RLC-2 Repeater and Linking Controller
Software Version 3.06

Link Communications Inc.
P.O. Box 1071
Sidney, MT 59270
(406) 482-7515

Introduction:

Congratulations, you have purchased a very powerful tool for your group's repeater. The RLC-2 may seem complicated and intimidating at first, but don't worry. Setting it up and programming it are easy and straightforward, once you have read the manual. Please take the time to read it before you try to start programming. This will save you a lot of confusion and frustration, as it should answer most of your questions.

The RLC-2 repeater controller consists of one repeater port, two linking ports, four analog voltage inputs, four logical (dry contact) inputs, and eight MOSFET output drivers. The repeater port and each of the linking ports can be configured to require one of several combinations of COR and PL inputs for access. The RLC-2 has a single DTMF decoder that scans between the three receiver ports, thereby supporting DTMF control from all ports of the controller. Synthesized voice prompts the users in the programming of the controller's variables, provides voice ID's and alarms based on the inputs, etc.

This manual consists of three main sections: setup and interfacing, programming and commands, and the appendices with commonly referenced tables and charts. A glossary has also been included at the end to explain some of the terms and abbreviations that are used throughout the manual.

We have attempted to explain everything in a way that is easy to understand, but some questions are inevitable. If you have carefully read the manual and still have questions, call or us at (406) 587-4085 or Fax us at (406) 585-7575 write to us at

Link Communications Inc.
P.O. Box 1071
Sidney, MT 59270

LIMITED WARRANTY

COVERAGE:

Link Communications warrants that its products will be free from defects in materials and workmanship for a period of one year from the date of shipment. During this time, Link Communications will cover parts, labor and return shipping. If failure is caused by instances other than manufacturing defects, Link Communications will repair the product and bill the customer for parts and labor. Contact Link Communications for more information.

What Link Communications will not cover:

1. Too much voltage to the controller. The RLC-2 operates at +11V to +15V, negative ground.

2. Damage to the controller by lightning, accident, or incorrect power hook-up.

3. Incorrect unit installation.

4. Damage caused by shipment (damage claims are handled by the carrier).

6. Repairs by other than Link Communications.

THIS WARRANTY HOLDS ONLY TO THE ORIGINAL PURCHASER

HOW TO GET SERVICE

Please contact Link Communications for servicing information and authorization.

SOFTWARE

Link Communications holds the copyright on the RLC-2's software and hardware. Changes to the software, copying of the software, and use of the voice code is prohibited without the written consent of Link Communications.

SOFTWARE UPDATES

Link Communications will provide FREE Software updates for 6 months from the date of purchase. The owner must return replaced software chips to Link Communications in order to obtain further software updates. Software updates will cost $50.00 after the update warranty expires. Manual inserts and shipping are additional.

User Survey (Optional)

A knowledge of the user base will allow us to better serve you in the future by helping us develop more specialized software and hardware. Please take a few minutes and fill out this questionnaire.

RLC-2 Serial Number ..... _____
RLC-2 Purchase Date ..... _____

Application: (Circle All That Apply)

Ownership:

- 1 - Privately Owned Repeater
- 2 - Club Owned Repeater
- 3 - Group Owned Repeater
- 4 - Commercial Business Repeater
- 5 - Other _____

Installation:

- 1 - Wide Coverage Repeater with Chain Links
  - Port to Port Linking
- 2 - Full Duplex Links
- 3 - Half Duplex Links
- 4 - VHF Repeater: Power _____ Make _____
- 5 - UHF Repeater: Power _____ Make _____
- 6 - Link Ports Used as Repeater Ports: Yes No
- 7 - Serial Data Used to Control Repeater: Yes No
- 8 - Other Amateur Repeaters At the Site: Yes No
- 9 - Other Link Communication Products Used: Yes No

Misc:

- 1 - User Base: Technical Rag Chew Personal
- 2 - Autopatch used on the System: Yes No
- 3 - Frequency Adjustable Remotes: Yes No
- 4 - Linking to Other Repeaters: Yes No
- 5 - Linking Closed Access: Yes No
- 6 - PL Required on Main Repeater: Yes No Varies
- 7 - PL Required on Linking System: Yes No Varies

Please Return to: Link Communications
P.O. Box 1071
Bozeman, MT. 59771

Comments:

Table of Contents

*** Getting On The Air Quickly ***

Follow the steps below to get your RLC-2 operational and on the air quickly.

1) Read the entire manual or go to step 2

2) Read the 'Setup and Interfacing' section to make sure you have all of the needed parts
   - This section describes how to adjust your controller

3) Wire up your power cord to +12 Volts DC. Center pin is positive, sheild is ground.

4) Wire up your radio or audio amp.
   - pin 5 is your audio input (from your receiver audio out)
   - pin 4 is your audio output (to your mike jack or amp audio input)
   - pin 7 is your COR line (active low COR required (Goes to ground when active))
   - pin 3 is your PTT input (active low on PTT (Goes to ground when active))
   - pin 2 is your PL detect input (active low on detect (Goes to ground when active))

5) Once you have your radio connected adjust your audio (See step 2)

6) Programming your controller
   - Command C065 programs your Voice/CW messages
     - Slot #00, 01, 02, 03 are your main port ID slots
   - Command C064 recalls your Voice/CW messages
   - Command C049 programs or recalls your courtesy beeps

7) If using an RS-232 port refer to 'Serial Port Interfacing' to get your RS-232 cable built
   - The RLC-2's serial port is not a standard DB-9 serial wiring
   - You must have both RX and TX wired for the serial port to work
   - You must have your grounds commoned between the computer and RLC-2 ports

8) Once your serial is connected, press the reset button to see the RLC-2 copyright message
   - If you don't see the reset message check the following conditions
     - Is your Baud rate 2400 N 8 1
     - Do you have your RX and TX leads swapped (Very Common)
     - Are your grounds tied together
     - Is your computer on the correct serial port

9) Now you can DTMF or RS-232 control the RLC-2

10) Don't forget to use your password when DTMF programming
   - The password defaults to a '96'

11) Don't forget to enter the entire command name when using RS-232 interface
   - Command C058 will be entered on the serial port as [C058]
   - Command 12 will be entered on the serial port as [0012]

12) Call Link Communications Inc. for more help after
   - You have read the entire manual
   - Specific questions about the controller operation

Setup and Interfacing

This section of the manual contains everything you should need to know to get your repeater controller up and running. The numbered steps cover the basics, through connecting your radios and adjusting the RLC-2. After that there is information concerning the other input and output features of the RLC-2: the serial interface, the logical output and input lines, and the analog input lines.

Step #1: Check the Packing List

Your package should contain the following items:
(1) RLC-2 Repeater Controller
(1) 2.50mm Power Connector
(1) DB-9 Female Solder Connector
(5) DB-9 Male Solder Connectors
(1) RLC-2 Manual
If any of these parts are missing, contact Link Communications.

Step #2: Connect Power

- The RLC-2 was designed to run off of 12V DC. 11V to 14V should work fine.

- Locate the 2.50mm power connector included in your parts bag.

- Unscrew the plastic outer shield and thread your power and ground wires through it (20 gauge suggested).

- Solder the +12V wire to the center pin of the 2.50mm connector.

- Solder the ground wire to the shield of the 2.50mm power connector.

- Screw on the plastic outer shield.

- When power is applied to the RLC-2 controller, the 5 LED's on the RLC-2 controller should light, indicating proper board operation. **If all of the LED's do not light, turn off the power immediately.**

Step #3: Connecting Your Receivers to the RLC-2

The main repeater and each of the links connect to the RLC-2 using a male DB-9 connector (included). The control receiver connects to the same DB-9 as the main repeater. The pin-outs are listed below.

Main Port

1 - Control RX COR
2 - PL Input (Active Low)
3 - PTT Out (Active Low)
4 - Audio Out (600 Ω)
5 - Audio In (10K Ω)
6 - Control RX Audio In
7 - COR Input (Active Low)
8 - Ground
9 - Ground

Link Ports 1 and 2

1 - Ground
2 - PL Input (Active Low)
3 - PTT Out (Active Low)
4 - Audio Out (600 Ω)
5 - Audio In (10K Ω)
6 - Ground
7 - COR Input (Active Low)
8 - Ground
9 - Ground

Connecting the Receiver COR

- The first step in connecting your receiver is to locate an active low (0V when the receiver is unsquelched) COR signal. The signal must be able to sink 4mA to ground. The input impedance of the RLC-2 COR input is 10KΩ and it is diode clamped with internal pull-up resistors. This allows it to handle input voltages of up to 40 volts without damage to the controller. **The COR input must not go below 0V (ground); this would damage the 82C55 IC.** Using one of the supplied DB-9 Male connectors, connect your COR signal to pin #7 (or pin #1 for the control receiver).

Connecting a PL Input (optional)

- If you wish to use a PL (CTCSS) decoder on any of the receivers, it can be connected to pin #2 of the appropriate connector in the same fashion as the COR input.

Connecting the Receiver Audio

- 2 types of audio can be used on the RLC-2 controller:
    Type 1: De-emphasized audio (Speaker Audio)
    Type 2: Discriminator audio (Raw Unsquelched Audio)

- If type 1 audio is used, remove the appropriate jumper on the controller. This removes the de-emphasis filter from the circuit. As the controller comes shipped, all ports are set up for type 2 audio.

Receiver De-emphasis Jumpers

J1 - Main Receiver De-emphasis Jumper
J2 - Link 1 Receiver De-emphasis Jumper
J3 - Link 2 Receiver De-emphasis Jumper
J4 - Control Receiver De-emphasis Jumper (J8 on Rev. A,B Boards)

- If type 2 audio is used, place the appropriate jumper in circuit (over both pins). This will place a -6dB/octave de-emphasis filter into the circuit. Some discriminators can not directly drive the 10KΩ input impedance. If this is the case, a pre-driver or different audio access point will be required. The filter will not allow PL to pass through the controller. Contact Link Communications if your needs require PL to pass through the controller.
- The audio input is connected to pin #5 of the male DB-9 connector (pin #6 for the control receiver).
- The audio adjustments will be described in Step #4.

How the DTMF Decoder Works

- The RLC-2's DTMF decoding circuit uses a scanner that enables the controller to receive tones from all the ports, without mixing the three receiver's audio together. This allows the receivers to have total control of the DTMF decoder when its COR is active. If the control receiver is active, and the control receiver is configured for priority control, then the DTMF decoder is locked to the control receiver's port until its COR goes away. Once the decoder has detected a tone on one of the ports, it stops scanning and waits up to three seconds for the next digit. It is reset at the beginning of each DTMF digit. If any of the DTMF digits are held for longer than 3 seconds or there is a pause of 3 seconds between digits, the DTMF scanner will resume scanning and all digits entered up to that point are lost.

Step #4: Connecting Your Transmitters to the RLC-2

Transmitter PTT

- The RLC-2 produces an active low PTT signal (ground when PTT is active). This output is buffered with an open collector type driver capable of sinking 150mA. There is a built in 30V zener clamping diode to protect the PTT MOSFET from the high voltage spikes that can be caused by interfacing to a PTT relay coil. Your transmitter PTT input should be connected to pin #3 of the DB-9 connector.

Transmitter Audio

- The RLC-2 provides a 10KΩ output impedance to your transmitter audio input.
- The transmitter audio is connected to pin #4 of the DB-9 connector.
- If it is not already, the DB-9 plug can now be plugged into the appropriate jack on the main board. The main repeater goes to the jack nearest the power jack, Link 1 is right next to it, and Link 2 is the third from the left (with the DB-9s toward you).

Step #5: Adjusting the RLC-2 Controller

- Locate connector JP1 on the RLC-2 (It is the 10 pin female connector). This test bus will provide the signals that we need to adjust the inputs on the RLC-2. In order to maintain audio deviation during channel switching, all of the receiver inputs to the Cross-Point Board must be set to the same level. These signals can be measured with an oscilloscope or an AC voltmeter. If you are using an AC voltmeter, remember that it reads AC signals as RMS values. In order to obtain an audio signal on JP1, a valid COR or PL must be received. Once a valid access signal is received, the RLC-2 will un-squelch the audio and be present on JP1.

Main Receiver Port Adjustment:
- Execute Commands C000 and C003 to enable Main-Link1,Link 2 TX

Main Receiver: Transmitter Port Adjustment:
- Present a stable Tone or DTMF tone to the Main RX.
- Adjust the 'Main RX' pot so that the signal on pin 1 of JP1 is 1 volt peak-to-peak.
- Adjust the 'Main TX' pot to obtain the desired deviation.

Link 1 Transmitter Port Adjustment:
- Adjust the 'Link 1 TX' pot to obtain the same deviation as the Main TX is.

Link 2 Transmitter Port Adjustment:
- Adjust the 'Link 2 TX' pot to obtain the same deviation as the Main TX is.

Link 1 Receiver Port Adjustment:
- Present the same Tone or DTMF signal used in the Main port to Link 1 Receiver. While watching the Main TX audio, adjust Link 1 RX pot for the same deviation that was present on the Main TX.

Link 2 Receiver Port Adjustment:
- Present the same Tone or DTMF signal used in the Main port to Link 2 Receiver. While watching the Main TX audio, adjust Link 2 RX pot for the same deviation that was present on the Main TX.

Voice Level Adjustment:
- Use Keypad Test (C146) to generate Voice Data.
- Adjust 'Voice' pot to 2.0 Khz deviation or until it "sounds" good, this adjustment is for all transmitters.

Tone Generators Adjustment:
- Adjust 'Tone 1' to 1.5 KHZ deviation, Adjust 'Tone 2' to 1.5 KHZ deviation
- This adjustment is for all transmitters.

Control Receiver Adjustment
- Present a stable Tone or DTMF Tone to Control RX.
- Set-up the Control Receiver port as a radio port
-- Use C141*1* Configure the port as a radio port
-- Use C142*1* Routes Control Receiver audio to the Main TX port
- Adjust 'CON RX' pot to match the deviation used earlier

Serial Port Interfacing

The RLC-2 has a serial terminal port for interfacing to any serial device, i.e. packet and serial terminal. This allows the user to monitor, control, and program all facets of the controller. The serial terminal carries highest priority for access and programming of the RLC-2. There is an 8 digit password needed to log on to the serial port of the controller, ensuring the security of the system. The format for the input password is simply "[$$$$$$$$]" , where "$" is any ASCII character. The serial system can not be accessed from the DTMF port decoder, only via a serial system.

RS-232 Signals and Interfacing

The RLC-2 output is the RS-232 standard, ±12V. The serial terminal port also contains the I/O pins for the software controlled resistors. (See the Software Resistor Section for interfacing programming information).

Pin-Out Serial/Resistor P6 Connector

1 - Wiper Resistor #2 (Capacitively Coupled)
2 - Low Side Resistor #2
3 - Wiper Resistor #1 (Capacitively Coupled)
4 - RS-232 Data Input (From Your Terminal)
5 - Ground Reference
6 - High Side Resistor #2 (Capacitively Coupled)
7 - Low Side Resistor #1
8 - High Side Resistor #1 (Capacitively Coupled)
9 - RS-232 Data Output (To Your Terminal)

Local Terminal Interfacing

When using a local ASCII terminal at the RLC-2's location, an ASCII terminal can be used to communicate with the programming features of the RLC-2. The terminal's communication parameters must be set to:

Baud (Default)..... 2400
Start Bits..... 1
Stop Bits 1
Parity ..... N
Word Length 8

These parameters will allow communication with the RLC-2. For system operations, see the next section "Operation and Programming Over the Serial Port".

Configuration of the Serial Port

- Serial Command 'S15' is provided to configure the serial port Echo conditions, Serial Baud rate, Serial Log-On condition, and internal serial echoing of data.
- Echo conditions: Allows the controller to echo all input data out the serial port
- Baud rate: Allows baud rate changes from 300,600,1200,2400,4800, and 9600 baud.
- Serial log-on: Allows the user to turn ON or OFF the serial log-on requirement.
- Internal Serial Echo: Allows the user to turn on internal serial echo messages

Operation and Programming Over the Serial Port

- The RLC-2's serial port gives the controller the ability to communicate with the world over a digital radio link. The RLC-2 has a security key of 10 characters that must be entered properly in order to have the RLC-2 communicate with your computer terminal. The syntax of the initial password is as follows:

[$$$$$$$$]
"[" is the first character entered
"]" is the last character entered
"$" is any ASCII character except the "[" or "]"

The default password is: [ABCDEFGH]
Once the proper password has been entered, the RLC-2 will respond with the message

"RLC-2 REPEATER AND LINK CONTROLLER: LOG ON"

If you did not receive this message after you logged on, then check:
- Are you already logged on
- Do you have the correct password, including CAPS
- Is your serial port connected, and configured correctly?

Once on the serial system, you have access to all features of the RLC-2, and several special commands only for the serial user. **A very important note, all commands entered over the serial port must begin with a "[" and end with a "]" in order to be accepted.**

Serial Command Structures:

- Upper Case Letters must be used, You must log on before any control can take place
- Lack of activity on the serial port will cause an automatic log off after 1 minute. This timer can be programmed using the Timer program command. This command is "C067".

RLC-2 Command Entry Format:

- All command names must be 4 characters long
-- Command name "12" must be entered as "0012"
- No <EOF> key is needed in the data string
-- To set the time to 12:15 PM, the normal DTMF tones are: 96 C135*12111*
-- Over the serial port the data string is: [C13512111]
-- To do a keypad test, the normal DTMF tones are: C146*123456789*
-- Over the serial port the data string is: [C146123456789]
- No Passwords are needed over the serial port
-- Notice when setting the time above, the DTMF side needed a password
-- When controlling over the serial port, no password was used
- Commands are entered exactly like over the are, except for the above "Rules"
- Voice response will be over the Main Repeater port
- Characters entered for RLC-2 Commands must be limited to the DTMF Tones
-- 0 1 2 3 4 5 6 7 8 9 A B C D * #
-- Do not use you <EOF> key in the string, it will cause incorrect execution of the command

Serial Commands Entry Format:

- All Serial Commands begin with the Letter "S"
- The Commands number from 00 .. 15 Currently

Serial Commands:

S00 - Formated Dump of the Latched Output Lines

OUTPUT 01 ON/OFF
OUTPUT 02 ON/OFF
OUTPUT 03 ON/OFF
OUTPUT 04 ON/OFF
OUTPUT 05 ON/OFF
OUTPUT 06 ON/OFF
OUTPUT 07 ON/OFF
OUTPUT 08 ON/OFF

S01 - Formated Dump of the Input Lines

INPUT 01 HIGH/LOW
INPUT 02 HIGH/LOW
INPUT 03 HIGH/LOW
INPUT 04 HIGH/LOW

S02 - Formated Dump of the Analog Lines (Currently only Raw Data)

ANALOG 01 ### (### 000 .. 255)
ANALOG 02 ### (### 000 .. 255)
ANALOG 03 ### (### 000 .. 255)
ANALOG 04 ### (### 000 .. 255)

S03 - System Information Dump

S04 - Serial Dump of Command Names C000 .. C210

C000:C001: .. : C007:C208:C209:C210

S05 - Serial Dump of Selected Voice Message in "Up-Loadable" Code

- Access to all user programmable messages
- Format to allow the user to re-program the message using an ASCII Communications program. In order to use this command, the communications program must be in the ASCII download condition (Usually hitting the Page Down Key and selecting ASCII Format).
- Data will be formated using the C065 Command, and additional data
- Example of the Initial ID Message
--Voice message coding
-- Message defaults to: "Repeater ID 0"
-- Serial Command to Access data: [S0501]
-- Data Looks Like: [C0650113760560380330000]
--- C065 is the Message Programming Name
--- 01 is the Message Number
--- 1 is the Message Type (Voice)
--- 376 (Repeater) 056 (Pause) 038 (I) 033 (D) 000 (Zero)

S06 - Formated Dump of Selected Macro Positions
- Allows the user to see what is inside a programmed Macro slot
- Data output format looks like

Example #1

[
MACRO ## (## 01 .. 30)

C091
C092
C093
]

Macro contains the commands:
1) Turn on Output 1
2) Turn on Output 2
3) Turn on Output 3

Example #2

[
MACRO ## (## 01 .. 30)

C091
C092
C049 PLUS 1:1:2:0:0:1:0:0:0:0:5:0:5:
]

Macro contains the commands:
1) Turn on Output 1
2) Turn on Output 2
3) Program the Main Courtesy Beep to 1 Sequence, Tone 1(1200) Tone 2(1000) Length 50 mS Delay 50 mS

Example #3

[
MACRO ## (## 01..30)

C099
C091
C099
]
Macro Pulses Output Line #1 OFF-ON-OFF

S07 - Serial Dump of the System Passwords

[
1 - 96
2 - 97
3 - 98
4 - 99
]

S08 - Formated Dump of Scheduler Positions

[
SCHEDULER POSITION 01 ON EVERY DAY AT 00:12 . . HR C058
SCHEDULER POSITION 02 ON EVERY DAY AT 12:34 PM DY C059
SCHEDULER POSITION 03 OFF THURSDAY AT 11:12 AM WK C138
                                :
SCHEDULER POSITION 20 OFF

S09 - Complete System SRAM Download

This command allows the user to completely download (Move from the RLC-2 to your computer) the contents of your RLC-2 controller. This is handy for re-uploading your controller after a re-boot condition. The file transfer size is 16K Bytes.

Steps:

1 - Put your computer into the ASCII Download position
2 - Type [S09]
3 - When the controller prompts you, close your ASCII file (Hit the ESC Key)

S10 - SRAM Upload check

This command allows the user to check the file that was downloaded using command S09. This routine will check the file for the proper header and check the number of bytes present inside the file. The file header '{1234ABCD ... ' must be present for the controller to accept the file.

Steps:

1 - Type [S10] RLC-2 will prompt you to begin your transfer
2 - Put your computer into the ASCII Upload position and upload a file.
3 - When the controller prompts you, close your ASCII upload (Hit the ESC Key)

S11 - SRAM Upload from Computer to RLC-2

This command does the same as command S10 except it writes the uploaded file to the system RAM. If the file has problems, it will overwrite all the contents of your controller. Before attempting an upload, be sure to do a download to save your current controller data in case an error occurs when you upload the new file.

!!! An invalid file will TOAST your controllers settings !!!

S12 - Not Currently Defined

S13 - Change the Serial Systems Log-On Password Name

This command allows the user to change the serial log-on password (Default ABCDEFGH) from its current name, to a new name.

Format for programming:

[S13 ######## $$$$$$$$]

######## is the Current Serial Password, 8 Characters in Length
$$$$$$$$ is the New Serial Password, 8 Characters in Length

S14 - Enable/Disable voice echo when programming over the serial port

This command allows the serial user to enable/disable the voice response over the main repeater port when doing serial programming. The default condition is the voice is echoed. When the user logs off the controller, the voice echo condition is reset to '0'.
Format for programming:

[S14 1 or 0]

0 - Enables the Voice response
1 - Disabled the Voice response

S15 - Set-Up serial port Echo, Baud, Log-On, and Internal Echo

This command allows the user to set-up the parameters on the serial port.
The default conditions are:
- Serial Echo 'Off'
- Baud Rate '2400 Baud'
- Log-On 'Required'
- Internal Echo 'Off'

Serial Echo allows all data that is sent to the RLC-2 to be echoed out back to the sending source.
Parameters: @
1 - On
0 - Off

Baud rate can be changed to: 300,600,1200,2400,4800,9600 Baud
Parameters: #
0 - 9600
1 - 4800
2 - 2400
3 - 1200
4 - 600
5 - 300

Log-On Control is used when radio connection is used. The log-on should be used if security is needed for control over the serial port. When using a serial terminal, or a computer, the log-on can be shut-off.
Parameters: $
1 - On
0 - Off

Internal Echo Control is used to enable/disable the controllers internal responses over the serial port. The function is normally used for Link Communications use. This function is normally 'Off'
Parameters: %
1 - Enabled internal echo
0 - Disables internal echo

Serial Format: [S15 @ # $ %]

S99 - Serial System Log OFF

This command logs the serial server off the RLC-2 Controller. The Serial Port Log-Off Message will appear when you Log-Off. If you do not Log-Off, the RLC-2 will automatically Log-Off after 1 Minute of Non-Activity.

"RLC-2 REPEATER AND LINK CONTROLLER: LOG OFF"

Software Resistors and their Applications

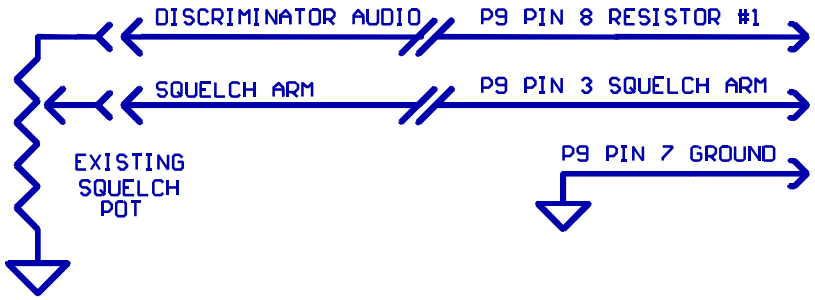
The RLC-2 offers a unique option to the repeater controller. The controller offers two 50KΩ resistors controllable from your DTMF tone pad. Using this option, the RLC-2 can vary the resistance in 196Ω steps with a total of 255 possible resistance values. With this feature, it is possible for the repeater operator to remotely control the squelch circuit of the repeater, volume of remotes, or vary the repeater's power output. These are just a few of the applications made possible by the software resistors. See Command C143 for information on setting the value of the resistors.

Software Resistor Interfacing Precautions

The software resistors are AC coupled using a 0.1uF capacitor. The capacitors are placed in series with the high side and the wiper side of the resistor (See below). Because of the added capacitors, only AC can be varied using the resistor. This guards against damaging +12V that would otherwise be fatal to the software resistors. When using the resistors, it is very important to remember that **the software resistors are a ±5 Volt device, therefore the peak amplitude of the input signal cannot exceed the ±5 Volt limit without damage to the resistor.**

Pin-Out Serial/Resistor P6 Connector

1 - Wiper Resistor #2 (Capacitively Coupled)
2 - Low Side Resistor #2
3 - Wiper Resistor #1 (Capacitively Coupled)
4 - RS-232 Data Input (From Your Terminal)
5 - Ground Reference
6 - High Side Resistor #2 (Capacitively Coupled)
7 - Low Side Resistor #1
8 - High Side Resistor #1 (Capacitively Coupled)
9 - RS-232 Data Output (To Your Terminal)



AC Coupled

Software Resistor Applications

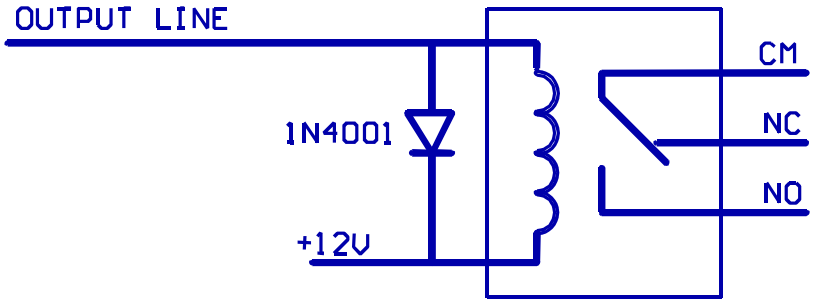
Analog Examples

Logical Latched Output Lines

The RLC-2 offers 8 logical control lines for site control. Because the output lines are open collector, the user will not measure any voltage on the output lines, only an open or a ground. In order to check the condition of the control lines, a meter set to resistance will be needed. The meter will read an open when the control line is off and a virtual ground when the control line is on. When using a semiconductor device as a latch, certain current limitations are imposed. The Output used can sink (apply a ground), of 150mA. If this current is exceeded, the Output will short and destroy the device. See figure below on how to connect a relay to one of the output lines. (See Command Listing for output control line commands).

Pin-Out Logical Latched Outputs P2 Connector

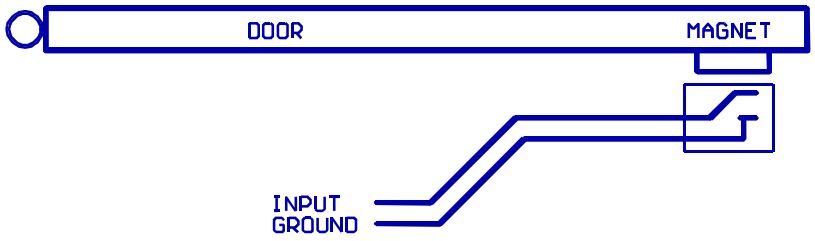
1 - Ground
2 - Output #8
3 - Output #6
4 - Output #4
5 - Output #2
6 - Output #7
7 - Output #5
8 - Output #3
9 - Output #1



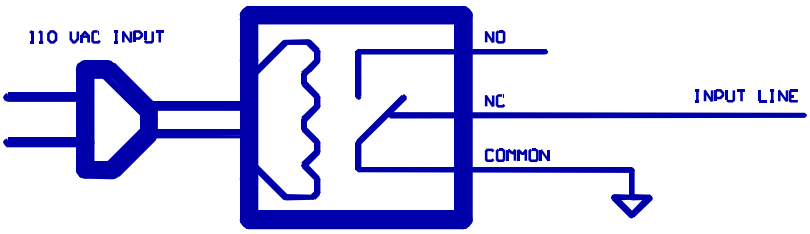
Relay Interfacing to a Control Line

Logical Input Line

The RLC-2 offers the user 4 logical input lines. These lines recognize an open/ground input change. These lines are internally pulled up to +5 Volts and zener diode clamped to 5 Volts. This allows direct interface to higher voltage inputs that do not exceed +40 Volts. The application to site users is great: door open/closed magnetic contacts, local site controlled switches, and site power monitoring relays. See figures below for some circuit installation procedures. These are just a few of the applications that the logical input lines can be used for.



Magnetic Door Alarm Interface



Local House Power Failure Alarm

Analog Input Telemetry Lines

The RLC-2 offers what most other controllers charge thousands for, 4 analog monitoring input lines. This is a nice feature that allows the site owner to monitor analog conditions like temperature, site voltage, forward and reflected power, heat sink temperature, and much more. The RLC-2 comes set up to measure 0-25 Volts with 100mV resolution. For special applications, the input voltage will only vary a few volts. With a clip of a resistor (Revision A boards), the lifting of a jumper (Revision B boards), or a flip of a dip switch (Revision C boards), the RLC-2 will measure 0-5 Volts, giving 20mV resolution. It is important not to apply over 30 volts to the RLC-2 in the 25 Volt range or 7 volts in the 5 volt range. If this voltage threshold is exceeded, damage to the analog op amp will occur.

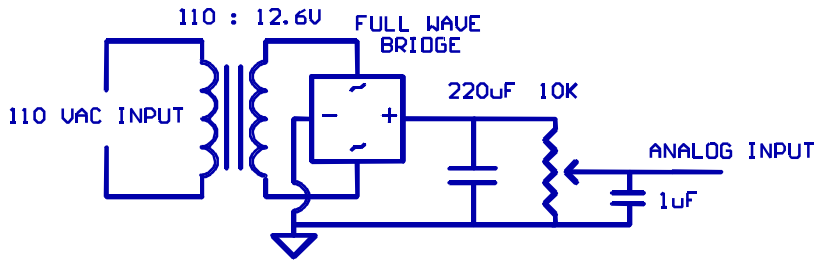
Pin-Out Analog/Input P1 Connector

1 - Ground Reference
2 - Dry Contact Input #4
3 - Dry Contact Input #2
4 - Analog Input #4
5 - Analog Input #2
6 - Dry Contact Input #3
7 - Dry Contact Input #1
8 - Analog Input #3
9 - Analog Input #1

Revision A boards must clip one of the voltage division resistors to use 0-5 volt range.
- Clip R3 (Analog 1); R4 (Analog 2); R5 (Analog 3); R6 (Analog 4)

Revision B boards can simply lift a jumper to use the 0-5 volt range.
- Jumper J13 (Analog 1); J14 (Analog 2); J15 (Analog 3); J16 (Analog 4)

Revision C boards can simply flip a switch to use the 0-5 volt range.
- Switch S1,1 (Analog 1); S1,2 (Analog 2); S1,3 (Analog 3); S1,4 (Analog 4);



Adjust Resistor

until Voice Matches Analog Input on 0-25 volt Scale
Site AC House Power Monitor

Programming and Commands

This section of the manual first discusses some of the things you need to know that are common to all of the commands, such as passwords. It then has a list of the commands sorted according to their function, a list sorted according to the command name, and lastly a detailed description of what each command does and how it is used.

