

# **CAT-300DXL Repeater Controller**

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## Foreword

For your convenience, this manual is divided into twelve chapters. A brief description of each chapter and its contents are listed below. Control and programming of the CAT-300DXL has been carefully structured. Once you become familiar with the procedures described in this manual, you will find it very easy to program and control the CAT-300DXL to suite your particular requirements.

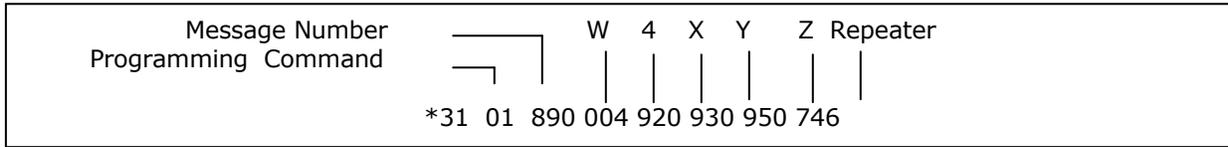
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| Chapter 1  | This chapter describes some of the CAT-300DXL features. Also included are the technical specifications.   |
| Chapter 2  | This chapter describes the various configurations for the CAT-300DXL, dipswitch settings, and modes of operation.   |
| Chapter 3  | This chapter describes how to control the CAT-300DXL. The control operator prefix code must precede each control command. The default value for the control operator code is [100]. <b><u>Do not unlock the CAT-300DXL when changing control channels.</u></b> Unlocking is used to program the controller. |
| Chapter 4  | This chapter describes how to use the features of the CAT-300DXL. These are considered repeater user commands.  |
| Chapter 5  | This chapter describes how to program the CAT-300DXL with DTMF tones. <b><u>During programming the CAT-300DXL must be un-locked.</u></b> The default value for the unlock code is [1234567].  |
| Chapter 6  | This chapter describes how to interface the CAT-300DXL to a RF package. It defines the input and output connections, and how to adjust the audio levels.  |
| Chapter 7  | This chapter describes how to connect a computer to the CAT-300DXL controller. Information includes a description of the editor program and how to upload and download the contents of the controller memory.   |
| Chapter 8  | This chapter describes the various integrated circuits and their functions that are used in the CAT-300DXL.   |
| Chapter 9  | This chapter contains a list of the vocabulary words used to program the voice synthesizer.   |
| Chapter 10 | This chapter contains a PC board layout for part location on the CAT-300DXL board.  |
| Chapter 11 | This chapter contains the schematic diagram for the CAT-300DXL.   |
| Chapter 12 | This chapter contains the parts list for the CAT-300DXL.  |

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

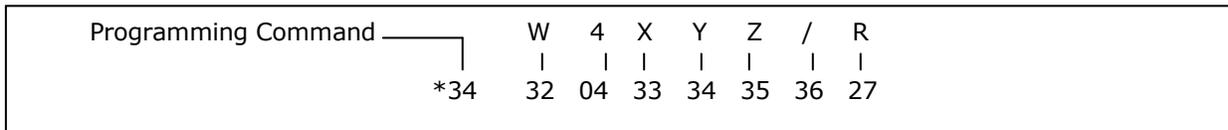
If you are anxious to get the CAT-300DXL in operating and don't have time to read this manual, the following short version will appeal to you. This is a list of the minimum steps required to install the CAT-300DXL and verify its operation. Now fire-up your soldering iron and lets get started. This information is suitable for most repeater types.

1. Open the connector kit, 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 plug. Connect the wires to a +12VDC power supply. Note: There is no power switch on the CAT-300DXL.
2. Solder five wires to the 25 pin "D" connector. Connect these wires to pins 6, 10, 11, 13 and 24.
3. Connect the pin-10 wire to the transmitter's PTT and the pin-11 wire to the transmitter's modulation input.
4. The CAT-300DXL audio controls are pre set to initial testing values. With the repeater transmitter powered-up and ready to transmit, turn on the +12VDC power supply connected to the controller. The repeater should transmit, and you should hear the voice synthesizer say: "CAT300DXL VERSION 1.04." Adjust TX1 control (R40) for proper transmitter deviation. Cycle the power supply and confirm that the voice synthesizer is at the desired level.
5. Turn the +12VDC power supply OFF. Connect the pin-6 wire to the receiver's COR or COS output. Connect the pin-13 wire to the RECEIVE audio output.
6. Turn the +12VDC power supply ON. Monitor TP2 with a DC voltmeter. Open and close the repeater's squelch control while observing the voltage on TP2. If TP2 goes from LOW to HIGH dipswitch #1 should be left in the OFF position. If TP2 goes from HIGH to LOW set dipswitch #1 to ON. If TP2 stays LOW, turn the power supply OFF and add a 2200 ohm pull-up resistor (included in the connector kit) on the CAT-300DXL board at the R6 position. Note: LOW is any voltage less than 0.8VDC. HIGH is any voltage between 3VDC and 15VDC.
7. Connect an AC voltmeter to TP6. Using a typical transceiver, key-up and send a DTMF tone. Adjust RX1 control (R45) for 200mV as indicated on the AC voltmeter. If this causes the repeater to over deviate, readjust the TX1 control (R40). Make sure that RF from the transceiver does not give a false voltmeter indication.
8. Compare the received and synthesized voice audio, and adjust the VOICE Level (R51) for the best sounding balance. The synthesized voice should not exceed 3KHz deviation for the best quality speech, and it should always be lower than the receive audio.
9. Compare the received and CW ID audio, and adjust the BEEP Level (R52) as desired. For best results, the CW ID should not exceed 1.5KHz deviation. This will insure that repeater users will always be able to talk over the CW ID when it comes on during a QSO in progress.
10. Connect a phone line to the RJ11 jack. Key-up, and enter [\* PHONE NUMBER], un-key. The voice synthesizer will say, "AUTOPATCH", read back the number, wait two seconds, take the phone off hook and dial the phone number. During the autopatch, adjust the PHONE-IN (R14) for the desired level of phone audio at the transmitter. The phone audio input should modulate the transmitter at the same level as audio from the repeater's receiver. Adjust the PHONE-OUT-RX1 (R12) for the desired level of received audio into the telephone line. Key-up, and enter the [#] to disconnect the autopatch.
11. Key-up, and enter the seven digit unlock number [1234567]. The voice will say, "CAT-300 CONTROL."

12. Voice ID #1: Key-up and send [\*3101], followed by the series of three- digit numbers that represents your call letters for ID #1. (at rest ID). Refer to Chapter 9, Voice Vocabulary Word List. Example: Load Repeater ID #1 with "W4XYZ Repeater"



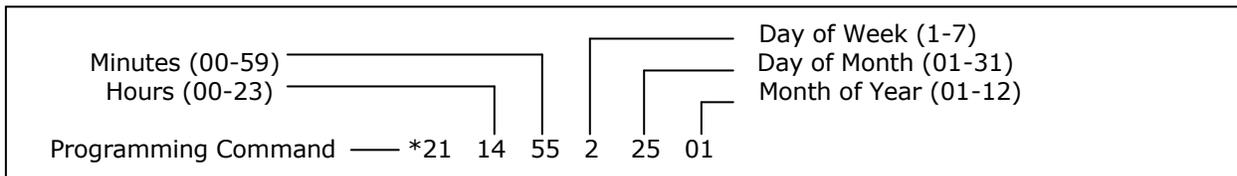
13. Voice ID #2: Key-up and send [\*3102], followed by the three-digit numbers that represents your call letters for ID #2 (active ID).
14. CW ID: Key-up and send [\*34], followed by the series of two-digit numbers that represents your call letter identification. Refer to the CW ID programming table. Example: Load the CW ID memory buffer with W4XYZ/R.



00=0	06=6	12=C	18=I	24=O	30=U	36=/
01=1	07=7	13=D	19=J	25=P	31=V	
02=2	08=8	14=E	20=K	26=Q	32=W	
03=3	09=9	15=F	21=L	27=R	33=X	
04=4	10=A	16=G	22=M	28=S	34=Y	
05=5	11=B	17=H	23=N	29=T	35=Z	

15. To read the time, key-up and send [\*20]. Un-key, the voice will read the time, day of week, month and day of month.
16. To set the clock, key-up, and send [\*21] followed by the hours, minutes, day of week, day of month, and month of year. Un-key, and the voice will say, "CONTROL OK."

Example: 2:55 PM Monday January 25th. All entries must be double digit, except the day of week.



17. Key-up and send [\*0]. Un-key, the controller will lock-up, and the voice will say, "MANUAL EXIT." The CAT-300DXL will lock-up automatically if the programming timer expires. The voice will say, "TIMER EXIT."

18. Program a new seven digit UNLOCK code. Set dipswitch #8 to ON; the voice will say, "ENTER CONTROL." Key-up, and enter a seven-digit number. Un-key, if the number is accepted, the voice will say, "DATA INPUTS OK." If the number is rejected, the voice will say, "ENTER CONTROL." Key-up, and enter the seven-digit number again. Set dipswitch #8 to the OFF position.
19. DTMF muting is a feature that prevents your DTMF tones from being transmitted. If you wish to have DTMF tones muted on your repeater, enable this feature. Key-up, and enter [100171]. The voice will say, "ONE SEVEN ON."
20. To test your DTMF keypad, key-up, and enter [3751234567890\*#ABC]. The voice will read back all the numbers that were decoded. Note: the "D" key cannot be tested.
21. To check the time, key-up and enter [400].
22. This completes the installation and calibration of your CAT-300DXL repeater controller. Enjoy!

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

Congratulations on your purchase of the CAT-300DXL Repeater Controller. Programming is a snap with its carefully structured uniform programming commands. The manual is easy to follow with numerous examples. The voice synthesizer interacts with you during each control and programming operation. The CAT-300DXL contains a digital clock for time-of-day announcements.

### **Scheduler**

An advanced 40-position scheduler fully automates repeater operation. Any command that can be manually executed can also be scheduled to one-minute accuracy. Program the hours, minutes, day of week, or day of month and month of year. The CAT-300DXL will do the rest.

### **Voice Synthesizer**

A vocabulary base of 475 words carefully selected for amateur repeater operation is available to ID your repeater, announce the time and interact with you during control and programming operations. Additional message buffers can be activated on demand, through hardware inputs, or by the scheduler.

### **Digital Voice Clock**

The digital voice clock will announce the time-of-day upon request, at the completion of an autopatch, during repeater IDs, or on the hour through the grandfather clock feature.

### **Autopatch**

A full feature autopatch with storage for (100) speed dial numbers highlight the CAT-300DXL. Each speed dial location accepts numbers of up to eleven digits and includes space for the users call letters. Regular calls are preceded by a phone number read-back. This feature can be suppressed by a microphone key-click. Hook-Flash and autopatch time extender commands round out the features. In addition to the Reverse autopatch, full telephone control and programming provides an extra measure of security. Long distance protection is provided by a number counter. A user programmable pre-dial number buffer is provided for (9) or (\*67) caller ID suppression.

### **User Function Switches**

Four user function output switches are provided to control equipment at your repeater site. These switches can be controlled manually by DTMF commands, or by the scheduler during automatic operation. They can be made to turn OFF, ON or Momentarily change state, any time you choose.

### **Hardware Inputs**

Four hardware inputs, which are activated by an input from other equipment at the repeater site, cause the CAT-300DXL to execute any repeater command. External repeater control or information about the repeater site is instantly available.

### **Courtesy Tone**

Memory space is provided for the storage of eight custom courtesy tones. Each tone can consist of up to three different tone frequencies of various lengths and separations.

### **Digital Voice Recorder**

An optional digital voice recorder, controlled by the CAT-300DXL, can be added to your repeater. Control of the digital voice recorder is fully integrated into the CAT-300DXL control and command structure. The CAT-300DXL will permit you to substitute any of the sixteen tracks in place of the messages normally generated by the voice synthesizer. In fact: you can even intermix tracks with voice synthesizer messages. A signal report test feature is also included. Simply enter a DTMF command to record a seven second test message. Un-key and the test message will playback. You instantly know how your signal sounds through the repeater.

**CW ID**

The repeater will switch to a CW ID when a repeater user talks over the voice ID.

**Repeater Control Prefix**

A total of seventeen prefix numbers control repeater operation. Each prefix is programmable from one to seven digits depending on the security you require.

**Repeater Timers**

A total of fourteen timers control repeater operation. Each timer is user programmable to afford maximum flexibility to suite your special requirements.

**DTMF Keypad Test**

A DTMF keypad test will read back the numbers decoded in a synthesized voice.

**Macro**

By entering a single macro number, the CAT-300DXL will execute up to ten commands in a string. Memory space is provided for the storage of twenty macro strings. This feature permits the repeater owner to customize the control functions to suit his or her particular needs.

**Active Memory Save**

Configure the CAT-300DXL to suite your special requirements. Active Memory Save permits you to store the current settings of the control channels, timers, codes, CW ID buffer and the twenty voice messages. Memory space is provided for the storage of four memory saves. These memory saves can be later recalled with a simple DTMF command.

**Specifications**

Microprocessor	80C535
Memory EPROM	128K X 8
RAM	8K X 8 (non volatile)
Clock Accuracy	±1 minute per month at +25 degrees C.
	In the absence of power, data and time
	will be maintained for ten years.
Voice Synthesizer	Texas Instruments TSP53C30
	Linear Predictive Coded
Voice Vocabulary	475 Words
DTMF Transceiver	MT8888
Operating Temperature	-15 to +55 degrees C
Call Letter	ID Buffer size Voice (23) CW (31)
Control Codes	(14) Buffer size (1 - 7) Digits
Scheduler	(40) Commands
Macro	(20) Ten Function
Memory Saves	(4) Timers, Codes, CW ID, (8) Voice Messages
Speed Dial User	(100) Eleven Digit Entry - Eight Position ID
Speed Dial Emergency	(5) Eleven Digit Entry - Eight Position ID
Telephone Area Code	(20) Area Code Look-up Table - 20 Position
Telephone Prefix Number	(100) Prefix Look-up Table - Hundred Position
Voice Synthesizer	(12) Messages (23) Words
Digital Voice Recorder	(16) Tracks Maximum Record Time (4 minutes)
User Function Outputs	(4) Switch Open Drain 40 volts at 80mA.
Hardware Inputs	(4) 10K ohm input impedance
Audio Input	0.2 - 2VAC adjustable 10K ohms
Audio Output	2 VAC adjustable 600 ohms
Logic Inputs	Active Low.0 to .8 volts
Logic Inputs	Active High.2.4 to 15 volts
Part 68 Telephone	(4H1USA-21625-KX-E) (REN - 0.4B) Certification.
Power Requirements	9 to 15 VDC MAX input at 80mA
Size	8.5" X 6.0"

**Warranty**

Computer Automation Technology warrants this product to the original purchaser to be free from defective materials and workmanship for a period of one (1) year from the date of purchase when returned prepaid. Computer Automation Technology shall not be liable for any consequential damages caused by this product.

### **Software Copyright**

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### **FCC Part 68 Equipment Registration**

Should the CAT-300DXL controller or its protective circuitry cause harm to the telephone network, the telephone company shall, where practical, notify you that temporary discontinuance of service may be required. However, where prior notices are not practical, the telephone company may temporarily discontinue service if such action is deemed reasonable in the circumstances. In the case of such temporary discontinuance, the telephone company shall promptly notify you. You have the right to bring a complaint to the FCC if you feel the disconnection is not warranted.

The telephone company may make changes in its communications facilities, equipment, operation or procedures, where such action is reasonably required and proper in its business. Should any such changes render the CAT-300DXL incompatible with the telephone company facilities, you shall be given adequate notice to make modifications to maintain service.

The FCC prohibits the connection of the CAT-300DXL controller to party lines or to be used in conjunction with coin telephone service.

The CAT-300DXL is equipped with a USOC RJ11C standard miniature modular jack and is designed to have the telephone line connected with the standard plug. If the plug is withdrawn, no interference to other equipment connected to the same line will be encountered.

Telephone company notification prior to connection of the CAT-300DXL controller is no longer required. However, if requested by the telephone company you must provide the registration number: (4H1USA-21625-KX-E), ringer equivalency number: (REN 0.4B) and the line to which the CAT-300DXL controller is connected.

In the event the CAT-300DXL should fail to operate properly, disconnect it from the telephone line until the controller is repaired. If service is needed contact:

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### **FCC Part 15 RF Interference**

When installed in the RME-1000 rack mount enclosure, the CAT-300DXL 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 With Remote Base and Digital Voice Recorder

In this configuration the CAT-300DXL supports a Repeater, Remote Base Transceiver, and optional DR-1000 Digital Recorder.

