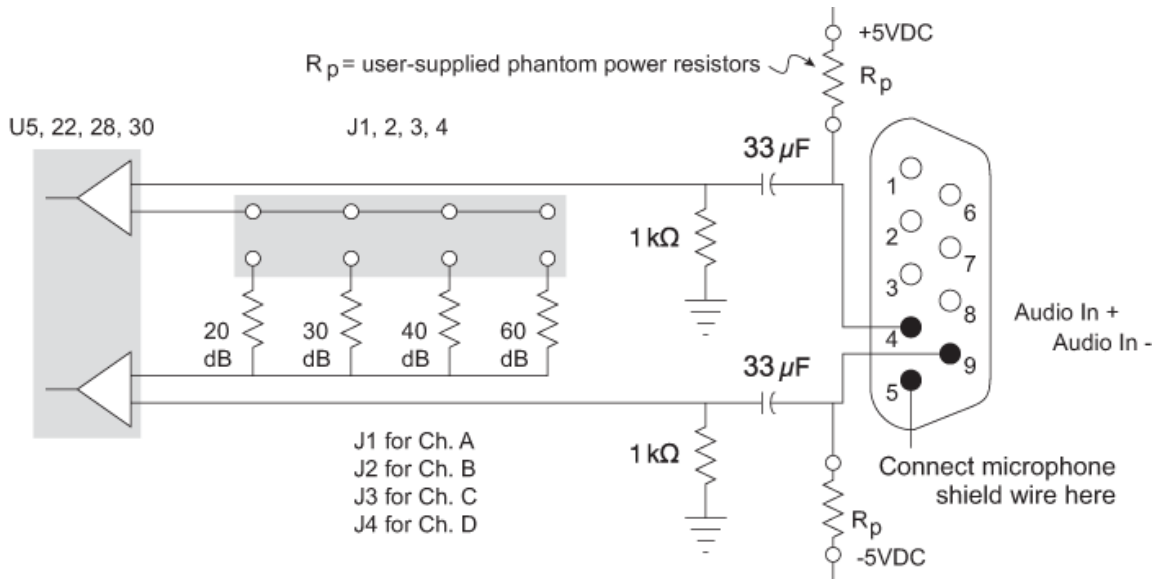
LED Light	Status	
Green	Solid Flashing	Network link. Network activity.
Amber	Solid/Flashing	One ACENet device per network will function as the ACENet master, and will be identified with a flashing amber light. All other ACENet devices should report a solid amber light.



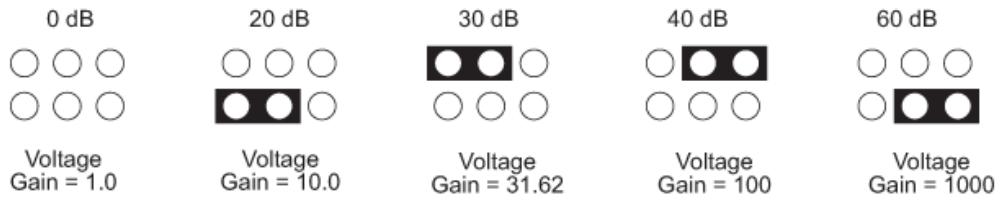
4 Audio Input and Output

4.1 Audio Input

The ACE-RIU is capable of receiving audio inputs from a wide variety of devices, such as microphones (freestanding and headset mics), PC sound cards, VCRs, and tape drives. The nominal input impedance of each stage is 1 k.



Setting the gains:



