Go Beyond Normal Limits...℠

RITRON®

W I R E L E S S   S O L U T I O N S

RCCR CLEAN CAB LOCOMOTIVE RADIO
Owner's Manual

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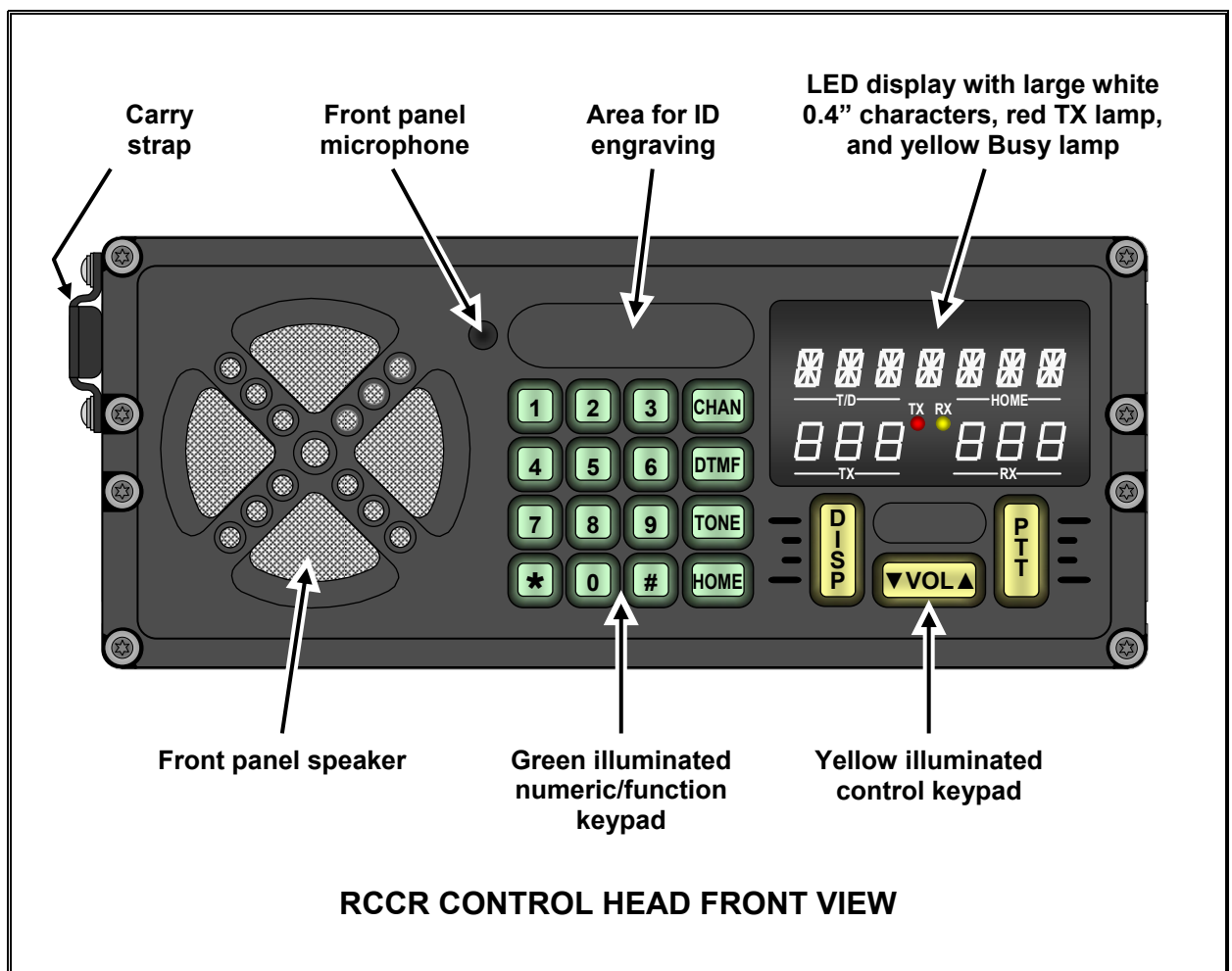
Table of Contents

Introduction

The Ritron RCCR radio is designed specifically for Clean Cab locomotive operation and meets all AAR specifications for fit, form and function. The location of all connectors is consistent with AAR standards to allow the easy replacement of a Clean Cab radio without re-routing existing cables.

The RCCR radio is available in two models:

RCCR-151   A single-piece radio with the control head attached to the main radio.

RCCR-152   A two-piece radio with the control head detached from the main radio.

The RCCR-152 control head is connected to the main radio via an AAR standard 19-pin connector cable. The female mating connector on the main radio can be located on either the rear or the front of the radio to allow maximum flexibility during installation. A small plate covers the unused connector location. The male mating connector is located on the back of the RCCR-152 control head. The control head is designed to mount in the standard AAR opening in the locomotive throttle stand or overhead.

Carry strap   **Front panel microphone**   **Area for ID engraving**   **LED display with large white 0.4" characters, red TX lamp, and yellow Busy lamp**

Front panel speaker   **Green illuminated numeric/function keypad**   **Yellow illuminated control keypad**

RCCR CONTROL HEAD FRONT VIEW
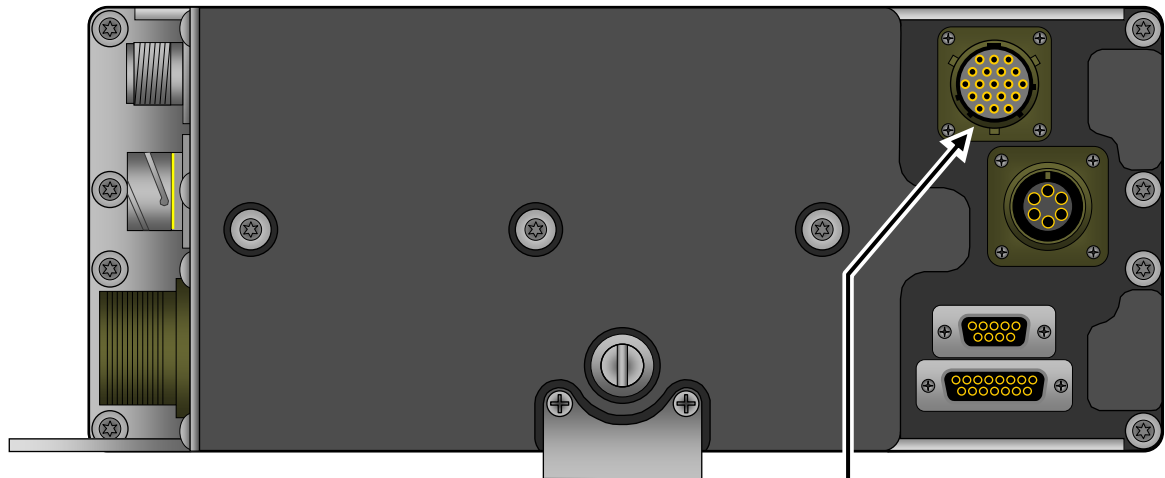
RCCR-152 – RADIO REAR VIEW

The 19-Pin female connector can be installed in either location.

RCCR-152 – RADIO FRONT VIEW

Go Beyond Normal Limits...™

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WIRELESS SOLUTIONS
DESIGNED & MANUFACTURED IN CARMEL, INDIANA 46032 U.S.A.
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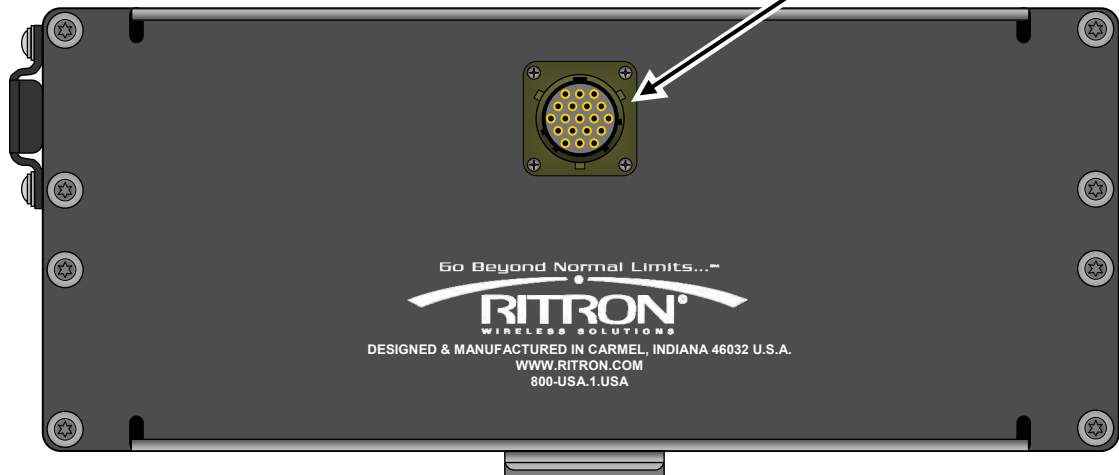
Channel Zone Set-Up

The RCCR -151 Locomotive Radio can be set-up using the front panel keypad such that any or all of the available Channel Zones are enabled for normal radio operation. The available zones are:

- Home Channel Zone (1 – 500)
- Wideband Channel Zone (AAR03 – 97)
- Narrowband Channel Zone (AAR005 – 097)
- Narrowband Offset Zone (AAR104 – 197)
- Digital Channel Zone (AAR302 – 488)

IMPORTANT!
DO NOT pause more than 2 seconds between keypad presses prior to the completion of set-up, otherwise the radio will automatically resume normal operation and the operator must begin at Step 1.

To enable Channel Zones using the front panel keypad:

1. Press **CHAN** - **#** - **6** – **2** – **7 – 7 – 6 - 9**

2. "**CH PLAN**" will be displayed on the top row of the LED Display.

3. Referring the table below, press the keypad digits to enable the corresponding channel zone(s) you wish to enable.

    1 – Home Channel Zone (1 – 500)
    2 – Wideband Channel Zone (AAR03 – 97)
    3 – Narrowband Channel Zone (AAR005 – 097)
    4 – Narrowband Offset Zone (AAR104 – 197)
    5 – Digital Channel Zone (AAR302 – 488)

4. After last digit is pressed, wait 2 seconds and the radio will automatically resume to normal operation.

5. If a channel from a list that is not enabled is entered using the front keypad, "**INVALID**" will be displayed momentarily (2 sec), and then the last valid channel entered will be displayed.

The following example illustrates a Channel Zone Set-Up to enable only the Narrowband Channel Zone (3) and Digital Channel Zone (5).

Press **CHAN - # - 6 – 2 – 7 – 7 – 6 – 9** ►   **CH PLAN** is displayed ►   Press **3 – 5**
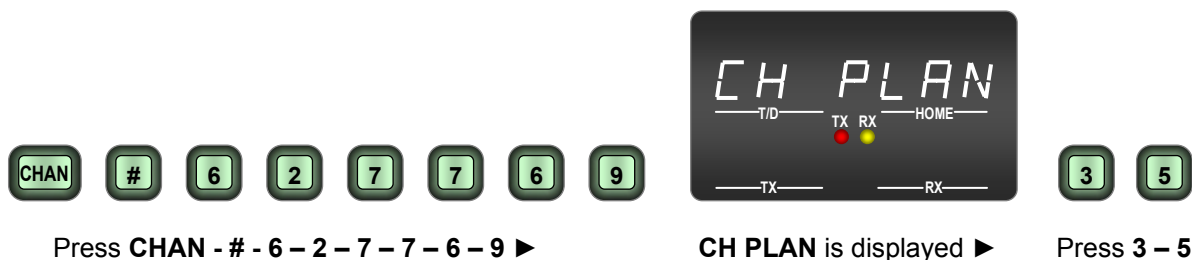
CHAN **AAR Channel Selection**

The **CHAN** button is used in conjunction with the numeric keypad to select AAR channels:

- 03 - 97 for Wide Band (25 kHz) operation
- 005 - 097 for Narrow Band (12.5 kHz) operation
- 104 - 197 for Narrow Band (12.5 kHz), 7.5 kHz Offset operation
- 302 – 488 for Digital (6.25 kHz) operation

Refer to chart "AAR Channels" on page 31 for the complete list of AAR frequencies available with the **CHAN** button. Note that wide band channels 05-97 are the same frequency as the corresponding narrow band channels 005-097, only the operating bandwidth is different. 7.5 kHz offset, narrow band channels 104-197 operate the transmitter and the receiver on a frequency 7.5 kHz higher than the selected AAR channel. For example, wide band channel 12 and narrow band channel 012 both operate at 160.290 MHz while narrow band offset channel 112 operates 7.5 kHz above channels 12 and 012 at 160.2975 MHz.