Passwords and Their Use

In order to maintain the security needed in any controller, the RLC-2 offers the users the ability to flag a password to any command (See Command C043 for Password programming). The command list sorted by name contains (in the "pass" column) either a P0 or a N. The 'N' indicates that no password is needed for this command. The 'P0' indicates that password '0' is needed for access. When passwords are used, the command name must be 4 digits long. The format for using passwords is ** $$$$ where the '**' is the password and the '$$$$' is the command name, with leading zeros attached, if applicable. The default passwords are:

```
+)))))0)))))),
*  P0  *  96  *
*  P1  *  97  *
*  P2  *  98  *
*  P3  *  99  *
.)))))2)))))-
```

The <EOF> Key

The <EOF> key refers to the key that is used to tell the controller that the command has been entered (with the DTMF pad) and that it is time to act on it. It is also used to separate the command name from any parameters it might have. The <EOF> key is '*' by default, but this can be changed with Command C045.

Programming Messages

Many of the messages in the RLC-2 can be changed to a message more specific to your controller. This is done with the commands listed as "Set...Message." These messages are composed of words that are found in the Voice Word Library (Appendix C). Each word there is identified by a three digit code (leading 0s are necessary for shorter codes). Each message has a specific maximum length, although not all messages have the same maximum. It should be noted that any entry in the Voice Word Library is considered a whole word. Spelling out the letters "H E L L O" counts as five words, not one. The RLC-2 gives the ability to also configure the messages as CW. This allows messages to be either Voice or CW. For command execution using a message assignment, command names can also be assigned to react when a user programmable message is called. (See Command C064, and C065 for more information on Message programming)

A Brief Description on how to use: Macros

Definition:

A Macro is a type of command that contains several other commands. The use for macros is to allows the user to execute several commands by entering only 1 command. The uses of macros are many, to many to describe here, But I will explain a few uses.

Example #1

Need to re-configure the repeater and add a drop-out message on the main port.

1) Configure the repeater port for COR and PL Access (C018*3)
2) Add a "Good Morning/Afternoon/Evening" message on transmitter drop.(Slot 94)
3) Turn off the link connections to the main port (C002, C005)

For this example use macro #01
-P- C180*01 C018 3 A C065 94 111 426 A C002 A C005 *

Voice Response "WR 1"
This macro contains the above commands using the 'A' key as the isolation digit.
The voice message attached to macro #01 can be programmed using C065 slot #50.
To execute this macro sequence, enter the command -P- C181.

Example #2

Want to have different Autopatch up commands for access from different ports.

1) Have more than 1 autopatch up command (C160)
2) Be able to configure the controller depending what command accessed
3) Have 1 common drop command

For this example use macro #2,#3,#4

Macro #2 is the main port autopatch access
Macro #3 is link 1 port autopatch access
Macro #4 is link 2 port autopatch access

For Main port access
-P- C180*02 C002 A C005 A C160 *

Turns off Main - Link 1, Main - Link 2 and calls the autopatch up command
Voice Response "WR 2", Message response C065 slot #51

For Link 1 port access
-P- C180*03 C002 A C005 A C011 A C160 *

Turns off Main - Link 1, Main - Link 2 and calls the autopatch up command
Voice Response "WR 3", Message response C065 slot #52

For Link 2 port access
-P- C180*04 C002 A C005 A C011 A C160 *

Turns off Main - Link 1, Main - Link 2 and calls the autopatch up command
Voice Response "WR 4", Message response C065 slot #53

On Hook hang-up command
-P- C180*05 C161 A C000 A C003 A C010 *

Hangs up to autopatch, and re-connects Main-Link 1-Link 2 Ports.
Voice Response "WR 5", Message response C065 slot #54

A Brief Description on how to use: Drop-Out Messages

Definition:

A drop-out message is a message that is sent right before the transmitter PTT unkeys. This message is sent every time the TX unkeys, but is not sent when normal conversation keep the transmitter keyed up. The uses for drop-out messages is to indicate some special condition on the repeater, tell the user to recall some message and for everyday telemetry responses. Each port has (2) drop-out message slots with a 3 voice or CW word capacity, or 1 command name slot.

Drop-Out Message Slots

The drop-out message slots are accessed with the message writing command

- Main Slot #1 (C065 * 94 "Normal Format")
- Main Slot #2 (C065 * 95 "Normal Format")
- Link 1 Slot #1 (C065 * 96 "Normal Format")
- Link 1 Slot #2 (C065 * 97 "Normal Format")
- Link 2 Slot #1 (C065 * 98 "Normal Format")
- Link 2 Slot #2 (C065 * 99 "Normal Format")

Drop-Out Message Control

- To enable a drop-out message slot simply program in a voice or CW message
- To Disable a drop-out message slot program a voice word "000"

Example #1

Want to speak Good Morning/Afternoon/Evening on the main port when the TX unkeys

Command C065 is used to program the slot

-P- C065*94 111 426 * Speak word 426 out Main port

Example #2

Want to speak "EP" in voice to indicate emergency power condition, and clear the message when the alarm clears. Use input #1 to sense power loss, Macro #06 to build the message and Macro #07 to clear the message. When input #1 goes from a high to a low, indicates power loss, and low to a high indicates a normal condition.

Input #1 Alarm Condition, Low Message calls macro #06 in alarm

-P- C065*31 3 1 C186 *

Input #1 Normal Condition, High Message calls macro #07 in normal

-P- C065*27 3 1 C187 *

Macro #06 will append a drop-out message

C180*06 C065 94 111 034 045 *

Macro #06 voice message: AC Power Fail Alarm

-P- C065*55 111 030 032 112 166 384*

Macro #07 will cancel drop-out message #1

C180*07 C065 94 111 000 *

Macro #07 voice message: AC Power Fail Alarm Clear

-P- C065*56 111 030 032 112 166 384 355*

A Brief Description on how to use: Lack of Activity Timers

The lack of activity timers are used to time event changes, and execute a command once the time has expired. Common uses for the lack of activity timers is watching the PTT on the link ports. When there has been no PTT for 'XXX' seconds, the link port is shut off. Using the lack of activity timers gives the controller the ability to watch-dog the main functions of the controller. There are 4 lack of activity timers on the RLC-2. See Commands C050-C056 for controlling and programming of the Lack of activity timers. When the timer is not needed, the user can disable the timer from running using command C055.

Example #1
Want to shut off Link 1 PTT after 5 minutes of no use.

1) Must initially program the Lack of activity timer using C056
   -P- C056* 1 08 0 1 030 C002 *
- Lack of Activity Timer #1
- Event 08, Link 1 PTT
- Polarity 0, Active to Inactive Transition
- Time 030, 10 Seconds * 30 = 5 Minutes
- Command C002, turn off Main to Link 1

2) When ever there is PTT on Link 1, the timer is reset
3) After 5 minutes the Command C002 is executed

To disable this event, execute Command C055* 1 0 to disable event #1

Example #2
Want to have timed repeater access and after 10 minutes shut the repeater off.

1) Will use 2 macros for this example. Macro 01 to disable the repeater and Macro 02 to disable the repeater and put it into timed access mode.

2) Macro #01:-P-C180* 01 C021 0 A C055 1 0 A C065 94 111 000 *
   - Disables Main PTT
   - Disabled Lack of Activity Timer #1
   - Clears Main drop-out message #1

3) Macro #02:-P-C180* 02 C021 1 A C056 1 01 0 1 060 C181 A C065 94 111 080 * - Enables Main PTT
   - Programs Lack of Activity Timer #1 for 10 minutes and to execute C181
   - Programs Main drop-out message to speak 'Time'

4) Macro Messages
   - C065* 50 111 376 080 079 * 'Repeater Time Off'
   - C065* 51 111 376 118 004 010 161 * 'Repeater On For 10 Minutes'

A Brief Description on how to use: Scheduler

The RLC-2 scheduler is provided to allows timed execution of events. There are many uses for the scheduler like auto-configuring the repeater access modes, sending out club related messages, schedule link activity for nets and the list goes on. The scheduler has 3 modes of execution.

- Mode 1 is execution hourly (User enters only the minutes)
- Mode 2 is execution daily (User enters the hours and minutes)
- Mode 3 is execution weekly (User enters the day, hours and minutes)

The scheduler time sequences are programmed using Command C061. The user can voice recall a scheduler slot using Command C062. The user can enable/disable a scheduler slot using Command C063. The day type (Which day it is) is programmed using Command C060 and voice recall is accomplished using Command C059.

Example #1

Want to send out BBS message #1 at 4:55 PM daily out the Main port.

1) BBS Message #1 Command is C107

2) Scheduler type 2 is needed (Daily)

3) -P- C061* 01 2 1 0455 1 C107 *
   - Slot #01 is used
   - Scheduler Type is 2
   - Audio Routing Variable is 1 (Main port only)
   - Time is 0455 PM
   - Command C107 is executed

Example #2

At 7:50 PM on Wednesday you need to speak a BBS message indicating the net will start in 10 minutes out all 3 ports. At 7:59PM you want to re-configure the system so all ports are tied together, time-out timers are shut-off for all ports.

1) Will use Macro #10 to execute the multiple commands

2) Scheduler type 3 is needed (Weekly)

3) -P- C061* 02 7 3 4 0750 1 C108 *
   - Slot #02 is used
   - Scheduler Type is 3
   - Audio Routing Variable is 7 (Main, Link 1 and Link 2)
   - Day is 4, Wednesday
   - Time is 0750 PM
   - Command C108 is executed

After the net is over, the control operator should use a macro to restore the 'normal' condition of the controller.

A Brief Description on how to use: Remote Base Functions

The RLC-2 can control many common remote base radios. The controller can directly control ICOM and Kenwood HF radios. Control of Kenwood mobile radios is accomplished using the Doug Hall Electronics RBI-1 (See Remote Base section of the manual for Doug Hall RBI-1 information). ICOM IC900/901 band modules are supported using the Link Communications RLC-ICM interface. BCD and channel selectable remotes are also supported.

HF Remote Bases:
The RLC-2 will directly control most ICOM and Kenwood HF radios that have an RS-232 interface available. Control of the remotes is accomplished using the RLC-2 RS-232 serial port. The serial port can also be used by your terminal, modem or TNC if an external electronic transfer switch is used (See the Schematic Section for a diagram on how to build the transfer switch). When sharing the serial port, the RLC-2 will set (Turn the output line 'ON' or a Low) output line #5 while the HF serial transfer is taking place. When the transfer is complete, the RLC-2 will clear that output line. When interfacing the Audio, COR and PTT inputs, a link port must be used.

Doug Hall RBI-1 Remote Base:
The RLC-2 will control an external Doug Hall RBI-1 interface using 3 of its output lines. Interfacing the RBI-1 is accomplished by using Outputs 8,7,6. The output lines will shift the needed data out to the RBI-1 which will then control the attached radio. Most features of the radio are supported like PL frequency, encode/decode, frequency, offset, and power level. The RBI-1 will support 4 bands (2M, 220, 440, 1.2Ghz.). Link Communications only supports the RBI-1. You can purchase the interface from Doug Hall Electronics. (See Remote Base section for order information).

Link Communications RLC-ICM Remote Base Interface:
The RLC-2 will control an external RLC-ICM interface using 3 of its output lines. The RLC-ICM will allow remote control of the ICOM IC900/901 band modules. The RLC-ICM will support 6 bands (10M, 6M, 2M, 220, 440, 1.2Ghz). The interfacing of the RLC-ICM is accomplished using Outputs 8,7,6. These lines contain the data to control the interface. Contact Link Communications for more on the RLC-ICM.

Serial BCD data:
The RLC-2 supports serial shifting BCD data using 3 of the output lines. The user can enter up to 20 digits to be shifted out. Outputs 8,7,6 are used to shift the data out. An external shift register is needed to decode the serial data into parallel data.

Parallel BCD data:
The RLC-2 supports parallel shifting BCD data using 4 of the output lines. The user can enter up to 20 digits to be shifted out. Outputs 1,2,3,4 are used to shift the data out. An external shift register is needed to decode the multiple parallel data into usable data. The common use for this type of data is in channel selectable radio that require 4 bits to be set to access 16 channels.

A Brief Description on how to use: Audio Routing Variables

The RLC-2 supports audio routing variables for message handling. The term "audio routing" indicates where the message audio will be routed to when the message is being sent. These routing variables are used for all the controllers messages.

The routing variable is a number ranging from 0 to 7. The number is composed of 3 weighted bits. Bit 1 is weighted as '1'. Bit 2 is weighted as '2'. Bit 3 is weighted as '4'. These 3 bits indicate which port to route the audio to. Bit 1 is the Main port audio, Bit 2 is Link 1 port audio and Bit 3 is Link 2 port audio. When the user builds a message and the audio routing is needed, the user must add up the "weights" to come up with a number for where the message is routed.

Audio Routing Variable	Destination for the message
0	Where ever the DTMF tones came from
1	Route only to the Main port
2	Route only to Link 1 port
3	Route to Main and Link 1 ports
4	Route only to Link 2 port
5	Route to Main and Link 2 ports
6	Route to Link 1 and Link 2 ports
7	Route to Main, Link 1 and Link 2 ports

The audio routing variables are used in the Message programming routine, Command C065; Scheduler programming, Command C061; 2-tone paging utility, Command C139; and the Reverse Autopatch over the air ringing Command C176, and on the air connection C159. It is very important to understand how the audio routing variables work to understand how the RLC-2 works.

Special Cases:

1) Macro Messages: Message Number 50-79
2) Scheduler Events 01-20

- The audio routing variable used in the Macro message or a scheduler call is the audio routing variable that will be used for all the messages in the macro. This is needed so that all messages from a macro go out only the ports requested. The audio routing variable for the scheduler will override the audio routing variables in the macro messages if the macro is called from a scheduler event.

Rules to follow:

When programming a macro message, and if the message audio routing variable is set to '0' (Route the messages to where the DTMF tones came from), and the macro that you are programming is called from an event change (Analog alarms, or Input Alarms all with message type '3'), the message will go out to where that last DTMF tones came from. This can cause problem by routing a message to a port that is not expecting or needing that message.

Always assign an audio routing variable to automatic messages other than '0'.

A Brief Description on how to use: Analog Input Alarming

The RLC-2 supports both High and Low level Analog alarms. This feature gives the user the ability to watch-dog their sites without any worry of damage by an out-of-tolerance condition. Applications for the analog alarms is DC power supply voltages, Heat sink temperature, Battery voltage, Charging current, ect...

Programming analog alarm points is accomplished by locating your analog conversion faceplate assigned to the analog input, and the point where you want either the high or low alarm occur. The analog alarm value is programmed using Command C069. The alarm value points are located in the pages following Command C069. On the 'X' axis locate the faceplate used, and follow down the 'Y' axis to the point where your alarm will occur.

Example #1
Monitor the heatsink temperature and alarm when the temperature rises above 135 degrees. When the line goes into alarm call Macro #01. When the line returns to normal call Macro #02 to clear the alarm.

1) Analog 1 is used for this example
2) Faceplate 06 (Fahrenheit) is assigned to analog 1
   -P- C070* 1 06
3) Assign a diliminator name of 'Degrees'
   -P- C065* 85 111 190
3) High Analog 1 Alarm at 135 degrees
   -P- C069* 1 1 168
      - Analog 1 selected, High alarm at 135 degrees
4) Low Analog 1 Alarm not used
   -P- C069* 1 0 000
      - Analog 1 selected, low alarm disabled
5) On alarm need to speak a message, and append a drop-out message slot
   -P- C065* 39 3 1 C181
      - Analog 1 'High' Message type 3 calls Command C181
6) Macro #01 will speak a message and append a drop-out message
   -P-C180* 01 C065 94 111 116 384
      - Drop-out Message 'Temperature Alarm'
7) On alarm clear speak a message, and clear drop-out message slot
   -P- C065* 35 3 1 C182
      - Analog 1 'Low' Message type 3 calls Command C182
8) Macro #02 will speak a message and clear the drop-out message
   -P-C180* 02 C065 94 111 000
      - Drop-out Message 'Cleared'

A Brief Description on how to use: Input Line Alarming

The RLC-2 controller supports input line transition monitoring. This allows the user to monitor contact closure functions and either send a message, or execute an event. Several practical applications for the input lines can be developed. The input lines are sampled every 'XX' seconds. This time is programmed using Command C066. This timer is used to keep messages from piling up in the voice/cw handler due to contacts bouncing.

Example #1
Want to append a drop-out message on the Main port when the door opens. We will use drop-out message slot 1 to indicate the condition and macros 1,2 for the programming. When the door opens the contact will open or go high. When the door is closed the contact is closed or low. Input #1 is used for the door alarm.

1) Input #1 High message indicates an alarm condition
   - P - C065 * 27 3 1 C181 *
     - Slot #27 with message type 3 calls Command C181
2) Input #1 Low message is used for the normal condition
   - P - C065 * 31 3 1 C182 *
     - Slot #31 with message type 3 calls Command C182

3) Macro #01 indicates an alarm condition and appends the message 'Door Open'
   - P - C180 * 01 C065 94 101 126 095 *
     - Writes 'Door Open' into drop-out message slot #1

4) Macro #02 indicates a normal condition and clears the drop-out message
   - P - C180 * 02 C065 94 111 000 *
     - Writes a '0' which cancels the drop-out message

5) Speak the macro message 'Door Open Alarm' when the alarm macro is called
   - P - C065 * 50 101 126 095 384 *

6) Speak the macro message 'The Door Is Shut' when the normal macro is called
   - P - C065 * 51 101 0069 126 157 138 *

Example #2
Want to append a drop-out message on the Main port when the AC power fails. Use input #2 for the AC fail and drop-out message #2. Use macro #3,4 for the drop-out message alarm and normal configurations.

1) Input #2 High message indicates an alarm condition
   - P - C065 * 27 3 1 C183 *

2) Input #2 Low message indicates a normal condition
   - P _ C065 * 32 3 1 C184 *

3) Follow the example above for other programming

Command Listing (by function)

Main Receiver:

- Selects Access Modes for Main Receiver
-- COMMAND C018
- Selects COR and PL Access for Main Receiver
-- COMMAND C036
- Selects COR Access for Main Receiver
-- COMMAND C035

Link 1 Receiver:

- Selects Access Modes for Link 1 Receiver
-- COMMAND C019
- Removes Link 1 OFF the Controller with DTMF Access Enabled
-- COMMAND C028
- Enables Link 1 ON the System
-- COMMAND C030

Link 2 Receiver:

- Selects Access Modes for Link 2 Receiver
-- COMMAND C020
- Removes Link 2 OFF the Controller with DTMF Access Enabled
-- COMMAND C029
- Enables Link 2 ON the System
-- COMMAND C031

Main Repeater - Link System Variables

Repeater - Link 1 Only:

- Selects Repeater ON Link 1, TX and RX
-- COMMAND C000
- Removes Repeater OFF Link 1, TX and RX
-- COMMAND C002
- Allows Repeater to MONITOR Link 1 RX, no TX
-- COMMAND C001

Repeater - Link 2 Only:

- Selects Repeater ON Link 2, TX and RX
-- COMMAND C003
- Removes Repeater OFF Link 2, TX and RX
-- COMMAND C005
- Allows Repeater to MONITOR Link 2 RX, no TX
-- COMMAND C004

Repeater - Common Link System Variables:
- Selects Repeater ON Link 1 and Link 2, TX and RX
-- COMMAND C032
- Removes Repeater OFF Link 1 and Link 2, TX and RX
-- COMMAND C033
- Allows Repeater to MONITOR Link 1 and Link 2 RX, no TX
-- COMMAND C034

Link 1 and Link 2 Messages, Beeps and Voice:
- Programs Link 1 Courtesy Beep
-- COMMAND C049*2
- Programs Link 2 Courtesy Beep
-- COMMAND C049*3
- Programs Link 1 'ON' Voice Message
-- COMMAND C065*07
- Programs Link 1 'OFF' Voice Message
-- COMMAND C065*09
- Programs Link 2 'ON' Voice Message
-- COMMAND C065*08
- Programs Link 2 'OFF' Voice Message
-- COMMAND C065*10

Link 1 and Link 2 Mode Control:
Link 1 and Link 2 Special Mode Programming:
- Locks Link 1 in its current mode
-- COMMAND C024
- Unlocks Link 1 from its current mode
-- COMMAND C025
- Locks Link 2 in its current mode
-- COMMAND C026
- Unlocks Link 2 from its current mode
-- COMMAND C027
- Programs Link 1 into Loop Back Mode (Repeater Mode)
-- COMMAND C013*1
- Programs Link 2 into Loop Back Mode (Repeater Mode)
-- COMMAND C014*1
- Programs Link 1 into Normal Linking Mode
-- COMMAND C013*0
- Programs Link 2 into Normal Linking Mode
-- COMMAND C014*0
- Supervisory Control Link 1 PTT
-- COMMAND C022
- Supervisory Control Link 2 PTT
-- COMMAND C023

Link 1 - Link 2 System Control Variables:
- Link 1 Monitors Main
-- COMMAND C006
- Link 2 Monitors Main
-- COMMAND C007
- Link 1 Monitors Link 2
-- COMMAND C008
- Link 2 Monitors Link 1
-- COMMAND C009
- Connects Link 1 - Link 2 (Chain Linking)
-- COMMAND C010
- Disconnects Link 1 - Link 2 Connection
-- COMMAND C011

Link 1 - Link 2 Repeater Control
- Link 1 Repeater ON/OFF
-- COMMAND C013
- Link 2 Repeater ON/OFF
-- COMMAND C014

Repeater Control VariablesRepeater Control:
- Supervisory Control Main PTT
-- COMMAND C021

Repeater Messages, Beeps and Voice
- Programs Repeater Initial ID
-- COMMAND C065*01
- Programs Repeater Forced CW ID Message
-- COMMAND C065*47
- Programs Repeater Rotating ID Message #1
-- COMMAND C065*02
- Programs Repeater Rotating ID Message #2
-- COMMAND C065*03
- Programs Repeater Rotating ID Message #3
-- COMMAND C065*04
- Programs Repeater Time-Out Timer Message
-- COMMAND C065*91
- Programs Repeater Courtesy Beep
-- COMMAND C049
- Programs Repeater CW Frequencys
-- COMMAND C138

Command Name and Enter Key Name Change:
- Changes the Current Command Name to a New Command Name
-- COMMAND C044
- Changes the Current <EOF> Digit to a New Name
-- COMMAND C045

Analog Lines Reading and Voice Messages

Analog Inputs:
- Read Analog Input #1
-- COMMAND C081
- Programs Analog Input #1 Voltage/Temperature Scale
-- COMMAND C070*1
- Programs Analog Input #1 Offset Value
-- COMMAND C080*1
- Programs Analog Input #1 Message
-- COMMAND C065*43
- Read Analog Input #1 High-Low Variations
-- COMMAND C071
- Clear Analog #1 High-Low Variations
-- COMMAND C075
- Program Analog #1 Alarm Trigger Point
-- COMMAND C069*1 ###
- Program Analog #1 Alarm Message
-- COMMAND C065*39
- Programs Analog #1 Alarm Normal Message
-- COMMAND C065*35
- Interrogates Analog #1 Alarm Condition
-- COMMAND C079*1
- Read Analog Input #2
-- COMMAND C082
- Programs Analog Input #2 Voltage/Temperature Scale
-- COMMAND C070*2
- Programs Analog Input #2 Offset Value
-- COMMAND C080*2
- Programs Analog Input #2 Message
-- COMMAND C065*44
- Read Analog Input #2 High-Low Variations
-- COMMAND C072
- Clear Analog #2 High-Low Variations
-- COMMAND C076
- Program Analog #2 Alarm Trigger Point
-- COMMAND C069*2 ###
- Program Analog #2 Alarm Message
-- COMMAND C065*40
- Programs Analog #2 Alarm Normal Message
-- COMMAND C065*36
- Interrogates Analog #2 Alarm Condition
-- COMMAND C079*2

Analog Lines Reading and Voice Messages

- Read Analog Input #3
-- COMMAND C083
- Programs Analog Input #3 Voltage/Temperature Scale
-- COMMAND C070*3
- Programs Analog Input #3 Offset Value
-- COMMAND C080*3
- Programs Analog Input #3 Message
-- COMMAND C065*45
- Read Analog Input #3 High-Low Variations
-- COMMAND C073
- Clear Analog #3 High-Low Variations
-- COMMAND C077
- Program Analog #3 Alarm Trigger Point
-- COMMAND C069*3 ###
- Program Analog #3 Alarm Message
-- COMMAND C065*41
- Programs Analog #3 Alarm Normal Message
-- COMMAND C065*37
- Interrogates Analog #3 Alarm Condition
-- COMMAND C079*3

- Read Analog Input #4
-- COMMAND C084
- Programs Analog Input #4 Voltage/Temperature Scale
-- COMMAND C070*4
- Programs Analog Input #4 Offset Value
-- COMMAND C080*4
- Programs Analog Input #4 Message
-- COMMAND C065*46
- Read Analog Input #4 High-Low Variations
-- COMMAND C074
- Clear Analog #4 High-Low Variations
-- COMMAND C077
- Program Analog #4 Alarm Trigger Point
-- COMMAND C069*4 ###
- Program Analog #4 Alarm Message
-- COMMAND C065*42
- Programs Analog #4 Alarm Normal Message
-- COMMAND C065*38
- Interrogates Analog #4 Alarm Condition
-- COMMAND C079*4

Analog Alarming, Uses and Limitations

The RLC-2 supports level detection, and command execution for the analog lines. This condition, also known as analog alarming, is useful for automatic detection of an "Out of Limits" condition on any of the analog inputs. The RLC-2 supports both high and low level alarm conditions.

A few applications of the alarming function:

- Monitor Building High Temperature Alarm
-- If a High Temperature alarm occurs, turn on an output line to start a fan
-- When the temperature returns below the alarm point, turn off the fan

- Automatic Power Conservation
-- Monitor the DC Battery voltage, if the voltage drops below the alarm set point then change the repeater courtesy beep using a macro.
-- When the voltage returns back to normal, change the courtesy beep back to normal

Format:

To program the Alarm Point, see command C069. The programming format requires 5 digits to be entered. For instance, Analog #1 High alarm point is set at 13.8V. When the voltage is greater than or equal to 13.8V, the RLC-2 will execute Analog #1 'Alarm' message. (Note: the Message can be Voice, CW, or a Command Name) The entry format for 13.8V is 140 (See alarm calculate table).

The entry would look like: C069*1 1 140 (Sets Analog 1 high alarm to 140)

Alarm Rate:

To keep the controller from 'Toggling' in and out of alarm, the RLC-2 will only test the alarm conditions once every minute.

Interrogation of Alarm Condition:

Command C079 is provided to allow the user to check the status of a selected Analog Alarm. When interrogated, the line is either 'Alarm' or 'Clear'. To check what value is programmed as the alarm point, see Command C069.

Command Listing (by function)

Input Lines Reading and Voice Messages

Input Lines:
- Read Input Line #1
-- COMMAND C086
- Enable Input Line #1
-- COMMAND C085*1
- Input Line #1 'HI' Message
-- COMMAND C065*27
- Input Line #1 'LOW' Message
-- COMMAND C065*31

- Read Input Line #2
-- COMMAND C087
- Enable Input Line #2
-- COMMAND C085*2
- Input Line #2 'HI' Message
-- COMMAND C065*28
- Input Line #2 'LOW' Message
-- COMMAND C065*32

- Read Input Line #3
-- COMMAND C088
- Enable Input Line #3
-- COMMAND C085*3
- Input Line #3 'HI' Message
-- COMMAND C065*29
- Input Line #3 'LOW' Message
-- COMMAND C065*33

- Read Input Line #4
-- COMMAND C089
- Enable Input Line #4
-- COMMAND C085*4
- Input Line #4 'HI' Message
-- COMMAND C065*30
- Input Line #4 'LOW' Message
-- COMMAND C065*34

Command Listing (by function)

Output Lines Control, Reading and Voice Messages

Output Line Control:
- Output Line #1 'ON' (LOW)
-- COMMAND C091
- Output Line #1 'ON' Voice Message
-- COMMAND C065*19
- Output Line #1 'OFF' (OPEN)
-- COMMAND C099
- Output Line #1 'OFF' Message
-- COMMAND C065*11

- Output Line #2 'ON' (LOW)
-- COMMAND C092
- Output Line #2 'ON' Voice Message
-- COMMAND C065*20
- Output Line #2 'OFF' (OPEN)
-- COMMAND C100
- Output Line #2 'OFF' Message
-- COMMAND C065*12

- Output Line #3 'ON' (LOW)
-- COMMAND C093
- Output Line #3 'ON' Voice Message
-- COMMAND C065*21
- Output Line #3 'OFF' (OPEN)
-- COMMAND C101
- Output Line #3 'OFF' Message
-- COMMAND C065*13

Output Line #4 'ON' (LOW)
-- COMMAND C094
- Output Line #4 'ON' Voice Message
-- COMMAND C065*22
- Output Line #4 'OFF' (OPEN)
-- COMMAND C102
- Output Line #4 'OFF' Message
-- COMMAND C065*14

Output Lines Control, Reading and Voice Messages

- Output Line #5 'ON' (LOW)
-- COMMAND C095
- Output Line #5 'ON' Voice Message
-- COMMAND C065*23
- Output Line #5 'OFF' (OPEN)
-- COMMAND C103
- Output Line #5 'OFF' Message
-- COMMAND C065*15

- Output Line #6 'ON' (LOW)
-- COMMAND C096
- Output Line #6 'ON' Voice Message
-- COMMAND C065*24
- Output Line #6 'OFF' (OPEN)
-- COMMAND C104
- Output Line #6 'OFF' Message
-- COMMAND C065*16

- Output Line #7 'ON' (LOW)
-- COMMAND C097
- Output Line #7 'ON' Voice Message
-- COMMAND C065*25
- Output Line #7 'OFF' (OPEN)
-- COMMAND C105
- Output Line #7 'OFF' Message
-- COMMAND C065*17

- Output Line #8 'ON' (LOW)
-- COMMAND C098
- Output Line #8 'ON' Voice Message
-- COMMAND C065*26
- Output Line #8 'OFF' (OPEN)
-- COMMAND C106
- Output Line #8 'OFF' Message
-- COMMAND C065*18

Command Listing (by function)
Timed Event Scheduler

Setting the Day Counter:
- Tells the Scheduler what day it is
-- COMMAND C060
- Reads Back the Day Counter
-- COMMAND C059

Working with Timed Events:
- Programs the actual timed events
-- COMMAND C061
- Enables or Disables a Scheduled Event
-- COMMAND C062
- Reads Back the actual programmed event
-- COMMAND C063

Time of Day Clock:
- Reads the Time of Day Clock Female
-- COMMAND C133
- Reads the Day, Month and Year Clock
-- COMMAND C134
- Reads the Time of Day Clock Male
-- COMMAND C135
- Reads the Time of Day Good Morning, Afternoon, Evening
-- COMMAND C136
- Sets the Time of Day Clock
-- COMMAND C137
- Sets the Day, Month and Year Clock
-- COMMAND C138

2-Tone Paging Routines

- Programs 1 of 10 2-Tone Paging Slots
-- COMMAND C141

- Recalls 1 of 10 2-Tone Paging Slots
-- COMMAND C142

Software Controlled Resistors

- Programs 1 of the 2 Software Resistors
-- COMMAND C145

Keypad Test

- Allows the User to Key in up to 20 DTMF Pad Tones
-- COMMAND C148

DTMF Send

- The user can send DTMF style beeps down a selected port. Can send up to 50 digits
-- COMMAND C131

Macros

- Programs 1 of the 30 multiple command Macros
-- COMMAND C180*01-30

- Recalls Macro #01 COMMAND C181
- Recalls Macro #02 COMMAND C182
- Recalls Macro #03 COMMAND C183
- Recalls Macro #04 COMMAND C184
- Recalls Macro #05 COMMAND C185
- Recalls Macro #06 COMMAND C186
- Recalls Macro #07 COMMAND C187
- Recalls Macro #08 COMMAND C188
- Recalls Macro #09 COMMAND C189
- Recalls Macro #10 COMMAND C190
- Recalls Macro #11 COMMAND C191
- Recalls Macro #12 COMMAND C192
- Recalls Macro #13 COMMAND C193
- Recalls Macro #14 COMMAND C194
- Recalls Macro #15 COMMAND C195
- Recalls Macro #16 COMMAND C196
- Recalls Macro #17 COMMAND C197
- Recalls Macro #18 COMMAND C198
- Recalls Macro #19 COMMAND C199
- Recalls Macro #20 COMMAND C200
- Recalls Macro #21 COMMAND C201
- Recalls Macro #22 COMMAND C202
- Recalls Macro #23 COMMAND C203
- Recalls Macro #24 COMMAND C204
- Recalls Macro #25 COMMAND C205
- Recalls Macro #26 COMMAND C206
- Recalls Macro #27 COMMAND C207
- Recalls Macro #28 COMMAND C208
- Recalls Macro #29 COMMAND C209
- Recalls Macro #30 COMMAND C210