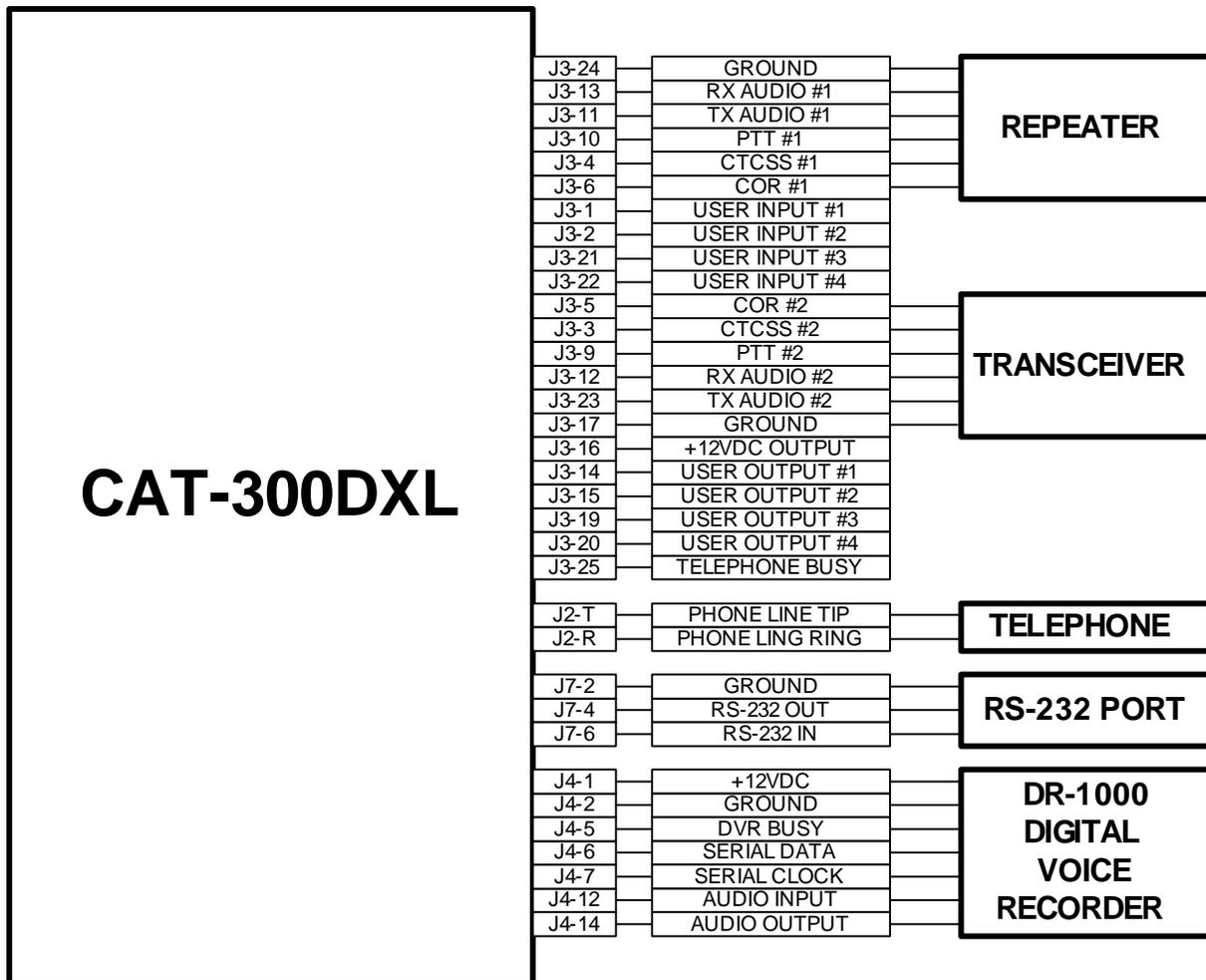


Figure 2-1

## Dip Switch Settings

An eight-position dipswitch is used to configure the CAT-300DXL.

### Switch 1

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

### Switch 2

This switch determines Repeater CTCSS input logic. Switch #2 should be ON if the CTCSS input is an active low and OFF if the CTCSS is active high.

### Switch 3

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

### Switch 4

This switch determines Remote Base CTCSS input logic. Switch #4 should be ON if the CTCSS input is an active low and OFF if the CTCSS is active high.

### Switch 5

Reserved.

### Switch 6

Reserved.

### Switch 7

This switch is used to initialize the CAT-300DXL. 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 DATA LOAD COMPLETED." Return switch #7 to the OFF position for normal operation.

### Switch 8

This switch has two functions:

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

Switch #8 is also used to activate the computer interface. Turn the DC power off. Set switch #8 to ON and turn the DC power ON. After the power-up message is complete, the CAT-300DXL will switch to the computer interface mode.

## Chapter 3 - Repeater Control

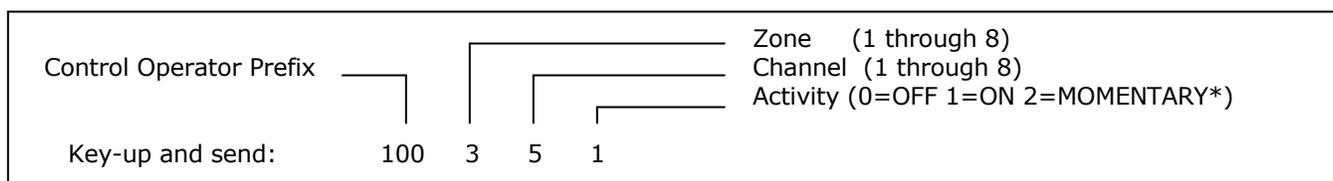
The CAT-300DXL has a maximum capacity of 64 remote control channels. These channels are segregated into eight zones according to their function. In addition to being controlled by the scheduler, these channels can be manually controlled by DTMF commands on the repeater, or telephone inputs.

### Interrogation of Repeater Control Status by Radio

Key-up and send the control operator prefix number followed by the zone number and a zero. Un-key and the voice synthesizer will read back the channels that are turned on in that zone. Example: "ONE TWO FIVE ON." If all the channels are turned off, the voice synthesizer will say: "ALL CLEAR."

### Changing Repeater Control Status by Radio

To change the status of a zone channel, key-up and send the control operator prefix number followed by the zone number, channel number and a [1] to turn the channel ON or a [0] to turn the channel OFF. Un-key and the voice will read back the zone, channel number and control activity. The voice will say, "ONE ONE ON." or "THREE FIVE OFF." Example: With a control operator prefix of 100, turn Zone 3 Channel 5 ON.



Un-key and the voice synthesizer will say, "THREE FIVE ON."

\* The momentary command is limited to Zone 7, Channels 5,6,7 and 8.

### Changing Repeater Control Status By Telephone

Call the repeater by telephone. When the CAT-300DXL answers a beep will be heard. Enter the control operator prefix code followed by a (#) pound sign. The voice will say, "CONTROL READY." You need only enter the Zone number, Channel number and a (1) to turn the channel ON or a (0) to turn the channel OFF followed by the (#) pound. It is not necessary to enter the control operator prefix number before each command when controlling by phone. To terminate control send [\*0#].

### Repeater Control Channels

ZONE #1	ZONE #2
1. Repeater Transmitter Enable*	1. Repeater Timeout Timer Enable*
2. Repeater CTCSS Enable	2. Squelch Tail Enable*
3. DTMF Access Enable	3. Scheduler Enable*
4. Repeater CTCSS Override Enable	4. DTMF Pad Test Enable*
5. Turn on Delay Enable	5. Repeater CTCSS OR Logic Enable
6. Fan Enable	6. Grandfather Clock Sleep Enable
7. DTMF Muting Enable	7. Courtesy Beep Enable*
8. Control Operator CTCSS Enable	8. Talk Over Voice Synthesizer Enable

<b>ZONE #3</b>	<b>ZONE #4</b>
1. Repeater ID #1 (At Rest) Enable*	1. Autopatch Enable*
2. Repeater ID #2 (Active) Enable*	2. Autopatch Timeout Timer Enable*
3. Squelch Tail Message Enable	3. Autopatch CTCSS Enable
4. Dropout Message Enable	4. Reserved Enable
5. Digital Recorder Enable*	5. User Speed Dial Enable*
6. Signal Report Enable*	6. Phone Number Read Back Enable
7. Time of Day Request Enable*	7. Autopatch Radio Mute Enable
8. Grandfather Clock Enable*	8. Autopatch Pre-Dial Enable

<b>ZONE #5</b>	<b>ZONE #6</b>
1. Emergency Speed Dial Enable*	1. Remote Base Transmit Enable
2. Reverse Autopatch Enable*	2. Remote Base Receive Only Enable
3. Area Code Look-Up Enable	3. Remote Base CTCSS Input Enable
4. Telephone Off Hook Enable	4. Remote Base Link Command Enable
5. Telephone Ring Announcer Enable	5. Remote Base Macro Enable
6. Telephone Line Busy Enable	6. Remote Base Auto Disconnect Enable
7. Speed Dial Pre-Dial Enable	7. Remote Base ID Enable
8. Ring Detector Enable*	8. Reserved Enable

<b>ZONE #7</b>	<b>ZONE #8</b>
1. User Function #1 Input Enable*	1. Digital Recorder Switch #1 Enable
2. User Function #2 Input Enable*	2. Digital Recorder Switch #2 Enable
3. User Function #3 Input Enable*	2. Digital Recorder Switch #3 Enable
4. User Function #4 Input Enable*	4. Digital Recorder Switch #4 Enable
5. User Function #1 Output Enable	5. Digital Recorder Switch #5 Enable
6. User Function #2 Output Enable	6. Digital Recorder Switch #6 Enable
7. User Function #3 Output Enable	7. Digital Recorder Switch #7 Enable
8. User Function #4 Output Enable	8. Digital Recorder Switch #8 Enable

\* During initialization these control channels are set to the enable position.

### **Zone 1 Repeater Control**

#### **1. Repeater Transmitter Enable**

This is the master repeater switch. This channel must be enabled for normal repeater operation. The CAT-300DXL will continue to respond to control operator commands even when the repeater's transmitter is disabled. This channel will automatically be enabled after an initialization reset.

#### **2. Repeater CTCSS Enable**

When this channel is enabled, in addition to a COR input, an input from a CTCSS decoder at J3-4 must also be present before the repeater will activate. A COR input by itself will have no affect. To prevent loss of control, **DO NOT ENABLE THIS CHANNEL** unless a CTCSS decoder is connected to J3-4.

### **3. DTMF Access Enable**

When this channel is enabled, a DTMF Access number selected by programming command \*504\* must be entered to activate the repeater. Once this number is entered and the user un-keys, the voice will say, "OK UP". A COR input will activate the repeater until it returns to rest. A rest period of up to 29 minutes can be selected with the [\*602\*] programming command. When the CAT-300DXL is initialized this timer defaults to 60 seconds. This timer can be bypassed returning the repeater to DTMF Access by sending the DTMF Access number. The voice will say, "OK DOWN".

### **4. Repeater CTCSS Override**

When this channel is enabled, and CTCSS is also enabled, a repeater user without a CTCSS encoder can activate the repeater by entering the DTMF Access number. Once this number is entered and the user un-keys, the voice will say, "OK UP". A COR input will activate the repeater until it returns to rest.

### **5. Turn on Delay Enable**

When this channel is enabled, a deliberate and sustained input must be present before the controller will activate the repeater. A time delay of 0.1 to 9.9 seconds can be selected with the [\*603\*] programming command. When the CAT-300DXL is initialized, this timer defaults to 1.0 seconds. This channel is useful as a "ker-chunk" filter during periods when noise bursts are present on the repeater input.

### **6. Fan Control Enable**

When this channel is enabled, user output switch #4 is converted into a Fan Control output. When PTT #1 turns ON, user output #4 J3 pin 20 will turn ON. After PTT #1 turns OFF this output will remain ON for an additional period of time determined by the [\*613\*] Fan Control timer. This timer default is 60 seconds. Use this output to control a fan relay to cool the repeater's transmitter. When this channel is enabled, Zone 7 Channel 8 will have no effect.

### **7. DTMF Muting Enable**

When this channel is enabled, anytime a DTMF tone is received, 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. This time is set by the [\*606\*] programming command. 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 pass the DTMF tones through the repeater. To temporarily disable DTMF muting, precede the DTMF string with a pound (#).

### **8. Control Operator CTCSS Enable**

When this channel is enabled, a CTCSS input is required for the CAT-300DXL to accept control or program inputs from the control operator.

## **Zone 2 Repeater Control**

### **1. Repeater Timer Enable**

Repeater timeout is user programmable with the [\*601\*] timer programming command. When the CAT-300DXL is initialized, this timer defaults to 3 minutes. When this channel is turned off, the repeater will not time-out.

### **2. Squelch Tail Enable**

When this channel is enabled, the repeater's transmitter will remain on for a period of time determined by the COR Drop to Courtesy Beep Timer [\*604\*] and Courtesy Beep to PTT Drop Timer [\*605\*]. To make the transmitter turn off at the instant COR is lost, turn this channel OFF. This feature is useful when linking to other repeaters or during band openings.

### **3. 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.

#### **4. DTMF Pad Test Enable**

When this channel is enabled, a repeater user is able to perform a test of their radio's 12 or 16-button keypad. As the numbers are being decoded, they are stored in memory. When the repeater user stops transmitting the controller will read back all the numbers that were decoded. **Do not use the (D) key during a pad test.** The (D) key is reserved for control operations.

#### **5. Repeater CTCSS OR Logic Enable**

When this channel is enabled, the COR and CTCSS inputs will function as a (OR) logic input. This means activity on either the COR or CTCSS inputs will cause the controller to key the repeater's transmitter. This is a layered command. Therefore, Repeater CTCSS Enable, Zone 1 Channel 2 must be ON or this control function will have no effect.

#### **6. Grandfather Clock Sleep 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.

#### **7. Courtesy Tone Enable**

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.

#### **8. Talk Over Voice Synthesizer Enable**

When this channel is enabled, Squelch Tail and Transmitter Drop messages will be mixed with receive audio. When this channel is disabled, receiver audio will be blocked when the voice synthesizer speaks.

### **Zone 3 Voice Synthesizer Control**

#### **1. Repeater ID #1 (At Rest) Enable**

When this channel is enabled, repeater ID message #1 will repeat subject to the setting of the Repeater ID Timer [\*607\*]. This ID will consist of up to 23 words selected from the voice vocabulary table and programmed with the [\*3101] command. This is typically used as the "welcome" ID.

#### **2. Repeater ID #2 (Active) Enable**

When this channel is enabled, repeater ID message #2 will repeat subject to the setting of the ID timer. This ID will consist of up to 23 words selected from the voice vocabulary table and is programmed with the [\*3102] command. When Repeater ID #1 and #2 are enabled, ID messages selection will be determined by whether the repeater is at rest or active with a QSO in progress. ID #2 is typically a short voice ID used during repeater activity.

#### **3. Squelch Tail Message Enable**

When this channel is enabled, a voice squelch tail message will occur when a repeater user un-keys their transmitter. This message will repeat subject to the setting of the squelch tail message timer [\*608\*]. This message will consist of up to 23 words selected from the voice vocabulary table and is programmed with the [\*3103] command.

#### **4. Dropout Message Enable**

When this channel is enabled, a voice drop out message will occur just before the repeater transmitter turns off. This message will repeat subject to the setting of the drop out message timer [\*609\*]. This message will consist of up to 23 words selected from the voice vocabulary table and is programmed with the [\*3104] command.

#### **5. Digital Recorder Enable**

When this channel is enabled, repeater users can play digital recorder tracks by entering the digital recorder prefix number [725] followed by the desired track number.

## **6. Signal Report Enable**

When this channel is enabled, repeater users can perform the signal report test by entering the signal report number [750] and following the directions of the voice synthesizer. The user records a seven second message that is instantly played back.

## **7. Time of Day Request Enable**

When this channel is enabled, repeater users can request a time of day announcement by entering the time of day request number. This message will consist of up to 23 words selected from the voice vocabulary table and is programmed with the [\*3116] command. When the CAT-300DXL is initialized, this message defaults to: "THE TIME IS [ACTUAL TIME]."

## **8. Grandfather Clock Enable**

When this channel is enabled, the CAT-300DXL will announce the time on the hour. This message will consist of up to 23 words selected from the voice synthesizer vocabulary table and programmed with the [\*3117] command. When the CAT-300DXL is initialized, this message defaults to: "CAT-300DXL REPEATER THE TIME IS [ACTUAL TIME]."

### **Zone 4 Autopatch**

#### **1. Autopatch Enable**

This channel must be enabled for the controller to process manually dialed autopatch requests.

#### **2. Autopatch Timer Enable**

Autopatch timeout is user programmable with the [\*611\*] and [\*612\*] timer programming commands. When the CAT-300DXL is initialized the autopatch timer defaults to 3 minutes and the autopatch activity timer defaults to 30 seconds. When this channel is turned off, the autopatch will not time-out.

#### **3. Autopatch CTCSS Enable**

When this channel is enabled, a CTCSS input is required for the CAT-300DXL to accept an autopatch or speed dial request.

#### **4. Reserved**

#### **5. User Speed Dial Enable**

This channel must be enabled for the controller to process User Speed Dial requests. A user can access any speed dial location. The voice will say, "CALL TO W4XYZ", delay two seconds to check the dial tone, and then dial the phone number stored at that location. Space is provided for (100) phone numbers with call letter ID.

#### **6. Phone Number Read Back Enable**

This channel must be enabled for the controller to read-back the phone number prior to dialing. After the repeater user enters the number, the CAT-300DXL will read-back the number for verification. If the number was entered correctly, the repeater user does nothing and in two seconds the CAT-300DXL will redial the number. If the number is incorrect, the repeater user enters the autopatch disconnect code during the two second period and the call will be terminated. To temporarily suspend the phone number read back, key-up when the voice says, "AUTOPATCH".

#### **7. Autopatch Radio Mute Enable**

When this channel is enabled, during an autopatch, mobile radio audio will go directly to the telephone line and not be broadcast on the repeater's transmitter. This feature provides a measure of privacy during an autopatch.