Input Gains

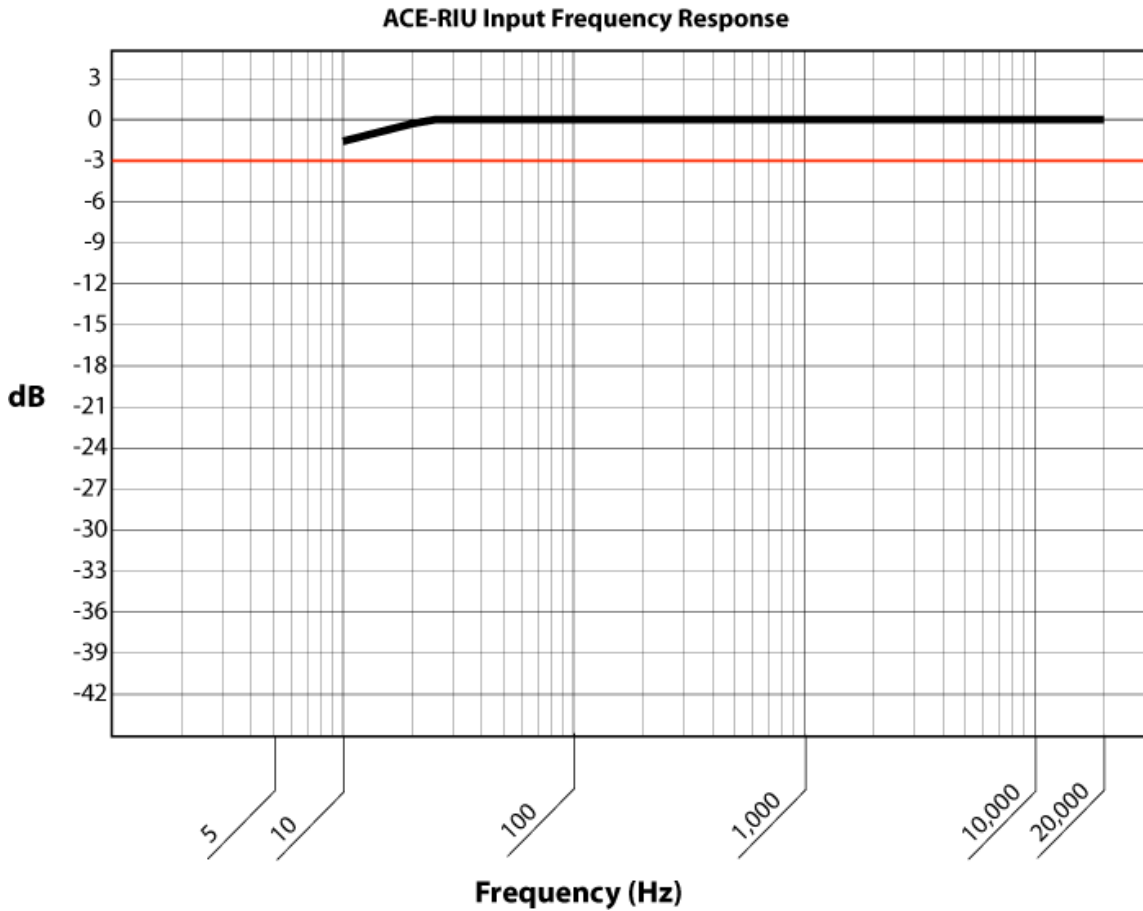
To adjust the input gains, you will need to access the ACE-RIU internal board. Refer to Additional Information (chapter 7) for instructions.

The input gains for each channel are set using jumper blocks J1(ChA), J2(ChB), J3(ChC) and J4(ChD). Gain values are: no jumper = 0 dB (line level input), 20, 30, 40 or 60 dB.

With a 0 dB gain setting, the maximum input signal level that can be applied without distortion by the ACE-RIU is 2.5 V_{pp}. Theoretically, an input signal as small as +/- 5 mV_{peak} could be applied to the audio input. However, it might not be possible to actually use a +/- 5 mV_{peak} signal

input to the ACE-RIU due to on-board circuit noise, ambient noise (both audio and electronic), interface cabling construction and microphone characteristics.

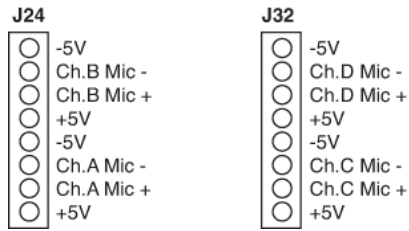
If you are unsure of your headsets compatibility with the ACE-RIU, ASTi provides a headset evaluation service.