Programs Custom Macro Messages for each Recalled Macro:
- Programs Macro Message
-- COMMAND C065*50 .. 80

Macros 01 .. 20 are 40 Keystroke Sequences
Macros 21 .. 30 are 90 Keystroke Sequences

(See Command C180 for more Information)

DTMF Tone Muting

Mutes DTMF Transmitters:
- Toggles Mute Function for Main Transmitter
-- COMMAND C039

- Toggles Mute Function for Link 1 Transmitter
-- COMMAND C040

- Toggles Mute Function for Link 2 Transmitter
-- COMMAND C041

Command Listing (by name)

Pass	Name:	Brief Functional Description
P0	**C000**	Link 1 RX/TX Enabled **ON** Main Repeater System
P0	**C001**	Link 1 RX Enabled **ON** Main Repeater System
P0	**C002**	Link 1 Disabled **OFF** Main Repeater System
P0	**C003**	Link 2 TX/RX Enabled **ON** Main Repeater System
P0	**C004**	Link 2 RX Enabled **ON** Main Repeater System
P0	**C005**	Link 2 Disabled **OFF** Main Repeater System
P0	**C006**	Main RX Enabled **ON** Link 1 System
P0	**C007**	Main RX Enabled **ON** Link 2 System
P0	**C008**	Link 2 RX Enabled **ON** Link 1 System
P0	**C009**	Link 1 RX Enabled **ON** Link 2 System
P0	**C010**	Link 1 - Link 2 RX/TX **ON** both Systems
P0	**C011**	Link 1 - Link 2 RX/TX **OFF** both Systems
P0	**C012**	Main port Repeater/Link Control
P0	**C013**	Link 1 port Repeater/Link Control
P0	**C014**	Link 2 port Repeater/Link Control
P0	**C015**	Main port Time-Out Timer Enabled/Disabled
P0	**C016**	Link 1 port Time-Out Timer Enabled/Disabled
P0	**C017**	Link 2 port Time-Out Timer Enabled/Disabled
P0	**C018**	Main port Access Mode 0-5
P0	**C019**	Link 1 Access Mode 0-4
P0	**C020**	Link 2 Access Mode 0-4
P0	**C021**	Main port supervisory PTT Enabled/Disabled
P0	**C022**	Link 1 port supervisory PTT Enabled/Disabled
P0	**C023**	Link 2 port supervisory PTT Enabled/Disabled
P0	**C024**	Link 1 Lock current mode
P0	**C025**	Link 1 Clear current lock condition
P0	**C026**	Link 2 Lock current mode
P0	**C027**	Link 2 Clear current lock condition
P0	**C028**	Link 1 off system with DTMF still enabled
P0	**C029**	Link 2 off system with DTMF still enabled
P0	**C030**	Link 1 on system
P0	**C031**	Link 2 on system
P0	**C032**	Repeater on both Link 1 and Link 2
P0	**C033**	Repeater off both Link 1 and Link 2
P0	**C034**	Repeater monitor both Link 1 and Link 2
P0	**C035**	Repeater COR access
P0	**C036**	Repeater COR and PL Access
P0	**C037**	Voice Polite Enable/Disable
P0	**C038**	COR command auto-execution on COR drop Enable/Disable
P0	**C039**	Main DTMF mute Enable/Disable
P0	**C040**	Link 1 DTMF mute Enable/Disable
P0	**C041**	Link 2 DTMF mute Enable/Disable
P0	**C042**	Voice message echo out Main when links control Enable/Disable

Command Listing (by name)

Pass	Name:	Brief Functional Description
P0	**C043**	Program Passwords 0-3
P0	**C044**	Re-name a command name to a new name
P0	**C045**	Re-name the <EOF> key
P0	**C046**	Program the DTMF execution mask
P0	**C047**	Global DTMF mask change (Changes the DTMF mask on all commands)
P0	**C048**	Global change of the first digit in the command name
P0	**C049**	Program the courtesy beeps for all ports
P0	**C050**	Start Lack of activity timer #1
P0	**C051**	Start Lack of activity timer #2
P0	**C052**	Start Lack of activity timer #3
P0	**C053**	Start Lack of activity timer #4
P0	**C054**	Voice recall of the Lack of activity timer paramaters
P0	**C055**	Lack of activity timer Enable/Disable
P0	**C056**	Program the Lack of activity timers
P0	**C057**	Kerchunk filter Enable/Disable
P0	**C058**	Interrogate the Link system
P0	**C059**	Voice recall of Scheduler Day Counter
P0	**C060**	Program Scheduler Day Counter
P0	**C061**	Program Scheduler Events
P0	**C062**	Scheduler events Enable/Disable
P0	**C063**	Voice recall of Scheduler events
P0	**C064**	Recall message slot 00-99 (Voice, CW, Command, DVR)
P0	**C065**	Program message slot 00-99 (Voice, CW, Command, DVR)
P0	**C066**	Recall timer slot 00-23 (All controller timers)
P0	**C067**	Program timer slot 00-23 (All controller timers)
P0	**C068**	Analog alarm line Enable/Disable
P0	**C069**	Analog alarm program
P0	**C070**	Analog conversion faceplate program
P0	**C071**	Analog 1 High/Low recall
P0	**C072**	Analog 2 High/Low recall
P0	**C073**	Analog 3 High/Low recall
P0	**C074**	Analog 4 High/Low recall
P0	**C075**	Analog 1 High/Low value reset
P0	**C076**	Analog 2 High/Low value reset
P0	**C077**	Analog 3 High/Low value reset
P0	**C078**	Analog 4 High/Low value reset
P0	**C079**	Analog alarm condition interrogate
P0	**C080**	Analog line calibration
P0	**C081**	Analog 1 recall
P0	**C082**	Analog 2 recall
P0	**C083**	Analog 3 recall
P0	**C084**	Analog 4 recall

Command Listing (by name)

Pass	Name:	Brief Functional Description
P0	**C085**	Input lines Enable/Disable
P0	**C086**	Input 1 recall
P0	**C087**	Input 2 recall
P0	**C088**	Input 3 recall
P0	**C089**	Input 4 recall
P0	**C090**	Output lines Interrogate
P0	**C091**	Output 1 ON
P0	**C092**	Output 2 ON
P0	**C093**	Output 3 ON
P0	**C094**	Output 4 ON
P0	**C095**	Output 5 ON
P0	**C096**	Output 6 ON
P0	**C097**	Output 7 ON
P0	**C098**	Output 8 ON
P0	**C099**	Output 1 OFF
P0	**C100**	Output 2 OFF
P0	**C101**	Output 3 OFF
P0	**C102**	Output 4 OFF
P0	**C103**	Output 5 OFF
P0	**C104**	Output 6 OFF
P0	**C105**	Output 7 OFF
P0	**C106**	Output 8 OFF
P0	**C107**	BBS 1 Recall
P0	**C108**	BBS 2 Recall
P0	**C109**	BBS 3 Recall
P0	**C110**	BBS 4 Recall
P0	**C111**	BBS 5 Recall
P0	**C112**	Remote base select (Doug Hall RBI-1 or Icom IC-900/901)
P0	**C113**	Remote base Parallel BCD write (Output 1,2,3,4)
P0	**C114**	Remote base Serial BCD write (Output 1,2,3)
P0	**C115**	Remote base Pulse X times out Y
P0	**C116**	Remote base write variables (Doug Hall RBI-1 or Icom IC-900/901)
P0	**C117**	Remote base reset (Doug Hall RBI-1 only)
P0	**C118**	Remote base short entry (Doug Hall RBI-1 or Icom IC-900/901)
P0	**C119**	Remote base voice interrogate (Doug Hall RBI-1 or Icom IC-900/901)
P0	**C120**	Remote base Mode On/Off
P0	**C121**	Remote base Enter HF frequency
P0	**C122**	Remote base Change HF mode (LSB, USB, CW, AM, FM,FSK)
P0	**C123**	Remote base Bump HF remote frequency UP 100 Hz
P0	**C124**	Remote base Bump HF remote frequency Down 100 Hz
P0	**C125**	Remote base Selects VFO A or B
P0	**C126**	Remote base Recall Memory ##

Command Listing (by name)

Pass	Name:	Brief Functional Description
P0	**C127**	Remote base Store Memory ##
P0	**C128**	Remote base Start Scan
P0	**C129**	Remote base Program radio address, Scan features program
P0	**C130**	Remote base Interrogate last entered frequency
P0	**C131**	Send DTMF style data down a selected port
P0	**C132**	Set-up DTMF regeneration length and delay
P0	**C133**	Clock read time female
P0	**C134**	Clock read date female
P0	**C135**	Clock read time male
P0	**C136**	Clock read Good Morning, Afternoon, Evening
P0	**C137**	Clock set the time
P0	**C138**	Clock set the date
P0	**C139**	Set the CW code speed
P0	**C140**	Set the CW code frequencies
P0	**C141**	2-Tone commercial paging program
P0	**C142**	2-Tone commercial paging recall
P0	**C143**	Control receiver mode select: COntrol receiver or a receiver port
P0	**C144**	Control receiver audio routing variable
P0	**C145**	Software resistors program
P0	**C146**	Program pre-access words
P0	**C147**	Configure pre-access on controller
P0	**C148**	DTMF keypad test
P0	**C149**	Build and send a voice message
P0	**C150**	Send ports initial ID
P0	**C151**	Enable/Disable Analog High/Low time-stamping
P0	**C152**	Autopatch Go from Direct On-Air to Monitor On-Air Ports
P0	**C153**	Autopatch Cancel snoop monitoring channels
P0	**C154**	Autopatch Reverse Patch Answer
P0	**C155**	Autopatch snoop on Main port
P0	**C156**	Autopatch snoop on Link 1
P0	**C157**	Autopatch snoop on Link 2
P0	**C158**	Autopatch reverse patch log-on
P0	**C159**	Autopatch reverse patch direct on-air
P0	**C160**	Autopatch "ON"
P0	**C161**	Autopatch "OFF"
P0	**C162**	Autopatch Program Dialing Table Slots
P0	**C163**	Autopatch Voice Recall Dialing Table Slots
P0	**C164**	Autopatch Enable/Disable Dialing Table Checking
P0	**C165**	Autopatch Manual OFF-Hook, Reverse Patch Answer
P0	**C166**	Not Currently Enabled
P0	**C167**	Autopatch Memory Dialer Program
P0	**C168**	Autopatch Memory Dialer Readback

Command Listing (by name)

Pass	Name:	Brief Functional Description
P0	**C169**	Autopatch Memory Position Enable/Disable
P0	**C170**	Autopatch Direct Memory Position 911 Access
P0	**C171**	Autopatch Voice Number Readback ON/OFF
P0	**C172**	Autopatch Half/Full Duplex ON/OFF
P0	**C173**	Autopatch Forward/Reverse Timer Reset
P0	**C174**	Autopatch Forward Access Configure
P0	**C175**	Autopatch Dialing Modes Enable/Disable
P0	**C176**	Autopatch Reverse Patch Configuration
P0	**C177**	Controller RESET Function
P0	**C178**	Macro Delete a macro position
P0	**C179**	Macro Voice Readback of Macro Position
P0	**C180**	Macro Program macro #01-#30
P0	**C181**	Recall Macro #01
P0	**C182**	Recall Macro #02
P0	**C183**	Recall Macro #03
P0	**C184**	Recall Macro #04
P0	**C185**	Recall Macro #05
P0	**C186**	Recall Macro #06
P0	**C187**	Recall Macro #07
P0	**C188**	Recall Macro #08
P0	**C189**	Recall Macro #09
P0	**C190**	Recall Macro #10
P0	**C191**	Recall Macro #11
P0	**C192**	Recall Macro #12
P0	**C193**	Recall Macro #13
P0	**C194**	Recall Macro #14
P0	**C195**	Recall Macro #15
P0	**C196**	Recall Macro #16
P0	**C197**	Recall Macro #17
P0	**C198**	Recall Macro #18
P0	**C199**	Recall Macro #19
P0	**C200**	Recall Macro #20
P0	**C201**	Recall Macro #21
P0	**C202**	Recall Macro #22
P0	**C203**	Recall Macro #23
P0	**C204**	Recall Macro #24
P0	**C205**	Recall Macro #25
P0	**C206**	Recall Macro #26
P0	**C207**	Recall Macro #27
P0	**C208**	Recall Macro #28
P0	**C209**	Recall Macro #29
P0	**C210**	Recall Macro #30

In Depth Command Description: C000..C011
Port Configuration

These commands allow the user to configure all 3 ports connections between all other ports.

```
644444444444444L44444444444444444444444L4444444444444444447
5  Description   *        Command          *  Voice Response   5
K)))))))))))))))3))))))))))))))))))))))))3))))))))))))))))))M
5Main <-> Link 1 *C000*                    *LINK 1 ON          5
5Main <-  Link 1 *CO01*                    *LINK 1 M O N       5
5Main  -  Link 1 *CO02*                    *LINK 1 OFF         5
5Main  -> Link 1 *CO06*                    *REPEATER M O N     5
K)))))))))))))))3))))))))))))))))))))))))3))))))))))))))))))M
5Main <-> Link 2 *C003*                    *LINK 2 ON          5
5Main <-  Link 2 *CO04*                    *LINK 2 M O N       5
5Main  -  Link 2 *CO05*                    *LINK 2 OFF         5
5Main  -> Link 2 *CO07*                    *REPEATER M O N     5
K)))))))))))))))3))))))))))))))))))))))))3))))))))))))))))))M
5Link1 <- Link 2 *CO08*                    *LINK 2 M O N       5
5Link1 -> Link 2 *CO09*                    *LINK 1 M O N       5
5Link1 <-> Link2 *CO10*                    *LINK 1-2 TX ON     5
5Link1  -  Link2 *CO11*                    *LINK 1-2 TX OFF    5
944444444444444N44444444444444444444444N4444444444444444448
```

Parameters: None

Defaults:

- Both Links Off
- Link cross connect is open

Other Considerations:

Certain switches keep these commands from being executed. Their effect is summarized below.

- Link is Locked. See commands C024-C027
  Voice Response: "LK"

C001 and C004 have a monitor mute timer associated with these commands. This this is used to delay the re-connection of the port being monitored by a certain time amount. The timer is programmed using Command C067. The default time is 3 seconds.

In Depth Command Description: C012 - C014
Main, Link 1 and Link 2 Repeater or Link port Configuration

These commands allow the user to enable or disable the loop back feature on Main repeater, Link 1 and Link 2. This feature is used when configuring the port as a repeater port. Loop back refers to a feature that allows the port receiver signal to key the PTT of the transmitter on the same port. This feature can only be used on full duplex radios. Loop back is handy for checking out how the linking paths are in case of a large fade margin or a weak linking signal.

```
644444444444444L44444444444444444444L44444444444444444447
5  Description   *        Command         *  Voice Response    5
K)))))))))))))3)))))))))))))))))))3)))))))))))))))))))))M
5Main LoopBack   *C012* #                 *Repeater ON/OFF     5
K)))))))))))))3)))))))))))))))))))3)))))))))))))))))))))M
5Link 1 LoopBack *C013* #                 *LINK 1 RPT ON/OFF   5
K)))))))))))))3)))))))))))))))))))3)))))))))))))))))))))M
5Link 2 LoopBack *C014* #                 *LINK 2 RPT ON/OFF   5
944444444444444N44444444444444444444N44444444444444444448
```

Parameters:

- Controls if a link or a repeater
1 - Turn the port into a repeater
0 - Turn the port into a link

Defaults:

- Main port loop Back Enabled
- Both Link 1 and Link 2 Loop Back Disabled

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered
E2 - Not a Valid Mode

In Depth Command Description: C015 - C017
Main, Links 1 and Link 2 Time Out Timers Enabled/Disabled

These commands enable or disable the receiver ports' time-out timers. This command simply allows the timer to run or shuts the timer off.

```
644444444444444L444444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))))M
5Main Time-out   *C015* #                   *Repeater T O T #    5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))))M
5Link 1 Time-out *C016* #                   *LINK 1 T O T #      5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))))M
5Link 2 Time-out *C017* #                   *LINK 2 T O T #      5
944444444444444N444444444444444444444444N4444444444444448
```

Parameters:

- Controls the Time-Out timer Enable/Disable function

1 - Time-Out timer Enabled, Will speak 'ON'

0 - Time-Out timer Disabled, Will speak 'OFF'

Default:

Main Time-Out timer Enabled

Link 1 and Link 2 Time-Out timer Disabled

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered

E2 - Not a Valid Mode

In Depth Command Description: C018 - C020
Set-up Main, Link 1 and Link 2 Access modes

The RLC-2 offers the user the ability to select from five modes, or combinations of conditions necessary to gain access to the controller from a link port. These conditions are based on the state of the COR and PL (CTCSS) inputs. For a condition to be satisfied, its input must be pulled to a logic low (ground) by the receiver. Mode 0 completely disables the port, separating it from the system, and allowing no access to the DTMF decoder from that port.

Mode	Description	Comments
0	NO ACCESS	No transmit or receive allowed
1	COR ACCESS	COR activity triggers repeater
2	PL ACCESS	PL activity triggers repeater
3	COR AND PL ACCESS	COR and PL activity required
4	COR OR PL ACCESS	COR or PL activity required
5	COR OR PL ACCESS	** COR or PL special activity

This selection of modes allows the RLC-2 user to remotely control access to the controller during high traffic times.

Description	Command	Voice Response
Main Access	*C018* #	See Below
Link 1 Access	*C019* #	See Below
Link 2 Access	*C020* #	See Below

Parameters:

- Access Modes

0 - No Access, Port is removed from the system, will speak 'No ACS'.

1 - COR Access, will speak "COR".

2 - PL Access, will speak "PL"

3 - COR and PL Access, will speak "CAP"

4 - COR or PL Access, will speak "COP"

5 - COR or PL Special Access on Main Only, will speak "COP"

- This mode allows traffic to go out the link system only when 'PL' is active. When COR or PL is active the signal will go out the main repeater port

Defaults:

- COR Access (Mode 1) for all ports

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered

E2 - Not a Valid Mode

In Depth Command Description: C021 - C023
Supervisory PTT control for Main, Link 1 and Link 2

This command allows the ports PTT to be shut off. When the port transmitter is turned off, all traffic to that port is turned off. This is normally a control operator command, therefore the command name should be at least 4 digits.

```
644444444444444L4444444444444444444L4444444444444444447
5   Description    *       Command       *  Voice Response    5
K)))))))))))))))3)))))))))))))))))))3)))))))))))))))))))M
5 Main Port PTT    *C021* #              * REPEATER ON/OFF    5
K)))))))))))))))3)))))))))))))))))))3)))))))))))))))))))M
5 Link 1 Port PTT  *C022* #              * Link 1   ON/OFF    5
K)))))))))))))))3)))))))))))))))))))3)))))))))))))))))))M
5 Link 2 Port PTT  *C023* #              * Link 2   ON/OFF    5
944444444444444N4444444444444444444N4444444444444444448
```

Parameters:

- Controls the PTT Enable/Disable control

1 - Enables PTT on the port.

0 - Disabled the PTT on the port.

Defaults:

- Main, Link 1, and Link 2 port's Enabled

Error Message:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered

E2 - Not a Valid Mode

In Depth Command Description: C024 - C027
Link 1 and 2 Lock/Unlock

These commands allow the user to lock Links 1 and 2 in their current mode. They are useful for links that should not be disturbed. Normally they would be reserved for the control operator and not left to normal access. Upon interrogation (Command C058) of a link that is locked, the response will be "LK" followed by the mode which the link is currently in.

```
6444444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response   5
K)))))))))))))))3))))))))))))))))))))))))3))))))))))))))))M
5Link 1  Lock    *C024*                     *LINK 1 L K ON      5
5        Unlock  *CO25*                     *LINK 1 L K OFF     5
K)))))))))))))))3))))))))))))))))))))))))3))))))))))))))))M
5Link 2  Lock    *C026*                     *LINK 2 L K ON      5
5        Unlock  *CO27*                     *LINK 2 L K OFF     5
9444444444444444N44444444444444444444444N4444444444444448
```

Parameters: None

Defaults:

- Both Link 1 and Link 2 Unlocked

In Depth Command Description: C028 - C029
Remove Links 1 and 2 From System with DTMF Still Enabled

These commands allow the user to disconnect the links from the link system, while still allowing DTMF access from the port. This command has the same effect as Commands C018..C020 (Access Mode 0) except it allows the link to still have access to the DTMF decoder.

```
644444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))))3))))))))))))))))))))))))3))))))))))))))))M
5Remove Link 1   *C028*                     *LINK 1 OFF S Y S   5
K)))))))))))))))3))))))))))))))))))))))))3))))))))))))))))M
5Remove Link 2   *C029*                     *LINK 2 OFF S Y S   5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters: None

Defaults:

- Both Links on the System

In Depth Command Description: C030 - C031
Enable Links 1 and 2 on the System

This command allows the user to reconnect Links 1 and 2 to the link system (their counterparts are Commands C028..C029). This returns the port in the last condition that it was before it was removed.

```
644444444444444L444444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))))3)))))))))))))))))))))))))3))))))))))))))))M
5Enable Link 1   *C030*                     *LINK 1 ON S Y S    5
K)))))))))))))))3)))))))))))))))))))))))))3))))))))))))))))M
5Enable Link 2   *C031*                     *LINK 2 ON S Y S    5
944444444444444N444444444444444444444444N4444444444444448
```

Parameters: None

Defaults:

- Both Links Enabled on the System

In Depth Command Description: C032 - C034
Repeater ON/OFF/MON the Link System

These commands allow the user to control the state of the linking system with one command. Command C032 will execute Command C000, enabling Link 1 on the Main repeater system and Command C003, enabling Link 2 on the repeater system. Command C033 similarly removes both links (Commands C002..C005) and Command C034 allows for monitoring both links (Commands C001..C004). See Commands C000..C005 for more information. Note that this command does not affect the access mode of either link (Commands C018..C020); if a link is in access mode 0, for example, it will still be inaccessible.

```
644444444444444L44444444444L4444444444444444444444444444447
5  Description   *  Command   *        Voice Response          5
K)))))))))))))))3)))))))))))3)))))))))))))))))))))))))))))))M
5Links On        *C032*       *REPEATER ON LINK 1 & LINK 2     5
K)))))))))))))))3)))))))))))3)))))))))))))))))))))))))))))))M
5Links Off       *C033*       *REPEATER OFF LINK 1 & LINK 2    5
K)))))))))))))))3)))))))))))3)))))))))))))))))))))))))))))))M
5Monitor Links   *C034*       *REPEATER M O N LINK 1 & LINK 2  5
944444444444444N44444444444N4444444444444444444444444444448
```

Parameters: None

In Depth Command Description: C035 - C036
Repeater COR Access or Repeater CAP Access

The purpose of these commands is to allow the user to change the access mode of the Main Repeater with one simple command. They do the exact same things as Command C018 with parameters of 1 and 4.

```
644444444444444L444444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response   5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))))M
5Access  Mode 1  *C035*                     *REPEATER C O R     5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))))M
5Access  Mode 4  *C036*                     *REPEATER C A P     5
944444444444444N444444444444444444444444N4444444444444448
```

Parameters:

All parameters are incorporated into the chart above

In Depth Command Description: C037
Voice Response Polite/Impolite Switch

This command forces the Voice Synthesizer to be polite or impolite. When the voice is polite, voice synthesized messages will be shut off if activity interrupts its talking. If the voice is impolite, the voice synthesizer will ignore activity, and continue talking over any conversation. If the voice message is an ID, and the voice synthesizer is set to polite response, an the voice message is interrupted, then the controller will kill the voice synthesizer, and start the forced CW ID. Polite voice only applies to the system ID's.

```
644444444444444L44444444444444444444444L4444444444444444447
5  Description   *        Command          * Default Message   5
K)))))))))))))3)))))))))))))))))))))3)))))))))))))))))))))M
5Polite Voice    *C037*1*                   *P V ON             5
5Impolite Voice  *CO37*0*                   *P V OFF            5
944444444444444N44444444444444444444444N4444444444444444448
```

Defaults:

- The default Voice is Impolite

Refer to Command C065 for voice message programming. The voice polite switch only enables the use of the polite bit that is programmed with C065. This command is simply a global polite enable switch.

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - To Many Digits
E2 - Invalid Mode Selection

In Depth Command Description: C038
COR Command Execution ON/OFF

This command allows the user to select between COR command execution, and <EOF> key needed for command execution. This command is useful if the <EOF> key (Defaults to a '*') is required for commands to be executed. In most cases, the controller will be set for COR drop (when the receiver goes from active to inactive, in any mode) to execute a command.

```
644444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))))3)))))))))))))))))M
5Set COR Execute *C038* #                    *COR EX ON/OFF      5
944444444444444N44444444444444444444444N4444444444444448
```

Parameter:

$ - Controls the execution on Access drop

1 - COR Execution ON

0 - COR Execution OFF

Error Message:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered

E2 - Invalid Mode

In Depth Command Description: C039 - C041
Main, Link 1 and Link 2 Transmitter DTMF Mute Enable/Disable

The RLC-2 has the ability to mute the audio when DTMF digits are being entered. When muting is enabled, the RLC-2 will begin muting as soon as a valid DTMF digit is detected (a short "bleep" is inevitable) and continue muting as long as at least one digit is entered each second. This allows multiple tones to be muted without each one causing a "bleep." One second after the last tone ends, the audio is returned to normal.

```
64444444444444444L44444444444444444444L4444444444444444447
5   Description    *       Command       *  Voice Response    5
K)))))))))))))))))3)))))))))))))))))))))3)))))))))))))))))))M
5 Main DTMF Mute   *C039* #               *MN DTMF CVR ON/OFF  5
K)))))))))))))))))3)))))))))))))))))))))3)))))))))))))))))))M
5 Link 1 DTMF Mute *C040* #               *L1 DTMF CVR ON/OFF  5
K)))))))))))))))))3)))))))))))))))))))))3)))))))))))))))))))M
5 Link 2 DTMF Mute *C041* #               *L2 DTMF CVR ON/OFF  5
94444444444444444N44444444444444444444N4444444444444444448
```

Parameters:

- Controls the DTMF mute function

1 - Enables DTMF mute

0 - Disabled DTMF mute

Defaults:

- DTMF Muting is Disabled

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many digits entered

E2 - Invalid Mode

In Depth Command Description: C042
Echo Link Responses over Main Port Enable/Disable

This command allows the user to determine whether or not voice responses to commands entered from a linking port are echoed over the Main Repeater Port. They are always echoed over their own transmitter; this command does not affect that. Neither does it affect the voice response to commands that are entered from the Main Repeater Port. The main use of this command is to keep a watch over the commands that are executed over the link system while you are monitoring the Main Repeater. When programming a message in, and the message is a voice message, the user must define if the message needs to be echoed out the main if enabled. (See Command C065 for message programming)

```
64444444444444444L44444444444444444444L4444444444444444447
5   Description    *       Command       *  Voice Response    5
K)))))))))))))))3)))))))))))))))))))3)))))))))))))))))))M
5Echo     Enabled  *C042*1*              *C D ON             5
5         Disabled *CO42*0*              *C D OFF            5
94444444444444444N44444444444444444444N4444444444444444448
```

Parameters:

All parameters are incorporated into the chart above

Defaults:

- Voice Over Main Enabled

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many digits entered
E2 - Invalid Mode

In Depth Command Description: C043
Re-Program Passwords 0..3

This command allows the user to change the four preprogrammed passwords used in the controller. Each password must be 2 digits long and may not contain the <EOF> key. The passwords are a level priority password. This means that Password #0 is higher priority than Password #1, and Password #1 is higher priority than Password #2, ... So if a command contains Password #3 for access, Passwords #0, #1, and #2 also will have access to that command.

```
64444444444444444L4444444444444444444L44444444444444444447
5   Description    *       Command       *  Voice Response    5
K)))))))))))))))3)))))))))))))))))))3)))))))))))))))))))))M
5Set Password      *C043*@ $$ %%*        *O $$ N %% P @       5
94444444444444444N4444444444444444444N44444444444444444448
```

Parameters:

@ is the Password Selected
$$ is the Old Password
%% is the New Password

Defaults:

- Default Passwords:

```
+)))))))))))))))))))0)))))))))))))))))))),
*  Password Selected   *   Default Password   *
/)))))))))))))))))))3)))))))))))))))))))))1
*         0            *          96         *
*         1            *          97         *
*         2            *          98         *
*         3            *          99         *
.)))))))))))))))))))2)))))))))))))))))))))-
```

Example:

To change password 0 from 96 to 55, the keystrokes needed are:
96 C043 * 0 96 55 *

Voice Readback:

O 96 (Old Password)
N 55 (New Password)
P 0 (Password Number)

Special case: To completely disable the passwords, program in a '00' for password #0.

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered
E2 - Invalid Password Match

In Depth Command Description: C044
Change Command Name and Password Requirement

This command allows the user to change any of the preprogrammed command names to any combination of DTMF digits (excluding the <EOF> key) four digits or less in length. All command names that are less than four digits must be padded with leading zeros to four digits when using this command. Command name "12" would be entered as "0012". Command Name "1200" would be entered as "1200". Afterward, when executing those commands, any leading zeros can be omitted (unless the command is password protected). This command is capable of changing its own name. If two commands are given the same name, the one that has the lowest number in the manual will always be the one referenced. It can then be renamed, separating the two commands.

This command also allows the user to determine which of the four passwords, if any, are required to execute the command. Command C043 is used to set the password codes. After initialization the controller (the way it comes shipped), all commands are password protected and use password P0 (which is set to 96 by initialization). All commands that use a password must be four digits long (or padded with leading 0s when they are executed).

```
644444444444444L444444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5Change Name     *C044*&&& $$$$ @ !*       *   &&&  $$$$  @!    5
944444444444444N444444444444444444444444N4444444444444448
```

Parameters:

&&& is the Command names command number (000-210)
$$$$ is the Command's New Name
@ is the Password Enable/Disable Bit
(1=password required, 0=no password needed)
! identifies which of the four passwords is to be used (See Command C043)

Example:

You want to rename the command to enable Link 1 on the Main repeater. This command is "C000." You want to rename it to "150" and you want Password #2 to be required.

C044 * 000 0150 1 2 *

Voice response:

0 0 0 0 1 5 0 1 2

Example:

You want to disable the password on Link 1-Link 2 PTT enable command "C010". You want to keep the same command name.

C044 * 010 C010 0 0 *

Voice response:

0 106 C 0 1 0 0 0

Example:

You want to Rename the "Time of Day" function to a single digit. The command name is "C133". The New Command name is "1". You do not want a password for this function.

<P> C044*133 0001 00 *

Voice response:

1 3 3 0 0 0 1 0 0

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered
E2 - Invalid Password number, must be 0,1,2,3
E3 - Invalid command number, must be between 000-210

In Depth Command Description: C045
Set <EOF> Key

This command allows the user to change the <EOF> key. This key is used to tell the RLC-2 to execute a command that has been entered into the controller, or with commands that have parameters, that the command name has been entered and that the parameters are coming up next. The <EOF> key can not be used in any command names.

```
644444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response   5
K)))))))))))))3)))))))))))))))))))))))3)))))))))))))))))M
5Set <EOF> Key   *C045*&*                   *Beep - Beep       5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters:

* is the current <EOF> key
& is the new <EOF> key

Defaults:

- '*' <EOF> Key

Special case: When the controller is in pre-access mode the 'EOF' digit defaults to a 'D' key. When the controller is returned from pre-access mode, the 'EOF' digit defaults to a '*' key.

Special programming caution:
If you change the 'EOF' digit from its current definition to a new key, the macro programming will need to be re-programmed. The macro programming inserts the users 'EOF' digit into memory when the sequences are programmed, and when the 'EOF' key changes, the macro sequences are no longer are valid.

