



**Audio Specialties Group
Products Division**

**Ri-1000
Intercom/Radio System Interface
Operators Guide**



Rev-0

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SECTION 1.0: Introduction

The Ri-1000 interface is a stand-alone device specifically designed as a signal and control bridge between professional voice communication systems and 2-way radio equipment. The Ri-1000 is a radio-independent device which allows it to be used with existing radio equipment and adapt to a multitude of radio systems.

1.1 Safety and Precautions

As with any high-power radio frequency equipment, care must be taken assure safe operation. Follow these guide lines:

- 1 Always have an antenna connected to the transmitting radio's connector if the radio is in transmit mode, or is selected to allow for remote transmit enable.
- 2 Place the antennas above eye level to assure that the antenna will not be able to injure eyes.
- 3 Always examine the cable that connects the antenna to the Radio Transmitter for damage and verify that the connectors are securely attached. (A damaged connector can short-circuit the transmitter output. This condition could heat-up the connector and cause burn to the hand if touched.)
- 4 Never handle the antenna if the radio is in transmit mode, or is selected to allow for remote transmit enable.
- 5 Verify the state of the transmitting radiator (Antenna) prior to placing the Ri-1000 in to transmit mode.

SECTION 2: Capabilities

2.1 Intercom

Several intercom system types are compatible with the WIFB. Telex RTS, Clear-Com and generic four-wire systems all can be accommodated. The Ri-1000 can identify the variety of CALL-Signaling architectures that these systems use. The call signals are used to activate the Transmitter for intermittent use applications. Additionally, the four-wire input can be used as the transmit key by applying a 20KHz signal to the input.

The output of the Receiver is routed through the Ri-1000 to the intercom system with the ability to direct the signal to the four-wire output, and CH-1 or CH-2 of the Two-wire connection simultaneously.

Additionally, there is a rear-panel AUXILLARY OUTPUT with an independent front panel output level control.

2.2 IFB

As with the intercom use, several types of IFB signals can be connected. Wet and dry/balanced signals can be connected simultaneously along with the ability to mix the different signals into the transmitter. This allows the talent to hear a mix of the non-interrupted signal and the interrupt signal in one receiver when using systems that don't offer this capability.

2.3 Continuous Audio.

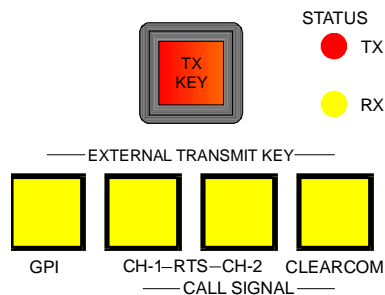
By using the balanced four-wire input, straight audio signal can be transmitted to provide non-interrupting audio for program distribution for cueing purposes.

SECTION 3: Features

3.1 Front Panel

3.1.1 Transmit Key Selection

3.1.1.1 Indicators



These switches, located toward the left side of the front panel, allow the user a range of Transmit mode options.

All the switches are mechanically momentary, electronically latching configured by firmware to interact with each other.

TX KEY: The red, TX KEY switch illuminates whenever the Ri-1000 has placed the TX relay in the TXE (Transmit Enable) state. (Contacts are closed). If an associated radio transmitter is configured and connected to the Ri-1000, the radio will be placed into transmit condition if this switch is illuminated. The TX relay and the TX KEY indicator are each controlled from separate outputs of the micro-controller system. Normal operation places these two control pins at equal states.

STATUS TX: This indicator is intended to illuminate when the radio equipment is actually in TX mode. Connection to the radio for this feature is dependent on the user's desire to do so. If no connection is made or if the equipment is not capable of supplying this status signal, the indicator will not function as specified.

STATUS RX: This indicator is intended to illuminate when the radio equipment is receive mode (RSSI). Connection to the radio for this feature is dependent on the user's desire to do so. If no connection is made or if the equipment is not capable of supplying this status signal, the indicator will not function as specified.