#### **8. Autopatch Pre-Dial Enable**

When this channel is enabled the CAT-300DXL will generate the number stored in the pre-dial buffer," before regenerating the manually dialed telephone number. This feature is useful when the CAT-300DXL is connected to a business phone system and a [9] is required to access an outside line. This feature can also be used to suppress caller ID if the pre-dial buffer is loaded with [\*67]. Use the [\*89] programming command to enter a pre-dial number of up to seven digits. The default pre-dial number is [9].

## Zone 5 Autopatch

### 1. Emergency Speed Dial Enable

This channel must be enabled for the controller to process an emergency speed dial autopatch call. Space is provided for five public service phone numbers with identifications. A user can access any emergency speed dial location. Example: the voice will say, "CALL TO FIRE DEPARTMENT," delay two seconds and then dial the phone number stored at that emergency speed dial location.

### 2. Reverse Autopatch Enable

This channel must be enabled for the controller to process a reverse autopatch. A user can call the repeater by phone, enter the reverse autopatch prefix number followed by any speed dial table position number. Terminate the entry with the pound [#]. The controller will generate a ringing type tone and the voice will say, "CALL FOR W4XYZ." The radio user need only enter the reverse autopatch prefix number to complete the autopatch.

### 3. Area Code Look-Up Enable

During an autopatch the CAT-300DXL counts the number of digits entered to determine if a long distance call is being attempted. If the entry exceeds seven digits the autopatch will terminate. However, if this channel is enabled, when a ten-digit telephone number is dialed, the controller will compare the first, second, and third digits to the area code look-up table. When an eleven digit telephone number is dialed the second, third and fourth digits will be compared to the area code look-up table. If there is a match the autopatch will be permitted. No match and the autopatch will terminate.

### 4. Telephone Off Hook Enable

When this channel is enabled (activated), the CAT-300DXL will take the phone off hook, key the repeater's transmitter and provide an audio path to manually dial a phone number.

### 5. Telephone Ring Announcer Enable

When this channel is enabled, an incoming phone call will cause the CAT-300DXL to key-up the transmitter and generate a ringing tone to indicate the repeater's phone is ringing.

### 6. Telephone Line Busy Enable

When this channel is enabled, a positive DC voltage applied to J3 pin 25 produces a telephone busy input to the controller. If attempted, an autopatch call will be rejected, and the voice will say, "TELEPHONE LINE IN SERVICE." (See CAT NOTES on the web site for a typical circuit to sense telephone activity.)

### 7. Speed Dial Pre-Dial Enable

When this channel is enabled the CAT-300DXL will generate the number stored in the pre-dial buffer, before generating the telephone number stored in the speed dial memory. This feature is useful when the CAT-300DXL is connected to a business phone system and a [9] is required to access an outside line. This feature can also be used to suppress caller ID if the pre-dial buffer is loaded with [\*67]. Use the [\*89] programming command to enter a pre-dial number of up to seven digits. The default pre-dial number is [9].

### 8. Ring Detector Enable

When this channel is enabled and upon receipt of an incoming telephone call, the ring detector in the CAT-300DXL will answer the phone for control/programming operation. A delay in answering the phone is user programmable with the [\*616\*] programming command. When the CAT-300DXL is initialized, the ring detector timer defaults to 2 seconds. When this channel is turned off, the controller will not automatically answer the phone. This feature is useful when more than one telephone device is sharing the same line.

## Zone 6 User Function Control

### 1. Link Transmit Enable

When this channel is enabled, the CAT-300DXL will accept the [5001] link transmit user command. This feature permits monitoring of the Link receiver and activation of the Link transmitter.

### 2. Link Receive Enable

When this channel is enabled, the CAT-300DXL will accept the [5002] link receive user command. This feature permits monitoring of the Link receiver without transmitting on the Link transmitter.

### 3. Remote Base CTCSS Input Enable

When this channel is enabled, in addition to a Link COR input at J3-5, an input from a CTCSS decoder at J3-3 must also be present before the controller will activate the repeater. A COR input by itself will have no affect. DO NOT ENABLE THIS CHANNEL unless a CTCSS decoder is connected to J3-3.

### 4. Remote Base Link Command Enable

Normally, the CAT-300DXL will only respond to the Link control commands [5000] and [5001] through the Repeater input (RX1). This greatly reduces the possibility of the CAT-300DXL responding to a command meant for another repeater in the linking system. However, when this channel is enabled, Link control commands will be accepted through the Link receiver input (RX2).

### 5. Remote Base Macro Enable

When this channel is enabled, the CAT-300DXL will accept macro commands from the remote base receiver (RX2).

### 6. Remote Base Auto Disconnect Enable

When this channel is enabled, the link will disconnect automatically after a period of repeater inactivity. Voice message #13 will be called to announce the transceiver has disconnected. A link or repeater COR input will keep the transceiver activated until the repeater returns to rest. A rest period of up to 29 minutes can be selected by setting the sleep timer with [\*602\*] programming command. When the CAT-300DXL is initialized this timer defaults to 60 seconds.

### 7. Remote Base ID Enable

When this channel is enabled the CAT-300DXL will send the ID on both the repeater and remote base transmitters.

### 8. Reserved

## Zone 7 User Function Switches

### 1. User Function #1 Input Enable

When this channel is enabled, a voltage transition on J3 pin 1, will execute the rising-edge or falling-edge command stored at the Input #1 memory buffer.

## **2. User Function #2 Input Enable**

When this channel is enabled, a voltage transition on J3 pin 2, will execute the rising-edge or falling-edge command stored at the Input #2 memory buffer.

## **3. User Function #3 Input Enable**

When this channel is enabled, a voltage transition on J3 pin 21, will execute the rising-edge or falling-edge command stored at the Input #3 memory buffer.

## **4. User Function #4 Input Enable**

When this channel is enabled, a voltage transition on J3 pin 22, will execute the rising-edge or falling-edge command stored at the Input #4 memory buffer.

## **5. User Function #1 Output Enable**

When this channel is enabled (activated), user function switch #1 is turned on. Connector J3 pin 14 will switch 28VDC and sink 150 MA. This feature provides remote control of other equipment at the repeater site.

## **6. User Function #2 Output Enable**

When this channel is enabled (activated), user function switch #2 is turned on. Connector J3 pin 15 will switch 28 VDC and sink 150 MA.

## **7. User Function #3 Output Enable**

When this channel is enabled (activated), user function switch #3 is turned on. Connector J3 pin 19 will switch 28VDC and sink 150 MA.

## **8. User Function #4 Output Enable**

When this channel is enabled (activated), user function switch #4 is turned on. Connector J3 pin 20 will switch 28 VDC and sink 150 MA.

### **Zone 8 DVR Expanded Auxiliary Switches**

#### **1. Digital Recorder AUX Switch #1 Enable**

When this channel is enabled, expanded output switch #1 is turned on. Connector J3 pin 1 on the DR-1000 will turn on.

#### **2. Digital Recorder AUX Switch #2 Enable**

When this channel is enabled, expanded output switch #2 is turned on. Connector J3 pin 3 on the DR-1000 will turn on.

#### **3. Digital Recorder AUX Switch #3 Enable**

When this channel is enabled, expanded output switch #3 is turned on. Connector J3 pin 5 on the DR-1000 will turn on.

#### **4. Digital Recorder AUX Switch #4 Enable**

When this channel is enabled, expanded output switch #4 is turned on. Connector J3 pin 7 on the DR-1000 will turn on.

#### **5. Digital Recorder AUX Switch #5 Enable**

When this channel is enabled, expanded output switch #5 is turned on. Connector J3 pin 8 on the DR-1000 will turn on.

**6. Digital Recorder AUX Switch #6 Enable**

When this channel is enabled, expanded output switch #6 is turned on. Connector J3 pin 6 on the DR-1000 will turn on.

**7. Digital Recorder AUX Switch #7 Enable**

When this channel is enabled, expanded output switch #7 is turned on. Connector J3 pin 4 on the DR-1000 will turn on.

**8. Digital Recorder AUX Switch #8 Enable**

When this channel is enabled, expanded output switch #8 is turned on. Connector J3 pin 2 on the DR-1000 will turn on.

**Read Software Version**

To read the current software version of the Program and Voice ROMs, key-up and enter the control operator prefix code followed by [98]. Un-key and the voice will read the software versions.

**Load Memory Files By Telephone**

The CAT-300DXL will accept commands to read and load memory files by telephone when in the control operator mode. To read and load memory files by telephone. To read the current memory file enter [90#]. To load a memory file enter:

COMMAND	DESCRIPTION	COMMAND	DESCRIPTION
91#	Load memory file 1	93#	Load memory file 3
92#	Load memory file 2	94#	Load memory file 4

Figure 3-1

## Chapter 4 - Repeater Operation

### Time of Day Request

Key-up, and enter 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 buffer [16] and can be changed with the [\*3116] programming command.

### DTMF Keypad Test

Key-up, and enter 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". Note: **The "D" key cannot be tested.** (See Forced DTMF Command Entry.)

### Forced DTMF Command Entry

During normal operation, a DTMF command is entered at the drop of receiver COR. It is possible to force a DTMF command entry even while COR is present. The CAT-300DXL will accept the [D] key as an entry command in a way similar to the enter key on a computer.

### DTMF Access

When the repeater is in the DTMF Access mode, you must enter the DTMF Access code to activate the repeater. The voice will say, "OK UP" and then the repeater will respond to a carrier input. When the repeater returns to rest, for a time determined by the sleep timer, the DTMF Access code must be reentered to activate the repeater. You can bypass the rest period and return the repeater to DTMF access mode by reentering the DTMF access code. The voice will say, "OK DOWN."

### Repeater CTCSS Override

When repeater CTCSS is enabled, a repeater user without a CTCSS encoder can activate the repeater by entering the DTMF Access number. The voice will say, "OK UP" and the repeater will respond to a carrier input. After the repeater returns to rest, the DTMF Access code must be re-entered to override the CTCSS requirement. You can bypass the rest period and return the repeater to CTCSS access mode by reentering the DTMF access code. The voice will say, "OK DOWN."

### Autopatch Access

To initiate an autopatch, key-up and enter the autopatch access code followed by the phone number. Un-key, and the CAT-300DXL will redial the number. A series of beeps will be generated to indicate dialing in progress. The autopatch code can be any number from one to seven digits and is user selectable with the [\*507\*] programming command. During initialization the access code defaults to a [\*].

### Autopatch Access With Phone Number Verification

Key-up, and enter the autopatch access code followed by the phone number. Un-key, and the voice will read back the number, wait two seconds (dial tone verification), and then dial the number. If the number is incorrect, enter the autopatch disconnect code during the two second period. This will terminate the autopatch and prevent a wrong number.

### Autopatch Phone Number Read Back Suppression

To temporarily suppress the phone number read back, key-click your microphone when you hear the voice say: "AUTOPATCH". The CAT-300DXL will immediately start to dial the number.

### Autopatch Speed Dial Access

Key-up, and enter the speed dial number. Un-key, and the voice will read back the call letters assigned to that speed dial location, wait two seconds (verify dial tone), and then dial the number. Speed dial capacity is (100) numbers. The speed dial code can be any number from one to seven digits and is user selectable with the [\*509\*] programming command. During initialization, the speed dial code default to [6]. The speed dial number consists of the speed dial code, and the two-digit table position 00 through 99.







### **Unique Courtesy Tones**

The CAT-300DXL determines which courtesy tone to send by reading voice message buffer 05 when a signal is received by the repeater's receiver (RX1) and voice message buffer 06 when a signal is received by the remote base receiver (RX2). The courtesy tones are assigned a three-digit number and are called from a voice message, any three-digit voice word in the vocabulary list from Chapter 9 can be used as the courtesy tone. This includes: chimes, sound effects and words like "OVER".

## Chapter 5 - Repeater Programming By DTMF Tone

This chapter describes programming the CAT-300DXL controller via a DTMF keypad. Various types of program commands are described in detail and examples are given in the following text.

### Controller Initialization

To initialize the CAT-300DXL, set dipswitch #7 to ON and cycle DC power. During power-up, the voice will say, "RESET DATA LOAD COMPLETED." Set dipswitch #7 to OFF. Initialization consists of following operations:

#### Dipswitch #7 Initialization Default Settings

1. All memory locations are cleared.
2. Control channels that are marked with a [\*] in this manual are enabled.
3. The unlock number is loaded with the default value [1234567].
5. The control operator prefix code is loaded with the default value [100].
6. The control numbers are set to default values.
7. The timers are set to default values.
8. The voice message buffers are loaded with default messages.
9. ID #1 is loaded with "CAT THREE HUNDRED D X L REPEATER."
10. ID #2 is loaded with "CAT THREE HUNDRED D X L."
11. All active memory saves are filled with default values.
12. Load Hardware Input buffers with User Function Switch commands.

#### Programming the Unlock Control Number

To program the UNLOCK code, set dipswitch #8 to the ON position. The voice will say, "ENTER CONTROL." Key-up, and enter a seven-digit number. Un-key, if the number is accepted, the voice will say: "DATA INPUTS OK." If the number is rejected, the voice will say, "ENTER CONTROL." Key-up and enter the seven-digit number again. Set dipswitch #8 to the OFF position. NOTE: When the CAT-300DXL is powered up with dipswitch #7 set to ON, the unlock number defaults to: [1-2-3-4-5-6-7]

#### Unlocking the Controller By Radio

To unlock the controller, key-up and enter the seven-digit unlock number. The voice will say, "CAT-300DXL CONTROL."

#### Locking the Controller By Radio

Key-up and send [\*0]. Un-key, the controller will lock-up and the voice will say, "MANUAL EXIT." The CAT-300DXL will lock-up automatically when the programming timer expires. The voice will say, "TIMER EXIT." The programming time limit can be set with the [\*615\*] programming command.

#### Programming Controller By Telephone

To program the CAT-300DXL, call the repeater by telephone. When the CAT-300DXL answers, a beep will be heard. Enter the seven digit unlock number followed by a [#] pound. The voice will say, "CAT-300DXL CONTROL." Programming by phone is identical to programming by radio except you must end each entry with a [#] pound. To terminate programming by phone send [\*0#].

**NOTE:** The CAT-300DXL must be **unlocked** to perform the following procedures:

**Internal Command Structure**

The Internal Command Structure is a series of commands used to program the scheduler, four hardware input switch buffers and the macro strings. Each command is limited to four digits. The following CAT-300DXL operations are controlled by the Internal Command Structure:

	Pointer	Zone	Channel	Action
Control Repeater	1	1-8	1-8	0-1-2
Action 0 = OFF 1 = ON 2 = Momentary (0.5 second)				
Operation	Pointer	Table Position		
Send Time of Day	20 <b>21</b>	00		
Send Day of Week	22 <b>23</b>	00		
Send Day and Month	24 <b>25</b>	00		
Send Salutation	26 <b>27</b>	00		
Send Voice Message	30 <b>31</b>	01-20		
Play DR Track	32 <b>33</b>	01-16		
Send CW Buffer	34 <b>35</b>	00		
Send CW Character	36 <b>37</b>	00-46		
Load Repeater Courtesy Tone	50	01-08		
Load Link Courtesy Tone	51	01-08		
Expanded UF Switch Control	57	01-16		
Execute Macro	58	01-20		
Load Memory File	59	01-04		
Time Delay Control (Seconds)	60	01-99		
PTT #1 Control	61	00-01		
PTT #2 Control	62	00-01		
PTT #1/#2 Control	63	00-01		
PTT #1 Control with Voice delay	64	00-01		
PTT #2 Control with Voice Delay	65	00-01		
PTT #1/#2 Control with Voice Delay	66	00-01		
Link Control off/on/receive only	70	00-01-02		
Send Voice Vocabulary	9	000-999		

Figure 5-1

NOTE: Internal Command pointers in **BOLD** do not include PTT on/off commands and should be used in macro strings with the PTT control pointers 6100 through 6301. Use the even number pointers to program the scheduler.

**Scheduler Command Memory**

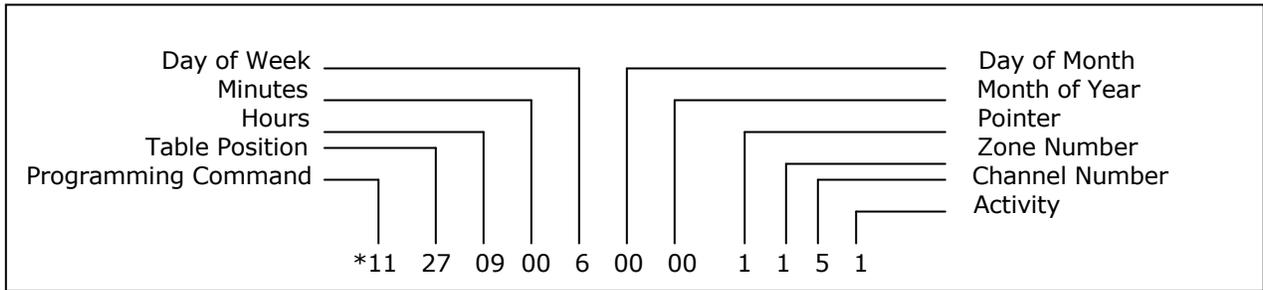
This memory area is reserved for storage of scheduler activity. This includes the time at which the command is to be executed, and the action to be taken.

