JEM Radio II
Operation Guide

Manual P/N M09999-999
Sept. 2024

JEM
COMMUNICATIONS, INC

2115 Victor Place
Colorado Springs, Colorado 80915
800.284.0399
www.jemcom.com

Table of Contents

Display

The main display shows the six digit AAR channel numbers for transmit and receive in enlarged print. To the right of the channel numbers is the home channel number along with the volume level. Just below the AAR channel numbers is where you'll see PLL frequencies or RAN codes when in use. On the fourth line you'll see the home channel name (if added), any digital messages, as well as any entry prompts.

In the image above, the radio is on home channel 3, volume level 7, RAN codes of 23 for TX/RX, and JEM HOME BASE channel name.

When the radio is transmitting "TX" will be displayed in the lower right corner.

When a transmission is received from another radio, the RSSI value is shown (-70 in the image above) in place of the home channel number and "BSY" will be displayed in the lower right corner.

When a transmission 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.

Channel Entry

A channel entry consists of entering 6 digits. The first three digits the AAR TX (transmit) channel and the second three are the AAR RX (receive) channel.

When using digital channels, the radio will default to RAN 01 for transmit, and RAN 00 for receive. 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.

When entering PLL frequencies on an analog channel, use the RAN button and reference the conversion table in Appendix A. (Example: RAN of 01 is PLL frequency 67.0.)

Text Messages

The JEM Radio II is capable of receiving and displaying text messages received from either an NXDN packet or from the network. When a text message is received, it will scroll 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, meaning they remain viewable even after the radio is restarted or loses power.

To view older messages, go to MENU > GENERAL > SCROLL MSG. If you press MENU on the default of '1' to view the most recently message received. Use the volume up and down button to change the SCROLL MSG number, followed by MENU to display the message(s). To view all stored messages, set SCROLL MSG to '0'. The JEM Radio II can store up to 10 messages.

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

Buttons

- The number buttons **0 – 9, '*', '#'** are used to send DTMF tones, enter AAR channels, PLL/ RAN codes and make menu selections.
- The **PTT** (Push To Talk) button will put the radio in transmit mode.
- The **VOL** button will increment/decrement 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 will provide you with access to the settings menu, along with access to various features such as the ability to display received text messages.
- Pressing **RAN** when on a **digital channel** button will display "RAN _ _ _ _".
- Pressing **RAN** when on an **analog channel** will display "PLL _ _ _ _". (See **Appendix A**) *(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 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 a network connection.

Bluetooth

The JEM Radio II is equipped with Bluetooth for data and audio. Users can program the core radio via the Bluetooth data connection, or pair a Bluetooth headset to the radio to send and receive audio. When a Bluetooth headset is paired to core radio, all audio will be routed through the paired device.

Network Use

On the back of the JEM Radio II is a network interface port. Currently, you can use the JEM programming software to program home channels and adjust minimum volume levels through the network port. In the future, it may be possible to use this port to remotely control the JEM Radio II, perform firmware upgrades, send text messages to the display, and get information about the radio itself.

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 button will present the user with a list of options and settings. To select an item, press the corresponding number on the keypad. For example, press '1' to select GENERAL. The volume up and down arrows are used to make adjustments to a particular setting, such as squelch, display brightness or volume.

To exit menu mode, press the MENU key. Conversely, you can also press CHAN, HOME, RAN or PTT to exit the menu.

Note, some of features may not be present in the menu due to being disabled during programming based on each customers needs. Please refer to the *JEM Radio II Software Guide* for more information about programming and customizing the functionality of the JEM Radio II.

See **Appendix C** for the menu hierarchy.

GENERAL

GENERAL	DESCRIPTION
1 SQUELCH	Adjusts the squelch level of the radio when on analog channels. The squelch cannot be adjusted when on digital channels.
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, a negative value will make it lower. Value can range from (-10 to + 10).
3 SCRLL MSG	Set number to any number between 0 and 10 to view a previously received message. Where 1 displays the most recent message, and selecting 0 will display all messages in memory. After selecting a number, press MENU to begin showing the message(s).
4 <SET DEFAULTS>	Sets all of the audio levels back to the default states. See **Appendix B** to view defaults.

AUDIO

AUDIO	DESCRIPTION
1 <USER 1>	Controls the audio levels of the connection to the 6-pin connector.
2 <USER 2>	Controls the audio levels of the connection to the 12-pin connector.
3 <USER 3>	Controls the audio levels of the connection to the 6-pin connector on the back of the head, when used in a two piece configuration.
4 <FACTORY>	Shows values for factory audio levels.
<USER 1> or <USER 2> or <USER 3>	
MASTER	The volume level of the specific output
MY LEVEL	The level that is heard on the audio out pin from the mic input (sidetone) of the same connector.
OTHER	The level that is heard from the other two audio inputs
<FACTORY>	
From Radio	Level of audio coming from the 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 microphone. A value of 20 is unity gain through the volume. A higher value will make it more sensitive.