EXTERNAL TRANSMIT KEY: Indicators

GPI:

WINK: Mode is selected. GPI Input is not activated. .
Solid ON: Mode is selected. GPI Input is activated.
BLINK: Mode is not selected. GPI Input is activated
Solid OFF: Mode is not selected. GPI Input is not activated.

RTS CH-1 or CH-2:

WINK: Mode is selected. RTS Call is not activated.
Solid ON: Mode is selected. RTS Call is activated.
BLINK: Mode is not selected. RTS Call is activated.
Solid Off: Mode is not selected. RTS Call is not activated.

Clear-Com:

These states are only valid if the FP TW INTERFACE CHANNEL SELECT switch is in the RTS CH-2/CC position.

WINK: Mode is selected. CC Call is not activated.
Solid ON: Mode is selected. CC Call is activated.
BLINK: Mode is not selected. CC Call is activated.
Solid Off: Mode is not selected. CC Call is not activated.

3.1.1.2 Switches

TX KEY: The red, TX KEY switch changes the mode of the Ri-1000 from standby (STBY Mode) to transmit (TX Mode) or back. It has final priority over all other Key Command Signals. If no other external key signal is activated and selected, tapping the TX KEY switch would put the Ri-1000 into TX Mode. Likewise, if the TX KEY switch is tapped while in TX Mode, the Ri-1000 will go into STBY Mode. Further, if the Ri-1000 is in TX Mode and has been placed in that mode by an external key signal, including EXT GPI, pressing and holding the TX KEY switch for 3-SEC will disable **all** external TX KEY capability and place the Ri-1000 in STBY Mode.

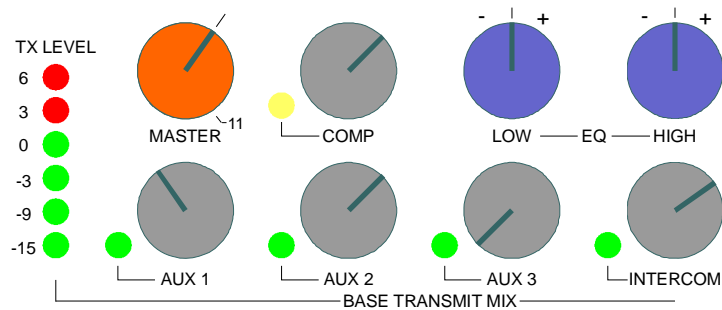
GPI: A simple push-on/push-off electronic latch function which allows an external “ground contact closure” state to put the Ri-1000 into TX Mode. Can be disabled by pressing and holding the TX KEY switch for 3-sec or by pressing the GPI switch. It can be selected concurrently with “call” signal keying enabled.

RTS CH-1: Selects the 20KHz “call” function from channel #1 of an RTS TW intercom connection to activate the TX Mode. This switch electronically interlocks with the RTS CH-2 and CLEARCOM switches.

RTS CH-2: Selects the 20KHz “call” function from channel #2 of an RTS TW intercom connection to activate the TX Mode. This switch electronically interlocks with the RTS CH-1 and CLEARCOM switches.

RTS CH-3: Selects the ‘DC on Audio’ “call” function from Clear-Com intercom connection to activate the TX Mode. This switch electronically interlocks with the RTS CH-1 and RTS CH-2 switches. *These states are only valid if the FP TW INTERFACE CHANNEL SELECT switch is in the RTS CH-2/CC position.*

3.1.2 Transmit Audio Mixer/Main Output Section.



3.1.2.1 The Ri-1000 features 3 auxiliary line-level balanced inputs identified as AUX-1, AUX-2 and AUX-3. The mix level is adjusted on the front panel by the associated knobs on the lower row of rotary controls. Each of the inputs features a two-color LED indicator. Green illumination indicates a -10dBm level and red indicates a 0dBm level.