**Read Scheduler Locations (01-40)**

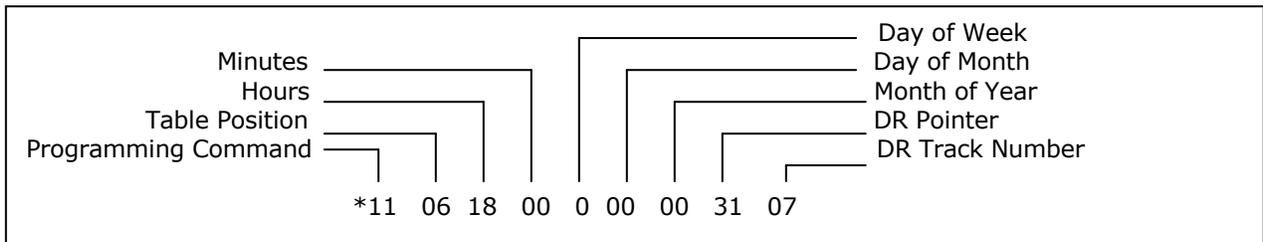
Key-up and send [\*10XX]. Un-key, and the voice will read back the status of the memory location. If there is no command stored at that memory location, the voice will say, "POSITION XX IS CLEAR." If a command is stored at that memory location, the voice will read back the time, day, and command stored.

**Program Scheduler Locations (01-40)**

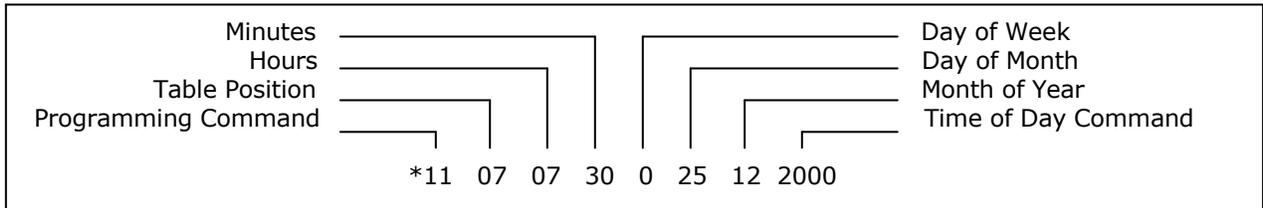
Key-up, and send [\*11XX] followed by the hours, minutes, day of week, or day of month, and month of year, and the command to be executed. Un-key, and the voice will say, "CONTROL OK." Example: Set Zone 1 Channel 5 (ON) - 9:00 AM Every Friday (Store at Table Location 27)



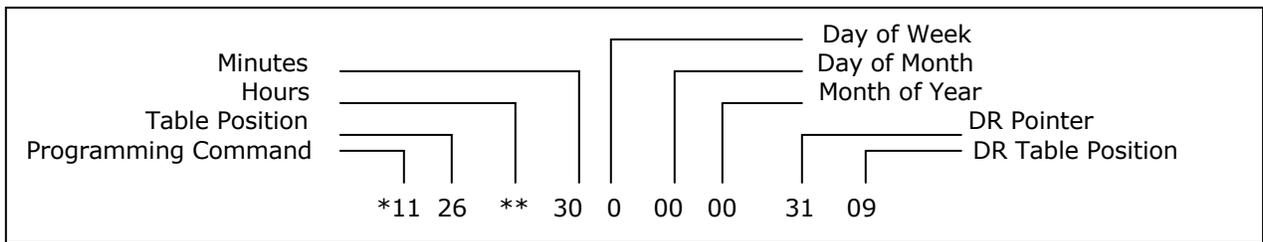
Example: Play DR Track 7 - 6:00 PM Every Day (Store at Table Location 6)



Example: Announce Time of Day - 7:30 AM - ON December 25th (Store at Table Location 07)



Example: Play DR Track 9 - 30 minutes after every hour. Store at Table Location 26)



DAY OF WEEK SCHEDULER PROGRAMMING TABLE					
0=Daily	2=Monday	4=Wednesday	6=Friday	8=Weekdays	
1=Sunday	3=Tuesday	5=Thursday	7=Saturday	9=Weekends	

Figure 5-2

**Erase Scheduler Locations (01-40)**

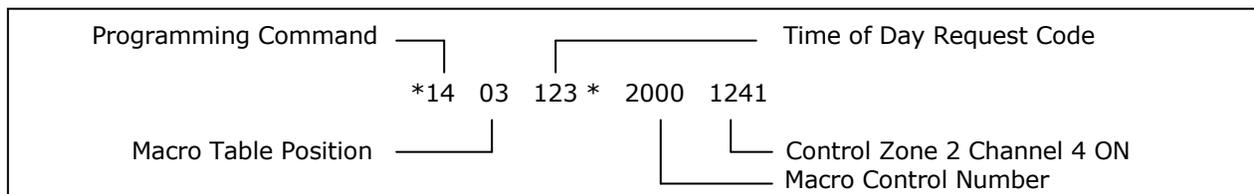
Key-up and send [\*12XX]. Un-key, and the voice will say, "POSITION XX IS CLEAR."

**Read Macro Locations (01-20)**

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

**Program Macro Locations (01-20)**

Key-up, and send [\*14XX] followed by the macro control number and a the string of internal commands (See figure 5-1) to be executed by this macro. Un-key, and the voice will say, "CONTROL OK." Example: Program a macro with a macro control number of 123 to announce the time and turn on Zone 2, Channel 4. (Store as memory location 3).



**Note:** The Macro Control number [123] is the number entered by a repeater user to execute the macro.

**Erase Macro Locations (01-20)**

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

**User Function Inputs**

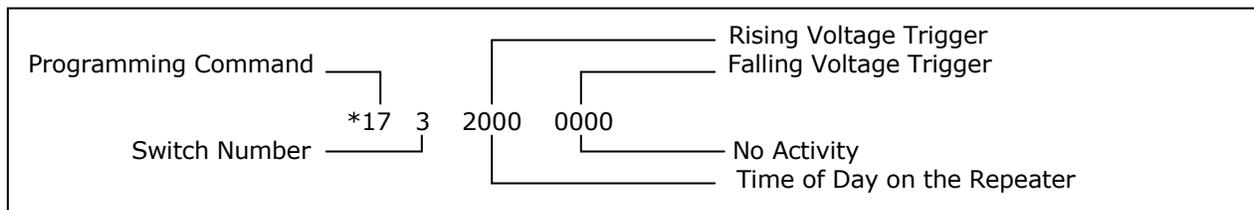
The CAT-300DXL has 4 logic inputs with 2 memories provided for each input. The first location executes on the rising voltage while the second executes on the falling voltage. If a location is loaded with [0000] no action will take place.

**Read User Function Inputs (1-4)**

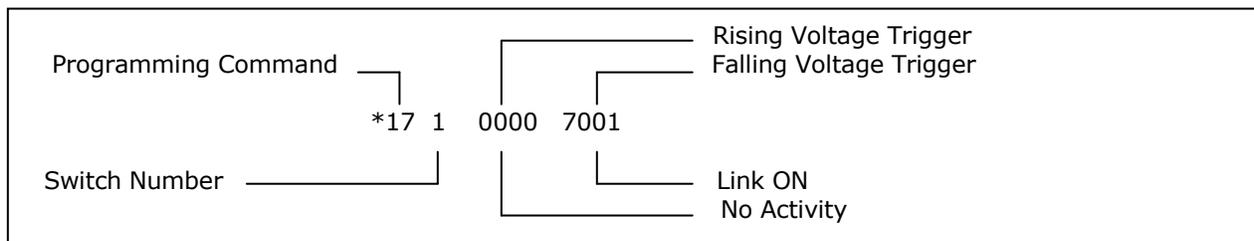
Key-up and send [\*16X]. Un-key, and voice will read back the Internal command stored at that switch memory location. If the location is empty, the voice will say, "ALL CLEAR."

**Program User Function Inputs (1-4)**

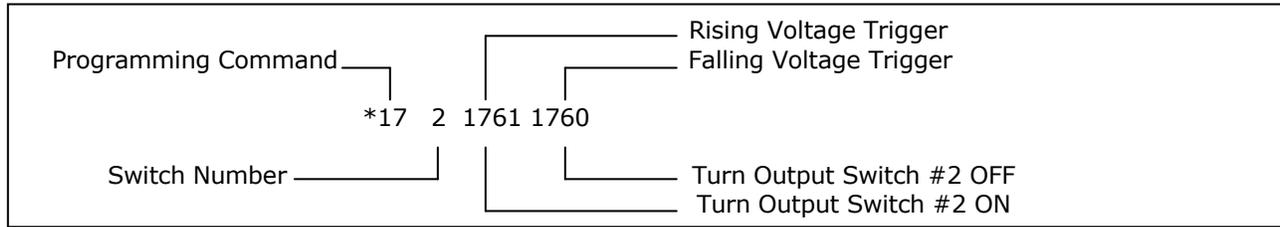
Key-up, and send [\*17X] followed by the internal command to be stored. See Figure 5-1. Un-key, and the voice will say, "CONTROL OK." Example: Announce the time of day on the repeater transmitter when switch #3 is activated by a rising logic voltage.



Example: Turn the link on when switch #1 is activated by a falling voltage input.



Example: Turn user function output switch #2 [Zone 7 Channel 6] on when input switch #2 is activated by a rising voltage and off with a falling voltage.



**Erase User Function Inputs (1-4)**

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

**Active Memory**

Save the current settings of active memory to be recalled later. Memory space is provided for four files.

**Save Active Memory (1-4)**

Save the current settings of active memory to be recalled later. Memory space is provided for four files. Configure the active memory to suite your special requirements. Use the [\*19X] programming command to save the current settings of the control channels, codes, timers, and first eight voice messages. Example: Save active memory as file #2. Key-up and send [\*192]. Un-key, and the voice will say, "PROGRAM FILE TWO OK."

**Load Active Memory With Default Values**

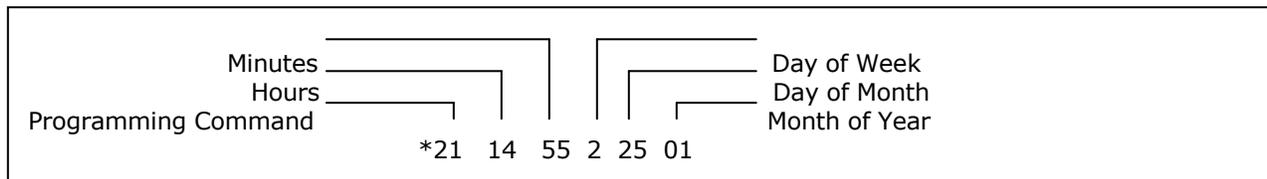
Key-up and send [\*199]. Un-key and active memory will be loaded with the default values. The voice will say, "CONTROL OK." This programming command only changes the control channel settings, codes, timers, and first eight voice message buffers.

**Send the Time of Day**

Key-up and send [\*20]. Un-key, the voice will read the time, day of week, month and day of month. Example: "THE TIME IS TWELVE TEN PM MONDAY JUNE FIVE."

**Setting the Clock**

Key-up and send [\*21] followed by the hours, minutes, day of week, day of month, and month of year. See Figure 5-3 for the number that represents the day of week. Un-key, and the voice will say "CONTROL OK." Example: 2:55 PM Monday January 25th. All entries must be double digit, except the day of week.



(Hours=0-23) (Minutes=0-59) (Day of Week=1-7) (Day of Month=1-31) (Month of Year=(1-12)  
 (Sun=1) (Mon=2) (Tue=3) (Wed=4) (Thr=5) (Fri=6) (Sat=7)

Figure 5-3

**Select 24 Hour Clock Operation**

To select 24 hour clock announcements, key-up and enter [\*222]. Un-key, and the voice will say "CONTROL OK." To return to 12-hour clock announcements, key-up and enter [\*221]. To read the current selection, key-up and enter [\*220].

**Voice Synthesizer Memory Storage**

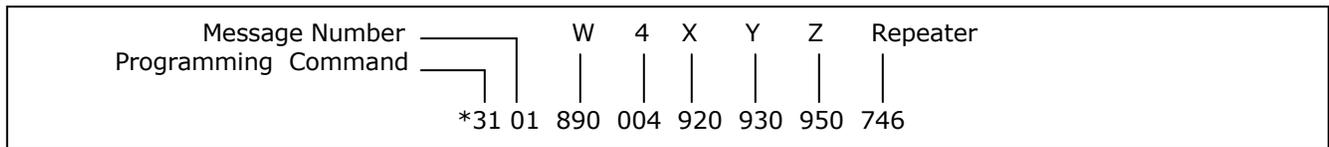
Space is provided for twenty user programmable messages of up to 23 words each.

**Send Synthesized Voice Message Locations (01-20)**

Key-up and send [\*30XX]. Un-key, and the voice synthesizer will say the message stored at memory location "XX".

**Program Synthesized Voice Message Locations (01-20)**

Key-up, and send [\*31XX], followed by the series of three digit numbers that represent the words required to construct the message. Memory space is provided for twenty-three entries. Refer to the Voice Vocabulary Word List in Chapter 9. Example: Load Repeater ID #1 with "W4XYZ Repeater"



**Voice Message Table**

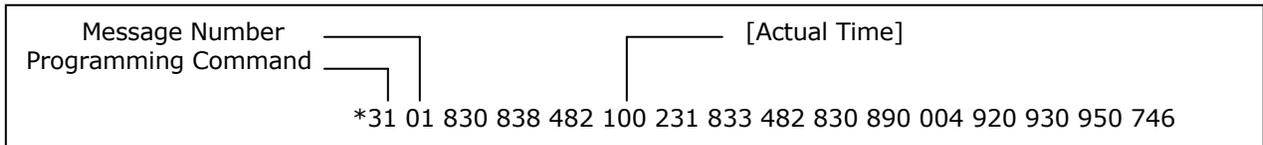
01	Repeater ID #1	02	Repeater ID #2
03	Squelch Tail Message	04	Transmitter Drop Message
05	Courtesy Tone Repeater	06	Courtesy Tone Remote Base
07	Message #7	08	Message #8
09	Message #9	10	Message #10
11	Message #11	12	Message #12
13	Automatic Link Clear Message	14	Link Disconnect Message
15	Link Connect Message	16	Time of Day Message
17	Grandfather Clock Message	18	Autopatch Disconnect Message
19	Repeater Timeout Message	20	Repeater Timeout Clear Message

Figure 5-4

**Program Voice Message With Time Variables**

To insert the time-of-day into a voice message, load the number [100] in the message. Other time variables include: [101 - Day of the Week], [102 - Day and Month] and [103 - Salutation].

Example: Load ID #1 with, "THE TIME IS [ACTUAL TIME] AND THIS IS THE W4XYZ REPEATER."



VOICE MESSAGE TIME VARIABLES	
100	Time of Day
101	Day of Week
102	Day of Month
103	Salutation

Figure 5-5

**User Function Control by Voice Message.**

The voice message buffers can also control the four User Function switches. If during the execution of a voice message, a User Function switch command (111 through 122) is encountered, the CAT-300DXL will set the switch and then continue with the remainder of the voice message.

### User Function Switch Voice Control Commands

111	User Switch #1 OFF	117	User Switch #3 OFF
112	User Switch #1 ON	118	User Switch #3 ON
113	User Switch #1 MOMENTARY	119	User Switch #3 MOMENTARY
114	User Switch #2 OFF	120	User Switch #4 OFF
115	User Switch #2 ON	121	User Switch #4 ON
116	User Switch #2 MOMENTARY	122	User Switch #4 MOMENTARY

Figure 5-6

### Digital Recorder Track Selection by Voice Message

The voice message buffers can be used to select one of the sixteen DR voice tracks. If during the execution of a voice message, a DR track command (140 through 155) is encountered, the CAT-300DXL will play the recorded message stored at that track.

140	TRACK #1	144	TRACK #5	148	TRACK #9	152	TRACK #13
141	TRACK #2	145	TRACK #6	149	TRACK #10	153	TRACK #14
142	TRACK #3	146	TRACK #7	150	TRACK #11	154	TRACK #15
143	TRACK #4	147	TRACK #8	151	TRACK #12	155	TRACK #16

Figure 5-7

### Courtesy Tone Selection by Voice Message

The voice message buffers can be used to generate courtesy tones. If during the execution of a voice message, a courtesy tone command (161 through 168) is encountered, the CAT-300DXL will generate the courtesy tone stored at that memory location. See Figure 5-8.

161	TONE #1	163	TONE #3	165	TONE #5	167	TONE #7
162	TONE #2	164	TONE #4	166	TONE #6	168	TONE #8

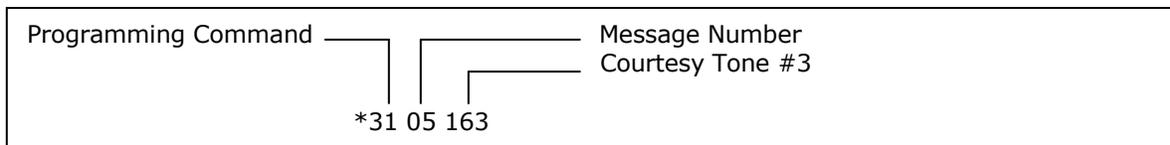
Figure 5-8

### Erase Synthesized Voice Message Locations (01-20)

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

### Load Courtesy Tone Repeater Receiver

Key-up and send [\*3105], followed by the three-digit number that represents the desired courtesy tone from the courtesy tone command table at Figure 5-7 above. Un-key, and the voice will say, "CONTROL OK." Example: Select courtesy tone #3.



