

# **CAT-800 Repeater Controller**

## ***Computer Automation Technology, Inc***

---

7378 W. Atlantic Blvd. #239  
Margate, Florida 33063  
Phone: (954) 978-6171  
Internet: <http://www.catauto.com>

## Table of Contents

<a href="#">Chapter 1</a>	Introduction and Specifications	
	<a href="#">Introduction</a>	1-1
	<a href="#">Specifications</a>	1-2
<a href="#">Chapter 2</a>	System Configurations	
	<a href="#">Repeater – Transceiver - Transceiver Diagram</a>	2-1
	<a href="#">Repeater – Transceiver - RLS-1000 Diagram</a>	2-2
	<a href="#">Repeater – Transceiver - CL-100 Catlink Diagram</a>	2-3
	<a href="#">Repeater – Transceiver - WX-250 Weather Receiver Diagram</a>	2-4
	<a href="#">Dipswitch Settings</a>	2-5
<a href="#">Chapter 3</a>	Repeater Control by DTMF Commands	
	<a href="#">Interrogation of Repeater Control Status</a>	3-1
	<a href="#">Changing Repeater Control Status</a>	3-1
	<a href="#">Zone Control Tables 1 through 4</a>	3-2
	<a href="#">Zone Control Tables 5 through 8</a>	3-3
	<a href="#">Read Firmware Version</a>	3-4
	<a href="#">Perform Remote Control Reset</a>	3-4
	<a href="#">Zone 1 DTMF Control Definitions</a>	3-5
	<a href="#">Zone 2 DTMF Control Definitions</a>	3-6
	<a href="#">Zone 3 DTMF Control Definitions</a>	3-7
	<a href="#">Zone 4 DTMF Control Definitions</a>	3-8
	<a href="#">Zone 5 DTMF Control Definitions</a>	3-9
	<a href="#">Zone 6 DTMF Control Definitions</a>	3-10
	<a href="#">Zone 7 DTMF Control Definitions</a>	3-11
	<a href="#">Zone 8 DTMF Control Definitions</a>	3-12
<a href="#">Chapter 4</a>	Repeater Operation Features	
	<a href="#">Time-of-Day Message</a>	4-1
	<a href="#">DTMF Keypad Test</a>	4-1
	<a href="#">DTMF Access</a>	4-1
	<a href="#">Two-Tone Paging</a>	4-1
	<a href="#">Forced DTMF Entry</a>	4-1
	<a href="#">DTMF Muting Override</a>	4-1
	<a href="#">Repeater ID</a>	4-1
	<a href="#">User Macro</a>	4-1
	<a href="#">Logic Inputs</a>	4-1
	<a href="#">User Output Switches</a>	4-2
	<a href="#">Load Courtesy Tones</a>	4-2
	<a href="#">Port Linking User Macro Command Table</a>	4-2
	<a href="#">Event Macro</a>	4-2
	<a href="#">Voice Synthesizer Message Selection</a>	4-2
	<a href="#">Digital Audio WAV Player Track Selection</a>	4-2

<a href="#">Chapter 5</a>	Repeater Programming by DTMF Commands	
	<a href="#">Initialization</a>	5-1
	<a href="#">Programming the Master Unlock Number</a>	5-1
	<a href="#">Locking the Controller</a>	5-1
	<a href="#">Internal Command Assignment Table</a>	5-2
	<a href="#">Program Scheduler Event Macros</a>	5-4
	<a href="#">Day of Week Scheduler Programming Table</a>	5-5
	<a href="#">Program User Macros</a>	5-6
	<a href="#">User Macro Default Table</a>	5-7
	<a href="#">Program Event Macros</a>	5-8
	<a href="#">Event Macro Default Table</a>	5-9
	<a href="#">Set Clock Time</a>	5-10
	<a href="#">Program DTMF Muting Override Command</a>	5-11
	<a href="#">Program Forced Entry Command</a>	5-11
	<a href="#">Program Voice Messages</a>	5-11
	<a href="#">Voice Message Table</a>	5-11
	<a href="#">Program CW Identification</a>	5-12
	<a href="#">CW ID Message Table</a>	5-12
	<a href="#">CTCSS Logic Table</a>	5-12
	<a href="#">Program User Function Output Switch Assignment</a>	5-13
	<a href="#">User Function Output Switch Table</a>	5-13
	<a href="#">Program Control Codes and Prefix Numbers</a>	5-14
	<a href="#">Program Timers</a>	5-15
	<a href="#">Program Courtesy Tones</a>	5-17
	<a href="#">Courtesy Tone Programming Table</a>	5-18
	<a href="#">Program Paging Tone</a>	5-19
	<a href="#">Paging Tone Programming Table</a>	5-19
	<a href="#">Audio Test Tone</a>	5-19
	<a href="#">Exit Programming Mode</a>	5-19
	<a href="#">DTMF Programming Command Table</a>	5-20
<a href="#">Chapter 6</a>	Interfacing to Other Equipment	
	<a href="#">Connection to Repeater Transmitter</a>	6-1
	<a href="#">Connecting to Repeater Receiver</a>	6-1
	<a href="#">Connecting to CTCSS Decoder</a>	6-1
	<a href="#">Checking PTT and COR Activity</a>	6-1
	<a href="#">Checking DTMF Decoder Activity</a>	6-1
	<a href="#">Receiver De-emphasis</a>	6-2
	<a href="#">Transmit Audio Adjustment</a>	6-2
	<a href="#">Voice Synthesizer Adjustment</a>	6-2
	<a href="#">Interface Review Table</a>	6-2
	<a href="#">LED Display Indicators</a>	6-2
	<a href="#">Power Supply</a>	6-2
	<a href="#">Connector Kit</a>	6-2

	<a href="#">Printed Circuit Board Layout</a>	6-3
	<a href="#">Test Point Table</a>	6-3
	<a href="#">Header Connector Definitions</a>	6-4
	<a href="#">Connector Assignment Table</a>	6-5
	<a href="#">TS-64 CTCSS Wiring Diagram</a>	6-6
<a href="#">Chapter 7</a>	Internet Setup	
	<a href="#">Internet Setup Using Ethernet Port</a>	7-1
	<a href="#">Internet Setup Using USB Port With Windows® Editor</a>	7-1
<a href="#">Chapter 8.</a>	Windows Editor Programming Instructions	
	<a href="#">CAT-800 Setup</a>	8-1
	<a href="#">Define CTCSS Logic Inputs</a>	8-2
	<a href="#">Define User Outputs</a>	8-3
	<a href="#">Internet Setup</a>	8-3
	<a href="#">Change Control Zone Settings</a>	8-4
	<a href="#">Change Control Codes</a>	8-5
	<a href="#">Change Timers Settings</a>	8-5
	<a href="#">Program CW Message</a>	8-6
	<a href="#">Program Courtesy Tones</a>	8-6
	<a href="#">Program Voice messages</a>	8-7
	<a href="#">Program Event Macros</a>	8-7
	<a href="#">Program User Macros</a>	8-8
	<a href="#">Program Paging Tones</a>	8-8
	<a href="#">Program Scheduler</a>	8-9
	<a href="#">USB Transfer of Configuration File</a>	8-9
	<a href="#">Configuration File Internet Transfer / Clock Set</a>	8-10
	<a href="#">Help Internal Command and Voice Message Tables</a>	8-10
<a href="#">Chapter 9.</a>	Internet Control and Programming	
	<a href="#">Login Web Page</a>	9-1
	<a href="#">Start Page</a>	9-2
	<a href="#">Control Zone-1 and Zone-2 Page</a>	9-3
	<a href="#">Control Zone-3 and Zone-4 Page</a>	9-5
	<a href="#">Control Zone-5 and Zone-6 Page</a>	9-7
	<a href="#">Control Zone-7 and Zone-8 Page</a>	9-9
	<a href="#">System Code Page</a>	9-11
	<a href="#">System Long Timer Page</a>	9-13
	<a href="#">System Short Timer Page</a>	9-15
	<a href="#">Internet Settings Page</a>	9-16
<a href="#">Chapter 10.</a>	Vocabulary Word List	
	<a href="#">Vocabulary Word List Table</a>	10-1
<a href="#">Chapter 11.</a>	<a href="#">Drawings</a>	
	<a href="#">CAT-800 PC Board Artwork</a>	11-1
	<a href="#">DR-800 PC Board Artwork</a>	11-2
<a href="#">Chapter 12.</a>	Schematics	

	Schematics (Five Sheets)	12-1
	<a href="#">CAT-800 Schematic Sheet 1 of 4</a>	12-2
	<a href="#">CAT-800 Schematic Sheet 2 of 4</a>	12-3
	<a href="#">CAT-800 Schematic Sheet 3 of 4</a>	12-4
	<a href="#">CAT-800 Schematic Sheet 4 of 4</a>	12-5
	<a href="#">DR-800 Schematic Sheet 1 of 1</a>	12-6
<a href="#">Chapter 13.</a>	Parts List	
	Part List Table	13-1
<a href="#">Chapter 14.</a>	USB Firmware Update Procedure	
	Firmware Update Instructions	14-1
<a href="#">Chapter 15.</a>	Controller Projects	
	<a href="#">Emergency Power Announcement</a>	15-1
	<a href="#">Emergency Net Announcement</a>	15-1
	<a href="#">Unique Repeater Off/On Command</a>	15-1
	<a href="#">Change Grandfather Clock Message</a>	15-2
	<a href="#">Change Port #1 CTCSS Logic to Active Low</a>	15-2
	<a href="#">Add a Fan to Cool the Repeater</a>	15-2
	<a href="#">Place Controller in DTMF Access Mode from midnight until 6AM</a>	15-2
	<a href="#">Program Club meeting announcement on the 2<sup>nd</sup>. Tuesday of the month</a>	15-3
<a href="#">Chapter 16.</a>	Digital Voice Player	
	<a href="#">Digital Voice Player Installation</a>	16-1
	<a href="#">Digital Voice Player Adjustment</a>	16-1
	<a href="#">WAV File Preparation</a>	16-1
	<a href="#">WAV File Name Requirement</a>	16-1
	<a href="#">WAV as Repeater ID</a>	16-1
	<a href="#">Digital Audio Player Control</a>	16-2
	<a href="#">Digital Audio Player Demo</a>	16-2
	<a href="#">Program User Macro to Play Digital Voice Audio Track</a>	16-2
	<a href="#">Digital Audio WAV Track Internal Command Table</a>	16-2
	<a href="#">Program Event Macro to Play Digital Voice Audio Track</a>	16-3
	<a href="#">Program Courtesy Tone with Aircraft Cabin Chime Track</a>	16-3
	<a href="#">Program Grandfather Clock Message with Westminster Chime Track</a>	16-3
	<a href="#">Reprogram Voice Message #8</a>	16-3
	<a href="#">WAV File Generation</a>	16-4

Revised 4/30/2019 V3.00

## **I Don't Have Time To Read This Manual**

If you are anxious to get the CAT-800 in operating and don't have time to read this manual, the following short version will appeal to you. This is a list of the minimum steps required to install the CAT-800 and verify its operation. Now fire-up your soldering iron and let's get started.

### **Connecting the CAT-800 to the Repeater's Transmitter**

Open the connector kit and remove the 2.5mm power plug and the 25 pin "D" connector. Solder a +12 volt wire to the center connector and a ground wire to the outer connector of the power plug. Connect the wires to a +12VDC power supply. Solder five wires to the 25 pin "D" male connector. Connect wires to pins 6, 10, 11, 13 and 17. Connect the pin 10 wire to the transmitter's PTT, the pin 11 wire to the transmitter's modulation input and pin 17 to the repeater's chassis ground.

### **Transmitter Test**

Turn on the +12VDC power supply. The repeater should transmit and you should hear the CAT-800's "power up" message. The voice synthesizer will say: "CAT800 VERSION 1.04." Adjust the TX1 control for proper transmitter deviation. Turn the +12VDC power supply OFF.

### **Connecting CAT-800 to the Repeater's Receiver**

Connect the pin 6 wire to the receiver's COR or COS output. Connect the pin 13 wire to the receiver's receive audio output.

### **Receiver Test COR1**

Monitor the COR#1 test point with a DC voltmeter. Open and close the repeater's squelch control while observing the voltage on the test point. If the voltage goes from low to high COR#1 input is considered active high dipswitch #1 should be off. If the voltage goes from high to low COR#1 input is considered active low dipswitch #1 should be on. If the COR#1 test point remains low with the squelch control opened and closed the receiver's COR output may be an open collector circuit and require a pull-up resistor. The CAT-800 has onboard pull-up resistors on each of the COR input lines. To the left of the cluster of test points are three jumper plugs. Verify a jumper plug is installed on the COR-1 position. This adds a pull-up resistor to the COR#1 input. Turn the +12VDC power supply on. Check for a voltage at the COR #1 test point that is greater than 3VDC. Open the receiver's squelch and verify the voltage drops to 0VDC. Make sure dipswitch #1 is in the on position and the green front panel PORT-1 led turns on when the squelch is opened or when a signal is being received.

### **Receiver Test RX1**

Connect an AC voltmeter to the RX1 test point. Using a typical transceiver, key-up and send a DTMF tone. Adjust RX1 control for 200mV as indicated on the AC voltmeter. If this causes the repeater's transmitter to over deviate, readjust TX1 as required.

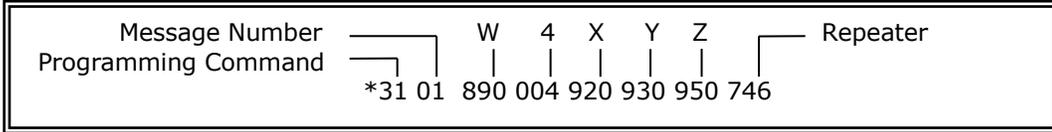
NOTE: Make sure that RF from the transceiver does not get into the voltmeter leads causing a false indication.

### **Voice Synthesizer Test**

Compare receive and synthesized voice audios and adjust the VOICE Level as desired. For best quality speech, the synthesized voice should not exceed 3KHz deviation. The synthesize voice should be lower than the receive audio.

**Program Voice Identification**

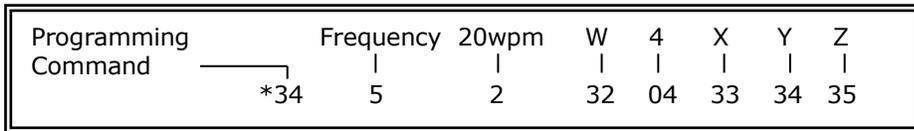
Key-up and enter the seven digit unlock number [1234567]. The voice will say: "CAT-800 CONTROL." Key-up and send [\*3101], followed by the three digit numbers that represents your call letters form the Voice Message Vocabulary Word List table. Example: Load Repeater voice ID with "W4XYZ Repeater." To hear the repeater's voice ID, key-up and send [\*3001].



VOICE MESSAGE VOCABULARY WORD LIST							
0=000	5=005	A=210	F=370	K=530	P=680	U=870	Z=950
1=001	6=006	B=250	G=410	L=550	Q=720	V=880	REPEATER=746
2=002	7=007	C=270	H=440	M=580	R=730	W=890	
3=003	8=008	D=310	I=470	N=620	S=770	X=920	
4=004	9=009	E=340	J=500	O=650	T=820	Y=930	

**Program CW Identification**

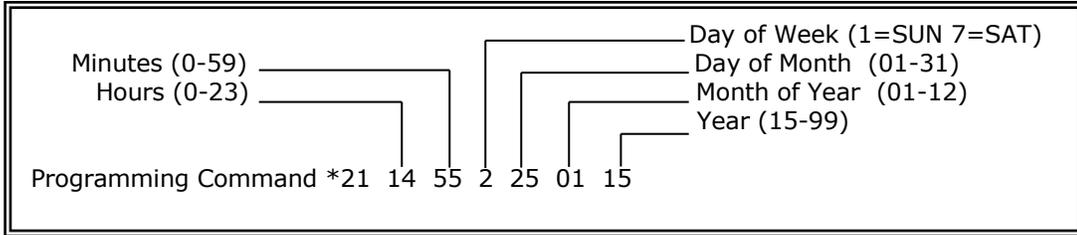
Key-up and send [\*34], followed by the two digit numbers that represents your call letters. Refer to the CW ID Programming Table. Example: Load the CW ID buffer with W4XYZ/R. To hear the repeater's CW ID, key-up and send [\*33].



CW ID PROGRAMMING TABLE
00=004=408=812=C16=G20=K 24=O28=S32=W36=/
01=105=509=913=D17=H21=L 25-P 29=T 33=X
02=206=610=A14=E 18=I 22=M26=Q30=U34=Y
03=307=711=B15=F 19=J 23=N27=R31=V35=Z

### Setting the Clock

To read the time, key-up and send [\*20]. Un-key, the voice will read the time, day of week, month, day of month and year. To set the clock, key-up and send [\*21] followed by the hours, minutes, day of week, day of month, month and year. Un-key and the voice will say "CONTROL OK." Example: 2:55 PM Monday January 25<sup>th</sup> 2015. All entries must be double digit, except the day of week.



### Exit Programming Mode

Key-up and send [\*0]. Un-key, the controller will lock-up and the voice will say: "MANUAL EXIT." The CAT-800 will lock-up automatically when the programming timer expires. The voice will say: "TIMER EXIT."

### Program Unique Unlock Number

Program a new seven digit UNLOCK number. Set dipswitch #8 to ON and the voice will say: "ENTER CONTROL." Key-up and enter a new seven-digit number. Un-key, if the number is accepted, the voice will say: "CONTROL OK." If rejected, the voice will say: "ENTER CONTROL." Key-up and enter the seven-digit number again. After the new unlock number is accepted set dipswitch #8 to the OFF position.

### Enable DTMF Muting

DTMF muting is a feature that prevents your DTMF tones from being transmitted. To enable this feature, key-up and enter [100171]. The voice will say: "ONE SEVEN ON" and your DTMF tones will be muted on the repeater's transmitter output.

### Test DTMF Tone Decoding

To verify that all of the DTMF tones are being decoded, key-up and enter [4751234567890\*#ABC]. Check that the voice synthesizer reads back [1234567890\*#ABC].

### Test Time of Day

To verify the correct time, key-up and enter [400]. Check that the voice synthesizer announces the time.

### Test Voice Identification

To verify the voice identification, key-up and enter [70001]. Check that the voice synthesizer announces the repeater's identification.

## **Chapter 1 - Introduction and Specifications**

Congratulations on your purchase of the CAT-800 Repeater Controller. The CAT-800 is a three-port controller and will support a repeater on Port #1 and transceivers on Port #2 and #3. The CAT-800 is designed to be a drop-in for the very popular CAT-250 controller adding a third port and Internet conductivity.

Programming the CAT-800 is a snap, with its carefully structured uniform programming commands. The manual is easy to follow and the voice synthesizer interacts with you during control and programming operation. An optional Windows® editor is available to program the CAT-800 controller through its USB port.

### **Voice Synthesizer**

A vocabulary base of 470 words with twenty voice messages is available to ID your repeater system and make voice announcements. Each voice message will accept up to fifteen numbers, letters or words from the vocabulary list in Chapter 10. In addition to the repeater port, voice messages can be directed to Port #2 and Port #3.

### **DTMF Control**

Three DTMF decoders one dedicated to each port afford complete control over the CAT-800 controller.

### **CW ID**

The CW buffer is user programmable in both tone frequency and speed. If both the voice and CW IDs are enabled, the controller will ID in voice. If a repeater user transmits during the voice ID the controller will switch to the CW ID and allow the user's audio to pass.

### **Courtesy Tone**

Create up to eight custom courtesy tones. Each tone can consist of up to three different tone frequencies of various lengths and separations. Courtesy tones can be changed on the fly loading a different courtesy tone number in event macros 20. Courtesy tone event macros 21 and 22 are assigned to the Port #2 and Port #3 receivers.

### **Port Configuration**

The CAT-800 is a three-port controller. Port #1 is configured as a repeater port while Port #2 and Port #3 are transceiver ports. They can be set-up as a half-duplex or full-duplex port by setting dipswitches #4 and #5.

### **User Function Output Switches**

Five open drain switches are available to control equipment at your repeater site. These switches are located on the J1 connector and are controlled manually by DTMF commands from within a user or event macro. They can be made to turn OFF, ON or momentarily change state for a period of 250 or 500mS. Switches #1 and #2 are also available on the Port #2 connector J2 while Switches #3 and #4 are available on Port #3 connector J3. At default the switches are assigned as standard user function switches. These switches can be redefined to control a fan or CTCSS encoder. When Fan Control is selected the switch will follow PTT #1 and remain on for 60 seconds after PTT #1 turns off. When CTCSS Encoder (PTT) is selected the switch will follow PTT #1 but turn off 250mSEC before PTT #1 turns off. When CTCSS Encoder (COR) is selected the switch will follow COR #1.

### **User Function Logic Inputs**

Five logic inputs activated by a voltage change from other equipment at the repeater site, causes the CAT-800 to execute event macros 07 through 16. Two event macros are assigned to each logic input. Different macros are called when the input goes high and then low. To facilitate initial testing, at default the five logic inputs are assigned to turn on and off the five user output switches.

### DTMF Keypad Test

A DTMF keypad test will read back the numbers decoded in a synthesized voice. This feature is available on all three ports.

### User Macros

The CAT-800 supports thirty User Macros each containing sixteen internal commands. A user macro is a series of internal commands, defined by the repeater owner. These macros permit the owner to customize certain aspects of repeater operation. Once the CAT-800 decodes the macro number, the internal commands will execute in the order they were stored within the macro string.

### Event Macros

An event macro is a series of internal commands, defined by the repeater owner. Event Macros are positioned throughout the program to execute during certain prescribed operations. The CAT-800 supports sixty event macros with each containing sixteen internal commands.

### Specifications

Microprocessor	ARM Cortex M4F processor core, 150 DMIPS performance
Memory	1024KB Flash, 256K SRAM
Voice Synthesizer	Texas Instruments MSP53C391NI2D
Voice Vocabulary	470 Words
Digital Audio WAV Player (Optional)	30 Tracks
DTMF Receivers	(3) MT88L70AS Decoders
Operating Temperature	15 to +55 degrees C
Call Letter ID	Buffer Size VOICE (15) - CW (16)
User Macros	(30) Buffer Size (16) Internal Commands
Event Macros	(60) Buffer Size (10) Internal Commands
Scheduler	(20) Positions
Logic Inputs	(5) 10K ohm input impedance
	Low (0 to 0.7VDC) High (3 to 15VDC)
User Function Outputs	(5) Open Drain Relay Driver (28VDC at 100mA)
Audio Input	Receiver 0.2 - 2VAC adjustable 10K ohms
Audio Output	Transmitter 2VAC adjustable 600 ohms
Power	+9 to +15VDC at 80mA
Size	5" X 7"
Warranty	Limited one-year, parts and labor.

### FCC Part 15 RF Interference

When installed in the RME-200L rack mount enclosure, the CAT-800 has been tested and found to meet the standards for a Class A digital device, as specified in Part 15 of the FCC Rules. These specifications are designed to provide reasonable protection against such interference in a commercial installation. However, there is no guarantee that interference will not occur in a particular installation.

## Chapter 2 - System Configuration

### Repeater-Transceiver-Transceiver

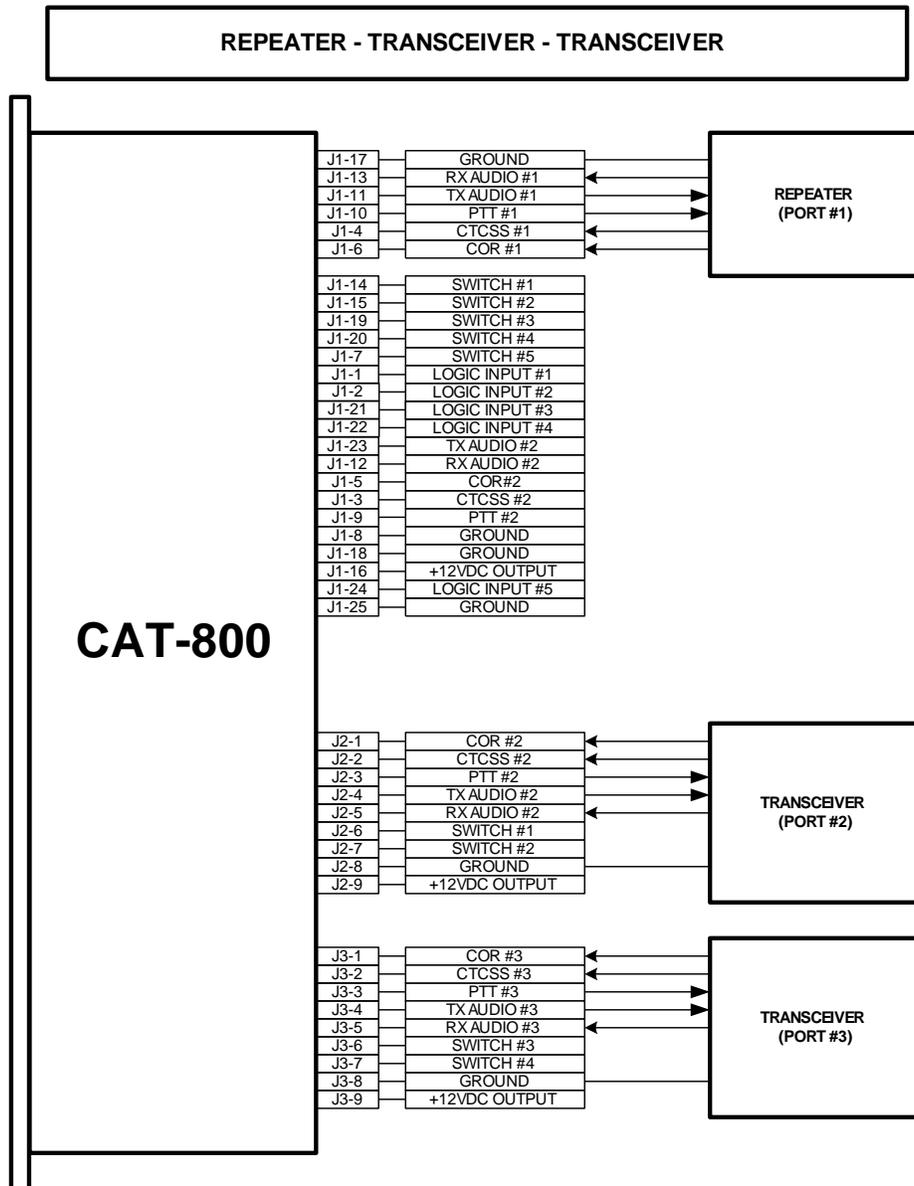


Figure 2-1

In this configuration the CAT-800 supports a repeater on Port #1 and a transceiver on Port #2 and Port #3.

## Repeater-Transceiver-Remote Link Switch

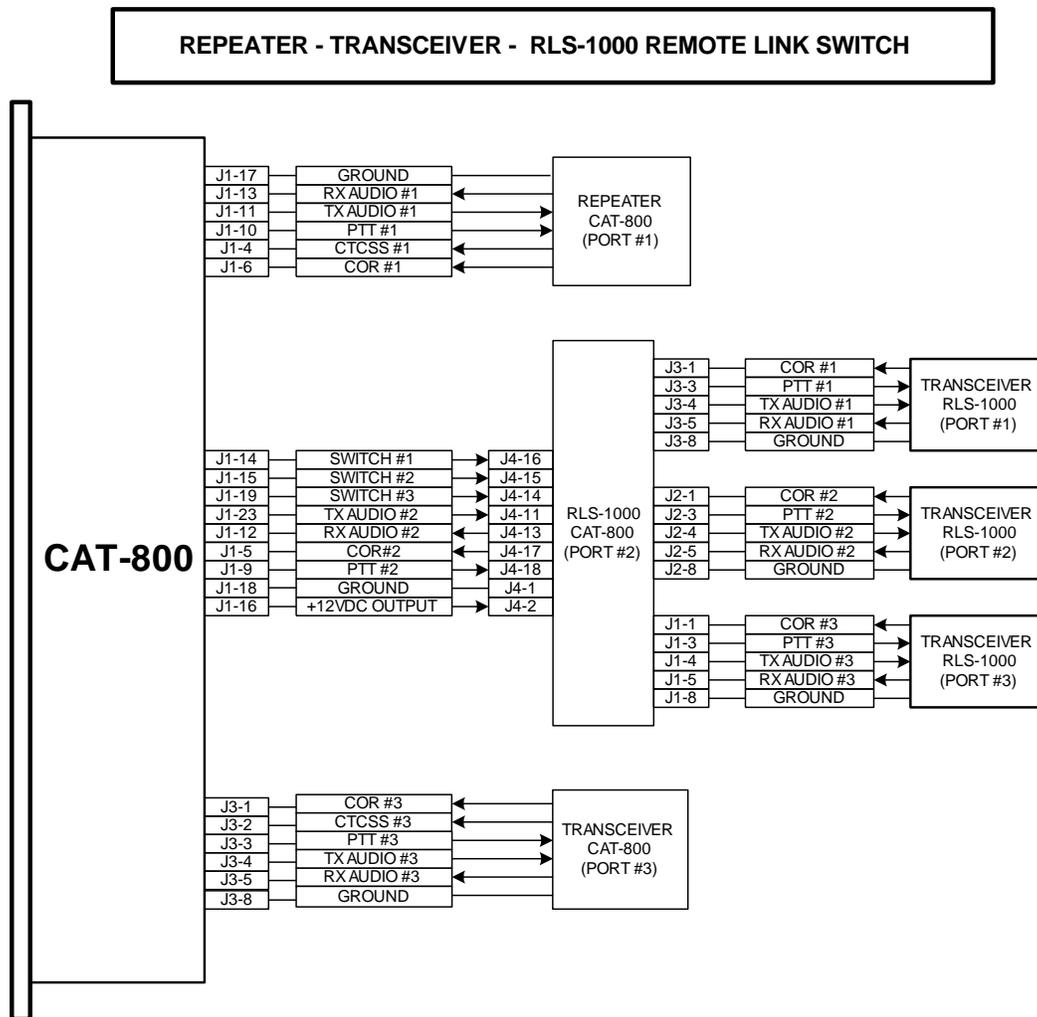


Figure 2-2

In this configuration the CAT-800 supports a repeater on Port #1, an RLS-1000 Remote Link switch on Port #2 and a transceiver on Port #3. The RLS-1000B provides a method to connect three transceivers to Port #2 of the CAT-800 repeater controller. The COR output of the RLS-1000 is active high so dipswitch #2 should be off. Since the receiver audio and COR inputs are mixed, all three transceivers can be selected at the same time. Transceiver selection is accomplished by grounding three of the RLS-1000 control lines. To select transceiver #1 turn on switch #1 [Zone 6-1]. To select transceiver #2 turn on switch #2 [Zone 6-2]. To select transceiver #3, turn on switch #3 [Zone 6-3].