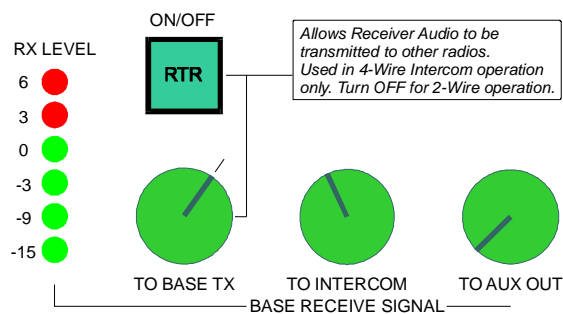
A solo-listen function is available by pressing on the knob for the desired input. The signal from the soloed input interrupts the normal radio receive signal that is heard on the front panel Headset position. This function is non-latching but more than one input can be monitored by pressing on several knobs simultaneously.

3.1.2.2 The INTERCOM mix level adjusts the level from both the 2-wire and the 4-wire incoming circuits.

3.1.2.3 The COMP control is a variable threshold compressor. CW position provides maximum dynamic range control to protect radio signals from the effects of highly dynamic audio sources such as music and dialog. A CCW position effectively eliminates the compressor from the signal path.

- 3.1.2.4 The EQ section provides a two band shelving EQ with +/-10dB cut/boost at 500Hz and 2KHz. The EQ circuitry is post-compressor so changes in the EQ settings are not altered by the dynamics processing.
- 3.1.2.5 The MASTER control adjusts the over-all level of the mixed signals which route to the transmitter..
- 3.1.2.5 The TX LEVEL meter is post-master to show the actual signal going to the radio equipment.

3.1.3 Receiver Audio Distribution.

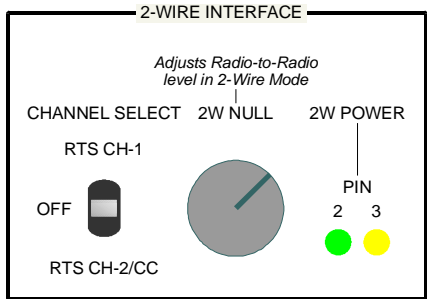


The Ri-1000 distributes the incoming receiver audio to four places. The receiver audio is routed to the base transmitter mix by the TO BASE TX control. The TO INTERCOM control sets the level to the 2-Wire and 4-Wire intercom circuits. The TO AUX OUT control sets the level of the rear-panel XLR AUXILLARY OUTPUT connector. Finally, the receiver audio is also routed to the earpiece amplifier for the front-panel headset position.

The RX LEVEL meter indicates the level of the received audio prior to any signal level adjustments.

The RTR switch, when depressed, allows the audio from the radio receiver to be routed to the transmitter TX signal. This effectively allows the portable radio users (walkie-talkies) to hear each other. This routing is only required when the wired intercom system is not capable of providing this path. When using 2-Wire intercom systems, this routing is via the 2-W/4-W converter. When using 2-Wire intercom, this switch should be in the OFF position for optimum audio performance

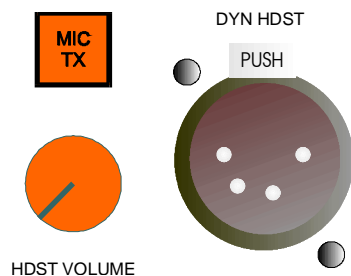
3.1.4 2-Wire Interface



The integrated 2-Wire interface is RTS and Clear-Com compatible. Power for the interface circuitry is provided by the intercom line for optimum isolation. (See section 3.2.X for details) Power indicators are provided to show which pins of the XLR connector have power. This is a convenience for troubleshooting. The 2W NULL control sets the Radio-to-Radio audio level by adjusting the amount of intercom signal that is sent to the transmit mix circuitry. Typically, this control will be set between the 10:00 and 2:00 positions.