Mic Power

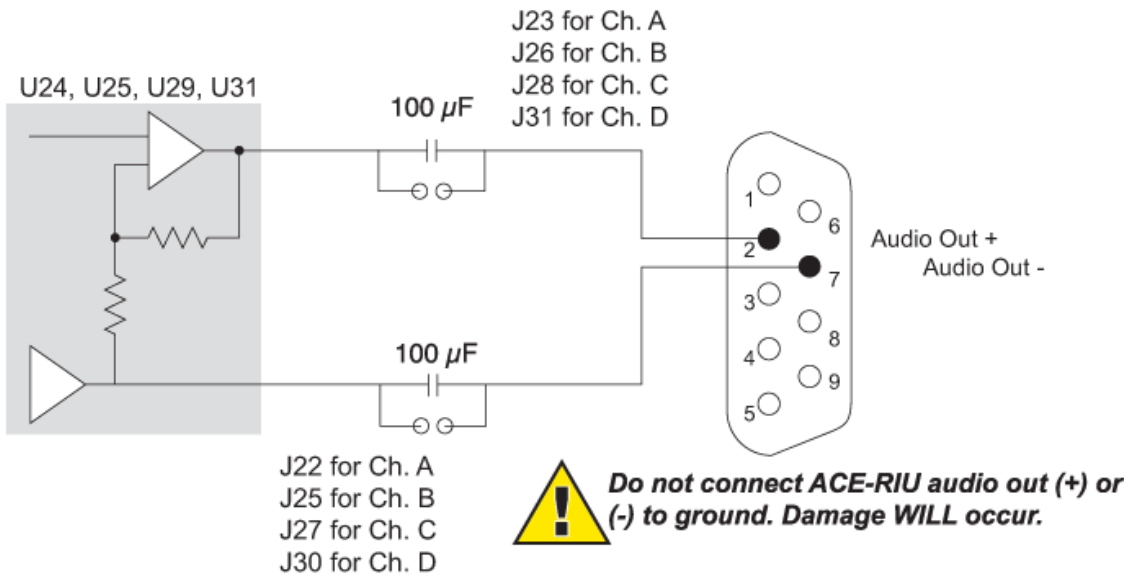
The ACE-RIU can provide mic power voltage to electret-type microphones. A +10 VDC potential is created across the audio in + and lines by populating resistor packs in connectors J24 and J32. Installing resistors in J24 provides mic power to ACE-RIU channels A and B, where installing resistors in J32 provides power to channels C and D.

The resistor values range from 470 to 10 k based on the type of microphone used. Resistor selection is based on the current required to drive the microphone pre-amp.

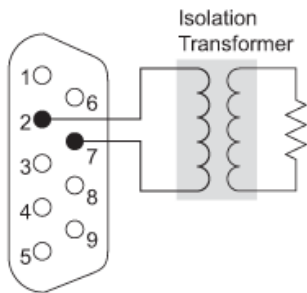


4.2 Audio Output

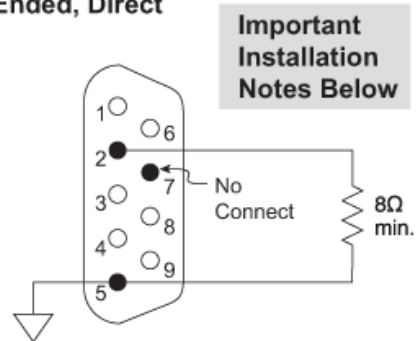
Each ACE-RIU channel features a high-performance differential audio amplifier that is capable of driving a wide variety of audio interfaces.



Single-Ended, Isolation Transformer



Single-Ended, Direct



The ACE-RIU audio output can be configured to drive bridged loads or single-ended loads. Bridged loads are not connected to an external ground point. Examples include differential inputs to professional audio recorders, mixers, amplifiers, headsets and “floating” speakers. Single-ended loads have signal returns that are connected to an external ground point. Examples include inputs to consumer-grade audio devices like tape recorders and PC sound cards.

Each channel is capable of supplying 1 Watt RMS into a bridge connected 8 W load. If a single ended 8 load is connected to the output, the ACE-RIU is capable of supplying 250 mWatts RMS.