## Repeater-Transceiver-Catlink

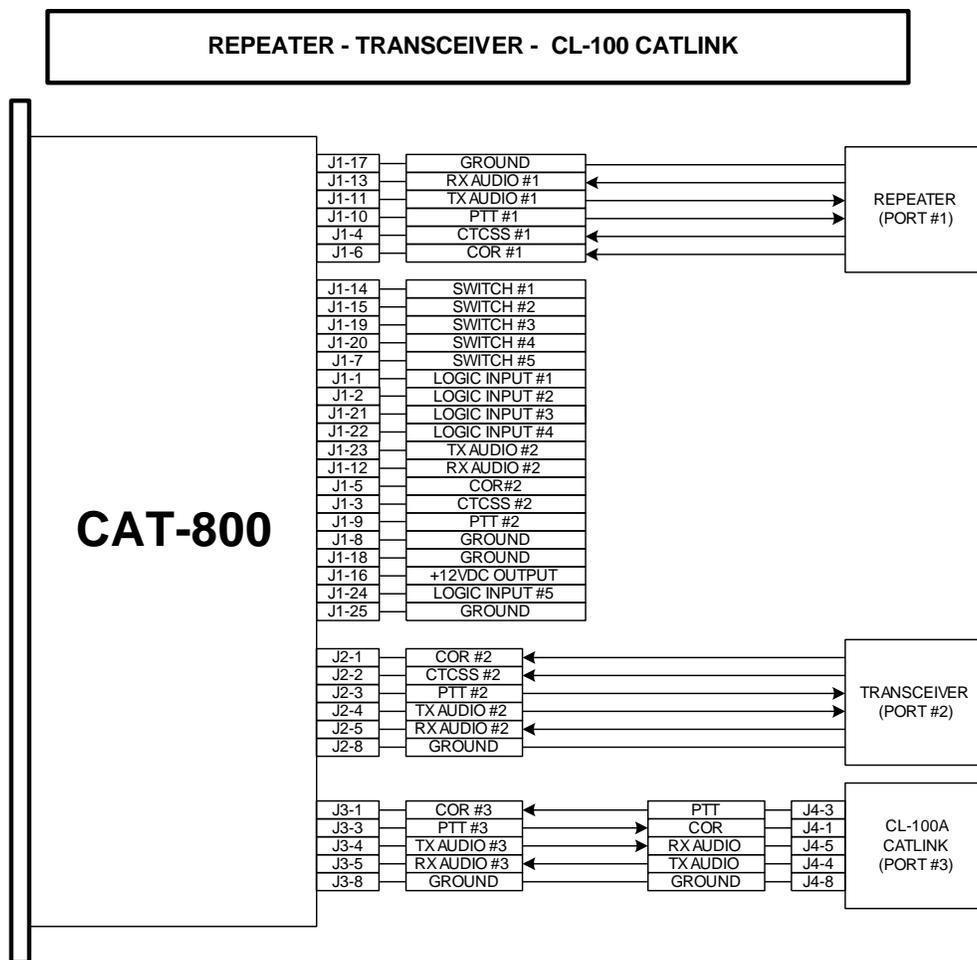


Figure 2-3

In this configuration the CAT-800 supports a repeater on Port #1, a transceiver on Port #2 and a CL-100A on Port #3. The CL-100 is a complete standalone RF interface to the Internet. A pair of Cat-Links will provide a VOIP link to another repeater or remote transceiver. The CL-100 will convert the CAT-800's TX audio and PTT outputs into digital packets and send them through the Internet to another CL-100 or CH-100 Cathub. The CL-100's PTT output provides an active low to the CAT-800's Port #3 COR. This COR input need to be pulled up. Turn on dipswitch #3. The CAT800's PTT provides an active low COR to the Catlink. Set the CL-100's dipswitch #1 to on. The RX and TX audios must be cross-connect.

## Repeater-Transceiver-Weather Receiver

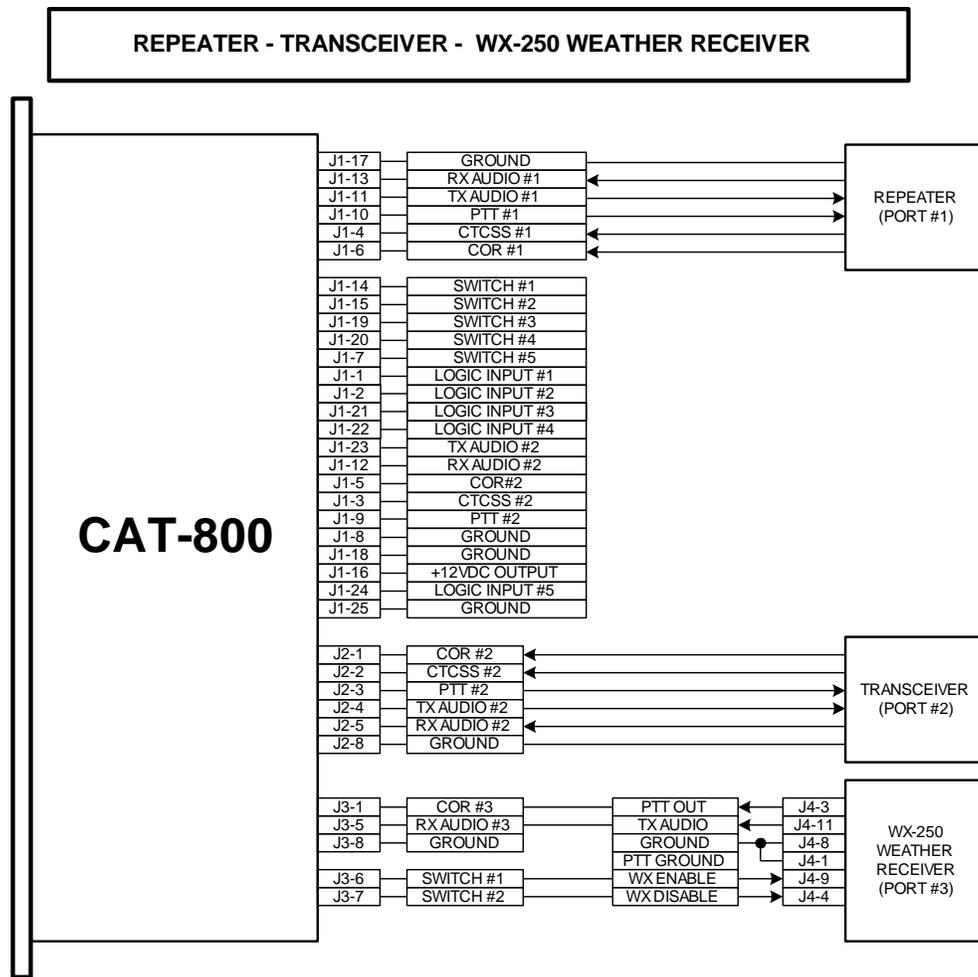


Figure 2-4

In this configuration the CAT-800 supports a repeater on Port #1, a transceiver on Port #2 and a WX-250 Weather receiver on Port #3. The WX-250 is a highly sensitive receiver with a digital decoder that responds to Specific Area Message Encoded (SAME) alerts transmitted by the NOAA weather station located in your geographic area. Select your county code and the type of alerts. Select warnings and or watches. During a weather alert, a relay activates providing COR and RX audio to the CAT-800. When an alert is received [PTT OUT] J4-3 will generate an active low COR #3 to the CAT-800. The [TX AUDIO] J4-11 will provide weather audio containing the weather announcement. On the CAT-800 set dipswitch #3 on because the COR input is active low. You will need the pull-up resistor installed so make sure the COR #3 jumper plug is installed on the board. To monitor the weather receiver on demand, turn on the CAT-800's switch #1 [Zone 6-1] [100611] must be enabled. Key-up and enter [811]. This will ground the [WX ENABLE] input J4-9. To discontinue monitoring, key-up and enter [810]. To disable alerts, turn on switch #2, [Zone 6-2] [100621] must be enabled. Key-up and enter [821]. To reset the alert, key-up and enter [821] to turn switch #2 on and [820] to turn switch #2 back off.

## Dipswitch Settings

An eight-position dipswitch configures various functions of the CAT-800.

**Switch 1** This switch determines Port #1 COR input logic. Switch #1 should be ON if the Port #1 receiver's COR is an active low and OFF if COR is active high.

**Switch 2** This switch determines Port #2 COR input logic. Switch #2 should be ON if the Port #2 receiver's COR is an active low and OFF if COR is active high.

**Switch 3** This switch determines Port #3 COR input logic. Switch #3 should be ON if the Port #3 receiver's COR is an active low and OFF if COR is active high.

**Switch 4** This switch determines the operation of Port #2. Switch #4 should be ON for full-duplex transceiver operation and OFF for half-duplex transceiver operation.

**Switch 5** This switch determines the operation of Port #3. Switch #5 should be ON for full-duplex transceiver operation and OFF for half-duplex transceiver operation.

**Switch 6** This switch places the CAT-800 in the cross band repeat mode. With transceivers on both Port #1 and Port #2, enabled the link with the [A2] command. A signal received by the Port #1 receiver will only key the Port #2 transmitter and a signal received by the Port #2 receiver will only key the Port #1 transmitter. With transceivers on both Port #1 and Port #3, enabled the link with the [A3] command. A signal received by the Port #1 receiver will only key the Port #3 transmitter and a signal received by the Port #3 receiver will only key the Port #1 transmitter. With transceivers on Port #1, Port #2 and Port #3, enabled the link with the [A23] command. A signal received by the Port #1 receiver will key the Port #2 and Port #3 transmitter and a signal received by the Port #2 or Port #3 receivers will key the other transmitters. If dipswitch #6 is changed the power must be cycled for the change to take effect.

**Switch 7** This switch is used to initialize the CAT-800. Set this switch to ON. Cycle the power OFF and back ON. During power-up, the memory will be flushed and reloaded with default values. The voice will say: "RESET SYSTEM OK." Set dipswitch #7 to the OFF position and recycle power.

**Switch 8** This switch is used to program a new MASTER un-lock number. Set switch #8 to ON. The voice will say: "ENTER CONTROL." After the seven-digit master unlock number is entered, set switch #8 to OFF.

## Controller Security

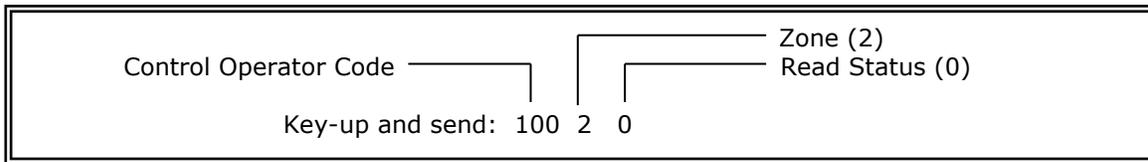
Before placing the CAT-800 into operation five numbers should be changed. They are: the MASTER Unlock number, the Secondary Unlock number and the Control Operator numbers for Port #1, Port #2 and Port #3. See page 5-1 to change the unlock numbers and page 5-14 to change the Control Operator numbers.

### Chapter 3 - Repeater Control

The CAT-800 has eight control zones with eight control channels each. These zones can be manually controlled by DTMF commands; user and event macros and logic input action. The first three zones are assigned to control the three ports. Zones 4 and Zone 8 are global control zones common to all three ports. Zone 5 controls the five user logic inputs while Zone 6 controls the five user output switches. Zone 9 is reserved for control of the various Internet functions. NOTE: The procedures described in this chapter are control functions not programming functions. DO NOT UNLOCK the controller with the seven-digit number before trying to control these nine zone channels.

#### Interrogation of Repeater Control Status

Key-up and send the Port #1 control operator code [100] followed by the zone number and a zero. Un-key and the voice will read back the channels that are turned on in that zone. Example: Read Zone 2 control status. If all the channels are turned off, the voice will say: "CLEAR."

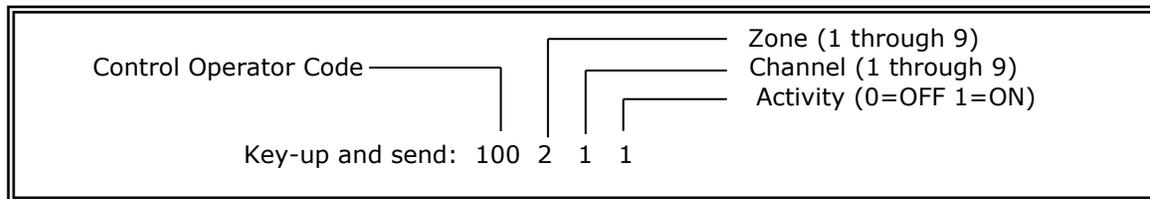


Un-key and the voice will say: "ONE- FIVE- EIGHT"

#### Changing Repeater Control Status

To change the status of a control function, key-up and send the Port #1 control operator code followed by the zone number, channel number in that zone and a [1] to turn the control channel ON or a [0] to turn the control channel OFF. Un-key and the voice will read back the zone, channel number and control activity.

Example: Turn Zone 2 Channel 1 ON through the Port #1 receiver.



Un-key and the voice will say: "TWO ONE ON."

Control of the CAT-800 is also available through the Port #2 and Port #3 receivers. The procedure is the same as above however the default control operator code for Port #2 is [200] and Port #3 is [300].

## CAT-800 Repeater Control Channels

### Zone 1

1	PORT #1 TRANSMIT	ENABLE*
2	PORT #1 CTCSS	ENABLE
3	PORT #1 RECEIVER	ENABLE*
4	PORT #1 TURN ON DELAY	ENABLE
5	PORT #1 TRANSMITTER HANG TIME	ENABLE*
6	PORT #1 COURTESY TONE	ENABLE*
7	PORT #1 DTMF MUTING	ENABLE
8	PORT #1 TIMEOUT	ENABLE*

### Zone 2

1	PORT #2 TRANSMIT	ENABLE*
2	PORT #2 CTCSS	ENABLE
3	PORT #2 RECEIVER	ENABLE*
4	PORT #2 TURN ON DELAY	ENABLE
5	PORT #2 ECHOLINK® CONTROL	ENABLE
6	PORT #2 AUTO-DISCONNECT	ENABLE
7	PORT #2 DTMF MUTING	ENABLE
8	PORT #2 TIMEOUT	ENABLE*

### Zone 3

1	PORT #3 TRANSMIT	ENABLE*
2	PORT #3 CTCSS	ENABLE
3	PORT #3 RECEIVER	ENABLE*
4	PORT #3 TURN ON DELAY	ENABLE
5	PORT #3 ECHOLINK® CONTROL	ENABLE
6	PORT #3 AUTO-DISCONNECT	ENABLE
7	PORT #3 DTMF MUTING	ENABLE
8	PORT #3 TIMEOUT	ENABLE*

### Zone 4

1	PORT #2 CONTROL OPERATOR	ENABLE*
2	PORT #2 MACRO CONTROL	ENABLE*
3	PORT #3 CONTROL OPERATOR	ENABLE*
4	PORT #3 MACRO CONTROL	ENABLE*
5	SCHEDULER	ENABLE*
6	RESERVED	ENABLE
7	GRANDFATHER CLOCK	ENABLE*
8	GRANDFATHER CLOCK SLEEP MODE	ENABLE*

NOTE: (\*) Indicates the channel's default setting.

### Zone 5

1	USER LOGIC INPUT #1	ENABLE*
2	USER LOGIC INPUT #2	ENABLE*
3	USER LOGIC INPUT #3	ENABLE*
4	USER LOGIC INPUT #4	ENABLE*
5	USER LOGIC INPUT #5	ENABLE*
6	RESERVED	ENABLE
7	RESERVED	ENABLE
8	RESERVED	ENABLE

### Zone 6

1	USER OUTPUT SWITCH #1	ENABLE*
2	USER OUTPUT SWITCH #2	ENABLE*
3	USER OUTPUT SWITCH #3	ENABLE*
4	USER OUTPUT SWITCH #4	ENABLE*
5	USER OUTPUT SWITCH #5	ENABLE*
6	RESERVED	ENABLE
7	RESERVED	ENABLE
8	RESERVED	ENABLE

### Zone 7

1	REPEATER VOICE ID	ENABLE*
2	REPEATER CW ID	ENABLE*
3	TRANSMITTER TURN OFF MESSAGE #1	ENABLE
4	TRANSMITTER TURN OFF MESSAGE #2	ENABLE
5	TIMED MESSAGE #1	ENABLE
6	TIMED MESSAGE #2	ENABLE
7	TIMED MESSAGE #3	ENABLE
8	TIMED MESSAGE #4	ENABLE

### Zone 8

1	FORCED DTMF ENTRY (ALL PORTS)	ENABLE*
2	DTMF ACCESS (ALL PORTS)	ENABLE
3	TIME-OF-DAY REQUEST (ALL PORTS)	ENABLE*
4	DTMF KEYPAD TEST (ALL PORTS)	ENABLE*
5	VOICE MESSAGE DEMO REQUEST (ALL PORTS)	ENABLE*
6	TWO-TONE PAGING REQUEST (ALL PORTS)	ENABLE*
7	DIGITAL AUDIO WAV PLAYER (ALL PORTS)	ENABLE*
8	RESERVED	ENABLE

**Read Firmware Version**

To read the current firmware version of the CAT-800, key-up and enter the control operator prefix code followed by [100\*8]. Un-key and the CAT-800's voice will say: "VERSION TWO POINT ZERO ZERO". The default control operator code for Port #1 is [100]. EXAMPLE: Key-up and enter [100\*8]. Use the default control operator code [200] for Port #2 and [300] for Port #3.

**Perform Remote Control Reset**

To perform a remote control reset of the CAT-800, key-up and enter the control operator prefix code followed by [100\*9]. Un-key and the CAT-800's voice will say: "EXPECT MICRO RESET". The default control operator code for Port #1 is [100]. EXAMPLE: Key-up and enter [100\*9]. Use the default control operator code [200] for Port #2 and [300] for Port #3. This procedure is identical to cycling the DC power to the CAT-800 and will not effect it's programming.

NOTE: Since the microprocessor is running in several different loops it may be possible to reset the controller remotely. However for the reset to work the microprocessor must be able to recognize the [100\*9] command. If the microprocessor has stopped executing its program it is not likely it will respond to your reset command. You will need to cycle DC power on the controller.

## Zone 1 Control Channels

### 1. Port #1 Transmitter Enable (\*)

When this channel is enabled the Port #1 PTT will be active. This channel must be enabled for normal repeater operation. The CAT-800 will continue to respond to control operator commands even when this channel is disabled. This channel will automatically be enabled after a dipswitch #7 initialization reset.

### 2. Port #1 CTCSS Enable

When this channel is enabled, in addition to a COR input, an input from a CTCSS decoder at J1-4 must also be present before Port #1 will activate. At default this input is set for "COR and CTCSS active high logic". Use programming command (\*3612) to change the CTCSS logic input to active low. Use programming command (\*3613) to change the logic to "COR or CTCSS active high logic". NOTE: To prevent loss of control, DO NOT ENABLE THIS CHANNEL unless a working CTCSS decoder is connected to J1-4.

### 3. Port #1 Receiver Enable (\*)

When this channel is enabled the CAT-800 will respond to a RF input from the Port #1 receiver. When this channel is disabled the Port #1 transmitter will continue to operate by responding to RF inputs from the Port #2 and Port #3 receivers.

### 4. Port #1 Turn on Delay Enable

When this channel is enabled, a deliberate and sustained input on Port #1 must be present before the controller will respond. A time delay of 0.1 to 9.9 seconds can be selected with the [\*623\*] programming command. When the CAT-800 is initialized, this timer defaults to 1.0 seconds. This channel is useful during periods when noise bursts are present on the repeater input.

### 5. Port #1 Transmitter Hang Time Enable (\*)

When this channel is enabled, the Port #1 transmitter will have a hang-time subject to the settings of the COR Drop to Courtesy Beep Timer [\*620\*] and the Courtesy Beep to PTT Drop Timer [\*621\*]. At default these timers are set for one second and four seconds.

### 6. Port #1 Courtesy Tone Enable (\*) (Event Macro 20)

When this channel is enabled, a courtesy tone will occur when the COR signal is lost. To eliminate the courtesy tone, turn this channel OFF. The timeout timer will continue to be reset.

### 7. Port #1 DTMF Muting Enable

When this channel is enabled, anytime a DTMF tone is received, the receive audio will be turned off to the Port #1 transmitter. The transmit audio will remain muted until a pre-determined time after the last DTMF tone is received. During the mute period, cover beeps are transmitted each second to indicate repeater activity. This feature prevents control commands from being repeated. It provides an extra measure of security. There may be times when it is desirable to temporarily pass DTMF tones through the repeater. Precede the DTMF string with a (#). This key can be changed with the [\*28X] programming command.

### 8. Port #1 Timeout Enable (\*)

When this channel is enabled, a continuous signal on the Port #1 input will cause the Port to turn off. The time-out period is user programmable with the [\*601\*] timer command. When the CAT-800 is initialized, this timer defaults to 3 minutes. When this channel is turned off, Port #1 will-not timeout.

## Zone 2 Control Channels

### 1. Port #2 Transmitter Enable (\*)

When this channel is enabled the Port #2 PTT will be active. This channel must be enabled for normal operation. The CAT-800 will continue to respond to control operator commands even when this channel is disabled. This channel will automatically be enabled after a dipswitch #7 initialization reset.

### 2. Port #2 CTCSS Enable

When this channel is enabled, in addition to a COR input, an input from a CTCSS decoder at J1-3 or J2-2 must also be present before Port #2 will activate. At default this input is set for "COR and CTCSS active high logic". Use programming command (\*3622) to change the CTCSS logic input to active low. Use programming command (\*3623) to change the logic to "COR or CTCSS active high logic". NOTE: To prevent loss of control, DO NOT ENABLE THIS CHANNEL unless a working CTCSS decoder is connected to J1-3 or J2-2.

### 3. Port #2 Receiver Enable (\*)

When this channel is enabled the CAT-800 will respond to a RF input from the Port #2 receiver. When this channel is disabled the Port #2 transmitter will continue to operate by responding to RF inputs from the Port #1 and Port #3 receivers.

### 4. Port #2 Turn on Delay Enable

When this channel is enabled, a deliberate and sustained input on Port #2 must be present before the controller will respond. A time delay of 0.1 to 9.9 seconds can be selected with the [\*623\*] programming command. When the CAT-800 is initialized, this timer defaults to 1.0 seconds. This channel is useful during periods when noise bursts are present on the repeater input.

### 5. Echolink® Control Enable

When Port #2 is connected to Port #1 and DTMF Muting (Zone 1 Channel 7) is enabled, a DTMF command entered through Port #1 will be muted on both the Port #1 and Port #2 transmit audios. When this channel is enabled, Port #2 transmit audio will be the actual DTMF command. The DTMF command will continue to be muted on the Port #1 transmit audio.

### 6. Port #2 Auto-Disconnect Enable (Event Macro #34)

When this channel is enabled, after a period of Port #2 inactivity determined by the setting of the [\*605\*] timer, the CAT-800 will execute event macro [34]. The default setting of event macro #34 will disconnect Port #2 from Port #1.

### 7. Port #2 DTMF Muting Enable

When this channel is enabled, anytime a DTMF tone is received, by the Port #2 receiver, the audio will be turned off to the Port #1 transmitter. The transmit audio will remain muted until a pre-determined time after the last DTMF tone is received. During the mute period, cover beeps are transmitted each second to indicate repeater activity. This feature prevents control commands from being repeated. It provides an extra measure of security. There may be times when it is desirable to temporarily pass DTMF tones to the Port #1 transmitter. Precede the DTMF string with a (#). This key can be changed with the [\*29X] programming command.

### 8. Port #2 Timeout Enable (\*)

When this channel is enabled, a continuous signal on the Port #2 input will cause the Port to turn off. The time-out period is user programmable with the [\*602\*] timer command. When the CAT-800 is initialized, this timer defaults to 3 minutes. When this channel is turned off, Port #2 will not timeout.

## Zone 3 Control Channels

### 1. Port #3 Transmitter Enable (\*)

When this channel is enabled the Port #3 PTT will be active. This channel must be enabled for normal operation. The CAT-800 will continue to respond to control operator commands even when this channel is disabled. This channel will automatically be enabled after a dipswitch #7 initialization reset.

### 2. Port #3 CTCSS Enable

When this channel is enabled, in addition to a COR input, an input from a CTCSS decoder at J3-2 must also be present before Port #3 will activate. At default this input is set for "COR and CTCSS active high logic". Use programming command (\*3632) to change the CTCSS logic input to active low. Use programming command (\*3633) to change the logic to "COR or CTCSS active high logic". NOTE: To prevent loss of control, DO NOT ENABLE THIS CHANNEL unless a working CTCSS decoder is connected to J3-2.

### 3. Port #3 Receiver Enable (\*)

When this channel is enabled the CAT-800 will respond to a RF input from the Port #3 receiver. When this channel is disabled the Port #3 transmitter will continue to operate by responding to RF inputs from the Port #1 and Port #2 receivers.

### 4. Port #3 Turn on Delay Enable

When this channel is enabled, a deliberate and sustained input on Port #3 must be present before the controller will respond. A time delay of 0.1 to 9.9 seconds can be selected with the [\*623\*] programming command. When the CAT-800 is initialized, this timer defaults to 1.0 seconds. This channel is useful during periods when noise bursts are present on the repeater input.

### 5. Echolink® Control Enable

When Port #3 is connected to Port #1 and DTMF Muting (Zone 1 Channel 7) is enabled, a DTMF command entered through Port #1 will be muted on both the Port #1 and Port #3 transmit audios. When this channel is enabled, Port #3 transmit audio will be the actual DTMF command. The DTMF command will continue to be muted on the Port #1 transmit audio.

### 6. Port #3 Auto-Disconnect Enable (Event Macro 35)

When this channel is enabled, after a period of Port #3 inactivity determined by the setting of the [\*606\*] timer, the CAT-800 will execute event macro [35]. The default setting of event macro #35 will disconnect Port #3 from Port #1.

### 7. Port #3 DTMF Muting Enable

When this channel is enabled, anytime a DTMF tone is received by the Port #3 receiver, the audio will be turned off to the repeater's transmitter. The transmit audio will remain muted until a pre-determined time after the last DTMF tone is received. During the mute period, cover beeps are transmitted each second to indicate repeater activity. This feature prevents control commands from being repeated. It provides an extra measure of security. There may be times when it is desirable to temporarily pass DTMF tones through the repeater. Precede the DTMF string with a (#). This key can be changed with the [\*29X] programming command.

### 8. Port #3 Timeout Enable (\*)

When this channel is enabled, a continuous signal on the Port #1 input will cause the Port to turn off. The time-out period is user programmable with the [\*603\*] timer command. When the CAT-800 is initialized, this timer defaults to 3 minutes. When this channel is turned off, Port #3 will-not timeout.

## Zone 4 Control Channels

### 1. Port #2 Control Operator Enable (\*)

When this channel is enabled, the CAT-800 will accept control operator commands to change the settings of the zone channels from the Port #2 receiver. The default code is [200]. This code can be changed with the [\*502\*] programming command.

### 2. Port #2 Macro Enable (\*)

When this channel is enabled, the CAT-800 will accept user macro commands from the Port #2 receiver.

### 3. Port #3 Control Operator Enable (\*)

When this channel is enabled, the CAT-800 will accept control operator commands to change the settings of the zone channels from the Port #3 receiver. The default code is [300]. This code can be changed with the [\*503\*] programming command.

### 4. Port #3 Macro Enable (\*)

When this channel is enabled, the CAT-800 will accept user macro commands from the Port #3 receiver.

### 5. Scheduler Enable (\*)

When this channel is enabled, all action by the scheduler will be executed per the times programmed in the scheduler table. There may be times, during emergency net operations, when it is not desirable to have channels change automatically. To suspend scheduler operation, turn this channel off.

### 6. Reserved

### 7. Grandfather Clock Enable (\*) (Event Macro 33)

When this channel is enabled, the CAT-800 will announce the time of day every hour on the hour. This channel enables the Grandfather Clock Event Macro #33, which sends voice message 8 on the repeater's transmitter. When the CAT-800 is initialized, this message defaults to Example: "CAT-800 REPEATER THE TIME IS."

### 8. Grandfather Clock Sleep Mode Enable (\*)

It may be desirable to suspend the grandfather clock operation during the early morning hours. When this channel is enabled, the last announcement will be at 11:00 PM. Time announcements will resume at 7:00 AM the next morning.

## Zone 5 Control Channels

### **1. User Logic Input #1 Enable (\*) (Event Macros 07 and 08)**

When this channel is enabled, a transition from low to high on connector J1-1 will execute event macro #07 while a transition from high to low will execute event macro #08.

### **2. User Logic Input #2 Enable (\*) (Event Macros 09 and 10)**

When this channel is enabled, a transition from low to high on connector J1-2 will execute event macro #09 while a transition from high to low will execute event macro #10.

### **3. User Logic Input #3 Enable (\*) (Event Macros 11 and 12)**

When this channel is enabled, a transition from low to high on connector J1-21 will execute event macro #11 while a transition from high to low will execute event macro #12.

### **4. User Logic Input #4 Enable (\*) (Event Macros 13 and 14)**

When this channel is enabled, a transition from low to high on connector J1-22 will execute event macro #13 while a transition from high to low will execute event macro #14.

### **5. User Logic Input #5 Enable (\*) (Event Macros 15 and 16)**

When this channel is enabled, a transition from low to high on connector J1-24 will execute event macro #15 while a transition from high to low will execute event macro #16.

**6. Reserved**

**7. Reserved**

**8. Reserved**

## **Zone 6 Control Channels**

### **1. USER Output Switch #1 Enable**

When this channel is enabled, switch #1 will perform per its pre-defined function. Connector J1-14 or J2-6 will sink 150 MA to ground. At default this switch is defined as a DTMF remote controlled switch. Use the User Macro #10 command [811] to turn the switch on and User Macro #11 command [810] to turn the switch off. Use the programming command [\*391X] to change the operation to a fan control or CTCSS encoder switch.

### **2. USER Output Switch #2 Enable**

When this channel is enabled, switch #2 will perform per its pre-defined function. Connector J1-15 or J2-7 will sink 150 MA to ground. At default this switch is defined as a DTMF remote controlled switch. Use the User Macro #12 command [821] to turn the switch on and User Macro #13 command [820] to turn the switch off. Use the programming command [\*392X] to change the operation to a fan control or CTCSS encoder switch.

### **3. USER Output Switch #3 Enable**

When this channel is enabled, switch #3 will perform per its pre-defined function. Connector J1-19 or J3-6 will sink 150 MA to ground. At default this switch is defined as a DTMF remote controlled switch. Use the User Macro #14 command [831] to turn the switch on and User Macro #15 command [830] to turn the switch off. Use the programming command [\*393X] to change the operation to a fan control or CTCSS encoder switch.

### **4. USER Output Switch #4 Enable**

When this channel is enabled, switch #4 will perform per its pre-defined function. Connector J1-20 or J3-7 will sink 150 MA to ground. At default this switch is defined as a DTMF remote controlled switch. Use the User Macro #16 command [841] to turn the switch on and User Macro #17 command [840] to turn the switch off. Use the programming command [\*394X] to change the operation to a fan control or CTCSS encoder switch.

### **5. USER Output Switch #5 Enable**

When this channel is enabled, switch #5 will perform per its pre-defined function. Connector J1-5 will sink 150 MA to ground. At default this switch is defined as a DTMF remote controlled switch. Use the User Macro #18 command [851] to turn the switch on and User Macro #19 command [850] to turn the switch off. Use the programming command [\*395X] to change the operation to a fan control or CTCSS encoder switch.

### **6. Reserved Enable**

### **7. Reversed Enable**

### **8. Reversed Enable**

## Zone 7 Control Channels

### 1. Repeater Voice ID Enable (\*) (Event Macro 17)

When this channel is enabled, the CAT-800 will execute Event Macro 17 identifying the repeater's transmitter in voice. Voice message #1 is assigned as the default message.

### 2. Repeater CW ID Enable (\*) (Event Macro 19)

When this channel is enabled, the CAT-800 will execute Event Macro 19 identifying the repeater's transmitter in CW by sending the CW buffer.

### 3. Transmitter Turn Off Message #1 Enable (Event Macro 27)

When this channel is enabled, the transmitter drop out message #1 will occur when a repeater user unkeys their transmitter. This message will repeat subject to the setting of the [\*611\*] turn off message timer. This message will consist of up to 15 words selected from the vocabulary table and programmed with the [\*3102\*] command.

### 4. Transmitter Turn Off Message #2 Enable (Event Macro 28)

When this channel is enabled, the transmitter drop out message #2 will occur just before the repeater transmitter turns off. This message will repeat subject to the setting of the [\*612\*] turn off message timer. This message will consist of up to 15 words selected from the voice vocabulary table and is programmed with the [\*3103] command.

### 5. Timed Message #1 Enabled (Event Macro 29)

When this channel is enabled, timed voice message #1 will occur on a regular schedule subject to the setting of the [\*607\*] timed message #1 timer and event macro #29. This message will consist of up to 15 words selected from the voice vocabulary table and is programmed with the [\*3104\*] command.

### 6. Timed Message #2 Enabled (Event Macro 30)

When this channel is enabled, timed voice message #2 will occur on a regular schedule subject to the setting of the [\*608\*] timed message #2 timer and event macro #30. This message will consist of up to 15 words selected from the voice vocabulary table and is programmed with the [\*3105\*] command.

### 7. Timed Message #3 Enabled (Event Macro 31)

When this channel is enabled, timed voice message #3 will occur on a regular schedule subject to the setting of the [\*609\*] timed message #3 timer and event macro #31. This message will consist of up to 15 words selected from the voice vocabulary table and is programmed with the [\*3106\*] command.

### 8. Timed Message #4 Enabled (Event Macro 32)

When this channel is enabled, timed voice message #4 will occur on a regular schedule subject to the setting of the [\*610\*] timed message #4 timer and event macro #32. This message will consist of up to 15 words selected from the voice vocabulary table and is programmed with the [\*3107\*] command.

## **Zone 8 Control Channels**

### **1. Forced DTMF Entry D Key Enable (\*) (All Ports)**

When this channel is enabled it is possible to force a DTMF command even while the port is active. To force a DTMF command, end the command with a [D]. This key can be changed with the [\*29X] programming command.

