

Intelligent Radio Interface Module

Introduction

With the multitude of proprietary two-way radio protocols present in today's Land Mobile Radio market, it is important to be able to transition or interoperate between these different technologies. Zetron's Intelligent Radio Interface Module (iRIM) is designed to solve this problem. With the iRIM, you can continue to leverage your investment in operator control equipment, such as Consoles and Desktop Remotes.

Zetron's iRIMs allow legacy Tone Remote Control (TRC) equipment to operate modern mobile radios, while providing the same level of control traditionally associated with control stations. Thus, TRC equipment is not only able to control Push-to-Talk (PTT), but also various advanced radio functions such as channel or talk-group selection, privacy code monitor, repeater talk-around, and coded vs. clear mode.

The iRIM is compatible with the following Zetron consoles:

- Model 4010
- Series 4000 Button-Based and Integrator RD
- VoIP Radio Dispatch System
- AcomEVO System

For legacy equipment that is also able to decode MDC-1200 (a.k.a. Motorola Stat Alert™), the iRIM also converts proprietary Push-to-Talk IDs (PTT IDs) or ANIs decoded by the associated radio into MDC-1200 allowing the legacy equipment to display the incoming PTT-ID (including Status and Emergency IDs in most cases).

General

Each iRIM contains interfaces for up to two radios. For each radio, the iRIM has a 4-wire analog circuit for remotely interfacing to legacy control equipment (consoles & desktop remotes), and an interface to the proprietary mobile radio that consists of audio, PTT, and serial data signals.

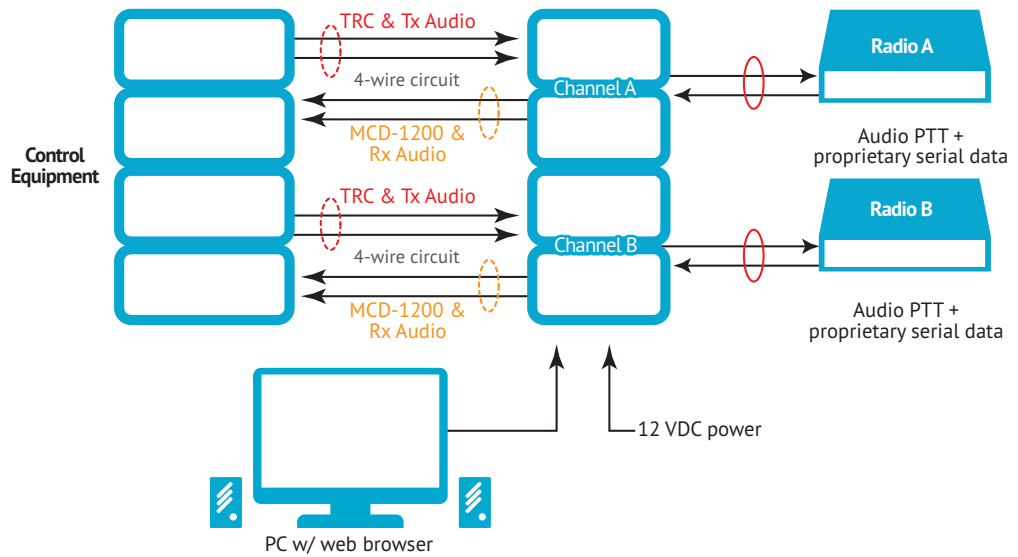
In addition, the iRIM contains an Ethernet IP connection. This connection is used to configure the iRIM using a web browser such as Internet Explorer; iRIMs are completely configured via HTTP – there are no jumpers or trim pots to adjust, allowing you to make all changes remotely without physically touching the equipment; iRIM firmware may be field updated using FTP.



Key Features

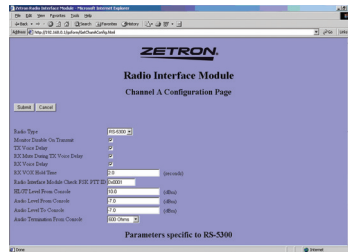
- Provides advanced radio control and status over simple 4-wire analog circuits.
- Adapts legacy TRC Consoles & Desktop Remotes to proprietary, modern two-way mobile radios allowing users to keep their large investment in control equipment.
- Provides control over PTT, privacy code monitor, channel or talk-group selection, repeat/talk-around, and coded/clear.
- Provides incoming PTT-IDs, status and emergency-IDs for equipment capable of decoding and displaying MDC-1200, allowing users to see the source of the incoming call.
- Supports one or two radios per iRIM. One 19" rack unit (1.75" high) will house up to four radio interfaces in optional rack adapters.
- Configured via Ethernet port and via web browser. Options and levels may be entirely changed remotely over the network via IP without visiting the equipment site.
- Operates from 12 VDC and may share the mobile radio's power supply.
- Current Radio Signaling Technologies Supported:
 - Motorola SmartNet™/ SmartZone™
 - Motorola ASTRO™
 - EF Johnson LTR®
 - Trident PassPort®
 - APCO Project 25 (P25)
 - Kenwood FleetSync™
 - NXDN/Kenwood NEXEDGE™
- Current Compatible Mobile Radios:
 - EF Johnson RS-5300 and compatible variants
 - Kenwood TK-x180
 - Kenwood TK-5x10
 - Kenwood NX-700/800

iRIM System Diagram



Radio Control

The iRIMs will decode all standard Tone Remote Control (TRC) function tones, allowing control of up to 15 different radio functions. Function tone entries are configured by the installer from a pull-down list, allowing you to map each of the available standard tone remote function tones to a radio function. Some of the possible radio functions include: Emergency Acknowledge, Scrambler Disable, Scrambler Enable, Monitor Unmute Disable, and Monitor Unmute Able.