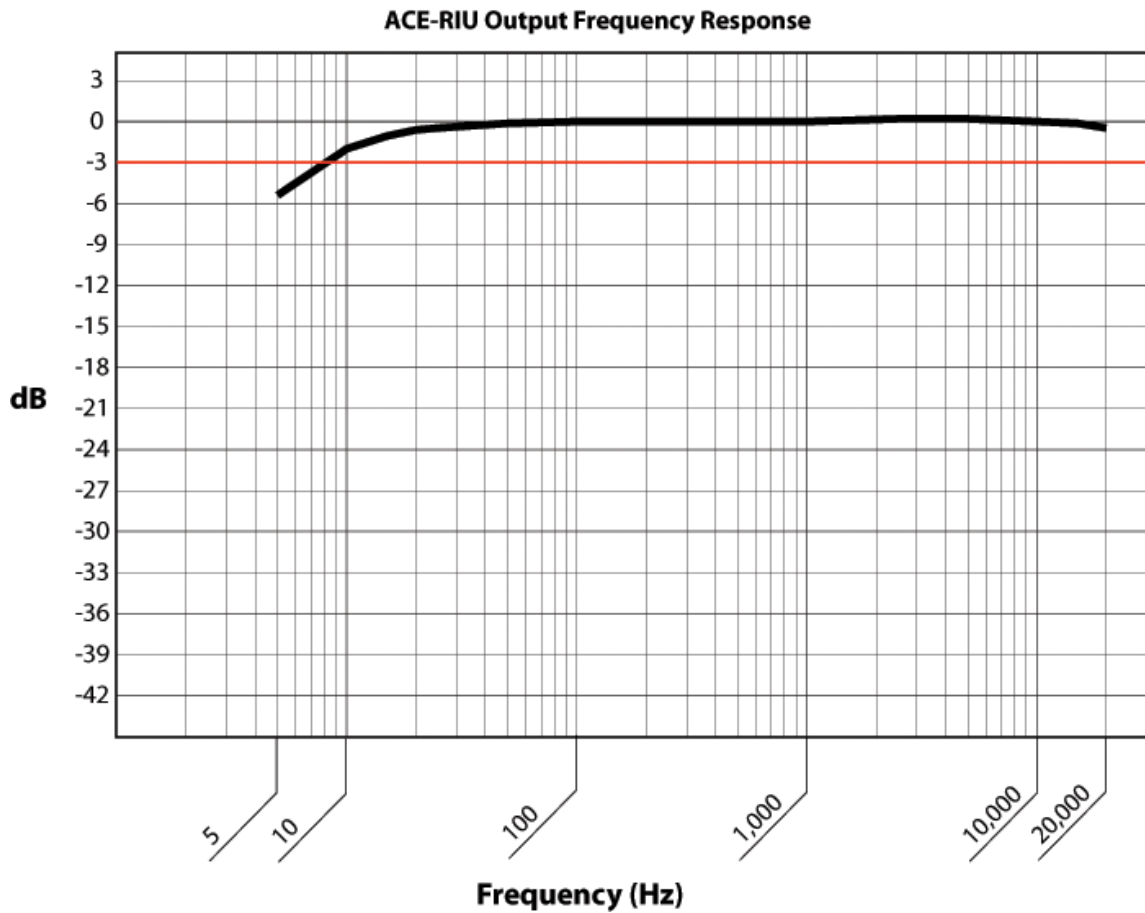
The output impedance of each channel is typically 0.1 into an 8 load.

Each ACE-RIU channel provides a balanced output with a maximum signal level of 10 Vpp. When used to drive a single ended load, the output maximum signal level is 5 Vpp.

When driving bridge-connected loads (differential, with no ground connection), connect both the Audio Out + (pin 2) and Audio Out (pin 7) to the load.

When driving single-ended loads (with external ground connection), connect only the Audio Out + (pin 2) to the input side of the load and Ground (pin 5) to the grounded side of the load. Audio Out (pin 7) must be left unconnected. Note that the single-ended configuration ties the ACE-RIU signal return ground to the external ground, which may introduce noise from the external ground into the ACE-RIU audio circuit. If external ground noise is introduced into the ACE-RIU in the single-ended configuration, it may be necessary to connect the ACE-RIU output to the load through a bridge-connected isolation transformer (see figure above). By default, the ACE-RIU has a DC blocking capacitor in line. ASTi does not recommend adding the jumper to remove the DC blocking capacitor.