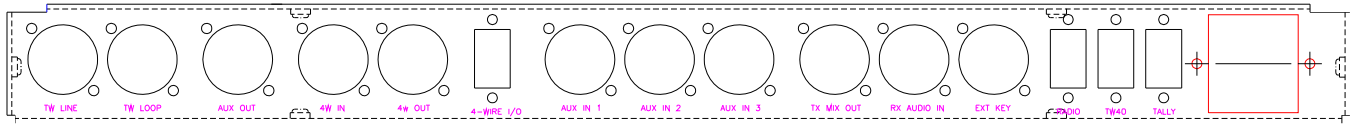
The CHANNEL SELECT switch determines which pin of the 2-Wire connection will be accessed. Regardless of the switch position, power is always derived from Pin-2 of the 2-Wire connection. The OFF position turns off the power supply of the 2-Wire interface. Also, the selection of CH-1 or CH-2/CC will turn off the RTR mode which is only required in four-wire situations.

3.1.5 Headset Position



This switch is used to place the Ri-1000 into TX Mode while simultaneously mixing the front-panel headset microphone signal to the transmitter TX signal. Wired intercom users will not hear this audio. The microphone amplitude is adjustable with an internal trim potentiometer. The XLR connector is interchangeable and can be fitted with a 4-pin, 5-pin or male 4-pin. Standard is a 5-pin female. The HDST VOLUME control sets the listen level of the front panel headset. Unless the solo function of a BASE TRANSMIT MIX input is soloed, the headset listens to the receiver audio signal.

3.2 Rear Panel



3.2.1 Two-Wire Signals

The left most XLR connectors are for the 2-Wire line signals. These are compatible with RTS TW and Clear-Com circuits. The 2-Wire interface circuitry has a dedicated power supply which is energized by the 2-wire circuit. The 4-wire side of the interface is transformer isolated from the audio circuits in the Ri-1000. This provides the greatest isolation from the intercom circuits to minimize hum, buzz and other noises which can be generated without proper isolation.

3.2.2 Aux Output

The Receiver appears on an individual XLR male connector. This is a transformer isolated line level output suitable for routing to a powered speaker for receiver monitoring. The intercom line is not heard on this connector.

3.2.3 Four-Wire

The four-wire connections are available as individual XLR male and female connectors as well as a dedicated bi-directional female D-Sub-9 connector. The pin-out is compatible with a Clear-Com FOR-22. A direct pin-for-pin cable will connect the two pieces of equipment together.

3.2.4 Auxiliary Inputs

The three AUX inputs to the transmit mixer each have a dedicated XLR connection. These are line-level transformer coupled inputs.

3.2.5 Radio Connections

Connections to the radio equipment are available via three methods. Each is intended to satisfy a particular signal type requirement. There are two D-Sub-9 connectors provided. The left connector RADIO provides dry/balanced transformer isolated audio, TX key closure and TX Status logic. This is intended to interface to radios located hundreds of feet from the Ri-1000.

The right connector TW40 emulates the Clear-Com TW40 Radio Interface “TO RADIO” connector. This allows existing interface cables to work with the Ri-1000. This connector is unbalanced and should therefore not be used when the radio equipment is more than ten feet from the Ri-1000.

The radio audio signals are available on individual XLR connectors as is the EXT Key logic input. These are electronically identical to the RADIO connector signals. The TX output connection can be used to feed a local powered speaker for monitoring the audio mix being sent to the radio transmitter. Though possible to do so, the female connector RX AUDIO INPUT should not be used simultaneously with the RADIO connection since there is no buffering between them.

SECTION 4: Operational Modes

4.1 Configuring for Intercom Use

4.1.1.1 RTS Ch-1

To transmit and receive intercom in half-duplex mode when connected to two-wire intercom system with 2-channels (RTS), depress the CH-1 button and the CONT. button. Plug the two-wire intercom circuit into the 2-W I/C IN or LOOP connector on the rear panel.

RTS CH-2/Clear-Com

To transmit and receive intercom in half-duplex mode when connected to two-wire intercom system with 2-channels (RTS), depress the CH-2 button and the CONT. Button. Plug the two-wire intercom circuit into the 2-W I/C IN or LOOP connector on the rear panel.