### CW ID Memory Storage

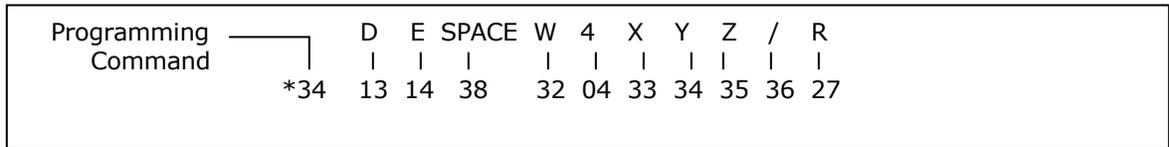
Memory space is provided for a CW identification. The buffer will accept 31 characters. If a repeater user talks over a voice ID, the CAT-300DXL will switch to the CW ID. If both voice ID messages are disabled, (Zone 3 Channel 1 and Zone 3 Channel 2 turned OFF), the controller will ID in CW only. If the short voice ID is turned off (Zone 1-3), the controller will ID in CW when the repeater is active. During initialization, the buffer is loaded with "CAT-300DXL REPEATER."

**Send Repeater CW ID**

Key-up and send [\*33]. Un-key and the CAT-300DXL will send the CW ID. The CW ID will be sent by the transmitter even if it was requested by telephone.

**Program Repeater CW ID**

Key-up and send [\*34], followed by the two digit numbers that represents the call letter identification. Memory space is provided for (31) entries. Refer to the CW ID programming table Figure 5-9. Example: Load the CW ID memory buffer with DE W4XYZ/R.



CW ID Programming Table									
00=Zero	05=Five	10=A	15=F	20=K	25=P	30=U	35=Z	40= ;	45=(
01=One	06=Six	11=B	16=G	21=L	26=Q	31=V	36=/	41= ,	46=SK
02=Two	07=Seven	12=C	17=H	22=M	27=R	32=W	37=AR	42= :	
03=Three	08=Eight	13=D	18=I	23=N	28=S	33=X	38=Space	43= ?	
04=Four	09=Nine	14=E	19=J	24=O	29=T	34=Y	39= .	44= -	

Figure 5-9

**Erase Repeater CW ID**

Key-up and send [\*35]. Un-key and the voice will say: "CONTROL OK." Note: If the CW ID buffer is empty, and a repeater user keys-up during a voice ID, the voice ID will continue.

**Expanded User Function Switches**

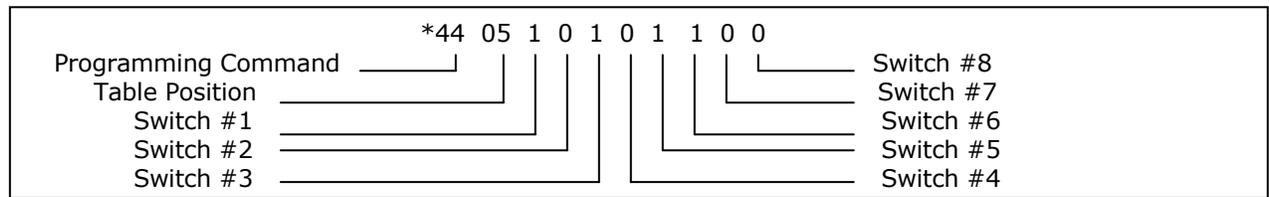
The DR-1000 Digital Voice Recorder Card makes available an additional eight switches to control a CTCSS encoder-decoder or any other equipment at the repeater site. The switch settings are stored as a group in the form of presets. A sixteen-position table is provided, where each row is a preset for all eight switches. These switches can be changed by a DTMF command or automatically by the action of the scheduler.

**Read Expanded User Function Switch Presets (01-16)**

Key-up, and send [\*43XX]. Un-key, and the voice will announce the settings of each switch stored at memory location [XX]. If all switches are OFF, the voice will say, "POSITION XX IS CLEAR." If some of the switches are ON, the voice will read back the "on" switches in order from switch #1 to switch #8.

**Program Expanded User Function Switch Presets(01-16)**

Key-up, and send [\*44XX] followed by the settings of the eight switches. Un-key, and the voice synthesizer will say: "CONTROL OK". Example: At table position 5, set switches 1,3,5 and 6 to ON.



**Erase User Function Switch Locations (01-16)**

Key-up, and send [\*45XX]. Un-key and the voice will say: "CONTROL OK".

**Control - 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-300DXL is powered up with dip-switch #7 set to the ON position (initialize reset).

**Control Operator Prefix Number [\*501\*]**

This number must precede any command used to change the settings of the repeater's control channels in Zones 1 through 8. Example: To program a Control Operator Prefix Number of 100, key-up and send [\*501\*100], Un-key and the voice will say: "CONTROL OK." Access to this number should be limited to control operators.

**Time Request Number [\*502\*]**

This number must be entered to request the time of day announcement. Example: To program a Time Request Number of 400, key-up and send [\*502\*400]. Un-key and the voice will say, "CONTROL OK."

**Memory Recall Prefix [\*503\*]**

This number must precede the command used to execute a memory move from storage into active memory. Example: To program a Memory Recall Prefix Number of 175, key-up and send [\*503\*175]. Un-key, and the voice will say: "CONTROL OK."

**DTMF Access Number [\*504\*]**

When the repeater is in the DTMF Access Mode it will not respond to a COR input. The repeater user must enter a DTMF access number to activate the repeater. When the repeater returns to rest for a period determined by the sleep timer, the number must be re-entered to activate the repeater. Example: To program a DTMF Access Number of 325, key-up and send [\*504\*325]. Un-key, and the voice will say, "CONTROL OK."

**DTMF Pad Test Number [\*505\*]**

This number must be entered to initiate a DTMF keypad test. Example: To program a DTMF Pad Test Number of 375, key-up and send [\*505\*375]. Un-key, and the voice will say, "CONTROL OK."

**User Function Switch Number [\*506\*]**

This number must precede the command to change the settings of the user function switches on the CAT-300DXL. Example: To program a User Function Switch Number of 550, key-up and send [\*506\*550]. Un-key, and the voice will say, "CONTROL OK."

**Autopatch Access Number [\*507\*]**

This number must be entered to access the autopatch. Example: To program an autopatch access number of [\*], key-up and send [\*507\*[\*]]. Un-key, and the voice will say: "CONTROL OK."

**Autopatch Disconnect Number [\*508\*]**

This number must be entered to terminate the autopatch. Example: To program an autopatch termination number of [#], key-up, and send [\*508\*#]. Un-key, and the voice will say, "CONTROL OK."

**User Speed Dial Prefix Number [\*509\*]**

This number must be entered to access a user speed dial location. Example: To program the speed dial prefix 6, key-up and send [\*509\*6]. Un-key, and the voice will say, "CONTROL OK." This number must precede the speed dial table location. With the prefix 6, the speed dial numbers will be 600 through 699.

**Emergency Speed Dial Prefix Number [\*510\*]**

This number must be entered to access an emergency speed dial location. Example: To program the speed dial prefix 91, key-up and send [\*510\*91]. Un-key, and the voice will say, "CONTROL OK." This number must precede the speed dial location number. With the prefix 91, the speed dial numbers will be 910 through 914. In this way, 911 can be an emergency speed dial number.

**Autopatch Long Distance Access Number [\*511\*]**

This number must be entered to access the autopatch for long distance calls. Example: To program an autopatch access number of 200, key-up and send [\*511\*200]. Un-key and the voice will say, "CONTROL OK."

**Reverse Autopatch Access Number [\*512\*]**

This number must be entered to access the reverse autopatch. Example: To program the reverse autopatch access number 800, key-up and send [\*512\*800]. Un-key, and the voice will say, "CONTROL OK." This number must precede the speed dial table position number when calling the repeater. This number is also used to answer a reverse autopatch call.

**Digital Recorder Control Number [\*513\*]**

This number must be entered to PLAY any one of the DR tracks. This number must precede the track number. Example: To program a DR Control Number of 725, key-up and send [\*513\*725]. Un-key, and the voice will say, "CONTROL OK."

**Signal Report Test Number [\*514\*]**

This programming command selects the signal-report control number. The default number is [750].

**Expanded User Function Switch Number [\*515\*]**

This number must precede the command to change the settings of the expanded user function switches on the DR-1000 digital voice recorder Card. Example: To program a user function switch control number of 575, key-up and send [\*515\*575]. Un-key, and the voice will say, "CONTROL OK."

**Remote Base Control Number [\*516\*]**

This programming command selects the link control prefix number. This number must precede the command used to activate or deactivate the link. The default number is [500].

**Voice Demonstration Control Number [\*517\*]**

This number must be entered to PLAY any 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 [\*517\*700]. Un-key and the voice will say: "CONTROL OK."

**Read Control Number [\*501 - \*517]**

Key-up and send [\*501]. Un-key and the voice synthesizer will read back the Control Operator Prefix numbers. The voice will say: "PRESET CODE FIVE ZERO ONE IS ONE ZERO ZERO."

**Timer Memory**

This memory area is reserved for storage of the controller's sixteen timers. These timers are user programmable. If the CAT-300DXL is initialize by applying power with dip-switch #7 is in the ON position, the timers will be automatically loaded with default times.

**Repeater Time-out [\*601\*]**

The maximum length of a transmission is limited by the repeater's time-out timer. This timer is programmable between 1.0 and 1799 seconds. Example: To program this timer to 2 minutes, key-up and enter [\*601\*120]. Un-key, and the voice will say, "CONTROL OK." When initialize, this timer will default to 180 seconds.

**Repeater Sleep Timer [\*602\*]**

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 1.0 and 1799 seconds. When initialize, this timer will default to 60 seconds. This timer is also used with the turn on delay feature and the remote base auto disconnect feature.

**Repeater Turn on Delay Timer [\*603\*]**

When the repeater is at rest, this timer determines 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 [\*603\*15]. Un-key, and the voice will say, "CONTROL OK." When initialized, this timer will default to 1.0 second.

**COR Drop to Courtesy Beep Timer [\*604\*]**

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

**Courtesy Beep to PTT Drop Timer [\*605\*]**

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. When initialized, this timer will default to 4 seconds.

**DTMF Mute Delay Timer [\*606\*]**

This timer determines the time the transmit audio will continue to be muted after the entry of the last DTMF tone. This timer is programmable between 0.1 and 9.9 seconds. When initialized, this timer will default to 1 second.

**Repeater ID Timer [\*607\*]**

This timer sets the time between transmissions of the repeater ID. The ID occurs when a repeater user stops transmitting. This timer is programmable between 1.0 and 1799 seconds. When initialized, the timer defaults to 480 seconds.

**Squelch Tail Message Timer [\*608\*]**

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. When initialized, the timer defaults to 1799 seconds.

**Drop Out Message Timer [\*609\*]**

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. When initialized, the timer defaults to 1799 seconds.

**Voice Delay Timer [\*610\*]**

The CAT-300DXL generates a PTT output, and after a short delay, the voice speaks. This delay is field programmable. This feature is useful in repeater systems using CTCSS tone squelch or multiple linking where the system is slow to come up. The voice delay timer can be programmed between 0.1 and 9.9 seconds. When initialized, the timer defaults to 1.0 second.

**Autopatch Timer [\*611\*]**

This timer sets the maximum length of an autopatch, and is programmable between 1.0 and 1799 seconds. When initialized, this timer will default to 180 seconds.

**Autopatch Activity Timer [\*612\*]**

The repeater user must periodically key-up to maintain the autopatch. Five seconds before the autopatch activity timer is to expire, the controller will generate a warning beep. The user must key-up or the autopatch will disconnect. This timer is programmable between 1.0 and 1799 seconds. When initialized, this timer will default to 30 seconds.

**Fan Control Timer \*613\*]**

When Zone 1 Channel 6 is enabled, user output switch #4 becomes a Fan Control output. When PTT #1 turns ON, User Output #4 (J3 pin 20) will turn ON. After PTT #1 turns OFF this output will remain ON for an additional period of time determined by the [\*613\*] Fan Control timer. This timer is programmable between 1.0 and 1799 seconds. The timer default is 60 seconds.

**Repeater Programming Timer [\*615\*]**

During the programming mode, this timer determines the maximum time the controller remains unlocked. This timer is programmable between 1 and 1799 seconds. When initialized, this timer will default to 300 second.

**Ring Detector Timer [\*616\*]**

This timer sets the delay between detection of the first ring and when the CAT-300DXL answers a control operator call in. This timer is programmable between 1.0 and 1799 seconds. When initialized, the timer defaults to 2.0 seconds.

**Read Timer Setting [\*601 - \*616]**

Key-up and send [\*601]. Un-key and the voice synthesizer will read back the setting of the repeater's time-out timer. The voice will say, "TIMER 601 IS THREE MINUTES."

**User Speed Dial Memory**

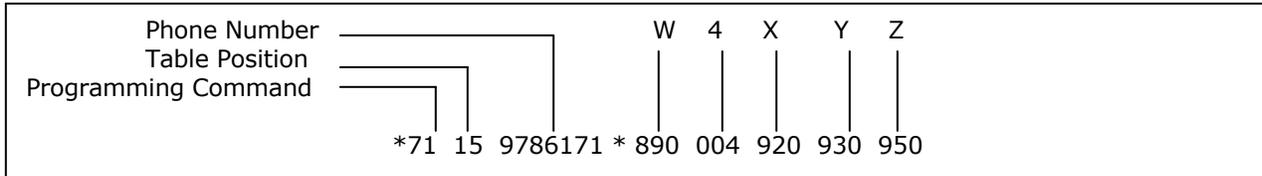
This memory area is reserved for storage of 100 phone numbers with call letter identification. Space is provided for an eleven-digit phone number with an ID of eight numbers, letters, or words from the Voice Vocabulary Word List.

**Read User Speed Dial Locations (00-99)**

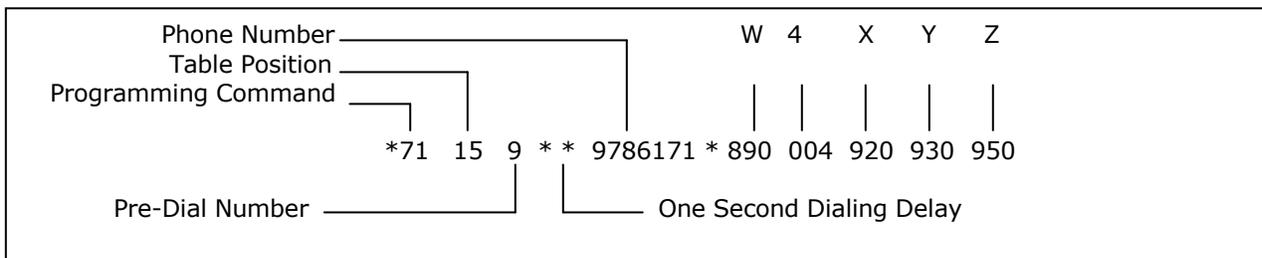
Key-up and send [\*70XX]. Un-key, and the voice synthesizer will read back the status of the memory location. If there is no number stored at that memory location, the voice will say, "POSITION XX IS CLEAR." If a User Speed Dial is stored at that memory location, the voice will read the phone number and ID.

**Program User Speed Dial Locations (00-99)**

Key-up, and send [\*71XX] followed by up to an eleven-digit phone number, a [\*] separator and up to eight words from the voice synthesizer vocabulary list. Un-key, and the voice will say, "CONTROL OK." Example: 978-6171 W4XYZ (Store at table position 15).



Example 2: Same but with pre-dial number and dialing delay



**Erase User Speed Dial Locations (00-99)**

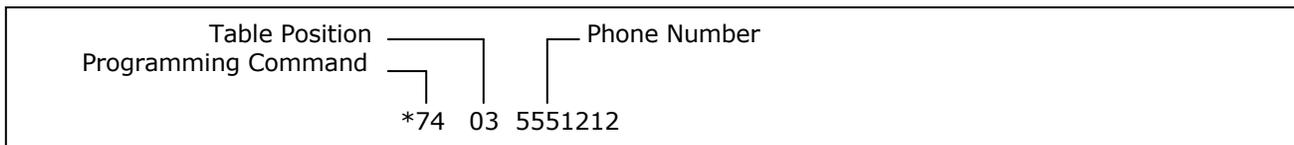
Key-up and send [\*72XX]. Un-key, and the voice will say, "POSITION XX IS CLEAR"

**Read Lock-Out Number Locations (01-20)**

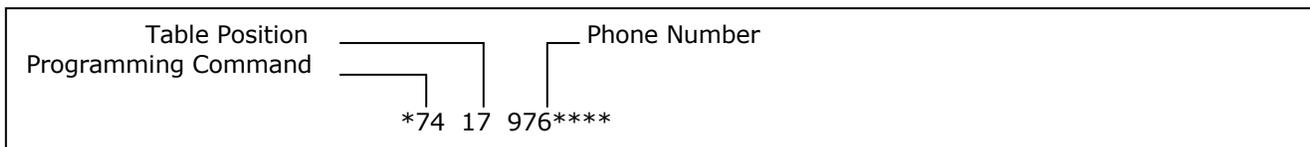
Key-up and send [\*73XX]. Un-key, and the voice synthesizer will read back the phone number stored at that memory location. If there is no number stored at that memory location, the voice will say, "POSITION XX IS CLEAR."