Mixed Bandwidth

When entering AAR channel pairs the TX and RX frequencies must use the same bandwidth. It is not possible to enter a mixed wide/narrow band TX/RX pair. For example, if the TX frequency is entered to operate Wide Band and the RX frequency is entered to operate Narrow Band the radio will not allow it and revert to the last valid channel entry.

Invalid Channel Entries

If an invalid AAR channel entry is attempted "*INVALID*" will momentarily show across the top of the display and no changes will be made.

When selecting an AAR channel, the maximum delay between digit entries is 2 seconds (programmable, factory value). If the 2 seconds between digits is exceeded the radio will:

- Revert back to the last valid entry if digits entered up to the point of the delay were not valid.

- Operate on the channels specified by the digits entered up to the point of the delay if they are valid. For example, you intend to enter channel 11 for TX and 21 for RX but delay after entering the 3rd digit. The radio will be set to operate on 112 TX and 112 RX because the 3 digits entered (112) are a valid Quick Entry channel.

Non-AAR Channels

Valid AAR channels are 03-97, 005-097, 104-197 and 302-488 per chart "AAR Channels" on page 31. Any other channel entry must be made via a HOME channel. See the section "Home Channel Selection" for details on the programming and use of HOME channels.

CTCSS or DCS Tone Squelch

AAR channel selection using the **CHAN** button is carrier squelch only. If CTCSS or DCS is required the channel must be selected via a HOME channel entry. See the section "Home Channels" for details on the programming and use of HOME channels.

DTMF Sequences or Single-Tone

If a DTMF sequence or a Single-Tone is displayed at the time an AAR Channel entry is made, it will be retained after the new channel is selected. See sections "DTMF Tones", "Single-Tone" and "**DISP** Button" for instructions on the use of DTMF sequences and Single-Tones.


Ritron RCCR Clean Cab User Manual   *4*

Ritron, Inc.   **(800)-USA-1-USA**   **ritron@ritron.com**

OPERATING THE RADIO

CHAN Button Disable

The **CHAN** button can be disabled using the Ritron RCCR programmer. When disabled the **HOME** button must be used for channel selection.

## *To enter a Wide Band AAR frequency pair press:*

CHAN   1.   **CHAN** button

1   2.   Digit 1 of the 2-digit AAR channel for TX

2   3.   Digit 2 of the 2-digit AAR channel for TX

4   4.   Digit 1 of the 2-digit AAR channel for RX

7   5.   Digit 2 of the 2-digit AAR channel for RX

CHAN   6.   **CHAN** button <u>or</u> wait 2 seconds
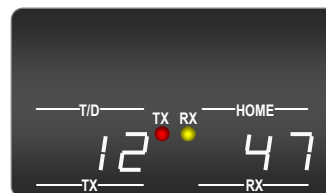
Resulting Display

To enter a Narrow Band AAR frequency pair press:

CHAN   1.   **CHAN** button

0   2.   Digit 1 of the 3-digit AAR channel for TX

1   3.   Digit 2 of the 3-digit AAR channel for TX

2   4.   Digit 3 of the 3-digit AAR channel for TX

1   5.   Digit 1 of the 3-digit AAR channel for RX

4   6.   Digit 2 of the 3-digit AAR channel for RX

7   7.   Digit 3 of the 3-digit AAR channel for RX
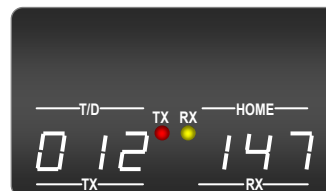
Resulting Display

For Quick Entry of an AAR frequency pair with the same TX/RX press:

CHAN   1.   **CHAN** button

0   2.   Digit 1 of the AAR channel

1   3.   Digit 2 of the AAR channel

2   4.   Digit 3 of the AAR channel (if narrowband)

CHAN   5.   **CHAN** button <u>or</u> wait 2 seconds
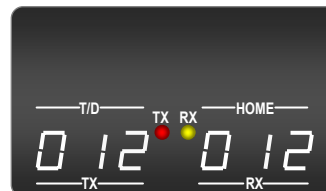
Resulting Display

DTMF Tones

DTMF tones can be transmitted directly by pressing the numeric keypad, or the DTMF Button can be used in conjunction with the numeric keypad to create a DTMF sequence of up to 3-digits. A DTMF sequence entered using the DTMF button is stored and displayed, and can then be transmitted by simply pressing the DISP dispatch button. DTMF tones are heard on the front-panel speaker whenever they are being transmitted.

RCCR Programmer Options that Affect DTMF Operation

Dispatch Sequence allows a DTMF Sequence of up to 3-digits otherwise a single-digit is all that is allowed.

Keypad Disable prevents DTMF from being sent directly whenever the numeric keypad is pressed, but still allows you to create a DTMF sequence using the DTMF button.

* Disable or # Disable prevents DTMF characters * or # from being sent directly whenever the numeric keypad is pressed.

DTMF Disable prevents use of the DTMF button to create a DTMF sequence, but does not prevent sending DTMF directly using the numeric keypad.

DTMF Single-Digit

- Sets a single-digit for DISP dispatch button operation.
- "Dispatch Sequence" selection on the RCCR programmer must be unchecked.
- The DTMF single-digit will be transmitted when entered.
- The DTMF single-digit entered will be preceded by a "D", appearing in the upper left side of the display in the area designated "—T/D—".
- The DTMF single-digit will be retained when the Channel is changed.

DTMF Sequence

- Allows a DTMF sequence of up to 3-digits for DISP dispatch button operation.
- "Dispatch Sequence" selection on the RCCR programmer must be checked.
- The DTMF dispatch sequence entered will appear in the upper left side of the display in the area designated "—T/D—".
- To transmit the DTMF sequence, press the DISP dispatch button.
- The DTMF dispatch sequence will be retained when the Channel is changed.

To enter a Single-Digit DTMF for dispatch press:

1. DTMF button

2. Desired DTMF digit.
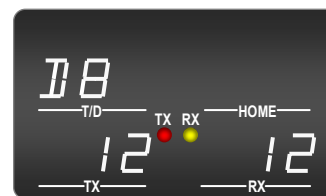   Radio will transmit the DTMF digit

Resulting Display

To enter a DTMF Sequence for dispatch press:

DTMF	1.	**DTMF** button
8	2.	Digit 1 of the DTMF sequence
9	3.	Digit 2 of the DTMF sequence (if desired)
0	4.	Digit 3 of the DTMF sequence (if desired)
DTMF	5.	**DTMF** button <u>or</u> wait 2 seconds (if less than 3 digits are entered)
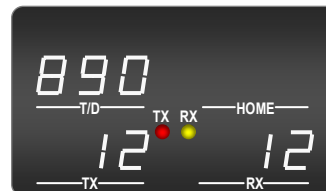
Resulting Display

[TONE]   # Single-Tone

The **TONE** Button is used in conjunction with the numeric keypad to send one of 9 different AAR single-tones. Once entered, the tone can be transmitted by simply pressing the **DISP** dispatch button. AAR single-tones are heard on the front-panel speaker whenever they are being transmitted.

- The AAR single-tone will be transmitted when entered.
- The AAR single-tone entered will be preceded by a "T", appearing in the upper left side of the display in the area designated "**—T/D—**".
- Keypad buttons 0, * and # are not valid single-tone entries.
- The AAR single-tone will be retained when the Channel is changed.
- *TONE Disable* can be set using the RCCR Programmer to prevent use of the **TONE** button to enter or send an AAR single-tone. This will not prevent the DISP button from transmitting any AAR single-tone that has been programmed into a HOME channel.

AAR Single-Tones	
Button	Tone (Hz)
1	900
2	1478
3	1748
4	1800
5	1900
6	2200
7	2400
8	2600
9	2800

To enter a Single-Tone press:

| TONE | 1. | **TONE** button |
| 8 | 2. | Desired Single-Tone Radio will transmit the Single-Tone |
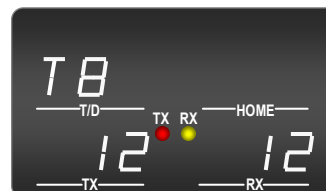
Resulting Display

DTMF or Single-Tone Dispatch

The **DISP** button is pressed to transmit any DTMF or Single-Tone that has been entered into the radio.
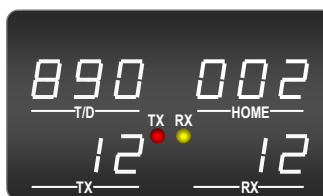
- The DTMF sequence or AAR single-tone sent is normally indicated in the upper left side of the display in the area designated "**—T/D—**".

- If no DTMF or Single-Tone is entered the DISP button has no effect.

- HOME channels can be programmed with an associated DTMF or AAR Single-Tone that will be automatically entered into the "**—T/D—**" area whenever that HOME channel is selected.

- When a HOME channel is programmed with an alphanumeric description, the DTMF or AAR Single-Tone will <u>not</u> be displayed until the DISP button is pressed. The DTMF or AAR single-tone will be shown in the upper left side of the display in the area designated "**—T/D—**" while the tone is sent, and will return to the alphanumeric description upon completion of the tone(s).

  In the example below HOME channel 002 is programmed with an alphanumeric description "INDYCOM" and a DTMF sequence "890".
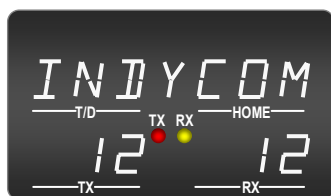
Alphanumeric Home Channel display ►	Press **DISP** ►	DTMF or Single-Tone transmitted ►	Alphanumeric Home Channel display
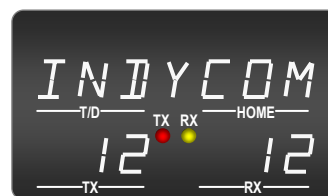
Transmit and Busy Indication

A red "TX" transmit light and yellow "RX" busy light are located in the center of display. The "TX" lights any time the radio is transmitting and the "RX" lights whenever the radio receives a transmission.
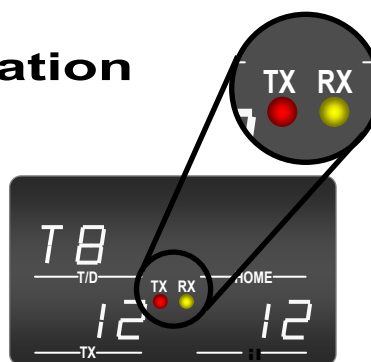
▼VOL▲ Volume

The VOL button is a toggle switch used to incrementally increase or decrease the front-panel speaker volume. Pressing the right side of the VOL button will increase speaker volume while pressing the left side will decrease volume. As the volume is changed the display will indicate the volume level and a tone will be heard. Volume can be set to a value between 1 and 20. The volume level can be adjusted by pressing the VOL button for each increment, or by holding the VOL button down to automatically increment.

Volume Display

- When pressing the VOL button, any "**—T/D—**" or "**—HOME—**" indications on the display will be momentarily replaced by the Volume Level and will reappear when the VOL button is released.

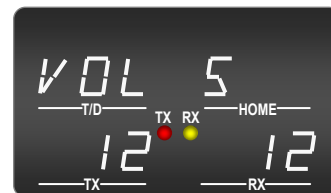- The RCCR PC programmer can be used to set a minimum allowable volume. For example, if the radio is set for a minimum volume of 3 the VOL button will never be able to lower the volume below level 3.

- The VOL button does not change the handset speaker audio. Handset volume is at a fixed level that can be set using the RCCR PC programmer.

- The RCCR PC programmer can set the AUX volume to a fixed level, or allow it to be adjusted by the VOL button.

PTT PTT (Push-to-Talk)

The PTT button is pressed to transmit voice message from the front-panel microphone. The red "TX" lamp in the center of the display will illuminate whenever the PTT button is pressed to indicate that the transmitter is active. The radio will transmit on the channel indicated in the "**—TX—**" area on the lower left side of the display.