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered

In Depth Command Description: C046
Change the DTMF Execution Mask for a Command

This command allows the users to control what ports can have execution access to the DTMF decoder. Main, Link 1, and Link 2 ports are maskable from executing any commands. The ports that are not affected by the DTMF execution mask are: Control receiver port, Serial RS-232 port, and the Reverse autopatch port. When a port is disabled from executing a command, the controller will still accept the DTMF tones, mute them and process them like normal, but will not allow execution of the command. The DTMF execution mask is simply a higher order password that is assigned to each command.

```
644444444444444L44444444444444444444444L4444444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))3))))))))))))))))))))))M
5 DTMF Mask PGM  *C046*### $*              *    See Below      5
944444444444444N44444444444444444444444N4444444444444444448
```

Parameters:

- ### is the command name (000-210)
- $ is the DTMF mask number (0-7)

Mask Number:

- 0 - No radio ports can access the DTMF decoder
- 1 - Main Port has access
- 2 - Link 1 Port has access
- 3 - Main and Link 1 have access
- 4 - Link 2 has access
- 5 - Main and Link 2 have access
- 6 - Link 1 and Link 2 have access
- 7 - Main, Link 1 and Link 2 all have access

Defaults:

- All port have access to the DTMF decoder

Voice Response:

"Command Name" and "Mask Number"

Example: Want to allows only the main port to execute command C000

-P- C046 * 000 1

Voice response:
C 0 0 0 1

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

- E1 - Too Many Digits Entered
- E2 - Invalid Command Number, Must be between (000-210)

In Depth Command Description: C047
Global Change the DTMF Execution Mask for all Commands

This commands operates the same as C046 except it changes the DTMF execution for every command. The command must be used with caution because it will erase the execution mask and change all of them to a new mask. The ports that are not affected by the DTMF execution mask are: Control receiver port, Serial RS-232 port, and the Reverse autopatch port. When a port is disabled from executing a command, the controller will still accept the DTMF tones, mute them and process them like normal, but will not allow execution of the command. The DTMF execution mask is simply a higher order password that is assigned to each command.

```
644444444444444L444444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))3))))))))))))))))))M
5 DTMF Mask PGM  *C047*$*                   *    '$' Mask       5
944444444444444N444444444444444444444444N4444444444444448
```

Parameters:

$ is the DTMF mask number (0-7)

Mask Number:

0 - No radio ports can access the DTMF decoder
1 - Main Port has access
2 - Link 1 Port has access
3 - Main and Link 1 have access
4 - Link 2 has access
5 - Main and Link 2 have access
6 - Link 1 and Link 2 have access
7 - Main, Link 1 and Link 2 all have access

Defaults:

- All port have access to the DTMF decoder

Voice Response:

"Mask Number"

Example: Want to allows only the main port to be able to execute commands

-P- C047 * 1
Voice response: 1

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.
E1 - Too Many Digits Entered
E2 - Invalid mask variable. Must be between 0-7

In Depth Command Description: C048
Global Change the first digit of the Command Names

This commands operates the same as C044 except it changes the first digit of all the command names. The command must be used with caution because it will erase the first digit of every one of the command names and replace it with a new first digit. This command is useful for groups that do not want to use the forth column of the DTMF pad. Simply with one command all commands now can have a new first digit.

```
644444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response   5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5 DTMF Mask PGM  *C048*$*                   *   '$' New Digit   5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters:

$ is the new first digit of all the command names

Defaults:

- All commands begin with 'C'

Voice Response:

"New digit"

Example: Want to change the 'C' in all the commands to a '#'

-P- C048 * #

Voice response:

'0F' which is the digit '#'

Special note: This command only changes the first digit of the command name. The passwords are still attached. If you do not want passwords attached, refer to Command C043.

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered

In Depth Command Description: C049
Main, Link 1 and Link 2 Courtesy Beep Program, Recall

This command allows the user to program in the courtesy beep sequences for all the ports. The beeps and be pre-programmed, or built from your DTMF data. The pre-programmed beeps are ones that are used on "other" repeater controllers on the market. The pre-programmed beeps range from 1-7 and only need a single digit to access.

```
644444444444444L444444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))))3)))))))))))))))))M
5Courtesy Beeps  *C049*# $$..$$*           *     Beep Sent      5
944444444444444N444444444444444444444444N4444444444444448
```

Definition:

A sequence contains 2 tones a length of the 2 tones, and the delay between sequences. If you only want 1 tone in a sequence, you simply enter a 0000. The software will then only generate 1 tone. For a triple beep you will need 3 sequences. For a DTMF digit sounding tone you only need 1 sequence because a sequence contains 2 tones, a length and a delay.

Parameters:

is the port the beep is intended for
- 1 - Main Port
- 2 - Link 1 Port
- 3 - Link 2 Port

$$..$$ is the tone data

Format for recalling pre-programmed beeps:

-P- C049 * # $

is the port the beep is intended for.
- 1,2,3 - Store Beeps data at these radio ports

$ is the pre-programmed beep
- 0 - No beep
- 1-7 Pre-Programmed Beeps

Format for programming your own beep sequences:

- 1 Sequence

-P- C049 * # 1 %%%% &&&& ^^ !!

is the port the beep is intended for.
- 1,2,3 - Store Beeps data at these radio ports

1 indicates that 1 sequence is used

%%%% is the frequency counts for the first tone in the sequence

&&&& is the frequency of the second tone in the sequence

^^ is the length of the sequence (10mS Steps)

!! is the delay between sequence 1 and sequence 2

- 2 Sequence

-P- C049 * # 2 %%%% &&&& ^^ !! %%%% &&&& ^^ !!

is the port the beep is intended for.

1,2,3 - Store Beeps data at these radio ports

2 indicates that 2 sequence are used

** Sequence #1

%%%% is the frequency counts for the first tone in sequence 1

&&&& is the frequency of the second tone in sequence 1

^^ is the length of the sequence (10mS Steps)

!! is the delay between sequence 1 and sequence 2

** Sequence #2

%%%% is the frequency counts for the first tone in sequence 2

&&&& is the frequency of the second tone in sequence 2

^^ is the length of the sequence (10mS Steps)

!! is the delay between sequence 2 and sequence 3

- 3 Sequence

-P- C049 * # 3 %%%% &&&& ^^ !!

is the port the beep is intended for.

1,2,3 - Store Beeps data at these radio ports

3 indicates that 3 sequence are used

** Sequence #1

%%%% is the frequency counts for the first tone in the sequence 1

&&&& is the frequency of the second tone in the sequence 1

^^ is the length of the sequence (10mS Steps)

!! is the delay between sequence 1 and sequence 2

** Sequence #2

%%%% is the frequency counts for the first tone in the sequence 2

&&&& is the frequency of the second tone in the sequence 2

^^ is the length of the sequence (10mS Steps)

!! is the delay between sequence 2 and sequence 3

** Sequence #3

%%%% is the frequency counts for the first tone in the sequence 3

&&&& is the frequency of the second tone in the sequence 3

^^ is the length of the sequence (10mS Steps)

!! is the delay between sequence 3 and end of the sequence

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered

E2 - Invalid Number of Sequences

E3 - Invalid Port for the Sequences. Must be 1,2,3

In Depth Command Description: C050 - C053
Start Software Lack of Activity Timer

These commands allows the user to start 1 of the software lack of activity timers. The software lack of activity timers are simply timers that once started, no external event can reset. Only re-executing the "Start lack of activity timer" will cause the timer to reset. The timer is programmed using Command C067 and is programmed in 10 second increments for a total of 9990 seconds. For applications on using the lack of activity timers, see the section "Using the Lack of Activity Timers" at the beginning of the manual.

```
644444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          * Default Message   5
K)))))))))))))))3))))))))))))))))))))))3))))))))))))))))M
5Start Timer #1  *C050*                    *    No Message     5
K)))))))))))))))3))))))))))))))))))))))3))))))))))))))))M
5Start Timer #2  *C051*                    *       "           5
K)))))))))))))))3))))))))))))))))))))))3))))))))))))))))M
5Start Timer #3  *C052*                    *       "           5
K)))))))))))))))3))))))))))))))))))))))3))))))))))))))))M
5Start Timer #4  *C053*                    *       "           5
944444444444444N44444444444444444444444N4444444444444448
```

In order for the timer to run, you first must enable the Lack of activity event. (See Command C056 to Program the event, and C055 to Enable/Disable the event)

Parameters: None

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Event not Enabled

In Depth Command Description: C054
Voice Recall of Lack of Activity Timer Events

This command allows the voice recall of the contents of the lack of activity timer slots. This is handy to see what is inside a programmed event.

```
644444444444444L44444444444444444444444L4444444444444444
5  Description   *        Command          * Default Message   5
K)))))))))))))3)))))))))))))))))))))3)))))))))))))))))M
5Recall Timer #  *C054* #                  * Contents of Timer 5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters:

- Timer that you want to check. Number must be between 1 and 4.

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered
E2 - Invalid Event Requested. Must be between 1 and 4

In Depth Command Description: C055
Enable/Disable Lack of Activity Timer Events

This command allows you to enable or disable lack of activity timer slots.

```
644444444444444L444444444444444444444444L4444444444444447
5  Description   *        Command          * Default Message   5
K)))))))))))))))3))))))))))))))))))))))3))))))))))))))))))M
5Control Timer # *C055* # $                * Contents of Event 5
944444444444444N444444444444444444444444N4444444444444448
```

Parameters:

- Timer that you want to check. Number must be between 1 and 4.

$ - Control flag

1 - Enable the event

0 - Disable the event

Voice response:

The response is the same as command C054

Special note: When the lack of activity timers are enabled, only the user can disable them. The events run in background mode. They are always present in the background og\f the controllers operation.

Special case: The software timers, slot #00, are disabled after they execute the needed event. Only the software timers disable themselves after execution.

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered

E2 - Invalid Event Requested. Must be between 1 and 4

In Depth Command Description: C056
Program the Lack of Activity Timer Events

This command allows the user to program the lack of activity timer slots. When the programmed event resets the time, and timer expires, the event will execute a command.

```
644444444444444L444444444444444444444444L4444444444444447
5  Description   *        Command          * Default Message   5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5Recall Timer #  *C056* # $$ % ^ &&& !!!!  * Contents of Event 5
944444444444444N444444444444444444444444N4444444444444448
```

Parameters:

- Timer that you want to check. Number must be between 1 and 4.
$$ - Event used to reset the timer
% - Polarity used to reset the timer.
    1 - Reset the timer on the Inactive to Active edge of the input
    0 - Reser the timer on the Active to Inactive edge of the input
^ - Audio routing variable used.
    0-7 - will route the message response to the requested port
&&& - Expiration time that needs to run before executing the selected command
!!!! - Command that needs to be executed once the timer expires

Events:

00 - Software Lack of Activity Timer Used
01 - Main Port Activity
02 - Main Port COR
03 - Main Port PL
04 - Main Port PTT
05 - Link 1 Port Activity
06 - Link 1 Port COR
07 - Link 1 Port PL
08 - Link 1 Port PTT
09 - Link 2 Port Activity
10 - Link 2 Port COR
11 - Link 2 Port PL
12 - Link 2 Port PTT
13 - Control Receiver COR
14 - Main Initial ID
15 - Link 1 Initial ID
16 - Link 2 Initial ID
17 - Input 1
18 - Input 2
19 - Input 3
20 - Input 4

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered
E2 - Invalid Timer Requested. Must be between 1 and 4
E3 - Invalid Event Requested

In Depth Command Description: C057
Enable/Disable Receiver Delay Access Filter (Kerchunk)

This command allows the user to Enable/Disable the kerchunk filters for each of the receiver ports. The filter should be set to a small value to keep from delaying access into the system. The controller will use the filters only when the transmitter of the selected port is inactive. If the transmitter is active, the delay filter will be bypassed. The timer is programmed using command C067 in 10mS increments (Up to 9.9 Seconds of delay).

```
644444444444444L444444444444444444444444L4444444444444447
5  Description   *        Command          * Default Message    5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5Kerchunk Filter *C057* # $ ^              *  Control Timer     5
944444444444444N444444444444444444444444N4444444444444448
```

Parameters:

- Main port filter Enabled/Disabled
$ - Link 1 Port filter Enabled/Disabled
^ - Link 2 Port filter Enabled/Disabled

1 - Enable filter
0 - Disable filter

Default:

All filters disabled

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered
E2 - Invalid filter requested. Must be 1,2,3

In Depth Command Description: C058
Interrogate Repeater and Link System

This command allows the user to interrogate the link system. Voice response will indicate what state the link system is currently in. The response will vary depending on which port the command is entered from.

```
644444444444444L444444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5Interrogate All *C058*                     *See Below          5
944444444444444N444444444444444444444444N4444444444444448
```

Parameters: None

MAIN REPEATER PORT INTERROGATION PERSPECTIVE:

LINK 1:
Repeater Link 1 ON/OFF/M
- ON Indicates Link 1 RX and TX connected to the Repeater Port
- OFF Indicates Link 1 RX and TX disconnected from the Repeater Port
- M Indicates Link 1 TX is disconnected from the Repeater Port, but RX is enabled

LINK 2:
Repeater Link 2 ON/OFF/M
- ON Indicates Link 2 RX and TX connected to the Repeater Port
- OFF Indicates Link 2 RX and TX disconnected from the Repeater Port
- M Indicates Link 2 TX is disconnected from the Repeater Port, but RX is enabled

LINK 1 INTERROGATION PERSPECTIVE:

LINK 1:

Link 1 Repeater ON/OFF

- ON Indicates Repeater traffic will go out Link 1 TX
- OFF Indicates two conditions:
  - -- Repeater RX and TX are OFF Link 1
  - -- Repeater TX is Monitoring Link 1
- M Indicates Link 1 RX is disconnected from Main Repeater Port

LINK 2:

Link 2 ON/OFF

- ON Indicates Link 1 traffic will go out Link 2 TX
- OFF Indicates Link 1 traffic will not go out Link 2 TX
- M Indicates Link 1 RX is disconnected from Link 2 Port

LINK 2 INTERROGATION PERSPECTIVE:

LINK 2:

Link 2 Repeater ON/OFF

- ON Indicates Repeater traffic will go out Link 2 TX
- OFF Indicates two conditions:
  - -- Repeater RX and TX are OFF Link 2
  - -- Repeater TX is Monitoring Link 2
- M Indicates Link 1 RX is disconnected from Main Repeater Port

LINK 1:

Link 1 ON/OFF

- ON Indicates Link 2 traffic will go out Link 1 TX
- OFF Indicates Link 2 traffic will not go out Link 1 TX
- M Indicates Link 2 RX is disconnected from Link 1 Port

In Depth Command Description: C059
Read Day for Timed Event Scheduler

This command allows the user to read back the day counter used for weekly scheduling events. The day counter is used to keep track of the day of the week, allowing the scheduler to execute an event when the day counters match. See Command C060 to set the day counter.

```
644444444444444L44444444444444444444444L4444444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))))3))))))))))))))))))))))3))))))))))))))))))M
5Read Day        *C059*                     *Days $             5
944444444444444N44444444444444444444444N4444444444444444448
     Where $ is the code for the day of the week
                          +))))))0)))))))))))))),
                          * Code * Day of Week  *
                          /))))))3))))))))))))))1
                          *   1   *   Sunday     *
                          *   2   *   Monday     *
                          *   3   *   Tuesday    *
                          *   4   *   Wednesday  *
                          *   5   *   Thursday   *
                          *   6   *   Friday     *
                          *   7   *   Saturday   *
                          .))))))2))))))))))))))-
```

Parameters: None

In Depth Command Description: C060
Set Day for Timed Event Scheduler

This command allows the user to set the day counter used for weekly scheduling events. The day counter is used to keep track of the day of the week, allowing the scheduler to execute an event when the day counters match. See Command C059 to read the day counter.

```
644444444444444L44444444444444444444444L4444444444444444
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))3))))))))))))))))))M
5Set Day         *C060*$*                    *Days $             5
944444444444444N44444444444444444444444N4444444444444444448
```

Parameter:

$ is the code for the day of the week

```
+))))))0))))))))))))),
* Code * Day of Week  *
/))))))3))))))))))))))1
*   1  *   Sunday     *
*   2  *   Monday     *
*   3  *   Tuesday    *
*   4  *   Wednesday  *
*   5  *   Thursday   *
*   6  *   Friday     *
*   7  *   Saturday   *
.))))))2))))))))))))))-
```

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Much Data Entered
E2 - Invalid Day Selected

In Depth Command Description: C061
Schedule a Timed Event

This command allows the user to set one of the scheduler's 20 events to execute a command at a specified time and interval. Any event can be executed at hourly, daily, or weekly intervals. The scheduler server is polite in its operation; the controller will wait for a break in the conversation before it executes its command. The scheduler is useful for events that can be performed automatically without the control operator or users entering commands. Uses include automatically turning the 'PL' access on the repeater in high interference times, announcing special interest messages during the week, configuring the repeater automatically, etc.

Limitations:

The scheduler can only handle 4 digit commands that have no parameters. Most commands that are needed for the event scheduler are of this type.

Format:

There is a different format for each of the types of events. They will be discussed separately. Examples follow the format descriptions.

The 3 types of events that can be programmed are:

1. Hourly Events: Command will be executed once an hour
2. Daily Events: Command will be executed once a day
3. Weekly Events: Command will be executed once a week

Hourly Scheduling:

- Commonly used for announcing time, temperature, or urgent messages.

```
644444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5Hourly Event    *C061*!! 1 # && $$$$      *See Command C063   5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters:

!! is the Scheduler Event Number (1..20)
1 selects hourly scheduling
is the audio routing variable for the commands executed message response
must be between 0-7, See C065 for message audio routing variables
&& is the Minute when the event occurs (00..59)
$$$$ is the 4 digit command name to be executed

Scheduler Programming Continued...

Daily Scheduling:
- Commonly used for re-configuring the repeater in high use times.

```
644444444444444L4444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))))3)))))))))))))))M
5Daily Event     *C061*!! 2 # @@ && $$$$   *See Command C063   5
944444444444444N4444444444444444444444N4444444444444448
```

!! is the Scheduler Event Number (1..20)
is the audio routing variable for the commands executed message response
must be between 0-7, See C065 for message audio routing variables
2 selects daily scheduling
@@ is the hour the event occurs (01..12)
&& is the minute the event occurs (00..59)
% is the AM/PM Bit (1=PM, 0=AM)
$$$$ is the 4 digit command name to be executed

Weekly Scheduling:
- Commonly used for announcing special events, configuring the repeater for weekly nets.

```
644444444444444L4444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))))3)))))))))))))))M
5Weekly Event    *C061*! 3 # & @@ && $$$$   *See Command C063   5
944444444444444N4444444444444444444444N4444444444444448
```

!! is the Scheduler Event Number (1..20)
is the audio routing variable for the commands executed message response
must be between 0-7, See C065 for message audio routing variables
3 selects weekly scheduling
& is the day the event occurs (1..7 see chart below)
@@ is the hour the event occurs (01..12)
&& is the minute the event occurs (00..59)
% is the AM/PM Bit (1=PM, 0=AM)
$$$$ is the 4 digit command name to be executed

```
+))))))0)))))))))))),
* Code * Day of Week  *
/))))))3))))))))))))1
*   1   *   Sunday     *
*   2   *   Monday     *
*   3   *   Tuesday    *
*   4   *   Wednesday  *
*   5   *   Thursday   *
*   6   *   Friday     *
*   7   *   Saturday   *
.))))))2))))))))))))-
```

Hourly Programming Example:

During the winter, your repeater listening group wants to know what the temperature is at the repeater site every hour. You do not want to continually key up the repeater and command this information. Using an hourly scheduler event slot, you can request a reading of Analog Input #1 (which could be configured for "Low Fahrenheit") at 45 minutes after every hour. We will be assign to this command to scheduler event 08. Note that by default, Command C061 is password protected with password P0 (96). You want analog #1 message to only go out the main port.

To set the timed event scheduler:

96 C061 * 08 1 1 45 C081 <Unkey or *>

Voice Response: S 08 ON D8 AT 0045 N C081

S 08 Scheduler Event Chosen
ON Event Enabled
D8 Occurs Every Day
0045 Time the Event Occurs
N Ignores AM and PM Bits
C081 Command to be Executed

Daily Programming Example:

During the day your repeater is overcome by interference that makes COR access impossible. This interference usually begins at 6:00 AM and does not quiet down until about 7:00 PM. During these hours, the repeater needs to be in PL and COR access mode. The owner has previously set up a macro that changes the courtesy beep and forces the repeater into PL and COR access. This event is assigned to Macro #3 (C183). Normal courtesy beep and COR access is assigned to Macro #4 (C184). Using the daily scheduler, the repeater owner will assign Macro #3 and Macro #4 to be executed by the controller as scheduler events 01 and 02. Note that by default, Command C061 is password protected with password P0 (96). You want macro #3 message to only go out the main port.

To set PL and COR access to the repeater:

96 C061 * 01 2 1 0600 0 C183 <Unkey or *>

Voice Response: S 01 ON D8 AT 0600 A C183

S 01 Event Chosen
ON Event Enabled
D8 Occurs Every Day
0600 Time the Event Occurs
A Occurs at AM
C183 Command to be Executed

To set COR access to the Repeater:

96 C061 * 02 2 1 0700 1 C184 <Unkey or *>

Voice Response: S 02 ON D8 AT 0700 P C184

S 02 Event Chosen
ON Event Enabled
D8 Occurs Every Day
0700 Time the Event Occurs
P Occurs at PM
C184 Command to be Executed

Weekly Programming Example:

Every Tuesday evening at 8:00 PM the repeater is connected to the link system for the weekly inner-state check-in net. The repeater owner wants to warn the users to be prepared 5 minutes before the net will occur, and then 1 minute before net time, enable the links on the repeater. The net is over at 9:30 PM, and you want to then return the repeater to normal COR access. Because this event only needs to be executed weekly, the user selects weekly event scheduling. Macro #4 (C184) returns the repeater to normal use, with COR access and the normal courtesy beep. Macro #5 (C185) configure the link system to operate without any time-out timers, short hang timer, and a really short courtesy beep. The 5 minute preannouncement message will be assigned to BBS message #4 (C110). We will assign these commands to scheduler events 03, 04, and 05. Note that by default Command C061 is password protected with password P0 (96). You want your message responses to only go out the main port.

To set the Net Voice Announcement Message:

P C061 * 03 3 1 4 0755 1 C110 <Unkey or *>

Voice Response: S 03 ON D4 AT 0755 P C110

S 03 Event Chosen
ON Event Enabled
D4 Occurs Every Wednesday
0755 Time the Event Occurs
P Occurs at PM
C110 Command to be Executed

To Configure the Repeater for the Linking Net:

P C061 * 04 3 1 4 0759 1 C184 <Unkey or *>

Voice Response: S 04 ON D4 AT 0759 P C184

S 04 Event Chosen
ON Event Enabled
D4 Occurs Every Wednesday
0759 Time the Event Occurs
P Occurs at PM
C184 Command to be Executed

To Return the Repeater to Normal When the Net is over:

P C125 * 05 3 1 4 0930 1 C185 <Unkey or *>

Voice Response: S 05 ON D4 AT 0930 P C185

S 05 Event Chosen
ON Event Enabled
D4 Occurs Every Wednesday
0930 Time the Event Occurs
P Occurs at PM
C185 Command to be Executed

In Depth Command Description: C062
Timed Event Scheduler Enable/Disable

This command allows the user to disable a scheduled event. If an event is only needed at certain times, and the user does not want the event to continue to occur, then disabling the event is the easiest way temporarily stop it. When the event is enabled or disabled, the voice will re-speak all the characteristics of that event. See Command C063 for interpretation of the voice response.

```
644444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response   5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5Event   Enable  *C062*$$ 1*               *See Command C063   5
5        Disable *C062*$$ 0*               *                   5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters:

$$ is the Scheduler Event Number (1..20)

Defaults:

- All events enabled

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits entered
E1 - Invalid Macro Number
E2 - Hourly Scheduler, To Many Digits
E3 - Number Entered it to Large
E4 - Daily Scheduler, To Many Digits
E5 - Weekly Scheduler, To Many Digits

In Depth Command Description: C063
Timed Event Scheduler Routine Read Back

This command allows the user to interrogate the programming parameters of the timed event scheduler. The voice response is explained in a separate section below.

```
644444444444444L444444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5Event   Enable  *C063*$$*                  *See Below          5
944444444444444N444444444444444444444444N4444444444444448
```

Parameters:

$$ is the Scheduler Event Number (1..20)

Voice Response: S && @ D% AT ~~!! ^ $$$$

S && Signifies Scheduler Event &&
@ On = Event Enabled / Off = Event Disabled
D% Day of Week - See chart below

```
+))))))0))))))))))))),
*   %   * Day of Week  *
/))))))3))))))))))))))1
*   1   *   Sunday     *
*   2   *   Monday     *
*   3   *   Tuesday    *
*   4   *   Wednesday  *
*   5   *   Thursday   *
*   6   *   Friday     *
*   7   *   Saturday   *
*   8   *   Everyday   *
.))))))2))))))))))))))-
```

~~ Hour of Day that the Event Occurs
!! Minute of Hour that the Event Occurs
^ AM or PM
$$$$ Command to be Executed

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered
E2 - Invalid Scheduler Requested

In Depth Command Description: C064
Message Read Back Utility

This command reads back the preprogrammed Voice, CW (Morse code), or Command execution messages. This helps in determining what messages are programmed in without having to re-program them.

```
644444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response   5
K)))))))))))))3)))))))))))))))))))))3))))))))))))))))))M
5Read Message    *C064*$$*                  *See Below         5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters:

$$ is a two-digit code representing the number of the message you wish to recall.

Message Numbers:

00 - RLC-2 Version
01 - Main Initial ID
02 - Main ID #1
03 - Main ID #2
04 - Main ID #3
05 - Link 1 ID
06 - Link 2 ID
07 - Link 1 ON
08 - Link 2 ON
09 - Link 1 OFF
10 - Link 2 OFF
11 - Out 1 OFF
12 - Out 2 OFF
13 - Out 3 OFF
14 - Out 4 OFF
15 - Out 5 OFF
16 - Out 6 OFF
17 - Out 7 OFF
18 - Out 8 OFF
19 - Out 1 ON
20 - Out 2 ON
21 - Out 3 ON
22 - Out 4 ON
23 - Out 5 ON
24 - Out 6 ON
25 - Out 7 ON
26 - Out 8 ON
27 - IN 1 HI
28 - IN 2 HI
29 - IN 3 HI
30 - IN 4 HI
31 - IN 1 LOW
32 - IN 2 LOW
33 - IN 3 LOW
34 - IN 4 LOW
35 - Analog 1 LOW
36 - Analog 2 LOW
37 - Analog 3 LOW
38 - Analog 4 LOW
39 - Analog 1 HI
40 - Analog 2 HI
41 - Analog 3 HI
42 - Analog 4 HI
43 - Analog 1 Scale
44 - Analog 2 Scale
45 - Analog 3 Scale
46 - Analog 4 Scale
47 - Main Impolite ID
48 - Link 1 Impolite ID
49 - Link 2 Impolite ID
50 - Macro #01 Message
51 - Macro #02 Message
52 - Macro #03 Message
53 - Macro #04 Message
54 - Macro #05 Message
55 - Macro #06 Message
56 - Macro #07 Message
57 - Macro #08 Message
58 - Macro #09 Message
59 - Macro #10 Message
60 - Macro #11 Message
61 - Macro #12 Message
62 - Macro #13 Message
63 - Macro #14 Message
64 - Macro #15 Message
65 - Macro #16 Message
66 - Macro #17 Message
67 - Macro #18 Message
68 - Macro #19 Message
69 - Macro #20 Message
70 - Macro #21 Message
71 - Macro #22 Message
72 - Macro #23 Message
73 - Macro #24 Message
74 - Macro #25 Message
75 - Macro #26 Message
76 - Macro #27 Message
77 - Macro #28 Message
78 - Macro #29 Message
79 - Macro #30 Message
80 - BBS #1 Message
81 - BBS #2 Message
82 - BBS #3 Message
83 - BBS #4 Message
84 - BBS #5 Message
85 - Analog1 Delimiter
86 - Analog2 Delimiter
87 - Analog3 Delimiter
88 - Analog4 Delimiter
89 - Not currently used
90 - Main Time-Out Msg.
91 - Autopatch OFF Msg.
92 - Link 1 Monitor
93 - Link 2 Monitor
94 - Main Drop #1
95 - Main Drop #2
96 - Link 1 Drop 1
97 - Link 1 Drop 2
98 - Link 2 Drop 1
99 - Link 2 Drop 2

In Depth Command Description: C065
Message Program Utility

This command allows programming of the many messages on the RLC-2. The messages can be Voice, CW (Morse Code), or a Command that you want to be executed when a message is spoken. Refer to C064 for the message number.

```
644444444444444L44444444444444444444444L4444444444444444
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5Program Message *C065*$$ # & ^ %% .. %%   *See Below          5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters:

$$ is a two-digit code representing the number of the message you wish to recall.

\# is the message type

1 - Voice Message
2 - CW (Morse Code) Message
3 - Command to be executed when a message is called

***** The entry '&' applies only to Voice Messages. It should be left out for all other messages *****

& is the message echo and polite variable

0 - Message is impolite (Cannot be interrupted if voice polite switch is on) and message is not echoed out the Main port if executed on the link port
1 - Message is polite (Can be interrupted if voice polite switch is on)
2 - Message is echoed out Main if executed on a Link port
3 - Message is echoed and message is polite

^ is the message routing variable (Binary Coding)

0 - Message routed to where the DTMF tones came from
1 - Message routed to the Main Repeater Port ONLY
2 - Message routed to Link 1 Port ONLY
3 - Message routed to Main and Link 1 Ports
4 - Message routed to Link 2 Port ONLY
5 - Message routed to Main and Link 2 Ports
6 - Message routed to Link 1 and Link 2 Ports
7 - Message routed to Main and Link 1 and Link 2 Ports

Message Lengths:

#01 .. #08	20 Words Long,	1- 4 Digit Command Name
#09 .. #80	10 Words Long,	1- 4 Digit Command Name
#80 .. #84	40 Words Long,	1- 4 Digit Command Name
#85 .. #93	10 Words Long,	1- 4 Digit Command Name
#94 .. #99	3 Words Long,	1-4 Digit Command Name

Voice Message Programming:

The format for Voice message programming must begin with a '1' to indicate the message type. Words are 3 digits long. (See Voice Table for Word List)

Example: To Program 'KF7FW Repeater' for the Initial ID, Route out Main

The Message is polite so it can be interrupted by a carrier and default to CW if needed.

96 C065*01 1 1 1 040 035 007 035 052 056 376 *

K F 7 F W _ Repeater

CW Message Programming:

The format for CW message programming must begin with a '2' to indicate the message type. CW data must be 2 digits long. (See CW Tables for Character list)

Example: To Program 'KF7FW / R' for the Initial ID, Route out Main

96 C065*01 2 1 20 15 07 15 32 36 27 *

K F 7 F W / R

Command Execution Programming:

The command execution programming is useful when an event change needs to change another event. The command name must be 4 digits in length. Additional data for a command is not allowed, use a Macro position to accommodate this need. Example: Want to change the Repeater Courtesy Beep when the Door Opens, and also want a message sent indicating this condition to the users. You want the message to go out Main and Link 1 Ports. You would have to use a Macro to execute all the commands. To send a message to the listening users, you would assign the needed message to the Macro ## Message header. To change the courtesy beeps, you would use Command C049. The Macro would be called from the input line that is connected to the door alarm.

Example: Will use Macro #01 for Door Open

Macro #01: (Command C181)

1) Assign the Door Alarm Message to Macro #01
   - Message Position is #50
   - 96 C065* 50 1 3 126 095 383* 'Door Open Alarm'

2) Program Macro #01 to Change the Courtesy Beep
   - Courtesy Beep Program is Command C049
   - Will Change the Beep to Pre-Programmed Beep 1
   - 96 C180 01 C049 1 1* Pre-Programmed beep #1
   - Response "WR 1"

3) Assign Input Line #1, "Low" Message to Macro #01
   - 96 C065* 31 3 3 C181*

Example: Will use Macro #02 for Door Normal

Macro #02: (Command C182)

1) Assign the Door Normal Message to Macro #02
   - Message Position is #51
   - 96 C065* 51 1 3 069 126 157 138* 'The Door is Shut'
2) Program Macro #02 to Change the Courtesy Beep back to Normal
   - Courtesy Beep Program is Command C049
   - Will Change the Beep to Pre-Programmed Beep #5
   - 96 C180 02 C049 1 5*
   - Response "WR 2"
3) Assign Input Line #1, "High" Message to Macro #02
   - 96 C065* 27 3 3 C182*

Error Messages:

If the is not correct, the RLC-2 will send a "E" error code.