**Program Lock-Out Number Locations (01-20)**

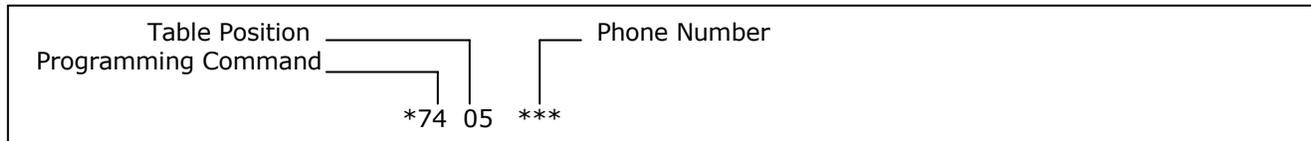
Key-up and send [\*74XX] followed by the seven-digit phone number. Un-key, and the voice will say, "CONTROL OK." Example: Lockout number 555-1212. (Store at table position 3)



Example: Lock-out all numbers with the 976 Prefix. (Store at table position 17)



Example: Lock-out all three digit numbers. (Store at table position 5)



**Erase Lock-Out Number Locations (01-20)**

Key-up and send [\*75XX]. Un-key, and the voice will say, "POSITION XX IS CLEAR"

**Area Code Memory**

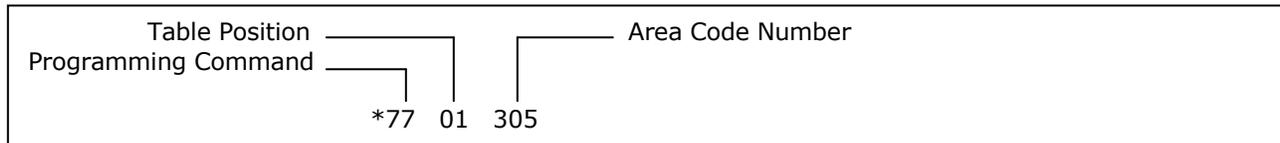
This memory area is reserved for the storage of 20 area code numbers. These numbers are the area codes allowed to be called; all others will be rejected.

**Read Area Code Location (01-20)**

Key-up and send [\*76XX]. Un-key, and the voice synthesizer will read back the area code number stored at that memory location. If there is no number stored at that memory location, the voice will say, "NO AREA CODE NUMBER".

**Program Area Code Location (01-20)**

Key-up, and send [\*77XX] followed by the area code number to be added to the look-up table. Un-key and the voice will say, "CONTROL OK." Example: Add area code number 305 (Store at table position 01).



**Erase Area Code Location (01-20)**

Key-up and send [\*78XX]. Un-key, and the voice will say, "CONTROL OK"

**Emergency Speed Dial Memory**

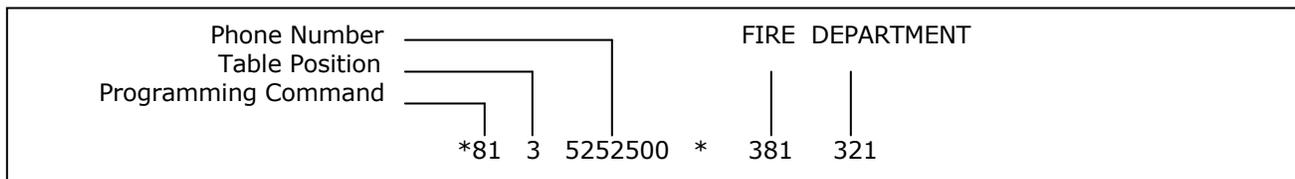
This memory area is reserved for five phone numbers with identification. Space is provided for up to an eleven-digit phone number with an identification of eight numbers, letters, or words from the voice synthesizer word list.

**Read Emergency Speed Dial Locations (0-4)**

Key-up and send [\*80X]. Un-key, and the voice will read back the status of the memory location. If there is no number stored at that memory location, the voice will say, "POSITION X IS CLEAR." If an Emergency Speed Dial is stored at that memory location, the voice will read the phone number and the identification.

**Program Emergency Speed Dial Locations (0-4)**

Key-up, and send [\*81X] followed by the phone number, a [\*] separator and up to eight words from the voice vocabulary list. Un-key, and the voice will say, "CONTROL OK." Example: 525-2500 FIRE DEPARTMENT (Store at table position 3)



**Erase Emergency Speed Dial Locations (0-4)**

Key-up and send [\*82X]. Un-key, and the voice will say, "POSITION X IS CLEAR"

**Pre-Dial Number**

When the CAT-300DXL is initialized, the pre-dial number is loaded with "9". If Zone 4 Channel 8 is enabled, this number will precede all manually dialed numbers. Memory space is provided for a pre-dial number of up to seven digits.

**Read Pre-Dial Number**

To read the pre-dial number, key-up and enter [\*89]. Un-key and the voice synthesizer will read back the number.

**Program Pre-Dial Number**

To program the pre-dial number, key-up and enter [\*89] followed by the number. Space is provided for a number of up to seven digits. Example: to program the number "7", key-up and enter [\*897]. Un-key, and the voice will say, "CONTROL OK". To program caller ID suppression, key-up and enter [\*89\*67].

**Audio Test Tone**

The CAT-300DXL generates a 1000Hz test tone, which modulates the transmitter and can be monitored at TP2. Simultaneously, a DTMF [A] is applied to the phone circuitry and is monitored at TP1. The phone line will not go off-hook during this test. These tones are use as a reference when setting audio levels. To activate the tones, key-up and enter [\*901]. The tone plays for 30 seconds.

**Courtesy Tone**

Memory space is provided for the storage of eight custom courtesy tones. Each tone can consist of up to three different tone frequencies of various lengths and separations.

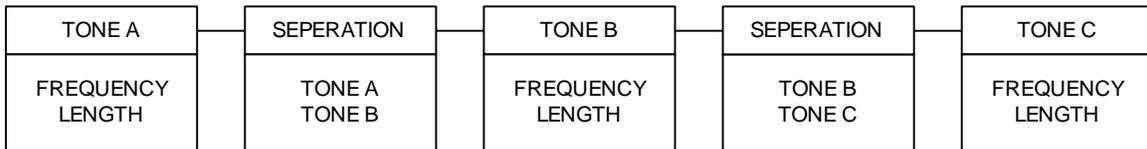


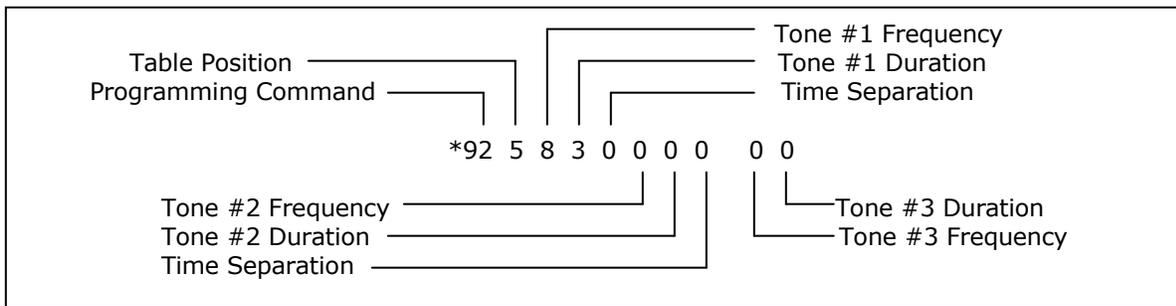
Figure 5-10

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

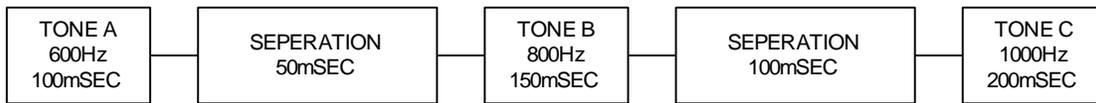
To send a courtesy tone, key-up and send [\*91X]. Un-key and the CAT-300DXL will transmit the courtesy tone. "X" represents the courtesy tone table location.

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

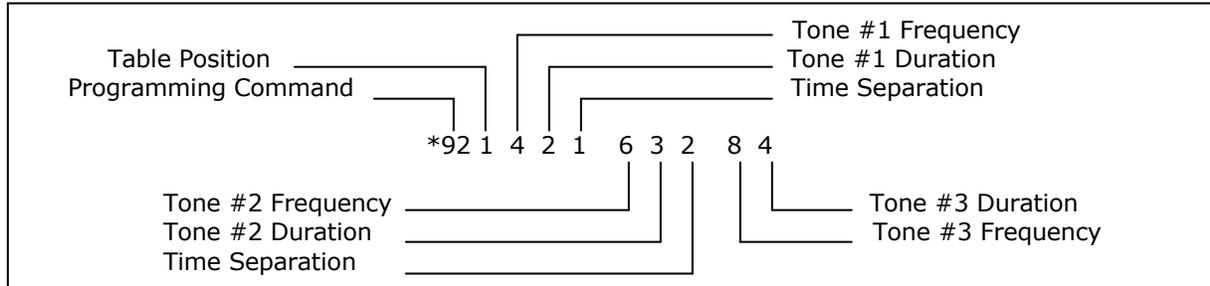
To program a courtesy tone, key-up and send [\*92X], followed by the frequency, duration and separation from table in Figure 5-11. Example: Program courtesy tone table location 5 with a tone of 1000Hz with a duration of 150 milliseconds.



To program a multiple courtesy tone, key-up, and send [\*92X], followed by the desired tone frequencies, durations, and separations. Example: Program courtesy tone table location 1 with a three-frequency tone.



The [\*92X] programming command is used to develop eight custom courtesy tones 161 through 168.



Tone Frequency (Hertz)									
0=OFF	1=300	2=400	3=500	4=600	5=700	6=800	7=900	8=1000	
Tone Duration - Tone Separation (Milliseconds)									
0=0	1=50	2=100	3=150	4=200	5=250	6=300	7=350	8=400	9=450

Figure 5-11

**Erase Courtesy Tone Location (1-8)**

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

**Select Courtesy Tone**

To select tone "163" as the repeater's courtesy beep, load Voice Message buffer #05 with "163." Example: Enter \*3105 163.

**Westminster Chimes on Grandfather Clock**

The courtesy tone generator can be used to generate Westminster chimes during the Grandfather clock message announcement. Enter the following programming commands:

[*926 894 694 79]
[*927 499 494 79]
[*928 894 690]
[*3117 166 963 167 963 168 963 100]

Figure 5-12

**Digital Recorder**

The CAT-300DXL will support the DR-1000 Digital Voice Recorder for true voice message announcements. Substitute DR tracks for voice messages, speed dial identifications and courtesy tones. For additional information on how to record tracks over the telephone line, consult Chapter 14 of this manual.

**Play Digital Voice Recorder Tracks (01-16)**

Key-up and send [\*94XX]. Un-key, and the CAT-300DXL will play the pre-recorded message stored at track "XX"

**Record Digital Voice Recorder Tracks (01-16)**

Key-up and send [\*95XX]. Un-key, and the voice will say, "START MESSAGE". Key-up and enter the message to be stored at track "XX".

**Erase Digital Voice Recorder Tracks (01-16)**

Key-up and send [\*96XX]. Un-key, and the voice will say, "CONTROL OK".

**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: "MANUAL EXIT." If you fail to exit the programming mode, when the programming timer [\*615\*] expires, the CAT-300DXL will automatically return to normal repeater operation. The voice will say, "TIMER EXIT."

**DTMF Programming Table**

<b>ENTRY</b>	<b>DESCRIPTION</b>	
*10XX	READ SCHEDULER COMMAND	
*11XX	PROGRAM SCHEDULER COMMAND	
*12XX	ERASE SCHEDULER COMMAND	
*13XX	READ MACRO	
*14XX	PROGRAM MACRO	
*15XX	ERASE MACRO	
*16X	READ HARDWARE INPUT SWITCH	
*17X	PROGRAM HARDWARE INPUT SWITCH	
*18X	ERASE HARDWARE INPUT SWITCH	
*19X	SAVE ACTIVE MEMORY	
*199	INITIALIZE ACTIVE MEMORY	
*20	SEND TIME OF DAY	
*21	PROGRAM TIME OF DAY	
*220	READ CLOCK SELECTION	
*221	SET CLOCK FOR 12 HOUR TIME	
*222	SET CLOCK FOR 24 HOUR TIME	
*30XX	SEND VOICE SYNTHESIZER	
*31XX	PROGRAM VOICE SYNTHESIZER	
*32XX	ERASE VOICE SYNTHESIZER	
*33	SEND CW ID	
*34	PROGRAM CW ID	
*35	ERASE CW ID	
*43XX	READ DIGITAL RECORDER SWITCHES	
*44XX	PROGRAM DIGITAL RECORDER SWITCHES	
*45XX	ERASE DIGITAL RECORDER SWITCHES	DEFAULT
*501*	CONTROL OPERATOR PREFIX CODE	100
*502*	TIME OF DAY REQUEST CODE	400
*503*	MEMORY RECALL PREFIX CODE	175
*504*	DTMF ACCESS CODE	325
*505*	DTMF PAD TEST CODE	375
*506*	USER FUNCTION SWITCH PREFIX CODE	550
*507*	AUTOPATCH ACCESS CODE	*
*508*	AUTOPATCH DISCONNECT CODE	#
*509*	USER SPEED DIAL PREFIX CODE	6
*510*	EMERGENCY SPEED DIAL PREFIX CODE	91
*511*	AUTOPATCH LONG DISTANT ACCESS CODE	200
*512*	REVERSE AUTOPATCH CODE	800
*513*	DIGITAL RECORDER TRACK PREFIX CODE	725
*514*	SIGNAL REPORT CODE	750
*515*	EXPANDED USER FUNCTION SWITCH PREFIX CODE	575
*516*	REMOTE BASE PREFIX CODE	500
*517*	VOICE MESSAGE DEMO PREFIX CODE	700

<b>ENTRY</b>	<b>TIMER DESCRIPTION</b>	<b>RANGE</b>	<b>DEFAULT</b>
*601*	REPEATER TIME-OUT	1-1799	180
*602*	REPEATER SLEEP TIME	1-1799	60
*603*	TURN ON DELAY TIME	.1-9.9	1.0
*604*	COR DROP TO BEEP TIME	.1-9.9	1.0
*605*	BEEP TO PTT DROP TIME	.1-9.9	4.0
*606*	DTMF MUTE DELAY TIMER	.1-9.9	1.0
*607*	REPEATER ID TIME	1-1799	480
*608*	SQUELCH MESSAGE TIME	1-1799	1799
*609*	DROP OUT MESSAGE TIME	1-1799	1700
*610*	VOICE DELAY TIMER	.1-9.9	1.0
*611*	AUTOPATCH LENGTH TIME	.1-9.9	180
*612*	AUTOPATCH ACTIVITY TIME	1-1799	30
*613*	FAN TIMER	1-1799	60
*614*	RESERVED FOR FUTURE USE		
*615*	PROGRAM MAX LENGTH TIME	1-1799	500
*616*	RING DETECTOR TIME	1-1799	2.0
<b>ENTRY DESCRIPTION</b>			
*70XX	READ USER SPEED DIAL		
*71XX	PROGRAM USER SPEED DIAL		
*72XX	ERASE USER SPEED DIAL		
*73XX	READ LOCKOUT NUMBER LOCATION		
*74XX	PROGRAM LOCKOUT NUMBER LOCATION		
*75XX	ERASE LOCKOUT NUMBER LOCATION		
*76XX	READ AREA CODE		
*77XX	PROGRAM AREA CODE		
*78XX	ERASE AREA CODE		
*80X	READ EMERGENCY SPEED DIAL		
*81X	PROGRAM EMERGENCY SPEED DIAL		
*82X	ERASE EMERGENCY SPEED DIAL		
*89	PROGRAM PRE-DIAL NUMBER		
*901	GENERATE 1000Hz ON PORT #1		
*902	GENERATE 1000Hz ON PORT #2		
*903	GENERATE [DTMF A] ON TELEPHONE PORT		
*91X	SEND COURTESY TONE		
*92X	PROGRAM COURTESY TONE		
*93X	ERASE COURTESY TONE		
*94XX	PLAY DIGITAL RECORDER TRACK		
*95XX	RECORD DIGITAL RECORDER TRACK		
*96XX	ERASE DIGITAL RECORDER TRACK		
*0	MANUAL EXIT		

## Chapter 6 - Interfacing to Other Equipment

Interfacing the CAT-300DXL to your repeater system is a simple matter. A minimum of two inputs and two outputs are required for the CAT-300DXL to control a repeater. They are:

1. A COR signal to indicate when a signal is being received.
2. A RX audio signal containing DTMF tones to be processed for control.
3. A PUSH-TO-TALK signal to tell the repeater transmitter to turn ON.
4. A TRANSMIT AUDIO signal containing a combination of receive audio, synthesized voice, and courtesy tone.

Additional connections are required to realize all features of the CAT-300DXL.

### Determining COR Logic

Locate your repeater receiver's COR output. This line has a DC voltage that changes state when a signal is being received. If the COR line is 0 volts and goes to a positive voltage when a signal is received, it is said to be (positive logic) or active HIGH. If the COR line is a positive voltage, and goes to 0 volts when a signal is received, it is said to be (negative logic) or active LOW.

Note: 0 volts (logic low) is any voltage less than 0.8VDC. A positive voltage (logic high) is any voltage greater than 3.0VDC. Set dipswitch #1 on the CAT-300DXL to ON for (negative logic) and OFF for (positive logic).

### Connection to Repeater Receiver

Connect the repeater receiver audio output to J3-13 and the COR to J3-6 of the CAT-300DXL. Measure the COR voltage level when the receiver is active. Verify this line changes from less than 0.8VDC to greater than 3.0 VDC. If the COR line will not meet these limits it may be necessary to add an external pull-up resistor or transistor to the COR line.