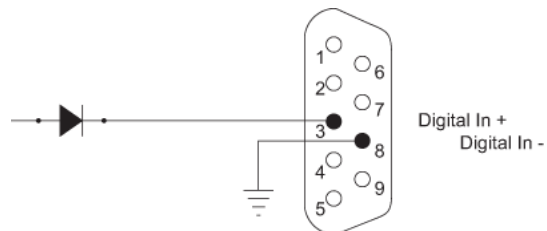
CAUTION: Failure to follow the installation instructions for single-ended applications may result in ACE-RIU damage that is not covered by the product warranty.



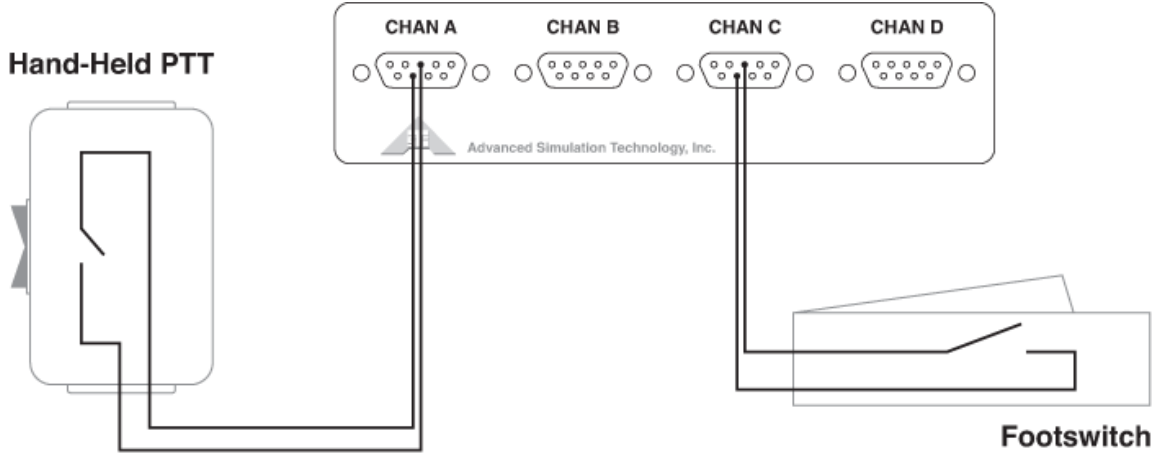
5 Digital Input and Digital Output

5.1 Digital Input

The ACE-RIU provides contact-sensing digital inputs. No power is required. Connecting the DI+ and DI lines together triggers the digital input.

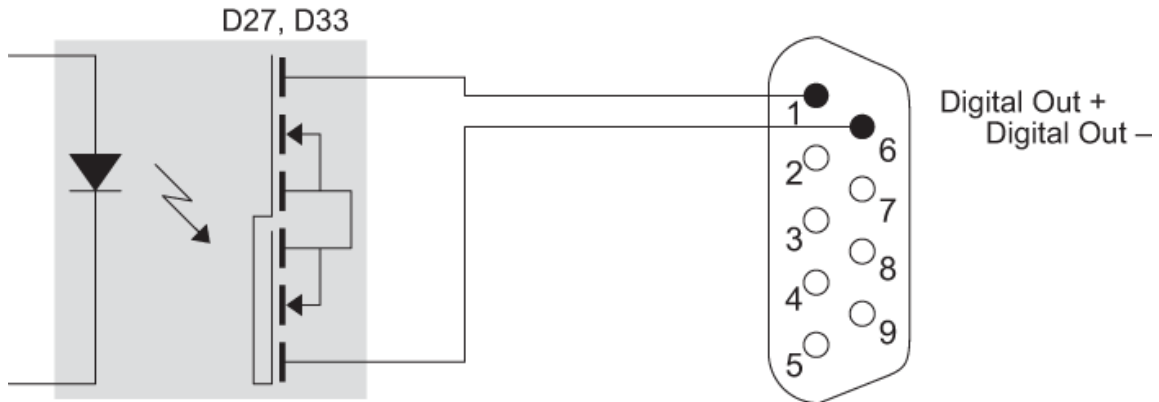


The digital inputs on the ACE-RIU are useful for providing a direct interface with Press-To-Talk (PTT) switches. The PTT input is fed directly into the model, thereby eliminating control latency associated with Host I/O systems.