E1 - No Such Message

E2 - To Many Digits Entered for Selected Message

In Depth Command Description: C066
Recall System Timers

This command allows the user to mark recall the several system timer values. This is useful to find out what a timer is programmed for before any changes take place.

```
644444444444444L444444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))))3)))))))))))))))))M
5 Recall Timers  *C066* $$                  *  Number in Timer   5
944444444444444N444444444444444444444444N4444444444444448
```

Parameter:

$$ - timer number

Timer Table:

00 - Main Port Hang Timer (10mS Increments) Default 200 - 2 Sec
01 - Link 1 Port Hang Timer (10mS Increments) Default 001 - 10mS
02 - Link 2 Port Hang Timer (10mS Increments) Default 001 - 10mS
03 - Main Port Time-Out Timer (10 Sec. Increments) Default 018 - 3 Min.
04 - Link 1 Port Time-Out Timer (10 Sec. Increments) Default 018 - 3 Min.
05 - Link 2 Port Time-Out Timer (10 Sec. Increments) Default 018 - 3 Min.
06 - Main Initial ID Timer (10 Sec. Increments) Default 030 - 5 Min.
07 - Link 1 Port ID Timer (10 Sec. Increments) Default 030 - 5 Min.
08 - Link 2 Port ID Timer (10 Sec. Increments) Default 030 - 5 Min.
09 - Main Port Courtesy Beep Delay Timer (10 mS Increments) Default 100 - 1 Sec
10 - Link 1 Port Courtesy Beep Delay Timer (10 mS Increments) Default 100 - 1 Sec
11 - Link 2 Port Courtesy Beep Delay Timer (10 mS Increments) Default 100 - 1 Sec
12 - Main Port Pending ID Timer (10 Sec. Increments) Default 030 - 5 Minutes
13 - Main Port Receiver Delay Timer (Kerchunk) (10 mS Increments) Default 010 - 1 Sec
14 - Link 1 Port Receiver Delay Timer (Kerchunk) (10 mS Increments) Default 010 - 1 Sec
15 - Link 2 Port Receiver Delay Timer (Kerchunk) (10 mS Increments) Default 010 - 1 Sec
16 - Autopatch Forward Patch Time-Out Timer (10 Sec. Increments) Default 018 - 3 Min.
17 - Autopatch Reverse Patch Time-Out Timer (10 Sec. Increments) Default 018 - 3 Min.
18 - Autopatch Reverse Ring-In Time-Out Timer (10 Sec. Increments) Default 002 - 20 Sec
19 - Serial Port Log-On Time-Out Timer (10 Sec. Increments) Default 006 - 1 Min.
20 - Voice Delay Start Timer (10 mS Increments) Default 100 - 1 Sec
21 - Impolite ID Timer (10 Sec. Increments) Default 003 - 30 Sec
22 - Input Line Delay Read Timer (10 mS Increments) Default 100 - 1 Sec
23 - DTMF Cover Mute Length Timer (10 mS Increments) Default 300 - 3 Sec
24 - DTMF Scanner Stop Delay Timer (10 mS Increments) Default 500 - 5 Sec
25 - Monitor Mute Delay Timer (10mS Increments) Default 300 - 3 Sec
26 - Autopatch 'B' Key Delay Digit Length (10mS Increments) Default 050 - 500mS

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered
E2 - Invalid Timer Slot

In Depth Command Description: C067
Program System Timers

This command allows the user to program the several system timers. The timers are programmed in certain increments. (See Timer Table for timer increments). You must enter 3 digits of timer data, including the leading zeros.

```
644444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))3))))))))))))))))))M
5 Program Timers *C067* $$ ###             *  Number in Timer   5
944444444444444N44444444444444444444444N4444444444444448
```

Parameter:

$$ - timer number (See Timer Table)

- Timer value

Timer Table:

00 - Main Port Hang Timer (10mS Increments) Default 200 - 2 Sec
01 - Link 1 Port Hang Timer (10mS Increments) Default 001 - 10mS
02 - Link 2 Port Hang Timer (10mS Increments) Default 001 - 10mS
03 - Main Port Time-Out Timer (10 Sec. Increments) Default 018 - 3 Min.
04 - Link 1 Port Time-Out Timer (10 Sec. Increments) Default 018 - 3 Min.
05 - Link 2 Port Time-Out Timer (10 Sec. Increments) Default 018 - 3 Min.
06 - Main Initial ID Timer (10 Sec. Increments) Default 030 - 5 Min.
07 - Link 1 Port ID Timer (10 Sec. Increments) Default 030 - 5 Min.
08 - Link 2 Port ID Timer (10 Sec. Increments) Default 030 - 5 Min.
09 - Main Port Courtesy Beep Delay Timer (10 mS Increments) Default 100 - 1 Sec
10 - Link 1 Port Courtesy Beep Delay Timer (10 mS Increments) Default 100 - 1 Sec
11 - Link 2 Port Courtesy Beep Delay Timer (10 mS Increments) Default 100 - 1 Sec
12 - Main Port Pending ID Timer (10 Sec. Increments) Default 030 - 5 Minutes
13 - Main Port Receiver Delay Timer (Kerchunk) (10 mS Increments) Default 010 - 1 Sec
14 - Link 1 Port Receiver Delay Timer (Kerchunk) (10 mS Increments) Default 010 - 1 Sec
15 - Link 2 Port Receiver Delay Timer (Kerchunk) (10 mS Increments) Default 010 - 1 Sec
16 - Autopatch Forward Patch Time-Out Timer (10 Sec. Increments) Default 018 - 3 Min.
17 - Autopatch Reverse Patch Time-Out Timer (10 Sec. Increments) Default 018 - 3 Min.
18 - Autopatch Reverse Ring-In Time-Out Timer (10 Sec. Increments) Default 002 - 20 Sec
19 - Serial Port Log-On Time-Out Timer (10 Sec. Increments) Default 006 - 1 Min.
20 - Voice Delay Start Timer (10 mS Increments) Default 100 - 1 Sec
21 - Impolite ID Timer (10 Sec. Increments) Default 003 - 30 Sec
22 - Input Line Delay Read Timer (10 mS Increments) Default 100 - 1 Sec
23 - DTMF Cover Mute Length Timer (10 mS Increments) Default 300 - 3 Sec
24 - DTMF Scanner Stop Delay Timer (10 mS Increments) Default 500 - 5 Sec
25 - Monitor Mute Delay Timer (10mS Increments) Default 300 - 3 Sec
26 - Autopatch 'B' Key Delay Digit Length (10mS Increments) Default 050 - 500mS

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered
E2 - Invalid Timer Slot

Timer System Definitions and Examples

Transmitter Hang Timers

This is the time that the transmitter stays on after all keying sources have been disabled. This is programmed in 10mS Increments. Example: 2 second hang timer = 200

Repeater Initial ID Timers When the RLC-2 is keyed up after a period of inactivity (it is reset every time a pending ID is sent only on the main port), during which the initial ID timer has expired the initial ID is sent as soon as it is unkeyed. When the initial ID is sent, the pending timer is started only on the main port. Basically, the Initial ID Timer determines how long of a period of inactivity signifies a new set of communications. This timer is programmed in 10 Second increments. Example: 10 minute ID timer = 060

Main Repeater Pending ID Timer

This command allows the user to set the Pending ID Timer. When the RLC-2 is keyed up after a period of inactivity during which the initial ID timer has expired (it is reset every time a pending ID is sent), the initial ID is sent as soon as it is unkeyed. When the initial ID is sent, the pending timer is started. When the pending timer expires, one of the three rotating ID messages is sent. The pending timer is then restarted. If there is any activity before the pending ID timer expires, the next of the three rotating ID messages will be sent and the timer restarted. This assures that a pending ID will be the last message sent in each communication. If the pending timer expires without any activity since the last pending ID, no ID is sent at that time. If the receiver is keyed up between the time the pending timer expires and the initial ID timer expires, the pending ID is sent and the pending ID timer is restarted. If both the pending and initial ID timers expire before the next activity, the initial ID is sent, starting the process all over again. Basically, the pending ID timer determines how often an ID is sent during a communication. This timer is programmed in 10 Second increments. Example: 10 minute ID timer = 060

Courtesy Beep Delay Timers

These timers are used to determine how long the delay will be between the times the receiver becomes inactive and the courtesy beep is sent. The use of the timer is to keep the courtesy beep from being sent every time the receiver becomes inactive. Since a courtesy beep will not be sent while the receiver is active, a courtesy beep will only be sent during periods of receiver inactivity longer than this timer. Normally it is set for 1 second. This timer is programmed in 10 mS increments. Example: 1 second courtesy beep delay timer = 100.

Receiver Delay Key-up Timers

These timers are used to delay the recognition of valid receiver access. The timers are used to keep people from keying up the repeater just to hear the beeps and voice. The timers also are nice to keep fast noise bursts from keying up the port. The timers only work if that ports transmitter is not active and a receiver signal comes in. If the port is active, the delay circuit is bypassed. This timer is programmed in 10 mS increments. Example: 1 second kerchunk filter delay timer = 100.

Autopatch Forward Time-out Timer

This timer is provided to time the forward autopatch calls. The timer allows the system to shut-off the autopatch if a caller gets long-winded or drives out of the repeater, therefore not allowing the call to hang up. This timer is programmed in 10 Second increments. Example: 3 minute autopatch forward timer = 018

Autopatch Reverse Time-out Timer

This timer is provided to time the reverse autopatch calls. The timer allows the system to shut-off the autopatch if a caller gets long-winded or hangs up without dropping the autopatch. This timer is programmed in 10 Second increments. Example: 3 minute autopatch reverse timer = 018

Autopatch Reverse Ring-in

This timer is provided to time the reverse autopatch answer timer before automatic hang-up. This timer is provided to allows the callers time to enter either the log-on command or the direct on air command before the controller hangs up. During this time, the controller will accept valid commands like they are entered over a radio port, with the forced execution digit. This timer is programmed in 10 Second increments. Example: 1 minute autopatch reverse ring-in timer = 006

RS-232 Serial Port Timer

This timer is provided to time the serial port log-on, automatic log-off time. When the serial port log-on is required, the timer is started. The timer is reset every time a character is entered. If 'X' time goes by without a valid character (activity), the controller will log-off the serial port and require a log-on sequence to continue. This timer is programmed in 10 Second increments. Example: 10 minute serial timer = 060

Voice delay start Timer

This timer allows the user to set-up the voice delay start timer. This timer is used when a voice message starts. The controller starts this timer, and when it expires begins to speak. The timer is only used to delay the start of a voice sequence. This timer is programmed in 10 mS increments. Example: 1 second voice delay timer = 100.

Main Port Only, Impolite ID timer

This timer allows the main port ID'er to wait until there is either no activity, or the timer expires. This is nice is there is a conversation on the repeater, and the repeater needs to ID. The controller will start this timer and will only force the impolite ID message (47,48,49) if activity does not break before the timer expires. This timer is programmed in 10 Second increments. Example: 1 minute impolite timer = 006.

Input line response timer

This timer provides the user a way to "slug" the response of the logical input lines. This is nice if an input is changing quickly, and the messages get monotonous. The timer will only look at the inputs when the timer expires. This timer is programmed in 10 mS increments. Example: 30 second input line delay timer = 300.

DTMF Cover Timer

This timer controls the controllers muting of DTMF data received. This allows DTMF tones to be muted during and between when tones are received. You should not set this timer really long in case of voice falsing the DTMF decoder. If a long time is programmed, and a voice false DTMF occurs, the receivers audio will be gone until the timer expires. This timer is programmed in 10 mS increments. Example: 1 second DTMF mute timer = 100.

DTMF Scanner timer

This timer controls the controllers DTMF scanner. If you want the DTMF decoder to stay stopped longer after a DTMF tone has been entered, this timer is provided to allow you the delay. On a busy system, it is a good idea not to have this timer set to a long time. If the timer is set to delay scanning, then other ports are locked out from the DTMF decoder. This timer is programmed in 10 mS increments. Example: 5 second DTMF Scanner timer = 500.

Monitor Mute timer

This timer controls the amount of delay the controller will insert when the Main port receiver goes inactive to the time the link ports audio is un-muted. This mode is enabled only when the controller is monitoring the link ports. This is handy when a conversation is active on the main port, and there are conversations active on the link ports. Normally the moment the main receiver goes inactve, the link port audio will then be re-enabled, but with the timed delay, the timer must expire before the audio is re-enabled from the links. This timer is programmed in 10 mS increments. Example: 2 second monitor mute timer = 200.

Autopatch 'B' delay digit length

This timer is used to time the length of the mute (pause) digit used in autopatch calls. This digit is needed when accessing out an existing PBX system. There is delay between the sending of the PBX access code and the dialing of the outside number. The DTMF digit 'B' is assigned for this purpose. This timer is programmed in 10 mS increments. Example: 500 mS delay length timer = 050.

In Depth Command Description: C068
Analog Alarm Enable/Disable

This command allows the user to mark which Analog Input Lines are to be watched for readings outside of a specified safe range. This feature is often used to watch for voltage changes that can affect repeater operation. This command "AND's" the analog lines so that the disabled ones will not trigger an alarm.

```
644444444444444L44444444444444444444444L4444444444444444
5  Description   *        Command          *  Voice Response   5
K)))))))))))))3)))))))))))))))))))))3))))))))))))))))))M
5Analog  Enable  *C068*$ 1*                *      $ ON         5
5        Disable *C068*$ 0*                *      $ OFF        5
944444444444444N44444444444444444444444N4444444444444444
```

Parameter:
$ is the Analog Input Line Selected (1..4)

Defaults:
- Analog Alarms Disabled

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - To Much Data Entered
E2 - Invalid Analog Line

In Depth Command Description: C069
Analog Alarm Value Program

This command allows the user to program the analog alarms for each of the analog inputs. The alarm number varies from 000-255. This number corresponds to a number that the controller uses. The best way to decide what number to use is by trial and error, or use the enclosed formulas. The default alarm value is 000, with the alarms disabled.

The controller has 2 alarm points per channel, a high and a low point. These two alarm points are described in detail under the analog alarms section. For programming the high and low alarms, the user must first decide what number the alarm condition will occur.

The user can disable either the Low alarm and/or the High alarm. To disable the Low alarm point, set the alarm point to 000. To disable the High alarm point, set the alarm point to 255.

```
64444444444444444L444444444444444444444444L4444444444444447
5   Description    *  Default DTMF Name     *     Response      5
K)))))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5  Alarm Program   *C069 * # ^ $$$          *Depends on Message 5
94444444444444444N444444444444444444444444N4444444444444448
```

Parameters:

#	- Analog Line Number
^	- Alarm point selected (1=High Alarm, 0=Low Alarm)
$$$	- Alarm Number

Conversion Tables:

Locate the alarm point for the faceplate used, then locate the alarm number 000-255. The tables on the following pages contain all of the faceplates that are used. Simply locate the faceplate needed, and the alarm point that you need, then locate under the column marked "Number" and this is the number that needs to be entered for your alarm point. The number conversion tables have the alarm numbers in 10 number steps; this is for readability only. The actual number can be any number from 000-255.

Example: Want to alarm Analog 1 with a High Alarm at 14.7 Volts and a Low Alarm at 11.5 Volts

- Locate 14.7 Volts under FC1 (Number located is 235) Calibration Effects Number Entered
- Locate 11.5 Volts under FC1 (Number located is 184) Calibration Effects Number Entered

-P- C069 * 1 1 235 (High Alarm Point)
-P- C069 * 1 0 184 (Low Alarm Point)

- Controller Responds 'Analog 1 High Alarm Point At 14.7 (Analog 1 Deliminator Message)'
- Controller Responds 'Analog 1 Low Alarm At Point 11.5 (Analog 1 Deliminator Message)'

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - To Much Data Entered

E2 - Invalid Analog Line

Input Number and Analog Alarm Conversion Tables

Number	FC0		FC1		FC2		FC3		FC4		FC5	
255	**0**	5.00	**S0Q**	16.0	**S0Q**	32.0	**S0Q**	64.0	**S0Q**	128.0	**S0Q**	255	**S,**
245	**1**	4.80	**S3Q**	15.4	**S3Q**	30.7	**S3Q**	61.5	**S3Q**	123.0	**S3Q**	245	**S1**
235	**1**	4.61	**S3Q**	14.7	**S3Q**	29.5	**S3Q**	59.0	**S3Q**	118.0	**S3Q**	235	**S1**
225	**1**	4.41	**S3Q**	14.1	**S3Q**	28.2	**S3Q**	56.5	**S3Q**	112.9	**S3Q**	225	**S1**
215	**1**	4.22	**S3Q**	13.5	**S3Q**	27.0	**S3Q**	54.0	**S3Q**	107.9	**S3Q**	215	**S1**
205	**1**	4.02	**S3Q**	12.9	**S3Q**	25.7	**S3Q**	51.5	**S3Q**	102.9	**S3Q**	205	**S1**
195	**1**	3.82	**S3Q**	12.2	**S3Q**	24.5	**S3Q**	48.9	**S3Q**	097.9	**S3Q**	195	**S1**
185	**1**	3.63	**S3Q**	11.6	**S3Q**	23.2	**S3Q**	46.4	**S3Q**	092.9	**S3Q**	185	**S1**
175	**1**	3.43	**S3Q**	11.0	**S3Q**	22.0	**S3Q**	43.9	**S3Q**	087.8	**S3Q**	175	**S1**
165	**1**	3.24	**S3Q**	10.4	**S3Q**	20.7	**S3Q**	41.4	**S3Q**	082.8	**S3Q**	165	**S1**
155	**1**	2.04	**S3Q**	09.7	**S3Q**	19.5	**S3Q**	38.9	**S3Q**	077.8	**S3Q**	155	**S1**
145	**1**	2.84	**S3Q**	09.1	**S3Q**	18.2	**S3Q**	36.4	**S3Q**	072.8	**S3Q**	145	**S1**
135	**1**	2.65	**S3Q**	08.5	**S3Q**	16.9	**S3Q**	33.9	**S3Q**	067.8	**S3Q**	135	**S1**
125	**1**	2.45	**S3Q**	07.8	**S3Q**	15.7	**S3Q**	31.4	**S3Q**	062.7	**S3Q**	125	**S1**
115	**1**	2.25	**S3Q**	07.2	**S3Q**	14.4	**S3Q**	28.9	**S3Q**	057.7	**S3Q**	115	**S1**
105	**1**	2.06	**S3Q**	06.6	**S3Q**	13.2	**S3Q**	26.4	**S3Q**	052.7	**S3Q**	105	**S1**
095	**1**	1.86	**S3Q**	06.0	**S3Q**	11.9	**S3Q**	23.8	**S3Q**	047.7	**S3Q**	095	**S1**
085	**1**	1.67	**S3Q**	05.3	**S3Q**	10.7	**S3Q**	21.3	**S3Q**	042.7	**S3Q**	085	**S1**
075	**1**	1.47	**S3Q**	04.7	**S3Q**	09.4	**S3Q**	18.8	**S3Q**	037.6	**S3Q**	075	**S1**
065	**1**	1.27	**S3Q**	04.1	**S3Q**	08.2	**S3Q**	16.3	**S3Q**	032.6	**S3Q**	065	**S1**
055	**1**	1.08	**S3Q**	03.5	**S3Q**	06.9	**S3Q**	13.8	**S3Q**	027.6	**S3Q**	055	**S1**
045	**1**	0.88	**S3Q**	02.8	**S3Q**	05.6	**S3Q**	11.3	**S3Q**	022.6	**S3Q**	045	**S1**
035	**1**	0.69	**S3Q**	02.2	**S3Q**	04.4	**S3Q**	08.8	**S3Q**	017.6	**S3Q**	035	**S1**
025	**1**	0.49	**S3Q**	01.6	**S3Q**	03.1	**S3Q**	06.3	**S3Q**	012.5	**S3Q**	025	**S1**
015	**1**	0.29	**S3Q**	00.9	**S3Q**	01.9	**S3Q**	03.8	**S3Q**	007.5	**S3Q**	015	**S1**
005	**1**	0.10	**S3Q**	00.3	**S3Q**	00.6	**S3Q**	01.3	**S3Q**	002.5	**S3Q**	005	**S1**
000	**-**	0.00	**S2Q**	00.0	**S2Q**	00.0	**S2Q**	00.0	**S2Q**	000.0	**S2Q**	000	**S-**

Input Number and Analog Alarm Conversion Tables

Number	FC6		FC7		FC8		FC9		FC10		FC11	
255	**0**	440	**S0Q**	229	**S0Q**	-042	**S0Q**	-043	**S0Q**	100	**S0Q**	360	**S,**
245	**1**	405	**S3Q**	209	**S3Q**	-036	**S3Q**	-039	**S3Q**	096	**S3Q**	346	**S1**
235	**1**	369	**S3Q**	189	**S3Q**	-029	**S3Q**	-036	**S3Q**	092	**S3Q**	332	**S1**
225	**1**	334	**S3Q**	170	**S3Q**	-022	**S3Q**	-032	**S3Q**	088	**3Q**	317	**1**
215	**1**	299	**S3Q**	150	**S3Q**	-015	**S3Q**	-028	**S3Q**	084	**S3Q**	304	**S1**
205	**1**	264	**S3Q**	130	**S3Q**	-008	**S3Q**	-024	**S3Q**	080	**S3Q**	289	**S1**
195	**1**	228	**S3Q**	111	**S3Q**	-001	**S3Q**	-020	**S3Q**	077	**S3Q**	275	**S1**
185	**1**	193	**S3Q**	091	**S3Q**	006	**S3Q**	-016	**S3Q**	073	**S3Q**	261	**S1**
175	**1**	158	**S3Q**	071	**S3Q**	013	**S3Q**	-012	**S3Q**	069	**S3Q**	247	**S1**
165	**1**	122	**S3Q**	052	**S3Q**	020	**S3Q**	-008	**S3Q**	065	**S3Q**	233	**S1**
155	**1**	087	**S3Q**	032	**S3Q**	027	**S3Q**	-004	**S3Q**	061	**S3Q**	219	**S1**
145	**1**	052	**S3Q**	012	**S3Q**	034	**S3Q**	-000	**S3Q**	057	**S3Q**	205	**S1**
135	**1**	016	**S3Q**	-008	**S3Q**	041	**S3Q**	003	**S3Q**	053	**S3Q**	191	**S1**
125	**1**	-019	**S3Q**	-027	**S3Q**	048	**S3Q**	007	**S3Q**	049	**S3Q**	177	**S1**
115	**1**	-054	**S3Q**	-047	**S3Q**	054	**S3Q**	011	**S3Q**	045	**S3Q**	162	**S1**
105	**1**	-089	**S3Q**	-067	**S3Q**	061	**S3Q**	015	**S3Q**	041	**S3Q**	148	**S1**
095	**1**	-125	**S3Q**	-086	**S3Q**	068	**S3Q**	019	**S3Q**	037	**S3Q**	134	**S1**
085	**1**	-160	**S3Q**	-106	**S3Q**	075	**S3Q**	023	**S3Q**	033	**S3Q**	120	**S1**
075	**1**	-195	**S3Q**	-126	**S3Q**	082	**S3Q**	027	**S3Q**	029	**S3Q**	106	**S1**
065	**1**	-230	**S3Q**	-145	**S3Q**	089	**S3Q**	031	**S3Q**	026	**S3Q**	092	**S1**
055	**1**	-266	**S3Q**	-165	**S3Q**	096	**S3Q**	035	**S3Q**	022	**S3Q**	078	**S1**
045	**1**	-301	**S3Q**	-185	**S3Q**	103	**S3Q**	038	**S3Q**	018	**S3Q**	064	**S1**
035	**1**	-336	**S3Q**	-204	**S3Q**	110	**S3Q**	042	**S3Q**	014	**S3Q**	049	**S1**
025	**1**	-372	**S3Q**	-224	**S3Q**	117	**S3Q**	046	**S3Q**	010	**S3Q**	035	**S1**
015	**1**	-407	**S3Q**	-244	**S3Q**	124	**S3Q**	050	**S3Q**	006	**S3Q**	021	**S1**
005	**1**	-442	**S3Q**	-263	**S3Q**	131	**S3Q**	054	**S3Q**	002	**S3Q**	007	**S1**
000	**-**	-460	**S2Q**	-273	**S2Q**	134	**S2Q**	056	**S2Q**	000	**S2Q**	000	**S-**

In Depth Command Description: C070
Analog Faceplate Selection

This command allows the user to assign a number conversion faceplate to the analog inputs. The faceplate determines what the input voltage is, and converts it to a number the user can understand. The default faceplates are noted next to the analog input lines in the faceplate section.

```
644444444444444444L44444444444444444444444L4444444444444447
5   Description    *  Default DTMF Name     *     Response      5
K)))))))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5Faceplate Program * C070* # $$             *Depends on Message 5
944444444444444444N44444444444444444444444N4444444444444448
```

Parameters:

- Analog Line Number (1-4)
$$ - Faceplate Number

Faceplates:

00 - 0.00 - 5.00 Number Readout
01 - 00.0 - 16.0 Number Readout
02 - 00.0 - 32.0 Number Readout
03 - 00.0 - 64.0 Number Readout
04 - 000.0 - 128.0 Number Readout
05 - 000 - 255 Number Readout
06 - Fahrenheit Temperature Low Resolution
07 - Celsius Temperature Low Resolution
08 - Fahrenheit Temperature High Resolution
09 - Celsius Temperature High Resolution
10 - 000 - 100 Number Readout
11 - 000 - 360 Wind Direction Conversion

Example: Want to assign a 00.0 - 16.0 faceplate to Analog Input 1

-P- C070* 1 01
- Voice Response '1 1'

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - To Much Data Entered
E2 - Invalid Analog Line
E3 - Invalid Faceplate

In Depth Command Description: C071 - C074
Readback Analog Input High-Low Extremes

These commands allow the user to readback the analog inputs High and Low that occur on the selected analog lines. The High/Low feature is always running, it does not need to be enabled. When changing offsets or faceplates to the selected analog lines, the High/Low monitor needs to be Reset. (See Command C075..C078)

```
644444444444444L44444444444444444444L44444444444444444447
5  Description   *        Command        *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))3)))))))))))))))))))M
5   Analog #1    *C071*                  *Analog 1 High..Low  5
5   Analog #2    *C072*                  *Analog 2 High..Low  5
5   Analog #3    *C073*                  *Analog 3 High..Low  5
5   Analog #4    *C074*                  *Analog 4 High..Low  5
944444444444444N44444444444444444444N44444444444444444448
```

Parameters: None

Special case: Command C151 allows the user to enable/disable time-stamping of the analog high/low conditions. The time stamp indicates when the high and low condition occurred. Clearing the high/low conditions will reset the time stamping.

In Depth Command Description: C075 - C078
Reset Analog Input High-Low Extremes

These commands allow the user to reset the analog inputs High and Low values. When changing offsets or faceplates to the selected analog lines, the High/Low monitor needs to be Reset. Reading of the Analog High/Low is accomplished using Command C071.

```
644444444444444L44444444444444444444444L44444444444444447
5  Description   *        Command         *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))3))))))))))))))))))))M
5   Analog #1    *C075*                   *Analog 1 H..L Clear 5
5   Analog #2    *CO76*                   *Analog 2 H..L Clear 5
5   Analog #3    *C077*                   *Analog 3 H..L Clear 5
5   Analog #4    *CO78*                   *Analog 4 H..L Clear 5
944444444444444N44444444444444444444444N44444444444444448
```

Parameters: None

In Depth Command Description: C079
Analog Alarm Interrogate

This command allows the interrogation of the analog alarm lines. The condition will read either "Clear" or "Alarm". This condition is useful to determine if one of the selected lines is in alarm.

```
644444444444444L444444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5Check Analog Am *C079* #                   *Analog # CLR/ARM   5
944444444444444N444444444444444444444444N4444444444444448
```

Parameters:

Analog Lines 1..4

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - To many digits Entered
E2 - Invalid Analog Line Selected

In Depth Command Description: C080
Analog Input Line Calibration

This command allows the user to calibrate each of the analog inputs. The calibration number can be any number from 00-99. The sign of the calibration number (plus of minus) is determined when the user enters the calibration numbers.

```
64444444444444444L444444444444444444444444L4444444444444447
5   Description    *  Default DTMF Name     *     Response      5
K)))))))))))))))))3)))))))))))))))))))))))))3)))))))))))))))M
5Calibrate Analog  * C080 * # ^ $$          *Depends on Message 5
94444444444444444N444444444444444444444444N4444444444444448
```

Parameters:

#	- Analog Line Number
^	- Calibration Polarity (1=Plus, 0=Minus)
$$	- Calibration Number

Example:

When you read analog input 1 the controller says the voltage is 3.35 volts. When you measure the voltage with a calibrated voltage meter the meter reads 3.95 volts. You need to calibrate the controllers analog input 1 by adding an offset the reading. Knowing that faceplate 00 gives a result in 15mV resolution you figure you need to add .60 volts. The number needed to calibrate the input figures out to be 38. When you now read the controller it reads within 15mV of the correct reading.

-P- C080 *1 1 38
- Controller Responds '1 Plus 38'

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - To Much Data Entered
E2 - Invalid Analog Line

In Depth Command Description: C081 - C084
Read the Analog Input Lines

These commands allow the user to read the Analog Input lines. To control the label assigned to each input see Command C065. To set the scale each input is interpreted on see Command C070.

```
64444444444444L444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response   5
K)))))))))))))3)))))))))))))))))))))3))))))))))))))))M
5Read Analog #1  *C081*                    *See Above          5
5            #2  *C082*                    *                   5
5            #3  *C083*                    *                   5
5            #4  *C084*                    *                   5
94444444444444N444444444444444444444N4444444444444448
```

Parameters: None

Default:

- All Voltage Faceplates: 00-25 Volts

In Depth Command Description: C085
Input Line Enable/Disable

This command allows the user to choose which Logical Input Lines trigger an alarm when they sense a state change. When a line that is enabled undergoes a state change it will announce the appropriate high or low message as set by Commands C065. This command is useful for disabling the alarm on lines that change too often for monitoring to be practical. Lines that normally do not change states work well with an alarm. This command "AND's" the input lines so that the disabled ones will not trigger an alarm.

```
644444444444444L44444444444444444444444L4444444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))))))M
5Input   Enable  *C085*$ 1*                *INPUT $ ON          5
5        Disable *C085*$ 0*                *INPUT $ OFF         5
944444444444444N44444444444444444444444N4444444444444444448
```

Parameter:

$ is the Logical Input Line Selected (1..4)

Defaults:

- Input Lines Enabled

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered
E2 - Not a Valid Input Line

In Depth Command Description: C086 - C089
Read the Logical Input Lines

These commands allow the user to interrogate Logical Input Lines 1..4. When executed, the RLC-2 will check the status of the selected line and respond with the selected line's "HI" or "LOW" message. Command C085 for information on enabling or disabling the input line alarms.

```
644444444444444L44444444444444444444444L4444444444444444447
5  Description   *        Command          *  Voice Response   5
K)))))))))))))))3))))))))))))))))))))))3))))))))))))))))))M
5Read Logical #1 *C086*                    *See Above          5
5              #2 *C087*                    *                   5
5              #3 *C088*                    *                   5
5              #4 *C089*                    *                   5
944444444444444N44444444444444444444444N4444444444444444448
```

Parameters: None

In Depth Command Description: C090
Interrogate Logical Output Line

This command allows the user to interrogate Logical Output Lines 1..8. When executed, the RLC-2 will check the status of the selected line and respond with the ON or OFF message. Commands C090 .. C106 control the ON/OFF state of the output lines.

```
644444444444444L44444444444444444444444L4444444444444444447
5  Description   *        Command          * Default Response  5
K)))))))))))))3)))))))))))))))))))))3))))))))))))))))))M
5Interrogate     *C090*$*                   *OUT $ ON/OFF       5
944444444444444N44444444444444444444444N4444444444444444448
```

Parameter:

$ is the Logical Output Line Selected (1..8)

Error Message:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered
E2 - Not a Valid Output Line

In Depth Command Description: C091 - C098
Turn Latched Outputs On

These commands allow the user to turn each of the logical output lines on individually. Commands C099..C106 turn them off. Note that the outputs are buffered with open collector drivers; therefore on means that the line is pulled to ground (will sink current) and off means that the output is in a high impedance state and will not sink any current.

Description	Command	Voice Response
Output #1 On	*C091*	*See Above
#2	*C092*	*
#3	*C093*	*
#4	*C094*	*
#5	*C095*	*
#6	*C096*	*
#7	*C097*	*
#8	*C098*	*

Parameters: None

In Depth Command Description: C099 - C106
Turn Latched Outputs Off

These commands allow the user to turn each of the logical output lines off individually. Commands C091..C098 turn them on. Note that the outputs are buffered with open collector drivers; therefore on means that the line is pulled to ground (will sink current) and off means that the output is in a high impedance state and will not sink any current.

```
64444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response   5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5Output #1 Off   *C099*                     *See Above         5
5       #2       *C100*                     *                  5
5       #3       *C101*                     *                  5
5       #4       *C102*                     *                  5
5       #5       *C103*                     *                  5
5       #6       *C104*                     *                  5
5       #7       *C105*                     *                  5
5       #8       *C106*                     *                  5
94444444444444N44444444444444444444444N4444444444444448
```

Parameters: None

In Depth Command Description: C107 - C111
BBS Message Slot Recall Routine

This command allows the repeater owner to recall a preprogrammed BBS Message The RLC-2 supports 5 BBS Message Slots.

```
64444444444444L444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response   5
K)))))))))))))3)))))))))))))))))))))3))))))))))))))))M
5Recall BBS   #1 *C107*                     *B B S   1         5
5             #2 *C108*                     *B B S   2         5
5             #3 *C109*                     *B B S   3         5
5             #4 *C110*                     *B B S   4         5
5             #5 *C111*                     *B B S   5         5
94444444444444N444444444444444444444N4444444444444448
```

Parameters:

All parameters are incorporated into the chart above

In Depth Command Description: C112
Select Remote Base Type: Doug Hall RBI-1 or Icom IC900/901

This command allows the user to select which multi-band remote base is used on the RLC-2. The 2 multi-band remotes supported are the Doug Hall RBI-1 Kenwood controller, and the Link Comm RLC-ICM Icom IC900/901 controller. The remote controller units connect to the output line port, lines 6,7,8.

```
644444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5Select Remote   *C112* #                   * Remote Base #     5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters:

- Indicates which remote base requested

1 - Doug Hall RBI-1

2 - Link Comm RLC-ICM Icom IC900/901

Default:

Doug Hall RBI-1

Error Message:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered

E2 - Not a Remote Base Type

In Depth Command Description: C113
Parallel BCD Data Write

This command allows the user to write out multiple BCD data "nibbles" to the output control lines. This data uses output 1,2,3,4. The uses of this type of remote base data is used with channel selected radios. The user can write up to 20 digits of information out the output lines.

