

CI-RC-4M Applications Report



General:

The CI-RC-4M is a multi link controller capable of controlling up to 4 transceivers. This unit can control each transceiver pair in a number of different configurations from standard drops and links to CTCSS, NAC and DTMF controlled drops and links. 5 CTCSS tones and 7 NAC codes can be programmed into each path of the controller which will allow the user to steer the transceivers by turning links “On” and “Off” or by changing transmitter channels. This system also has an auxiliary E&M type connection available which can connect up to as many as four transceiver pairs. This external connectivity can be used in cases where equipment such as tone remote is required at a site.

Software Sample:

Site 2					
	TXA	TXB	TXC	TXD	
RXA	\$1 01	\$1 03			
	\$1 02	\$1 04	\$1 01	\$1 03	\$1 04
	\$999	\$999	\$999	\$999	\$999
RXB	\$1 02		\$1 03	\$1 04	
	\$999		\$999	\$999	\$999
RXC	\$1 02	\$1 01		\$1 04	
	\$999	\$999		\$999	\$999
RXD	\$1 02	\$1 01	\$1 03		
	\$999	\$999	\$999		

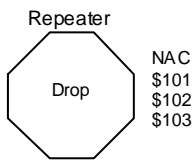
Drop/link/link/link

The diagram above shows an example of the main window of the software. Each box has the capability of enabling its designated path in various conditions. For example the RXA to TXA path will be enabled with 5 indicated NAC codes. The NAC code \$999 is in each box because in this configuration it's being used as an All Call code. If RXA is keyed up with \$999 it will key all its designated transmitters but if it receives a code of \$103 it will only key TXA and TXC.

The following are some examples of the applications/configurations this unit is capable of.

Application A:

Drop Repeater:



The Drop repeater using the RC-4M can be configured for a number of different applications. The diagram above shows a drop repeater with 3 NAC codes to enable it. The transmitter can be configured to pass the NAC codes or can be configured to one NAC code only depending on how the RSS software for the receiver is configured. This functionality can be done with CTCSS as well. The repeater can be configured with 5 CTCSS tones and 7 NAC codes. This type of configuration can be expanded to 10 CTCSS and 14 NAC codes by adding a second receiver on the same frequency but only one transceiver pair can be active at a time. This means that if there are two receivers and one transmitter then each RX to TX must have a different set of NAC or CTCSS tones.

RC-4M Drop programming

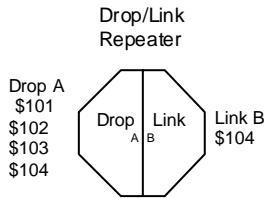
Drop Repeater		
	TXA	
RXA	\$101 \$102	\$103

Sample Subscriber NAC Programming:

- Ch1 RX = \$101 TX = \$101
- Ch2 RX = \$101 TX = \$102
- Ch3 RX = \$101 TX = \$103

Application B:

Drop/ link Repeater with steering:



The Drop/Link repeater shown above is configured with 4 NAC codes on the Drop side and one on the link side. When any of the NAC codes are seen by the receiver the repeater will come up but if NAC code of \$104 is seen then the link will also be enabled. The system can be configured to pass all the NAC codes it sees out the transmitters or can be strapped to a single NAC output. This configuration can also be setup to change transmitter frequencies depending on the received NAC code by connecting the channel select lines to the back connections available on the RC-4M. This configuration can also be done using CTCSS tones. DTMF is also available for this type of configuration but is limited to only turning on and off links and can not change transmitter channels.

Sample Programming:

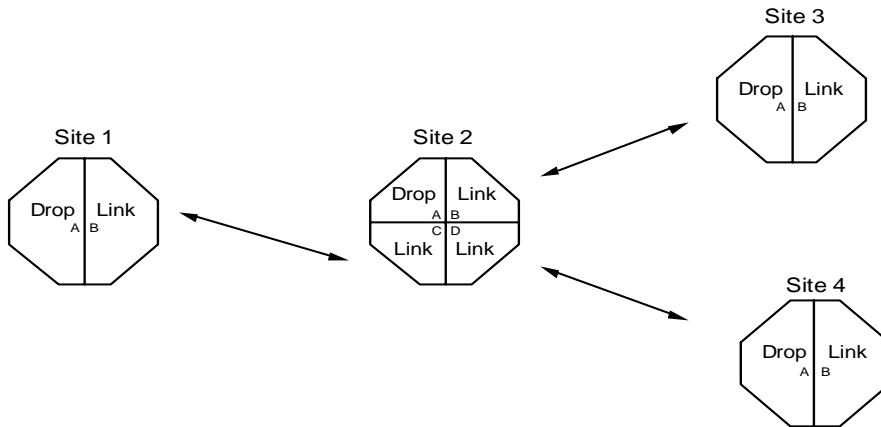
		Drop / Link Repeater		
		TXA	TXB	
RXA	\$101	\$103	\$104	
	\$102	\$104		
RXB	\$104			