5.2 Digital Output

The digital output circuitry consists of an opto-isolated, solid-state relay for switching power to external loads.



Each Digital Output (DO) circuit has a continuous current rating of 120 mA maximum, and a maximum power dissipation rating of 180 mW.

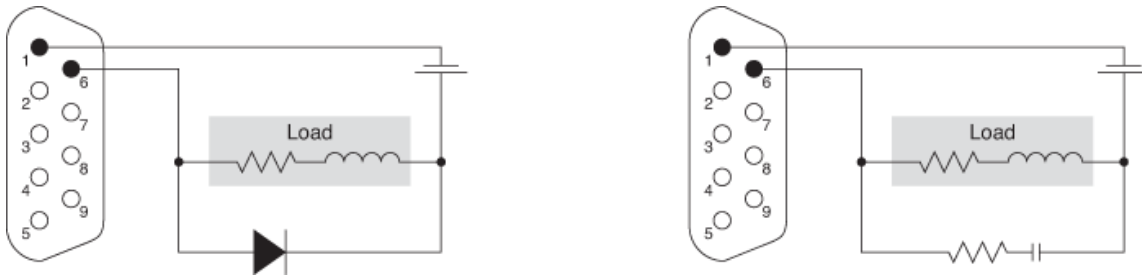
While providing 10 mA of load current, the MOSFET on-state resistance is typically 21 .

The relays maximum response frequency is 500 Hz.

Type	Opto-Isolated FET
Maximum Continuous Current Rating	120 mA
Maximum Power Dissipation	180 mW
Maximum Frequency Response	500 Hz

Surge Protection for Digital Output Circuitry

When driving an inductive load, such as a relay coil, always use a C/R snubber or clamping diode in parallel with the load to suppress large spikes.



6 Software Configuration

6.1 Telestra

Refer to the Telestra 4 Remote Management System 4 User Guide (DOC-01-TEL4-RMS4-UG-4)² for software configuration instructions.

6.2 Voisus

Refer to Voisus Hardware Clients in the Voisus Client User Guide³ to learn more about ACE-RIU software configuration in Voisus.

7 Additional Information

7.1 Access the ACE-RIU Internal Board

You may wish to access the ACE-RIU internal board to set the gains or provide microphone power. To access the ACE-RIU internal board, follow these steps:

1. Using a Phillips head screwdriver, remove the two side screws on the front panel of the ACE-RIU.

²http://support.asti-usa.com/media/pdf/t4/rms4_ug.pdf

³voisus_client_ug.pdf

2. Using a 3/16" nut driver, remove the eight jackscrews from the front faceplate.
3. Remove the faceplate with the white printing.
4. Remove the plastic bezel surrounding the faceplate.
5. Slide the black cover off the board.
6. Set the gains or install the resistors as needed.

Reassemble the ACE-RIU

To reassemble the ACE-RIU, follow these steps:

1. Slide the black cover on the board.
2. Place the plastic bezel back on the faceplate.
3. Insert the faceplate with white printing.
4. Using a 3/16" nut driver, attach the eight jackscrews to the front faceplate.
5. Using a Phillips head screwdriver, attach the two side screws on the ACE-RIU front panel.

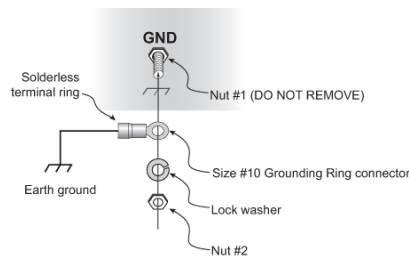
7.2 Earth Ground

ASTi does not require the ACE-RIU to be grounded. However, it was designed to accommodate customers with strict grounding policies and requirements.

You should generally keep your grounding wire as short as possible to reduce resistance. This will most effectively dissipate the unwanted electrical charge.

Equipment

- 10 grounding ring connector
- Ground wire (stranded, braided, or strap wire; 18 gauge AWG minimum)



Note: Do not remove nut #1 from the screw as it will cause the screw to fall inside the ACE-RIU chassis.