It is important to monitor the channel before transmitting to avoid interference with other radio users. If the "**—TX—**" and "**—RX—**" are set to the same channel and you hear a received voice signal in the front-panel speaker, you should wait for the received signal to go away before pressing the PTT button. The yellow "RX" busy lamp in the center of the display is another indication that a signal is received.

Brightness Control

Display brightness is automatically adjusted depending on the ambient light in the locomotive cab, dimming in low light and increasing intensity in high light. The keypad is automatically backlit in low light conditions.

HOME ## Home Channel Selection

The **HOME** button is used in conjunction with the numeric keypad to select up to 500 HOME channels.

Each HOME channel can be custom programmed for:

- Transmit frequency and bandwidth
- Receive frequency and bandwidth
- CTCSS or DCS encode and/or decode
- DTMF or Single-Tone dispatch code
- 7-character alphanumeric description

A HOME channel is selected by pressing the **HOME** button and then entering a 1, 2 or 3-digit HOME channel number using the numeric keypad. Once entered, the transmit and receive channels will be displayed in the areas designated "**—TX—**" and "**—RX—**". The HOME channel number will be displayed in the area designated "**—HOME—**" unless an alphanumeric description has been assigned, in which case the description will be appear on the top row across the entire width of the display. If an invalid HOME channel entry is attempted "*INVALID*" will momentarily show across the top of the display and no changes will be made.

The following example illustrates a HOME channel number 124 programmed for AAR channel 12 transmit and AAR channel 47 receive with a DTMF dispatch code of 890.

To select a HOME channel press:

HOME　1.　**HOME** button

1　　2.　Digit 1 of the HOME channel
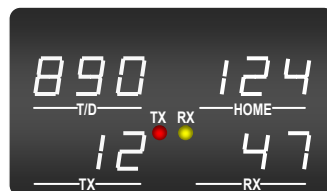
2　　3.　Digit 2 of the HOME channel (if required)

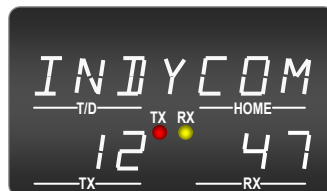**4**　　4.　Digit 3 of the HOME channel (if required)

HOME　5.　**HOME** button or wait 2 seconds
　　　　(if less than 3 digits are entered)

Resulting Display

If an alphanumeric description "INDYCOM" is programmed in the example above, the resulting display would be:

Resulting Display

Revert to Last TX/RX Channel Pair

A special feature of the HOME button allows the radio to toggle between the last 2 TX-RX channel pairs entered by pressing the HOME button and then the **#** button. This can be channel pairs that were entered via the CHAN button or the HOME button. This is convenient for railroads that operate on 2 primary TX-RX pairs to allow the user to quickly change between the two.

<u>**To toggle between the last two TX-RX channel pairs press:**</u>

1.   HOME button

2.   # button

Error Messages

Error messages are displayed when certain radio malfunctions are detected to alert the user of potential problems with the unit.

INVALID

This error message will appear momentarily any time an invalid channel entry is made.   If an invalid AAR CHAN button entry or HOME channel entry is attempted "**INVALID**" will momentarily show across the top of the display and no changes will be made.
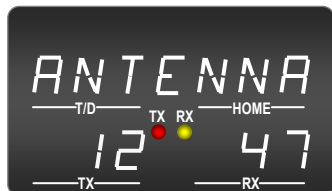
ANTENNA

If an antenna VSWR greater than 3:1 is detected while the radio is transmitting "**ANTENNA**" will show across the top of the display. The display will revert back to normal once the transmitter is released, or if the high VSWR condition is corrected. The radio will still transmit into the antenna with VSWR conditions greater than 3:1, albeit at reduced RF output levels. If the "**ANTENNA**" error should appear check the antenna connection to the radio, the antenna cable, and the antenna itself for damage.

RCCR Connectors – Rear Panel

Remote Control Head (19-Pin Female)

A Mic Audio	**H** No Connection	**P** No Connection
B No Connection	**J** Vcc	**R** No Connection
C No Connection	**K** Not Used	**S** RXD 232
D No Connection	**L** Ground	**T** TXD 232
E Mic Ground	**M** Speaker (-)	**U** Handset Ground
F Not Used	**N** Speaker (+)	**V** Handset Audio
G No Connection		

Rear Handset (6-Pin)

A Mic Audio
B Mic Ground
C PTT
D PTT Ground
E Receive Audio
F Not Used
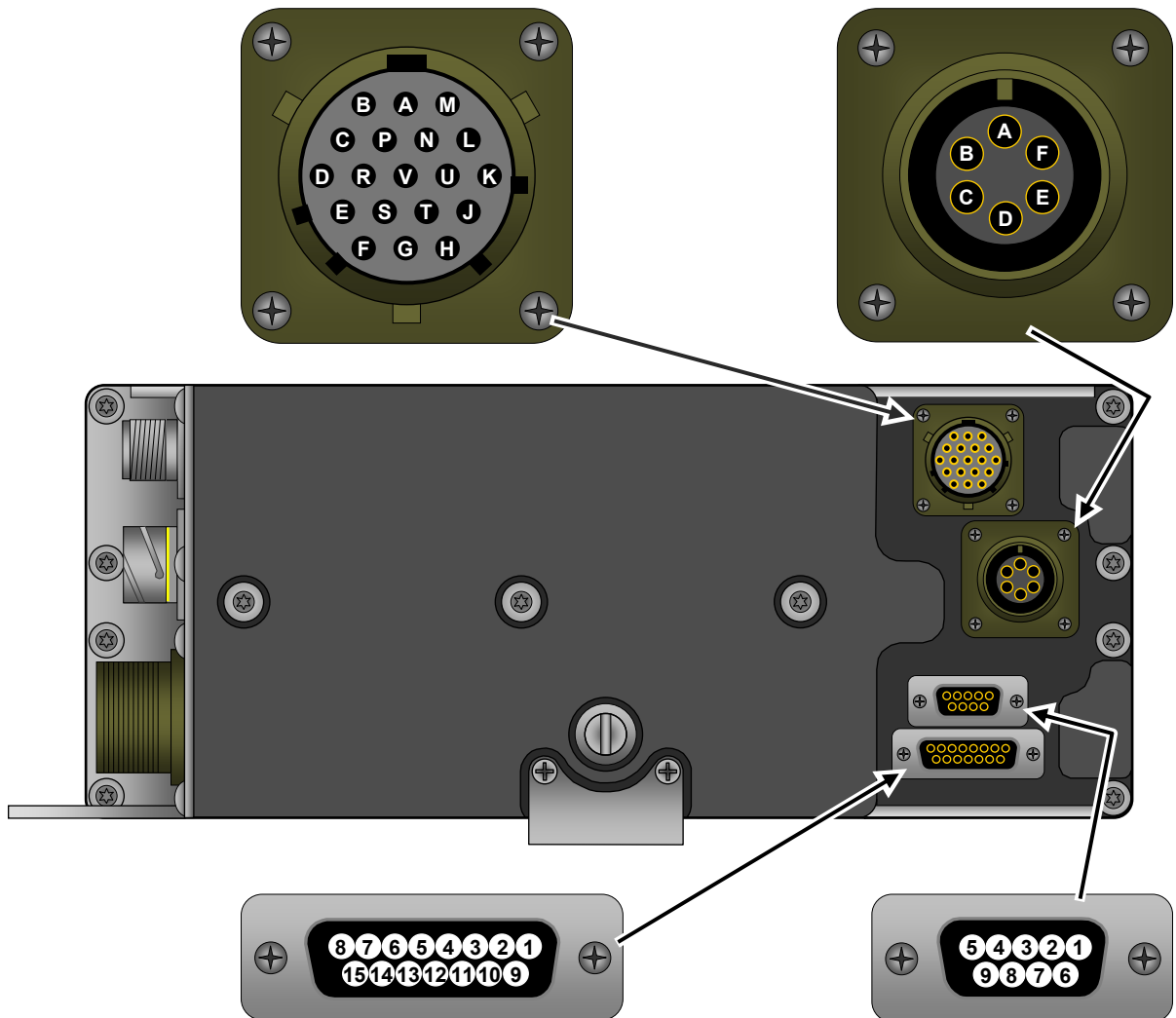
Accessory / Program Connector (DB15)

1	TD	**6**	MONITOR	**11** GROUND
2	CD	**7**	SPAREIN	**12** RD
3	ACC_TX	**8**	SPAREOUT	**13** DTR
4	EXPTT	**9**	DISC_OUT	**14** RTS
5	MUTE	**10**	ACC_AUD	**15** CTS

Data Connector (DB9)

1	No Connection	**6**	DSR
2	RD	**7**	RTS
3	TD	**8**	CTS
4	No Connection	**9**	No Connection
5	Ground		

RCCR Connectors – Side Panel

Antenna Connector (SO-239)
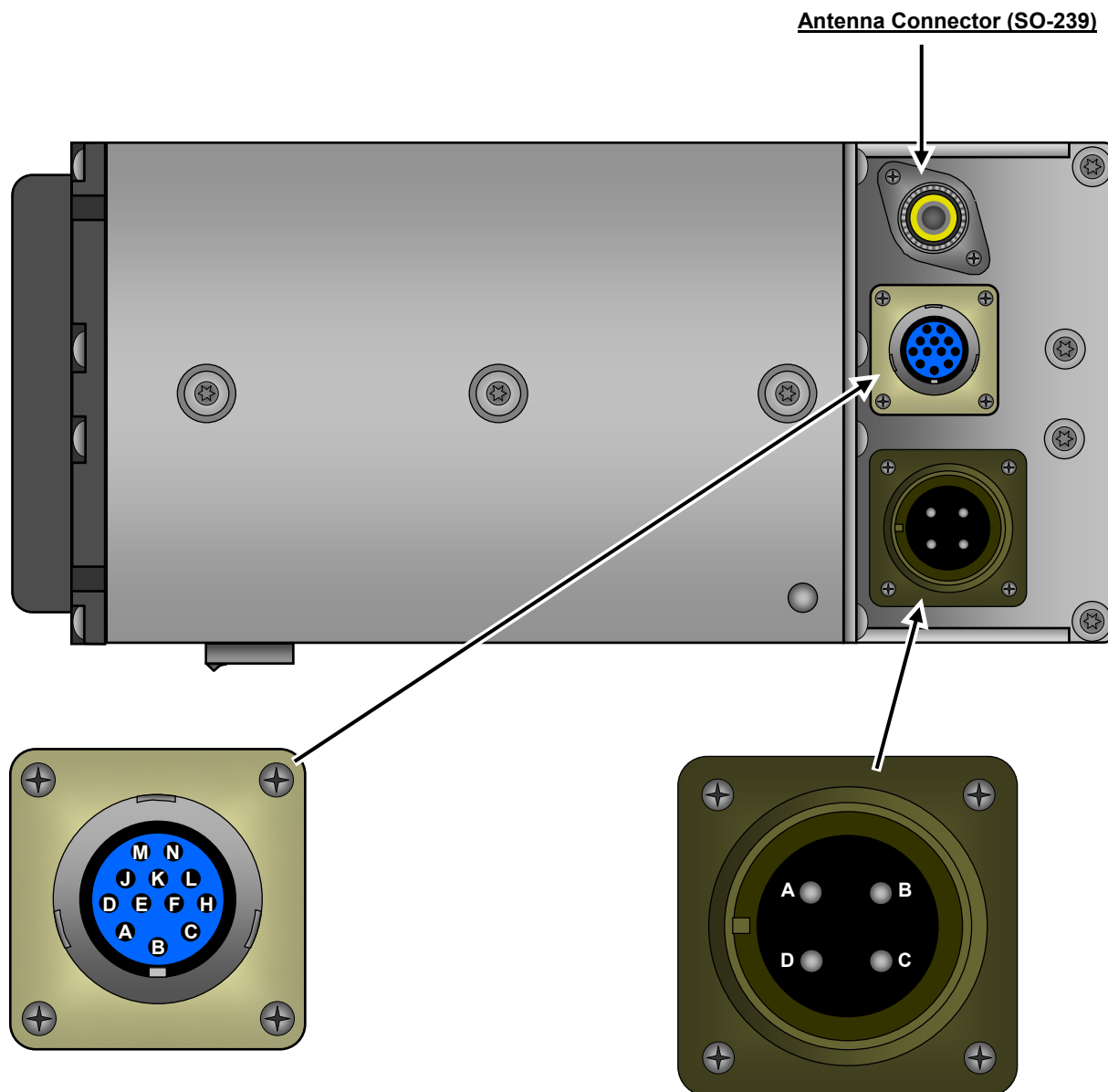
Auxiliary Connector (12-Pin)

