



JEM Radio II Operation Guide

Manual P/N M09999-999



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Display



The normal display will show the 6-digit AAR channel number in enlarged print. The home channel number and channel label (if there is one) along with the volume. The home channel label is displayed on the 4th line. This is also where digital messages are displayed as well as RAN code and HOME channel entry prompts.



When a reception is received from another radio, the RSSI value will be shown near the top-right corner, just below the volume setting. The abbreviation “BSY” will be displayed in the lower right corner.

When a reception is received from another radio on a digital channel and the RAN codes match, the display will toggle between the unit ID and talk group of the transmitting radio. If the RAN codes do not match, “BSY” will be displayed but the display will not show the unit ID or talk group.

When the radio is transmitting, “TX” will be displayed in the lower right corner. The volume is displayed in the upper right corner. The home channel number is displayed on the top line just to the left of the volume number.

Channel Entry

A channel entry consists of entering 6 digits. The first 3 are the AAR TX channel and the second three are the AAR RX channel. The default RAN of 01 (Freq, 67.0Hz) will automatically be used on digital channels when the channel is changed. If a different RAN code is required, it can be entered using the RAN button where the first 2 digits is the TX ran code and the second is the RX ran code.

Shortcuts

If only 3 digits are entered, it will be assumed that the RX channel should be the same as the TX channel and the new channel will automatically be selected after the timeout period or the CHAN button is pressed.

If a non-default RAN code is required, the RAN button can be pressed immediately after the 3rd digit instead of the CHAN button. This will confirm the channel entry just like pressing the CHAN button but will also automatically prompt for the new RAN codes.

Text Messages

A text message that is received either from an NXDN packet or from the network will be scrolled across the display once, after which “MSG” will blink in bottom right corner of display.

If a text message is received before a previous message is finished scrolling, the new message will begin scrolling immediately and the previous message will be saved. Messages will be saved in non-volatile memory.

There is an option in the GENERAL menu to replay any of the last 10 text messages received. The SCROLL MSG option number is set to ‘1’ by default which is the last message received. Simply selecting the SCROLL MSG option and then pressing the MENU button will play the last message. Changing the message number allows selecting older messages with ‘10’ being the oldest. Selecting ‘0’ will play all 10 messages.

Any message received by the radio when in menu mode will be stored and displayed once menu mode is exited.

After a message is received, the text “MSG” will be displayed every second until the user acknowledges it by pressing any button.

Buttons

- The number buttons **0 – 9**, *****, **#** are used to send DTMF tones, enter AAR channels, enter RAN codes and make menu selections.
- The **PTT** (Push To Talk) button will put the radio in transmit mode.
- The **VOLUME** button will increase/decrease the audio volume of the front panel speaker as well as the speaker outputs on the 12-pin connector on the back of the radio.
- The **CHAN** button allows for AAR channel number entries.
- The **MENU** button displays device settings and extra features.
- The **RAN** button allows for the entry of RAN codes when on a digital channel or PLL tones when on an analog channel. See (Appendix A).
- Pressing RAN when on a digital channel button will display “RAN _ _ _ _”.
- Pressing RAN when on an analog channel will display “PLL _ _ _ _” (This feature needs to be enabled, refer to JEM Radio II Software Guide.)
- Pressing **Home** followed by # will revert to the previous Channel/RAN/PLL that the radio was on.

Headset Use

The radio has been designed so that headsets can be used directly with the radio without the use of external boxes that contain amplifiers/mixers and volume controls.

The radio has independent volume control of the "fixed" level audio outputs on the 6 and 12 pin connectors on the deck and the 6-pin connector on the head when it's installed separate from the deck. These outputs can drive headset speakers directly (8 ohms) without the requirement for an external amplifier. Any microphone input (other than the panel mic) can be mixed into any audio output so the user can control how much of his own voice (side tone) he hears relative to the other audio sources which could be another user, audio from the radio, or audio from the IP network.

IP Network Use

The network interface allows the following functions, firmware updates, text messages to the display, getting unit ID from the locomotive network and sending/receiving audio data.

Virtual Control Head



A command can be sent to the radio that will cause it to send all the data that gets sent to the display to also get sent out the PC port serial port or the Ethernet port. This makes it possible to write a software application that can display the data as well as send button press commands to the radio essentially making it a software equivalent of the control head.

Secondary Control Head

A second control head can be connected to the 12-pin connector and used on the conductor side of the locomotive.

Menus



The MENU key will bring up a list of options that can be selected with the number keys. Once the option is selected, the value can be incremented or decremented by using the volume control button. When menus are displayed, pressing the menu key again will exit the current menu section. Pressing the CHAN, HOME, or PTT button will also exit menu mode. See (Appendix E) for the menu hierarchy.

Note, some of these features can be disabled during programming if the customer does not want users altering audio or NXDN settings. Please refer to the *JEM Radio II Software Guide* for more information.