Procedure

1. Remove nut #2.
2. Slip the grounding ring connector onto the threaded end of the jackscrew.
3. Insert nut #2 onto the threaded end of jackscrew. Take care not to cross-thread or over-tighten the nut when reattaching.

7.3 Firmware Updates

Telestra

Refer to the Telestra 4 Remote Management System 4 User Guide (DOC-01-TEL4-RMS4-UG-4) for instructions on updating ACE-RIU firmware.

Voisus

1. In the Voisus web interface, navigate to the Hardware Devices page.
2. Select the RIU tab. The interface will inform you if any connected RIUs are in need of a firmware update. Follow the on-screen instructions to complete the procedure.

8 Specifications

8.1 Power Requirements

Input to PSL-UM-001	100-240 VAC, 50-60Hz, 1.5ARMS (120VAC),
0.75ARMS (240VAC)	
Power Connector	Inside Diameter 0.100, Outside Diameter 0.218, locking, center positive Connector Part #
	Switchcraft 712RA supplied with P2439 Hex Nut (5/16-32) and P2441 Washer
	Mating Connector Part #
	Switchcraft 760k
Power Consumption	15 VDC, 2A

The hardware is powered by an individual power supply included with ACE-RIU shipment. The power adapter inlet connector is an IEC320 type C14 or C8, requiring a matching cordset equipped with an IEC320 C13 or C7 connector (female line cord). Country-specific power connectors must be acquired separately for international use.

8.2 Memory Devices

The ACE-RIU memory devices are summarized in the table below.

Volatile	
MCU Internal SRAM	69kb
Non-Volatile	
MCU Internal	256kb
Flash	8 Mb

8.3 Temperature and Humidity Ranges

Type	Suggested Range
Operating Temperature Range	+10C to +32C (50F to 90F)
Operating Max. Temperature Gradient	20C (68F) per hour
Operating Humidity Range	10% to 70% non-condensing
Storage Temperature Range	0C to 55C (32F to 135F)
Storage Max. Temperature Gradient	30C (86F) per hour
Storage Humidity Range	5% to 95%

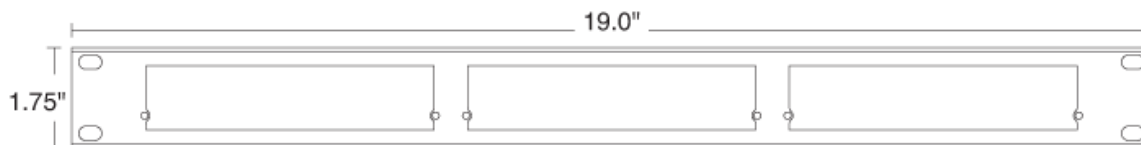
8.4 Reliability

Typical System Mean Time Between Failure (MTBF)	
COTS	251,042 hours
MIL	119,713 hours

9 ACE-RIU Rackmounts

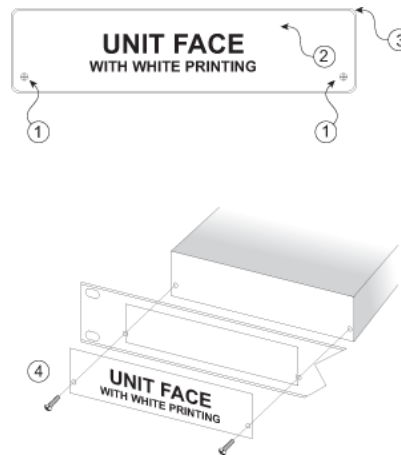
ACE-RIUs may be rackmounted in a 1U high, 19 wide bracket. The bracket will accommodate up to 3 ACE-RIUs. The brackets can be supplied unassembled, or ASTi can mount the components for a small fee.

When the ACE-RIU is rackmounted, the front bezel of the ACE-RIU case is not used. Keep the bezel in the event that the ACE-RIU is removed from the bracket and used as a stand-alone unit. Without the bezel, the endplate of the ACE-RIU will not fit on the case correctly.