Sample Subscriber NAC Programming:

- Ch1 RX = \$101 TX = \$101
- Ch2 RX = \$101 TX = \$102
- Ch3 RX = \$101 TX = \$103
- Ch4 RX = \$101 TX = \$104

Application C:

Standard Drop/Link/Link/Link system:

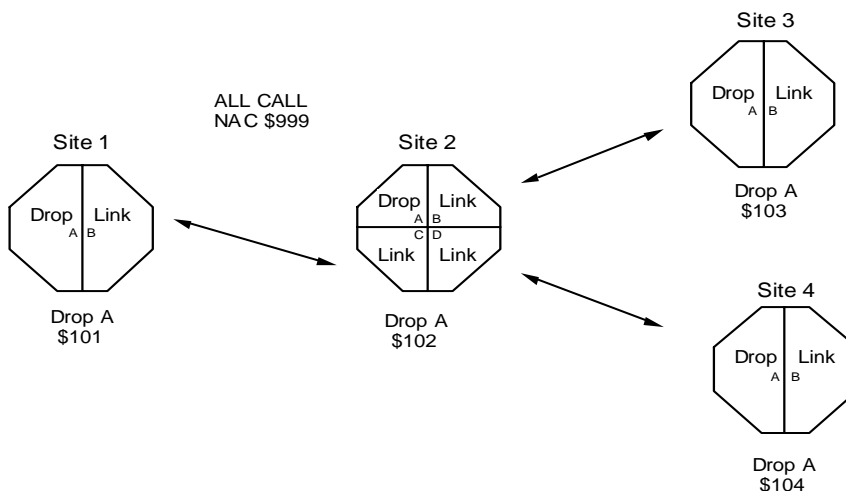


In this application Site 1, 3, 4, will be connected to an RC-4L with a standard Drop/Link configuration. Site 2 will be connected to an RC-4M in a Drop/Link/Link/Link configuration. The Links on all the units will be continually enabled with all CTCSS, NAC and other codes enabled in the receiver and transmitter RSS software only. The RC-4M will have the receiver and transmitter paths enable as carrier only.

This Application can be configured in analog mode as well.

Application D:

Drop/Link/Link/link with Basic NAC Steering:



This application will operate as individual Drop repeaters with an all Call function. Each site with its specific NAC code will operate as a local repeater only. When NAC \$999 is transmitted to any Drop receiver the entire system will come up.

Each Drop transmitter will be set in the RSS software for its specific NAC code. Each link transmitter will be set for \$999. All of the receivers will be set for Any P25 signal because all repeat controls will be done on the RC-4M.

The hand held units will be programmed with two channels. Channel one and two will have the same receive frequency and NAC code. Channel one and two will also have the same transmit frequency but will have the local NAC on one channel and the ALL CALL code on the other.

This Application can be configured in analog mode as well.

RC-4M programming:

Site 1,3,4			Site 2			
	TXA	TXB	TXA	TXB	TXC	TXD
RXA	\$xxx \$999	\$999	\$102 \$999	\$999	\$999	\$999
RXB	\$999		\$999		\$999	\$999
			\$999	\$999		\$999
			\$999	\$999	\$999	

\$xxx = Specific Drop NAC (\$101,\$103,\$104)

Sample Subscriber NAC Programming:

Site 1

Ch1 RX = \$101 TX = \$101

Ch2 RX = \$101 TX = \$999

Site 2

Ch1 RX = \$101 TX = \$102

Ch2 RX = \$101 TX = \$999

Site 3

Ch1 RX = \$101 TX = \$103

Ch2 RX = \$101 TX = \$999

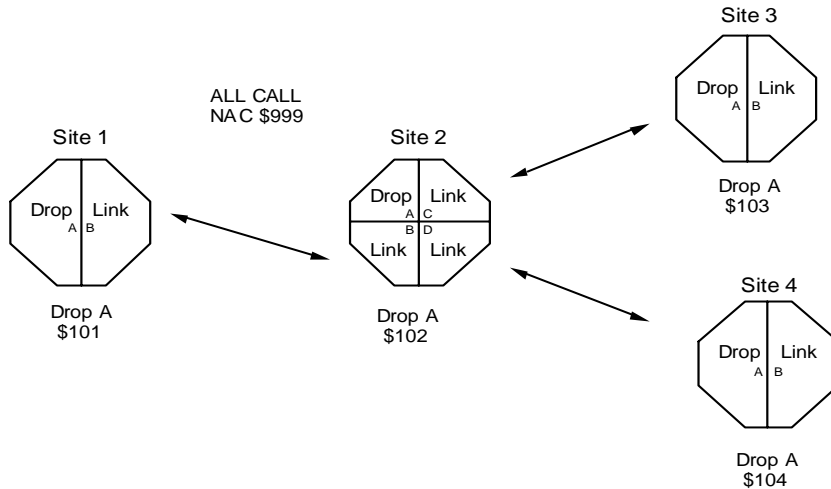
Site 4

Ch1 RX = \$101 TX = \$104

Ch2 RX = \$101 TX = \$999

Application E:

Drop/Link/Link/link with Advanced NAC Steering:



This application will operate as individual Drop repeaters with the ability to call specific repeater sites as well as an ALL CALL function. Each site with its specific NAC code will operate as a local repeater only.

When the drop repeater receives a NAC code for a specific site it will key up that site only. For example if the Site 1 receives a NAC of \$103 the system will connect Site 1 to Site 3 only.

When NAC \$999 is transmitted to any Drop receiver the entire system will come up.

Each Drop transmitter will be set in the RSS software for its specific NAC code. All the Link transmitters will not need to be programmed with any NAC codes as it will be passed from the receivers. All of the receivers will be set for NAC \$F7F.

The hand held units will be programmed with five channels. Channel one to five will have the same receive frequency and NAC code. Channel one to five will also have the same transmit frequency but will have the local NAC on one channel, the NAC codes for the other sites on three channels, and the ALL CALL NAC on the last channel.

NOTE: With this configuration the transmitters will be wired to the RC-4M through the VOCOD input so it will not pass data unless the hand held units are set to receive on any P25 signal. This would allow the drop transmitters to be connected through the front panel to allow data.

RC-4M Programming:

Site 1

	TXA	TXB
RXA	\$101 \$103 \$102 \$104	\$103 \$104
	\$999	\$999
	\$101	
RXB	\$999	

Site 3

	TXA	TXB
RXA	\$101 \$103 \$102 \$104	\$101 \$104
	\$999	\$999
RXB	\$103 \$999	

Site 4

	TXA	TXB
RXA	\$101 \$103 \$102 \$104	\$101 \$102
	\$999	\$999
RXB	\$104 \$999	

Site 2

	TXA	TXB	TXC	TXD
RXA	\$101 \$103 \$102 \$104	\$101	\$103	\$104
	\$999	\$999	\$999	\$999
RXB	\$102 \$999		\$103 \$999	\$104 \$999
RXC	\$102 \$999	\$101 \$999		\$104 \$999
RXD	\$102 \$999	\$101 \$999	\$103 \$999	

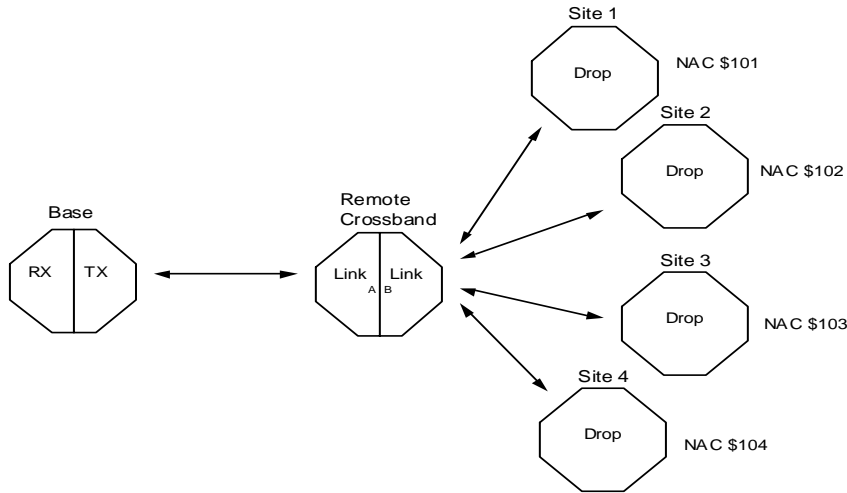
Sample Subscriber NAC Programming:

All sites radios

- Ch1 RX = \$101 TX = \$101
- Ch2 RX = \$101 TX = \$102
- Ch3 RX = \$101 TX = \$103
- Ch4 RX = \$101 TX = \$104
- Ch5 RX = \$101 TX = \$999

Application F:

Remote Base control:



This application requires only one RC-4M at the Remote Cross band site. The Drop repeaters will use the RC-4L product and the Base will use the Base Controller connected to a tone remote or other external connection capable of changing the transmitter channels.