GENERAL

| GENERAL | DESCRIPTON |
|---------------|--|
| 1 SQUELCH | Adjusts squelch using the volume key, with values ranging from 3 to 7. |
| 2 VOL OFFSET | Controls the relative volume of the speaker outputs on pins M&N of the 12-pin connector to the level of the panel speaker. A positive value will make the volume louder than the panel speaker. Value can range from (-10 to +10). |
| 3 SCROLL MSG | <p>Select 0 to scroll all messages, or select 1-10, with 1 being the most recent message to view messages.</p> <p>Message scrolling will begin when you exit the Menu.</p> |
| 4 <SET DFLTS> | Sets all the audio levels back to the default states. See (<i>Appendix B</i>) |

AUDIO

| AUDIO | DESCRIPTION |
|--|---|
| 1 <USER 1> | The connection to the 6-pin connector |
| 2 <USER 2> | The connection to the 12-pin connector |
| 3 <USER 3> | The connection to the 6-pin connector on the front panel when it is mounted separately from the deck. |
| Select <USER 1> or <USER 2> or <USER 3> to adjust: | |
| MASTER | The main volume of this output |
| MY LVL | The level that is heard on the audio out pin from the mic input of the same connector. (Sidetone) |
| OTHER | The level that is heard on the audio out from the mic inputs of the other 2 connectors. |
| 4. <FACTORY> | |
| From Radio | Level of audio coming from Radio when it's in RX mode |
| To Radio | Level going to the input of the internal radio. (This will affect the deviation of the radio) |
| Panel Mic | Control sensitivity of the panel Mic. A value of 20 is unity gain through the volume. A higher value will make it more sensitive. |

NXDN

| DIGIAL | DESCRIPTON |
|----------------------|--|
| 1 DEFLT RANTX | RAN codes should be entered for each home channel in the C05053 program. If no values are entered, it will by default write RAN codes of 00 00 and a parameter error will be displayed as a warning when the data is written to the device |
| 2 DEFLT RANRX | |

INFO

| INFO | DESCRIPTON |
|-------------------------|--|
| SN Serial Number | Serial number of the unit. |
| DECK VER | JEM supplied firmware for the deck of the radio |
| HEAD 1 VER | JEM supplied firmware for the head of the radio |
| HEAD2 VER | JEM supplied firmware for the 2nd head of the radio if there is one. |
| MODEL | Model of internal radio |
| RADIO FIRM | ICOM/KNWD supplied firmware |

DISPLAY

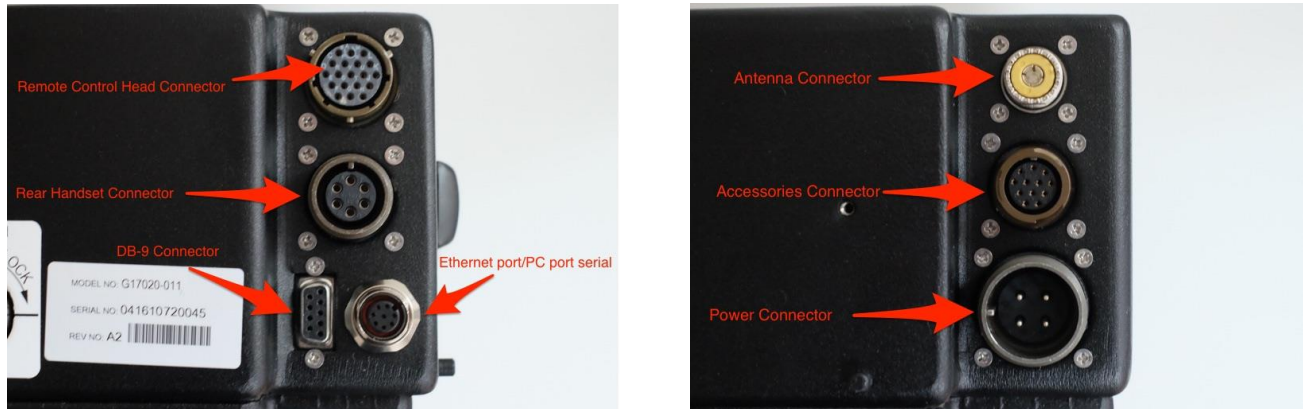
| INFO | DESCRIPTON |
|----------------------|--|
| 1. BRIGHTNESS | Use volume keys to adjust display brightness from 1 to 4. |
| 2. NXDN DATA | Use the volume keys to enable (setting of 1) or disable (setting of 0) the transmission of a radio's ID. |

Error Messages

An error messages will scroll on the 8th line if it's longer than 14 characters.

| Message | Cause |
|-------------------------|--|
| "INVALID ON HOME CHNLS" | RAN button is pressed when on a home channel |
| "PTT is ON" | When the radio powers up and any of the PTT inputs are low (active), the radio will print out the message "PTT is ON" to alert the user that there may be a stuck PTT source. The radio will not go into transmit mode until all of the PTT inputs are first inactive. |