A	Remote Mic	**H**	Audio Ground
B	Mic Ground	**J**	13.6VDC Ground
C	Remote PTT	**K**	Not Used
D	PTT Ground	**L**	Not Used
E	Remote Audio	**M**	External Speaker (+)
F	+13.6 VDC	**N**	External Speaker (-)

Power Connector (4-Pin)

A	+72 VDC
B	-13.6 VDC Ground
C	-72 VDC
D	+13.6 VDC

RCCR Connectors – Remote Head
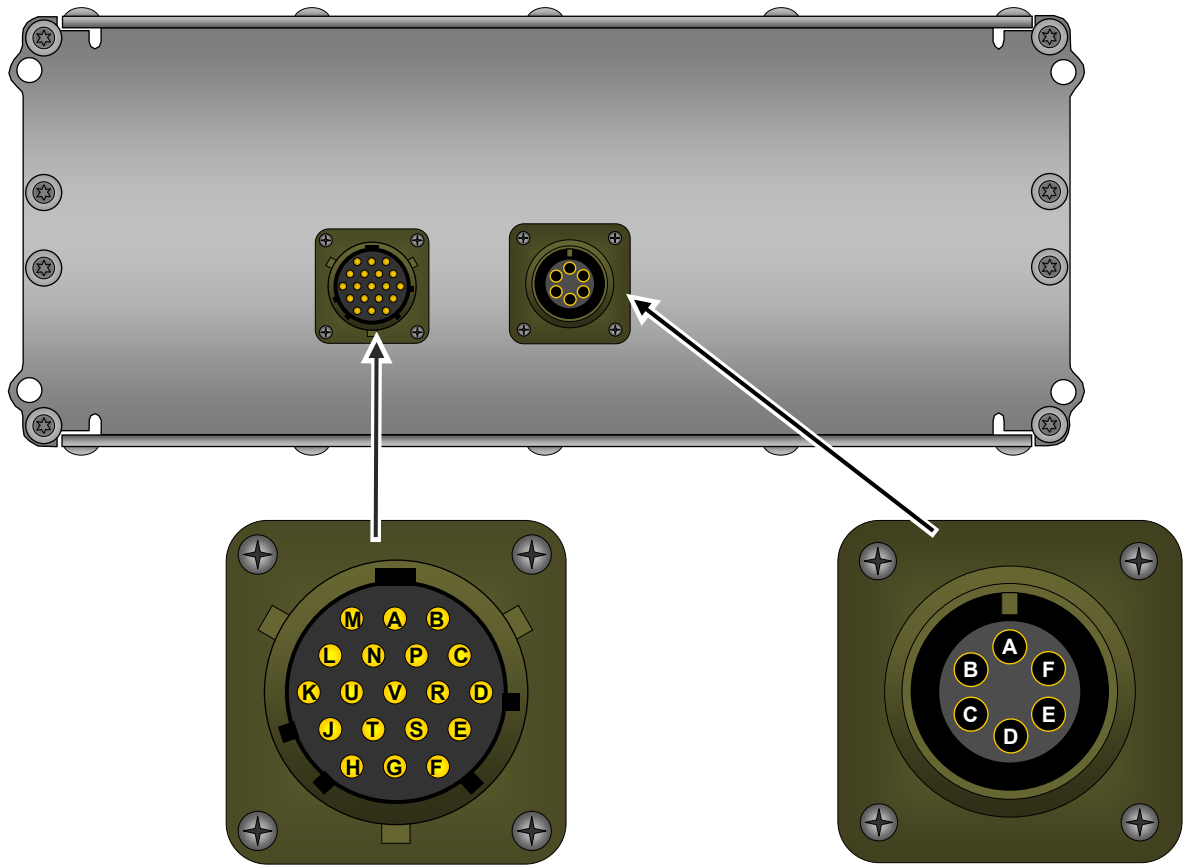
Remote Control Head (19-Pin Male)

A Mic Audio	**H** No Connection	**P** No Connection
B No Connection	**J** Vcc	**R** No Connection
C No Connection	**K** Not Used	**S** RXD 232
D No Connection	**L** Ground	**T** TXD 232
E Mic Ground	**M** Speaker (-)	**U** Handset Ground
F Not Used	**N** Speaker (+)	**V** Handset Audio
G No Connection		

Remote Head Handset (6-Pin)

A Mic Audio
B Mic Ground
C PTT
D PTT Ground
E Receive Audio
F Not Used

PROGRAMMING THE RADIO

Getting Started

The RCCR radio is programmed through the DB-15 connector located on the rear of the radio. Ritron model RCCR-PAC programming cable connects the radio to the serial communications port of the computer. The RCCR programmer is a Windows based software package used to set all radio operating parameters.

Connecting to the Computer

The RCCR radio is connected to the serial communications port of your computer using the PC/Radio cable assembly included in the RITRON model RCCR-PCPK-1.0 Programmer Kit. If you do not have the PC/Radio cable assembly it can be purchased from RITRON. The DB-15 to DB-9 cable is RITRON PN# RCCR-PAC.

Once the PC/Radio cable assembly has been connected to the computer, the correct COM Port must be selected from the **COM Port** menu item under the **Radio** menu on the RCCR Programmer Main screen.

The Programmer Screen

The programmer screen pictured below will appear whenever the RITRON RCCR Programmer is first opened. This is the starting point of any programming operation you wish to perform.

If an RCCR radio is connected to the computer when the programmer is first opened the radio's programming will be automatically read in and displayed. If a radio is not connected the Radio Definition File named **RCCR_default.rdf** will be read in. See "Open File" and "Save File" topics in this manual for information on the use of Radio Definition Files.

The pull-down menus **File** and **Radio** at the top left of the screen are used to open and save Radio Definition Files for recurring use, and to read and write data to the RCCR radio.

Menu item **Help** will open a programmer help file, while menu item **AAR Frequencies** will open a file containing a full list of AAR channels. Both files are in pdf format and require that Adobe Acrobat Reader be installed on your computer hard drive to view them. They cannot be edited and are for reference only.

The **Customer ID** field allows you to enter up to 25 characters of text to help identify the radio or Radio Definition FIle.

A row of tabs, located below the pull-down menus, are used to access the many programmable attributes of the RCCR radio.
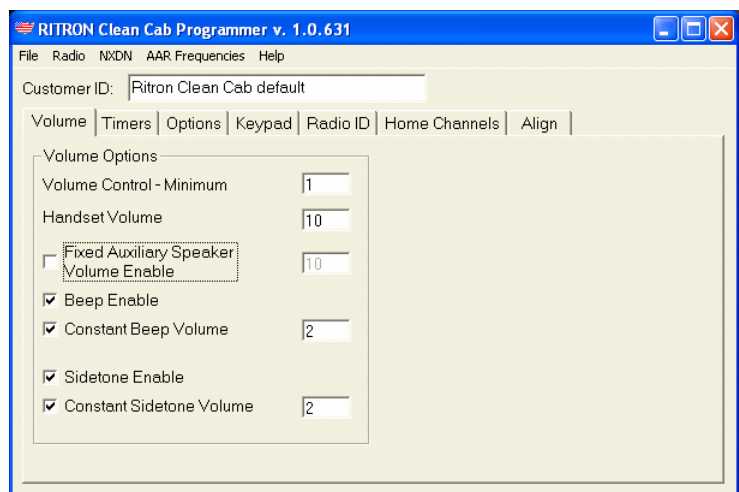
RCCR Programmer Screen

Programmer Menus

Open File

Radio Definition Files saved to your computer hard drive can be read to review programming of radios currently in service or for programming other radios to the same set-up.

To read a Radio Definition File:

1. From the **File** menu, select the **Open File** menu item.

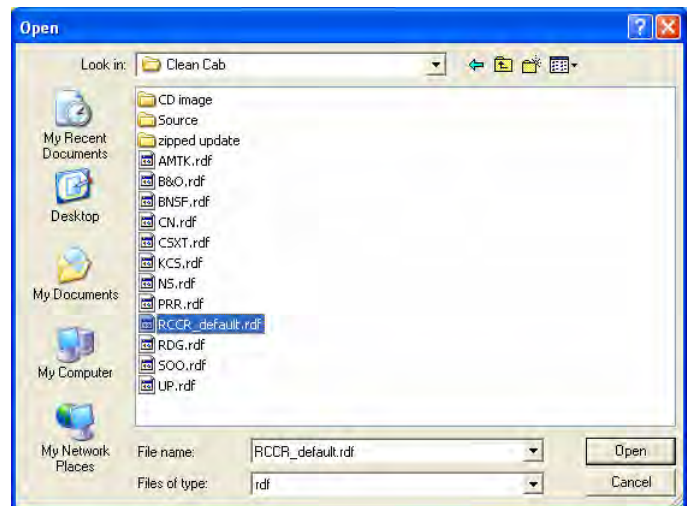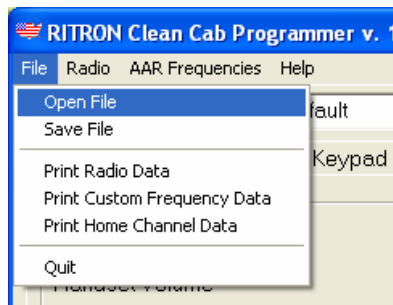2. The **Open** dialog box will appear. The standard Windows directory tree is available for navigation to alternative file locations on your computer hard drive. Use the "Look In:" pull-down menu to select the location of the Radio Definition File to be read. The dialog box will initially open to the Windows directory that contains the RCCR Programmer software.

3. Radio Definition Files are saved with an ".rdf" file extension. The dialog box will present a list of all ".rdf" files contained in the currently displayed Windows file directory.

4. Select the filename of the Radio Definition File to be opened from the list.

5. Press the **Open** button to open the Radio Definition File. As an alternative, you can double-click on a filename in the list to open the Radio Definition File.

6. The programmer screens will now display the radio programming information read from the Radio Definition File.

Open Dialog Box

Save File

After a radio's programming has been read or changed, you may want to save a Radio Definition File detailing the radio programming for future reference. Radio Definition Files are useful for reviewing a radio's programming while the radio is in service or to save a radio set-up for programming into other radios.

To save a Radio Definition File:

1. From the **File** menu, select the **Save File** menu item.

2. The **Save** dialog box will appear. The standard Windows directory tree is available for navigation to alternative file locations on your computer hard drive. Use the "Look In:" pull-down menu to select the location where the Radio Definition File is to be saved. The dialog box will initially open to the Windows directory that contains the RCCR Programmer software.

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3. Radio Definition Files will be saved with an ".rdf" file extension. The dialog box will present a list of all ".rdf" program files contained in the currently displayed Windows file directory. When creating a filename make sure it is unique and not contained in the list of existing files because the programmer will simply overwrite the existing file if the filename is the same.

4. Enter a unique filename into the "File name" box. You must enter the ".rdf" extension after the filename or the programmer will not be able to read the file at a later time.

   NOTE: The Radio Definition File named RCCR_default.rdf is read into the programmer automatically when the programmer is first started. This file must be located in the same Windows directory that contains the RCCR Programmer software. Edit and save this file to create your own unique radio personality that is displayed every time the RCCR Programmer software is started.

5. Press the **Save** button to save the Radio Definition File to your computer hard drive.

Print Radio Data

You can print out a pre-formatted report of the radio programming or a Radio Definition File.

To print a radio programming report:

1. Read the radio or open a Radio Definition File.

2. From the **File** menu, select the **Print Radio Data** menu item.

3. The *Print* dialog box will appear to allow setting of printer options. The default printer as defined in the Windows printer set-up of your computer will be automatically selected.

4. The report will always detail the radio's programming as it appears on the screen. To be sure the report reflects the actual radio programming, be sure to **Read Radio** or **Program Radio** just before printing the report.