### **2. DTMF Access Enable (ALL PORTS)**

When this channel is enabled, the repeater will go to sleep and not respond to normal inputs. If a repeater user enters the DTMF Access number [325] the repeater will wake-up and continue to operate until a period of inactivity occurs determined by the [\*614\*] sleep timer. Use the [\*504\*] programming command to change the DTMF Access number.

### **3. Time of Day Request Enable (\*) (All Ports)**

When this channel is enabled, repeater users can request the time of day by entering the time of day request number [400]. Example: "THE TIME IS 7:15 PM."

### **4. DTMF Keypad Test (\*) (All Ports)**

When this channel is enabled, a repeater user is able to perform a test of their radio's 12 or 16-button keypad. Enter the keypad test number [475] followed by each of the keypad digits. As the numbers are being decoded, they are stored in memory. When the user stops transmitting the controller will read back all the numbers that were decoded. The Forced DTMF Entry key is defaulted to the [D] key. It must be entered last and it will not read back during the pad test.

### **5. Voice Demo Request Enable (\*) (All Ports)**

When this channel is enabled, repeater users can play any of the twenty voice synthesizer messages. Enter the voice demo request number [700] followed by the two-digit message number.

### **6. Two Tone Sequential Paging Enable (\*) (All Ports)**

When this channel is enabled, a repeater user can transmit a two-tone page. The first tone will be on for one second while the second tone will be on for three seconds. Memory space is provided for twenty paging tones. Enter the paging tone request number [650] followed by the desired two-digit paging tone table position.

### **7. Digital Audio WAV Player (\*) (All Ports) (Optional DR-800 Required)**

When this channel is enabled, a repeater user can play digital audio tracks. Memory space is provided for thirty tracks. Enter the digital audio WAV player request number [725] followed by the two-digit track number. Digital audio tracks can also be integrated into voice messages, user and event macros.

### **8. Reserved**

## Chapter 4 - Repeater Operation

### Time of Day Message

Key-up, and enter [400], the time of day access code. Un-key, and the voice synthesizer will announce the time. Example: The voice will say: "THE TIME IS 7:30 PM". The time of day announcement is stored in voice message [09] and can be changed with the [\*3109] programming command or the Windows editor.

### DTMF Keypad Test

Key-up, and enter [475], the DTMF keypad access code followed by the keypad numbers and letters to be tested. The entries can be in any order. Un-key, and the voice will read-back all numbers and letters that were decoded including the "STAR" and "POUND". The Forced DTMF Entry key is defaulted to the [D] key. It must be entered last and it will not read back during the pad test.

### DTMF Access

When the CAT-800 is in the DTMF Access mode, you must enter the DTMF Access code to activate the repeater. The voice will say: "OK UP" and the repeater will respond to a COR and or CTCSS input. When the repeater returns to rest, for a time determined by the sleep timer, the DTMF Access code must be re-entered to activate the repeater. You can bypass the rest period and return the repeater to DTMF access mode by re-entering [325], the DTMF access code. The voice will say: "OK DOWN".

### Two-Tone Paging

The CAT-800 will generate two-tone sequential paging tones. Memory space is provided for five different tones. The first tone will send for one second followed by the second tone for three seconds. To send a paging tone key-up and send the paging tone prefix number followed by the two-digit tone table position. The default prefix number is [650]. A two-tone page was entered in table position [01]. Key-up and send [65001].

### Forced DTMF Entry

During normal operation a DTMF command is processed when the input goes inactive. It is possible to force a DTMF command entry even while the input is active. The CAT-800 will accept the [D] key as an entry command. This key can be changed with the [\*29X] programming command. NOTE: Zone 8 Channel 1 must be enabled for the CAT-800 to accept the Forced DTMF command on ports 1, 2 and 3.

### DTMF Muting Override

With DTMF muting enabled, there may be times when it is desirable to pass the DTMF tones to the repeater or link transmitters. To temporarily disable DTMF muting, precede the DTMF string with a pound [#]. Use the DTMF muting programming command [\*28X] to change [#] to a different number or character.

### Repeater ID

The CAT-800 will identify in both synthesized voice and CW. If control Zone 7 Channel 1 "Repeater Voice ID" is enabled the CAT-800 will ID in voice only by sending Voice message #1. If Zone 7 Channel 2 "Repeater CW ID" is enabled, the CAT-800 will identify in CW only. If both zone channels are enabled the CAT-800 will identify in voice. However if someone talks over the voice ID the CAT-800 will switch to the CW ID and mix with the receive audio.

### User Macro

A user macro is a series of commands, defined by the repeater owner. User macros permit the owner to customize certain aspects of repeater operation. Once the CAT-800 decodes the user macro number, the internal commands will execute in the order they were stored within the macro string. The CAT-800 supports thirty user macros

### Logic Inputs

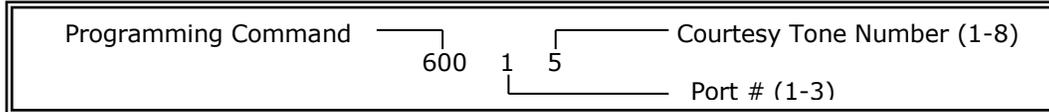
The CAT-800 has five logic inputs that are assigned to execute event macros 07 through 16. At default these event macros are programmed to turn on the five output switches. Use the programming commands [\*1707] through [\*1716] to reconfigure these logic inputs.

### User Output Switches

The CAT-800 has five output switches. At default the switches are assigned as DTMF remote control switches. They are controlled by user macros 10 through 19. From the user macro table on page 5-7, key-up and enter [811] to turn switch #1 on or [810] to turn switch #1 off. Use the [\*39XX] programming command from the table on page 5-14 to redefine the switches to control a fan relay or CTCSS encoder. The associated Zone 6 control channels must be enabled for the switches to operate.

### Load Courtesy Tone

The CAT-800 supports eight unique courtesy tones. To manually load a courtesy tone use the [600] prefix code followed by the port and courtesy tone number. Example: Load courtesy tone #5 into the Port #1 courtesy tone buffer.



### Port Linking User Macro Commands

The first seven User Macros have been programmed at default to connect Port #2 and or Port #3 to Port #1. Reprogram the DTMF command, macro action and voice announcement to suite your needs. NOTE: Port #1 has priority over Port #2 and Port #3.

USER MACRO	DTMF COMMAND	PORT #2	PORT #3	MACRO ACTION
01	A0	----	----	Read Port Connection Status
02	A2	ON	OFF	Connect Port #2
03	B2	OFF	OFF	Disconnect Port #2
04	A3	OFF	ON	Connect Port #3
05	B3	OFF	OFF	Disconnect Port #3
06	A23	ON	ON	Connect Port #2 and Port #3
07	B23	OFF	OFF	Disconnect Port #2 and Port #3

### Event Macro

An event macro is a series of commands, defined by the repeater owner. Event macros permit the owner to customize certain aspects of repeater operation. Event macros are assigned to various locations through out the CAT-800 program. Examples of event macros are: logic inputs, port activity and timed messages. The commands will execute in the order they were stored within the macro string. The CAT-800 supports sixty event macros each containing a maximum of ten internal commands.

### Voice Synthesizer Message Selection

Key-up and enter the VOICE prefix number [700] followed by the double-digit message number. The CAT-800 will key the transmitter and play the message.

### Digital Audio WAV Player Track Selection (Optional DR-800 Required)

Key-up and enter the DIGITAL AUDIO WAV PLAYER TRACK prefix number [725] followed by the double-digit track number. The CAT-800 will key the transmitter and play the track.

## Chapter 5 - Repeater Programming By DTMF Tone

This section describes how to program the CAT-800 using DTMF commands. The various types of program commands are described in detail and examples are given in the following text. NOTE: DTMF programming is limited to Port #1 only.

### Initialization

To initialize the CAT-800, set dipswitch #7 to on and cycle DC power. During power-up, the voice will say: "RESET SYSTEM OK." Set dipswitch #7 to off. Initialization consists of the following operations:

1	All memory locations are cleared.
2	The channels marked with a [*] are enabled.
3	The master unlock number is loaded with the default value [1234567].
4	The secondary unlock number is loaded with the default value [7654321].
5	The Port #1 control operator prefix code is loaded with [100].
6	The Port #2 control operator prefix code is loaded with [200].
7	The Port #3 control operator prefix code is loaded with [300].
8	All codes are loaded with default values.
9	All timers are loaded with default values.
10	The voice ID is loaded with "CAT-800 REPEATER".
11	All messages are loaded with default messages.
12	Event and User macros are loaded with defaults.

### Programming the Master Unlock Number

To program the Master UNLOCK number, set dipswitch #8 to the on position. The Port #1 transmitter will activate and the voice will say: "ENTER CONTROL." Key-up and enter a seven-digit number through the Port #1 receiver input. Un-key, if the number is accepted, the voice will say: "CONTROL OK." If the number is rejected, the voice will say: "ENTER CONTROL." Key-up and re-enter the seven-digit number. When finished set dipswitch #8 to the off position.

### Unlocking the Controller [1234567]

To unlock the controller, key-up and enter the master-unlock number. The voice will say: "CAT-800 CONTROL."

Note: The CAT-800 can be unlocked and placed in the programming mode by entering the master-unlock or the secondary unlock number. The master unlock number must be changed by using dipswitch #8. The secondary unlock number can be changed remotely without having to go to the repeater site. For security reasons use the secondary unlock number because it can easily be changed. Use the master-unlock number only when conditions are thought to be secure.

### Locking the Controller [\*0]

Key-up and send [\*0]. Un-key, the controller will lockup and the voice will say: "MANUAL EXIT." The controller will lock automatically when the programming timer expires. The voice will say: "TIMER EXIT." The default time is ten minutes. NOTE: The CAT-800 must be unlocked to perform the following programming functions described in Chapter 5.

## CAT-800 Internal Command Assignments

The Internal Command Structure is a series of four digit commands used to program the CAT-800's User and Event Macro strings and the five hardware input switches.

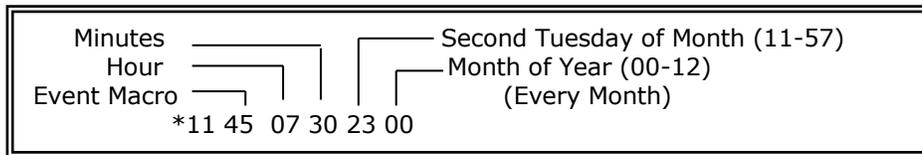
INTERNAL COMMAND TABLE			
	COMMAND	CHANNEL	ACTION
CONTROL REPEATER ZONE 1	11	1-9	0=OFF 1=ON
CONTROL REPEATER ZONE 2	12	1-9	0=OFF 1=ON
CONTROL REPEATER ZONE 3	13	1-9	0=OFF 1=ON
CONTROL REPEATER ZONE 4	14	1-9	0=OFF 1=ON
CONTROL REPEATER ZONE 5	15	1-9	0=OFF 1=ON
CONTROL REPEATER ZONE 6	16	1-9	0=OFF 1=ON
CONTROL REPEATER ZONE 7	17	1-9	0=OFF 1=ON
CONTROL REPEATER ZONE 8	18	1-9	0=OFF 1=ON
CONTROL REPEATER ZONE 9	19	1-9	0=OFF 1=ON
	COMMAND	COMMENTS	
PLAY TIME OF DAY	2000	-----	
PLAY DAY OF WEEK	2001	-----	
PLAY DAY AND MONTH	2002	-----	
PLAY SALUTATION	2003	-----	
PLAY VOICE MESSAGE (V/S Mixes with RX Audio)	30XX	02-20	
PLAY VOICE MESSAGE (V/S Stops RX Audio only)	31XX	02-20	
PLAY VOICE ID (V/S ID Message 01 Only) <a href="#">(See Note Table 5-4)</a>	3200	-----	
PLAY WAV ID (WAV Track ID Message 01 Only) <a href="#">(See Note Table 5-4)</a>	3300	-----	
PLAY CW ID BUFFER	3400	-----	
PLAY CW CHARACTER	35XX	00-46	
PLAY DIGITAL AUDIO WAV TRACK (WAV Mixes with RX Audio)	36XX	01-30	
PLAY DIGITAL AUDIO WAV TRACK (WAV Stops RX Audio only)	37XX	01-30	
PLAY COURTESY TONE	4000	-----	
LOAD COURTESY TONE PORT #1 (Receiver Active)	401X	1-8	
LOAD COURTESY TONE PORT #2 (Receiver Active)	402X	1-8	
LOAD COURTESY TONE PORT #3 (Receiver Active)	403X	1-8	
PLAY TWO-TONE PAGING TONE	42XX	01-05	
AUDIO SWITCH SW [VOICE TO TX1]	501X	0=OFF 1=ON	
AUDIO SWITCH SW [VOICE TO TX2]	502X	0=OFF 1=ON	
AUDIO SWITCH SW [VOICE TO TX3]	503X	0=OFF 1=ON	
AUDIO SWITCH SW [VOICE TO TX1-TX2]	512X	0=OFF 1=ON	
AUDIO SWITCH SW [VOICE TO TX1-TX3]	513X	0=OFF 1=ON	
AUDIO SWITCH SW [VOICE TO TX1-TX2-TX3]	514X	0=OFF 1=ON	
AUDIO SWITCH CONTROL [WAV PLAYER TO TX1]	521X	0=OFF 1=ON	
AUDIO SWITCH CONTROL [WAV PLAYER TO TX2]	522X	0=OFF 1=ON	
AUDIO SWITCH CONTROL [WAV PLAYER TO TX3]	523X	0=OFF 1=ON	

AUDIO SWITCH CONTROL [WAV PLAYER TO TX1-TX2]	531X	0=OFF 1=ON
AUDIO SWITCH CONTROL [WAV PLAYER TO TX1-TX3]	532X	0=OFF 1=ON
AUDIO SWITCH CONTROL [WAV PLAYER TO TX1-TX2-TX3]	533X	0=OFF 1=ON
AUDIO SWITCH CONTROL [RX2 AUDIO TO TX3 AUDIO]	540X	0=OFF 1=ON
AUDIO SWITCH CONTROL [RX3 AUDIO TO TX2 AUDIO]	550X	0=OFF 1=ON
LOAD TIME DELAY (SECONDS)	60XX	01-99
PTT#1 CONTROL	611X	0=OFF 1=ON
PTT#2 CONTROL	612X	0=OFF 1=ON
PTT#3 CONTROL	613X	0=OFF 1=ON
PTT#1-PTT#2 CONTROL	621X	0=OFF 1=ON
PTT#1-PTT#3 CONTROL	622X	0=OFF 1=ON
PTT#1-PTT#2-PTT#3 CONTROL	623X	0=OFF 1=ON
PTT#1 AND AUDIO SW [VOICE TO TX1]	631X	0=OFF 1=ON
PTT#2 AND AUDIO SW [VOICE TO TX2]	632X	0=OFF 1=ON
PTT#3 AND AUDIO SW [VOICE TO TX3]	633X	0=OFF 1=ON
PTT#1-PTT#2 AND AUDIO SW [VOICE TO TX1-TX2]	641X	0=OFF 1=ON
PTT#1-PTT#3 AND AUDIO SW [VOICE TO TX1-TX3]	642X	0=OFF 1=ON
PTT#1-PTT#2-PTT#3 AND AUDIO SW [VOICE TO TX1-TX2-TX3]	643X	0=OFF 1=ON
PTT AND VOICE AUDIO SW FROM ACTIVE PORT	651X	0=OFF 1=ON
PTT#1 AND AUDIO SW [WAV PLAYER TO TX1]	661X	0=OFF 1=ON
PTT#2 AND AUDIO SW [WAV PLAYER TO TX2]	662X	0=OFF 1=ON
PTT#3 AND AUDIO SW [WAV PLAYER TO TX3]	663X	0=OFF 1=ON
PTT#1-PTT#2 AND AUDIO SW [WAV PLAYER TO TX1-TX2]	671X	0=OFF 1=ON
PTT#1-PTT#3 AND AUDIO SW [WAV PLAYER TO TX1-TX3]	672X	0=OFF 1=ON
PTT#1-PTT#2-PTT#3 AND AUDIO SW [WAV PLAYER TO TX1-TX2-TX3]	673X	0=OFF 1=ON
PTT AND WAV AUDIO SW FROM ACTIVE PORT	674X	0=OFF 1=ON
USER FUNCTION SWITCH #1	681X	0=OFF 1=ON
USER FUNCTION SWITCH #2	682X	0=OFF 1=ON
USER FUNCTION SWITCH #3	683X	0=OFF 1=ON
USER FUNCTION SWITCH #4	684X	0=OFF 1=ON
USER FUNCTION SWITCH #5	685X	0=OFF 1=ON
USER FUNCTION SWITCH #1 PULSE OUTPUT	691X	(1=500mS - 2=250mS)
USER FUNCTION SWITCH #2 PULSE OUTPUT	692X	(1=500mS - 2=250mS)
USER FUNCTION SWITCH #3 PULSE OUTPUT	693X	(1=500mS - 2=250mS)
USER FUNCTION SWITCH #4 PULSE OUTPUT	694X	(1=500mS - 2=250mS)
USER FUNCTION SWITCH #5 PULSE OUTPUT	695X	(1=500mS - 2=250mS)
READ PORT STATUS	7000	-----
CONNECT PORT #2 TO PORT #1	7121	-----
DISCONNECT PORT #2 FROM PORT #1	7120	-----
CONNECT PORT #3 TO PORT #1	7131	-----
DISCONNECT PORT #3 FROM Port #1	7130	-----
CONNECT PORT #2 AND PORT #3 TO PORT #1	7231	-----



**Program Scheduled Event Macro Time for Week of Every Month**

Example: Set Event Macro 45 for 2<sup>nd</sup> Tuesday of every month at 7:30 AM.



SCHEDULER PROGRAMMING MINUTES AND HOURS			
00-59	Minutes		
00-23	Hours		(**) = Every Hour
SCHEDULER PROGRAMMING DAY OF WEEK			
00	Daily	27	Second Saturday of Month
01	Sunday	31	Third Sunday of Month
02	Monday	32	Third Monday of Month
03	Tuesday	33	Third Tuesday of Month
04	Wednesday	34	Third Wednesday of Month
05	Thursday	35	Third Thursday of Month
06	Friday	36	Third Friday of Month
07	Saturday	37	Third Saturday of Month
08	Weekdays	41	Forth Sunday of Month
09	Weekends	42	Forth Monday of Month
11	First Sunday of Month	43	Forth Tuesday of Month
12	First Monday of Month	44	Forth Wednesday of Month
13	First Tuesday of Month	45	Forth Thursday of Month
14	First Wednesday of Month	46	Forth Friday of Month
15	First Thursday of Month	47	Forth Saturday of Month
16	First Friday of Month	51	Fifth Sunday of Month
17	First Saturday of Month	52	Fifth Monday of Month
21	Second Sunday of Month	53	Fifth Tuesday of Month
22	Second Monday of Month	54	Fifth Wednesday of Month
23	Second Tuesday of Month	55	Fifth Thursday of Month
24	Second Wednesday of Month	56	Fifth Friday of Month
25	Second Thursday of Month	57	Fifth Saturday of Month
26	Second Friday of Month		
SCHEDULER PROGRAMMING MONTH AND YEAR			
01-31	Day of Month		(00) = Skip Day of Month
01-12	Month of Year		(00) = Skip Month of Year

**Disable Scheduled Event Macro 40**

Key-up and send [\*1140 0] to disable scheduler macro 40 or [\*1140 1] to enable macro 40.

**Erase Scheduled Event Macro Time (40-60)**

Key-up and send [\*12XX]. Un-key, the voice will say: "CONTROL OK."

**User Macro Command Memory**

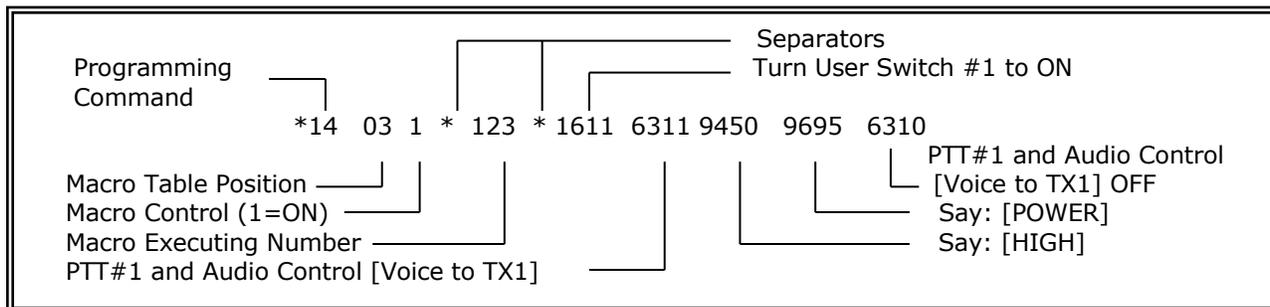
A user macro is a series of commands, defined by the repeater owner. User macros permit the owner to customize certain aspects of repeater operation. Once the CAT-800 decodes the macro number, the commands will execute in the order they were stored within the macro string. The CAT-800 supports thirty user macros.

**Read User Macro Locations (01-30)**

Key-up and send [\*13XX]. Un-key and voice will read back the macro control number followed by the enable control byte followed by the macro data commands stored at that memory location. If the location is empty, the voice will say: "MACRO NUMBER XX NO CODE NO DATA."

**Program User Macro Locations (01-30)**

Key-up and send [\*14XX] followed by the macro control number and the string of internal commands to be executed. See Figure 5-1. Un-key and the voice will say: "CONTROL OK." Example: Program macro #3 with a control number of [123] to Turn ON User Function Switch #1 and say: "HI POWER". The Macro Control number [123] is the number entered by a repeater user to execute the macro.



**Program User Macro Locations Enable – Disable (01-30)**

Key-up and send [\*14XX] followed by a [1] to enable the macro or a [0] to disable the macro. This feature permits the macro to be turned off without having to erasing it. Un-key and voice will say: "CONTROL OK."

**Erase User Macro Locations (01-30)**

Key-up and send [\*15XX]. Un-key, the voice will say: "CONTROL OK."

**User Macro Default Data**

The following table describes a series of default User Macros to connect and disconnect the three ports. These User Macros can be changed with the [\*14XX] programming command. The CAT-800 supports a total of forty user macros.





EVENT MACRO DEFAULT TABLE		
01	PORT #1 INPUT ACTIVE	
02	PORT #1 INPUT INACTIVE	
03	PORT #2 INPUT ACTIVE	
04	PORT #2 INPUT INACTIVE	
05	PORT #3 INPUT ACTIVE	
06	PORT #3 INPUT INACTIVE	
07	LOGIC INPUT #1 ACTIVE HIGH	[6811-6311-9800-9001-9656-6310]
08	LOGIC INPUT #1 ACTIVE LOW	[6810-6311-9800-9001-9654-6310]
09	LOGIC INPUT #2 ACTIVE HIGH	[6821-6311-9800-9002-9656-6310]
10	LOGIC INPUT #2 ACTIVE LOW	[6820-6311-9800-9002-9654-6310]
11	LOGIC INPUT #3 ACTIVE HIGH	[6831-6311-9800-9003-9656-6310]
12	LOGIC INPUT #3 ACTIVE LOW	[6830-6311-9800-9003-9654-6310]
13	LOGIC INPUT #4 ACTIVE HIGH	[6841-6311-9800-9004-9656-6310]
14	LOGIC INPUT #4 ACTIVE LOW	[6840-6311-9800-9004-9654-6310]
15	LOGIC INPUT #5 ACTIVE HIGH	[6851-6311-9800-9005-9656-6310]
16	LOGIC INPUT #5 ACTIVE LOW	[6850-6311-9800-9005-9654-6310]
17	REPEATER ID	[5011-3200-5010]
18	REPEATER FINAL ID	[6111-3400-6110]
19	REPEATER CW ID	[3400]
20	PLAY COURTESY TONE PORT #1 ACTIVE	[4000]
21	PLAY COURTESY TONE PORT #2 ACTIVE	[4000]
22	PLAY COURTESY TONE PORT #3 ACTIVE	[4000]
23	REPEATER TIME OUT	[6311-9746-9838-9664-6310]
24	REPEATER TIMEOUT CLEAR	[6311-9746-9838-9664-9283-6310]
25	DTMF ACCESS UP	[6311-9650-9530-9875-6310]
26	DTMF ACCESS DOWN	[6311-9650-9530-9324-6310]
27	TX OFF MESSAGE #1	[6311-3002-6310]
28	TX OFF MESSAGE #2	[6311-3003-6310]
29	TIMED MESSAGE #1	[6311-3004-6310]
30	TIMED MESSAGE #2	[6311-3005-6310]
31	TIMED MESSAGE #3	[6311-3006-6310]
32	TIMED MESSAGE #4	[6311-3007-6310]
33	GRANDFATHER CLOCK MESSAGE	[6311-3008-6310]
34	LINK AUTO DISCONNECT PORT #2	[6311-9561-9002-9838-9664-6310-7120]
35	LINK AUTO DISCONNECT PORT #3	[6311-9561-9003-9838-9664-6310-7130]
36	RESERVED	
37	RESERVED	
38	RESERVED	
39	RESERVED	
40	SCHEDULED EVENT MACRO #40	
41	SCHEDULED EVENT MACRO #41	

42	SCHEDULED EVENT MACRO #42	
43	SCHEDULED EVENT MACRO #43	
44	SCHEDULED EVENT MACRO #44	
45	SCHEDULED EVENT MACRO #45	
46	SCHEDULED EVENT MACRO #46	
47	SCHEDULED EVENT MACRO #47	
48	SCHEDULED EVENT MACRO #48	
49	SCHEDULED EVENT MACRO #49	
50	SCHEDULED EVENT MACRO #50	
51	SCHEDULED EVENT MACRO #51	
52	SCHEDULED EVENT MACRO #52	
53	SCHEDULED EVENT MACRO #53	
54	SCHEDULED EVENT MACRO #54	
55	SCHEDULED EVENT MACRO #55	
56	SCHEDULED EVENT MACRO #56	
57	SCHEDULED EVENT MACRO #57	
58	SCHEDULED EVENT MACRO #58	
59	SCHEDULED EVENT MACRO #59	
60	POWER UP MACRO	[6311-6001-9275-9008-9456-9746-9999-6310]

**Erase Event Macro Locations (01-60)**

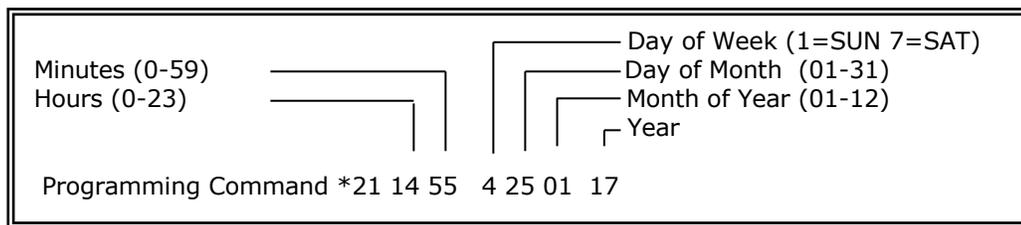
Key-up and send [\*18XX]. Un-key, the voice will say: "CONTROL OK."

**Check Time of Day**

Key-up and send [\*20]. Un-key, the voice will read the time, day of week, day of month, month and year. Example: "THE TIME IS TWELVE FIFTEEN PM MONDAY MAY TWENTY THREE TWO THOUSAND FOURTEEN." NOTE: A CR2032 coin battery supplies back-up power for the clock.

**Setting the Clock**

Key-up and send [\*21] followed by the hours, minutes, day of week, day of month, month of year and year. Un-key and the voice will say "CLOCK SET OK." Example: 2:55 PM Wednesday January 25th. 2017. All entries must be double digit, except the day of week.



**Program DTMF Muting Override Command [\*28X]**

With DTMF muting enabled, there may be times when it is desirable to pass the DTMF tones to the transmitter. To temporarily disable DTMF muting, precede the DTMF string with a pound [#]. This key can be changed with the [\*28X] programming command. To change this key to [A], key-up and send [\*28A]. Un-key, the voice will say: "CONTROL OK." Select [\*], [#], [A], [B], [C], or [D]. To read the command, key-up and send [\*28].

**Program Forced Entry Command [\*29]**

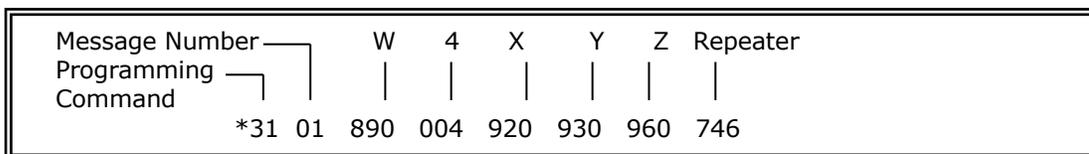
DTMF commands are entered when the port goes inactive. To force a DTMF command when the port is active, end the command with a [D]. This key can be changed with the [\*29X] programming command. To change this key to [#], key-up and send [\*29#]. Un-key, the voice will say: "CONTROL OK." Select [\*], [#], [A], [B], [C], or [D]. To read the command, key-up and send [\*29].

**Send Voice Message [\*3001]-[\*3020]**

Key-up and send [\*3001]. Un-key and the voice synthesizer will say the voice ID message #1.

**Program Voice Message [\*3101]-[\*3120]**

Key-up and send [\*31XX] followed by the message number and three digit numbers that represent the words required to construct the ID. Memory space is provided for 15 entries. Refer to the Voice Vocabulary Word List. Example: Load Repeater Port #1 ID with "W4XYZ Repeater".



DEFAULT VOICE MESSAGE TABLE		
01	REPEATER VOICE ID	"CAT-800 REPEATER"
02	TRANSMITTER TURN OFF MESSAGE #1	"TRANSMITTER OFF MESSAGE #1"
03	TRANSMITTER TURN OFF MESSAGE #2	"TRANSMITTER OFF MESSAGE #2"
04	TIMED MESSAGE #1	"TIME MESSAGE 1"
05	TIMED MESSAGE #2	"TIME MESSAGE 2"
06	TIMED MESSAGE #3	"TIME MESSAGE 3"
07	TIMED MESSAGE #4	"TIME MESSAGE 4"
08	GRANDFATHER CLOCK MESSAGE	"CAT-800 THE TIME IS"
09	TIME OF DAY REQUEST MESSAGE	"THE TIME IS"
10	MESSAGE 10	"MESSAGE 10"
11	MESSAGE 11	"MESSAGE 11"
12	MESSAGE 12	"MESSAGE 12"
13	MESSAGE 13	"MESSAGE 13"
14	MESSAGE 14	"MESSAGE 14"
15	MESSAGE 15	"MESSAGE 15"
16	MESSAGE 16	"MESSAGE 16"
17	MESSAGE 17	"MESSAGE 17"
18	MESSAGE 18	"MESSAGE 18"
19	MESSAGE 19	"MESSAGE 19"
20	MESSAGE 20	"MESSAGE 20"

**Erase Synthesized Voice Message [\*3201]-[\*3220]**

Key-up and send [\*32XX]. Un-key and the voice will say: "CONTROL OK." The voice ID will be erased.

**CW ID Memory Storage**

Memory space is provided for fifteen. During initialization, the CW buffer is loaded with "CAT800/R."

**Send CW Identification [\*33]**

Key-up and send [\*33]. Un-key and the CAT-800 will send the CW ID.

**Program CW Identification [\*34]**

To program the CW buffer send [\*34] followed by the numbers in the CW ID Programming Table. Memory space is provided for (15) entries. Example: Load CW ID with W4XYZ, Frequency 800Hz and 20 Words per Minute.

Programming Command	Frequency	20wpm	W	4	X	Y	Z
*34	5	2	32	04	33	34	35

**CW ID PROGRAMMING TABLE**

00=004=408=812=C16= 20=K24= 28=S32= 36=/ 40=;  
                   G          O          W  
 01=105=509=913=D17=H21=L 25=P29=T33=X37=A41=,  
   R  
 02=206=610=A14=E18=I 22= 26= 30=U34=Y38=S42=:  
                                   M      Q          PACE  
 03=307=711=B15=F 19=J 23=N27=R31=V35=Z39=. 43=?  
 Frequ 1=4 2=5 3=6 4=7 5=8 6=9 7=12  
 ency 00 00 00 00 00 00 00  
 Hz  
 Spee 1=252=203=184=155=5  
 d  
 W.P.  
 M.

**Erase CW Identification [\*35]**

Key-up and send [\*35]. Un-key and the voice will say: "CONTROL OK."

**Program CTCSS Inputs [\*3610 - \*3634]**

The CAT-800 has three CTCSS logic inputs, one for each of the three ports. At default the three inputs are set for "COR and CTCSS" active high logic. Use the \*36XX programming commands to change the CTCSS logic inputs. NOTE: X equals the logic input number 1 through 5.