The Base transmitter will be programmed with the RSS for a different NAC code in each channel. This NAC code will be received at the Cross band repeater and retransmitted to the appropriate Drop repeater. Coming back from the Drop repeaters the NAC code is sent to the Cross band repeater and then to the Base. The Base and Cross band repeater will have the receivers set to \$F7F.

If frequency changes are required at the Cross band Site transmitter the channel select lines will need to be connected to the RC-4M.

This Application can be configured in analog mode as well.

Note: This application can only used with a maximum of 5 CTCSS and 7 NAC codes unless a second link receiver is added which will double the number of codes or channels.

RC-4M Cross band programming:

		Crossband	
		TXA	TXB
RXA			COR enabled
RXB	\$101 \$103 \$102 \$104		

Sample Subscriber NAC Programming:

Site 1

Ch1 RX = \$101 TX = \$101

Site 2

Ch1 RX = \$102 TX = \$102

Site 3

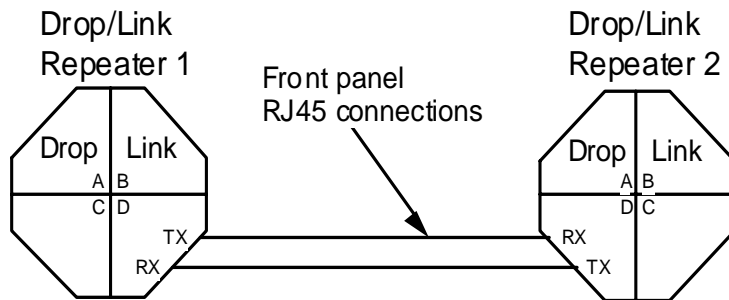
Ch1 RX = \$103 TX = \$103

Site 4

Ch1 RX = \$104 TX = \$104

Application G:

Portable or site interconnectivity:



This application shows two portable Drop/ link repeaters being interconnected directly through the front panel RJ45 connections on the RC-4M. This interconnectivity will allow users the flexibility of being able to expand the existing portable or fixed system without any extra RF equipment.

This type of configuration can be used for situations where there is more than one department or group working in an area and they need to talk to each other at a moments notice.

In the example programming shown below the two repeaters work independently until \$999 is received which effectively interconnects both repeaters.

This type of system can be configured in analog mode as well with CTCSS.

Example programming:

Drop/Link Repeater 1				
	TXA	TXB	TXC	TXD
RXA	\$101 \$102			
	\$999	\$999	\$999	\$999
RXB	\$999		\$999	\$999
RXC	\$999	\$999		\$999
RXD	\$999	\$999	\$999	

Drop/Link Repeater 2				
	TXA	TXB	TXC	TXD
RXA	\$201 \$202			
	\$999	\$999	\$999	\$999
RXB	\$999		\$999	\$999
RXC	\$999	\$999		\$999
RXD	\$999	\$999	\$999	

Sample Subscriber NAC Programming:

Repeater 1

Ch1 RX = \$101 TX = \$101

Ch2 RX = \$101 TX = \$102

Ch3 RX = \$101 TX = \$999

Repeater 1

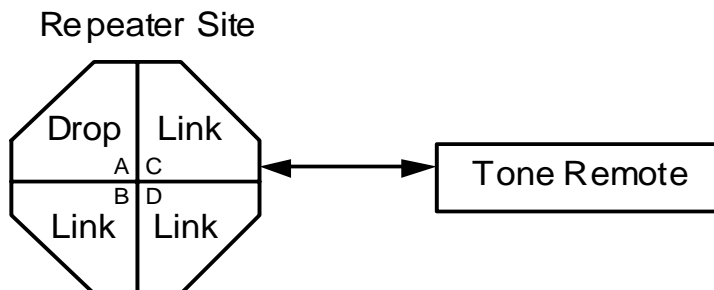
Ch1 RX = \$201 TX = \$201

Ch2 RX = \$201 TX = \$202

Ch3 RX = \$201 TX = \$999

Application H:

RC-4M Repeater with AUX/Audio connection:



The RC-4M has an optional E&M/AUX audio connection available that can be configured to connect up to four pair of transceivers. When fully configured for four pair of radios an external unit, such as a tone remote, can monitor all four receivers and transmit out all four transmitters.

If each transceiver needs individual control a separate tone remote would be required on each pair.