### Connection to Repeater Transmitter

Locate your repeater's Push-To-Talk input. When grounded, this line will make the repeater transmit. Connect the CAT-300DXL PTT #1 output (J3-10) to this line. Locate your repeater's TX audio input. This is the line where the audio signal used to modulate the transmitter is applied. Connect the TX audio (J3-11) to this line.

### Connection to Remote Base Receiver

Connect the remote base receiver audio output to J3-12 and the COR to J3-5 of the CAT-300DXL. Measure the COR voltage level when the receiver is active. Verify this line changes from less than 0.8VDC to greater than 3.0 VDC. If the COR line will not meet these limits it may be necessary to add an external pull-up resistor or transistor to the COR line.

### Connection to Remote Base Transmitter

Locate your remote base transmitter's Push-To-Talk input. When grounded, this line will make the repeater transmit. Connect the CAT-300DXL PTT #2 output (J3-9) to this line. Locate your remote base TX audio input. This is the line where the audio signal used to modulate the transmitter is applied. Connect the TX audio (J3-23) to this line. If the remote transmitter's audio input is low level, i.e. microphone level, you may need to move the jumper plug on J8 to pins 1 and 2.

### Interface Review

1. Are dipswitches #1 through #8 in their proper positions?
2. Is the PTT #1 output at J3-10 connected to the transmitter PTT input?
3. Is the TX1 Audio at J3-11 connected to the transmitter audio input?
4. Is the COR #1 at J3-6 connected to the repeater receiver COR output?
5. Is dipswitch #1 ON for active low COR or OFF for active high COR?
6. Is the COR level changing from less than 0.8 to greater than 3.0 VDC?
7. Is the RX1 Audio at J3-13 connected to the receiver audio output?
8. Is the audio input level TP6 sufficient for the DTMF decoder?

### **Connector Kit**

Included with the controller is a connector kit containing a 25 pin "D" connector to mate with J3, a 2.5mm power plug to mate with J1 (center pin is [+]), connector cable for J7 serial port, two 2200 ohm resistors, and two .0047uF capacitors. If the COR inputs are active low, install the 2200 ohm resistors as pull-ups on the board at the R5 and R6 positions. If the receiver's COR circuit is not capable of pulling down the 2200 ohm resistor increase the resistor value to 10K ohms. If the controller is supplied with discriminator audio, install the .0047uF capacitors on the board at the C23 and C24 positions to de-emphasize the audio.

### **Audio Level Adjustment (Repeater Receiver)**

The audio mixing-switching circuits of the CAT-300DXL are optimized around an input and output of -10dBm (220mVAC RMS). For best results, the receiver audio input should be 220mV when a DTMF tone is being received. While providing a DTMF audio input at J3-13, adjust the RX1 Audio level control for an audio level at TP6 of (220mVAC RMS).

### **Audio Level Adjustment (Remote Base Receiver)**

While providing a DTMF audio input at J3-12, adjust the RX2 Audio level control for an audio level at TP6 of (220mVAC RMS).

### **Audio Level Adjustment (Repeater Transmitter)**

Adjust the TX1 audio level control for (220mVAC RMS) at TP4.

### **Audio Level Adjustment (Remote Base Transmitter)**

Adjust the TX2 audio level control for (220mVAC RMS) at TP5.

### **Audio Level Adjustment (Beep)**

Unlock the CAT-300DXL and enter the [\*901] programming command to produce the 1000Hz test tone. Adjust the BEEP Level control for a transmit audio output level of (90mVAC RMS) at TP4. Repeat the [\*901] programming command to produce the test tone. Check the audio level at TP1. The voltage should be approximately (300mVAC RMS). Exit the programming mode.

### **Audio Level Adjustment (Transmitter Deviation)**

Once the RX1 and BEEP levels are balanced, adjust the TX1 Audio control for the desired level of modulation while monitoring the repeater's transmitter.

### **Audio Level Adjustment (Voice Synthesizer)**

Compare the received audio and synthesized-voice audio, and adjust the RPT VOICE LEVEL control as desired. For best quality speech, the synthesized voice should not exceed 3KHz deviation.

### **Audio Level Adjustment (CW ID And Courtesy Tone)**

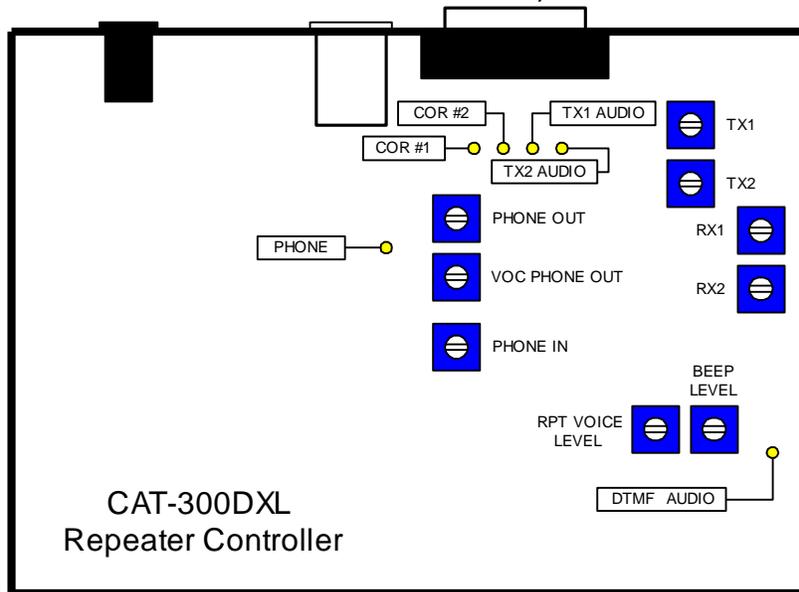
Compare the received and CW ID audio, and adjust the BEEP LEVEL control as desired. For best results the CW ID should not exceed 1.5KHz deviation. This will insure that repeater users will always be able to talk over the CW ID when it comes on during a QSO in progress.

### **Audio Level Adjustment (Autopatch)**

Access the autopatch. With the CAT-300DXL in the autopatch mode, adjust the PHONE-IN control for the desired level of phone audio at the transmitter. During an autopatch, the telephone audio should modulate the transmitter at the same level as audio from the repeater's receiver. Adjust the PHONE-OUT control for the desired level of received audio into the telephone line.

**Audio Level Adjustment (Control Operator Call-in)**

Call the CAT-300DXL on the telephone and enter the control operator mode [100#]. Interrogate the control channels and adjust VOC-PHONE-OUT control for the desired voice synthesizer level.



**Repeater Interface (J3)**

Connector J3 provides an interface to the repeater.

1.	User Input #1	2.	User Input #2	3.	CTCSS #2
4.	CTCSS #1	5.	COR #2	6.	COR #1
7.	RESERVED	8.	RESERVED	9.	PTT #2
10.	PTT #1	11.	TX1 Audio	12.	RX2 Audio
13.	RX1 Audio	14.	User Output #1	15.	User Output #2
16.	+12VDC	17.	Ground	18.	Ground
19.	User Output #3	20.	User Output #4	21.	User Input #3
22.	User Input #4	23.	TX2 Audio	24.	Ground
25.	Telephone Busy				

Figure 6-1

**Accessory Interface (J4)**

Connector J4 provides the interface for the DR-1000 Digital Recorder.

1.	+12 Volts	2.	Ground	3.	No Connection
4.	Serial Strobe	5.	Busy DVR	6.	Serial Data
7.	Serial Clock	8.	TX Audio	9.	PTT
10.	Serial Strobe	11.	COR	12.	Audio From DVR
13.	RX Audio	14.	Audio To DVR		

Figure 6-2

### Audio Delay Repeater Interface (J5)

This interface is used to connect the DL-1000C audio delay board to the repeater's receive-audio path. The CAT-300DXL is shipped from the factory with a jumper installed across pins 1 and 2. This completes the received-audio path when the audio delay board is not used. An audio delay board connected to J5 will eliminate the receiver squelch noise crash and the chirp of the first DTMF tone when muting is enabled.

### Audio Delay Remote Base Interface (J6)

This interface is used to connect the DL-1000C audio delay board to the repeater's receive-audio path. The CAT-300DXL is shipped from the factory with a jumper installed across pins 1 and 2. This completes the received-audio path when the audio delay board is not used. An audio delay board connected to J6 will eliminate the remote base receiver squelch noise crash.

### Test Point TP1 - Telephone Audio Output

This test point monitors the audio that is generated by the controller and sent to the phone line during an autopatch or control operator call in. It also monitors the audio received from the telephone line during an autopatch.

### Test Point TP2 - COR #1

This test point monitors the COR #1 logic input to the controller.

### Test Point TP3 - COR #2

This test point monitors the COR #2 logic input to the controller.

### Test Point TP4 - Transmitter Audio Output (TX1)

This test point monitors the audio generated by the controller to modulate the repeater's transmitter. This includes receive audio, courtesy tone audio, CW ID audio, and voice synthesizer audio. During an autopatch, audio from the phone line is also present at TP4.

### Test Point TP5 - Transmitter Audio Output (TX2)

This test point monitors the audio generated by the controller to modulate the remote base transmitter. If your remote-base transmit audio input is very sensitive (microphone Level), and you find the TX2 Audio level control is set to minimum, move the jumper plug at J8 between pins 1 and 2. This inserts a voltage divider in the TX2 audio path. This will improve the adjustment range of the TX2 audio output control.

### Test Point TP6 - DTMF Decoder Audio

This test point monitors the receive audio present at the input of the DTMF decoder. For proper decoder operation, the DTMF audio should be greater than (200mVAC RMS). When measuring this test point, make sure RF from the repeaters transmitter or your HT is not being picked-up on the voltmeter leads. This will cause an erroneous indication that will disrupt the alignment procedure. Set your HT to the low power position and hold it away from the controller and voltmeter leads, or have someone off-site generate the DTMF tones.

### RS-232 Interface Cable

The CAT-300DXL controller's RS-232 port is available at header J7. Included in the connector kit, is a three-wire cable terminated with a header plug on one end. On the other end, solder a "DB-9" connector.

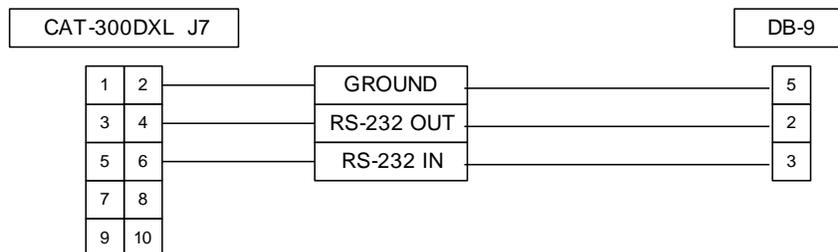


Figure 6-3

### Header Pin Assignments

Header connectors on the CAT-300DXL, DR-100, and DL-1000C use the same numbering system. Looking at the board's solder side, one of the header pins is connected to a square solder pad. This pin is always pin one. One row of pins are assigned odd numbers while the other row of pins are assigned even numbers. A white dot denotes pin-one on the component side of the board. See figure 6-4.

### Component Side View Of headers

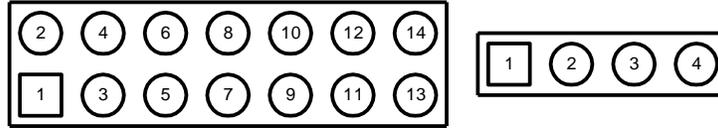


Figure 6-4

### Positive Current Transmitter PTT

The CAT-300DXL keys the transmitter by grounding the PTT line. Some transmitters require a DC current to key the transmitter, which is usually obtained from a +12volt DC supply. In these cases a switching device must be installed between the transmitter and the CAT-300DXL Push-to Talk output at J3-10. Figure 6-5 describes two possible circuits that will supply the transmitter. Use caution when connecting this circuit. Do not apply +12VDC directly to J3-10. This will result in damage to U2.

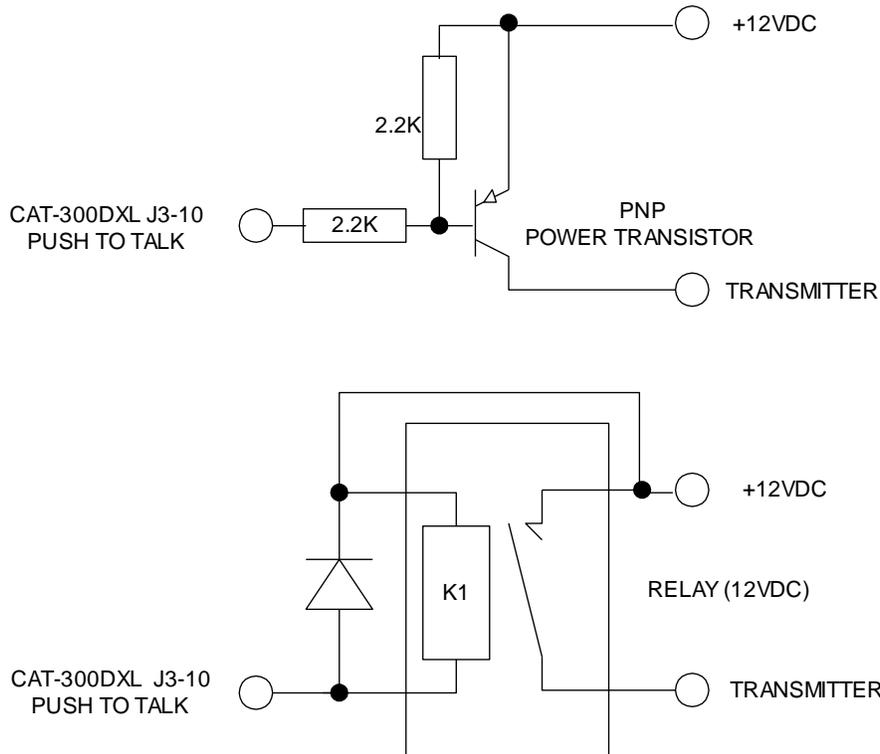


Figure 6-5

**Connection to CTCSS Decoder**

If your repeater receiver has a CTCSS decoder logic output, connect it to J3-4. For proper operation, the CTCSS decoder input must be connected to the discriminator audio output. Speaker audio or top of volume control audio exhibits undesirable low frequency roll-off. This will cause the CTCSS decoder output to toggle during voice peaks, and the receive audio will cut out. Connect the TS-64 CTCSS Encoder/Decoder assembly to the CAT-300DXL as described in Figure 6-6.

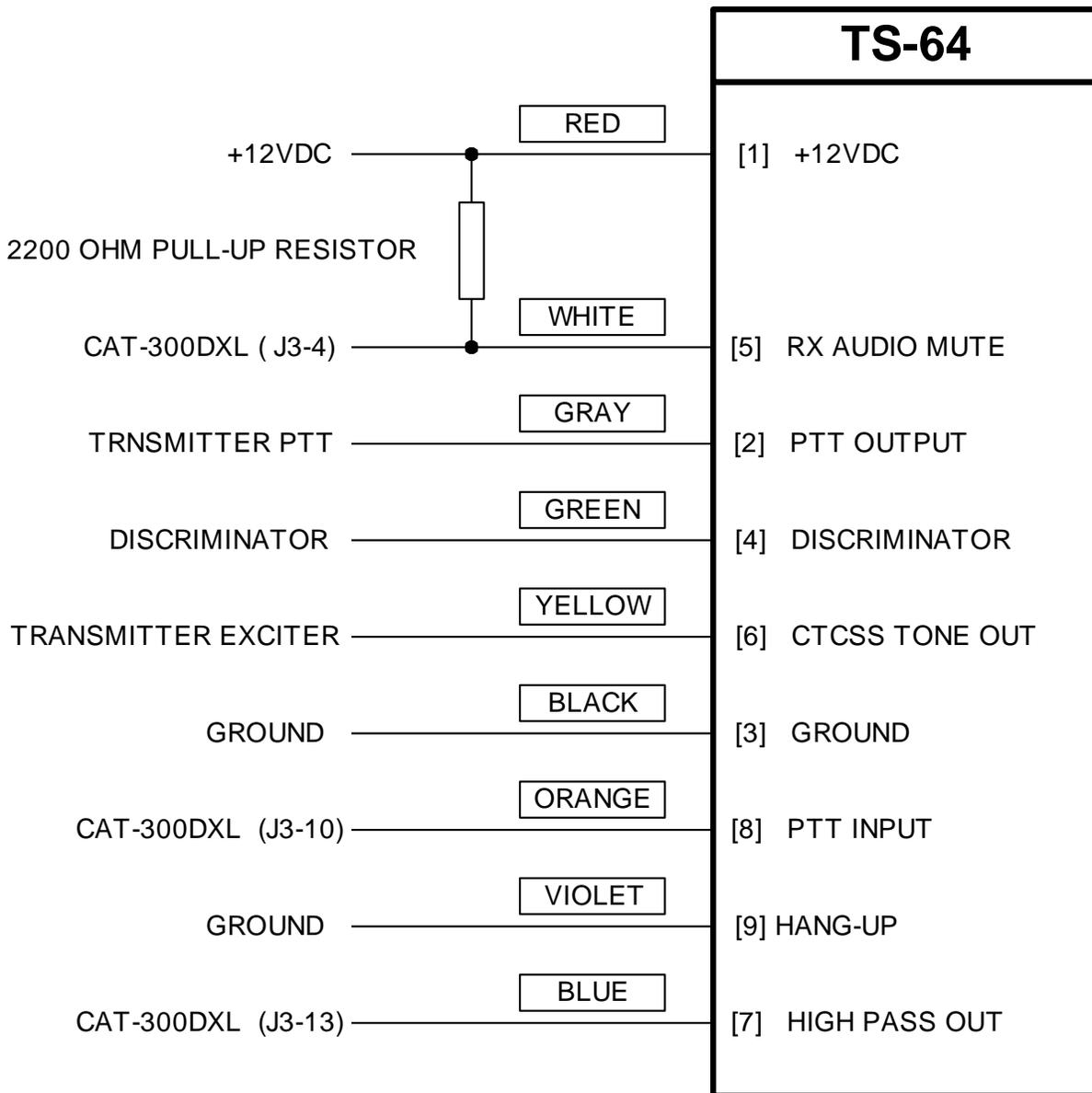
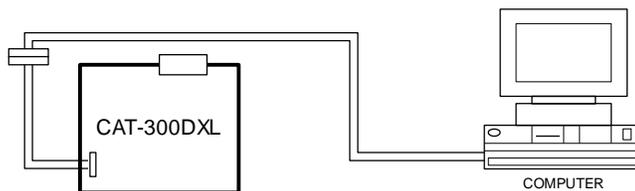


Figure 6-6

## Chapter 7 - RS-232 Computer Interface

This chapter describes how to communicate with the CAT-300DXL through the RS-232 computer interface. The rate is fixed at [4800] baud with [8] bits, no parity and [1] stop bit.