CTCSS LOGIC INPUTS		
*3610	READ PORT #1 CTCSS INPUT SETTING	
*3611	SET PORT #1 CTCSS LOGIC (COR AND CTCSS) ACTIVE HI	DEFAULT
*3612	SET PORT #1 CTCSS LOGIC (COR AND CTCSS) ACTIVE LO	
*3613	SET PORT #1 CTCSS LOGIC (COR OR CTCSS) ACTIVE HI	
*3614	SET PORT #1 CTCSS LOGIC (COR OR CTCSS) ACTIVE LO	
*3620	READ PORT #2 CTCSS INPUT SETTING	
*3621	SET PORT #2 CTCSS LOGIC (COR AND CTCSS) ACTIVE HI	DEFAULT
*3622	SET PORT #2 CTCSS LOGIC (COR AND CTCSS) ACTIVE LO	
*3623	SET PORT #2 CTCSS LOGIC (COR OR CTCSS) ACTIVE HI	
*3624	SET PORT #2 CTCSS LOGIC (COR OR CTCSS) ACTIVE LO	
*3630	READ PORT #3 CTCSS INPUT SETTING	
*3631	SET PORT #3 CTCSS LOGIC (COR AND CTCSS) ACTIVE HI	DEFAULT
*3632	SET PORT #3 CTCSS LOGIC (COR AND CTCSS) ACTIVE LO	
*3633	SET PORT #3 CTCSS LOGIC (COR OR CTCSS) ACTIVE HI	

*3634	SET PORT #3 CTCSS LOGIC (COR OR CTCSS) ACTIVE LO	
-------	--	--

**Program USER Function Output Switch Assignments [\*39X0 - \*39X4]**

At default the five switches are set up as DTMF remote control switches. To read a switch setting, enter the [\*39X0]. To configure the switch as a user function switch use the [\*39X1] programming command. To configure the switch as a fan control relay driver use the [\*39X2] programming command. To configure the switch as a CTCSS encoder control switch that follows PTT use the [\*39X3] programming command. To configure the switch as a CTCSS encoder that follows COR use the [\*39X4] programming command.

When the Fan Control is selected the switch will follow PTT #1 and remain on for an additional 60 seconds after PTT #1 turns off. When CTCSS Encoder Switch (PTT) is selected the switch will follow PTT #1 but turn off 0.5 seconds before PTT #1 turns off. When CTCSS Encoder Switch (COR) is selected the switch will follow COR #1. NOTE: X equals the switch number 1 through 5.

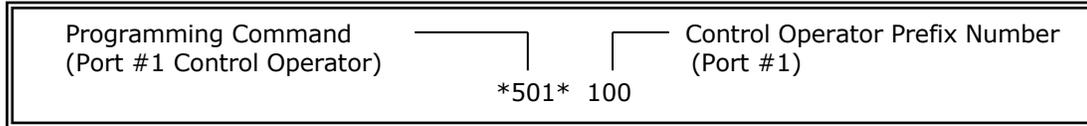
USER FUNCTION OUTPUT SWITCH ASSIGNMENT TABLE		
*3910	READ USER FUNCTION SWITCH #1 SELECTION	
*3911	PROGRAM AS USER FUNCTION SWITCH	DEFAULT
*3912	PROGRAM AS FAN CONTROL SWITCH	
*3913	PROGRAM AS CTCSS ENCODER SWITCH (PTT)	
*3914	PROGRAM AS CTCSS ENCODER SWITCH (COR)	
*3920	READ USER FUNCTION SWITCH #2 SELECTION	
*3921	PROGRAM AS USER FUNCTION SWITCH	DEFAULT
*3922	PROGRAM AS FAN CONTROL SWITCH	
*3923	PROGRAM AS CTCSS ENCODER SWITCH (PTT)	
*3924	PROGRAM AS CTCSS ENCODER SWITCH (COR)	
*3930	READ USER FUNCTION SWITCH #3 SELECTION	
*3931	PROGRAM AS USER FUNCTION SWITCH	DEFAULT
*3932	PROGRAM AS FAN CONTROL SWITCH	
*3933	PROGRAM AS CTCSS ENCODER SWITCH (PTT)	
*3934	PROGRAM AS CTCSS ENCODER SWITCH (COR)	
*3940	READ USER FUNCTION SWITCH #4 SELECTION	
*3941	PROGRAM AS USER FUNCTION SWITCH	DEFAULT
*3942	PROGRAM AS FAN CONTROL SWITCH	
*3943	PROGRAM AS CTCSS ENCODER SWITCH (PTT)	
*3944	PROGRAM AS CTCSS ENCODER SWITCH (COR)	
*3950	READ USER FUNCTION SWITCH #5 SELECTION	
*3951	PROGRAM AS USER FUNCTION SWITCH	DEFAULT
*3952	PROGRAM AS FAN CONTROL SWITCH	
*3953	PROGRAM AS CTCSS ENCODER SWITCH (PTT)	
*3954	PROGRAM AS CTCSS ENCODER SWITCH (COR)	

### Control Code And Prefix Number Memory

This memory area is reserved for storage of control and prefix numbers. These numbers can be from one to seven digits and will change to a default value when the CAT-800 is powered up with dipswitch #7 set to the on position.

#### Control Operator Prefix Number Port #1 [\*501\*]

This programming command selects the control operator number for Port #1. This number must precede the command to change the zone control functions. Example: To program a Control Operator Prefix of [100] for Port #1, key-up and send:



Un-key, the voice will say: "CONTROL OK." The default number for Port #1 is [100].

#### Control Operator Number Port #2 [\*502\*]

This programming command selects the control operator number for Port #2. The default control operator code for Port #2 is [200].

#### Control Operator Number Port #3 [\*503\*]

This programming command selects the control operator number for Port #3. The default control operator code for Port #3 is [300].

#### DTMF Access Code [\*504\*]

This programming command selects the DTMF access prefix number. When the repeater is in the DTMF Access Mode it will not respond to a COR input. The repeater user must enter the DTMF access number to activate the repeater. When the repeater returns to rest for a period determined by the sleep timer, this number must be re-entered to activate the repeater. The default number is [325].

#### Time Of Day Request [\*505\*]

This programming command selects the number that must be entered to request the time of day announcement. Example: To program a Time Request Number of 400, key-up and send [\*505\*400]. Un-key and the voice will say, "CONTROL OK."

#### DTMF Pad Test Number [\*506\*]

This programming command selects the DTMF pad test prefix number. This number must be entered to initiate a DTMF keypad test. Example: To program a DTMF Pad Test Number of 475, key-up and send [\*506\*475]. Un-key and the voice will say: "CONTROL OK."

#### Select Courtesy Tone Control Number [\*507\*]

This programming command selects the Load Courtesy Tone number. The default courtesy tone is number one. Example: To program the load courtesy tone number of 600, key-up and send [\*507\*600]. Un-key and the voice will say "CONTROL OK."

#### Paging Tone Control Number [\*508\*]

This programming command selects the number that must be entered to PLAY one of the paging tones. This number must precede the two-digit paging tone table position number. Example: To program a paging tone Control Number of 650, key-up and send [\*508\*650]. Un-key and the voice will say: "CONTROL OK."

**Voice Demonstration Control Number [\*509\*]**

This programming command selects the number that must be entered to PLAY one of the voice messages. This number must precede the voice message number. Example: To program a Voice Demonstration Control Number of 700, key-up and send [\*509\*700]. Un-key and the voice will say: "CONTROL OK."

**Play Digital Audio WAV Track Control Number [\*510\*]**

This programming command selects the number that must be entered to PLAY one of the digital audio tracks. This number must precede the two-digit track number. Example: To program a Play Audio Track Control Number of 725, key-up and send [\*510\*725]. Un-key and the voice will say: "CONTROL OK."

**Reserved [\*511\*]**

This programming command is reserved for future use.

**Secondary Unlock Number [\*512\*]**

This programming command selects the secondary unlock number used to place the CAT-800 in the programming mode. This number is not restricted to a seven-digit number. The default number is [7654321].

**Read Control And Prefix Numbers [\*501 - \*512]**

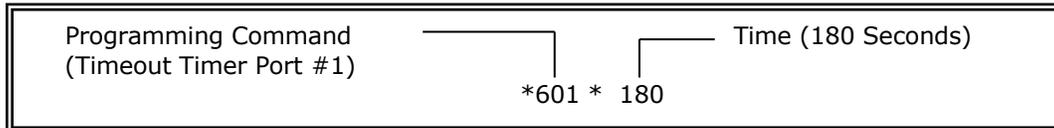
Use this programming command to read the Port #1 control operator code. Example: Key-up and enter [\*501], un-key and the voice will say: "CODE FIVE ZERO ONE IS ONE ZERO ZERO."

**Timer Memory**

This memory area is reserved for storage of [19] timers. These timers are user programmable. When the CAT-800 is initialized, these timers are automatically loaded with default values.

**Port #1 Timeout Timer [\*601\*]**

This timer limits the time a signal can appear on the Port #1 receiver input. If this time limit is exceeded the controller will turn off the transmitter. This timer is programmable between 60 and 1799 seconds. Example: To program the Port #1 timer for 3 minutes, key-up and enter [\*601\*180]. Un-key and the voice will say: "CONTROL OK." When the CAT-800 is initialized this timer defaults to 180 seconds.



**Port #2 Timeout Timer [\*602\*]**

This timer limits the time a signal can appear on the Port #2 receiver input. If this time limit is exceeded the controller will turn off the transmitter. When the CAT-800 is initialized this timer defaults to 180 seconds.

**Port #3 Timeout Timer [\*603\*]**

This timer limits the time a signal can appear on the Port #3 receiver input. If this time limit is exceeded the controller will turn off the transmitter. When the CAT-800 is initialized this timer defaults to 180 seconds.

**System ID Timer [\*604\*]**

This timer sets the time between transmissions of the Port #1 ID. The ID occurs when a repeater user stops transmitting. This timer is programmable between 60 and 1799 seconds. The timer default is 480 seconds.

**Port #2 Inactivity Disconnect Timer [\*605\*]**

This timer determines how long Port #2 remains inactive before event macro 38 executes. Control Zone 2 Channel 6 must be enabled. This timer is programmable between 60 and 1799 seconds. The timer default is 600 seconds.

**Port #3 Inactivity Disconnect Timer [\*606\*]**

This timer determines how long Port #3 remains inactive before event macro 39 executes. Control Zone 3 Channel 6 must be enabled. This timer is programmable between 60 and 1799 seconds. The timer default is 600 seconds.

**Timed Message #1 Timer [\*607\*]**

This timer sets the timed message repeat period. This timer is programmable between 1.0 and 1799 seconds. The timer default is 300 seconds.

**Timed Message #2 Timer [\*608\*]**

This timer sets the timed message repeat period. This timer is programmable between 1.0 and 1799 seconds. The timer default is 600 seconds.

**Timed Message #3 Timer [\*609\*]**

This timer sets the timed message repeat period. This timer is programmable between 1.0 and 1799 seconds. The timer default is 900 seconds.

**Timed Message #4 Timer [\*610\*]**

This timer sets the timed message repeat period. This timer is programmable between 1.0 and 1799 seconds. The timer default is 1200 seconds.

**PTT Off Message #1 Timer [\*611\*]**

This timer sets the time between transmissions of the squelch tail message. The message occurs when a repeater user stops transmitting. This timer is programmable between 1.0 and 1799 seconds. The timer default is 1799 seconds.

**PTT Off Message #2 Timer [\*612\*]**

This timer sets the time between transmissions of the drop out message. The message occurs when a repeater stops transmitting. This timer is programmable between 1.0 and 1799 seconds. The timer default is 1799 seconds.

**DTMF Programming Length Timer [\*613\*]**

During the programming mode, this timer determines the maximum time the controller remains unlocked. This timer is programmable between 60 and 1799 seconds. When initialize, this timer will default to 600 second.

**DTMF Access Sleep Timer [\*614\*]**

This timer determines the time required for the repeater to be at rest before the DTMF access code is required to activate the repeater. This timer is programmable between 60 and 1799 seconds. The timer default is 60 seconds.

**COR Drop to Courtesy Beep Timer [\*620\*]**

This timer determines the time between loss of COR and generation of the courtesy beep. This timer is programmable between 0.1 and 9.9 seconds. When initialize, this timer defaults to 1 second. Example: To program the timer for 2.5 seconds, key-up and enter [\*620\*25].

**Courtesy Beep to PTT Drop Timer [\*621\*]**

This timer determines the time between the generation of the courtesy beep and the time the repeater transmitter turns off. This timer is programmable between 0.1 and 9.9 seconds. The timer default is 4 seconds.

**Pre-Voice Delay Timer [\*622\*]**

This timer determines the time after PTT goes active and the voice synthesizer begins to speak. This timer is programmable between 0.1 and 9.9 seconds. The timer default is 0.5 seconds.

**Turn on Delay Timer [\*623\*]**

When the repeater is at rest, this timer sets the time COR must be present before the repeater will activate. This timer is programmable between 0.1 and 9.9 seconds. Example: To program this timer to 1.5 seconds, key-up and enter [\*623\*15]. Un-key and the voice will say: "CONTROL OK." When initialize this timer will default to 1.0 seconds. This timer also sets the turn on delay time for the Port #2 input.

**DTMF Muting Timer [\*624\*]**

This timer determines the time the transmit audio will continue to be muted after the entry of the last DTMF tone. When initialize, this timer defaults to 1 second.

**Read Timer Settings [\*601-\*624]**

Key-up and send [\*601]. Un-key and the voice synthesizer will read back the setting of the Port #1 time-out timer. The voice will say: "TIMER 601 IS THREE MINUTES."

**Courtesy Tone**

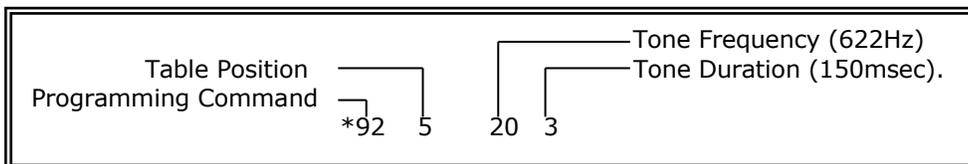
Memory space is provided for [8] custom courtesy tones. Each tone can consist of up to three different tone frequencies of various lengths and separations.

**Send Courtesy Tone (1-8)**

Key-up and send [\*91X]. Un-key and the CAT-800 will transmit the courtesy tone. "X" represents the courtesy tone table location.

**Program Courtesy Tone (1-8)**

Key-up and send [\*92X] followed by the table position, frequency, duration and separation numbers from the courtesy tone-programming table. Example: Program courtesy tone table location 5 with a tone of 622Hz and duration of 150msec.

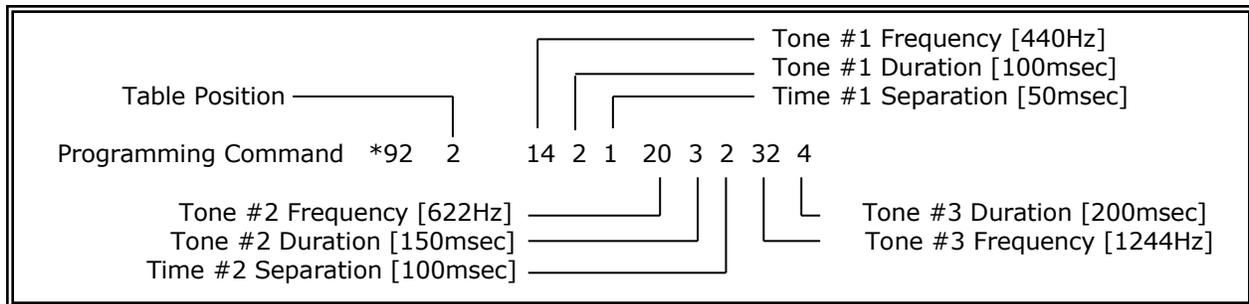


**COURTESY TONE DEFAULT TABLE**

Tone	Freq	Time	Space	Freq	Time	Space	Freq	Time
1	330 Hz	150mSEC	50mSEC	493 Hz	150mSEC	50mSEC	660 Hz	150mSEC
2	660 Hz	150mSEC	50mSEC	493 Hz	150mSEC	50mSEC	330 Hz	150mSEC
3	880 Hz	150mSEC	50mSEC	1046 Hz	150mSEC			
4	880 Hz	150mSEC						
5	660 Hz	150mSEC						
6	440 Hz	150mSEC						
7	440 Hz	150mSEC	0mSEC	660 Hz	150mSEC			
8	660 Hz	150mSEC	0mSEC	440 Hz	150mSEC			

COURTESY TONE PROGRAMMING TABLE						
TONE FREQUENCY (Hz)						
01=207	06=277	11=370	16=493	21=660	26=880	31=1174
02=220	07=293	12=392	17=523	22=698	27=932	32=1244
03=233	08=311	13=415	18=554	23=740	28=987	
04=246	09=330	14=440	19=587	24=784	29=1046	
05=261	10=349	15=466	20=622	25=830	30=1108	
Tone Duration (Milliseconds)						
0=0	1=50	2=100	3=150	4=200		
5=250	6=300	7=350	8=400	9=450		

To program a multiple courtesy tone, key-up and send [\*92X], followed by the desired tone frequency, duration and separation numbers. Example: Program courtesy tone table location 2 with a three-frequency courtesy tone.



### Erase Courtesy Tone (1-8)

Key-up and send [\*93X]. Un-key and the voice will say: "CONTROL OK."

### Paging Tone Memory

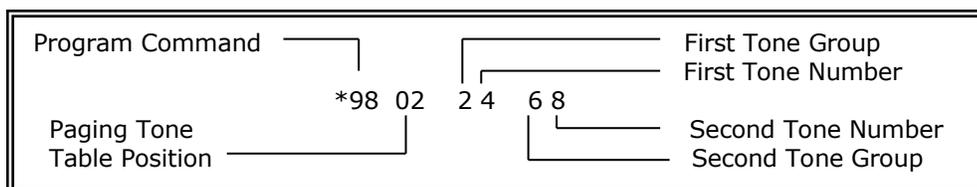
The CAT-800 will generate two-tone sequential paging tones. The first tone will be on for one second while the second tone will be on for three seconds. Memory space is provided for five paging tones. See the Two-Tone Sequential Paging Frequency Table.

### Send Paging Tone Locations (01-05)

Key-up and send [\*97XX]. Un-key and the CAT-800 will send the paging tones stored at that memory location. If the location is empty, the voice will say: "POSITION XX IS CLEAR." During this send command, the length of each tone is increased to four seconds to provide time to measure the frequency on a counter.

**Program Paging Tone Locations (01-05)**

Key-up and send [\*98XX] followed by the paging tone group and tone number. Un-key and the voice will say: "CONTROL OK." Example: Program [707 - 1395Hz] tones at table position 2.



**TWO-TONE SEQUENTIAL PAGING FREQUENCIES (Hz)**

Tone	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
1	349.0	600.9	288.5	339.6	584.8	1153.4
2	368.5	634.5	296.5	358.6	617.4	1185.2
3	389.0	669.9	304.7	378.6	651.9	1217.8
4	410.8	707.3	313.0	399.8	688.3	1251.4
5	433.7	746.8	322.1	422.1	726.8	1285.8
6	457.9	788.5	331.7	445.7	767.4	1321.2
7	483.5	832.5	341.7	470.5	810.2	1357.6
8	510.5	879.0	352.4	496.8	855.5	1395.0
9	539.0	928.1	363.7	524.6	903.2	1433.4
0	330.5	569.1	1092.4	321.7	553.9	1122.5

**Erase Paging Tone Locations (01-05)**

Key-up and send [\*99XX]. Un-key and the voice will say: "POSITION XX IS CLEAR."

**Audio Test Tone [\*901 \*902 \*903]**

The CAT-800 will generate a 1000Hz test tone. Use this tone as a reference when setting the transmitter audio levels. To activate the tone, as TX1 audio, key-up and enter [\*901]. To activate the tone, as TX2 audio, key-up and enter [\*902]. To activate the tone, as TX3 audio, key-up and enter [\*903].

**Exit Programming Mode [\*0]**

To exit the programming mode and return to normal repeater operation, key-up and send [\*0]. Un-key and the voice will say: "CONTROL EXIT." If you fail to exit the programming mode, the CAT-800 will exit the programming mode when the [\*613\*] timer expires. The CAT-800 will return to normal operation. The voice will say: "TIMER EXIT."

## CAT-800 DTMF Programming Commands

ENTRY	DTMF PROGRAMMING COMMAND TABLE	DEFAULT
*10XX	READ SCHEDULED EVENT TIME (40-59)	
*11XX	PROGRAM SCHEDULED EVENT TIME (40-59)	
*12XX	ERASE SCHEDULED EVENT TIME (40-59)	
*13XX	READ USER MACRO (01-40)	
*14XX	PROGRAM USER MACRO (01-40)	
*15XX	ERASE USER MACRO (01-40)	
*16XX	READ EVENT MACRO (01-50)	
*17XX	PROGRAM EVENT COMMAND (01-50)	
*18XX	ERASE EVENT COMMAND (01-50)	
*20	SEND TIME OF DAY	
*21	PROGRAM TIME OF DAY	
*28	READ DTMF MUTING OVERRIDE ENTRY KEY	
*28X	PROGRAM DTMF MUTING OVERRIDE ENTRY KEY	#
*29	READ FORCED ENTRY KEY	
*29X	PROGRAM FORCED ENTRY KEY	D
*30XX	SEND VOICE MESSAGE (01-20)	
*31XX	PROGRAM VOICE MESSAGE (01-20)	
*32XX	ERASE VOICE MESSAGE (01-20)	
*33	SEND CW IDENTIFICATION	
*34	PROGRAM CW IDENTIFICATION	
*35	ERASE CW IDENTIFICATION	
*3610	READ PORT #1 CTCSS INPUT SETTING	
*3611	SET PORT #1 CTCSS LOGIC (COR and CTCSS) ACTIVE HI	DEFAULT
*3612	SET PORT #1 CTCSS LOGIC (COR and CTCSS) ACTIVE LO	
*3613	SET PORT #1 CTCSS LOGIC (COR or CTCSS) ACTIVE HI	
*3614	SET PORT #1 CTCSS LOGIC (COR or CTCSS) ACTIVE LO	
*3620	READ PORT #2 CTCSS INPUT SETTING	
*3621	SET PORT #2 CTCSS LOGIC (COR and CTCSS) ACTIVE HI	DEFAULT
*3622	SET PORT #2 CTCSS LOGIC (COR and CTCSS) Active LO	
*3623	SET PORT #2 CTCSS LOGIC (COR or CTCSS) ACTIVE HI	
*3624	SET PORT #2 CTCSS LOGIC (COR or CTCSS) ACTIVE LO	
*3630	READ PORT #3 CTCSS INPUT SETTING	
*3631	SET PORT #3 CTCSS LOGIC (COR and CTCSS) ACTIVE HI	DEFAULT
*3632	SET PORT #3 CTCSS LOGIC (COR and CTCSS) ACTIVE LO	
*3633	SET PORT #3 CTCSS LOGIC (COR or CTCSS) ACTIVE HI	
*3634	SET PORT #3 CTCSS LOGIC (COR or CTCSS) ACTIVE LO	
*39X0	READ USER FUNCTION SWITCH SELECTION (X=SWITCH NUMBER)	
*39X1	PROGRAM AS USER FUNCTION SWITCH	DEFAULT
*39X2	PROGRAM AS FAN CONTROL SWITCH	
*39X3	PROGRAM AS CTCSS ENCODER SWITCH (PTT)	
*39X4	PROGRAM AS CTCSS ENCODER SWITCH (COR)	

*501*	PROGRAM CONTROL OPERATOR NUMBER PORT #1	100
*502*	PROGRAM CONTROL OPERATOR NUMBER PORT #2	200
*503*	PROGRAM CONTROL OPERATOR NUMBER PORT #3	300
*504*	PROGRAM DTMF ACCESS CODE	325
*505*	PROGRAM TIME OF DAY REQUEST NUMBER	400
*506*	PROGRAM DTMF PAD TEST NUMBER	475
*507*	PROGRAM LOAD COURTESY TONE NUMBER	600
*508*	PROGRAM PAGING TONE DEMO NUMBER (01 - 20)	650
*509*	PROGRAM VOICE MESSAGE DEMO NUMBER	700
*510*	PROGRAM DIGITAL VOICE WAV PLAYER DEMO NUMBER	725
*511*	RESERVED	
*512*	UNLOCK NUMBER #2 (NOT RESTRICTED TO A 7 DIGIT CODE LENGTH)	7654321
*601*	PORT #1 TIME-OUT TIMER (60 - 1799 SECONDS)	180
*602*	PORT #2 TIME-OUT TIMER (60 - 1799 SECONDS)	180
*603*	PORT #3 TIME-OUT TIMER (60 - 1799 SECONDS)	180
*604*	SYSTEM ID TIMER (60 - 1799 SECONDS)	480
*605*	PORT #2 INACTIVITY DISCONNECT TIMER (60 - 1799 SECONDS)	600
*606*	PORT #3 INACTIVITY DISCONNECT TIMER (60 - 1799 SECONDS)	600
*607*	TIMED MESSAGE #1 TIMER (60 - 1799 SECONDS)	300
*608*	TIMED MESSAGE #2 TIMER (60 - 1799 SECONDS)	600
*609*	TIMED MESSAGE #3 TIMER (60 - 1799 SECONDS)	900
*610*	TIMED MESSAGE #4 TIMER (60 - 1799 SECONDS)	1200
*611*	PTT OFF MESSAGE #1 TIMER (60 - 1799 SECONDS)	1799
*612*	PTT OFF MESSAGE #2 TIMER (60 - 1799 SECONDS)	1799
*613*	DTMF PROGRAMMING LENGTH TIMER (60 - 1799 SECONDS)	600
*614*	PROGRAM DTMF ACCESS SLEEP TIMER (60 - 1799 SECONDS)	60
*620*	PROGRAM COR DROP TO COURTESY BEEP TIMER (0.1 - 9.9 SECONDS)	1.0
*621*	PROGRAM COURTESY BEEP TO PTT DROP TIMER (0.1 - 9.9 SECONDS)	4.0
*622*	PRE-VOICE DELAY TIMER (0.1 - 9.9 SECONDS)	0.5
*623*	TURN-ON DELAY TIMER (0.1 - 9.9 SECONDS)	1.0
*624*	DTMF MUTING TIMER (0.1 - 9.9 SECONDS)	1.0
*901	TRANSMIT AUDIO TEST TONE PORT #1 (1000Hz for 30 SECONDS)	
*902	TRANSMIT AUDIO TEST TONE PORT #2 (1000Hz for 30 SECONDS)	
*903	TRANSMIT AUDIO TEST TONE PORT #3 (1000Hz for 30 SECONDS)	
*91X	PLAY COURTESY TONE (1-8)	
*92X	PROGRAM COURTESY TONE (1-8)	
*93X	ERASE COURTESY TONE (1-8)	
*97XX	TRANSMIT PAGING TONE (01 - 05)	
*98XX	PROGRAM PAGING TONE (01 - 05)	
*99XX	ERASE PAGING TONE (01 - 05)	
*0	MANUAL EXIT OF PROGRAMMING MODE	

## Chapter 6 – Interfacing to Other Equipment

Interfacing the CAT-800 to your repeater system is a simple matter. A minimum of two inputs, two outputs and a ground are required for the CAT-800 to control a repeater. They are:

1. A COR signal from the repeater's receiver to indicate that a signal is being received.
2. A receive audio signal containing DTMF tones to be processed for control of the CAT-800.
3. A Push-To-Talk signal from the CAT-800 to tell the repeater's transmitter to turn ON.
4. A transmit audio signal containing a combination of receive audio, synthesized voice, and courtesy tones to modulate the transmitter.
5. A ground wire to connect the chassis of the repeater to ground on the CAT-800.

NOTE: Additional connections may be required to realize all the features of the CAT-800.

### Connection to Repeater Transmitter

Locate the repeater Push-To-Talk input. When grounded, this line will make the repeater transmit. Connect the PTT #1 output (J1-10) to this line. Locate the TX audio input. This is the line where the audio signal used to modulate the transmitter is applied. Connect the TX1 audio (J1-11) to this input.

### Connection to Repeater Receiver

Locate the repeater receiver audio output and connect it to J1-13. Locate the repeater COR and connect it to J1-6. Verify the COR line changes from less than 0.2VDC to greater than 3.0 VDC "active high logic" or from greater than 3.0VDC to less than 0.2VDC "active low logic". If there is no voltage present this could be an indication the receiver COR circuit is an open collector switch and requires a pull-up resistor. The CAT-800 has a built in pull-up resistor for Port #1 COR. Set dipswitch #1 to on because COR #1 is considered active low. If the repeater's COR output is 0 VDC and goes above 3VDC when a signal is being received this is considered an active high COR. Dipswitch should be in the off position and you should remove the COR #1 jumper plug located behind the 25 pin "D" connector. For proper operation the Port #1 green COR LED will indicate the CAT-800 is receiving a proper COR signal. When the repeater is receiving a signal the green COR led should be on and when no signal is being received the led should be off. Do not continue until this condition is met.

### Connection to CTCSS Decoder

If your repeater has a CTCSS decoder output or you are using an external CTCSS decoder like the TS-64 connect the CTCSS logic output to J1-4. The default setting for this input is "active high logic". If the decoder logic output is active low use the [\*3612] programming command to change the controller to accept an "active low logic" input. You can also change from (COR and CTCSS) to (COR or CTCSS) mode with the [\*3613], [\*3614] programming commands.

### Check PTT and COR Activity

When power is applied the CAT-800 will key-up the transmitter, the voice will say CAT-800 and announce the firmware version and turn the transmitter off. If this occurs PTT and TX AUDIO are connected correctly. If this does not occur do not continue until this problem is resolved. If you hear the message but the transmitter remains on, the COR polarity dipswitch #1 is most likely in the wrong position. Change the setting of the dipswitch. You should hear the courtesy tone followed by a four second hang time and the transmitter should turn off.

### Check DTMF Decode Activity

Once the COR is resolved the next step is to check DTMF tone decoding. Key-up and enter a DTMF tone. Adjust RX1 control (R21) for 220mVAC at RX1 test point. Check each tone and verify the amber led lights. If there is a distortion problem the first tones to not decode are the [3] and [A]. Verify the repeater receiver and radio used to send the tones are on frequency. If the frequency is off by just a few KHz, inter-mod distortion may cause a DTMF decode problem. If the DTMF tone is not distorted the decoder should function with a level as low as 70mVAC. However adjust the level to 220mVAC to insure user radios with various levels of deviation will decode. If you experience a DTMF decode problem do not continue until the problem is resolved.

### Receive Audio De-Emphasis

If the controller is supplied with discriminator audio it may be necessary to de-emphasize the audio. With Jumper P2 installed a 0.0047uF capacitor is placed across the feed back resistor on the audio amplifier. This capacitor causes the high frequency response of the receiver's input amplifier to roll off producing de-emphasis. If the controller is supplied with processed audio, remove the jumper.

### Transmit Audio Adjustment

Once the receive audio is adjusted, key-up and send a DTMF tone. Monitor the transmitter output. Adjust the TX1 Audio control (R22) as required to set the transmitter deviation to 3 KHz or as desired. If the transmit audio adjustment is very sensitive and you find the control near minimum, it is strongly recommended that an external resistor voltage divider be installed at the audio input of the transmitter. Terminate the TX1 audio level by placing a 100 ohm resistor from the transmitter audio input to ground. Install this resistor at transmitter's modulation input not at the CAT-800's TX1 audio output .

### Voice Synthesizer Audio

Compare the received and synthesized voice audio and adjust the VOC Level control (R51) as desired. The synthesized voice should be lower than the receiver's audio level and never exceed 3KHz deviation. Over driving the Voice synthesizer audio will cause some letters to sound more alike. Repeat the above procedures for Port #2 and Port #3 using the RX2, TX2, RX3 and TX3 level controls.

### Interface Review

Verify the following eight conditions have been met.

INTERFACE REVIEW	
1	Is J1-17 connected to the repeater chassis?
2	Is J1-10 connected to the repeater transmitter's PTT input?
3	Is J1-11 connected to the repeater transmitter's modulation input?
4	Is J1-6 connected to the repeater COR output?
5	Is the COR level changing from less than 0.2 VDC to greater than 3.0 VDC?
6	Is dipswitch #1 on for active low COR voltage change or off for active high COR?
7	Is J1-13 connected to the repeater receiver's audio output?
8	Is the receive audio input level adjusted for 220mVAC at the RX1 test point?