Print Dialog Box

Print Custom Frequency Data

You can print out a pre-formatted list of all Custom frequencies contained in the radio programming or in a Radio Definition File. A list of all AAR standard frequencies can be printed by selecting the **AAR Frequencies** menu selection to open and print the associated pdf file.

To print a radio frequency list:

1. Read the radio or open a Radio Definition File.

2. From the **File** menu, select the **Print Frequency Data** menu item.

3. The *Print* dialog box will appear. The default printer as defined in the Windows printer set-up of your computer will be automatically selected.

4. The report will always detail the radio's programming as it appears on the Custom Frequencies list. To be sure the report reflects the actual radio programming, be sure to **Read Radio** or **Program Radio** just before printing the report.

Print Home Channel Data

You can print out a pre-formatted list of all Home Channels contained in the radio programming or in a Radio Definition File. This list will detail the custom programming of all Home Channels available on the radio.

To print a list of all Home Channel programming:

1. Read the radio or open a Radio Definition File.

2. From the **File** menu, select the **Print Home Channel Data** menu item.

3. The **Print** dialog box will appear. The default printer as defined in the Windows printer set-up of your computer will be automatically selected.

4. The report will always detail the radio's programming as it appears on the Home Channels list. To be sure the report reflects the actual radio's programming, be sure to **Read Radio** or **Program Radio** just before printing the report.

Read Radio

1. With the PC/Radio cable assembly connected to the computer and the radio, turn the radio on.

2. From the **Radio** menu, select the **Read Radio** menu item.

3. The programmer will "ping" the radio to establish communications. If the programmer does not see a radio the **No Radio!** message box will appear.   Be sure the cable is connected, the correct COM Port is selected and the radio is on.

4. The programmer will read the radio and fill all screens with the radio's programmed information. A communications status box will appear at the bottom of the screen while the programmer is reading the radio.

5. The radio will "beep" to indicate it has re-started to normal operating mode after the radio's programming has been read.

6. Review the programming information on the various screens.

"No Radio!" Message Box
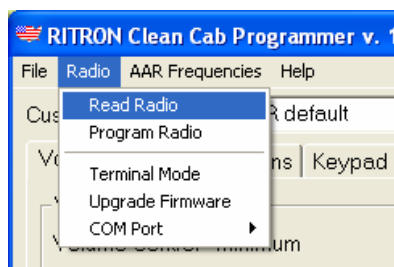
Radio Pull-down Menu

Communications Status Box

PROGRAMMING THE RADIO

Program Radio

1. With the PC/Radio cable assembly connected to the computer and the radio, apply DC power to the radio.

2. Read the radio or open a Radio Definition File (.rdf).

3. Edit the information on the programmer screens to the desired radio programming.

4. Review the information on all the programmer screens before starting the programming process.

5. From the **Radio** menu, select the **Program Radio** menu item.

6. The programmer will "ping" the radio to establish communications. If the programmer does not see a radio the **No Radio!** message box will appear. Be sure the cable is connected, the correct COM Port is selected and that the radio is on.

7. Once communication with the radio is established, the information from the various programmer screens will be programmed into the radio. A communications status box will appear at the bottom of the screen while programming is in process.

8. The radio will "beep" to indicate it has re-started to normal operating mode with the new programmed information after the radio programming process is complete.

Update Firmware

Periodically, updates to the radio firmware are available from RITRON. This may be to correct a problem, add new features, enhance performance, or customize radio operation. Updating the firmware does not change the radio programming.
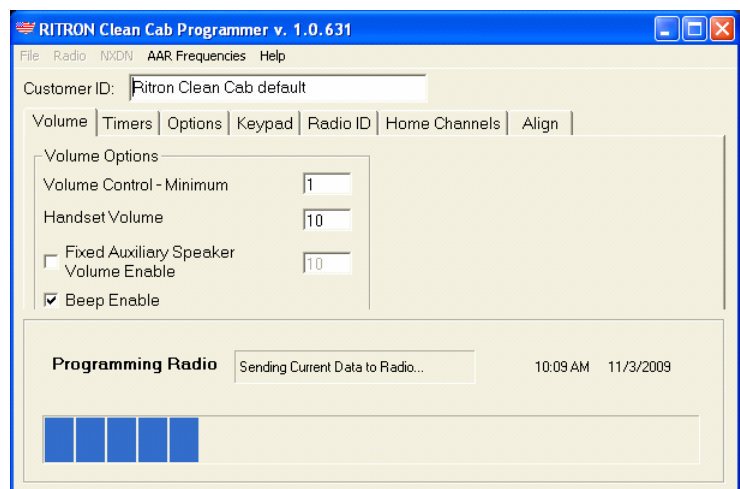
1. With the PC/Radio cable assembly connected to the computer and the radio, apply DC power to the radio.

2. From the **Radio** menu, select the **Update Firmware** menu item.

3. The programmer will "ping" the radio to establish communications. If the programmer does not see a radio the **No Radio!** message box will appear.   Be sure the cable is connected, the correct COM Port is selected, and that the radio is on.

4. The **Select firmware file to Upload** dialog box will appear. On the right side of the screen the standard Windows directory tree is available for navigation to alternative file locations on your computer hard drive. Select the location of the firmware file to be read. The dialog box will initially open to the Windows directory that contains the RCCR Programmer software.

5. Radio firmware files use an ".s19" file extension. On the left side of the dialog box will appear a list of all ".s19" firmware files in the currently displayed Windows file directory.

6. Select the firmware file to be opened from the list.

7. Press the **OK** button to open the radio firmware file. As an alternative, you can double-click on a filename in the list on the left side of the screen to open the radio firmware file.

    NOTE: If the radio firmware file selected is not valid for the radio you are attempting to update, the **Wrong File!** message box will appear. Verify that the selected firmware file is correct before attempting to update the radio firmware.

8. The programmer will update the radio to the new firmware revision. A communications status box will appear at the bottom of the screen while the programmer is updating the radio.

9. The radio must be powered down and restarted after the firmware update is complete.

PROGRAMMING THE RADIO

NXDN

The **NXDN** selection on the menu bar will open the NXDN programming screen on RCCR radio's equipped with the optional NXDN capability. If the radio does not have the digital PCB installed this selection will be dimmed and unavailable. Refer to the "NXDN" section of this manual for specific information on NXDN programming.
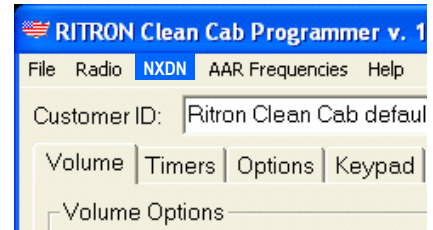
NXDN Menu Selection

AAR Frequencies

The **AAR Frequencies** selection on the menu bar will open a .pdf file with the complete AAR Frequency Table. This allows you to review the frequency of all AAR channels available to the RCCR radio. Reading these tables require that Adobe Acrobat be installed on your computer hard drive to view them, they cannot be edited, and are for reference only.

The "AAR_tables.pdf" file must be located in the same Windows directory as the RCCR Programmer software to access it from the **AAR Frequencies** menu selection.

AAR Frequencies Menu Selection

Help

The **Help** selection on the menu bar will open a Programmer Guide. This guide is a ".pdf" file and requires that Adobe Acrobat be installed on your computer hard drive to view it. Selecting the **Help** menu will launch Adobe Acrobat and open the "RCCR_programmer.pdf" file.

The "RCCR_programmer.pdf" file must be located in the same Windows directory as the RCCR Programmer software to access it from the **Help** menu selection.

Help Menu Selection
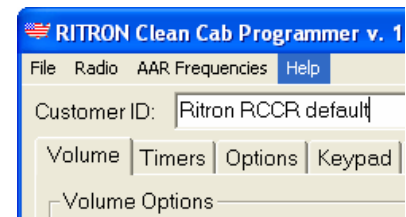
Volume

Volume Control - Minimum

This sets the minimum volume that the radio can be set to. This prevents radio operators from turning volume to a low level that may not be heard. Minimum volume can be set from 0-20.

Handset Volume

This sets the fixed volume level of the handset to any value from 0-20. Handset volume is not affected by the front-panel volume controls.

Fixed Auxiliary Speaker Volume Enable
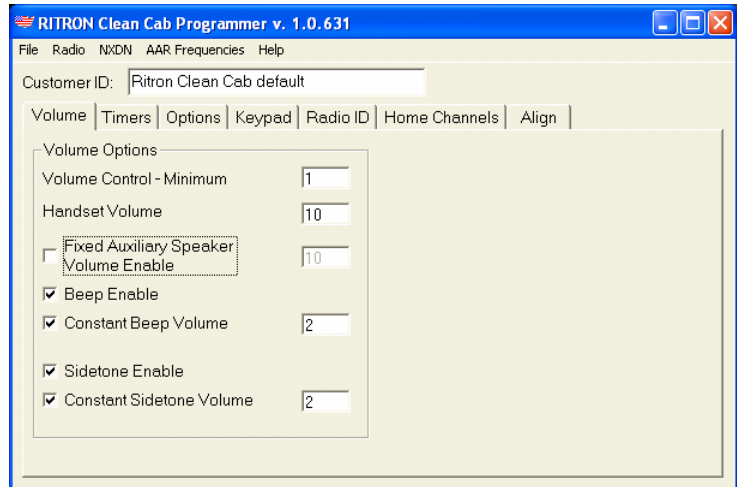
Volume Settings Screen

When Fixed Auxiliary Speaker Volume Enable is checked the Auxiliary Speaker Volume will be fixed, otherwise the Auxiliary Speaker Volume is adjusted by the front-panel volume controls. The fixed volume level to the Auxiliary Connector can be set to any value from 0-20. If Fixed Auxiliary Volume Enable is not checked the level setting is dimmed, unavailable, and has no effect.

Beep Enable

When Beep Enable is checked a beep will be heard whenever one of the radio front-panel keys is pressed.

Constant Beep Volume

Constant Beep Volume is only available as an option when Beep Enable has been checked, otherwise it is dimmed and unavailable. When Constant Beep Volume is checked the Beep Volume can be set to a fixed level from 0-20, otherwise Beep Volume is adjusted by the front-panel volume controls.

Sidetone Enable

When Sidetone Enable is checked DTMF or Single-Tone will be heard whenever they are sent.

Constant Sidetone Volume

Constant Sidetone Volume is only available as an option when Sidetone Enable has been checked, otherwise it is dimmed and unavailable. When Constant Sidetone Volume is checked the Sidetone Volume can be set to a fixed level from 0-20, otherwise Sidetone Volume is adjusted by the front-panel volume controls.

Timers

DTMF/Tone Timers (mS)

Minimum Duration

Sets the minimum time a DTMF Tone is sent with the numeric keypad, regardless of how long the key is pressed.

Maximum Duration

Sets the maximum time a DTMF Tone is sent with the numeric keypad, regardless of how long the key is pressed.
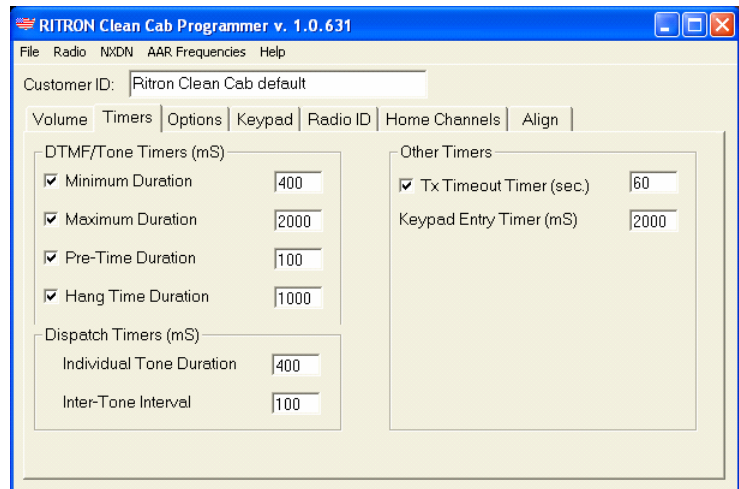
Timers Setting Screen

Pre-Time Duration

Sets the delay before a DTMF Tone is sent after a key on the numeric keypad is pressed. This allows time for the transmitter to power up and the receiving radios to lock onto the signal.