These modes allow all portable users to hear the intercom signal without the intercom users needing to activate or “key” the base transmitter. All dialogs on the intercom channel will be transmitted. For the duration that a portable user transmits on their walkie-talkie, they can not hear the intercom signal. With only one Ri-1000 system in use, only one portable user can transmit at a time. For applications that require multiple simultaneous portable users to transmit, additional Ri-1000 units can be connected.

4.2 Configuring for IFB Use

IFB, or specifically, continuous audio transmission is provided by the transmit portion of the Ri-1000. Though capable of processing receive audio, single direction, that is transmit only is fully supported by the Ri-1000.

For wet (with voltage) unbalanced IFB signals, use the 2-wire Intercom connection and the 2-Wire controls on the front panel. To listen to the Interrupt signal set the CHANNEL SELECT to RTS CH-1. Set the switch to CH-2/CC to listen to the non-interrupt signal.

For dry, balanced IFB signals, utilize the four-wire intercom input or any of the three auxiliary inputs.

4.4 Powering Options

4.4.1: AC power

The Ri-1000 will operate on 105-125VAC AC 50/60Hz.

4.4.2: DC powering

The WIFB allows for 12V DC powering through the provided 4-Pin XLR connector. It is not necessary to have the AC power switch on for DC operation. The required current is 10 A at 11-15V DC.

SECTION 5 Block Diagram

SECTION 6: Specifications

Specifications

6.1 Electrical Specifications

Ri-1000

Power Requirements:

120v AC 60Hz 100 Watts

Audio Inputs:

Max Input Level = +10dBm 400Hz

Outputs:

6.2 Mechanical Specification

Height: 1.75" inches
Width: 19" inches
Depth: 12 inches (? mm)
Weight: 12Lbs

Finish:

Front panel is light grey, silkscreened.

Chassis is black anodize

SECTION 7: Wiring Diagrams

7.1 Connector Pin-Out Detail

7.1.1 Two-Wire Intercom Connectors

Pin-1 TW Intercom Ground

Pin-2 CH-1 (IFB Interrupt)

Pin-3 CH-2 (IFB Non-Interrupt)

Pin-1 TW Intercom Ground

Pin-2 CH-1 (IFB Interrupt)

Pin-3 CH-2 (IFB Non-Interrupt)

7.1.2 Four-Wire Intercom Input/Output Connectors

XLR Four-Wire Input

Pin-1 Capacitive path to chassis

Pin-2 Positive Input

Pin-3 Negative Input

XLR Four-Wire Output

Pin-1 No Connection

Pin-2 Positive Output

Pin-3 Negative Output

Four-Wire Intercom D-SUB 9M

PIN#	Function
1	RX Audio Output to Intercom System (HIGH)
2	Intercom System Output to Radio TX (HIGH)
3	
4	
5	
6	RX Audio Output to Intercom System (LOW)
7	Intercom System Output to Radio TX (LOW)
8	
9	

7.1.3 Radio Connections

TW40 Connector D-SUB 9F

PIN#	Function

Balanced Audio Connector D-SUB 9M

PIN#	Function

7.1.4 Auxiliary Inputs and Auxiliary Output Connectors

Auxiliary Inputs XLR-Female

Pin-1 Capacitive path to chassis

Pin-2 Positive Input

Pin-3 Negative Input

Auxiliary Output XLR-Male

Pin-1 No Connection

Pin-2 Positive Output

Pin-3 Negative Output

7.1.5 External Key and Logic Connectors

External Key XLR-Female

Pin-1 No Connection

Pin-2 System Ground

Pin-3 Key Logic Input

Tally D-SUB 9F

PIN#	Function

7.2 Radio Equipment modifications

7.2.1 Transformer Isolation

7.2.2 Transmit Key

7.3 Adapter Cables

Kenwood
Motorola
Icom
Standard