### LED Display Indicator

The CAT-800 has six led indicators to display operational status. The green POWER led indicates power is applied and that the five and three volt regulators are operational. Three green leds indicate the input status of the three ports. An active COR input on J1-6 will light the Port-1 led. However if Zone 1 Channel 2 is enabled an active logic input on J-4 from a CTCSS decoder must also be present before the Port-1 led will light. This is also true for the Port-2 and Port-3 leds. The amber led indicates a DTMF tone is being decoded. A green led indicates INTERNET activity. Steady green indicates the CAT-800 is connected to the Internet. A flashing green indicates data is being transferred.

### Power Supply

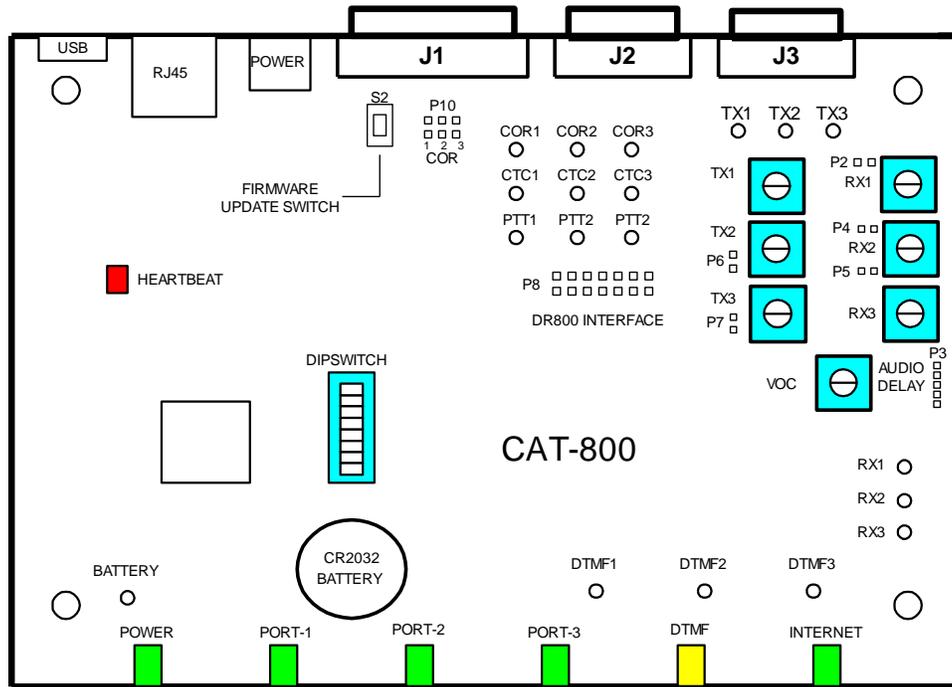
The CAT-800 is powered by an external 12VDC power supply. Connect the positive lead of the supply to the center pin of the coaxial power connector and the negative lead to the outer conductor. The power connector is a 2.5/5.5mm plug.

NOTE: Do not back-feed 12VDC power through J1-16. This is an output not an input and is not protected by the fuse and transorb. A short on the board could result in burned tracks. If necessary, only replace the fuse with a 0.5A fast blow.

### Connector Kit

Included with the controller is a connector kit containing a 25 pin "D" connector to mate with J1 and a 2.5mm power plug (center pin is [+]).

## CAT-800 Board Layout



### Test Point Table

The CAT-800 provides twenty-one test points to facilitate adjustments and troubleshooting.

TEST POINT	DESCRIPTION	LOCATION
PTT-1	Port #1 Push-To-Talk Output	J1-10
PTT-2	Port #2 Push-To-Talk Output	J1-9 and J2-4
PTT-3	Port #3 Push-To-Talk Output	J3-4
COR-1	Port #1 Carrier Operated Relay Input	U14-13
COR-2	Port #2 Carrier Operated Relay Input	U14-14
COR-3	Port #3 Carrier Operated Relay Input	U14-12
CTCSS-1	Port #1 CTCSS Input	J1-4
CTCSS-2	Port #2 CTCSS Input	J1-3 and J2-2
CTCSS-3	Port #3 CTCSS Input	J3-2
RX1	Port #1 DTMF Decoder Input	U9-14
RX2	Port #2 DTMF Decoder Input	U9-8
RX3	Port #3 DTMF Decoder Input	U11-14
TX1	Port #1 Transmit Audio Output	J1-11
TX2	Port #2 Transmit Audio Output	J1-23 and J2-4
TX3	Port #3 Transmit Audio Output	J3-4
DTMF1	Port #1 DTMF Strobe	U4-15
DTMF2	Port #2 DTMF Strobe	U5-15
DTMF3	Port #3 DTMF Strobe	U6-15
BATT	Clock Battery Voltage	Plus Lead of Clock Battery
TP-20	3.3 Volt Regulator	
TP-21	5.0 Volt Regulator	

### Heartbeat LED

The red LED located on the board will flash once a second to indicate the CAT-800 is executing its program.

## **Header Connector Definitions**

### **Header (P1)**

This connector is used to format the microprocessor during manufacturing.  
NOTE: Do not connect to this header.

### **Header (P2)**

If Port #1 is supplied with discriminator audio it may be necessary to de-emphasize the audio. With the jumper installed a capacitor will be connected across the feedback resistors of the RX1 audio amplifier. This will lower the gain at the higher frequencies and produce the necessary de-emphasis. If processed audio is supplied to the controller this jumper is not required.

### **Header (P3)**

This connector is used to attach an AD-1000 audio delay or AP-100 audio processor board.

### **Header (P4)**

If Port #2 is supplied with discriminator audio it may be necessary to de-emphasize the audio. With the jumper installed a capacitor will be connected across the feedback resistors of the RX2 audio amplifier. This will lower the gain at the higher frequencies and produce the necessary de-emphasis. If processed audio is supplied to the controller this jumper is not required.

### **Header (P5)**

If Port #3 is supplied with discriminator audio it may be necessary to de-emphasize the audio. With the jumper installed a capacitor will be connected across the feedback resistors of the RX3 audio amplifier. This will lower the gain at the higher frequencies and produce the necessary de-emphasis. If processed audio is supplied to the controller this jumper is not required.

### **Header (P6)**

If the link transmitter's input is very sensitive and you find the TX2 audio level control is near its minimum setting, install the jumper plug on P6 and readjust the TX2 control.

### **Header (P7)**

If the link transmitter's input is very sensitive and you find the TX3 audio level control is near its minimum setting, install the jumper plug on P7 and readjust the TX2 control.

### **Header (P8)**

This connector is used to interface the Digital Voice WAV Player to the CAT-800 Controller. It provides power and the data and clock signals used to control the DR-800 while receiving a busy signal and play back the audio from the DR-800.

### **Header (P10)**

If the COR #1 jumper is installed a pull-up resistor will be added to the COR #1 input. This may be required if the receiver's COR circuit is specified as an open collector output. The COR will be considered active LOW. Dipswitch #1 should be on.

If the COR #2 jumper is installed a pull-up resistor will be added to the COR #2 input. Dipswitch #2 should be on.

If the COR #3 jumper is installed a pull-up resistor will be added to the COR #3 input. Dipswitch #3 should be on.

### **Switch (S2)**

This switch is used to upload new firmware using the Texas Instruments program. See Chapter 14 for details.

### Connector Assignment Table

J1 the 25 pin "D" connector contains the Port #1 and Port #2 connections and the five Logic inputs and the five output switches. J2 the 9 pin "D" connector contains the Port #2 connections and Output switches #1 and #2. J3 the second 9pin "D" connector contains the Port #3 connections and Output switches #3 and #4.

PORT #1 PIN ASSIGNMENTS J1			
1	LOGIC INPUT #1	14	SWITCH #1
2	LOGIC INPUT #2	15	SWITCH #2
3	CTCSS #2	16	+12VDC OUTPUT
4	CTCSS #1	17	GROUND
5	COR #2	18	GROUND
6	COR #1	19	SWITCH #3
7	SWITCH #5	20	SWITCH #4
8	GROUND	21	LOGIC INPUT #3
9	PTT #2	22	LOGIC INPUT #4
10	PTT #1	23	TX AUDIO #2
11	TX AUDIO #1	24	LOGIC INPUT #5
12	RX AUDIO #2	25	GROUND
13	RX AUDIO #1		

PORT #2 PIN ASSIGNMENTS J2			
1	COR #2	6	SWITCH #1
2	CTCSS #2	7	SWITCH #2
3	PTT #2	8	GROUND
4	TX AUDIO #2	9	+12VDC OUTPUT
5	RX AUDIO #2		

PORT #3 PIN ASSIGNMENTS J3			
1	COR #3	6	SWITCH #3
2	CTCSS #3	7	SWITCH #4
3	PTT #3	8	GROUND
4	TX AUDIO #3	9	+12VDC OUTPUT
5	RX AUDIO #3		

### Port Linking

To connect Port #2 to Port #1 the default User Macro command is [A2]. To disconnect Port #2 from Port #1 the default User Macro command is [B2].

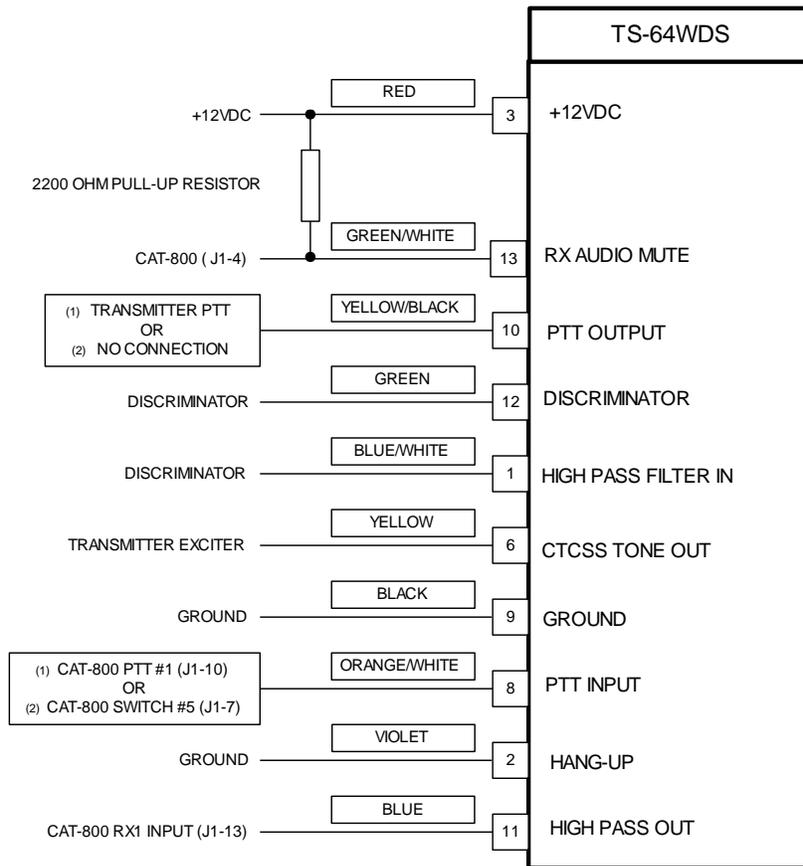
To connect Port #3 to Port #1 the default User Macro command is [A3]. To disconnect Port #3 from Port #1 the default User Macro command is [B3].

To connect Port #2 and Port #3 to Port #1 the default User Macro command is [A23]. To disconnect Port #2 and Port #3 from Port #1 the default User Macro command is [B23].

To change these commands reprogram User Macro 01 through 07. See the table on page 5-7

### CTCSS Decoder Diagram

Connect the TS-64WDS CTCSS Encoder/Decoder assembly to the CAT-800 as described in Figure 6-5. The decoder must be connected to discriminator audio. Speaker or volume control audio will have insufficient low frequency CTCSS tone content.



If you only want to send a CTCSS tone on the transmitter's output when a signal is present on the repeater's input connect the CAT-800 PTT #1 directly to the repeater's PTT input. Connect the CAT-800's switch #5 (J1-7) to the TS64WDS's pin #8 ORANGE/WHITE wire. Program switch #5 to follow the COR input with the (\*3954) command. Make sure Zone 6 Channel 5 is enabled.

If you only want to send a CTCSS tone on the transmitter's output whenever PTT #1 is active connect the CAT-800 PTT #1 directly to the repeater's PTT input. Connect the CAT-800's switch #5 (J1-7) to the TS64WDS's pin #8 ORANGE/WHITE wire. Program switch #5 to follow the PTT output with the (\*3953) command. Make sure Zone 6 Channel 5 is enabled.

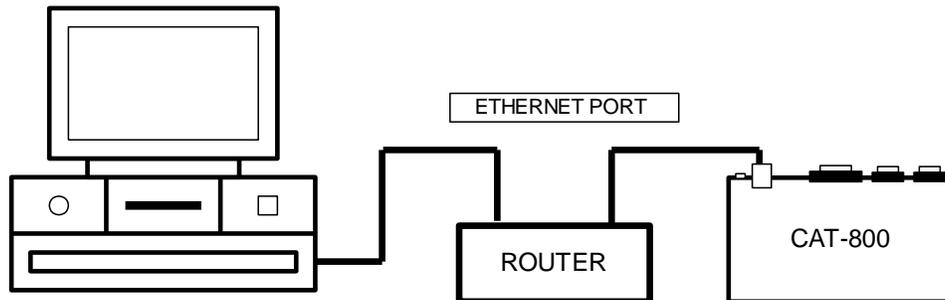
If you want to continuously transmit a CTCSS tone without the ability to remote control it, connect the CAT-800 PTT #1 (J1-10) to pin #8 of the TS64WDS's ORANGE/WHITE wire. Connect the TS64's pin #10 YELLOW/BLACK wire to the transmitter's PTT input.

## Chapter 7 – Internet Setup

If you plan to connect the CAT-800 to your router it will not be necessary to make any changes to its IP or GATEWAY addresses. If you intend to connect the CAT-800 to a different Internet source you can use the Ethernet port or the USB port with the CAT-800 Editor program.

### Internet Setup using Ethernet Port

With the computer set for DHCP addressing put the CAT-800's default address 192.168.1.245 in your browser's address line. Refer to page 8-3 of this manual for the procedure to change the IP, ROUTER and PORT settings as required.

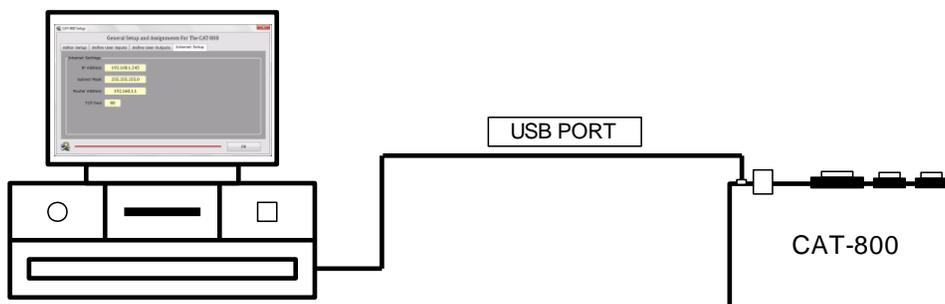


### Internet Setup using USB Port

Connect your computer's USB port to the CAT-800 at J4 as described in the figure below.

NOTE: Do not use excessive force when plugging into J4. Lightly rock the plug from left to right until you hear it snap into J4.

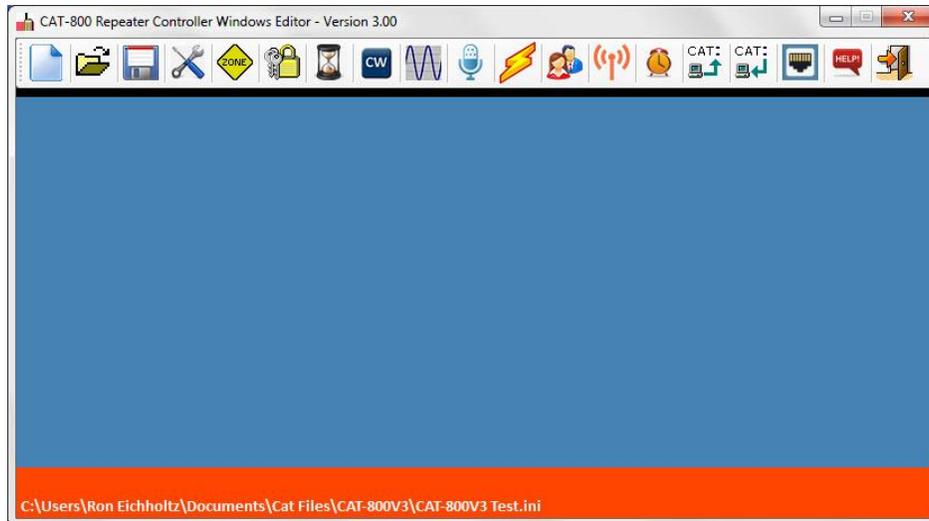
Start the windows editor program to display the "**CAT-800 Repeater Controller Editor**" main window. Along the top of the window click the "Load Default Settings" button. On the main editor window click the "Setup Internet/Input" button. Click on the "Internet Setup" tab. If you intend to connect the CAT-800 to a different Internet source you can use this window to make changes to the new IP, Router and Port addresses. See page 9-6 for instructions to change the IP, ROUTER and PORT addresses.



## Chapter 8 – Windows Editor

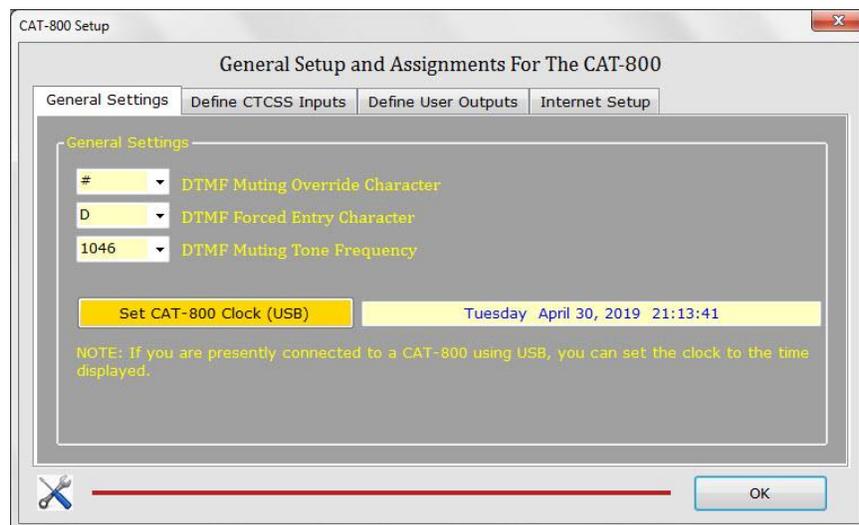
### ED-800 Windows Editor

Start the windows editor program to display the “CAT-800 Repeater Controller Editor” main window. Along the top of the window click the “Load Default Settings” button. All of the buttons will light up and the editor will display the CAT-800 memory as it is after a reset when power is applied with dipswitch #7 in the on position. The window should resemble the one shown below.



### General Setup and Assignments

Click the “WRENCH / SCREWDRIVER” button. You will see “The General Setup and Assignment For The CAT-800” window similar to the one below.



### Program DTMF Muting Override Command

With DTMF muting enabled, there may be times when it is desirable to pass the DTMF tones to the transmitter. To temporarily disable DTMF muting, precede the DTMF string with a pound [#]. This key can be changed to a [\*], [A], [B], [C] or [D].

### Program Forced Entry Command

DTMF commands are entered when the port goes inactive. To force a DTMF command when the port is active, end the command with a [D]. This key can be changed to a [\*], [#], [A], [B] or [C].

### DTMF Muting Tone Frequency

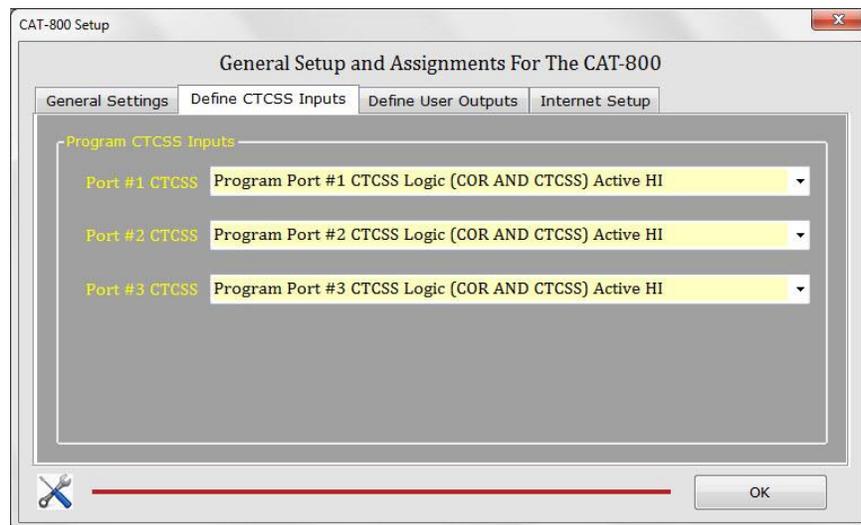
When DTMF Muting is enabled and a DTMF command is entered, a series of cover tones will be sent in place of the actual DTMF tones entered. You can change the cover tone frequency.

### Set the Clock (USB)

This window displays the time of your computer's clock. If the time is correct click the "Set CAT-800 Clock" button. When the button turns green the CAT-800's clock will be set. Click "OK" to return to the previous window.

### Define CTCSS Logic Inputs

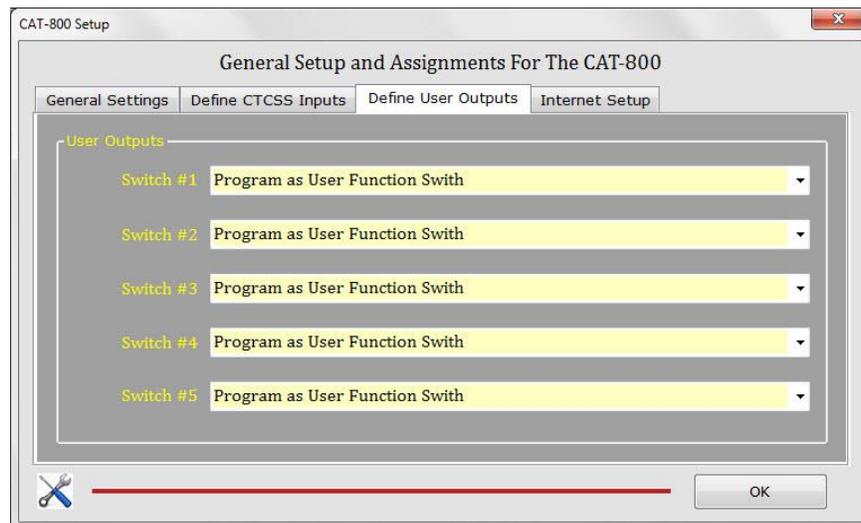
Click on the "Define CTCSS Input" tab. You will see a window similar to the one below. The CAT-800 has three CTCSS logic inputs, one for each of the three ports. At default the three inputs are set for "COR and CTCSS" active high logic. Click the down arrows to display the drop down menu. Select the desired CTCSS logic for each of the three inputs. When finished click "OK".



### Define User Outputs

Click on the "Define User Outputs" tab. You will see a window similar to the one below. The CAT-800 has five user defined output switches. At default the five outputs are set up as DTMF remote control switches. Click the down arrows to display the drop down menus. Configure the switch as a fan control relay driver, a CTCSS encoder control switch that follows PTT or a CTCSS encoder that follows COR. When finished click "OK".

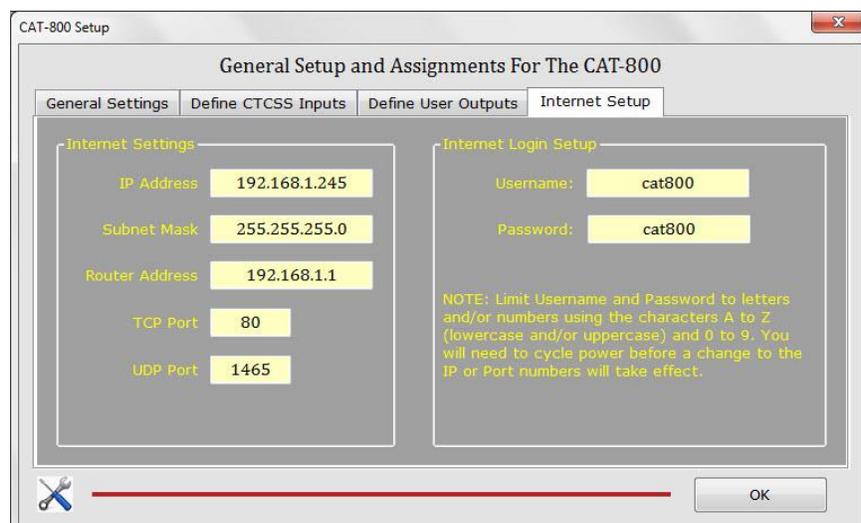
NOTE: The Fan Control switch will follow PTT #1 and remain on for 60 seconds after PTT #1 turns off. The CTCSS Encoder Switch (Follows PTT) will follow PTT #1 but turn off 250mSEC before PTT #1 turns off. The CTCSS Encoder Switch (Follows COR) will follow COR #1.



### Internet Setup

Click on the "Internet Setup" tab. You will see a window similar to the one below. If you plan to connect the CAT-800 to your router it will not be necessary to make any changes to the addresses in this window. If you intend to connect the CAT-800 to a different Internet source you can use this window to make changes to the new IP, Router and Port addresses. NOTE: You must cycle power on the controller for the changes to take place.

Use this window to change the Username and Password. NOTE: Limit Username and Password to letter and/or numbers especially the characters A to Z (lowercase or uppercase) and 0 to 9.



## Zone Channels

The CAT-800 has nine control zones with eight control channels each. The first three zones are assigned to control the three ports. Zones 4 thru Zone 8 are global control zones common to all three ports. Zone 5 controls the five user logic inputs while Zone 6 controls the five user output switches. Zone 9 is reserved for control of the various Internet functions.

If you clicked on the "Edit Zone Channel" button at the top of the main editor window you will see a window similar to the one below. Put a check mark in the boxes of the control function you want to enable and click "OK".



## Control Codes

If you clicked on the "LOCK AND KEYS" button at the top of the main editor window you will see a window similar to the one below. The codes can be between one and seven digits and can contain the letters A, B and C. The D is a forced entry and cannot be used as part of a control code. When finished click "OK".

Port #1 Control Operator:	100	System Unlock Number #1:	1234567
Port #2 Control Operator:	200	System Unlock Number #2:	7654321
Port #3 Control Operator:	300		
DTMF Access Code:	325		
Time Of Day Request:	400		
DTMF PAD Test:	475		
Load Courtesy Tone:	600		
Paging Tone Number:	650		
Voice Message Demo:	700		
DR-800 Playback Demo:	725		

Code numbers can be from 1 to 7 digits. Remember, these digits will change to a default values when the CAT-800 is powered up with dip switch #7 set to the ON position.

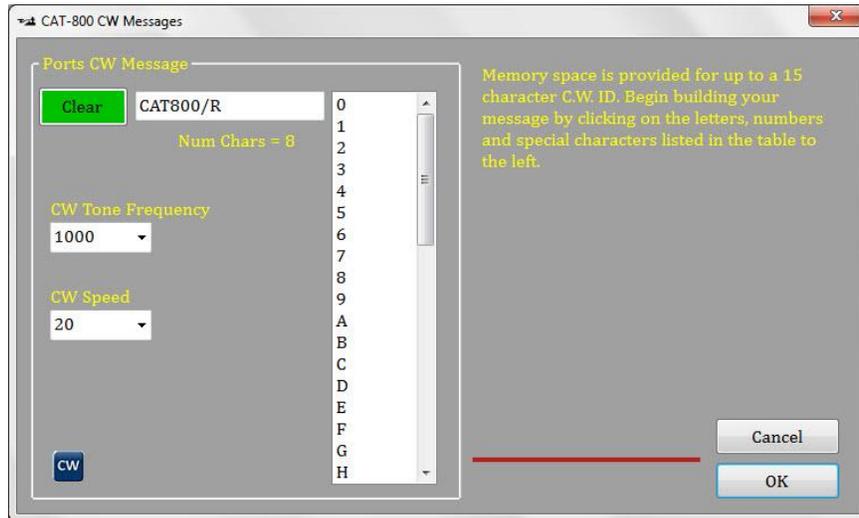
## Timers

If you clicked on the "HOUR GLASS" button at the top of the main editor window you will see a window similar to the one below. There are two long timer pages and one short timer page. The long timers can be programmed to any time between 60 and 1799 seconds. Example ten minutes would be entered as 600. The short timers can be programmed to any time between 0.1 and 9.9 seconds. Example 2.0 seconds would be entered as 20. When finished click "OK".

Transmitter Drop Message Timer #1 (60 - 1799 Seconds)	1799
Transmitter Drop Message Timer #2 (60 - 1799 Seconds)	1799
Timed Message #1 Timer (60 - 1799 Seconds)	600
Timed Message #2 Timer (60 - 1799 Seconds)	600
Timed Message #3 Timer (60 - 1799 Seconds)	900
Timed Message #4 Timer (60 - 1799 Seconds)	1200
Program DTMF Access Sleep Timer (60 - 1799 Seconds)	60

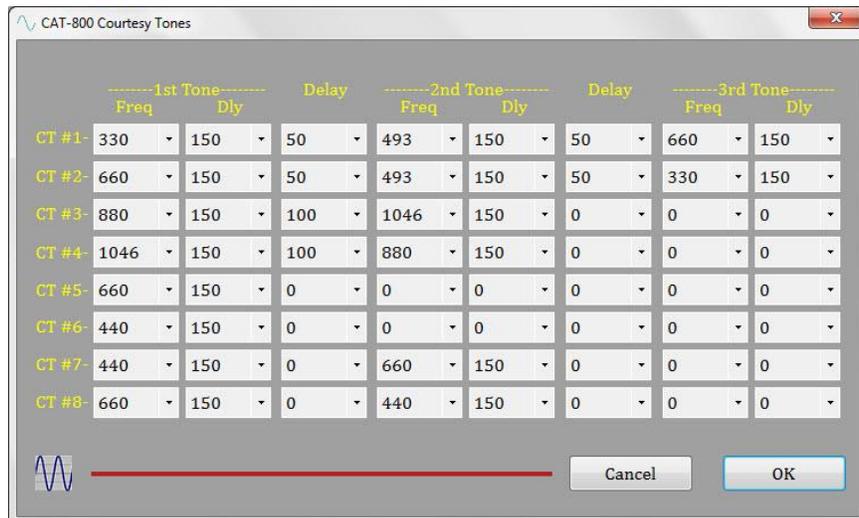
### CW Message

If you clicked on the "CW" button at the top of the main editor window you will see a window similar to the one below. Click the CLEAR button. Click the numbers and letters in the vertical column to construct the repeaters CW identification. Use the down arrows to select the tone frequency and speed. When finished click "OK".



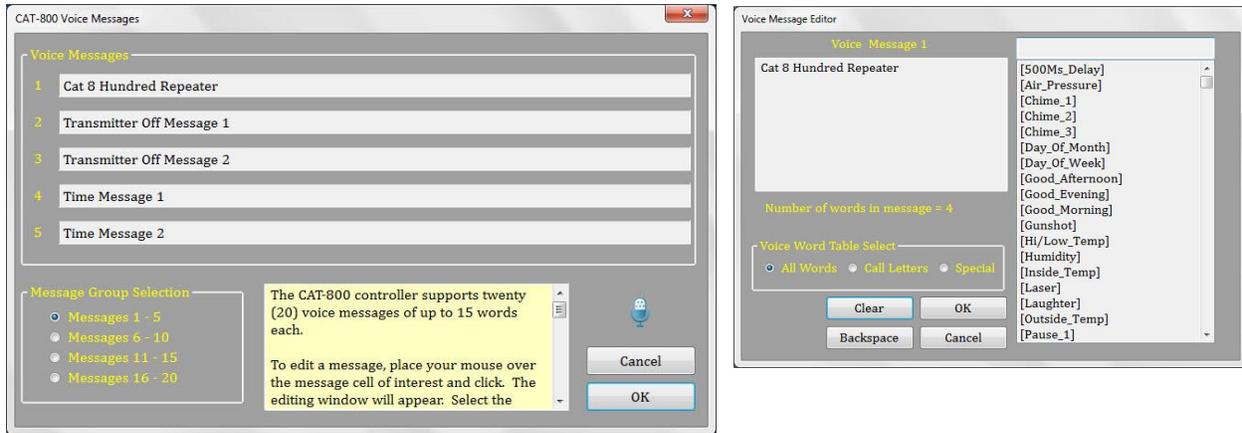
### Courtesy Beeps

If you clicked on the "SINWAVE" button at the top of the main editor window you will see a window similar to the one below. The first three courtesy tones are assigned to ports one through three. Use the down arrows to change the tone frequency, duration of the tone in milliseconds and the tone separation if the courtesy tone consists of more than one tone. When finished click "OK".