Cable Connectors



Remote Control Head Connector (19-Pin)

| PIN | Signal | PIN | Signal |
|-----|-------------|-----|-----------|
| A | Audio Out | M | Speaker - |
| E | GND | N | Speaker + |
| F | Hook 1 | S | RXF 232 |
| J | Vcc | T | TXF 232 |
| K | Vcc | U | PTT 1 |
| L | Mic Audio 3 | V | Mic Panel |

Power Connector (4-Pin)

| PIN | Signal | Description |
|---|------------|--------------------------------|
| A* | + 74 Vdc | Primary isolated input voltage |
| B | - 13.6 Vdc | Radio common (chassis) |
| C* | - 74 Vdc | Primary isolated input voltage |
| D | + 13.6 Vdc | Regulated radio voltage input |
| *Only one supply voltage can be used at a time. | | |

Rear Handset Connector (6-Pin)

| PIN | Signal | Description |
|-----|---------------|---|
| A | Mic Audio | Modulation input from handset microphone |
| B | Mic Ground | Mic Audio return (common with radio chassis) |
| C | PTT | Push-To-Talk input |
| D | PTT Ground | PTT return path (common with radio chassis) |
| E | Receive Audio | Audio input to receiver element in handset |
| F | Hook Switch | Optional input connected to the handset cradle switch |

Accessories Connector (12-Pin)

| PIN | Signal | Description |
|-----|------------------|---|
| A | Remote Mic | Remote microphone audio input |
| B | Mic Ground | Remote microphone ground |
| C | Remote PTT | Input signal for remote transmit activation |
| D | PTT Return | PTT reference (common) |
| E | Remote Audio | Low level audio output |
| F | + 13.6 Vdc | Low power (1Amp max) |
| H | Audio Return | Remote audio common |
| J | 13.6 Vdc Return | 13.6 Vdc common (chassis) |
| K | # | Do Not Use |
| L | # | Do Not Use |
| M | External Speaker | Remote speaker |
| N | External Speaker | Remote speaker return |

(Appendix A)

PLL Frequency lookup table

When on an analog channel, PLL frequencies could be entered using the RAN button with the following conversion table.

| 2 Digit Code | Frequency (Hz) | 2 Digit Code | Frequency (Hz) |
|--------------|----------------|--------------|----------------|
| 00 | NO TONE | 22 | 136.5 |
| 01 | 67.0 | 23 | 141.3 |
| 02 | 69.3 | 24 | 146.2 |
| 03 | 71.9 | 25 | 151.4 |
| 04 | 74.4 | 26 | 156.7 |
| 05 | 77.0 | 27 | 162.2 |
| 06 | 79.7 | 28 | 167.9 |
| 07 | 82.5 | 29 | 173.8 |
| 08 | 85.4 | 30 | 179.9 |
| 09 | 88.5 | 31 | 186.2 |
| 10 | 91.5 | 32 | 192.8 |
| 11 | 94.8 | 33 | 203.5 |
| 12 | 97.4 | 34 | 210.7 |
| 13 | 100.0 | 35 | 218.1 |
| 14 | 103.5 | 36 | 225.7 |
| 15 | 107.2 | 37 | 233.6 |
| 16 | 110.9 | 38 | 241.8 |
| 17 | 114.8 | 39 | 250.3 |
| 18 | 118.8 | | |
| 19 | 123.0 | | |
| 20 | 127.3 | | |
| 21 | 131.8 | | |

(Appendix B)

Default Values

| Setting | Value |
|---------------|-------|
| | |
| Volume Offset | 0 |
| Audio Out 1 | 16 |
| Audio Out 2 | 16 |
| Audio Out 3 | 16 |
| | |
| Mic 1 | 0 |
| Mic 2 | 0 |
| Mic 3 | 0 |
| Mic 2/3 | 0 |
| Mic 1/3 | 0 |
| Mic 1/2 | 0 |

(Appendix E)

Main

```

1 <GENERAL>
2 <AUDIO>
3 <NXDN>
4 <INFO>
5 <DISPLAY>

```

General

```

1 SQUELCH          3
2 VOL OFFSET       0
3 SCRLL MSG        1
4 <SET DFLTS>
5 <BACK>

```

Audio

```

1 <USER 1>
2 <USER 2>
3 <USER 3>
4 <FACTORY>
5 <BACK>

```

Digital

```

1 DEFLT RANTX      0
2 DEFLT RANRX      1
3 <BACK>

```

Info

```

SN 1234567890
DECK VER
HEAD VER
HEAD2 VER
MODEL
RADIO FIRM
7 <BACK>

```

Display

```

1 BRIGHTNESS      4
2 NXDN DATA       1
3 <BACK>

```

Set DFLTS

```

CONFIRM?
2 YES
3 <BACK>

```

User 1-3

```

1 MASTER          16
2 MY LVL          0
3 OTHER           0
4 <BACK>

```

Factory

```

1 FROM RADIO      4
2 TO RADIO        8
3 PANEL MIC       22
4 <BACK>

```