NXDN

NXDN	DESCRIPTION
1 DEFLT RANTX 2 DEFLT RANRX	Here you can change the default RAN codes for use on digital channels that aren't used as home channels. When necessary, all home channels that require RAN codes should be entered using the C05053 programming application. If no values are entered for a home channel, the radio will default to RAN codes of 01 00 and an error will be displayed as a warning when the data is written to the device.

INFO

INFO	DESCRIPTION
“SN”	The assigned serial number for the JEM Radio II
DECK VER	JEM supplied firmware for the deck of the radio
HEAD 1 VER	JEM supplied firmware for the head of the radio
HEAD 2 VER	JEM supplied firmware for the second head of the radio, if there is one.
MODEL	Model of internal radio
RADIO FIRM	Some versions of the JEM Radio II will show the core radio's firmware. However, the feature is unavailable on units with the Kenwood NX-5700 core radio installed.

DISPLAY

DISPLAY	DESCRIPTION
BRIGHTNESS	Use the volume up or down buttons to adjust the display's brightness.
NXDN DATA	A setting of 0 disables all NXDN data (talk groups and text messages) from being shown on the display. A setting of 1 will show NXDN data on the display. Note: Even when disabled, a user can still access and view any text messages stored in memory through the menu.

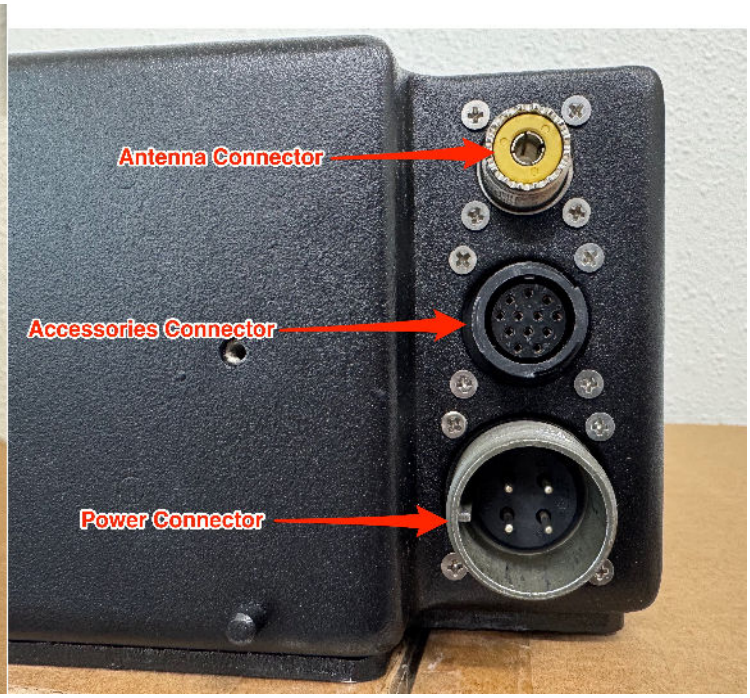
BLUETOOTH

BLUETOOTH	DESCRIPTION
<MY DEVICES>	Lists previously paired Bluetooth devices. Selecting a device's name will attempt to connect the core radio to the device.
<FIND DEVICES>	Used to pair a Bluetooth device to the core radio.
<DELETE DEVICE>	Used to delete previously paired Bluetooth devices from the core radio's memory.

Error Messages

Message	Cause
“NON-HOME ONLY”	Displayed when the RAN button is pressed when the radio is on a home channel.
“PTT is ON”	When the radio powers up and any of the PTT inputs are 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
A	Audio Out
E	GND
F	Hook 1
J	VCC
K	VCC
L	Mic Audio 3
M	Speaker -
N	Speaker +
S	RXF 232
T	TXF 232
U	PTT 1
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)
00	NO TONE
01	67.0
02	69.3
03	71.9
04	74.4
05	77.0
06	79.7
07	82.5
08	85.4
09	88.5
10	91.5
11	94.8
12	97.4
13	100.0
14	103.5
15	107.2
16	110.9
17	114.8
18	118.8
19	123.0
20	127.3
21	131.8