Hang Time Duration

Sets the length of time the transmitter will remain active after a DTMF Tone is sent using the numeric keypad. This allows time for multiple digit entries without the transmitter dropping between digits.

Dispatch Timers (mS)

Individual Tone Duration

Sets the length of time each DTMF or Single-Tone is sent when using the DISP button to send dispatch tones. For some models this selection will be dimmed and unavailable.

Inter-Tone Interval

This sets the delay between digits when a DTMF sequence is sent using the DISP button. For some models this selection will be dimmed and unavailable.

Other Timers

TX Timeout Timer (sec.)

When checked, the transmitter cannot continuously transmit for a period of time greater than the programmed time. The TX Timeout Timer can be set for 1-255 seconds.

Keypad Entry Timer (mS)

Sets the maximum length of time allowed between digits when making keypad entries.

Options

Frequencies

Four checkboxes are used to enable the AAR channels available for selection with the front-panel CHAN button. If not checked, the channels cannot be selected with the CHAN button, but are still available for programming to a Home Channel.

Wide Band Enable (03-97)

When checked AAR channels 05-97 will be available for selection with the CHAN button.

Option Settings Screen

Narrow Band Enable (005-097)

When checked AAR channels 005-097 will be available for selection with the CHAN button.

Narrow Band w/Offset Enable (104-197)

When checked AAR channels 104-197 will be available for selection with the CHAN button. This option is only available if Narrow Band Enable has been checked.

Digital Enable (302-488)

When checked AAR channels 302-488 will be available for selection with the CHAN button. For radio models without Digital Channel capability this selection will be dimmed and unavailable.

Advanced Options

Fixed Home Mode Dispatch Tones

When checked this will affect how Home channels are displayed when using DTMF or Single-Tone dispatch tones. When on a Home Channel the display normally shows either the Home Channel number or an alphanumeric description. When Fixed Home Mode Dispatch Tones is checked the radio will not display the Home number or alpha description if a dispatch code is changed via the numeric keypad. The radio will still operate on the Home channel frequencies, but the display will only show the RX and TX channels and the entered dispatch code. If the Home Channel is re-selected via the HOME button it will revert back to the normal display. For some models this selection will be dimmed and unavailable.

Dispatch Sequences

If checked the radio will allow DTMF dispatch codes of 1-3 digits, otherwise it will only allow single-digit entries. For some models this selection will be dimmed and unavailable.

Antenna Fault Detector Enable

When checked a message will appear on the display whenever there is an antenna fault condition.
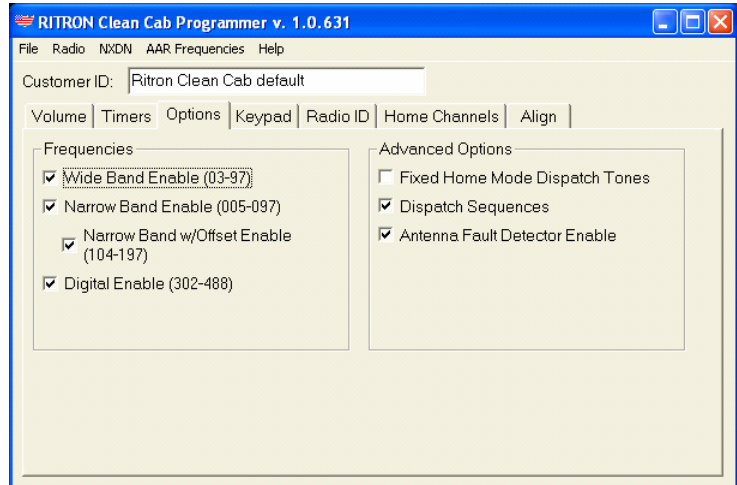
Keypad

Most front panel keypad buttons can be disabled by un-checking the associated box.

Channel

If the CHAN button is disabled all channel entries must be made via pre-programmed Home Channels using the HOME button.

Home

If the Home button is disabled all channel entries must be made using the CHAN button and are limited to AAR channels.
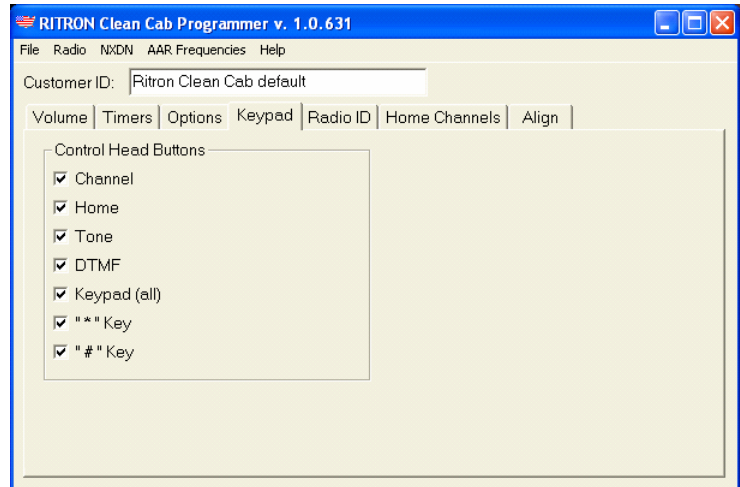
Keypad Settings Screen

Tone

If the Tone button is disabled the radio will be unable to send Single-Tone dispatch tones unless they have been pre-programmed into a Home channel, where they can be sent with the DISP button.

DTMF

If the DTMF button is disabled the radio will be unable to send DTMF dispatch sequences unless they have been pre-programmed into a Home channel, where they can be sent with the DISP button. This will not prevent DTMF tones from being sent using the numeric keypad.

Keypad (all)

If the numeric keypad is disabled it will not send DTMF tones when pressed. The keypad can still be used to enter channels via the CHAN or HOME buttons, or dispatch sequences using the DTMF or TONE buttons.

"*" Key

If the "*" key is disabled it will not send DTMF tones when pressed. It will still be available for entering DTMF sequences using the DTMF button.

"#" Key

If the "#" key is disabled it will not send DTMF tones when pressed. It will still be available for entering DTMF sequences using the DTMF button and for "Revert to Last TX-RX Channel Pair" feature using the HOME button.

Radio ID

The Radio ID screen displays general information about the radio. Information displayed in the Radio Identification and Radio Frequency Data fields are pre-programmed at the factory and cannot be changed.
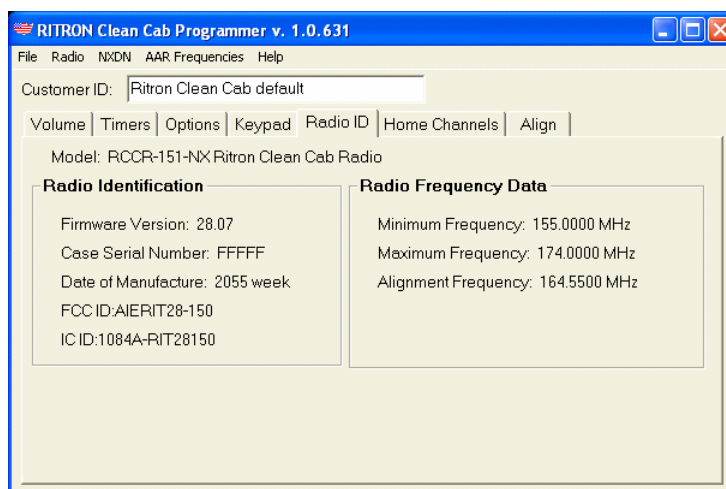
Radio ID Screen

Radio Identification

Firmware Revision: The firmware revision currently programmed into the radio.

Case Serial Number: The radio case serial number when it leaves the factory.

Date of Manufacture: The year and week the radio was tested in the factory.

FCC ID: The FCC Identifier for Equipment Certification.

IC ID: The Industry Canada Identifier for Equipment Certification.

Radio Frequency Data

Minimum Frequency: The minimum guaranteed operating frequency of the radio.

Maximum Frequency: The maximum guaranteed operating frequency of the radio.

Alignment Frequency: Frequency at which the radio was factory tested.

Home Channels

The Ritron RCCR radio can be programmed with up to 500 Home Channels that are accessed with the HOME button. Home Channels can be programmed to receive and transmit on any frequency from the AAR Table or from the Custom Frequency list. Home Channels can also be programmed for CTCSS or DCS encoding and decoding, and can have a DTMF or Single-Tone dispatch code assigned on some models.

The Home Channel programming screen contains a scrolling list of Home Channels 001-500.

NOTE: Only Home Channels that have been programmed will be available to the radio user with the HOME button. If the Home Channel number appears blank on the Home Channel list it cannot be accessed by the radio user.

To program a Home Channel:

1. Press the **Home Channels** tab to display the scrolling Home Channel list.
2. Select the Home Channel to be programmed from the scrolling Home Channel list.
3. The program data for the selected channel will be displayed on the right side of the screen.
4. Enter all program data for the selected channel. Data will appear on the Home Channel list as it is entered.
5. Any Home Channel may be removed from the list by first selecting the channel, and then pressing the **Delete Channel** button.
6. Home Channel program data is checked when you leave the Home Channel screen or select **Program Radio** from the **Radio** menu. If a programming error is detected (i.e. invalid Custom Frequency, no RX frequency entered) a message box will alert you to the error and allow you to go back and correct the entry.

All Home Channels 001-500 can be programmed for:

Home Name

Home Name is an alpha-numeric description for the corresponding Home Channel. The Home Name may use up to 7 characters including 0-9, A-Z, *, #, -, and _.

Display Home Name

When checked, any description entered in the Home Name field will show up on the display whenever the Home Channel is selected instead of the Home Channel number.

Home Channel Screen with an Analog Home Channel displayed

TX and RX Frequency

Enter the TX and RX frequencies to be used on this Home Channel. This can be any one of the AAR frequencies, or any Custom Frequency 500-599 that has been programmed into the radio.

Analog Home Channels can be programmed for:

TX and RX Tone

Each Home Channel can be programmed for a unique CTCSS or DCS TX code that will be continuously sent whenever the transmitter is active, and/or RX code that will quiet the receiver unless the code is detected. Using the drop-down, scrolling menus you can choose from a list of 51 CTCSS codes, 104 DCS codes, or None.

TX and RX Invert DCS

When checked, it inverts the polarity of the DCS TX and/or RX codes. These selections are only available if a DCS code is used.

Dispatch Code

Each Home Channel can be programmed with an assigned DTMF or Single-Tone Dispatch Code. This Dispatch Code will be automatically entered into the radio every time the Home Channel is selected. DTMF codes can be 1-3 digits while Single-Tone codes can be 1 digit only. For models that do not allow Dispatch Code programming on a Home Channel this selection will be dimmed and unavailable.

Digital Home Channels can be programmed for:

TX and RX RAN

The TX and RX RAN (Radio Access Number) is a unique number used to help mute unwanted transmissions on the same RF frequency. This number can be between 0 and 63. RAN 0 = no RAN.

Dest ID

The Destination ID is a unique Unit or Group ID number that allows the RCCR to call a specific individual unit or group depending on the Call Type selection.

Home Channel Screen with a Digital Home Channel displayed

RX Group

RX Group is a unique Group ID number for the RCCR that specifies a specific group in the NXDN system.

Squelch Type

To mute unwanted transmissions, the radio's squelch mode can be set for RAN, ID, RAN+ID, or Off.

RAN — To unmute the radio, the transmitted TX RAN must match the receiving radio's RX RAN.

ID — To unmute the radio, the transmitted Destination ID must match the receiving radio's Unit ID or Group ID number depending on the Call Type.

RAN+ID — To unmute the radio, both the TX and RX RAN's and the Destination and RX Group ID's must match.

Off — The radio will unmute with any transmission on the channel.

Call Type

The Home Channel can be programmed to transmit either an Individual or Group Call.

Custom Frequencies

The Ritron RCCR radio can be programmed with up to 100 custom frequencies for operation on analog channels that are not included in the AAR Tables. Custom frequency programming also specifies the operating bandwidth. Once entered, the custom programmed frequencies are available for Home Channel programming only. Custom frequencies cannot be accessed via the CHAN button, but only through inclusion on a Home Channel that is accessed with the HOME button.