```
644444444444444L44444444444444444444444L4444444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))))3))))))))))))))))))))))))3))))))))))))))))))M
5 Parallel Data  *C113* ## .. ##           *   ### .. ##        5
944444444444444N44444444444444444444444N4444444444444444448
```

Parameters:

- Indicates data written out the output lines

Output Lines Used:

Bit 0 - Output Line 1
Bit 1 - Output Line 2
Bit 2 - Output Line 3
Biti 3 - Output Line 4

Error Message:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered

In Depth Command Description: C114
Serial BCD Data Write

This command allows the user to write out multiple BCD data digits in serial format to the output control lines. This data uses output 7,8. The uses of this type of remote base data is used with BCD "thumb wheel" radios. The user can write up to 20 digits of information out the output lines.

```
644444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))))3))))))))))))))))))))))))3))))))))))))))))M
5  Serial Data   *C114* ## .. ##           *   ### .. ##        5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters:

- Indicates data written out the output lines

Output Lines Used:

Output 7 - Data Output
Output 8 - Data Input

Error Message:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered

In Depth Command Description: C115
Pulse Output 'X' 'N' times

This command allows the user to pulse one of the 8 output lines 1-8 times. This remote base type is used for push button channel selected radios. The pulse time is 150mS per pulse.

```
644444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5 Pulse Output   *C115* # $                *  No Voice Response 5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters:

- Indicates how many pulses needed (1-8)
$ - Indicates which output line will be pulsed

Error Message:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered
E2 - Too Many Pulses Requested
E3 - Invalid Output Line

In Depth Command Description: C116
Doug Hall RBI-1 or Icom IC900/901 Parameter Program

This command allows the user to control an external Multi-Band interface. The interface is selected using Command C112. The RBI-1 will allow control of several Kenwood type mobile radios. This includes the single band, and dual band radios. Refer to the RBI-1 manual for more information. The RLC-ICM will allows control of the Icom IC900 band modules.

For easy access to the radio's features by the end user, the keystrokes used to control the remote bases are stored in one of the 30 Macros. (See Command C180 for Macro programming information). In order for the RLC-2 to send information out to the interface, 3 of the RLC-2's output lines are needed. These three lines shift out the data to the interface, which in turn controls the remote radio. The description of the Lines used:

Doug Hall RBI-1 Interface	Link Comm RLC-ICM Interface
Output #6 ..... RBI-1 Remote Reset	Output #6 ..... Select Line
Output #7 ..... Data to RBI-1	Output #7 ..... Data to RLC-ICM
Output #8 ..... Clock to RBI-1	Output #8 ..... Clock to RLC-ICM

When using the remote base features, the RLC-2 will change any conditions on these lines. All data must be entered correctly in order to control the remote base interfaces. The RLC-2 will respond only after data has been shifted out correctly. The response will not be spoken if C116 is called from a Macro. This is to allow custom frequency faceplates to be assigned to the selected macro. The response is intended for verification of correctly programmed keystrokes.

```
644444444444444L444444444444444444444444L4444444444444444447
5  Description   *        Command          * Default Message   5
K)))))))))))))))3))))))))))))))))))))))))3))))))))))))))))))M
5Write Info. Out *C116*! @ #### $ %% ^ &   *Remote Base OK     5
5Short Info. Out *C116*#### $              *#### Plus/Minus/S  5
944444444444444N444444444444444444444444N4444444444444444448
```

Parameters:

Doug Hall RBI-1	ICOM IC900/901 Band Modules
! is the Band Unit Selected	
- 0 = 1240 MHZ Port 3	0 - 140 MHZ Band
- 1 = 1250 MHZ Port 3	1 - 150 MHZ Band
- 2 = 140 MHZ Port 0	2 - 160 MHZ Band
- 3 = 220 MHZ Port 0 for Dual Band Radios	3 - 220 MHZ Band
- 4 = 440 MHZ Port 0 for Dual Band Radios	4 - 430 MHZ Band
- 5 = 1270 MHZ Port 3	5 - 440 MHZ Band
- 6 = 1280 MHZ Port 3	6 - 900 MHZ Band
- 7 = 1290 MHZ Port 3	7 - 1260 MHZ Band
- 8 = 1260 MHZ Port 3	8 - 1270 MHZ Band
- 9 = 430 MHZ Port 0 for Dual Band Radios	9 - 1280 MHZ Band
- A = 28 MHZ	A - 1290 MHZ Band
- B = 52 MHZ	B - 28 MHZ Band
- C = 900 MHZ	C - 50 MHZ Band

@ is the Power Level Selected, Does not work on all radios
- 0 Low Power Mode
- 1 High Power Mode
- 2 Medium Power Mode
- 3 Do Not Change the Power Setting

is the Frequency Requested, 1Mhz, 100Khz, 10Khz, 5Khz

$ is the Radio Offset
- 0 Minus Offset
- 1 Plus Offset
- 2 Simplex
- 3 Minus 20 (1200 Only)

%% is the PL Tone Requested (Refer to the RBI-1 Manual for Frequency)

^ is the Access Mode Requested, Does not work on all radios
- 0 COR Access, PL Decoder OFF
- 1 PL Access, PL Decoder ON

& is the Encode Mode Requested, Does not work on all radios
- 0 PL Encoder Disabled
- 1 PL Encoder Enabled

Once all the variables are entered, the RLC-2 will send them to the remote base using Out#7, and Out #8. When programming in the parameters, the RLC-2 will speak the results.

Short form entry requires that the band, Power, PL and Access information be pre-programmed into the controller already. This is accomplished using C118. When only 5 digits are entered, the RLC-2 will recall your pre-programmed entries and use them. (See Command C118 for more information).

Example: Program the 147.380 + Repeater, COR, PL Encode, TX PL 100 Hz, High Power
C116* 2 1 7380 1 12 0 1 *
- (2) Band 2 (140-150 Mhz)
- (1) High Power
- (7380) Frequency
- (1) Plus Offset
- (12) 100 Hz. PL Frequency
- (0) COR Access
- (1) PL Encoder ON

Error Messages:

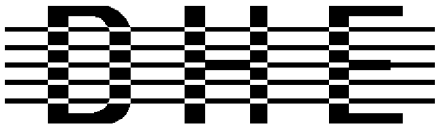
If the format is not correct, the RLC-2 will send a "E" error code.
E1 - Too Many Digits Entered
E2 - Number to Large

In Depth Command Description: C117
Doug Hall RBI-1 RESET

The command allows the User to remotely Reset the RBI-1. This command is used is the RBI-1, and the attached radio get "Out of Sync" for some reason. If the remote is not responding like it should, try issuing C117 to regain "Sync" between the two devices. This command should also be used when attaching another radio to the system.

```
644444444444444L44444444444444444444444L4444444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))))))M
5Reset RBI-1 Int *C117*                    *RBI-1 Reset         5
944444444444444N44444444444444444444444N4444444444444444448
```

Parameters: None



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INTRODUCTION

The DHE Remote Base Interface (RBI-1) Adapts the Kenwood series TM-X21 and TM-X31 mobile radios to several brands of Repeater Controllers. The RBI model 1 converts the serial data stream from the Controller and Directly controls the Kenwood Mobile radio. All connections to the Kenwood radio are made thru the microphone jack. In the maximum configuration using a Kenwood TM-701 Dual Band Mobile you can control Frequency,CTCSS encode On/Off, RF power level, Offset, Power On/Off, and Band. This is all still accomplished thru the microphone jack.

The RLC-2 Format supports the following functions:
Full frequency control, 4 ports/radios, and 4 bands.
Transmitter power HI/MED/LOW
CTCSS Frequency select, Encode on/off, Decode on/off.
-20 and -12 Mhz offsets on 1200.

The Supported Kenwood Mobile Radios are as follows:

140	220	440	1200	DUAL	
TM-221	TM-321	TM-421	TM-521	TM-621+	TM-721+
TM-231	TM-331	TM-431	TM-531	TM-631+	TM-731+
TM-241		TM-441	TM-541		TM-701+

+ Dual Banders

SPECIFICATIONS

Microprocessor:	INTEL 87C51 Series 12MHz
Connections:	
Power:	RCA Phono + center pin.
Controller:	9 Pin female "D" Connector
Expansion:	9 Pin male "D" connector.
Radios:	4 8 Pin Modular Compatible with Kenwood PG-4H cable. 1 PG-4H provided. Additional cables available from Kenwood or DHE.
Adjustments:	"T" (VR1) Radio transmit audio level adjust. "R" (VR2) Radio receive audio level adjust.
Audio:	Radio Transmit 0.050V to 2.5V Input. (response controlled by capacitor removal) Impedance 15K. Radio Receive 0.020V to 2.5V Output. (response controlled by capacitor removal) Impedance 5K.
"S" Meter output:	0 to +5V 0V = no signal, 5V = > "S" 9. Output impedance approx 5K.
Expansion output:	8 outputs, ground active, Sink 500mA each, 1A maximum total.
Power Requirements:	+10 to +14 Vdc @ 23mA.
Size:	1.5" X 5.1" X 5.5"

INSTALLATION

Place or mount the RBI in close proximity to the Kenwood mobile radio to be used. Connect the RBI with the provided PG-4H Cable from the 8 pin modular jack marked "RADIO" to the Kenwood Microphone jack. Only Port 1 (140/DUAL) will support a Dual Band radio. Port 1 is the only Port the 140 Mhz radio can be connected.

The RBI will support all 4 bands (140/220/440/1200) as follows:
If Port one is filled, Port 2 is for 220 only, Port 3 is for 440 only, Port 4 is for 1200 only. Basically, if the selected band is unavailable on Port 1 it will go to the port hard assigned to that band.

J2	Line Name	RLC-2 Connections
1	RBI-1 RESET	3 RLC-2 Output #6, P2
2	"S" Meter output	..
3	Data	6 RLC-2 Output #7, P2
4	Clock/Strobe	2 RLC-2 Output #8, P2
5	Kenwood TX Audio (T Pot)	4 RLC-2 Link Connector Port
6	Kenwood RX Audio (R Pot)	5 RLC-2 Link Connector Port
7	COS from Kenwood RX	7 RLC-2 COR Input (Must be Inverted to Active Low)
8	PTT to Kenwood TX	3 RLC-2 PTT Output
9	Ground	1 RLC-2 Ground Connection (On Link Ports Only)

Audio receive level from the Kenwood to the Controller is controlled by VR2 (R). The audio level from the Controller to the Kenwood is adjusted by VR1 (T). Refer to your manuals for additional adjustments in your controller.

RADIO SETUP

The Kenwood radio's need certain parameters setup before they can operate from the RBI. Things such as STEP, etc. Since the memory channels in the radio aren't used we will reset the radio to default on all setup options. This can be found in your Kenwood operating guide.

TM-701	Hold the MR key down during power on to reset.
TM-X21	Hold the VFO/M and M.IN keys down during power on to reset.
TM-621/721	Hold the F key down during power on to reset.
TM-631/731	Hold the MR key down during power on to reset.
TM-X31	Hold the MR key down during power on to reset.
TM-X41	Hold the VFO key down during power on to reset.

Capacitor C5 (10uF) Inside the RBI-1 Interface, must be removed, and replaced with a 1uF/25V Tant. Capacitor for the Audio to sound correct.

RADIO SETUP CONT...

Set the step size to 5KHz. (25Khz on 1200 Mhz units)
Set dual band radio's to single band.
Set power to desired setting. Remember, remote base transmitters can have a high duty cycle because it will be transmitting during all activity on the Repeater side. The mobile radio's used in a remote base configuration should be set to low power in most cases.
Set VFO/MEM to VFO for external frequency input.
Set CTCSS for desired frequencies. When using TM-X31/X41 series it will be set by the controller and will override your initial setting.
Set CTCSS Decode to off.
Set ABC and AL to off on models that support it.
Turn off Repeat functions.

Once these have been set, connect the Mike jack to the RBI. Reset the RBI to initialize the radio to the controller and get them in sync.
Any time there is manual changes from the radio front panel, the RBI and the Radio can get out of sync. This will require a RBI reset to correct. We recommend hooking the reset line from the RBI to a toggled User function output. Initialize the User function to "1" on and save those in all your Macro's or the reset line will be held low and disabled. To reset just interrogate the user function, this will toggle the reset line and reset the RBI.

SUPPORT CROSS REFERENCE

FUNCTION	CTCSS ENCODE	CTCSS SELECT	CTCSS DECODE	MULTI BAND	RF PWR POWER
GENERIC	Y	Y	Y	Y	Y
<u>KENWOOD</u>					
TM-X21	Y	N	N		N
TM-X31	Y	Y	Y		Y
TM-X41	Y	Y	Y		Y
TM-621/721	Y	N	N	Y	N
TM-631/731	Y	N	N	Y	N
TM-701	Y	Y	Y	Y	Y

In Depth Command Description: C118
Doug Hall RBI-1 or Link Comm RLC-ICM Short Entry Variable Program

```
644444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response   5
K)))))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5Remote Short    *C118*# $ !! % @          *    OK             5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters:

- Band unit selected
$ - Power Level Selected (See Command C021 for Description)
!! - PL Tone Programmed (See Command C021 for Description)
% - COR/PL Access
@ - PL Encode ON/OFF

Defaults:

- All Variables Set to 0

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - To Many Digits Entered

In Depth Command Description: C119
Remote Base Frequency Interrogate

This command allows the user to interrogate the last frequency entered in the Doug Hall RBI-1 or the RLC-ICM remote base interfaces.

```
644444444444444L444444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5Interrogate RB  *C119*                     * RMT Frequency     5
944444444444444N444444444444444444444444N4444444444444448
```

Parameters: None

In Depth Command Description: C120
Enter or Cancel HF Remote Base Mode

This command allows the user to enter or exit the controllers HF remote base mode. When the RLC-2 is in this mode the it re-maps the DTMF keyboard of the main port. The user then enters only 1 digit to access commands 121-130 excluding 129. To cancel the HF mode, simply execute C120 again.

```
644444444444444L44444444444444444444444L4444444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))))3))))))))))))))))))))))3))))))))))))))))))M
5Control HF Mode *C120*                     * HF Remote ON/OFF   5
944444444444444N44444444444444444444444N4444444444444444448
```

Parameters:

None

Keyboard Mapping:

DTMF:	Function:	Command:
1	Enter HF remote Base Frequency	See Command C121
2	Change HF mode	See Command C122
3	Bump frequency Up	See Command C123
4	Bump frequency Down	See Command C124
5	Select VFO A or B	See Command C125
6	Recall Radio Memory	See Command C126
7	Program Radio Memory	See Command C127
8	Start HF Scan (COR Cancels)	See Command C128
9	Cancel HF Mode	See Command C120
0	Interrogate HF Frequency	See Command C130
*	Controllers EOF Key	
#	Frequency Point Key	

Example:
You want to enter HF mode, then enter the frequency 14.25001 Mhz.

1) -P- C120 <Unkey> or '*' ; Controller responds HF Remote Base On
2) 1 14#25001 <Unkey> or '*' ; Controller reads back the frequency

Example:
Once you are in HF mode, you want to get back to normal operations

1) 9 <Unkey> or '*' ; Controller responds HF Remote Base Off

In Depth Command Description: C121
Enter HF Remote Base Frequency

This command allows the user to enter a frequency for the HF remote base. The remote base is connected to the RS-232 serial port. Once the address of the remote base is selected, and the serial port is connected, then frequency data will be sent out.

```
644444444444444L44444444444444444444444L4444444444444444
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))3)))))))))))))))))M
5 Send HF Freq.  *C121* $$$#^..^           * Frequency of HF    5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters:

$$$.$..$ is the frequency data.
is your point key
$$$. can be any number from 000..999
^..^ can be entered in 100Khz, 10Khz, 1Khz, 100Hz, 10Hz or any combination

Format #1: $$$.xxx 100 Mhz. to 999.999 Mhz.
- Controller will force the mode of operation to 'FM'

Format #2: $$.xxx 29 Mhz. to 99.999 Mhz.
- Controller will force the mode of operation to'FM' if 29 Mhz and above
- Controller will force the mode of operation to USB otherwise.

Format #3: $.xxx 0 Mhz. to 9.999 Mhz.
- Controller will force the mode of operation to 'LSB'

Output line control:

When the HF remote base routines send out data, the RLC-2 will turn 'ON' Output #5 while the transfer is taking place. Once the transfer is complete, the controller will clear Output #5. This line is used to switch between an RS-232 terminal and the HF remote base radio.

Example:

You want to enter the frequency 14.255 Mhz

-P- C121* 14#255
Voice Response '1 4 Point 2 5 5 '

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Few Digits Entered
E2 - Too Many Digits Entered

In Depth Command Description: C122
Change HF Remote Base Mode

This command allows the user to change the HF remote base mode of operation. Once a change is made the RLC-2 will send the changes out the serial port.

```
644444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))))3)))))))))))))))M
5 Send HF Mode   *C122* #                   *   Mode Sent       5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters:

- is the mode requested

Radio Type: Icom
0 - LSB (Lower Sideband)
1 - USB (Upper Sideband)
2 - AM (Amplitude Modulation)
3 - CW (Continuous Wave)
4 - CW (Continuous Wave)
5 - FM (Frequency Modulation)

Radio Type: Kenwood
1 - LSB (Lower Sideband)
2 - USB (Upper Sideband)
3 - CW (Continuous Wave)
4 - FM (Frequency Modulation)
5 - AM (Amplitude Modulation)
5 - CW (Continuous Wave)

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Few Digits Entered

In Depth Command Description: C123 - C124
Bump Up or Bump Down HF Remote Frequency

This command allows the users to bump up or down the remote base frequency by user defined 10 Hz. increments. See command C129 to set scan and bump steps.

```
644444444444444L44444444444444444444444L4444444444444444447
5  Description   *        Command          *  Voice Response   5
K)))))))))))))))3))))))))))))))))))))))3))))))))))))))))))M
5 Bump Up Freq.  *C123*                    * No Voice Response 5
K)))))))))))))))3))))))))))))))))))))))3))))))))))))))))))M
5 Bump Dn Freq.  *C124*                    * No Voice Response 5
944444444444444N44444444444444444444444N4444444444444444448
```

Parameters: None

In Depth Command Description: C125
Select VFO A or VFO B

This command allows the users to select VFO A or VFO B on your HF remote base

```
644444444444444L444444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5 Select VFO     *C125* #                  * VFO A or VFO B    5
944444444444444N444444444444444444444444N4444444444444448
```

Parameters:
# indicates what VFO the user is selecting

Icom Radio:
0 - VFO A
1 - VFO B

Kenwood Radio:
0 - VFO A
1 - VFO B

** Note to Kenwood Users

The RLC-2 writes the frequency into VFO A. It is not needed to use the VFO A/VFO B switch.

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered

In Depth Command Description: C126 - C127
Recalls and Programs Memory Channels

This command allows the users to recall or program frequencies into the HF remote bases memory channels. Radios memory channels differ between radio. Consult your owners manual for the number of memories your specific radio has.

```
644444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5 Recalls Memory *C126* ##                  *Frequency - Memory 5
944444444444444N44444444444444444444444N4444444444444448


644444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5 Writes Memory  *C127* ##                  * Memory Number ##  5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters:

- is the channel number (00-99)

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered

In Depth Command Description: C128
Starts HF Remote Base Scan

These commands allows the user to start the HF remote base scan function. The scanning function is controlled by the RLC-2. This allows the user to interrogate where the remote is located after the scanning stops. Scan speeds are programmed using C129.

```
644444444444444L44444444444444444444444L4444444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))))3)))))))))))))))))))))))3))))))))))))))))))M
5 Start Scanning *C128*                     *      SC ON         5
944444444444444N44444444444444444444444N4444444444444444448
```

Parameters:

None

In Depth Command Description: C129
Programs HF Remote Base Address or Program Scan steps/time

This command allows the users to configure the RLC-2 for the HF radio type connected. Kenwood radios do not have a radio address, but Icom radios do. See below for the radio address of your connected radio.

```
644444444444444L444444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response   5
K)))))))))))))3)))))))))))))))))))))))3)))))))))))))))))M
5 Radio Address  *C129* ### or $$ !!!      *  Number Entered   5
944444444444444N444444444444444444444444N4444444444444448
```

Parameters:

is the radio address of the connected radio if address mode is used
$$ are the scan steps in 10 hertz steps if scan/bump mode is used
!!! is the scan step timer in 10mS steps

Kenwood Users: Enter 000 for your radio address

Icom Users:

IC-735	- 004	IC-471 A/E/H	- 034
IC-R7000 - 008		IC-1271 A/E	- 036
IC-275 A/E/H	- 016	IC-781	- 038
IC-375 A	- 018	IC-725	- 040
IC-475 A/E/H	- 020	IC-R9000	- 042
IC-575 A/H	- 022	IC-765	- 044
IC-1275 A/E	- 024	IC-970 A/E/H	- 046
IC-R71 A/E/D	- 026	IC-726	- 048
IC-751 A	- 028	IC-R72	- 050
IC-761	- 030	IC-R7100	- 052
IC-271 A/E/H	- 032	Controller	- 224

Example:

You want your scan steps to be 100hZ and your scan time to be 100mS.

-P- C129 * 10 010
Scan steps = (Number * 10hz)
Scan time = (Number * 0.01s)

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered

In Depth Command Description: C130
Interrogate HF remote base frequency

This command allows the users interrogate the last entered HF frequency.

```
644444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response   5
K)))))))))))))))3)))))))))))))))))))))))3)))))))))))))))))M
5 Interrogate HF *C130*                     *  Frequency of HF  5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters: None

In Depth Command Description: C131
Regenerate DTMF data down a selected port

This command allows the users to regenerate DTMF "Like" data down a selected port. The data is generated with the 2-tone generators. The DTMF can be sent down any of the 3 radio ports. See command C132 to set-up the DTMF generator tone length and inner digit delay.

```
644444444444444L44444444444444444444444L4444444444444444447
5  Description   *        Command          *  Voice Response   5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))))M
5   Send DTMF    *C131* $ ##..##           * No Voice Response 5
944444444444444N44444444444444444444444N4444444444444444448
```

Parameters:

- is the DTMF digit needed to be regenerated. (See Below)

$ - is the audio routing variable

DTMF Data Table:

00 - DTMF digit 0
01 - DTMF digit 1
02 - DTMF digit 2
03 - DTMF digit 3
04 - DTMF digit 4
05 - DTMF digit 5
06 - DTMF digit 6
07 - DTMF digit 7
08 - DTMF digit 8
09 - DTMF digit 9
10 - DTMF digit 'A'
11 - DTMF digit 'B'
12 - DTMF digit 'C'
13 - DTMF digit 'D'
14 - DTMF digit '*'
15 - DTMF digit '#'
16 - Pause Digit

Audio Routing table:

0 - Route to where the DTMF came from
1 - Route to Main port
2 - Route to Link 1 port
3 - Route to Main and Link 1 port
4 - Route to Link 2 port
5 - Route to Main and Link 2 port
6 - Route to Link 1 and Link 2 port
7 - Route to Main, Link 1, and Link 2 port

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered
E2 - Invalid DTMF digit selected

In Depth Command Description: C132
Set-up DTMF Re-Generator

This command allows the users to set-up the length and delays for the DTMF re-generation. Most decoders can only handle 60mS tones. Many controllers require 100mS minimum tone lengths. Long tones will be decoded better than fast tones.

```
644444444444444L44444444444444444444444L4444444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))))M
5  Set-up DTMF   *C132* ## $$              * Numbers Entered    5
944444444444444N44444444444444444444444N4444444444444444448
```

Parameters:

- is the DTMF digit length in 10mS increments
$$ - is the DTMF inner digit delay

Default:

100mS DTMF length with a 100mS delay

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered

In Depth Command Description: C133 - C134
Read Female Time and Date of Clock

These commands allow the user to read the time and day that the controller's clock is set for. The voice for the time and date is female; See Commands C137..C138 to set the clock.

```
64444444444444L444444444444444444444L444444444444444447
5  Description   *        Command          *  Voice Response   5
K)))))))))))))3)))))))))))))))))))))3)))))))))))))))))M
5Read Time       *C133*                    *The Clock's Time   5
5Read Date       *C134*                    *The Clock's Date   5
94444444444444N444444444444444444444N444444444444444448
```

Parameters: None

In Depth Command Description: C135
Male Read Time

These commands allow the user to read the time and day that the controller's clock is set for. The voice for the time and date is male; See Commands C137 to set the clock.

```
644444444444444L44444444444444444444444L4444444444444444
5  Description   *        Command          *  Voice Response   5
K)))))))))))))))3))))))))))))))))))))))3))))))))))))))))M
5Read Time       *C135*                    *Male Clock Time    5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters: None

In Depth Command Description: C136
Female Voice: Good Morning, Afternoon, Evening

These commands allow the user to read the area of the day. From the times 12:00 AM to 11:59 AM, the voice will speak "Good Morning". From the times 12:00 PM to 4:59 PM, the voice will speak "Good Afternoon". From the times 5:00 PM to 11:59 PM the voice will speak "Good Evening". This command is useful to add special ID functions. See Commands C137 to set the clock.

```
644444444444444L44444444444444444444444L4444444444444444
5  Description   *        Command          *  Voice Response   5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5Speak Response  *C136*                     *Female Clock Time  5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters: None

In Depth Command Description: C137
Setting Time of Clock

This command allows the user to set the time that the controller's clock is set for. The time is entered in 12 hour format, with a leading zero if needed.

```
644444444444444L444444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))))3)))))))))))))))))M
5Set Time        *C137*$$ %% @*            *The Clock's Time    5
944444444444444N444444444444444444444444N4444444444444448
```

Parameters:

$$ is the Hour (00..12)
%% is the Minute (00..59)
@ indicates AM or PM (0=AM, 1=PM)

Example:

To set the time to 2:35 PM, the keystrokes needed are:
C137*02351*

Error Message:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - To Many Digits Entered
E2 - Time Entered is to Large

In Depth Command Description: C138
Setting Date of Clock

This command allows the user to set the day that the controller's clock is set for.

```
644444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response   5
K)))))))))))))))3))))))))))))))))))))))3))))))))))))))))M
5Set Date        *C138*$$ %% @@*           *The Clock's Date   5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters:

$$ is the Month (00..12)
%% is the Day (00..31)
@@ is the Year (00..99)

Example:

To set the date to 01-15-94, the keystrokes needed are:

C138*011594*

Error Message:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - To Many Digits Entered
E2 - Number Entered is to Small
E3 - Number Entered is to Large

In Depth Command Description: C139
Program CW Sending Speeds

This command allows the user to select the CW (Morse code) sending speed. The speed can vary from 5 WPM to 25 WPM. Speeds can be chosen from 5,10,13,15,20,25 WPM.

```
644444444444444L444444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))))M
5Set CW Speed    *C139*$*                   * CW at XX WPM      5
944444444444444N444444444444444444444444N4444444444444448
```

Parameter:

$ is the CW Sending Speed Code (1..6)

```
                          +)))))))0)))))))))),
                          *  Code   *   Speed    *
                          /)))))))3)))))))))))1
                          *   1     *   5  WPM   *
                          *   2     *   10 WPM   *
                          *   3     *   13 WPM   *
                          *   4     *   15 WPM   *
                          *   5     *   20 WPM   *
                          *   6     *   25 WPM   *
                          .)))))))2)))))))))))-
```

Defaults:

- 20 WPM

Error Message:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered
E2 - Not a Valid CW Speed Code 1..6 Only

In Depth Command Description: C140
Set CW Tone Frequencies

This command allows the 2 frequencies of the CW ID'er to be programmed. The number of counts needed to get a desired frequency can be found in the Tone Table near the end of the manual. This does not affect the CW sending rate (See Command C139), only the 2-tone frequencies. This command affects only the tone used when a CW message is sent; the courtesy beeps will not be affected.

```
644444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response   5
K)))))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5Change CW Tones *C140*$$$$ !!!!           *None               5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters:

$$$$ is the number of counts for tone #1 (See the Tone Table)
!!!! is the number of counts for tone #2 (See the Tone Table)

Defaults:

- CW Frequency 1 Defaults to 1000Hz (1000 counts)
- CW Frequency 2 Defaults to 1330Hz (0750 counts)

Error Message:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered

In Depth Command Description: C141
Set Pager Tones

This command allows the users to program one of the 10 2-tone pager slots on the RLC-2. The paging tones are assigned to the "TONE #1" pot. To make your pager work correctly, the deviation of the tones sent must be at a louder than normal level. Audio routing of the pager tones is controlled by the routing variable entered in the programming of the 2-tone sequence.

```
644444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *   Tone Response   5
K)))))))))))))3)))))))))))))))))))))))3)))))))))))))))M
5Set Pager Tones *C141*@ # ^^ $$ %% && !   *  Pager Sequence   5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters:

@ is the Pager Slot (0..9)
# is the audio routing variable (0-7) (See Command C065 for audio routing variable)
^^ is the Row Number for Tone #1 (00..10)
$$ is the Column Number for Tone #1 (01..14)
%% is the Row Number for Tone #2 (00..10)
&& is the Column Number for Tone #2 (01..14)
! is the code of the timing sequence needed
(See the chart of two-tone timing sequences on the next page).

Defaults:

- No Tones Programmed

Using the Two-Tone Pager Tone Table (next page):

On the back of your pager one of 2 types of tone information will appear:

CAP Codes .. Use the tone table character information
Tone Codes .. Use the actual frequency information

Entering the data into the RLC-2 is very straightforward. For tone #1, locate the ROW number needed; this is a two digit number ranging from 00..10 and enter those digits. Similarly, locate the COLUMN number needed for tone #1, this is a 2 digit number ranging from 01..14 and enter it. Do this also for Tone #2. Then locate the proper two-tone timing sequence and enter the corresponding code. If the data is entered correctly, you will hear a 2-tone sequence.

Error Message:

If the format is not correct, the RLC-2 will send a "E" error code.
E1 - Too Many Digits Entered
E2 - Number too Large (Invalid Pager Selection)

Two-Tone Timing Sequences:

Sequence	1st Tone	Gap	2nd Tone	Pager Groups
1	1.0	0	3.0	GE/MOTO TN&VC
2	0.4	0	0.8	MOTO Tone Only
3	1.0	0	3.0	NEC - B
4	1.0	0.25	3.0	NEC - A
5	1.0	0	1.0	NEC - C
6	0.4	0	0.8	NEC - M
7	0.5	0	0.5	NEC - L
8	0.4	0	0.4	NEC - D

Two-Tone Tone Groups

GROUP	TN #	MOTO1	MOTO2	MOTO3	MOTO4	MOTO5	MOTO6	MOTOA
COLUMB	ROW	C-01	C-02	C-03	C-04	C-05	C-06	C-07
R-00	0	330.5	569.1	1092.4	321.7	553.9	1122.5	358.9
R-01	1	349.0	600.9	288.5	339.6	584.8	1153.4	398.1
R-02	2	368.5	634.5	296.5	358.6	617.4	1185.2	441.6
R-03	3	389.0	669.9	304.7	378.6	651.9	1217.8	489.8
R-04	4	410.8	707.3	313.0	399.8	688.3	1251.4	543.3
R-05	5	433.7	746.8	953.7	422.1	726.8	1285.8	602.6
R-06	6	457.9	788.5	979.9	445.7	767.4	1321.1	668.3
R-07	7	483.5	832.5	1006.9	470.5	810.2	1357.6	741.3
R-08	8	510.5	879.0	1034.7	496.8	855.5	1395.0	822.2
R-09	9	539.0	928.1	1063.2	524.6	903.2	1433.4	912.0
R-10	A	569.1	979.9	569.1	569.1	979.9	979.9	979.9

GROUP	TN #	MOTOB	MOTOZ	GE A'	GE B'	GE C'	MOTO 10	MOTO 11
COLUMB	ROW	C-08	C-09	C-10	C-11	C-12	C-13	C-14
R-00	0	371.5	346.0	682.5	652.5	667.5	1472.9	1930.2
R-01	1	412.1	384.6	592.5	607.5	712.5	1513.5	1989.0
R-02	2	457.1	426.6	757.5	787.5	772.5	1555.2	2043.8
R-03	3	507.0	473.2	802.5	832.5	817.5	1598.0	2094.5
R-04	4	562.3	524.8	847.5	877.5	862.5	1642.0	2155.6
R-05	5	623.7	582.1	892.5	922.5	907.5	1687.2	2212.2
R-06	6	691.8	645.7	937.5	967.5	952.5	1733.7	2271.7
R-07	7	767.4	716.1	547.5	517.5	532.5	1781.5	2334.6
R-08	8	851.1	794.3	727.5	562.5	577.5	1830.5	2401.0
R-09	9	944.1	881.0	637.5	697.5	622.5	1881.0	2468.2
R-10	A	979.9	979.9	742.5	742.5	742.5	-----	-----

In Depth Command Description: C142
Recall Paging Tones

This command recalls the 2-tone paging tones that have set with Command C141. The controller will start the 2 tone sequence upon receiver drop or "*" (<EOF> key) entry.