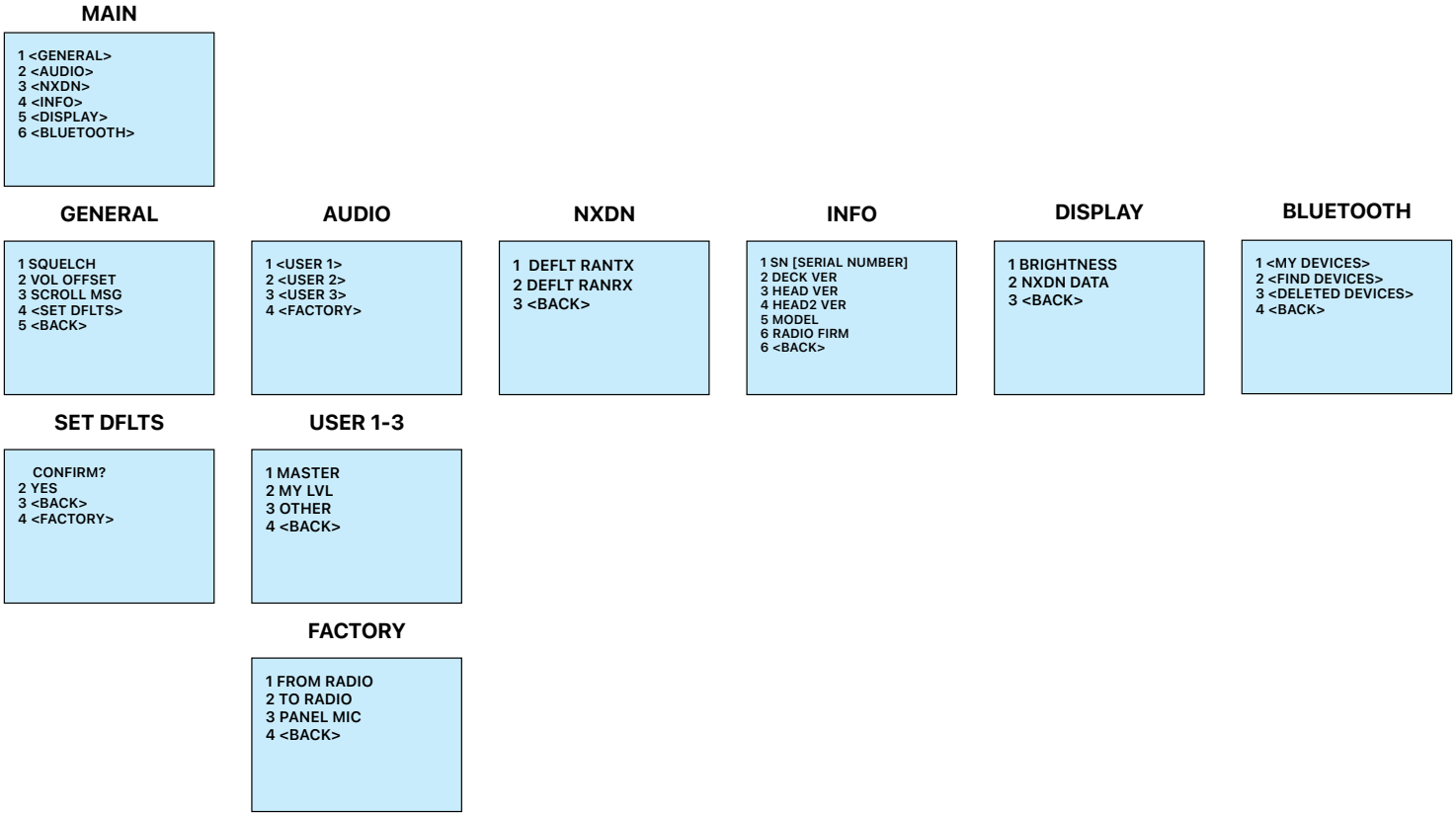
2 Digit Code	Frequency (Hz)
22	136.5
23	141.3
24	146.2
25	151.4
26	156.7
27	162.2
28	167.9
29	173.8
30	179.9
31	186.2
32	192.8
33	203.5
34	210.7
35	218.1
36	225.7
37	233.6
38	241.8
39	250.3

Appendix B

Default Volume 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 C


MAIN
1 <GENERAL>
2 <AUDIO>
3 <NXDN>
4 <INFO>
5 <DISPLAY>
6 <BLUETOOTH>
GENERAL
1 SQUELCH
2 VOL OFFSET
3 SCROLL MSG
4 <SET DFLTS>
5 <BACK>
AUDIO
1 <USER 1>
2 <USER 2>
3 <USER 3>
4 <FACTORY>
NXDN
1 DEFLT RANTX
2 DEFLT RANRX
3 <BACK>
INFO
1 SN [SERIAL NUMBER]
2 DECK VER
3 HEAD VER
4 HEAD2 VER
5 MODEL
6 RADIO FIRM
6 <BACK>
DISPLAY
1 BRIGHTNESS
2 NXDN DATA
3 <BACK>
BLUETOOTH
1 <MY DEVICES>
2 <FIND DEVICES>
3 <DELETED DEVICES>
4 <BACK>
SET DFLTS
CONFIRM?
2 YES
3 <BACK>
4 <FACTORY>
USER 1-3
1 MASTER
2 MY LVL
3 OTHER
4 <BACK>
FACTORY
1 FROM RADIO
2 TO RADIO
3 PANEL MIC
4 <BACK>