Pressing the **Custom Frequencies** tab located at the top left of the screen will display the Custom Frequencies list and allow you to add and edit radio channels 500-599.
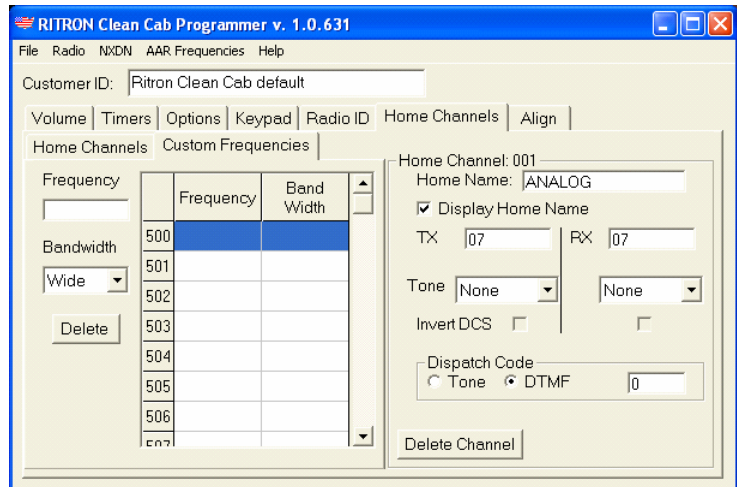
Home Channel Screen with Custom Frequency List displayed

NOTE: Only Custom Frequencies that have been programmed will be available for programming on a Home Channel. If a Custom Frequency is required it should be programmed prior to inclusion on a Home Channel.

To program a Custom Frequency:

1. Press the **Custom Frequencies** tab to display the scrolling list of Custom Frequencies 500-599.
2. Select the Custom Frequency to be programmed from the scrolling Custom Frequencies list.
3. The frequency and bandwidth for the selected Custom Frequency will be displayed on the left side of the screen.
4. Enter the frequency and bandwidth for the selected Custom Frequency. Data will appear on the Custom Frequencies list as it is entered.
5. Any Custom Frequency may be removed from the list by first selecting the Custom Frequency, and then pressing the **Delete** button on the left side of the screen.
6. If a programming error is detected (i.e. invalid Custom Frequency) a message box will alert you to the error and allow you to go back and correct the entry.

NXDN

General 1

Unit ID (own)

The Unit ID number is to identify the RCCR Locomotive radio in an NXDN system. The Unit ID can range between 1 and 65519.

Unit ID List

The Unit ID List is a list of up to 100 Unit ID numbers with their associated Unit Name from other transceivers in the NXDN system.

Unit ID

Unit ID is a number between 1 and 65519 used to identify other transceivers in the NXDN system.

Unit Name

Unit Name is an alpha-numeric description for the corresponding Unit ID number. The Unit Name may use up the 7 characters including 0-9, A-Z, *, #, -, and _.

Clear unit No.

Remove highlighted Unit ID/Unit Name from the Unit ID List.

NXDN Screen with Unit ID List displayed

Group ID List

The Group ID List is a list of up to 100 Group ID numbers with their associated Group Name from other transceivers in the NXDN system.

Group ID

Group ID is a number between 1 and 65519 used to identify the groups of transceivers in the NXDN system. Group ID number 65535 is used a Group All Call.

Group Name

Group Name is an alpha-numeric description for the corresponding Group ID number. The Group Name may use up the 7 characters including 0-9, A-Z, *, #, -, and _.

Clear unit No.

Remove highlighted Group ID/Group Name from the Group ID List.

NXDN Screen with Group ID List displayed

Align

Test and alignment of RCCR radio is accomplished using the RCCR Programmer. All adjustments can be made via the Align screen without disassembly of the radio.

Factory testing characterizes the radio performance across the specified frequency range and sets a calibration factor. This results in consistent performance, regardless of frequency. Typically, the radio has been tested near the middle of the specified operating frequency band with the resulting values stored in the radio. The radio was then tested near or at the highest specified frequency. The difference between the resulting values was stored as a "slope" value, a Δvalue / Δfrequency ratio.
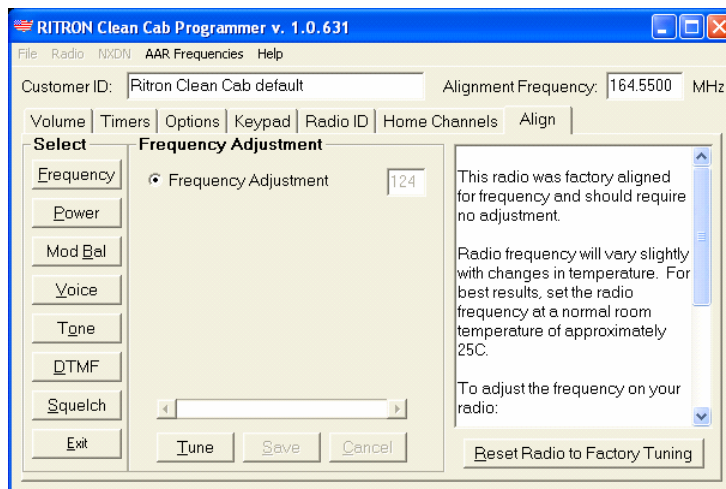
Align Screen

The radio cannot be tuned on a specific frequency or channel using the RCCR Programmer Align screen. The Align screen will display the frequency to be used for tuning.

The "slope" value cannot be changed using the RCCR Programmer for any of the tunable attributes. Instead, the programmer will allow tuning at the "Alignment Frequency" displayed on the Tune Radio screen and rely on the factory "slope" setting to apply the adjusted value appropriately at all other frequencies.

All factory testing is performed at the radio's nominal operating voltage of +13.8 VDC.

IMPORTANT
The RCCR radio has been fully tested at the factory and should not require adjustment.   An authorized RF service technician must perform test and alignment of an RCCR radio. Do not attempt service of the radio if not completely familiar with the operation of frequency synthesized radios.

APPENDIX

RF ENERGY EXPOSURE AWARENESS AND CONTROL INFORMATION, AND OPERATIONAL INSTRUCTIONS FOR FCC AND INDUSTRY CANADA (IC) OCCUPATIONAL USE REQUIREMENTS

BEFORE USING YOUR MOBILE 2-WAY RADIO READ THIS IMPORTANT RF ENERGY AWARENESS AND CONTROL INFORMATION AND OPERATIONAL INSTRUCTIONS TO ENSURE COMPLIANCE WITH THE FCC'S RF EXPOSURE GUIDELINES.

NOTICE: This radio is intended for use in occupational/controlled conditions, where users have full knowledge of their exposure and can exercise control over their exposure to meet FCC and IC limits. This radio device is NOT authorized for general population, consumer, or any other use.

This 2-way radio uses electromagnetic energy in the radio frequency (RF) spectrum to provide communications between two or more users over a distance.

It uses radio frequency (RF) energy or radio waves to send and receive calls. RF energy is one form of electromagnetic energy. Other forms include, but are not limited to, electric power, sunlight and x-rays. RF energy, however, should not be confused with these other forms of electromagnetic energy, which when used improperly can cause biological damage. Very high levels of x-rays, for example, can damage tissues and genetic material.

Experts in science, engineering, medicine, health, and industry work with organizations to develop standards for exposure to RF energy. These standards provide recommended levels of RF exposure for both workers and the general public. These recommended RF exposure levels include substantial margins of protection. All 2-way radios marketed in North America are designed, manufactured and tested to ensure they meet government established RF exposure levels. In addition, manufacturers also recommend specific operating instructions to users of 2-way radios. These instructions are important because they inform users about RF energy exposure and provide simple procedures on how to control it. Please refer to the following websites for more information on what RF energy exposure is and how to control your exposure to assure compliance with established RF exposure limits.

http://www.fcc.gov/oet/rfsafety/rf-faqs.html
http://www.osha.gov/SLTC/radiofrequencyradiation/index.html
http://www.ic.gc.ca/epic/site/smt-gst.nsf/vwapj/rss102e.pdf/$FILE/rss102e.pdf

Federal Communications Commission/Industry Canada Regulations

The FCC and IC rules require manufacturers to comply with the RF energy exposure limits for mobile 2-way radios before they can be marketed in the U.S. When 2-way radios are used as a consequence of employment, the FCC and IC require users to be fully aware of and able to control their exposure to meet occupational requirements. Exposure awareness can be facilitated by the use of a label directing users to specific user awareness information.

Your Ritron 2-way radio has an RF exposure product label. Also, this Ritron RCCR-151/152 user manual includes information and operating instructions required to control your RF exposure and to satisfy compliance requirements.

APPENDIX

Compliance with RF Exposure Standards

Your Ritron two-way radio is designed and tested to comply with a number of national and international standards and guidelines (listed below) regarding human exposure to radio frequency electromagnetic energy. This radio complies with the IEEE and ICNIRP exposure limits for occupational/controlled RF exposure environment at duty factors of up to 50% talk and 50% listen and is authorized by the FCC and IC for occupational use. In terms of measuring RF energy for compliance with the exposure guidelines, your radio antenna radiates measurable RF energy only while it is transmitting (during talking), not when it is receiving (listening) or in standby mode. Your Ritron two-way radio complies with the following RF energy exposure standards and guidelines:

- United States Federal Communications Commission, Code of Federal Regulations; 47 CFR §§ 2 sub-part J.

- American National Standards Institute (ANSI) / Institute of Electrical and Electronic Engineers (IEEE) C95. 1-1992.

- Institute of Electrical and Electronic Engineers (IEEE) C95.1-1999 Edition.
  Copyright Telecommunications Industry Association

- Industry Canada RSS-102 Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)

RF Exposure Compliance and Control Guidelines and Operating Instructions

To control exposure to yourself and others and ensure compliance with the occupational/controlled environment exposure limits always adhere to the following procedures.

Guidelines:

- User awareness instructions should accompany device when transferred to other users.
- Do not use this device if the operational requirements described herein are not met.

Instructions:

- Transmit no more than the rated duty factor of 50% of the time. To transmit (talk), push the Push-To-Talk (PTT) button. To receive calls, release the PTT button. Transmitting 50% of the time, or less, is important because this radio generates measurable RF energy exposure only when transmitting (in terms of measuring for standards compliance).
- Transmit only when people outside the vehicle are at least the recommended minimum lateral distance away, as shown in Table 1, from a properly installed according to installation instructions, externally-mounted antenna.

NOTE – Table 1 lists the recommended minimum lateral distance for bystanders in an uncontrolled environment from transmitting types of antennas *(i.e.,* monopoles over a ground plane, or dipoles) at several different ranges of rated radio power for mobile radios installed in a vehicle.

Table 1. Rated Power and Recommended Lateral Distance

Rated Power of Vehicle-installed Mobile Two-way Radio	Recommended Minimum Lateral Distance from Transmitting Antenna
Less than 10 Watts	24.4 inches (62 cm)
10 to 25 Watts	38.7 inches (98.3 cm)
25 to 50 Watts	54.6 inches (138.7 cm)

Mobile Antennas

- Install antennas on the top of the vehicle taking into account the recommended minimum lateral distances in table 1. These mobile antenna installation guidelines are limited to metal body motor vehicles or vehicles with appropriate ground planes. The antenna installation should additionally be in accordance with:

    a.) The requirements of the antenna manufacturer/supplier.
    b.) Instructions in the Radio Installation Manual, including minimum antenna cable lengths.
    c.) The installation manual should provide specific information of how to install the antennas to facilitate recommended operating distances to all potentially exposed persons.

- This device has been designed to operate with a standard VHF quarterwave whip antenna over a conducting ground plane and having a maximum gain of 2.1 dBi. Antennas other than a VHF quarterwave or having gain greater than 2.1 dBi are strictly prohibited for use with this device. The required antenna impedance is 50 ohms resistive.

- To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (EIRP) is not more than that permitted for successful communications.

Approved Accessories

- This radio has been tested and meets the FCC and IC RF exposure guidelines when used with the Ritron accessories supplied or designated for this product. Use of other accessories may not ensure compliance with the RF exposure guidelines, and may violate FCC and IC regulations.