## Voice Synthesizer Messages

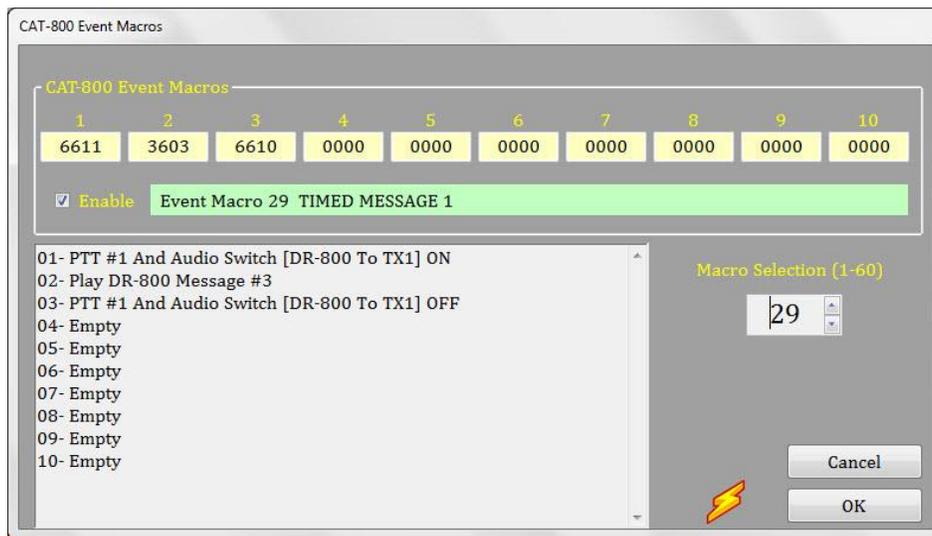
If you clicked on the "MICROPHONE" button at the top of the main editor window you will see a window similar to the one below. Voice Message #1 is the repeater's identification. Place the hand on the message and click. The voice message editor window will appear. Clear the message by clicking the CLEAR button. Click on the numbers, letters and words in the vertical column to construct a new voice message. When finished click "OK".



## Event Macros

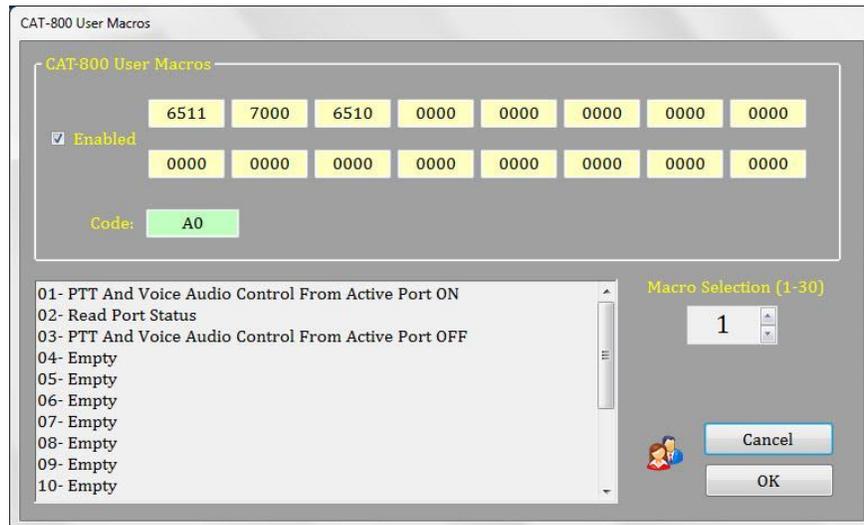
Event Macros are used to perform custom operations at pre determined times during repeater operation. There are seven basic types of event macros. They are: Port Activity, Logic Input, Repeater ID, Load and Play Courtesy Tones, Play Voice Messages, Link Auto Disconnect and Scheduled an Event. An event macro consists of up to ten four digit internal commands. If you clicked on the "LIGHTNING" button at the top of the main editor window you will see a window similar to the one below. Enter the four-digit internal commands in the order they are to be executed. Be sure and check mark the enable box. When finished click "OK".

NOTE: Click on the "Help" button at the top of the main editor window to display the "Table of Internal Commands". The table is also available in this manual on pages 5-2 and 5-3.



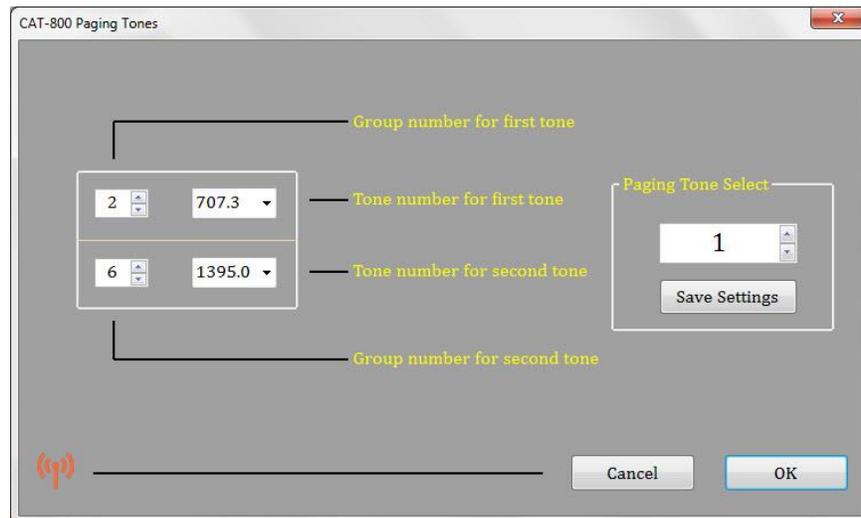
## User Macros

User macros are a series of commands, defined by the repeater owner. User macros permit the owner to customize certain aspects of repeater operation. Once the CAT-800 decodes the macro number, the commands will execute in the order they were stored within the macro string. The CAT-800 supports forty user macros. If you clicked on the "BOY AND GIRL" button at the top of the main editor window you will see a window similar to the one below. User macros use the same four digit internal commands as the event macros. The only difference is a DTMF control code is added. This is the code entered by the repeater user to execute the macro. This code can be from one to seven digits. When selecting this code make sure it does not conflict with an existing code in the system. Be sure and check mark the enable box. When finished click "OK".



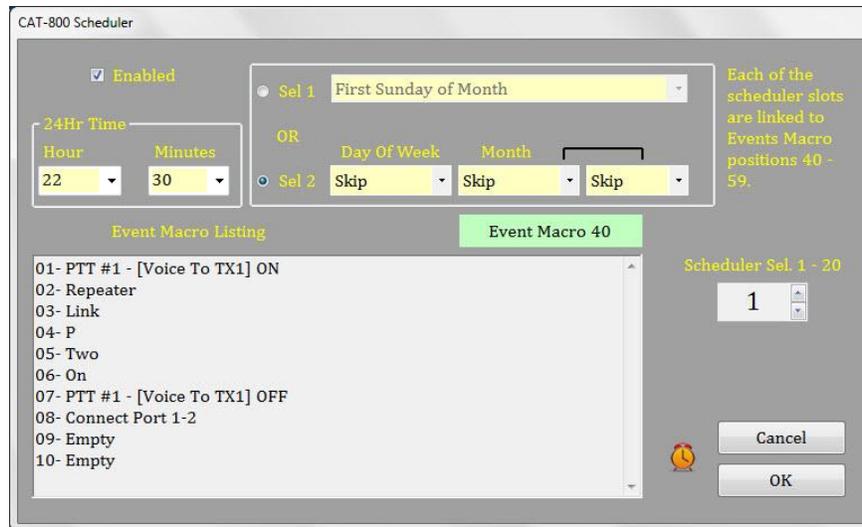
## Paging Tones

If you clicked on the "RED ANTENNA" button at the top of the main editor window you will see a window similar to the one below. Use the arrow buttons to select the first and second tones. When finished click "OK".



## Scheduler

If you click on the "ALARM CLOCK" button at the top of the main editor window you will see a window similar to the one below. Programming the scheduler is a two-step procedure. Each of the twenty table positions are directly linked to an event macro. Example scheduler position #1 is linked the event macro #40. In other words event macro 40 will execute and the time, day or date programmed in this window. Enter the time, day of week or day of month and month of year. Put a check mark in the enable box and click "OK".

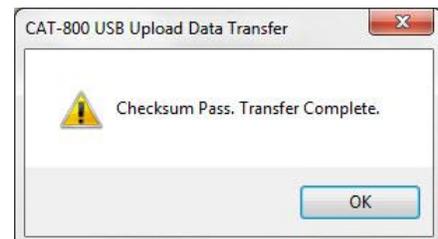


## Save Configuration File

Once you have finished preparing the program file click on the "FLOPPY DISK" button at the top of the main editor window. The "Save As" window will appear. Name the file and click on the "Save" button. Two files will be generated and saved on your hard drive as: **yourname.ini**. One file is used during an upload through the USB port while the other file is used during the upload through the Internet.

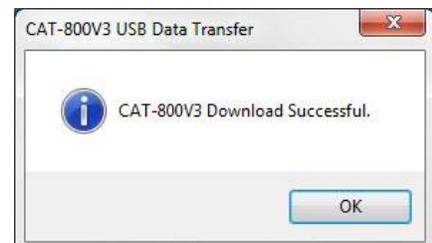
## Upload Data Using USB Transfer

Connect a USB cable between the CAT-800 and your computer. Click the "CAT Up Arrow" button to transfer the configure file you prepared with the editor program into the memory of the CAT-800 controller.



## Download Data Using USB Transfer

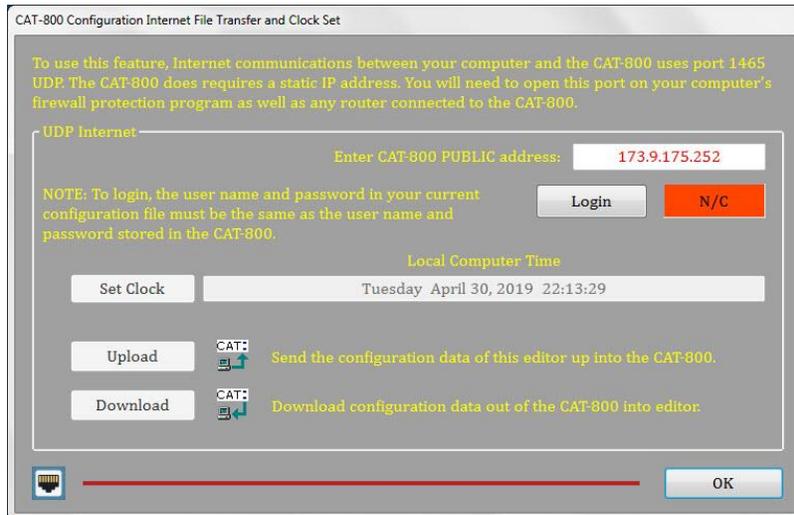
You can also click the "CAT Down Arrow" button to transfer the configure file from the CAT-800 to the editor.



## Internet Configuration File Transfer / Clock Set

If the CAT-800 is at a remote location you can transfer your configuration file through the Internet. Click the configuration file transfer button at the top of the main editor window. Enter the IP address in the window and click the Login button. A green Pass should appear. Click the Upload button to send your configuration data to the CAT-800 or click the Download button to receive the CAT-800's current configuration.

NOTE: To login, the user name and password in your current configuration file must be the same and the user name and password stored in the CAT800 controller.



NOTE: Internet communications between your computer and the CAT-800 uses port 1465 UDP. The CAT-800 requires a static IP address. You will need to open this port on your router and computer's firewall protection program as well as the router connected to the CAT-800.

NOTE: If port 1465 UDP conflicts with other devices in your system this port can be changed.

### Set the CAT-800 Clock (Internet)

This window displays the time of your computer's clock. If the time is correct click the "Set Clock" button. When the button turns green the CAT-800's clock has been set.

### CAT-800 Help

Click the HELP icon to display the event macro table, internal command table, voice message table and vocabulary word list. The internal commands are a series of four digit numbered commands used to program the CAT-800's User and Event Macro strings and the five hardware input switches.

## Chapter 9 – Internet Control and Programming

### Log In Web Page

Connect the CAT-800 to a port on your router. Place the CAT-800's default IP address 192.168.1.245 in the address line of your browser. Press enter and the computer will display the CAT-800 Login page. The default Username and Password are case sensitive and are both **cat800**.

## CAT-800 Authentication Required.

Username:	<input type="text" value="cat800"/>
Password:	<input type="password" value="••••••"/>

Firmware Build: 1.04

---

Copyright © 2015-2017 Computer Automation Technology.  
All rights reserved.

## CAT-800 Start Page

If the CAT-800 is connected to the internet, you can use the Internet browser in your computer, I-Phone or I-Pad to control, program and execute user macros, force voice messages and send paging tones. To execute one of the forty user macros enter the number into the cell and click [EXECUTE]. To send one of the twenty voice messages enter the voice message number and click [EXECUTE]. To send one of the five paging tones enter the paging tone number and click [EXECUTE]. Click the [EXECUTE] button to send the time of day. The CAT-800 will announce the time on the port #1 transmitter.

The CAT-800 also displays the software version, Internet connect time, microprocessor temperature, and which ports are linked. Buttons are provided to reset the controller and logout.

NOTE: The CAT-800 operates in three loops. They are: The repeater control loop, the USB communications loop and the Internet communications loop. Should the repeater control loop stop but you are able to establish Internet communications with the controller, it "may" be possible to restart the repeater control loop by pressing the reset button. This button performs the same function as cycling power on the controller. It will not make any changed to the controller's program and could save you a trip to the repeater site.



# Computer Automation Technology

## CAT-800 Start Page

---

---

<b>Start Page</b>	Execute User Macro	<input type="text"/>	Execute
<b>Control Zones 1 - 2</b>	Play Voice Message	<input type="text"/>	Execute
<b>Control Zones 3 - 4</b>	Send Paging Tone	<input type="text"/>	Execute
<b>Control Zones 5 - 6</b>	Play WAV Message	<input type="text"/>	Execute
<b>Control Zones 7 - 8</b>	Transmit Time Of Day (Port 1)		Execute
<b>System Codes</b>	System Software Version:		3.00J
<b>System Timers</b>	System Up Time:		56 Minutes.
<b>Setup Internet Settings</b>	System Time:		12:16 Saturday
	Reset Controller		Reset
	Logout from CAT-800		Logout

---

---

Copyright © 2015-2020 Computer Automation Technology. All rights reserved.

## CAT-800 Zone Control Channels

The CAT-800 has nine zones of eight control channels each. Zones 1 through Zone 8 control various operation of the CAT-800 controller. Check the box to enable the control function or uncheck the box to disable the control function. Then go to the bottom of the page and click [SAVE SETTINGS]. The window below displays the first two of the eight control zones.

### Zone 1 / 2 Control channels



## Computer Automation Technology

### CAT-800 Zones 1 - 2

- [Start Page](#)
- [Control Zones 1 - 2](#)
- [Control Zones 3 - 4](#)
- [Control Zones 5 - 6](#)
- [Control Zones 7 - 8](#)
- [System Codes](#)
- [System Long Timers](#)
- [System Short Timers](#)
- [Setup Internet Settings](#)
- [CAT-800 Stats Page](#)



Zone 1-1	PORT #1 TRANSMIT	<input checked="" type="checkbox"/>
Zone 1-2	PORT #1 CTCSS	<input type="checkbox"/>
Zone 1-3	PORT #1 RECEIVER	<input checked="" type="checkbox"/>
Zone 1-4	PORT #1 TURN ON DELAY	<input type="checkbox"/>
Zone 1-5	PORT #1 TRANSMITTER HANG TIME	<input checked="" type="checkbox"/>
Zone 1-6	PORT #1 COURTESY TONE	<input checked="" type="checkbox"/>
Zone 1-7	PORT #1 DTMF MUTING	<input type="checkbox"/>
Zone 1-8	PORT #1 TIMEOUT	<input checked="" type="checkbox"/>

Zone 2-1	PORT #2 TRANSMIT	<input checked="" type="checkbox"/>
Zone 2-2	PORT #2 CTCSS	<input type="checkbox"/>
Zone 2-3	PORT #2 RECEIVER	<input checked="" type="checkbox"/>
Zone 2-4	PORT #2 TURN ON DELAY	<input type="checkbox"/>

#### 1-1. Port #1 Transmitter Enable

When this box is checked the Port #1 PTT will be active. This channel must be enabled for normal repeater operation. The CAT-800 will continue to respond to control operator commands even when this box is unchecked. This channel will automatically be enabled after a dipswitch #7 initialization reset.

#### 1-2. Port #1 CTCSS Enable

When this box is checked, in addition to a COR input, an input from a CTCSS decoder at J1-4 must also be present before Port #1 will activate. To prevent loss of control, DO NOT CHECK THIS BOX unless a working CTCSS decoder is connected to J1-4.

#### 1-3. Port #1 Receiver Enable

When this box is checked the CAT-800 will respond to a RF input from the Port #1 receiver. When this channel is disabled the Port #1 transmitter will continue to operate by responding to RF inputs from the Port #2 and Port #3 receivers.

#### **1-4. Port #1 Turn on Delay Enable**

When this box is checked, a deliberate and sustained input on Port #1 must be present before the controller will respond. When the CAT-800 is initialized, this timer defaults to 1.0 seconds. This channel is useful during periods when noise bursts are present on the repeater input.

#### **1-5. Port #1 Transmitter Hang Time Enable**

When this box is checked, the Port #1 transmitter will have a hang-time subject to the settings of the COR Drop to Courtesy Beep Timer and the Courtesy Beep to PTT Drop Timer. At default these timers are set for one second and four seconds.

#### **1-6. Port #1 Courtesy Tone Enable (Event Macro 20)**

When this box is checked, a courtesy tone will occur when the COR signal is lost. To eliminate the courtesy tone, uncheck the box and click save. The timeout timer will continue to be reset.

#### **1-7. Port #1 DTMF Muting Enable**

When this box is checked, anytime a DTMF tone is received, the receive audio will be turned off to the Port #1 transmitter. The transmit audio will remain muted until a pre-determined time after the last DTMF tone is received. During the mute period, cover beeps are transmitted each second to indicate repeater activity. This feature prevents control commands from being repeated. It provides an extra measure of security. There may be times when it is desirable to temporarily pass DTMF tones through the repeater. Precede the DTMF string with a (#).

#### **1-8. Port #1 Timeout Enable**

When this box is checked, a continuous signal on the Port #1 input will cause Port #1 to turn off. The time-out period is user programmable. When the CAT-800 is initialized, this timer defaults to 3 minutes. When this box is unchecked, Port #1 will-not timeout.

#### **2-1. Port #2 Transmitter Enable**

When this box is checked the Port #2 transmitter will be active. This channel must be enabled for normal operation. The Port #2 receiver will continue to respond to control operator commands even when the box is unchecked. This channel will automatically be enabled after a dipswitch #7 initialization reset.

#### **2-2. Port #2 CTCSS Enable**

When this channel is enabled, in addition to a COR input, an input from a CTCSS decoder at J1-3 or J2-2 must also be present before Port #2 will activate. At default this input is set for "COR and CTCSS active high logic". NOTE: To prevent loss of control, DO NOT CHECK THIS BOX unless a working CTCSS decoder is connected to J1-3 or J2-2.

#### **2-3. Port #2 Receiver Enable**

When this channel is enabled the CAT-800 will respond to a RF input from the Port #2 receiver. When this channel is disabled the Port #2 transmitter will continue to operate by responding to RF inputs from the Port #1 and Port #3 receivers.

#### **2-4. Port #2 Turn on Delay Enable**

When this box is checked, a deliberate and sustained input on Port #2 must be present before the controller will respond. When the CAT-800 is initialized, this timer defaults to 1.0 seconds. This channel is useful during periods when noise bursts are present on the repeater input.

#### **2-5. Echolink® Control Enable**

When Port #2 is connected to Port #1 and DTMF Muting is enabled, a DTMF command entered through Port #1 will be muted on both the Port #1 and Port #2 transmit audios. When this box is checked, Port #2 transmit audio will be the actual DTMF command. The DTMF command will continue to be muted on the Port #1 transmit audio.

### 2-6. Port #2 Auto-Disconnect Enable (Event Macro #34)

When this box is checked, after a period of Port #2 inactivity the CAT-800 will execute event macro [34]. The default setting of event macro #34 will disconnect Port #2 from Port #1 and Port #3.

### 2-7. Port #2 DTMF Muting Enable

When this box is checked, anytime a DTMF tone is received, by the Port #2 receiver, the audio will be turned off to the Port #1 transmitter. The transmit audio will remain muted until a pre-determined time after the last DTMF tone is received. During the mute period, cover beeps are transmitted each second to indicate repeater activity. This feature prevents control commands from being repeated. It provides an extra measure of security.

### 2-8. Port #2 Timeout Enable

When the box is checked, a continuous signal on the Port #2 input will cause the repeater to turn off. The time-out period is user programmable. When the CAT-800 is initialized, this timer defaults to three minutes. When the box is not checked the repeater will-not timeout.

## Zone 3 / 4 Control channels



# Computer Automation Technology

## CAT-800 Zones 3 - 4

- Start Page
- Control Zones 1 - 2
- Control Zones 3 - 4
- Control Zones 5 - 6
- Control Zones 7 - 8
- System Codes
- System Long Timers
- System Short Timers
- Setup Internet Settings
- CAT-800 Stats Page



Zone 3-1	PORT #3 TRANSMIT	<input checked="" type="checkbox"/>
Zone 3-2	PORT #3 CTCSS	<input type="checkbox"/>
Zone 3-3	PORT #3 RECEIVER	<input checked="" type="checkbox"/>
Zone 3-4	PORT #3 TURN ON DELAY	<input type="checkbox"/>
Zone 3-5	PORT #3 ECHOLINK CONTROL	<input type="checkbox"/>
Zone 3-6	PORT #3 AUTO DISCONNECT	<input type="checkbox"/>
Zone 3-7	PORT #3 DTMF MUTING	<input type="checkbox"/>
Zone 3-8	PORT #3 TIMEOUT	<input checked="" type="checkbox"/>
Zone 4-1	PORT #2 CONTROL OPERATOR	<input checked="" type="checkbox"/>
Zone 4-2	PORT #2 MACRO CONTROL	<input checked="" type="checkbox"/>
Zone 4-3	PORT #3 CONTROL OPERATOR	<input checked="" type="checkbox"/>
Zone 4-4	PORT #3 MACRO CONTROL	<input checked="" type="checkbox"/>

### 3-1. Port #3 Transmitter Enable

When this box is checked the Port #3 transmitter will be active. This channel must be enabled for normal operation. The Port #3 receiver will continue to respond to control operator commands even when the box is unchecked. This channel will automatically be enabled after a dipswitch #7 initialization reset.

### **3-2. Port #3 CTCSS Enable**

When the box is checked, in addition to a COR input, an input from a CTCSS decoder at J3-2 must also be present before Port #3 will activate. At default this input is set for "COR and CTCSS active high logic". NOTE: To prevent loss of control, DO NOT ENABLE THIS CHANNEL unless a working CTCSS decoder is connected to J3-2.

### **3-3. Port #3 Receiver Enable**

When the box is checked the CAT-800 will respond to a RF input from the Port #3 receiver. When the box is unchecked the Port #3 transmitter will continue to operate by responding to RF inputs from the Port #1 and Port #2 receivers.

### **3-4. Port #3 Turn on Delay Enable**

When the box is checked, a deliberate and sustained input on Port #3 must be present before the controller will respond. When the CAT-800 is initialized, this timer defaults to 1.0 seconds. This channel is useful during periods when noise bursts are present on the repeater input.

### **3-5. Echolink® Control Enable**

When Port #3 is connected to Port #1 and DTMF Muting is enabled, a DTMF command entered through Port #1 will be muted on both the Port #1 and Port #3 transmit audios. When the box is checked, Port #3 transmit audio will be the actual DTMF command. The DTMF command will continue to be muted on the Port #1 transmit audio.

### **3-6. Port #3 Auto-Disconnect Enable (Event Macro 35)**

When the box is checked, after a period of Port #3 inactivity determined by the setting of the Auto Disconnect timer, the CAT-800 will execute event macro [35]. The default setting of event macro #35 will disconnect Port #3 from Port #1 and Port #2.

### **3-7. Port #3 DTMF Muting Enable**

When the box is checked, anytime a DTMF tone is received by the Port #3 receiver, the audio will be turned off to the repeater's transmitter. The transmit audio will remain muted until a pre-determined time after the last DTMF tone is received. During the mute period, cover beeps are transmitted each second to indicate repeater activity. This feature prevents control commands from being repeated. It provides an extra measure of security. There may be times when it is desirable to temporarily pass DTMF tones through the repeater. Precede the DTMF string with a (#).

### **3-8. Port #3 Timeout Enable**

When the box is checked, a continuous signal on the Port #3 input will cause the repeater to turn off. The time-out period is user programmable. When the CAT-800 is initialized, this timer defaults to three minutes. When the box is not checked the repeater will-not timeout.

## **Zone 4 Control Channels**

### **4-1. Port #2 Control Operator Enable**

When the box is checked, the CAT-800 will accept control operator commands to change the settings of the zone channels from the Port #2 receiver. The default Port #2 Control Operator code is [200].

### **4-2. Port #2 Macro Enable**

When the box is checked, the CAT-800 will accept user macro commands from the Port #2 receiver.

### **4-3. Port #3 Control Operator Enable**

When the box is checked, the CAT-800 will accept control operator commands to change the settings of the zone channels from the Port #3 receiver. The default Port #3 Control Operator code is [300].

#### 4-4. Port #3 Macro Enable

When the box is checked, the CAT-800 will accept user macro commands from the Port #3 receiver.

#### 4-5. Scheduler Enable

When the box is checked, all action by the scheduler will be executed per the times programmed in the scheduler table. There may be times, during emergency net operations, when it is not desirable to have channels change automatically. To suspend scheduler operation, uncheck the box.

#### 4-6. Reserved

#### 4-7. Grandfather Clock Enable (Event Macro 33)

When the box is checked, the CAT-800 will announce the time of day every hour on the hour. This channel enables the Grandfather Clock Event Macro #33, which sends voice message 8 on the repeater's transmitter.

#### 4-8. Grandfather Clock Sleep Mode Enable

It may be desirable to suspend the grandfather clock operation during the early morning hours. When the box is checked, the last announcement will be at 11:00 PM. Time announcements will resume at 7:00 AM the next morning.

### Zone 5 / 6 Control channels



## Computer Automation Technology

### CAT-800 Zones 5 - 6

- Start Page
- Control Zones 1 - 2
- Control Zones 3 - 4
- Control Zones 5 - 6
- Control Zones 7 - 8
- System Codes
- System Long Timers
- System Short Timers
- Setup Internet Settings
- CAT-800 Stats Page



Zone 5-1	USER LOGIC INPUT #1	<input checked="" type="checkbox"/>
Zone 5-2	USER LOGIC INPUT #2	<input checked="" type="checkbox"/>
Zone 5-3	USER LOGIC INPUT #3	<input checked="" type="checkbox"/>
Zone 5-4	USER LOGIC INPUT #4	<input checked="" type="checkbox"/>
Zone 5-5	USER LOGIC INPUT #5;	<input checked="" type="checkbox"/>
Zone 5-6		<input type="checkbox"/>
Zone 5-7		<input type="checkbox"/>
Zone 5-8		<input type="checkbox"/>

Zone 6-1	USER OUTPUT SWITCH #1	<input checked="" type="checkbox"/>
Zone 6-2	USER OUTPUT SWITCH #2	<input checked="" type="checkbox"/>
Zone 6-3	USER OUTPUT SWITCH #3	<input checked="" type="checkbox"/>
Zone 6-4	USER OUTPUT SWITCH #4	<input checked="" type="checkbox"/>

**5-1. User Logic Input #1 Enable (Event Macros 07 and 08)**

When the box is checked, a transition from low to high on connector J1-1 will execute event macro #07 while a transition from high to low will execute event macro #08.

**5-2. User Logic Input #2 Enable (Event Macros 09 and 10)**

When the box is checked, a transition from low to high on connector J1-2 will execute event macro #09 while a transition from high to low will execute event macro #10.

**5-3. User Logic Input #3 Enable (Event Macros 11 and 12)**

When the box is checked, a transition from low to high on connector J1-21 will execute event macro #11 while a transition from high to low will execute event macro #12.

**5-4. User Logic Input #4 Enable (Event Macros 13 and 14)**

When the box is checked, a transition from low to high on connector J1-22 will execute event macro #13 while a transition from high to low will execute event macro #14.

**5-5. User Logic Input #5 Enable (Event Macros 15 and 16)**

When the box is checked, a transition from low to high on connector J1-24 will execute event macro #15 while a transition from high to low will execute event macro #16.

**6-1. USER Output Switch #1 Enable**

When this box is checked, switch #1 will perform per its pre-defined function. Connector J1-14 or J2-6 will sink 150 MA to ground. At default this switch is defined as a remote controlled switch and is controlled by user macros 10 and 11. To turn switch #1 on go to the START PAGE and enter 10 in the Execute User Macro box and click the EXECUTE button. To turn Switch #1 off enter 11 in the box and click EXECUTE.

**6-2. USER Output Switch #2 Enable**

When this box is checked, switch #2 will perform per its pre-defined function. Connector J1-15 or J2-7 will sink 150 MA to ground. At default this switch is defined as a remote controlled switch and is controlled by user macros 12 and 13. To turn switch #2 on go to the START PAGE and enter 12 in the Execute User Macro box and click the EXECUTE button. To turn Switch #2 off enter 13 in the box and click EXECUTE.

**6-3. USER Output Switch #3 Enable**

When this box is checked, switch #3 will perform per its pre-defined function. Connector J1-19 or J2-6 will sink 150 MA to ground. At default this switch is defined as a remote controlled switch and is controlled by user macros 14 and 15. To turn switch #3 on go to the START PAGE and enter 14 in the Execute User Macro box and click the EXECUTE button. To turn Switch #3 off enter 15 in the box and click EXECUTE.

**6-4. USER Output Switch #4 Enable**

When this box is checked, switch #4 will perform per its pre-defined function. Connector J1-20 or J2-7 will sink 150 MA to ground. At default this switch is defined as a remote controlled switch and is controlled by user macros 16 and 17. To turn switch #4 on go to the START PAGE and enter 16 in the Execute User Macro box and click the EXECUTE button. To turn Switch #4 off enter 17 in the box and click EXECUTE.

**6-5. USER Output Switch #5 Enable**

When this box is checked, switch #5 will perform per its pre-defined function. Connector J1-5 will sink 150 MA to ground. At default this switch is defined as a remote controlled switch and is controlled by user macros 18 and 19. To turn switch #5 on go to the START PAGE and enter 18 in the Execute User Macro box and click the EXECUTE button. To turn Switch #5 off enter 19 in the box and click EXECUTE.



# Computer Automation Technology

## CAT-800 Zones 7 - 8

- [Start Page](#)
- [Control Zones 1 - 2](#)
- [Control Zones 3 - 4](#)
- [Control Zones 5 - 6](#)
- [Control Zones 7 - 8](#)
- [System Codes](#)
- [System Long Timers](#)
- [System Short Timers](#)
- [Setup Internet Settings](#)
- [CAT-800 Stats Page](#)



Zone 7-1	REPEATER VOICE ID	<input checked="" type="checkbox"/>
Zone 7-2	REPEATER CW ID	<input checked="" type="checkbox"/>
Zone 7-3	TRANSMITTER TURN OFF MESSAGE #1	<input type="checkbox"/>
Zone 7-4	TRANSMITTER TURN OFF MESSAGE #2	<input type="checkbox"/>
Zone 7-5	TIMED MESSAGE #1	<input type="checkbox"/>
Zone 7-6	TIMED MESSAGE #2	<input type="checkbox"/>
Zone 7-7	TIMED MESSAGE #3	<input type="checkbox"/>
Zone 7-8	TIMED MESSAGE #4	<input type="checkbox"/>
Zone 8-1	FORCED DTMF ENTRY (ALL PORTS)	<input checked="" type="checkbox"/>
Zone 8-2	DTMF ACCESS (ALL PORTS)	<input type="checkbox"/>
Zone 8-3	TIME-OF-DAY REQUEST (ALL PORTS)	<input checked="" type="checkbox"/>
Zone 8-4	DTMF KEYPAD TEST (ALL PORTS)	<input checked="" type="checkbox"/>

### 7-1. Repeater Voice ID Enable (Event Macro 17)

When the box is checked, the CAT-800 will execute Event Macro 17 identifying the repeater's transmitter in voice. Voice message #1 is assigned as the default message.