For trunked radio systems, which require a PTT request/grant process, the iRIMs can optionally delay the outgoing voice until the radio receives the system grant, ensuring that nothing is lost during the dispatch transmission. For control equipment that supports full-duplex circuits, the radio's progress tone can be provided to the dispatcher so that they know if their transmission request was granted.

The iRIMs also support an optional Line Check which may be assigned to one of the TRC functions. When a Line Check function is sent by the control equipment the iRIM responds with an acknowledgement ID thus allowing the operator to verify that the iRIM is communicating with the control equipment.

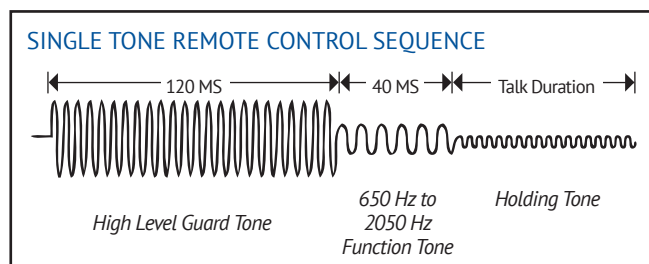
PTT-ID, Status & Emergency ID

The iRIMs may optionally intercept Push-to-Talk IDs, Status IDs and Emergency IDs from the mobile radio's serial data and convert these to MDC-1200 packets.

Standard MDC-1200 supports a 16-bit PTT-ID. For those radio signaling technologies which have a longer PTT-ID field, the installer may configure an off-set so that a range of up to 9999 (for Kenwood) or 65,535 (for EF Johnson) IDs may be passed to consoles or desktop remotes that only decode standard MDC-1200. When used with Zetron's Integrator RD and VoIP RDS, a modified MDC-1200 packet is employed which conveys the full range of the ID addresses. These PC-based consoles will then display the full ID or the alphanumeric alias.

For radio signaling schemes that support mobile status, the iRIM also intercepts the incoming status and conveys it to the control equipment using the 8-bit MDC-1200 status field.

The intercepted ID may be conveyed in-band to the control equipment at the beginning of the transmission or at the end. If conveyed at the beginning, the incoming voice is digitally delayed until the ID is sent to the control equipment. This ensures that the incoming audio is heard in its entirety.



Supported Features

The following table shows the features available for each model of radio and each radio signaling scheme.

Zetron iRIM Model	PN 901-9630				PN 901-9637	
Radio Manufacturer	Kenwood				EF Johnson	
Radio Model	<i>TK-x80</i>	<i>TK-x180</i>	<i>NX-700/800</i>	<i>TK-5x10</i>	<i>RS-5300</i>	<i>5300-ES</i>
AVAILABLE BANDS (* discontinued models)						
VHF- Lo Band						
VHF- Hi Band	TK-780*	TK-7180	NX-700	TK-5710	5317/5325*	
UHF Band	TK-880*	TK-8180	NX-800	TK-5810	5363/5343*	
700 MHz Band				TK-5910	5377*	5300-ES
800 MHz Band	TK-980		NX-900	TK-5910		
900 MHz Band	TK-981		NX-901			
SUPPORTED MODES						
Conventional Analog FM Mode	Yes	Yes	Yes	Yes	Yes	Yes
Analog FleetSync Mode	Yes	Yes	Yes	Yes		
Trunked Analog LTR Mode	Yes	Yes	Yes			
Trunked Analog PassPort Mode	No	Yes				
Trunked Analog MPT-1327 Mode	No	No				
Conventional Digital NXDN Mode			Yes			
Trunked Digital NXDN Mode			Yes			
Conventional Digital P25 Mode				Yes	Yes	Yes
Trunked Digital P25 Mode				Yes	Yes	Yes
Trunked Analog SmartNet Mode					Yes	Yes
Trunked Analog SmartZone Mode					Yes	Yes
Trunked Digital ASTRO Mode					Yes	Yes
SUPPORTED FEATURES						
Channel /talkgroup select	15 max ¹	15 max ¹	15 max ¹	15 max ¹	15 max ¹	15 max ¹
Transmit on current channel/talkgroup	Yes	Yes	Yes	Yes	Yes	Yes
Group Call	Yes	Yes	Yes	Yes	Yes	Yes
Individual Call	Rx only	Rx only	Rx only	Rx only	Rx only	Rx only
Selective Calling ²	Rx only	Rx only	Rx only	Rx only	Rx only	Rx only
Status Messages	Rx only	Rx only	Rx only	Rx only	No	No
Emergency	Rx only	Rx only	Rx only	Rx only	Rx only	Rx only
PTT-ID	Yes ³	Yes ³	Yes ³	Yes ³	Yes ³	Yes ³
Scanning	Limited ⁴	Limited ⁴	Limited ⁴	Limited ⁴	Limited ⁴	Limited ⁴
Monitor (unsquelch)	Yes ⁵	Yes ⁵	Yes ⁵	Yes ⁵	Yes ⁵	Yes ⁵
Monitor (ignore incoming privacy code)	Yes ⁵	Yes ⁵	Yes ⁵	Yes ⁵	Yes ⁵	Yes ⁵
Outgoing Privacy Code Enable	Yes ^{5,6}	Yes ^{5,6}	Yes ^{5,6}	Yes ^{5,6}	No	No
Talk Around	Yes ⁵	Yes ⁵	Yes ⁵	Yes ⁵	Yes ⁵	Yes ⁵
Coded/Clear	Yes ⁷	Yes ⁷	Yes ⁷	Yes ⁷	Yes ⁷	Yes ⁷
Radio Aux Outputs	Yes	Yes	Yes	Yes	Yes	Yes
Horn Alert	Yes	Yes	No	Yes	No	No
Home Channel	No	No	No	No	No	No