```
64444444444444L444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))3))))))))))))))))M
5Recall Tones    *C142*$                   *See Above          5
94444444444444N444444444444444444444N4444444444444448
```

Parameters:

$ is the Pager Slot (0..9)

Error Message:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered
E2 - Number too Large (Invalid Pager Selection)

In Depth Command Description: C143
Control Receiver Mode Select

This command allows the user to configure the control receiver as either a Control Receiver port, or an Input Only Receiver Port. The port does not have any courtesy beeps, time-out timers assigned to it. The port is intended for Weather Receivers, DVR inputs, or Tape cart machine support. When the port is a control receiver port, the DTMF decoder will lock to the port when a COR is active.

```
644444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response   5
K)))))))))))))3)))))))))))))))))))))))3)))))))))))))))))M
5Config. CONRX   *C143*0                   *Control RX ON      5
5Config. Receive *C143*1                   *Control RX OFF     5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters: See Table Above

Default: Control Receiver Configuration

Error Message:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered

In Depth Command Description: C144
Control Receiver Audio Routing Program

This command allows the user to direct where the control receiver audio goes when the port is configured as a receiver port.

```
644444444444444L444444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5Config. CONRX   *C144* $                    *      $           5
944444444444444N444444444444444444444444N4444444444444448
```

Parameters:

$ - Audio Routing Variable

- 0 - Route audio no place
- 1 - Route to Main TX on Activity
- 2 - Route to Link 1 TX on Activity
- 3 - Route to Main and Link 1 TX on Activity
- 4 - Route to Link 2 TX on Activity
- 5 - Route to Main and Link 2 TX on Activity
- 6 - Route to Link 1 and Link 2 TX on Activity
- 7 - Route to Main, Link 1 and Link 2 TX on Activity

Default: Control Receiver Configuration

Error Message:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered
E2 - Invalid Port

In Depth Command Description: C145
Set Value of Resistors 1 and 2

This command sets the values of the two software resistors. The resistors are variable up to 50KS with 255 possible values, providing 196S resolution. Typical applications include remote squelch and volume control. The resistors are AC devices, therefore DC cannot be controlled with the resistors.

```
644444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))))3))))))))))))))))))))))))3))))))))))))))))M
5Set Resistor #1 *C145*1 $$$*              *R 1 $$$            5
5    Resistor #2 *C145*2 $$$*              *R 2 $$$            5
944444444444444N44444444444444444444444N4444444444444448
```

Parameter:

$$$ is the resistance value code 000..255. Actual resistance is 196S times the code number.

Defaults:

- Resistances set to 25KS (code 128)

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered
E2 - Number too Large

In Depth Command Description: C146
Program Link Pre-Access Codes

This command allows the repeater owner to assign a pre-access code of 2 digits for the link ports. Pre-access is used when the system operators want common command structures on all repeaters. With common access commands on all of the repeaters, and when DTMF tones are entered to access these commands, any controllers that are on line will execute these commands. Pre-access allows each controller to have a unique access code before any commands are executed. When the pre-access is enabled (See Command C147), then pre-access must be used before commands can be executed. (When entering commands from the control receiver and through the serial port, pre-access is not needed). The main repeater ports pre-access is set to a '*' and the link port pre-access defaults to a #99. Any pre-access entered through the link port must can be any 3 digit sequence. Once pre-access is entered from the link ports, a 2 tone alert tone will be sent down the link ports informing the commanding station that they have accessed the pre-accessed controller. It is important to choose a first digit that will only be used for pre-access. The first digit is looked at when tones come in from the main port and if they match, the RLC-2 will not mute that digit and those to follow.

```
644444444444444L44444444444444444444444L4444444444444444447
5  Description   *        Command          *  Voice Response   5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))))M
5Set Code        *C146*& $$$*             * New Pre-Access $$ 5
944444444444444N44444444444444444444444N4444444444444444448
```

Parameters:

& is the current pre-access slot

1 - Slot #1

2 - Slot #2

$$$ is the new pre-access word

Error Messages:

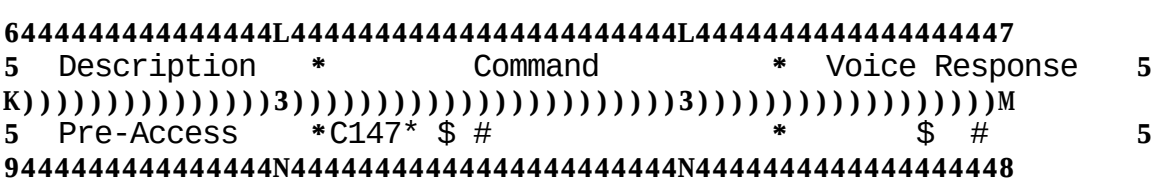
If the format is not correct, the RLC-2 will send a "E" error code.

E1 - To Many Digits Entered

In Depth Command Description: C147
Enable/Disable Pre-Access

This command allows the used to enable/disable the systems pre-access routines. When pre-access is disabled, the RLC-2 will execute all commands like normal. When pre-access is enabled, all main port commands must begin with a '*' followed by the command. The '*' must be entered for each command. When the pre-access is enabled, the RLC-2 changes the EOF key from a '*' to a 'D'. This keeps conflicts with the pre-access from occurring. When the pre-access is again turned off the RLC-2 changes the EOF from a 'D' to a '*'.

If the pre-access word is incorrect, nothing will occur. If the pre-access is correct, a dial tone will be transmitted down the link ports. The user must enter a DTMF tone with-in 15 seconds or the controller will cancel access. This is known when the dial tone stops. When the pre-access is turned off, access is like normal. When the pre-access is enabled, the RLC-2 changes the EOF key from a '*' to a 'D'. This keeps conflicts with the pre-access from occurring. When the pre-access is again turned off the RLC-2 changes the EOF from a 'D' to a '*'.



Parameters:

$ is the enable key

1 - ON, 0 - Off

is the half or full duplex set-up

1 - Half Duplex, 0 - Full Duplex

Default:

Pre-Access is disabled and access is full duplex

Error Message:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered

In Depth Command Description: C148
DTMF Tone Pad Test

This command allows the user to test their DTMF tone pad. It allows up to 20 digits to be entered. After the command is executed, the voice will speak the digits entered.

```
644444444444444L44444444444444444444444L4444444444444444447
5  Description   *        Command          *  Voice Response    5
K)))))))))))))))3))))))))))))))))))))))3))))))))))))))))))M
5DTMF Tone Test  *C148*$$$$....$$$$*       *See Above           5
944444444444444N44444444444444444444444N4444444444444444448
```

Parameters:

$ is any key on the DTMF Tone Pad

Error Message:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered

In Depth Command Description: C149
Program and Speak a Voice Message

This command allows a voice message to be spoken without using one of the BBS message slots. The use of this command is intended for Macro programming, but may also be used to see what Voice messages sound like before actually programming them. Once the message is spoken, it can no longer be recalled.

```
64444444444444L444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response   5
K)))))))))))))3)))))))))))))))))))))3)))))))))))))))M
5Program Message *C149* # $ %%% .. %%%     *What you Programed 5
94444444444444N444444444444444444444N4444444444444448
```

Parameters:

# - Audio Routing Variable (See Command C065,C066 for Definitions)
$ is the voice message echo if over the link Variable (See Command C065,C066)
%%% - Voice Words (See Voice Library at End of the Manual)

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - To Many Digits Entered
E2 - Invalid routing or echo variable

In Depth Command Description: C150
Send Port Initial ID

This command sends the Ports Initial ID over the selected port.

```
644444444444444L44444444444444444444444L4444444444444444
5  Description   *        Command          *  Voice Response    5
K)))))))))))))))3))))))))))))))))))))))3))))))))))))))))M
5Send Initial ID *C150*                    *REPEATER I D 0     5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters: None

In Depth Command Description: C151
Enable/Disable Time-Stamping of Analog High/Low Points

This command allows the user to enable or disable the time-stamping of the analog input tracking. The controller will stamp the current time to the high and low functions of any of the 4 analog inputs when an extreme condition occurs. This is nice to know exactly when an extreme condition occurred.

```
644444444444444L44444444444444444444444L4444444444444444
5  Description   *        Command          *  Voice Response    5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5  Time Stamp    *C151* ! # $ ^            *    ON or OFF       5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters:

! - Analog Input #1 Enable/Disable
- Analog Input #2 Enable/Disable
$ - Analog Input #3 Enable/Disable
^ - Analog Input #4 Enable/Disable

1 - Enable time-stamp
0 - Disable time stamp

Default:

Time-stamp enabled on all analog inputs

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - To Many Digits Entered

In Depth Command Description: C152
Autopatch Direct On Air to Monitor Selected Ports

This command allows the autopatch user to return from a direct on-the-air connection (See Command C159) to a monitor state. The monitor state monitors the ports that are enabled from the direct on-the-air command. The configuration of this command is the same as Command C159. The command is configured using Command C176.

```
64444444444444L44444444444444444444444L444444444444444444447
5  Description   *        Command          *    Voice Response     5
K)))))))))))))3)))))))))))))))))))))))3)))))))))))))))))))))M
5On-The-Air MON  *C152*                    *        'OFF'          5
94444444444444N44444444444444444444444N444444444444444444448
```

Parameters: None

In Depth Command Description: C153
Autopatch Channel Port Monitoring

This command allows the autopatch user to cancel any monitoring of the radio ports. The monitoring is controlled with Commands C152, C155, C156, C157. Executing this command simply puts the autopatch in an 'OFF' state with-respect-to all the radio ports.

```
644444444444444L44444444444444444444444L444444444444444444447
5  Description   *        Command          *    Voice Response     5
K)))))))))))))))3))))))))))))))))))))))3))))))))))))))))))))))M
5Cancel Monitor  *C153*                    *        'OFF'          5
944444444444444N44444444444444444444444N444444444444444444448
```

Parameters: None

In Depth Command Description: C154
Answer Reverse Patch Only

This command allows the user to answer the reverse autopatch when it rings out over the air. This command will only work if the controller counts rings from the telephone autopatch.

```
644444444444444L44444444444444444444444L4444444444444447
5  Description   *        Command          *  Voice Response   5
K)))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5Answer Reverse  *C154*                     *                   5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters: None

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - No rings counted

In Depth Command Description: C155 - C157
Autopatch Monitoring Selected Ports

This command allows the autopatch the ability to monitor the selected ports with the phone line. This feature is handy to listen to the activity on the system without the system knowing that you are present.

```
64444444444444444L44444444444444444444L4444444444444444447
5   Description    *       Command       *  Voice Response    5
K)))))))))))))))3)))))))))))))))))))3)))))))))))))))))))))M
5 Monitor Main     *C155*                *   Repeater ON      5
K)))))))))))))))3)))))))))))))))))))3)))))))))))))))))))))M
5 Monitor Link 1   *C156*                *Link 1 'ON' Message 5
K)))))))))))))))3)))))))))))))))))))3)))))))))))))))))))))M
5 Monitor Link 2   *C157*                *Link 2 'ON' Message 5
94444444444444444N44444444444444444444N4444444444444444448
```

Parameters: None

In Depth Command Description: C158
Reverse Autopatch Programming Password Access

This command allows the reverse patch to program and control the RLC-2. This command can only be accessed when the reverse patch is active. Access to this command from the RLC-2's radio ports is not allowed. In order for any programming of the controller to occur from the phone line, this command must be executed.

Timing of this command is determined from the reverse patch ring in timer (See Command C066 for Programming). While you are programming the controller, and time is running low, execution of the time-out timer reset will re-load the timed value.

```
64444444444444444L44444444444444444444L4444444444444444447
5   Description     *       Command       *  Voice Response    5
K)))))))))))))))))3)))))))))))))))))))3))))))))))))))))))M
5Programming Access *C158*                *Repeater ID #0      5
94444444444444444N44444444444444444444N4444444444444444448
```

Parameters: None

Default: 20 Seconds

In Depth Command Description: C159
Reverse Autopatch Direct ON-Air

This command allows the reverse patch to access directly on the air. This is useful when calling the controller from the phone and accessing "Over-The Air" features. Use of this command allows the phone conversations to have DTMF access to the repeaters radios. The audio routing from the phone lines is controlled using command C176 (Reverse Patch Configuration Command). It should be noted that non-licensed persons can have control to the radio. This is not allowed by the FCC.

Timing of this command is determined from the reverse patch time-out timer value. This value is programmed using command C066. While you are programming the controller, and time is running low, execution of the time-out timer reset will re-load the timed value.

```
64444444444444444L44444444444444444444L44444444444444444447
5   Description     *       Command       *  Voice Response     5
K)))))))))))))))))3)))))))))))))))))))3))))))))))))))))))))M
5Air Time Access    *C159*                *       'ON'          5
94444444444444444N44444444444444444444N44444444444444444448
```

Parameters: None

Autopatch Software And Adjustment

1) Turn off the power to your controller

2) Install the Patch board's cable to External Boards connector.

3) Mount your Patch board securely

4) Re-apply power to the RLC-2

5) Adjust the Patch unit

- Enable the Patch on the system using Command C175
- Bring the Patch on line using Command C160
- Adjust the Pot "P-R" until it "sounds" OK
-- This adjustment should be to 1.50 V P-P
- Adjust the Pot "R-P" to 1.5V P-P
-- You must Un-Squelch your Receiver to Adjust
- The Pot Label "D-P" is for DTMF to Patch
- The Pot Label "D-R" is for DTMF to Repeater
-- These Pots are activated when the dialer is active

6) It may be needed to have a party on the phone send a DTMF tone over the phone, with the patch on line in order to get a correct adjustment.

7) The patch is treated the same as a link radio. The audio must be adjusted to the same level in order for the telephone audio the be at a correct level. If the telephone audio is lower than the repeater audio, then it may be necessary to adjust your radio receiver audio level to a lower P-P value. The RLC-2 patch holds to the FCC type acceptance for telephone connection devices.

8) If you have any problems or questions on installing the Autopatch unit, contact Link Communications.

In Depth Command Description: C160
Autopatch ON Command

This command controls the "ON" functioning of the RLC-2 Autopatch unit. This command will accept several types of keypad entry for bring the autopatch on line. If the autopatch is currently in use, the controller will send out the message 'Autopatch is ON' and deny access.

```
644444444444444L44444444444444444444444L444444444444444444447
5  Description   *        Command          *  Voice Response      5
K)))))))))))))3)))))))))))))))))))))))3)))))))))))))))))))))M
53 Digit Dialing *C160*$$$* or %%%*       *Autopatch $$$         5
54 Digit Dialing *C160*$$$$*              *Autopatch $$$$        5
55 Digit Dialing *C160*$$$$$$*            *Autopatch $$$$$       5
57 Digit Dialing *C160*$$$$$$$*           *Autopatch $$$$$$$     5
58 Digit Dialing *C160*0 $$$$$$$*         *Autopatch $$$$$$$$    5
58 Digit Dialing *C160*1 $$$$$$$*         *Autopatch $$$$$$$$    5
510 Digit Metro  *C160* ### $$$$$$$*      *Autopatch $$$$$$$$$$  5
511 Digit Dial   *C160*0 ### $$$$$$$*     *Autopatch $$$$$$$$$$$ 5
511 Digit Dial   *C160*1 ### $$$$$$$*     *Autopatch $$$$$$$$$$$ 5
5911 Memory Dial *C160*911*               *Autopatch 911         5
944444444444444N44444444444444444444444N444444444444444444448
```

Entry Parameters:

- All entry formatting is controlled by Command C175
- All receiver access control is controlled by Command C175
- Direct 911 Access is obtained using Command C170 (Rename to 0911)
- Memory Dial $ is dialer position 0-9
- Memory Dial $$ is dialer position 00-99
- Memory Dial $$$ is dialer position 000-199 or 911
- Memory Dial 911 is dialer position 911
- When a 3 digit number is entered that is not one of the memory positions the patch will dial it in direct mode, not memory mode. (Only if 3 digit dialing is enabled)

Dialing Parameters:

Once the Voice finishes reading back the number, the autopatch will start dialing the number. No "kerchunk" is needed. The terminate the call, the user can enter the patch down code (See Command C161).

Timer Parameters:

When any number other than Autodial positions 0-9 or 911 are entered, the RLC-2 starts its Patch Time-out timer (See Command C066). Once the timers has expired, the autopatch is automatically shut off. On the Fly timer reset is accomplished using Command C173.

Defaults:

- No Autodial Positions Programmed
- Autopatch Timer set to 3 minutes
- Autopatch is Off Line (See Command C175 to Enable the Patch)

In Depth Command Description: C161
Autopatch OFF Command

This command controls the "OFF" functioning of the RLC-2 Autopatch unit. This command will cause the RLC-2 patch to hang up the telephone line. This command hangs up the phone for both Forward and Reverse calls. The OFF message is programmed using Command C065*91

```
64444444444444444L44444444444444444444444L44444444444444444447
5  Description    *        Command          *  Voice Response    5
K)))))))))))))))3)))))))))))))))))))))))3))))))))))))))))))))M
5Hang up the Line *C161*                    * Autopatch OFF MSG  5
94444444444444444N44444444444444444444444N44444444444444444448
```

Defaults:

- No Autodial Positions Programmed
- Autopatch Timer set to 3 minutes
- Autopatch is Off Line (See Command C175 to Enable the Patch)

In Depth Command Description: C162
Program Dialing Table

This command allows the user to program the local and long distance dialing tables. The table consists of 99-6 digit entrys. The first 3 digits are the long distance dialing look-up and the second 3 digits are the local prefix look-up.

Local Prefix only:

Enter a 000 for the long distance entry and the 3 digits for the local prefix.

Long Distance Prefix:

Enter the Area Code and the Prefix

```
644444444444444L44444444444444444444444L4444444444444444447
5  Description    *        Command          *  Voice Response     5
K)))))))))))))))3)))))))))))))))))))))))3))))))))))))))))))M
5Prefix Table PGM *C162* ### $$$ ^^^       *                     5
944444444444444N44444444444444444444444N4444444444444444448
```

Parameters:

is the slot number from 000-099
$$$ is the long distance prefix
^^^ is the local prefix

Defaults:

- No Autodial Positions Programmed
- Autopatch Timer set to 3 minutes
- Autopatch is Off Line (See Command C175 to Enable the Patch)

Example:

To enable all dialing in the '406' area code and store in slot 001

- P - C162 * 001 406 000

'Voice' Four Hundred Six Zero

Example:

To only allow dialing with a 1 585, 586, 587 and 406-388

-P- C162 * 001 000 585
-P- C162 * 002 000 586
-P- C162 * 003 000 587
-P- C162 * 004 406 388

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - To Many Digits Entered
E2 - Invalid slot selected

In Depth Command Description: C163
Recall Dialing Table Slot

This command allows the user to recall the contents of one of the dialing table slots.

```
64444444444444444L444444444444444444444444L44444444444444447
5  Description    *        Command          *  Voice Response    5
K)))))))))))))))3)))))))))))))))))))))))3))))))))))))))))))M
5 Recall Slot     *C163* $$$                * Long/Local Recall  5
94444444444444444N444444444444444444444444N44444444444444448
```

Parameters:

$$$ - slot number from 000-099

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - To Many Digits Entered
E2 - Invalid slot selected

In Depth Command Description: C164
Enable/Disable Dialing Table Checking

This command allows the user to Enable/Disable the dialing table checking routine (See Commands C162,C163). When the dialing table is disabled, the controller will only look at the dialing lengths enabled with command C175 (See Command C175). If more control is needed in the local and long distance dialing, the user can enable the dialing table routine. This will only let 7,8,11 and 12 digit numbers through to the autopatch if their local and long distance dialing information is available in the dialing table.

```
64444444444444444L444444444444444444444444L44444444444444447
5  Description    *        Command          *  Voice Response    5
K)))))))))))))))3)))))))))))))))))))))))))3)))))))))))))))))M
5Dial Table Pgm   *C164*$                    *Autopatch LD ON/OFF 5
94444444444444444N444444444444444444444444N44444444444444448
```

Parameters:

$ - Dial Table Enable/Disable Control

1 - Enable Dial Table

0 - Disable Dial Table

Default:

Dial Table is disabled

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered

In Depth Command Description: C165
Autopatch Manual Off Hook Command for Forward Calls

This command allows a manual autopatch to be configured. This function by-passes the normal call screening and allows any number of key strokes to pass through. This command should be kept in tight control to keep unauthorized access to long distance numbers.

This command is also used to answer reverse patch phone calls. When the reverse patch is in Mode 1 (Over the Air Ring Out) the call is answered by the manual off-hook command.

When the manual off-hook command is used, the normal patch time-out timers are also enabled. (See Command C066 time-out timers)

```
64444444444444444L44444444444444444444444L4444444444444444447
5  Description    *        Command          *  Voice Response    5
K)))))))))))))))3)))))))))))))))))))))))3))))))))))))))))))M
5Manual Off Hook  *C165*                     *None,Just Dial Tone 5
94444444444444444N44444444444444444444444N4444444444444444448
```

In Depth Command Description: C166
Nusiance Number Table Program

This command allows the user to enter up to 10 7 digit nusiance numbers. A nusiance number is a number that you do not want the users to dial. If the users tries to dial a number that is on the nusiance number list, the autopatch will throw away that number.

```
64444444444444444L444444444444444444444444L44444444444444444447
5  Description    *        Command          *  Voice Response    5
K)))))))))))))))3))))))))))))))))))))))))3))))))))))))))))))))M
5 Nusiance Enter  *C166* # $$$$$$$          *  Number Entered    5
94444444444444444N444444444444444444444444N44444444444444444448
```

Parameters:

is the nusiance slot number

ranges from 0..9

$$$$$$$ is the 7 digit number to be blocked

Default: All slots loaded with 000-0000

Example: Want to block the numbers 482-7515 and 555-1212

1) Use slots 1,2 for the numbers
2) C166 * 1 4827515 Voice responds "1 4827515"
3) C166 * 2 5551212 Voice responds "2 5551212"

Example: Want to remove the number stored in slot 0 from being blocked

1) C166 * 0 0000000 Voice responds "0 0000000"

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

ER1 - Too Many Digits Entered or To Few Digits Entered
ER2 - Invalid Slot Number

In Depth Command Description: C167
Autopatch Autodial Memory Program

This command programs the memory dial positions. There are a total of 200 memory dial slots, and a 911 emergency dialer slot. The slots can hold up to 12 digits. When a number is programmed, the autodial position is enabled for dialing (See Command C169).

```
64444444444444444L44444444444444444444444L44444444444444444447
5  Description    *        Command          *  Voice Response    5
K)))))))))))))))3)))))))))))))))))))))))3))))))))))))))))))))M
5Memory Program   *C167*$$$ #..#*           * Autopatch #..#     5
94444444444444444N44444444444444444444444N44444444444444444448
```

Parameters:

$$$ is the Memory dialer position
009 programs memory position #09
911 programs memory position #911

#..# are the memory dialing digits, 12 total

Defaults:

- No Autodialer positions programmed

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Invalid Autodial Position
E2 - Not Enough Digits Entered
E3 - To Many Digits Entered

In Depth Command Description: C168
Readback Autopatch Autodial Memory Positions

This command reads back the contents of the memory dial positions. There are a total of 200 memory dial slots, and a 911 emergency dialer slot. The slots can hold up to 14 digits. When a position is readback, the controller will speak the position, if it is enabled or disabled, and the positions number.

```
644444444444444L44444444444444444444444L4444444444444447
5  Description    *        Command          *  Voice Response    5
K)))))))))))))))3)))))))))))))))))))))))3))))))))))))))))M
5Memory Recall    *C168*$$$*                * See Below...       5
944444444444444N44444444444444444444444N4444444444444448
```

Parameters:

$$$ is the Memory dialer position
009 recalls memory position #09
911 recalls memory position #911

Voice Response:

Autopatch $$$ % #..#
$$$ is the Memory dialer position
% indicates if the position is enabled or disabled
#..# is the memory dialer contents

Defaults:

- No Autodialer positions programmed

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Not a Valid Autodial Position

In Depth Command Description: C169
Autopatch Autodial Memory Positions Enable/Disabled

This command enables or disables individual memory dialer positions. There are a total of 200 memory dial slots, and a 911 emergency dialer slot. When a memory dialer slot is initially programmed, the slot is enabled for dialing recall. If the position needs to be disabled from dialing, the slot must simply be disabled. The same holds true for re-enabling a memory dialing position.

```
64444444444444444L44444444444444444444444L444444444444444444447
5  Description    *        Command         *  Voice Response     5
K)))))))))))))))3)))))))))))))))))))))))3)))))))))))))))))))))M
5Memory Control   *C169*$$$ #*             *Autopatch $$$ On/Off 5
94444444444444444N44444444444444444444444N444444444444444444448
```

Parameters:

$$$ is the Memory dialer position
(1-Enables Recall)
(0-Disables Recall)
009 0 Disables memory position #09
911 1 Enables memory position #911

Defaults:

- No Autodialer positions programmed

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Not a Valid Autodial Position

In Depth Command Description: C170
Direct Access to Autodial Memory Positions 911

This command allows the user to directly access the 911 memory dialer position. This command is useful if the autopatch is a closed patch, but 911 access is open to the public. Using this command, the user does not need to bring up the autopatch to use the 911 position, this command automatically does it for you.

```
64444444444444444L44444444444444444444L444444444444444444447
5  Description    *        Command        *  Voice Response     5
K)))))))))))))))3)))))))))))))))))))))3))))))))))))))))))))M
5911 Access       *C170*                   *Autopatch 911       5
94444444444444444N44444444444444444444N444444444444444444448
```

Example:

For direct 911 dialing access to your local 911 service:
1) Rename C170 to 0911 using Command C044 using no Password
2) Program 911 memory position to "911" using Command C166

(P) C044* 170 0911 00* Renames Command to 0911
(P) C166* 911 911* Programs in the number "911"

Defaults:
- No Autodialer positions programmed

In Depth Command Description: C171
Autopatch Number Readback Enable/Disable

This command allows the user to Enable or Disable the Autopatch Number Readback when making an autopatch call. This command is useful if the user wants to keep others from knowing the number that was dialed. This command effects both the direct dialer, and the autodialer readback.

```
64444444444444444L44444444444444444444444L44444444444444444447
5  Description    *        Command         *  Voice Response     5
K)))))))))))))))3))))))))))))))))))))))3))))))))))))))))))))))M
5 Number Readback * C171* # *              *Autopatch S P ON/OFF 5
94444444444444444N44444444444444444444444N44444444444444444448
```

Parameters:

is the Enable/Disable Bit

1-Enables Number Readback

0-Disables Number Readback

Defaults:

- Number Readback Enabled

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Much Data Entered

E2 - Not a Valid Mode Selected

In Depth Command Description: C172
Autopatch Full/Half Duplex Switch

This command allows the user to Enable or Disable the Autopatch Full or Half Duplex feature. When the patch is in Full duplex, the phone conversation and radio audio is mixed over the selected port. This mode is like normal telephone conversations. When the Autopatch is in half duplex mode, the phone conversation is muted when the repeaters receiver is active, and only present when the repeaters receiver is squelched. This is like most of the patches available.

```
64444444444444444L444444444444444444444L44444444444444444447
5  Description    *        Command         *  Voice Response      5
K)))))))))))))))3)))))))))))))))))))))))3))))))))))))))))))))M
5Half/Full Duplex * C172* # *              *F D ON/OFF           5
94444444444444444N444444444444444444444N44444444444444444448
```

Parameters:

is the Enable/Disable Bit
(1-Enables Full Duplex)
(0-Disables Full Duplex))

Defaults:

- Full Duplex

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Much Data Entered
E2 - Not a Valid Mode Selected

In Depth Command Description: C173
Reset Autopatch Time-Out Timers

This command allows the user to reset the autopatch forward and reverse time-out timer while using the autopatch. This command is used when you have more to say and the patch is about to time-out. This command has no voice response, it just resets the timer back to its initial value. The response is a CW 'BEEP-BEEP'

The normal use for this command is when the patch prompts you that only 30 seconds are left in the call. Simply enter this command and the timer will be reset to its initial value.

```
64444444444444444L44444444444444444444L44444444444444444447
5  Description    *        Command        *  Voice Response     5
K)))))))))))))))3)))))))))))))))))))))3))))))))))))))))))))M
5 Timer Reset     *C173*                   *NONE                5
94444444444444444N44444444444444444444N44444444444444444448
```

In Depth Command Description: C174
Autopatch Pre-Dial Configure

This command allows the configuration of the autopatch pre-dial dialing digits. Most PBX systems use 1 digit for the pre-dial for an outside line. The RLC-2 will handle up to 3 digits of pre-dialing.

```
64444444444444444L444444444444444444444L44444444444444444447
5  Description    *        Command         *  Voice Response      5
K)))))))))))))))3)))))))))))))))))))))))3))))))))))))))))))))M
5  Pre-Dial       *C174*! ^ $ #            *   See Below          5
94444444444444444N444444444444444444444N44444444444444444448
```

Understanding the table:

! - Enables/Disables the 1 digit Pre-Dial Digit
1 - Enables Pre-Dial
0 - Disables Pre-Dial
^ - Programs the 1st Pre-Dial Digit
$ - Programs the 2nd Pre-Dial Digit
# - Programs the 3rd Pre-Dial Digit

-- If no pre-dial digit is wanted, enter a 0 for the ! and 0 0 0 for the dialing digits.

-- If only 1 pre-dial digit is wanted, enter a 1 for the ! and the dialing digit needed followed by 2 'B' digits. The 'B' DTMF digit is the pause while dialing digit.

Defaults:

Pre-Dial digit is not enabled

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - Too Many Digits Entered
E2 - Not a Valid Mode Selected

In Depth Command Description: C175
Configure and Enable/Disable the Autopatch on the System

This command enables the autopatch on the controller, and allows for special dialing formats for autopatch access. When the autopatch is Off-Line, neither the forward or Reverse patch are enabled. When any of the forward dialing formats are enabled, it also enables the reverse patch to operate. If the autopatch needs to be removed from the system, the dialing parameters should be set to 0.

```
64444444444444444L44444444444444444444444L444444444444444444447
5  Description    *        Command         *  Voice Response      5
K)))))))))))))))3)))))))))))))))))))))))3)))))))))))))))))))))M
5Autopatch Config *C175* ###*              * On or Off 8 Times    5
94444444444444444N44444444444444444444444N444444444444444444448
```

Parameters:

The number entered is the decimal equivalent of the binary 8 bits.

1	! - Enables or Disables 3 digit dialing
2	@ - Enables or Disables 4 digit dialing
4	# - Enables or Disables 5 digit dialing
8	$ - Enables or Disables 7 digit dialing
16	% - Enables or Disables 0 plus 7 digits long distance dialing
32	^ - Enables or Disables 1 plus 7 digits long distance dialing
64	& - Enables or Disables 0 plus 10 digits long distance and Metro 10 digit dialing
128	? - Enables or Disables 1 plus 10 digits long distance dialing

The entry must be a (1 to enable access) or a (0 to disable access)

If all 0's are entered the voice will speak "Autopatch Off Line", and no autopatch access is allowed.

Example: Want to enable 3,4,7 digit dialing and disable all others.
Number entered = 1+2+8
Enter a number 011 (Eleven) and the controller will speak:

ON ON OFF ON OFF OFF OFF OFF

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - To Few or to Many Digits Entered
E2 - Not a Valid Mode Selected

In Depth Command Description: C176
Reverse Patch Configuration Command

This command configure the reverse autopatch on the controller. When the autopatch is Off-Line, neither the forward or Reverse patch are enabled. If the reverse autopatch needs to be removed from the system, the parameter should be set to 0.