### 7-2. Repeater CW ID Enable (Event Macro 19)

When the box is checked, the CAT-800 will execute Event Macro 19 identifying the repeater's transmitter in CW by sending the CW buffer.

### 7-3. Transmitter Turn Off Message #1 Enable (Event Macro 27)

When the box is checked, the transmitter drop out message #1 will occur when a repeater user un-keys their transmitter. This message will repeat subject to the setting of the turn off message timer.

### 7-4. Transmitter Turn Off Message #2 Enable (Event Macro 28)

When the box is checked, the transmitter drop out message #2 will occur just before the repeater transmitter turns off. This message will repeat subject to the setting of the turn off message timer.

### 7-5. Timed Message #1 Enabled (Event Macro 29)

When the box is checked, timed voice message #1 will occur on a regular schedule subject to the setting of the timed message #1 timer and event macro #29. This message will consist of up to 15 words selected from the voice vocabulary table.

#### **7-6. Timed Message #2 Enabled (Event Macro 30)**

When the box is checked, timed voice message #2 will occur on a regular schedule subject to the setting of the #2 timer and event macro #30. This message will consist of up to 15 words selected from the voice vocabulary table.

#### **7-7. Timed Message #3 Enabled (Event Macro 31)**

When the box is checked, timed voice message #3 will occur on a regular schedule subject to the setting of the #3 timer and event macro #31. This message will consist of up to 15 words selected from the voice vocabulary table.

#### **7-8. Timed Message #4 Enabled (Event Macro 32)**

When the box is checked, timed voice message #4 will occur on a regular schedule subject to the setting of the timed message #4 timer and event macro #32. This message will consist of up to 15 words selected from the voice vocabulary table.

#### **8-1. Forced DTMF Entry D Key Enable (ALL PORTS)**

When the box is checked it is possible to force a DTMF command even while the port is active. To force a DTMF command, end the command with a [D].

#### **8-2. DTMF Access Enable (ALL PORTS)**

When the box is checked, the repeater will go to sleep and not respond to normal inputs. If a repeater user enters the default DTMF Access number [325] the repeater will wake-up and continue to operate until a period of inactivity occurs determined by the sleep timer.

#### **8-3. Time of Day Request Enable (ALL PORTS)**

When the box is checked, repeater users can request the time of day by entering the default time of day request number [400].

#### **8-4. DTMF Keypad Test (ALL PORTS)**

When the box is checked, a repeater user is able to perform a test of their radio's 12 or 16-button keypad. Enter the default keypad test number [475] followed by each of the keypad digits. As the numbers are being decoded, they are stored in memory. When the user stops transmitting the controller will read back all the numbers that were decoded. The Forced DTMF Entry key is defaulted to the [D] key. It must be entered last and it will not read back during the keypad test.

#### **8-5. Voice Demo Request Enable (ALL PORTS)**

When the box is checked, repeater users can play any of the twenty voice synthesizer messages. Enter the voice demo request number [700] followed by the two-digit message number.

#### **8-6. Two Tone Sequential Paging Enable (ALL PORTS)**

When the box is checked, a repeater user can transmit a two-tone page. The first tone will be on for one second while the second tone will be on for three seconds. Memory space is provided for twenty paging tones. Enter the default paging tone request number [650] followed by the desired two-digit paging tone table position.

#### **8-7. Digital Audio WAV Player (ALL PORTS) (Optional DR-800 Required)**

When this channel is enabled, a repeater user can play digital audio tracks. Memory space is provided for thirty tracks. Enter the digital audio WAV player request number [725] followed by the two-digit track number. Digital audio tracks can also be integrated into user and event macros.

#### **8-8. Reserved**

## CAT-800 System Codes

You can change any of the CAT-800 control or unlock codes by changing the codes in the appropriate boxes and clicking [SAVE SETTINGS] at the bottom of the page. These numbers can be from one to seven digits and will change to a default value when the CAT-800 is powered up with dipswitch #7 set to the on position. NOTE: The primary unlock number must be seven digits.



# Computer Automation Technology

## CAT-800 System Codes

Start Page	CONTROL OPERATOR NUMBER PORT #1	100
Control Zones 1 - 2	CONTROL OPERATOR NUMBER PORT #2	200
Control Zones 3 - 4	CONTROL OPERATOR NUMBER PORT #3	300
Control Zones 5 - 6	DTMF ACCESS CODE	325
Control Zones 7 - 8	TIME OF DAY REQUEST NUMBER	400
System Codes	DTMF PAD TEST NUMBER	475
System Long Timers	LOAD COURTESY TONE NUMBER	600
System Short Timers	PAGING TONE DEMO NUMBER (01 - 20)	650
Setup Internet Settings	VOICE MESSAGE DEMO NUMBER (01 - 20)	700
CAT-800 Stats Page	PLAY WAV TRACK DEMO NUMBER (01 - 30)	725
	PRIMARY UNLOCK NUMBER	1234567



### Control Operator Prefix Number Port #1

This number must precede the command to change the zone control functions through the Port #1 receiver.

### Control Operator Number Port #2

This number must precede the command to change the zone control functions through the Port #2 receiver.

### Control Operator Number Port #3

This number must precede the command to change the zone control functions through the Port #3 receiver.

**DTMF Access Code**

This number must be entered to activate the repeater when DTMF access is enabled. When the repeater is in the DTMF Access Mode it will not respond to a COR CTCSS input. The repeater user must enter the DTMF access number to activate the repeater. When the repeater returns to rest for a period determined by the sleep timer, this number must be re-entered to activate the repeater.

**Time Of Day Request Code**

This number must be entered to request the time of day announcement.

**DTMF Pad Test Number**

This number must be entered to initiate a DTMF keypad test.

**Select Courtesy Tone Control Number**

This number must be entered to load a Courtesy Tone.

**Paging Tone Control Number**

This number must be entered to PLAY one of the paging tones. This number must precede the two-digit paging tone table position number.

**Voice Demonstration Control Number**

This number must be entered to PLAY one of the voice messages. This number must precede the two-digit voice message number.

**Primary Unlock Number**

This number must be entered to unlock the CAT-800 and place it in the programming mode for over the air DTMF programming. The Primary Unlock number must be seven digits.

**Secondary Unlock Number**

This number must be entered to unlock the CAT-800 and place it in the programming mode for over the air DTMF programming. This number is not restricted to a seven-digit number.

## CAT-800 Long Timers

You can change any of the CAT-800 Long Timer settings by changing the time in the appropriate boxes and clicking [SAVE SETTINGS] at the bottom of the page. When the CAT-800 is initialized, these timers are automatically loaded with default values.



# Computer Automation Technology

## CAT-800 System Long Timers

Start Page	PORT #1 TIME-OUT TIMER (60 - 1799 SECONDS)	180
Control Zones 1 - 2	PORT #2 TIME-OUT TIMER (60 - 1799 SECONDS)	180
Control Zones 3 - 4	PORT #3 TIME-OUT TIMER (60 - 1799 SECONDS)	180
Control Zones 5 - 6	SYSTEM ID TIMER (60 - 1799 SECONDS)	480
Control Zones 7 - 8	PORT #2 INACTIVITY DISCONNECT TIMER (60 - 1799 SECONDS)	600
System Codes	PORT #3 INACTIVITY DISCONNECT TIMER (60 - 1799 SECONDS)	600
System Long Timers	TIMED MESSAGE #1 TIMER (60 - 1799 SECONDS)	300
System Short Timers	TIMED MESSAGE #2 TIMER (60 - 1799 SECONDS)	600
Setup Internet Settings	TIMED MESSAGE #3 TIMER (60 - 1799 SECONDS)	900
CAT-800 Stats Page	TIMED MESSAGE #4 TIMER (60 - 1799 SECONDS)	1200
	PTT OFF MESSAGE #1 TIMER (60 - 1799 SECONDS)	1799



### Port #1 Timeout Timer

This timer limits the time a signal can appear on the Port #1 receiver input. If this time limit is exceeded the controller will turn off the transmitter. This timer is programmable between 60 and 1799 seconds. When the CAT-800 is initialized this timer defaults to 180 seconds.

### Port #2 Timeout Timer

This timer limits the time a signal can appear on the Port #2 receiver input. If this time limit is exceeded the controller will turn off the transmitter. When the CAT-800 is initialized this timer defaults to 180 seconds.

### Port #3 Timeout Time

This timer limits the time a signal can appear on the Port #3 receiver input. If this time limit is exceeded the controller will turn off the transmitter. When the CAT-800 is initialized this timer defaults to 180 seconds.

### System ID Timer

This timer sets the time between ID transmissions. The ID occurs when a repeater user stops transmitting. This timer is programmable between 60 and 1799 seconds. The timer default is 480 seconds.

**Port #2 Inactivity Disconnect Timer**

This timer determines how long Port #2 remains inactive before event macro 38 executes. Control Zone 2 Channel 6 must be enabled. This timer is programmable between 60 and 1799 seconds. The timer default is 600 seconds.

**Port #3 Inactivity Disconnect Timer**

This timer determines how long Port #3 remains inactive before event macro 39 executes. Control Zone 3 Channel 6 must be enabled. This timer is programmable between 60 and 1799 seconds. The timer default is 600 seconds.

**Timed Message #1 Timer**

This timer sets the timed message repeat period. This timer is programmable between 1.0 and 1799 seconds. The timer default is 300 seconds.

**Timed Message #2 Timer**

This timer sets the timed message repeat period. This timer is programmable between 1.0 and 1799 seconds. The timer default is 600 seconds.

**Timed Message #3 Timer**

This timer sets the timed message repeat period. This timer is programmable between 1.0 and 1799 seconds. The timer default is 900 seconds.

**Timed Message #4 Timer**

This timer sets the timed message repeat period. This timer is programmable between 1.0 and 1799 seconds. The timer default is 1200 seconds.

**PTT Off Message #1 Timer**

This timer sets the time between transmissions of the squelch tail message. The message occurs when a repeater user stops transmitting. This timer is programmable between 1.0 and 1799 seconds. The timer default is 1799 seconds.

**PTT Off Message #2 Timer**

This timer sets the time between transmissions of the drop out message. The message occurs when a repeater stops transmitting. This timer is programmable between 1.0 and 1799 seconds. The timer default is 1799 seconds.

**DTMF Programming Length Timer**

During the programming mode, this timer determines the maximum time the controller remains unlocked. This timer is programmable between 60 and 1799 seconds. When initialize, this timer will default to 600 second.

**DTMF Access Sleep Timer**

This timer determines the time required for the repeater to be at rest before the DTMF access code is required to activate the repeater. This timer is programmable between 60 and 1799 seconds. The timer default is 60 seconds.

## CAT-800 Short Timers

You can change any of the CAT-800 Short Timer settings by changing the time in the appropriate boxes and clicking [SAVE SETTINGS] at the bottom of the page. When the CAT-800 is initialized, these timers are automatically loaded with default values.



# Computer Automation Technology

## CAT-800 System Short Timers

Start Page	PORT #1 COR DROP TO COURTESY BEEP (0.1 - 9.9 SECONDS)	1.0
Control Zones 1 - 2	PORT #1 COURTESY BEEP TO PTT DROP (0.1 - 9.9 SECONDS)	4.0
Control Zones 3 - 4	PRE VOICE DELAY TIMER (0.1 - 9.9 SECONDS)	0.5
Control Zones 5 - 6	DTMF MUTING TIMER (0.1 - 9.9 SECONDS)	1.0
Control Zones 7 - 8	TURN ON DELAY TIMER (0.1 - 9.9 SECONDS)	1.0
System Codes		
System Long Timers		
System Short Timers		
Setup Internet Settings		
CAT-800 Stats Page		
	Save Settings	

### COR Drop to Courtesy Beep Timer

This timer determines the time between loss of COR and generation of the courtesy beep. This timer is programmable between 0.1 and 9.9 seconds. When initialize, this timer defaults to 1 second.

### Courtesy Beep to PTT Drop Timer

This timer determines the time between the generation of the courtesy beep and the time the repeater transmitter turns off. This timer is programmable between 0.1 and 9.9 seconds. The timer default is 2 seconds.

### Pre-Voice Delay Timer

This timer determines the time after PTT goes active and the voice synthesizer begins to speak. This timer is programmable between 0.1 and 9.9 seconds. The timer default is 0.5 seconds.

### DTMF Muting Timer

This timer determines the time the transmit audio will continue to be muted after the entry of the last DTMF tone. When initialize, this timer defaults to 1 second.

### Turn on Delay Timer

When the repeater is at rest, this timer sets the time COR must be present before the repeater will activate. This timer is programmable between 0.1 and 9.9 seconds. When initialize this timer will default to 1.0 seconds. This timer also sets the turn on delay time for the Port #2 and Port #3 inputs.

### CAT-800 Internet Settings

This page displays the IP address, Subnet Mask, Router IP Address, UDP and TCP Port numbers. The MAC Address is assigned to every piece of equipment that connects to the Internet. This number cannot be changed and is the electronic serial number for your CAT-800 controller. If necessary, use this web page to change the IP address, Router address or Port numbers.

NOTE: If you change any information on this page when you click "Save Settings" communication with the CAT-800 will be lost.



## Computer Automation Technology

### CAT-800 Internet Settings

- Start Page
- Control Zones 1 - 2
- Control Zones 3 - 4
- Control Zones 5 - 6
- Control Zones 7 - 8
- System Codes
- System Long Timers
- System Short Timers
- Setup Internet Settings
- CAT-800 Stats Page

CAT-800 IP Address	<input type="text" value="192.168.1.245"/>
Subnet Mask	<input type="text" value="255.255.255.0"/>
Router IP Address	<input type="text" value="192.168.1.1"/>
TCP Port Number	<input type="text" value="80"/>
UDP Port Number	<input type="text" value="1465"/>
MAC Address	<input type="text" value="00:50:C2:C3:81:2D"/>

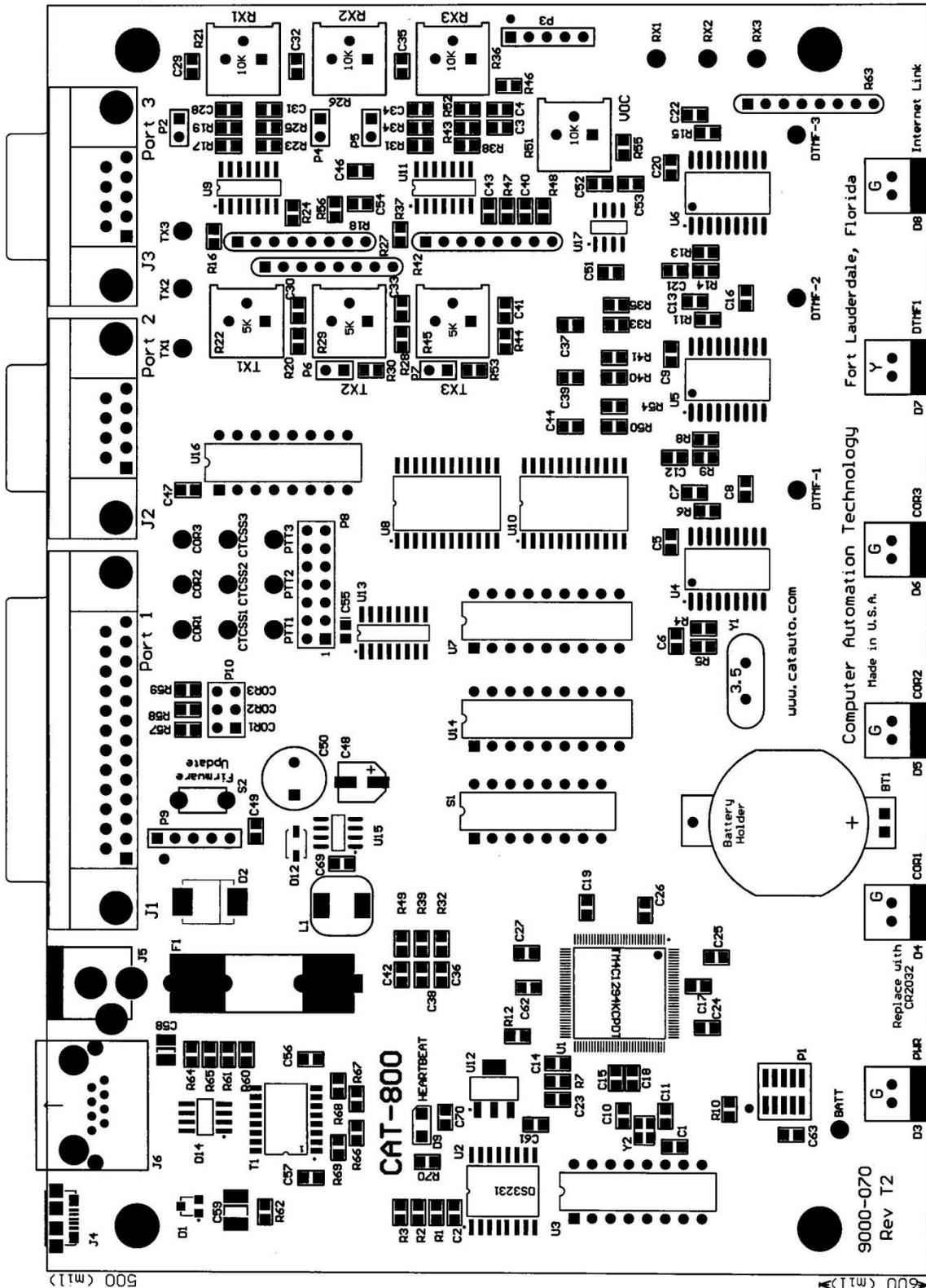
Save Settings

## Chapter 10 - Voice Vocabulary

Zero	000	Band	252	Expect	351	Juliet	502
One	001	Base	253	<b>F</b>	370	July	503
Two	002	Beacon	254	Fail	371	June	504
Three	003	Below	255	Failure	372	<b>K</b>	530
Four	004	Between	256	Fahrenheit	373	Key	531
Five	005	Bravo	257	Fast	374	Keypad	532
Six	006	Break	258	February	375	Kilo	533
Seven	007	Button	259	Feet	376	Knots	534
Eight	008	By	260	File	378	<b>L</b>	550
Nine	009	<b>C</b>	270	Filed	379	Land	551
Ten	010	Call	272	Final	380	Last	552
Eleven	011	Calling	273	Fire	381	Late	553
Twelve	012	Cancel	274	Flag	382	Left	554
Thirteen	013	Cat	275	Fog	383	Less than	555
Fourteen	014	Caution	276	For	384	Let	556
Fifteen	015	Center	277	Foxhunt	385	Level	557
Sixteen	016	Celsius	278	Foxtrot	386	Light	558
Seventeen	017	Change	279	Freezing	387	Lima	559
Eighteen	018	Charlie	280	Frequency	388	Line	560
Nineteen	019	Check	281	Friday	389	Link	561
Twenty	020	Circuit	282	From	390	List	562
Thirty	030	Clear	283	Front	391	Load	563
Forty	040	Clock	284	Full	392	Lock	564
Fifty	050	Closed	285	Fall	393	Lockout	565
Sixty	060	Club	286	<b>G</b>	410	Long	566
Seventy	070	Code	287	Gear	411	Look	567
Eighty	080	Come	288	Get	412	Low	568
Ninety	090	Complete	289	Go	413	Lower	569
<b>A</b>	210	Completed	290	Golf	414	<b>M</b>	580
A.M.	211	Computer	291	Good	415	Machine	581
Abort	212	Condition	292	Green	416	Macro	582
About	213	Congratulation	293	Ground	417	Make	583
Above	214	Connect	294	<b>H</b>	440	Malfunction	584
Acknowledge	215	Contact	295	Hail	441	Manual	585
Action	216	Control	296	Half	442	Many	586
Adjust	217	Current	297	Ham	443	March	587
Advise	218	Cycle	298	Hamfest	444	May	588
Aerial	219	Calm	299	Have	445	Mayday	589
Affirmative	220	<b>D</b>	310	Hazardous	446	Me	590
Again	221	Danger	311	Heavy	447	Measure	591
Air	222	Data	312	Henry	448	Measured	592
Alert	223	Date	313	Hertz	449	Meeting	593
All	224	Day	314	High	450	Mega.	594
Alpha	225	Days	315	Hold	451	Message	595
Alternate	226	December	316	Home	452	Meter	596
Altitude	227	Decrease	317	Hotel	453	Meters	597
Amateur	228	Degree	318	Hour	454	Micro	598
Amps	229	Delay	319	Hours	455	Mike	599
An	230	Delta	320	Hundred	456	Miles	600
And	231	Department	321	<b>I</b>	470	Milli	601
Answer	232	Direction	322	Ice	471	Million	602
April	233	Do	323	Icing	472	Minus	603
Are	234	Down	324	Identify	473	Minute	604
Area	235	Drizzle	325	Immediately	474	Minutes	605
As	236	Due	326	In	475	Mobile	606
Assistance	237	Dynamic	327	Inch	484	Modified	607
At	239	<b>E</b>	340	Inches	485	Monday	608
Attempt	240	East	341	Increase	476	Month	609
Attention	241	Echo	342	India	477	More than	610
August	242	Ed (suffix)	343	Information	478	Move	611
Automatic	243	Emergency	344	Ing (suffix)	479	Much	612
Autopatch	244	End	345	Inputs	480	<b>N</b>	620
Auxiliary	245	Enter	346	Intruder	481	Near	621
Avenue	246	Equals	347	Is	482	Negative	622
Average	247	Error	348	It	483	Net	623
<b>B</b>	250	Evacuate	349	<b>J</b>	500	New	624
Back	251	Exit	350	January	501	Next	625

Night	626	Rig	748	Type	851	<u>Female</u>	
No	627	Right	749	Today's	852	Good Morning	980
Normal	628	Road	750	Transceiver	853	Good Afternoon	981
North	629	Roger	751	Tone	854	Good Evening	982
Not	630	Romeo	752	<b>U</b>	870		
November	631	Route	753	Uniform	871	<u>Time Variables</u>	
Now	632	<b>S</b>	770	Unit	872	Time of Day	100
Number	633	Safe	771	Unlimited	873	Day of Week	101
<b>O</b>	650	Saturday	772	Until	874	Day and Month	102
O'clock	651	Scattered	773	Up	875	Salutation	103
October	652	Seconds	774	Use(noun)	876	Year	104
Of	653	Security	775	Use(verb)	877		
Off	654	Select	776	<b>V</b>	880	<b>User Switch Control</b>	
Ohms	655	Send	777	Variable	881	500mS Delay	150
On	656	Sent	778	Verify	882	UF #1 Off	151
Open	657	September	779	Version	883	UF #1 On	152
Operation	658	Sequence	780	Victor	884	UF #1 (250mS)	153
Operator	659	Service	781	Volts	885	UF #1 (500mS)	154
Or	660	Set	782	<b>W</b>	890	UF #2 Off	155
Organization	661	Severe	783	Wait	891	UF #2 On	156
Oscar	662	Short	784	Warning	892	UF #2 (250mS)	157
Other	663	Showers	785	Watch	893	UF #2 (500mS)	158
Out	664	Shut	786	Watts	894	UF #3 Off	159
Over	665	Side	787	Way	895	UF #3 On	160
Overcast	666	Sierra	788	Weather	896	UF #3 (250mS)	161
<b>P</b>	680	Sleet	789	Wednesday	897	UF #3 (500mS)	162
P.M.	681	Slow	790	Week	898	UF #4 Off	163
Papa	682	Snow	791	Weekday	899	UF #4 On	164
Pass	683	South	792	Welcome	900	UF #4 (250mS)	165
Patch	684	Speed	793	Well Done	901	UF #4 (500mS)	166
Per	685	Squawk	794	West	902	UF #5 Off	167
Phone	686	Star	795	What	903	UF #5 On	168
Pico	687	Start	796	Whiskey	904	UF #5 (250mS)	169
Plan	688	Stop	797	Will	905	UF #5 (500mS)	170
Please	689	Storm	798	Wind	906		
Plus	690	Sunday	799	Windchill	907		
Point	691	Switch	800	With	908		
Police	692	System	801	Wrong	909		
Position	693	S (plural)	802	Wind Chill	910		
Pound	694	<b>T</b>	820	<b>X</b>	920		
Power	695	Tango	821	X-Ray	921		
Practice	696	Target	822	<b>Y</b>	930		
Preset	697	Telephone	823	Yankee	931		
Press	698	Temperature	824	Year	932		
Program	699	Terminal	825	Yellow	933		
Pull	700	Test	826	Yes	934		
Push.	701	Than	827	Yesterday	935		
Put	702	Thank-You	828	You	936		
Percent	703	That	829	Your	937		
Pressure	704	The (short E)	830	<b>Z</b>	950		
<b>Q</b>	720	The (long E)	831	Zed	951		
Quebec	721	Then	832	Zero	952		
<b>R</b>	730	This	833	Zone	953		
Radio	731	This-is	834	Zulu	954		
Radios.	732	Thousand	835				
Rain	733	Thunderstorm	836	Pause 1	960		
Raise	734	Thursday	837	Pause 2	961		
Range	735	Time.	838	Pause 3	962		
Rate	736	Timer	839	Pause 4	963		
Ready	737	Today	840				
Receive	738	Tomorrow	841	<u>Sound Effects</u>			
Receiver	739	Tonight	842	Chime 1	964		
Red	740	Tornado	843	Chime 2	965		
Release	741	Tower	844	Chime 3	966		
Remark	742	Traffic	845	Gunshot	967		
Remote	743	Transmit	846	Laser	968		
Repair	744	Transmitter	847	Phaser	969		
Repeat	745	Try	848	Tic	971		
Repeater	746	Tuesday	849	Laughter	972		
Reset	747	Turn	850				

CAT-800 Repeater Controller Board

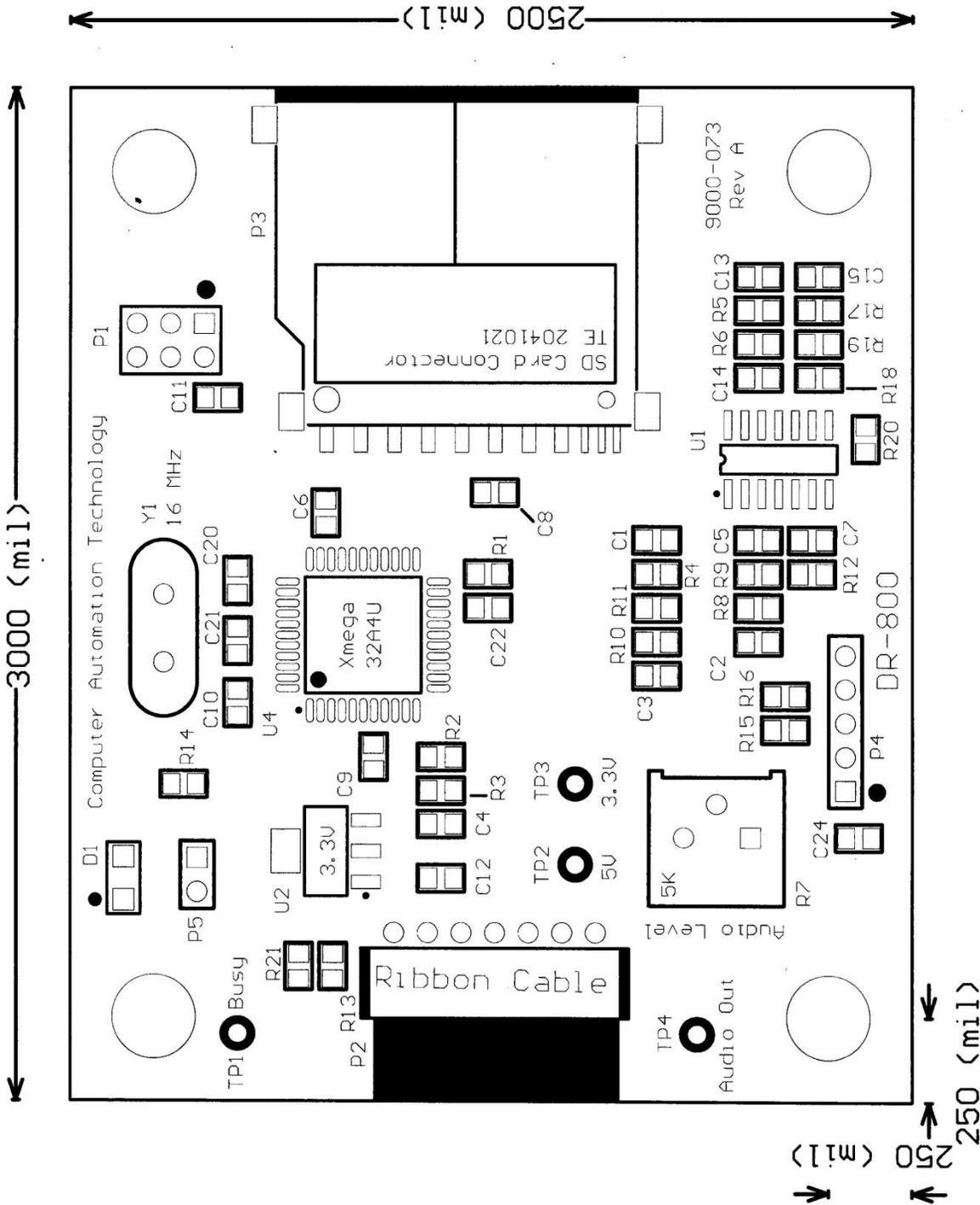


9000-070  
Rev T2

Computer Automation Technology  
Fort Lauderdale, Florida  
Made in U.S.A.

www.catauto.com

# DR-800 Digital Audio Player



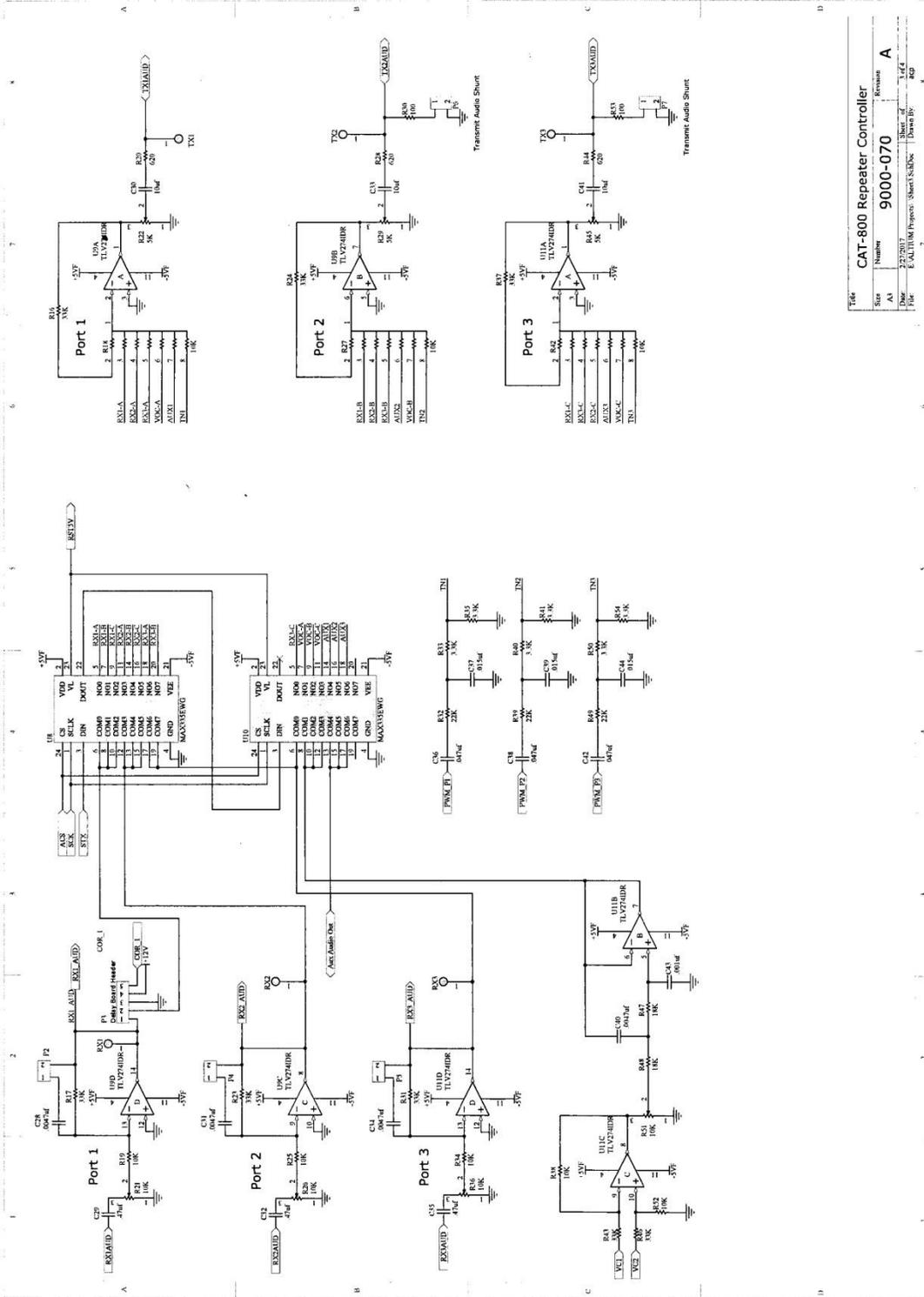
## Chapter 12 - Schematic

Controller Board (CAT-800)  
Controller Board (CAT-800)  
Controller Board (CAT-800)  
Controller Board (CAT-800)  
Digital Voice WAV Player Board (DR-800)