- For a list of Ritron approved accessories see this user manual, or visit the following website which lists approved accessories: www.ritron,com

Contact Information

For additional information on exposure requirements or other information, see:

Ritron, Inc.
505 West Carmel Drive
Carmel, IN 46032

PH: (317) 846-1201
FAX: (317) 846-4978

Email: ritron@ritron.com
Website: www.ritron.com

AAR Channels

Wide 25 kHz	Narrow 12.5 kHz	Digital 6.25 kHz	Frequency (MHz)	Wide 25 kHz	Narrow 12.5 kHz	Digital 6.25 kHz	Frequency (MHz)
* 03			159.930	26	026	345	160.500
					126	346	160.5075
* 04			160.050	27	027	347	160.515
*	104	302	160.1775		127	348	160.5225
* 05	005	303	160.185	28	028	349	160.530
*	105	304	160.1925		128	350	160.5375
* 06	006	305	160.200	29	029	351	160.545
*	106	306	160.2075		129	352	160.5525
07	007	307	160.215	30	030	353	160.560
	107	308	160.2225		130	354	160.5675
08	008	309	160.230	31	031	355	160.575
	108	310	160.2375		131	356	160.5825
09	009	311	160.245	32	032	357	160.590
	109	312	160.2525		132	358	160.5975
10	010	313	160.260	33	033	359	160.605
	110	314	160.2675		133	360	160.6125
11	011	315	160.275	34	034	361	160.620
	111	316	160.2825		134	362	160.6275
12	012	317	160.290	35	035	363	160.635
	112	318	160.2975		135	364	160.6425
13	013	319	160.305	36	036	365	160.650
	113	320	160.3125		136	366	160.6575
14	014	321	160.320	37	037	367	160.665
	114	322	160.3275		137	368	160.6725
15	015	323	160.335	38	038	369	160.680
	115	324	160.3425		138	370	160.6875
16	016	325	160.350	39	039	371	160.695
	116	326	160.3575		139	372	160.7025
17	017	327	160.365	40	040	373	160.710
	117	328	160.3725		140	374	160.7175
18	018	329	160.380	41	041	375	160.725
	118	330	160.3875		141	376	160.7325
19	019	331	160.395	42	042	377	160.740
	119	332	160.4025		142	378	160.7475
20	020	333	160.410	43	043	379	160.755
	120	334	160.4175		143	380	160.7625
21	021	335	160.425	44	044	381	160.770
	121	336	160.4325		144	382	160.7775
22	022	337	160.440	45	045	383	160.785
	122	338	160.4475		145	384	160.7925
23	023	339	160.455	46	046	385	160.800
	123	340	160.4625		146	386	160.8075
24	024	341	160.470	47	047	387	160.815
	124	342	160.4775		147	388	160.8225
25	025	343	160.485	48	048	389	160.830
	125	344	160.4925		148	390	160.8375
				49	049	391	160.845
					149	392	160.8525

* Denotes Canadian Channels

AAR Channels

--------------Channels--------------				--------------Channels--------------			
Wide 25 kHz	**Narrow 12.5 kHz**	**Digital 6.25 kHz**	**Frequency (MHz)**	**Wide 25 kHz**	**Narrow 12.5 kHz**	**Digital 6.25 kHz**	**Frequency (MHz)**
50	050	393	160.860	74	074	441	161.220
	150	394	160.8675		174	442	161.2275
51	051	395	160.875	75	075	443	161.235
	151	396	160.8825		175	444	161.2425
52	052	397	160.890	76	076	445	161.250
	152	398	160.8975		176	446	161.2575
53	053	399	160.905	77	077	447	161.265
	153	400	160.9125		177	448	161.2725
54	054	401	160.920	78	078	449	161.280
	154	402	160.9275		178	450	161.2875
55	055	403	160.935	79	079	451	161.295
	155	404	160.9425		179	452	161.3025
56	056	405	160.950	80	080	453	161.310
	156	406	160.9575		180	454	161.3175
57	057	407	160.965	81	081	455	161.325
	157	408	160.9725		181	456	161.3325
58	058	409	160.980	82	082	457	161.340
	158	410	160.9875		182	458	161.3475
59	059	411	160.995	83	083	459	161.355
	159	412	161.0025		183	460	161.3625
60	060	413	161.010	84	084	461	161.370
	160	414	161.0175		184	462	161.3775
61	061	415	161.025	85	085	463	161.385
	161	416	161.0325		185	464	161.3925
62	062	417	161.040	86	086	465	161.400
	162	418	161.0475		186	466	161.4075
63	063	419	161.055	87	087	467	161.415
	163	420	161.0625		187	468	161.4225
64	064	421	161.070	88	088	469	161.430
	164	422	161.0775		188	470	161.4375
65	065	423	161.085	89	089	471	161.445
	165	424	161.0925		189	472	161.4525
66	066	425	161.100	90	090	473	161.460
	166	426	161.1075		190	474	161.4675
67	067	427	161.115	91	091	475	161.475
	167	428	161.1225		191	476	161.4825
68	068	429	161.130	92	092	477	161.490
	168	430	161.1375		192	478	161.4975
69	069	431	161.145	93	093	479	161.505
	169	432	161.1525		193	480	161.5125
70	070	433	161.160	94	094	481	161.520
	170	434	161.1675		194	482	161.5275
71	071	435	161.175	95	095	483	161.535
	171	436	161.1825		195	484	161.5425
72	072	437	161.190	96	096	485	161.550
	172	438	161.1975		196	486	161.5575
73	073	439	161.205	97	097	487	161.565
	173	440	161.2125		197	488	161.5725

RCCR Radio Specifications

GENERAL	
FCC ID:	AIERIT28-150
FCC Rule Parts:	90
Industry Canada ID:	1084A-RIT28150
Industry Canada Specifications:	RSS-119, Issue 9
Frequency Range:	Narrow (AAR) Front End 159 – 162 MHz Broad Front-End 155 – 174 MHz
Synthesizer Step Size:	2.5 kHz
Frequency Stability:	+/-1 PPM (-30° to +60° C) TX/RX
Printed Circuit Board Revisions	Main G1750460D or higher RF G1750450E or higher Display G1750470B or higher Power Supply G1730540E or higher
RF Channels:	• AAR Wideband Channel 03 – 97 • AAR Narrowband Channels 005 – 097 • AAR Narrowband Channels 104 – 197 • AAR Digital Channels 302 – 488 • Custom Programmed Home Channels 1 - 500
Tone/Code Signaling:	• CTCSS • Digital Coded Squelch • Single-Tone Encode • DTMF Encode
Dimensions:	4.4"H x 10.6"W x 9.6"D
Weight:	16.7 lbs.
Enclosure Construction:	Modular case assembly made from precision machined aluminum plate. The case is assembled using corrosion resistant, high strength, stainless steel fasteners.
Environmental:	Splash resistant, shock and vibration per AAR S-5207
Antenna Fitting:	50Ω, SO-239 connector

TRANSMITTER		
Emission Designator:	wide narrow	16K0F3E 11K0F3E
Deviation:	wide narrow	+/- 5.00 kHz +/- 2.50 kHz
FM Hum and Noise:	wide narrow	-50 dB -45 dB
Audio Distortion:	wide narrow	< 3% < 3%
RF Power Output (adjustable):	10 - 50 Watts @ +13.6 VDC	
Spurious & Harmonics:	-25 dBm	
Audio Response:	Meets FCC and EIA requirements	
Time-out Timer:	60 seconds, programmable	

RECEIVER

Sensitivity: **(12 dB SINAD)**	wide narrow	0.25 µV (-119 dBm) typical 0.25 µV (-119 dBm) typical
L.O. Injection:		High side (RX frequency + 43.65 MHz)
Adjacent Channel (EIA):	wide narrow	-80 dB -70 dB
Spurious Rejection:	wide narrow	-90 dB -90 dB
Image Rejection (EIA):	wide narrow	-80 dB -80 dB
Intermodulation (EIA):	wide narrow	-80 dB -80 dB
CTCSS/DCS Decode Deviation:	wide narrow	500 – 850 Hz 350 – 500 Hz
FM Hum and Noise:	wide narrow	-50 dB -45 dB
Noise Squelch Sensitivity:		Programmable, factory set for 0.3 -0.35 µV
Frequency Response:		300 – 3000 Hz, de-emphasized
Audio Output		12 Watts into 4Ω, with less than 3 % THD
Receiving System:		Dual conversion superheterodyne
I.F. System:		1st .... 43.65 MHz 2nd .... 450 kHz
CTCSS/DCS Decode Time:		per EIA Standards

POWER REQUIREMENTS

	+72 VDC IN	+13.6 VDC IN
Minimum Supply Voltage:	+58 VDC	+10.9 VDC
Maximum Supply Voltage:	+85 VDC	+15.5 VDC
Standby Current:	230 mA	1 A
Receive Current (1/2 volume):	340 mA	1.6 A
Transmit Current:	2.1 A @ 50 Watts	10 A @ 50 Watt

APPENDIX

RITRON, INC. Limited Warranty

WHAT THIS WARRANTY COVERS:

RITRON, INC. ("RITRON") provides the following warranty against defects in materials and/or workmanship in the **RITRON Clean Cab radio** under normal use and service during the applicable warranty period (as stated below). "Accessories" means antennas, cables, handsets, speaker/microphones and items contained in the programming and programming/service kits.

WHAT IS COVERED	FOR HOW LONG	WHAT RITRON WILL DO
RCCR-151	2 years*	During the first two years after date of purchase, RITRON will repair or replace the defective product, at RITRON's option, parts and labor included at no charge.
RCCR-152	2 years*	
Accessories	90 days*	*After date of purchase

WHAT THIS WARRANTY DOES NOT COVER:

• Any technical information provided with the covered product or any other RITRON products;

• Installation, maintenance or service of the product, unless this is covered by a separate written agreement with RITRON;

• Any products not furnished by RITRON which are attached or used with the covered product, or defects or damage from the use of the covered product with equipment that is not covered (such as defects or damage from the use of a control head not manufactured by Ritron);

• Defects or damage, resulting from:

    - misuse, abuse, improper maintenance, alteration, modification, neglect, accident or act of God,

    - the use of covered products other than in normal and customary manner or,

    - improper testing or installation;

• Defects or damages from unauthorized disassembly, repair or modification, or where unauthorized disassembly, repair or modification prevents inspection and testing necessary to validate warranty claims;

• Defects or damages in which the serial number has been removed, altered or defaced.

IMPORTANT: This warranty sets forth the full extent of RITRON's express responsibilities regarding the covered products, and is given in lieu of all other express warranties. What RITRON has agreed to do above is your sole and exclusive remedy. No person is authorized to make any other warranty to you on behalf of RITRON. Warranties implied by state law, such as implied warranties of merchantability and fitness for a particular purpose, are limited to the duration of this limited warranty as it applies to the covered product. Incidental and consequential damages are not recoverable under this warranty (this includes loss of use or time, inconvenience, business interruption, commercial loss, lost profits or savings). Some states do not allow the exclusion or limitation of incidental or consequential damages, or limitation on how long an implied warranty lasts, so the above limitations or exclusions may not apply to you. Because each covered product system is unique, RITRON disclaims liability for range, coverage, or operation of the system as a whole under this warranty.

WHO IS COVERED BY THIS WARRANTY: This warranty is given only to the purchaser or lessee of covered products when acquired for use, not resale. This warranty is not assignable or transferable.

HOW TO GET WARRANTY SERVICE: To receive warranty service, you must deliver or send the defective product, delivery costs and insurance prepaid, within the applicable warranty period, to **RITRON, INC., 505 West Carmel Drive, Carmel, Indiana 46032-7564, Attention: Warranty Department.** Please provide a written explanation of the defect in as much detail as you can along with your name address, email and phone number. You must retain your sales or lease receipt (or other written evidence of the date of purchase) and deliver it along with the product. If RITRON chooses to repair or replace a defective product, RITRON may replace the product or any part or component with reconditioned product, parts or components. Replacements are covered for the balance of the original applicable warranty period. All replaced covered products, parts or components become RITRON's property.

RIGHTS TO SOFTWARE RETAINED : Title and all rights or licenses to patents, copyrights, trademarks and trade secrets in any RITRON software contained in covered products are and shall remain in RITRON. RITRON nevertheless grants you a limited non-exclusive, transferable right to use the RITRON software only in conjunction with covered products. No other license or right to the RITRON software is granted or permitted.

YOUR RIGHTS UNDER STATE LAW: This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

WHERE THIS WARRANTY IS VALID: THIS WARRANTY IS VALID ONLY WITHIN THE UNITED STATES, THE DISTRICT OF COLUMBIA AND PUERTO RICO.