9.1 Installation

1. Remove and retain screws near bottom of faceplate
2. Remove faceplate with white printing.
3. Remove plastic bezel surrounding faceplate. Retain this plastic piece for re-installation if ACE-RIU is removed from the rackmount bracket.
4. Using original screws, attach faceplate to front of mounting bracket. Attach body of ACE-RIU to rear of mounting bracket, as shown here.



10 Warranty Information

The equipment is under warranty for a period of one (1) year following purchase. In the case of equipment upgrades, warranty applies to original date of shipment of individual components.

Other commercial equipment purchased or provided such as monitors, amplifiers, speakers, and fiber optic links are also covered under the one year warranty unless otherwise stated.

The warranty does not cover improper equipment handling or improperly packaged returns. Extended warranties are available. Contact ASTi for details.

10.1 Repairs and Returns

If it becomes necessary to return equipment to ASTi please observe the following instructions:

1. Request an RMA number through the form on the ASTi support site: support.asti-usa.com⁴.
The receiving department at ASTi will not receive a repair without an RMA number.
The shipping label must include the RMA number.

⁴<https://rma.asti-usa.com/rma/>

Any items received from customers without RMA numbers or appropriate contact information included with shipment will not be tested. After sixty (60) days, ASTi reserves the right to scrap all hardware received in this condition.

2. When packaging the equipment in question, make sure it is well protected. Always DOUBLE BOX the device. The inner container should employ some semi-rigid, contour-fitting foam, while the exterior container should use a more pliant, shock-absorbing material such as styrofoam peanuts. The device should be properly enclosed in an antistatic bag to prevent possible ESD damage. Failure to properly package the equipment during shipping could void the warranty.
3. Do not send accessory pieces such as rack mount kits, power supplies or software. Only include items that do not work.
4. Include a description of the problem including the serial number for the unit in question. Include point of contact information including name, telephone number, and equipment return address. Failure to include this information could extensively delay the return of the equipment.
5. Evaluation of equipment is performed free of charge. No work will be done without prior customer approval.
6. Customer is responsible for shipping charges to ASTi for warranty and non-warranty repairs.
7. Note that if equipment is not under warranty, a purchase order will be required to cover any repairs. ASTi will provide a quote for all non-warranty items, including return shipping. Customer is responsible for return shipping charges on non-warranty equipment.
8. Equipment still under warranty will be shipped back via FedEx, unless otherwise directed. ASTi is responsible for return shipping charges on domestic items under warranty.
9. If equipment is not received by ASTi within thirty (30) days of the RMA number issuing date, the request data and number issued will be closed and designated as unused.
10. **International customers** must include the correct product value on all shipping documents. Contact ASTi for proper harmonized tariff codes. The customer is responsible for duties, taxes and fees incurred in shipment of the equipment.

11 APPENDIX A: ACE-RIU Configuration for Radio Bridge and Remote Control

The ACE-RIU is sold in two different configurations:

- **Operator ACE-RIU:** Interface module for operator stations. The device is labeled “ACE-RIU”.
- **Radio ACE-RIU:** Interface module for live radios. Used with Voisus and Synapse Radio Bridge and Remote Control. The device is labeled “Radio ACE-RIU”.

Each ACE-RIU is pre-configured at the factory prior to shipping. If you wish to verify the settings or change the configuration, follow the instructions below.

11.1 Configure the Internal Jumpers

Access the ACE-RIUs internal board. Instructions can be found in Additional Information (chapter 7). Adjust the internal jumpers to the values listed below for an Operator ACE-RIU or Radio ACE-RIU.

IMPORTANT: This operation must be performed at an approved ESD station to avoid damaging the equipment and voiding the manufacturer warranty.

Description	Jumper Settings	Operator ACE-RIU	Radio ACE-RIU
Input Gain, Channel A	J1	40 dB	0 dB
Input Gain, Channel B	J2	40 dB	0 dB
Input Gain, Channel C	J3	40 dB	0 dB
Input Gain, Channel D	J4	40 dB	0 dB
Output Coupling, Channel A	J5	OPEN	OPEN
Output Coupling, Channel B	J6	OPEN	OPEN
Output Coupling, Channel C	J7	OPEN	OPEN
Output Coupling, Channel D	J8	OPEN	OPEN