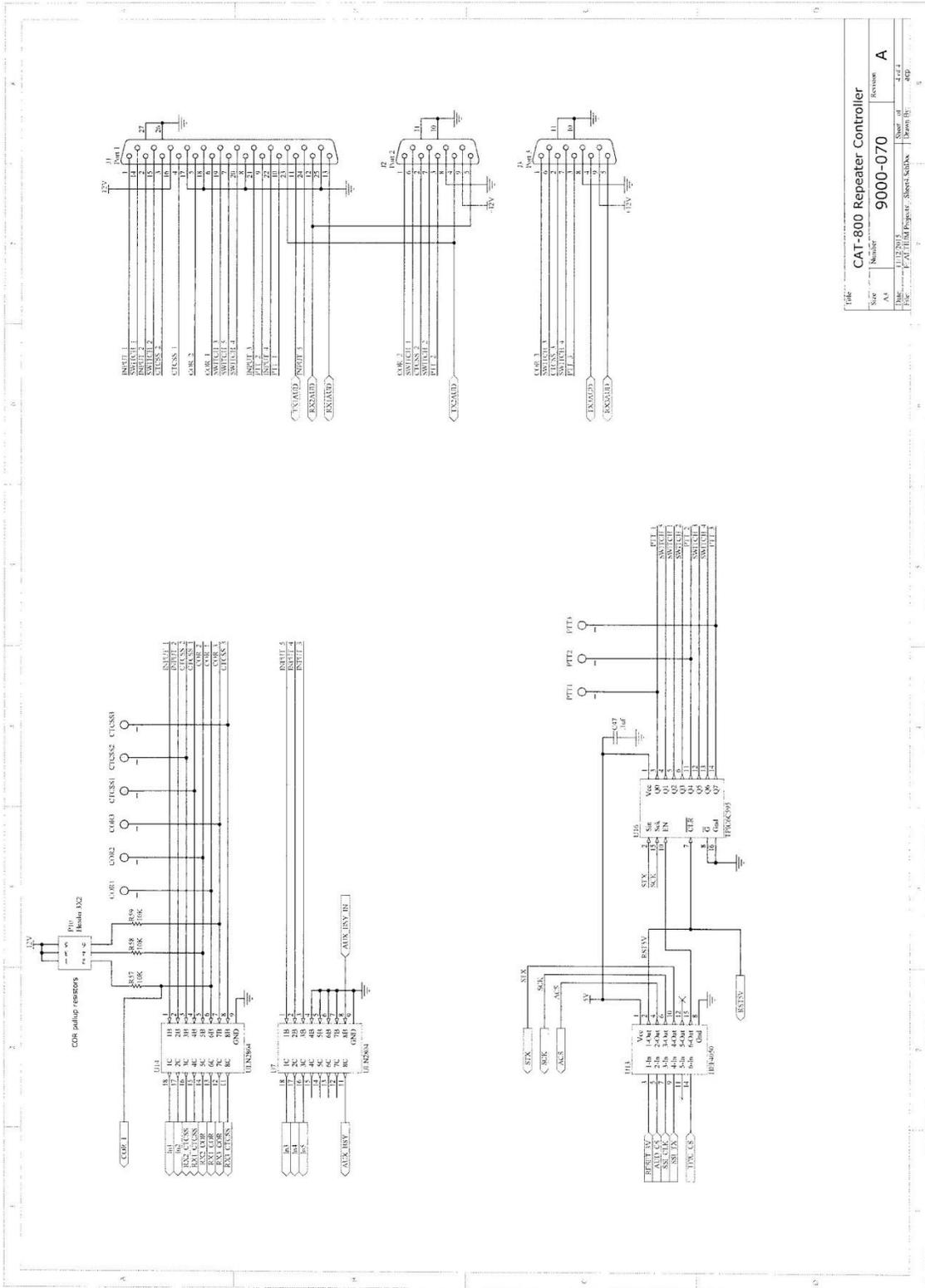
Sheet 1 of 4  
Sheet 2 of 4  
Sheet 3 of 4  
Sheet 4 of 4  
Sheet 1 of 1





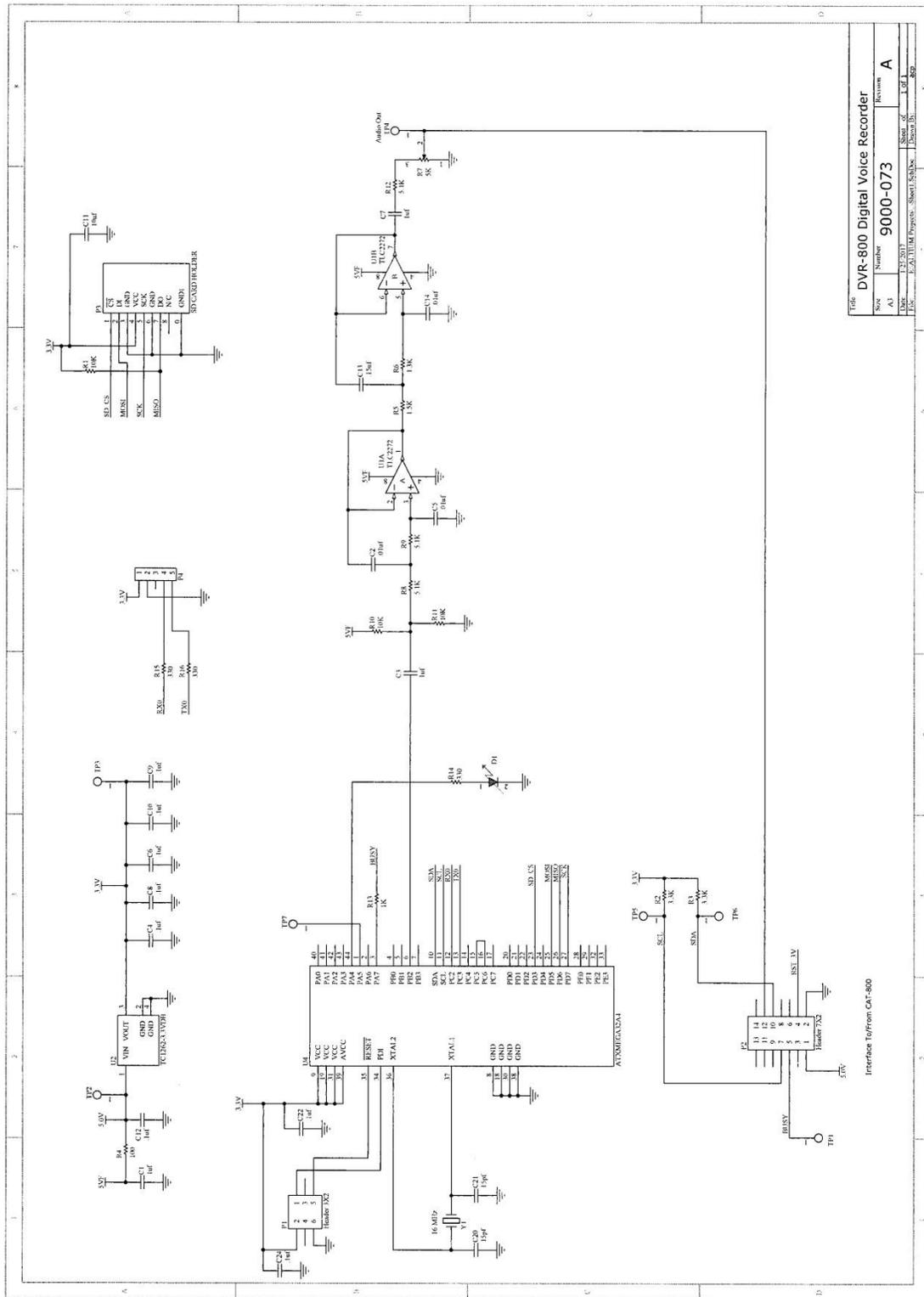


Title	CAT-800 Repeater Controller		
Size	Number	Revision	A
AI	9000-070	Sheet of	1 of 4
Date	2/2/2017	Drawn By	
File	E:\ALL\1118\Program - Sheet\SheetDoc		



Title: CAT-800 Repeater Controller			
Scale: A1	Number: 9000-070	Revision: A	
File: P:\ATL\Proj\9000-070\Sheet 4.dwg	Sheet of: 4 of 4	Drawn by: ep	

# DR-800 Digital Audio WAV Player Sheet 1 of 1



## Chapter 13 - Part List

### CAT-800 Repeater Controller Parts List

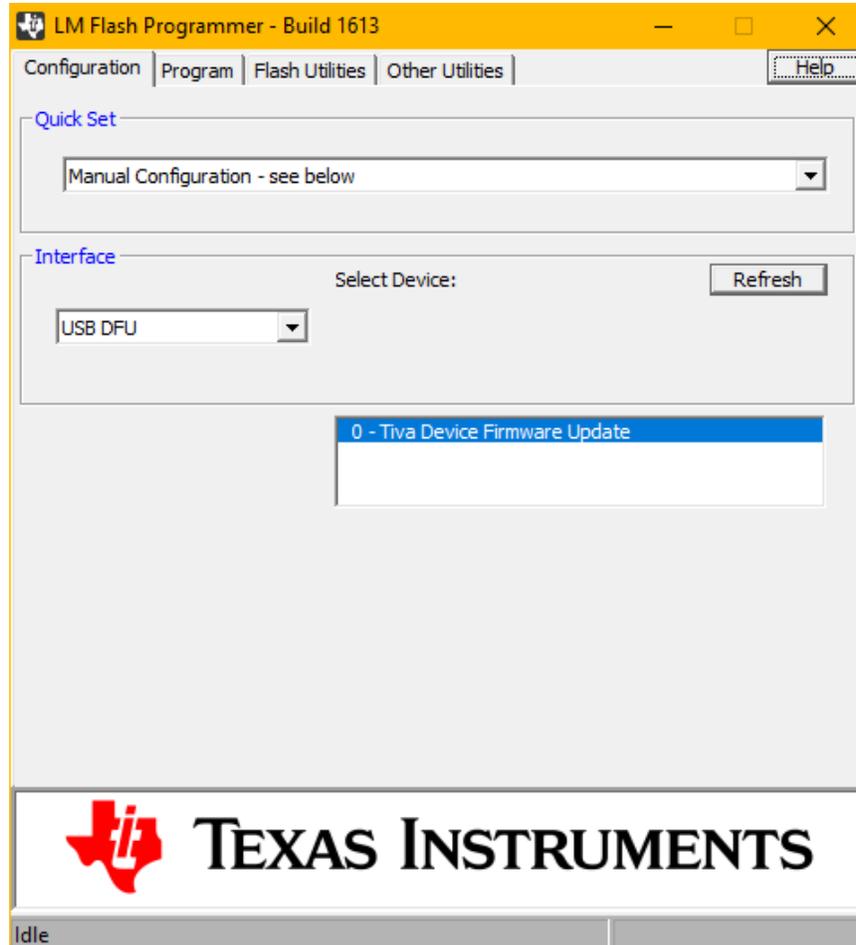
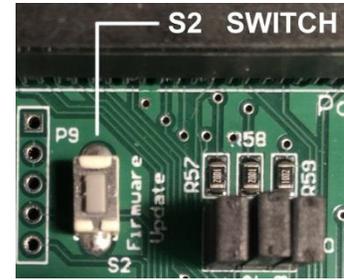
Quantity	Type	Value	Designation
3	Capacitor	33pf 50V	C46,C48,C50
1	Capacitor	.001uf 50V	C26
1	Capacitor	.0047uf 50V	C25
2	Capacitor	.015uf 50V	C34,C36
25	Capacitor	.1uf 50V	C1,C2,C4,C5,C6,C8,C9,C19,C24,C31 C32,C33,C35,C37,C38,C39,C40,C41 C42,C43,C44,C45,C47,C49,C51
3	Capacitor	.47uf 50V	C29,C32,C35
4	Capacitor	User Option Capacitor	C17,C18,C27,C28
10	Capacitor	10uf 16V	C7,C10,C11,C12,C20,C21,C22,C23 C29,C30
1	Capacitor	470uf 25V	C50
1	Connector	DC Power	J5
2	Connector	DB9 Female	J2,J3
1	Connector	DB25 Female	J1
1	Connector	USB	J4
1	Connector	Ethernet	J6
1	Connector	Header 1X5	J3
1	Connector	Header 2X5	P1
1	Connector	Header 2X7	J7
1	Crystal	25 MHz Resonator	Y2
1	Crystal	3.58MHz	Y1
1	Diode	SMCJ17A	D2
1	Fuse	0.5 Amp	F1
1	I.C.	TC1362-3.3VDR	U12
2	I.C.	LM348	U9,U11
2	I.C.	MAX335	U8,U10
1	I.C.	TM4C1294NCPDT-128- TQFP	U1
1	I.C.	ISD4004	U7
1	I.C.	MSP53C391	U3
1	I.C.	TPIC6C595	U16
2	I.C.	ULN2804N	U14
3	I.C.	MT88L70	U4,U5,U6
1	I.C.	DS3231	U2
1	I.C.	HfC4050	U13
1	I.C.	TC7660SEDA	U17
1	I.C.	LM340-5.0	U15
1	I.C.	MCP101	U10
2	Resistor	100 Ohm	R61,R62
3	Resistor	620 Ohm	R20,R28,R44
3	Resistor	5K Variable	R22,R29,R45
7	Resistor	10K	R22,R23,R25,R37,R39,R41,R43
4	Resistor	10K Variable	R21,R26,R36,R51

1	Resistor	10K 6 Pin SIP	R6
3	Resistor	10K 8 Pin SIP	R18,R27,R42
3	Resistor	10K 10 Pin SIP	R2,R4,R5
13	Resistor	33K	R7,R18,R19,R26,R28,R29,R30 R31,R36,R38,R40,R42,R48
2	Resistor	82K	R16,R17
8	Resistor	100K	R49,R50,R52,R53,R55,R56,R58,R59
4	Resistor	560K	R51,R54,R57,R60
4	Resistor	User Option	R8,R9,R10,R11
1	Switch	DIP Switch 8 Position	S1

## Chapter 14 – USB Firmware Upgrade Procedure

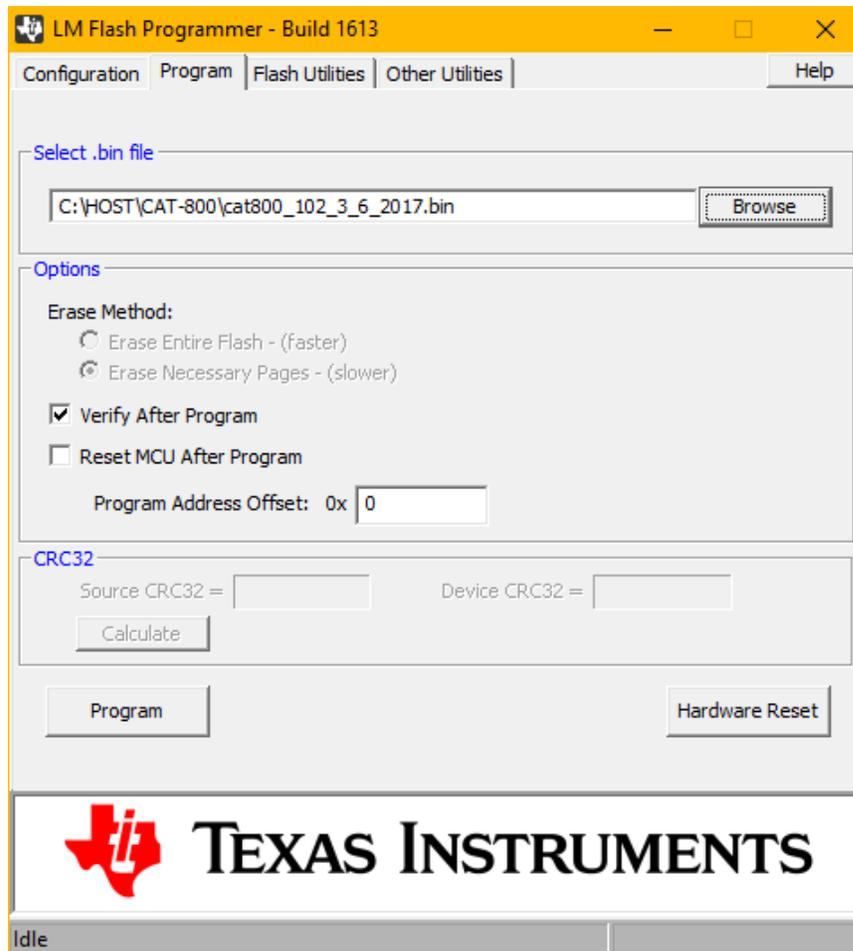
After you perform a firmware update it is necessary to re-initialize the CAT-800 controller using a dipswitch #7 reset. This will erase your configuration data. Make sure you have saved your existing configuration file before continuing with this procedure.

Turn off power to the CAT-800. Push and hold the firmware update button switch S2. Turn on power then after three seconds, release S2 and verify the power light is on. Open the LMI Flash Programmer installed on your computer to display the window below:



Note: You may need to click the "Refresh" button several times before the Tiva Device Firmware Update message appear within the window.

Click the "Program" tab to display the window below:



Click the Browse button and select the new CAT-800 firmware Update File ("bin" file).

**NOTE: Set Program Address Offset to 0 and check "Verify After Program".**

When ready, click the Program button (located above the red Texas icon). After programming and verification has completed remove power from your CAT-800. After a few seconds, re-apply power and verify the voice synthesizer announces the new firmware version.

Cycle power with dipswitch #7 on to re-initialize the controller. Set dipswitch #7 to off. Using the CAT-800 editor program upload your configuration file.

## Chapter - 15 Controller Projects

### Project #1 - "Emergency Power Announcement"

This project turns on Timed Message #1 to announce to repeater users that the repeater is operating on emergency power. When line power is restored the message turns off.

1. Unlock the controller to place the controller in programming mode.  
Key-up and enter: [1234567]
2. Program timed message #1 to say: "EMERGENCY POWER"  
Key-up and enter: [\*3104 344 695]
3. Program timed message #1 to repeat every ten minutes.  
Key-up and enter: [\*607\* 600]
4. Program logic input #1 to turn off and on timed message #1.  
Key-up and enter: [\*1707 1 \* 1750] Key-up and enter: [\*1708 1 \* 1751]
5. Lockup the controller to return it to normal operation.  
Key-up and enter: [\*0]
6. Connect a 5 or 12 VDC wall wart to the controller. Connect the (+) lead to J1-1 and the (-) lead to J1-8.
7. Turn on Zone 5 Channel 1.  
Key-up and enter: [100 511]

### Project #2 - "Emergency Net Announcement"

This project turns on Timed Message #2 at 6:00 AM to remind repeater users to check into the emergency net at 7:00PM each Monday night. At 7:15 PM Message #2 will turn off.

1. Unlock the controller to place the controller in programming mode.  
Key-up and enter: [1234567]
2. Program Timed Message #2 to say: "CHECK IN TO THE EMERGENCY NET TONIGHT AT SEVEN P M" every thirty minutes throughout the day.  
Key-up and enter: [\*3105 281 475 002 830 623 842 239 007 030 680 580]]
3. Schedule message #2 to turn on at 6:00 AM every Monday morning.  
Key-up and enter: [\*1140 06 00 02] Key-up and enter: [\*1740 1 1761]
4. Schedule message #2 to turn off at 7:15 PM every Monday night.  
Key-up and enter: [\*1141 19 15 02] Key-up and enter: [\*1741 1 1760]
5. Lockup the controller to return to normal operation.  
Key-up and enter: [\*0]

### Project #3 - "Unique Repeater Off/On Command"

This project sets up a unique DTMF command to turn the repeater off and a unique DTMF command to turn the repeater back on with a voice announcement for each.

1. Unlock the controller to place the controller in programming mode.  
Key-up and enter: [1234567]
2. Program User Macro #20 to turn off the repeater with the DTMF command [123] and announce that the repeater is being turned off.  
Key-up and enter: [\*1420 1 \* 123 \* 6511 9746 9654 6510 1110]
3. Program User Macro #21 to turn on the repeater with the DTMF command [321] and announce that the repeater is back on.  
Key-up and enter: [\*1421 1 \* 321 \* 1111 6511 9746 9656 6510]
4. Lockup the controller to return to normal operation.  
Key-up and enter: [\*0]

#### **Project #4 – “Change Grandfather Clock Message”**

This project removes: “CAT EIGHT HUNDRED REPEATER” from the grandfather clock message and replace it with “W4XYZ REPEATER”. Substitute your call letters.

1. Unlock the controller to place the controller in programming mode.  
Key-up and enter: [1234567]
2. Program the voice Message #8 with W4XYZ repeater.  
Key-up and enter: [\*3108 890 004 920 930 950 746 830 838 482 100 103]
3. Lockup the controller to return to normal operation.  
Key-up and enter: [\*0]

#### **Project #5 – “Change the Port #1 CTCSS Logic active low”**

This project changes the Port #1 CTCSS logic input from active high to active low COR and CTCSS logic. At default all three CTCSS inputs are set for active high COR and CTCSS logic.

1. Unlock the controller to place the controller in programming mode.  
Key-up and enter: [1234567]
2. Change the Port #1 CTCSS logic to active low.  
Key-up and enter: [\*3612]
3. Lockup the controller to return to normal operation.  
Key-up and enter: [\*0]

#### **Project #6 – “Add a Fan to cool the repeater using the controller’s switch #1”**

The fan will turn on when the transmitter turns on and remain on for an additional minute after the transmitter turns off. Connect a small 12VDC relay to the controller. Connect one coil lead to J1-14 and the other lead to a source of +12VDC. Place a spike suppression diode across the coil with the banded end on the +12V lead.

1. Unlock the controller to place the controller in programming mode.  
Key-up and enter: [1234567]
2. Change Switch #1 to a fan control switch.  
Key-up and enter: [\*3912]
3. Lockup the controller to return to normal operation.  
Key-up and enter: [\*0]
4. Turn on Zone 6 Channel 5.  
Key-up and enter: [100 6 1 1]
5. Turn off Zone 5 Channel 1.  
Key-up and enter: [100 5 1 1]

#### **Project #7 – “Place the controller in DTMF Access mode from midnight until 6:00 AM”**

During the early morning hours a control operator may not be available to monitor the repeater. Some repeater owners may choose to place the repeater into DTMF Access mode. The repeater will appear to be a sleep but if the DTMF Access number is entered the repeater will wake up. The default number is: [325]. After a period of inactivity the repeater will go back to sleep.

1. Unlock the controller to place the controller in programming mode.  
Key-up and enter: [1234567]
2. Schedule DTMF Access to turn on at 11:59 PM every day.  
Key-up and enter: [\*1142 23 59 00] Key-up and enter: [\*1742 1 \* 1821]
3. Schedule DTMF Access to turn off at 06:00 AM every day.  
Key-up and enter: [\*1143 06 00 00] Key-up and enter: [\*1743 1 \* 1820]
4. Lockup the controller to return to normal operation.  
Key-up and enter: [\*0]

**Project #8 – “Program Scheduler to make club meeting announcement.**

This project programs the scheduler to turn on Timed Message #1 at 6:00 AM on the second Tuesday of the month and turn Timed Message #1 off at 8:30 PM.

1. Unlock the controller to place the controller in programming mode.  
Key-up and enter: [1234567]
2. Program Timed Message #1 to say: “CLUB MEETING TONIGHT AT 7:30 PM”.  
Key-up and enter: [\*3104 286 593 842 239 007 030 680 580]
3. Program Scheduler Event #40 to occur at 6:00 AM on the second Tuesday of the month.  
Key-up and enter: [\*1140 06 00 23]
4. Program Scheduler Event #41 to occur at 7:30 PM on the second Tuesday of the month.  
Key-up and enter: [\*1141 19 30 23]
5. Program Event #40 to turn on Timed Message #1. “Zone 7 Channel 5”  
Key-up and enter: [\*1740 1 \*1751]
6. Program Event #41 to turn off Timed Message #1. “Zone 7 Channel 5”  
Key-up and enter: [\*1741 1 \* 1750]

## Chapter – 16 DR-800 Digital Voice WAV Player

The DR-800 plays prerecorded WAV files stored on a standard SD memory card. The Digital Voice Player will support ninety-nine WAV files of any length limited only by the size of the SD memory card used.

### Digital Voice WAV Player Installation

Mount the DR-800 on the under side of the cover using the supplied drill template and hardware. Connect the ribbon cable to the P8 header on the CAT-800 board. The CAT-800 controller requires firmware Version 1.02 or greater.

Turn on the power and check the red LED on the DR-800 lights indicating the SD card has initialized. The SD memory card supplied with the DR-800 has nine prerecorded tracks for test purposes.

Track [T01.wav] is a sample repeater ID.

Track [T02.wav] is a 320 second recording of the NOAA weather transmitter located in Miami Florida.

Track [T03.wav] is a 12 second sample-meeting announcement.

Track [T04.wav] is an aircraft cabin chime suitable to use as a unique courtesy tone.

Track [T05.wav] is a Westminster chime suitable for used in the grandfather clock message.

Track [T06.wav] is an Alarm Warning Tone

Track [T07.wav] is a Tornado Warning

Track [T08.wav] is a string of DTMF Tones

Track [T09.wav] is a 10 second 1000 Hz test tone.

Track [T10.wav] is a 10 second 400 Hz test tone.

### Digital Voice WAV Player Adjustment

If you have access to a deviation meter, key-up and enter [72501] to play track #01. Adjust R7 on the DR-800 board for 3 KHz deviation at the transmitter output. If a deviation meter is not available, key-up and enter [72502] to play track #02. Adjust R7 so the track's audio level is the same as the repeaters receive audio.

Turn the power off and remove the SD memory card. Insert the card in your computer's memory slot. Transfer your recorded WAV files to the card. Reinsert the card into the Digital WAV Player. Turn the power on. Verify the red LED on the DR-800 board is lit. Fold the ribbon cable back on its self and close the cover.

### WAV File Preparations

You can use any of the popular WAV file generator programs. The only requirement is that the file must be recorded in monaural with a sampling rate of 8000, 11025 or 16000 and be formatted in WAV (Microsoft) signed 16-bit PCM. There is very little difference in audio quality at the various sampling rates. A WAV file recorded with a 16000-sample rate uses approximately 2,000 KB per minute. This means the 8GB SD card supplied with the DR-800 can hold recordings in excess of sixty minutes.

### WAV File Name Requirement

As you record the WAV files their filename must correspond to their track number. For example: The filename for track #1 must be "T01.wav" and the filename for track #30 must be "T30.wav".

NOTE: If you do not use all ninety-nine tracks it is suggested that you save the default tracks for future testing and evaluation.

### Digital Audio WAV Track as Repeater ID

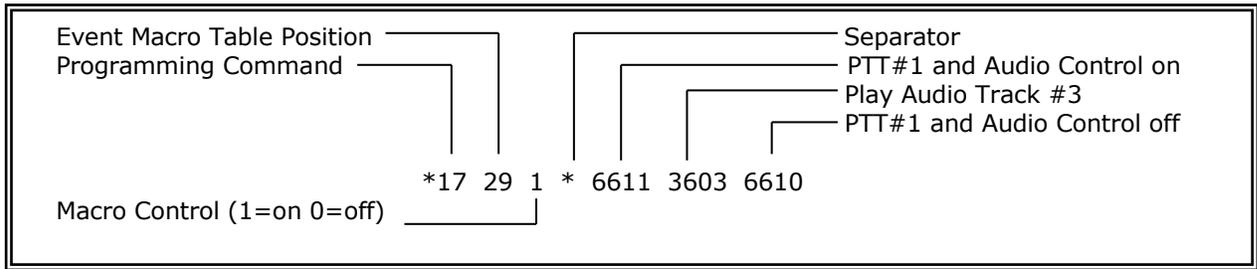
Track [T01] is assigned exclusively as the repeater's ID track message. Record Your ID on Track 01. Program Event macro 17 with the following: [\*17171\* 6611 3300 6610]. The repeater will ID using Track 01. If a repeater user keys-up when the track is playing the track will stop and the ID will switch to CW.





**Program Event Macro #29 Timed Message #1 to Play Track #3**

Unlock the controller with the seven digit unlock number [1234567]. Key-up and send [\*1729] followed by a [1] to enable the macro followed by the string of internal commands to be executed. Un-key and the voice will say: "CONTROL OK."



Timed Message #1 repeats every five minutes. To change the repeat time to once every twenty minutes unlock the controller with the seven-digit unlock number [1234567]. Key-up and send [\*607\*1200] for 1200 seconds.

NOTE: Control Zone 7 Channel 5 must be enabled for Timed Message #1 to function. This control channel is not defaulted on. Key-up and enter [100751].

**Program Event Macro #20 Port #1 Courtesy Tone as an Aircraft Cabin Chime**

Unlock the controller with the seven digit unlock number [1234567]. Key-up and send [\*1720 1 \* 6611 3604 6610]. Un-key and the voice will say: "CONTROL OK."

**Program Event Macro #33 Grandfather Clock Message to Play Westminster Chimes**

Unlock the controller with the seven digit unlock number [1234567]. Key-up and send [\*1733 1 \* 6611 3605 6610 6311 3008 6310]. Un-key and the voice will say: "CONTROL OK."

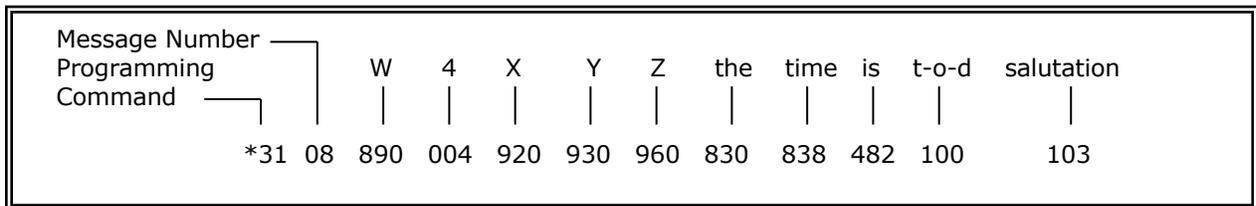
**Reprogram Voice Message #8**

In voice message #8 remove the words "cat eight-hundred" and replace them with your call letters. Example: Replace "cat eight-hundred" with "W4XYZ"

**Reprogram Voice Message #8**

In voice message #8 remove the words "cat eight-hundred" and replace them with your call letters.

Example: Replace "cat eight-hundred" with "W4XYZ"



## WAV File Generation

If you do not have a program to generate WAV files for the DR-800 may I suggest a program called: Audacity 2.1.2. This program was used to generate the default test WAV files of tracks #1, #2, #3, #4 and #5. This is an open source program available on the Internet for down loading at [www.audacityteam.org](http://www.audacityteam.org)

Set the recording to MONO and the sample rate to 8000, 11025 or 16000. Adjust the record level to peak around “-12”. Press the red circle to start recording and the yellow square to stop the recording. Press the green arrow to play the recording. If you are satisfied with the recording click “File”. In the drop down box click “Export Audio”. Save the recording to the SD memory card. Remember the filename must be T01.wav to T30.wav depending on your track assignment.

NOTE: Not all SD memory cards will initialize in the WAV player. Before you transfer WAV files to the card plug it in, if the red LED lights your good to go.