```
6444444444444444L44444444444444444444L44444444444444444447
5  Description    *        Command        *  Voice Response     5
K)))))))))))))))3)))))))))))))))))))))3)))))))))))))))))))M
5Reverse Config   *C176*#$%* or C176*0*    * Number Entered     5
9444444444444444N44444444444444444444N44444444444444444448
```

Parameters:

- Programs the reverse autopatch Mode 0,1,2
$ - Program the number of rings to answer (1-9)
% - Controls the audio routing variable (See Command C032)

Modes:

Mode 0 disables the reverse autopatch, ringing is ignored

Mode 1 direct ringing over the air and uses Command C154 to answer the call

-- Mode 1 uses the number of rings variable ($) to keep the phone from ringing over the air until the number of rings counter is met. If you want to have the phone ring 5 times before it rings out over the air, program the rings counter to 5.

Mode 2 DTMF coded access after ($) number of rings

- Command C158 or Command C159 must be entered in 20 seconds (default) or the patch will hang itself up. See Command C066 to program the reverse patch ring timer.

When Mode 1 is programmed, the autopatch will cause a 2 tone ringing over the ports that are enabled on the reverse patch after the ring counters match. The enabling is controlled by the audio routing variable (%). If only the Main port is enabled, then a routing variable of 1 is entered. When the reverse patch rings out, the tones will go out only the main port.

When Mode 2 is programmed, the autopatch will answer, and wait for 20 seconds (default) for the user to access either programming mode, or over the air mode. In the programming mode, the phone will act like the control receiver and allow programming of the RLC-2. This requires a 16 key pad phone. If direct over the air access mode is commanded, the patch will be connected to the ports that are enabled for the reverse patch (%).

To disable the reverse patch, simply enter a '0' as the only digit. When this is entered, the voice will say 'Off' and the reverse patch is disabled.

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - To Few or to Many Digits Entered
E2 - Not a Valid Mode Selected

Autopatch Examples

Example 1: Want "*" Up and "#" Down Patch Access

Solution: Rename Command C160 to "0000" with the "*" as the <EOF> key
Rename Command C161 to "000#" with the "*" as the <EOF> key

1) (P) C044* 160 0000 00* Rename C160 to 0000
2) (P) C044* 161 000# 00* Rename C161 to 000#

Example 2: Want "12*" Up and "13*" Down

Solution: Rename Command C160 to "0012" with the "*" as the <EOF> key
Rename Command C161 to "0013" with the "*" as the <EOF> key

1) (P) C044* 160 0012 00* Rename C160 to 0012
2) (P) C044* 161 0013 00* Rename C161 to 0013

Example 3: Want to program Memory dial position 123 with 555-1212

Solution: Go to the Memory Dialing program routine and program in your number, then recall it for clarity.

1) (P) C166* 123 5551212* Programs Memory Position
2) (P) C167* 123* Reads back Memory Position

Example 4: Want to disable Memory Position 123

Solution: Go to the Memory Dialer Enable/Disable Routine and disable position 123.

(P) C168* 123 0* Disabled Position #123

In Depth Command Description: C177
Remote Controller Reset

This command allows the user to remotely reset the RLC-2 Controller. This command acts like pushing the external reset switch. **NO REMOTE INITIALIZATION IS POSSIBLE, ONLY REMOTE RESETTING.**

```
64444444444444444L44444444444444444444444L444444444444444444447
5  Description    *        Command         *    CW Response       5
K)))))))))))))))3)))))))))))))))))))))))3))))))))))))))))))))))M
5Remote Reset     *C177*                   *  RESET ?             5
94444444444444444N44444444444444444444444N444444444444444444448
```

Parameters:

None

In Depth Command Description: C178
Delete a Macro Position

This command allows user to completely delete a macro position. Once the macro is deleted, the macro will need to be re-programmed in order to use it.

```
64444444444444444L444444444444444444444L4444444444444444447
5  Description    *        Command         *    Voice Response    5
K)))))))))))))))3)))))))))))))))))))))3))))))))))))))))))M
5 Delete a Macro  *C178 * ##               *       ## OFF        5
94444444444444444N444444444444444444444N4444444444444444448
```

Parameters:

- is the Macro Position

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - To Few or to Many Digits Entered
E2 - Not a Valid Macro Selected

In Depth Command Description: C179
Voice Recall of Selected Macro Position

This command allows the voice recall of a Macro position. Use of the command will allow the control operator to find what is located inside of the Macro position

```
64444444444444444L44444444444444444444444L4444444444444444447
5  Description    *        Command         *    CW Response      5
K)))))))))))))))3)))))))))))))))))))))))3))))))))))))))))))))M
5Voice Macro Reca *C179*##*                *  Contents of Macro  5
94444444444444444N44444444444444444444444N4444444444444444448
```

Parameters:

is the Macro Position

Defaults:

- OFF (Indicates Macro Position is Not Programmed)

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - To Many Digits Entered
E2 - No Such Macro Position

In Depth Command Description: C180
Program Selected Macro Position

This command allows the programming of a selected macro position. (See Attached Macro Programming Sheets). Macro programming in its concept allows the user to chain several command sequences together to form 1 complete command.
Example: Want to COR and PL the Repeater, Change the Courtesy Beep to a single beep of short duration, and Lengthen the ID timer to 10 Minutes. I want the Voice message "Repeater COR and PL" to be spoken when this happens to inform the users. I also want the Scheduler to call this command sequence at 6:00 AM. The Scheduler can only call 1 command at a time. Using a Multiple Command Macro sequence, the Scheduler will only call the Macro. All other commands will be executed by the Macro.

Solution: Use a Macro Programming Cell to Accomplish the Task
Actual Commands that need to be executed:

- C018* 3 * ; Force COR and PL Access
- C049*1 1 1000 0000 05 05 * ; Change the Courtesy Beep to 1000HZ at 50mS
- C067* 06 060 * ; Change Repeater ID Timer to 10 Minutes

For this Example we will use Macro #01
96 C180 * 01 C018 3 A C049 1 1 1000 0000 05 05 A C067 06 0600 * Response "WR 1"

Some Items to Note:
1) The commands are entered in 1 set of keystrokes
2) There are no <EOF> keys used within the Macro
3) Commands are entered with the additional data in each group
4) Command sequences are separate by the DTMF Digit 'A'
5) The Voice Response "WR 1" indicates Macro Sequence stored

To Change the Voice Response use C065*50* Position:
1) The Message is a Voice Message
2) The Message Slot is #50
3) The Message is attached to Macro #01 Readback Position
4) The Programming Sequence is: 96 C065* 50 1 0 0 376 032 044 047 184 045 041 *

Macro #1

```
6444L444L444L444L444L444L444L444L444L444L444L444L444L4447
5 1 * 2 * 3 * 4 * 5 * 6 * 7 * 8 * 9 * 10* 11* 12* 13* 14* 155
5   *   *   *   *   *   *   *   *   *   *   *   *   *   *   5
5 C * 0 * 1 * 8 * 3 * A * C * 0 * 4 * 9 * 1 * 1 * 1 * 0 * 0 5
K)))3)))3)))3)))3)))3)))3)))3)))3)))3)))3)))3)))3)))3)))3)))M
5 16* 17* 18* 19* 20* 21* 22* 23* 24* 25* 26* 27* 28* 29* 305
5   *   *   *   *   *   *   *   *   *   *   *   *   *   *   5
5 0 * 0 * 0 * 0 * 0 * 0 * 5 * 0 * 5 * A * C * 0 * 6 * 7 * 0 5
K)))3)))3)))3)))3)))3)))3)))3)))3)))3)))3)))3)))3)))3)))3)))M
5 31* 32* 33* 34* 35* 36* 37* 38* 39* 40*   *   *   *   *   5
5   *   *   *   *   *   *   *   *   *   *   *   *   *   *   5
5 6 * 0 * 6 * 0 *   *   *   *   *   *   *   *   *   *   *   5
9444N444N444N444N444N444N444N444N444N444N444N444N444N4448
```

Macro Specifics:

Macro Positions 01 - 20 are 40 Keystroke Macros
Macro Positions 21 - 30 are 90 keystroke Macros

Command Names that do not have additional Data are separated with an 'A' if additional commands are to follow, otherwise <EOF> to end the sequence.

Command Names that have additional data are entered in the order:
- Command Name (4 Digits)
- Then Additional Data
- Finally an 'A' if more commands are to follow, otherwise and <EOF> to end the sequence.

Voice recall of the Macro is accomplished using the C179 Command

Delete a Macro position using C178 Command

Error Messages:

If the format is not correct, the RLC-2 will send a "E" error code.

E1 - To Many Digits Entered
E2 - No Such Macro Position

In Depth Command Description: C181-C210
Recall Macro, Execute a Macro Sequence

This command allows the voice recall of a Macro position. Use of the command will allow the control operator to find what is located inside of the Macro position

```
64444444444444444L44444444444444444444444L444444444444444444447
5  Description    *        Command        *    Response         5
K)))))))))))))))3))))))))))))))))))))))3))))))))))))))))))))))M
5 Macro Recall    *C181* - C210*          *  Assigned Position  5
94444444444444444N44444444444444444444444N444444444444444444448
```

See Command C179 for Macro Voice Recall

See Command C180 for Macro Sequence Program

See Serial Command S06 for Macro Viewing

See Appendix #1 for Macro Recording Sheets

Appendix A - Initialization and Resetting the RLC-2

When the RLC-2 powers up, a warm reset is processed. This reset will load the most recent variables into the controller. The variables are stored in the nonvolatile RAM chip located on the controller board. If the variables in the SRAM get scrambled somehow, a cold boot will be needed. This cold boot resets all of the RLC-2's variables to the preprogrammed values. This cold boot is accomplished by pressing and holding the initialize switch and pushing the reset switch. You must hold the initialize switch down for at least 5 seconds when resetting. Once the controller has been initialized, the reset switch must be pushed again.

****** Caution, Will clear all programmed Variables ******

1. Depress the "Initialize" switch and hold

2. Depress and Release the Reset Switch while continuing to hold the Initialize switch

3. After 5 seconds let go of the "Initialize" switch

4. Depress and Release the Reset switch to Initialize the RLC-2

Appendix B - Troubleshooting

No LED's when the RLC-2 is powered up :
- Check for +12 Volts at Power Connector
- Check for bad or blown fuse (Earlier RLC-2's)
- Make sure that the +12 Volts is connected correctly
-- Center of Plug is (+), Shield is (-)

Only Some of the LED's are lit:
- Cross-Point Board is not plugged in correctly
- Short on that specific power supply
-- Call Link Communications if this occurs

No Audio at Test Bus:
- Check for main system power (All LED's lit)
- Is there a valid COR signal present (Active Low)?

Have audio at the test bus, but not on the transmitter:
- Are the output audio pots turned up (clockwise)?
- Is the transmitter connected to the audio output (high)?

The Voice seems Muffled:
- Turn down the pot marked 'Voice'

When I connect my COR, the RLC-2 will not accept it:
- Does the COR go to ground when active?
- Can the COR sink (2mA) when active?
- Does the 5V pull-up resistor conflict with your radio?
-- Motorola R-100 Repeaters are susceptible to this
-- Open collector the driver on R-100 repeaters

When I connect my serial terminal, I do not get any data:
- Is your terminal set to 2400,N,8,1?
- Are you wired to connector **Serial/Resistor?**
- Are all the RS-232 TX and RX and ground wires connected?
-- Is Pin #5 on the RLC-2 connected to (Pin #5: DB-9) or
(Pin #7: DB-25)?
-- Is Pin #4 on the RLC-2 connected to (Pin #3: DB-9) or
(Pin #2: DB-25)?
-- Is Pin #9 on the RLC-2 connected to (Pin #2: DB-9) or
(Pin #3: DB-25)?

Appendix C - Voice Word Library

Custom word requests can be given to Link Communications for $50.00 per word. The words will be added to the general word directory when purchased. Contact Link Communications Inc. for more information.

(F) Indicates The Female Voice

(F)A.M.	221	ALERT	158	CAPROCK	514
(F)AFTERNOON	250	ALL	123	CAUTION	187
(F)EIGHT	232	ALOFT	339	CEILING	340
(F)EIGHTEEN	242	ALPHA	057	CELSIUS	300
(F)ELEVEN	235	ALTERNATE	354	CENTRAL	387
(F)EVENING	251	AMATEUR	429	CHANGE	074
(F)FIFTEEN	239	AMATEUR	395	CHARGING	498
(F)FIFTY	247	AMPS	108	CHARLIE	062
(F)FIVE	229	ANALOG	383	CHECK	189
(F)FORTY	246	AND	184	CIRCUIT	151
(F)FOUR	228	ANSWER	296	CLEAR	355
(F)FOURTEEN	238	APRIL	428	CLOCK	163
(F)GOOD	248	AREA	150	CLOSED	434
(F)IS	220	ASSOCIATION	429	CLOUDS	411
(F)MORNING	249	AT	121	CLUB	391
(F)NINE	233	AUGUST	430	CODE	435
(F)NINETEEN	243	AUTOMATIC	081	COMMUNICATIONS	398
(F)O'CLOCK	224	AUTOPATCH	377	COMPLETE	113
(F)OH	223	AUXILIARY	431	CONNECT	152
(F)ONE	225			CONTROL	119
(F)P.M.	222	B	031	CONTROLLER	399
(F)SEVEN	231	BACHELOR	389	CRANE	201
(F)SEVENTEEN	241	BAD	494	CURRENT	436
(F)SIX	230	BAND	432	CURRENT	356
(F)SIXTEEN	240	BASE	380	CYCLE	086
(F)TEN	234	BATTERY	420		
(F)THE	218	BAY	495	D	033
(F)THIRTEEN	237	BELOW	365	DANGER	072
(F)THIRTY	245	BETWEEN	160	DATE	437
(F)THREE	227	BILLINGS	496	DAY	438
(F)TIME	219	BLOWING	357	DAYS	125
(F)TWELVE	236	BOZEMAN	497	DECEMBER	439
(F)TWENTY	244	BRAVO	060	DECREASING	351
(F)TWO	226	BREAK	198	DEGREES	190
(PAUSE)	252	BROKEN	338	DELTA	059
		BUSY	433	DEVICE	164
A	030	BUTTON	162	DIGITAL	385
A.M.	297	BY	289	DIRECTION	202
ABORT	084			DISPLAY	087
ABOUT	090	C	032	DIVIDED	288
ADJUST	159	CALIBRATE	200	DOOR	126
AFFIRMATIVE	286	CALL	085	DOWN	194
AIR	364	CANCEL	124	DRIZZLE	343
ALARM	384	CANOE	415	DUST	308

Appendix D - CW (Morse Code) Table

```
6444444444444L444444444444L444444444444L4444444444444444447
5  00  -  0   *  13  -  D   *  26  -  Q   *  39  -  AR        5
5  01  -  1   *  14  -  E   *  27  -  R   *  40  -  SPACE     5
5  02  -  2   *  15  -  F   *  28  -  S   *  41  -  PAUSE     5
5  03  -  3   *  16  -  G   *  29  -  T   *                    5
5  04  -  4   *  17  -  H   *  30  -  U   *                    5
5  05  -  5   *  18  -  I   *  31  -  V   *                    5
5  06  -  6   *  19  -  J   *  32  -  W   *                    5
5  07  -  7   *  20  -  K   *  33  -  X   *                    5
5  08  -  8   *  21  -  L   *  34  -  Y   *                    5
5  09  -  9   *  22  -  M   *  35  -  Z   *                    5
5  10  -  A   *  23  -  N   *  36  -  /   *                    5
5  11  -  B   *  24  -  O   *  37  -  .   *                    5
5  12  -  C   *  25  -  P   *  38  -  ?   *                    5
9444444444444N444444444444N444444444444N4444444444444444448
```

Appendix E - Tone Table

The frequency of the RLC-2 tone generator can be determined by applying the following formula or the table.

$$\text{Counts} = \left(\frac{1{,}000{,}000}{\text{Frequency}} \right) - 1$$

Tone Table, (100Hz to 2900Hz in 5Hz Steps)

FREQ	COUNTS	FREQ	COUNTS	FREQ	COUNTS	FREQ	COUNTS
100	9999	295	3388	490	2039	685	1458
105	9522	300	3332	495	2019	690	1448
110	9089	305	3277	500	1999	695	1437
115	8694	310	3224	505	1979	700	1427
120	8332	315	3173	510	1959	705	1417
125	7999	320	3124	515	1940	710	1407
130	7691	325	3075	520	1922	715	1397
135	7406	330	3029	525	1903	720	1387
140	7141	335	2984	530	1885	725	1378
145	6895	340	2940	535	1868	730	1368
150	6665	345	2897	540	1850	735	1359
155	6450	350	2856	545	1833	740	1350
160	6249	355	2815	550	1817	745	1341
165	6059	360	2776	555	1800	750	1332
170	5881	365	2738	560	1784	755	1323
175	5713	370	2701	565	1768	760	1314
180	5554	375	2665	570	1753	765	1306
185	5404	380	2630	575	1738	770	1297
190	5262	385	2596	580	1723	775	1289
195	5127	390	2563	585	1708	780	1281
200	4999	395	2530	590	1693	785	1272
205	4877	400	2499	595	1679	790	1264
210	4760	405	2468	600	1665	795	1256
215	4650	410	2438	605	1651	800	1249
220	4544	415	2408	610	1638	805	1241
225	4443	420	2379	615	1625	810	1233
230	4346	425	2351	620	1611	815	1225
235	4254	430	2324	625	1599	820	1218
240	4165	435	2297	630	1586	825	1211
245	4080	440	2271	635	1573	830	1203
250	3999	445	2246	640	1561	835	1196
255	3920	450	2221	645	1549	840	1189
260	3845	455	2196	650	1537	845	1182
265	3772	460	2172	655	1525	850	1175
270	3702	465	2149	660	1514	855	1168
275	3635	470	2126	665	1502	860	1161
280	3570	475	2104	670	1491	865	1155
285	3507	480	2082	675	1480	870	1148
290	3447	485	2060	680	1469	875	1141

FREQ	COUNTS	FREQ	COUNTS	FREQ	COUNTS	FREQ	COUNTS
880	1135	1135	880	1390	718	1645	606
885	1128	1140	876	1395	715	1650	605
890	1122	1145	872	1400	713	1655	603
895	1116	1150	868	1405	710	1660	601
900	1110	1155	864	1410	708	1665	599
905	1103	1160	861	1415	705	1670	597
910	1097	1165	857	1420	703	1675	596
915	1091	1170	853	1425	700	1680	594
920	1085	1175	850	1430	698	1685	592
925	1080	1180	846	1435	695	1690	590
930	1074	1185	842	1440	693	1695	588
935	1068	1190	839	1445	691	1700	587
940	1062	1195	835	1450	688	1705	585
945	1057	1200	832	1455	686	1710	583
950	1051	1205	828	1460	683	1715	582
955	1046	1210	825	1465	681	1720	580
960	1040	1215	822	1470	679	1725	578
965	1035	1220	818	1475	676	1730	577
970	1029	1225	815	1480	674	1735	575
975	1024	1230	812	1485	672	1740	573
980	1019	1235	808	1490	670	1745	572
985	1014	1240	805	1495	667	1750	570
990	1009	1245	802	1500	665	1755	568
995	1004	1250	799	1505	663	1760	567
1000	999	1255	795	1510	661	1765	565
1005	994	1260	792	1515	659	1770	563
1010	989	1265	789	1520	656	1775	562
1015	984	1270	786	1525	654	1780	560
1020	979	1275	783	1530	652	1785	559
1025	974	1280	780	1535	650	1790	557
1030	969	1285	777	1540	648	1795	556
1035	965	1290	774	1545	646	1800	554
1040	960	1295	771	1550	644	1805	553
1045	955	1300	768	1555	642	1810	551
1050	951	1305	765	1560	640	1815	549
1055	946	1310	762	1565	637	1820	548
1060	942	1315	759	1570	635	1825	546
1065	937	1320	756	1575	633	1830	545
1070	933	1325	753	1580	631	1835	543
1075	929	1330	750	1585	629	1840	542
1080	924	1335	748	1590	627	1845	541
1085	920	1340	745	1595	625	1850	539
1090	916	1345	742	1600	624	1855	538
1095	912	1350	739	1605	622	1860	536
1100	908	1355	737	1610	620	1865	535
1105	903	1360	734	1615	618	1870	533
1110	899	1365	731	1620	616	1875	532
1115	895	1370	728	1625	614	1880	530
1120	891	1375	726	1630	612	1885	529
1125	887	1380	723	1635	610	1890	528
1130	883	1385	721	1640	608	1895	526

FREQ	COUNTS	FREQ	COUNTS	FREQ	COUNTS	FREQ	COUNTS
1900	525	2155	463	2410	413	2665	374
1905	523	2160	461	2415	413	2670	373
1910	522	2165	460	2420	412	2675	372
1915	521	2170	459	2425	411	2680	372
1920	519	2175	458	2430	410	2685	371
1925	518	2180	457	2435	409	2690	370
1930	517	2185	456	2440	408	2695	370
1935	515	2190	455	2445	407	2700	369
1940	514	2195	454	2450	407	2705	368
1945	513	2200	453	2455	406	2710	368
1950	511	2205	452	2460	405	2715	367
1955	510	2210	451	2465	404	2720	366
1960	509	2215	450	2470	403	2725	365
1965	507	2220	449	2475	403	2730	365
1970	506	2225	448	2480	402	2735	364
1975	505	2230	447	2485	401	2740	363
1980	504	2235	446	2490	400	2745	363
1985	502	2240	445	2495	399	2750	362
1990	501	2245	444	2500	399	2755	361
1995	500	2250	443	2505	398	2760	361
2000	499	2255	442	2510	397	2765	360
2005	497	2260	441	2515	396	2770	360
2010	496	2265	440	2520	395	2775	359
2015	495	2270	439	2525	395	2780	358
2020	494	2275	438	2530	394	2785	358
2025	492	2280	437	2535	393	2790	357
2030	491	2285	436	2540	392	2795	356
2035	490	2290	435	2545	391	2800	356
2040	489	2295	434	2550	391	2805	355
2045	487	2300	433	2555	390	2810	354
2050	486	2305	432	2560	389	2815	354
2055	485	2310	431	2565	388	2820	353
2060	484	2315	430	2570	388	2825	352
2065	483	2320	430	2575	387	2830	352
2070	482	2325	429	2580	386	2835	351
2075	480	2330	428	2585	385	2840	351
2080	479	2335	427	2590	385	2845	350
2085	478	2340	426	2595	384	2850	349
2090	477	2345	425	2600	383	2855	349
2095	476	2350	424	2605	382	2860	348
2100	475	2355	423	2610	382	2865	348
2105	474	2360	422	2615	381	2870	347
2110	472	2365	421	2620	380	2875	346
2115	471	2370	420	2625	379	2880	346
2120	470	2375	420	2630	379	2885	345
2125	469	2380	419	2635	378	2890	345
2130	468	2385	418	2640	377	2895	344
2135	467	2390	417	2645	377	2900	343
2140	466	2395	416	2650	376		
2145	465	2400	415	2655	375	END OF TABLE	
2150	464	2405	414	2660	374		

Appendix F - Two Tone Pager Table

Two-Tone Timing Sequences:

Sequence	1st Tone	Gap	2nd Tone	Pager Groups
1	1.0	0	3.0	GE/MOTO TN&VC
2	0.4	0	0.8	MOTO Tone Only
3	1.0	0	3.0	NEC - B
4	1.0	0.25	3.0	NEC - A
5	1.0	0	1.0	NEC - C
6	0.4	0	0.8	NEC - M
7	0.5	0	0.5	NEC - L
8	0.4	0	0.4	NEC - D

Two-Tone Tone Groups

GROUP	TN #	MOTO1	MOTO2	MOTO3	MOTO4	MOTO5	MOTO6	MOTOA
COLUMB		C-01	C-02	C-03	C-04	C-05	C-06	C-07
ROW								
R-00	0	330.5	569.1	1092.4	321.7	553.9	1122.5	358.9
R-01	1	349.0	600.9	288.5	339.6	584.8	1153.4	398.1
R-02	2	368.5	634.5	296.5	358.6	617.4	1185.2	441.6
R-03	3	389.0	669.9	304.7	378.6	651.9	1217.8	489.8
R-04	4	410.8	707.3	313.0	399.8	688.3	1251.4	543.3
R-05	5	433.7	746.8	953.7	422.1	726.8	1285.8	602.6
R-06	6	457.9	788.5	979.9	445.7	767.4	1321.1	668.3
R-07	7	483.5	832.5	1006.9	470.5	810.2	1357.6	741.3
R-08	8	510.5	879.0	1034.7	496.8	855.5	1395.0	822.2
R-09	9	539.0	928.1	1063.2	524.6	903.2	1433.4	912.0
R-10	A	569.1	979.9	569.1	569.1	979.9	979.9	979.9

GROUP	TN #	MOTOB	MOTOZ	GE A'	GE B'	GE C'	MOTO 10	MOTO 11
COLUMB		C-08	C-09	C-10	C-11	C-12	C-13	C-14
ROW								
R-00	0	371.5	346.0	682.5	652.5	667.5	1472.9	1930.2
R-01	1	412.1	384.6	592.5	607.5	712.5	1513.5	1989.0
R-02	2	457.1	426.6	757.5	787.5	772.5	1555.2	2043.8
R-03	3	507.0	473.2	802.5	832.5	817.5	1598.0	2094.5
R-04	4	562.3	524.8	847.5	877.5	862.5	1642.0	2155.6
R-05	5	623.7	582.1	892.5	922.5	907.5	1687.2	2212.2
R-06	6	691.8	645.7	937.5	967.5	952.5	1733.7	2271.7
R-07	7	767.4	716.1	547.5	517.5	532.5	1781.5	2334.6
R-08	8	851.1	794.3	727.5	562.5	577.5	1830.5	2401.0
R-09	9	944.1	881.0	637.5	697.5	622.5	1881.0	2468.2
R-10	A	979.9	979.9	742.5	742.5	742.5	-----	-----

Bill of Materials

Item	Quantity	Reference	Part
1	25	C9,C10,C11,C12,C13,C14, C15,C16,C17,C18,C19,C20, C21,C22,C23,C24,C42,C43, C49,C87,C88,C89,C90,C91, C92	470pF
2	3	C25,C28,C30	4.7uF
3	5	C26,C27,C29,C93,C98	100pF
4	36	C31,C32,C33,C34,C35,C36, C37,C38,C39,C40,C41,C60, C61,C62,C63,C64,C65,C66, C67,C68,C69,C70,C71,C72, C73,C74,C75,C76,C77,C78, C81,C82,C94,C95,C100, C101	0.1uF
5	2	C44,C45	33pF
6	3	C46,C52,C53	10uF
7	2	C47,C48	22pF
8	1	C50	220uF
9	4	C51,C54,C55,C59	1uF
10	8	C56,C57,C58,C83,C84,C85, C86,C99	0.01uF
11	2	C79,C80	100uF
12	1	C96	2000pF
13	1	C97	68pF
14	6	D1,D2,D3,D4,D5,D24	LED
15	11	D6,D7,D8,D9,D26,D27,D28, D29,D30,D31,D32	1N750A
16	3	D18,D19,D20	1N4148
17	3	D21,D22,D23	1N5256B
18	1	D25	1N4001
19	1	F1	500mA Fuse
20	1	JP1	10 PIN Female Test Bus

Bill of Materials

Item	Quantity	Reference	Part
21	4	J1,J2,J3,J4	2 PIN HEAD/MALE
22	3	J5,J6,J7	4 PIN HEAD/MALE
23	1	J8	14 PIN HEAD
24	1	J9	2.50mm
25	1	J10	26 PIN H/F
26	1	J11	26 PIN H/M
27	5	P1,P2,P3,P4,P5	DB9/FEMALE
28	1	P6	DB9/MALE
29	3	Q9,Q10,Q11	2N7000
30	1	RG1	LM7805CT
31	2	R1,R63	16 PIN DIP/1K
32	4	R4,R5,R7,R9	40.2K
33	3	R10,R12,R14	510
34	6	R11,R25,R40,R42,R43,R74	1K
35	1	R13	270
36	9	R19,R20,R21,R23,R59,R60, R61,R62,R66	100K
37	3	R22,R24,R41	200K
38	8	R26,R27,R28,R29,R30,R31, R32,R33	5K
39	8	R34,R35,R36,R69,R73,R75, R76,R501	10K
40	4	R37,R38,R39,R48	680
41	1	R47	10M
42	1	R49	10 PIN SIP/47K
43	1	R50	1M
44	1	R51	10 PIN SIP/1K

Bill of Materials

Item	Quantity	Reference	Part
45	3	R52,R53,R55	237
46	1	R54	1.69K
47	1	R58	300K
48	1	R63	16 PIN SIP/1K
49	1	R65	33K
50	2	R67,R68	24.9K
51	8	R70,R71,R72,R100,R200, R300,R400,R500	47K
52	1	S1	DIPSW 8
53	2	S2,S3	SWITCH
54	4	U1,U2,U3,U4	LMC660
55	8	U5,U8,U11,U29,U30,U37, U40,U45	74HC574
56	10	U6,U7,U9,U10,U12,U13,U38, U39,U41,U42	74HC4066
57	2	U17,U14	74HC138
58	1	U15	TSP53C30
59	1	U16	6840
60	1	U18	74HC32
61	1	U19	74HC00
62	1	U20	DS1275
63	1	U21	DS1232
64	1	U22	74HC573
65	1	U23	27C512
66	1	U24	74HC04
67	1	U25	DS1225Y
68	1	U26	74C154

Bill of Materials

Item	Quantity	Reference	Part
69	1	U27	68HC11E1FN
70	1	U28	CS82C55-5
71	1	U31	27512
72	1	U32	DS1286
73	1	U33	LMC7660
74	1	U34	DS1267
75	2	U35,U36	LM317
76	1	U43	M-8870
77	1	U44	74HC4051
78	1	U46	UD2596A
79	1	Y1	8Mhz
80	1	Y2	3.14 Mhz
81	1	Y3	3.579545 Mhz
82	1	Manual	Users Manual
83	1	PC Board	4 Layer PC Board
84	1	Parts Bag	5 Female DB-9, 1 Male DB-9, 1 2.5 mm Power

Appendix H - Command Name Change Chart

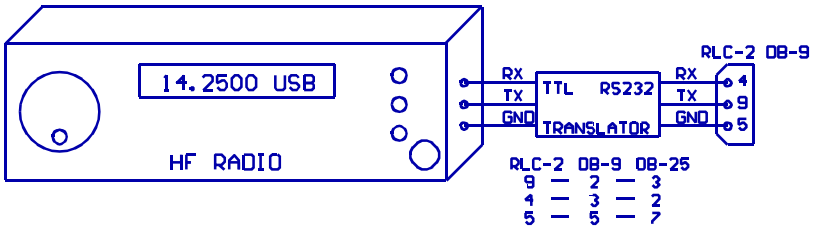
Appendix I - Macro Recording Sheets

Glossary

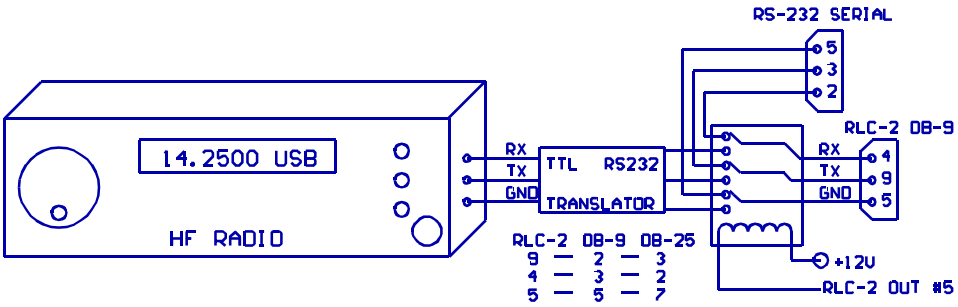
Schematic Diagrams

Connection to the RLC-2 for a Serial radio

The RLC-2 supports frequency programming of a remote HF radio (Icom or Kenwood). The interfacing to these radios is accomplished using the RLC-2 serial port. It is important to connect both the RX and TX lines to your radios RS-232 port. **Do Not Connect** the RLC-2 RS-232 port directly to your TTL input of your radio or damage to the RLC-2 and your radio serial interface will occur. If you are using the RS-232 port and alos want to use the serial port, an external switching device is needed (See Below). The serial radio interface was tested on an Icom IC-725 and a Kenwood TS-450.



Serial Port Interfacing, Only device on the RS-232 Port



Serial Port Interfacing, Sharing the RS-232 Port

Board Layout