Please see back page for table notes.

Table Notes

Table Notes:

1. The total functions per radio is 15. Functions other than channel/talk-group select will subtract from the available channel/talk-group selections. Not all control equipment are capable of using all 15 functions for channel/talk-group selection. Conventional channels on the radios typically include profiles for RF frequency, privacy code, air mode (analog/digital), and encryption key. Trunked channels on the radios typically include profiles for zone, system, talk-group and encryption key.
2. Selective Calling includes individual calls, call alert, radio check, radio remote monitor, status query and radio inhibit/stun/kill. The iRIM does not support any form of outgoing Selective Calling. Incoming Selective Calling is handled by the radio only – providing outgoing audio in response to incoming radio remote monitor is not supported by the iRIM.
3. PTT-ID is available only if control equipment can decode standard MDC-1200 signaling. When using Zetron's Integrator RD and VoIP RDS, the PTT-ID ranges from lowest to highest ID address is 9999 (for Kenwood) or 65,535 (for EF Johnson) regardless of the native range of the radio signaling scheme.
4. The iRIM for Kenwood radios supports scan on/off, add/delete, and priority channel. But for all radios, scan usefulness is limited because the operator can not determine which channel the radio has stopped on.
5. Monitor, Outgoing Privacy Code Enable and Talk Around are only available in Conventional modes, and may not be available in Digital modes.
6. Outgoing Privacy Code Enable allows the control equipment to selectively remove CTCSS/DCS/NAC coding during transmissions, useful for tone paging applications.
7. Radios must be equipped with their scrambler or encryption options to support the Coded/Clear function.

Specifications

PHYSICAL/ENVIRONMENTAL

Size/Weight:	1.5 x 7.75 x 10.25 inches (HxWxD), 1.9 pounds (1.75 x 19.0 x 10.25 in optional rack panel)
Temperature:	5° to 55° C (41° to 131°F)
Power:	13.5 VDC (10.5 - 16 VDC) @ 1A (initial power-on surge exceeds 2A)
Electrical	
4-Wire Freq. Response:	300 Hz to 3400 Hz +1/-3 dB, except for TRC guard tone notch
4-Wire Line Balance:	60 dB @ 1004 Hz
4-Wire Impedance:	600 ohms nominal
4-Wire Level Range:	Rx: -35 to +10 dBm. Tx: -35 to +10 dBm
TRC Decoding:	Compliant with TIA 102.BAHA Section 7, and TIA 102.CADA Annex D except that the iRIM requires 2175 Hz guard tone frequency.
Ethernet:	IPv4, 10-base T, RJ-45 connector. HTTP compatible with Microsoft Internet Explorer 6 or later.

RADIO FIRMWARE COMPATIBILITY

EF Johnson RS-5300:	Version 2.2.2 and 4.10.13. Remote control-head cable option required.
Kenwood TK-x80:	Version 2.2 checksum CFB8. KCT-19 cable option and R24/R94 PCB jumper modifications required.
Kenwood TK-x180:	Version 1.17, checksum 4-FD7
Kenwood TK-5x10:	Version F4.32.00 for conventional operation Version T4.25.00 for trunking operation
Kenwood NX-700/800:	Version 1.07.00



ZETRON AMERICAS
PO Box 97004,
Redmond, WA USA
98073-9704
(P) +1 425 820 6363
(F) +1 425 820 7031
(E) zetron@zetron.com

ZETRON EMEA
27-29 Campbell Court,
Bramley, Hampshire RG26
5EG, United Kingdom
(P) +44 1256 880663
(F) +44 1256 880491
(E) uk@zetron.com

ZETRON AUSTRALASIA
PO Box 3045, Stafford
Mail Centre, Stafford QLD
4053, Australia
(P) +61 7 3856 4888
(F) +61 7 3356 6877
(E) au@zetron.com



The Power to Respond

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