Typically, the CAT-300DXL Windows Editor is used to compose a CAT-300DXL data file, and the COMM32 program is used to upload the data file to the CAT-300DXL.

### CAT-300DXL COMM32 Program

The COMM32 communications program is used to communicate with the CAT-300DXL controller via the RS-232 interface. Communications can be directly to the computer as in the figure above. Or communication may be through a telephone modem via a "null modem" connection. (Consult user supplied modem instructions for telephone modem operation.)

COMM32 entries must be in lower case. In the examples the carriage return is displayed as (C/R). The following commands are used to communicate with the CAT-300DXL.

COMMAND	DEFINITION
u	Xmodem file UPLOAD to send to CAT-300DXL memory.
d	Xmodem file DOWNLOAD to save CAT-300DXL memory to disk.
q	QUIT the computer terminal mode.

Fabricate the cable described in Figure 6-3A of this manual. Use the cable to connect the computer's serial port to the J7 header on the CAT-300DXL controller. Start the [COMM32] communications program. Click on "Configuration" and "Comm Setup." Select the Port, 4800 baud, Parity NONE, Data Bits 8, and Stop Bits 1. Click OK. Select Program Setup and then select CAT-300DXL communications. Click OK.

To activate the RS-232 port, Key-up, and enter the control operator code followed by [97]. The CAT-300DXL will send: **CAT-300DXL Data Transfer, D=Download... U=Upload... Q=Quit. Select>**

These commands are used to transfer the contents of the CAT-300DXL memory between the controller and computer, where it can be stored on disk as a back-up file or used with the editor program.

### Data Transfer Download

To **DOWNLOAD** the memory and save it to disk, Type: **d (C/R)**. The CAT-300DXL will send: **Select Xmodem download protocol.** Place the arrow on the download button and click the left mouse button. Name the file to be down loaded and click OK. Once the download sequence starts, monitor the download window display until the download is complete.

### Data Transfer Upload

To **UPLOAD** the memory from disk, Type: **u (C/R)**. The CAT-300DXL will send: **Select Xmodem upload protocol.** Place the arrow on the upload button and click the left mouse button. Select the file to be uploaded and click OK. Once the upload sequence starts, monitor the upload window display until the upload is complete.

### Exit Terminal Routine

To quit the terminal mode, Type: **q (C/R)**. The sign-off message will appear.

### **CAT-300DXL Windows Editor**

The CAT Windows Editor offers a monumental break through in repeater controller programming. There are No endless strings of DTMF tones to enter or confusing script files to write. The program is completely mouse driven; you just point and click.

### **Print Driver**

The CAT-300DXL Windows Editor Program includes a print driver to produce a printout of the data in the controller's memory. Use the printed material to prepare manuals for the system control operators. From the print driver window, select from the following print command boxes: [Repeater Codes], [Repeater Timers], [Voice Messages], [Control Zones], [Memory Saves 1-4], [Macros], [Scheduler], [Courtesy Tones], [CW Message].

### **Computer Serial Port Configuration**

Use the COMM32 program, included on the editor disks, to communicate with the CAT-300DXL. If necessary, click on the configuration button to configure the serial port for 4800 baud, 8 data bits, N parity, and 1 stop bit. The data file name must include the file extension **.3XL**. A typical valid file name would be **W4XYZ.3XL** or **01MAR95.3XL**. The example that follows, describes how to communicate with the CAT-300DXL using the COMM32 program.

### **Activation Of The Computer Interface**

In addition to programming a new unlock number, dip-switch 8 is used to activate the computer interface. Turn the DC power off. Set dipswitch 8 to ON and turn the DC power on. After the power up message is complete, the CAT-300DXL will switch to the computer interface mode.

### **Remote Activation Of The Computer Interface**

Key-up and enter the control operator prefix code followed by **[97]**. Un-key, and the CAT-300DXL will automatically switch to the computer interface mode. When the computer interface activates the computer will display:

### **Please press (ENTER) to begin.**

Press the ENTER key and the computer will display:

### **CAT-300 Data Transfer. D=Download...U=Upload...Q=Quit. Select >**

To **DOWNLOAD** the memory and save it to disk, Type: **d (ENTER)**. The CAT-300DXL will send the memory using Xmodem protocol. Select the download transfer function on your computer by clicking on the DOWNLOAD button. Once the download sequence starts, monitor the activity display of packets transferred until the download is complete.

To **UPLOAD** the memory file from the computer to the CAT-300DXL, Type: **u (ENTER)**. The CAT-300DXL will receive the memory file using Xmodem protocol. Select the upload transfer function on your computer by clicking on the UPLOAD button. Once the upload sequence starts, monitor the activity display of packets transferred, until the upload is complete.

To **QUIT** the computer interface type: **q**

To **EXIT** the COMM32 program click on File Exit Program.

### **Using the CAT-300DXL Windows Editor**

#### **Voice Messages**

From the voice message display window, place the hand-icon on the message cell and double click (see figure 7-2). The voice synthesizer editor dialogue-box window will appear (see figure 7-3). Click on "Clear" to start a new message. Double click the letters, words and numbers in the voice word table to compose the message. Click "OK" when finished.

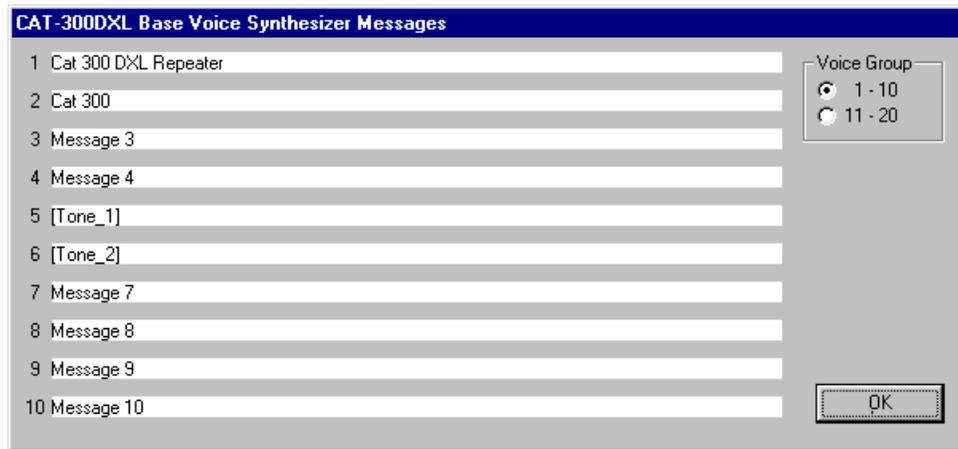


Figure 7-2

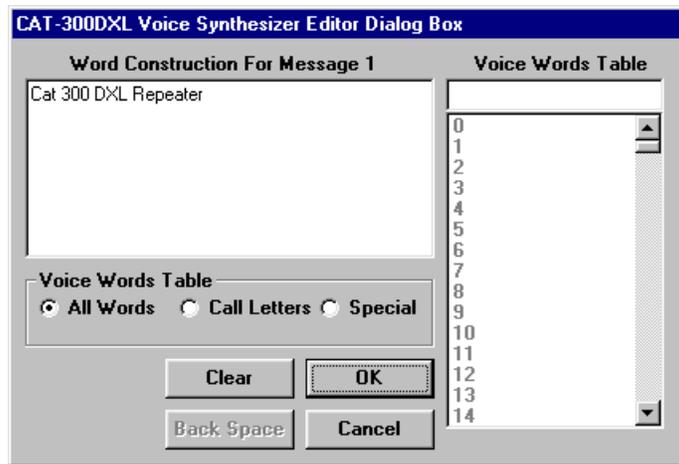


Figure 7-3

**Print Driver**

The CAT-300DXL Windows Editor Program includes a print driver to produce a hardcopy printout of the data in the controller's memory. Use the printed material to prepare manuals for the system control operators. From the print driver window, select from the following print command boxes:

Repeater Codes	Repeater Timers	Voice Messages	Control Zones
Memory Saves 1-4	Macros	Scheduler	Speed Dials
Courtesy Tones	CW Messages	Telephone Prefix	Area Codes

**User Speed Dial**

To program a speed dial window, place the hand icon on the telephone number cell and double click. The keypad window will appear. Use the keypad to enter the telephone number and click OK. Place the hand on the identification cell and double click. The voice synthesizer editor box window will appear. Double click the letters, words, and numbers in the voice word table.

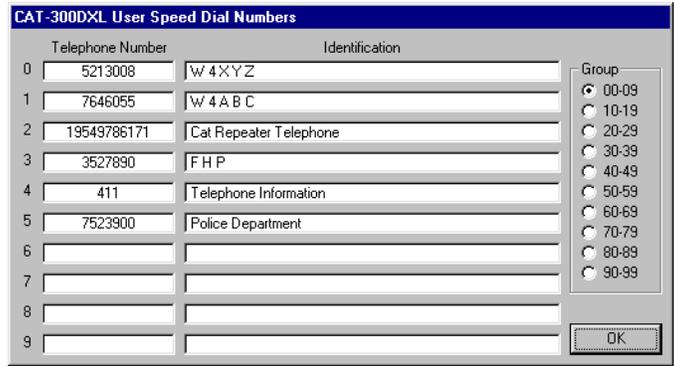


Figure 7-4

**Emergency Speed Dial**

To program an emergency speed dial location, use the emergency speed dial window. Programming is the same as for the user speed dial.



Figure 7-5



Figure 7-6

**Control Zones**

From the zone window, place the arrow on the ZONE TAB of interest and click. The selected zone card will move to the front of the window, and the enabled channels in that zone will appear with a check mark in the boxes. To change the status of a control channel in the zone, place the arrow in the desired box and click.

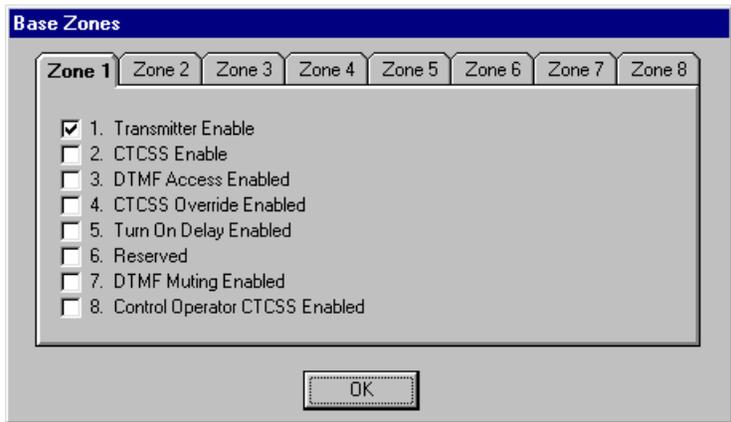


Figure 7-7

**Scheduler**

From the scheduler window, place the hand icon on the TIME cell and double click. The SCHEDULER POSITION window will appear. Place the hand on the COMMAND cell and double click. The KEYPAD window will appear. Use the keypad to enter the COMMAND and click OK. Place the hand on the SCHEDULED TIME cell and double click. Use the keypad to enter the time and click OK.

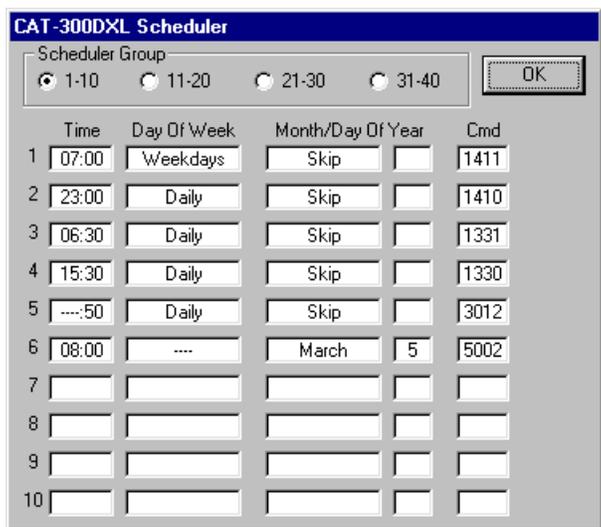


Figure 7-8

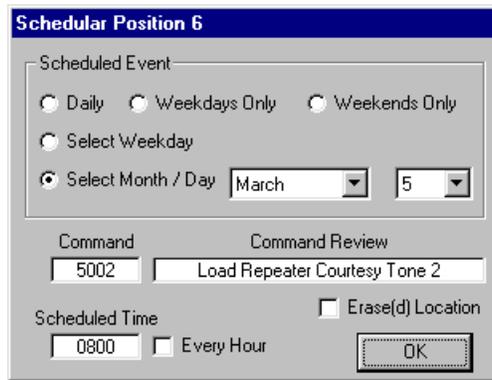


Figure 7-9

**Control Codes**

From the repeater code window, place the hand icon on the CONTROL OPERATOR PREFIX cell and double click. The KEYPAD window will appear. Use the keypad to enter a new control operator prefix code and click OK.

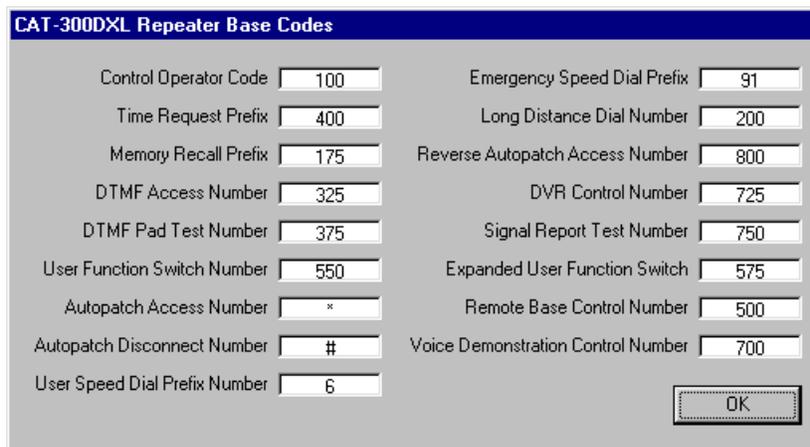


Figure 7-10



Figure 7-11

## Chapter 8 - Theory of Operation

### Microprocessor

The 80C535 microprocessor is the heart of the CAT-300DXL. This microprocessor receives instructions from the control operator or repeater user through the DTMF receiver, monitors the time from the on-board digital clock, and produces responses in accordance to the software program stored in the 27C010 PROM.

### PROM

The 27C010 is a UV erasable 1024K PROM. U15 contains the program used to control the operation of the CAT-300DXL and the data used by the voice synthesizer for word construction.

### SRAM With Real Time Clock

The DS1643Y is a static nonvolatile 64K RAM with a built-in clock. This memory/real-time-clock has a self-contained lithium energy source. In addition, the DS1643Y contains on-chip control circuitry that constantly monitors the power supply for an out-of-tolerance condition. When such a condition occurs, the lithium energy source is automatically switched on, and write protection is enabled to prevent loss of data. In the absence of power, data and time will be maintained for ten years. Clock accuracy is  $\pm$  one minute per month at an ambient temperature of +25 degrees centigrade.

### DTMF Transceiver

The MT-8888 Dual Tone Multi-Frequency (DTMF) transceiver U18 decodes all 16 DTMF tones. The MT-8888 outputs a 4-bit hexadecimal code to the microprocessor bus. This transceiver also generates the DTMF tones to dial numbers during an autopatch. A 3.58 MHz color burst crystal determines tone accuracy.

### Voice Synthesizer

The TSP53C30 operates as a slave to the system microprocessor. It includes a 10 pole linear predictive filter, an 8K ROM, and a 8-bit microprocessor. Speech data stored in the external 1024 PROM is transferred to the TSP53C30 via the data bus.

## Chapter 9 - Voice Vocabulary

Zero	000	At	239	Degree	318
One	001	Attempt	240	Delay	319
Two	002	Attention	241	Delta	320
Three	003	August	242	Department	321
Four	004	Automatic	243	Direction	322
Five	005	Autopatch	244	Do	323
Six	006	Auxiliary	245	Down	324
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As	236	Days	315	Half	442
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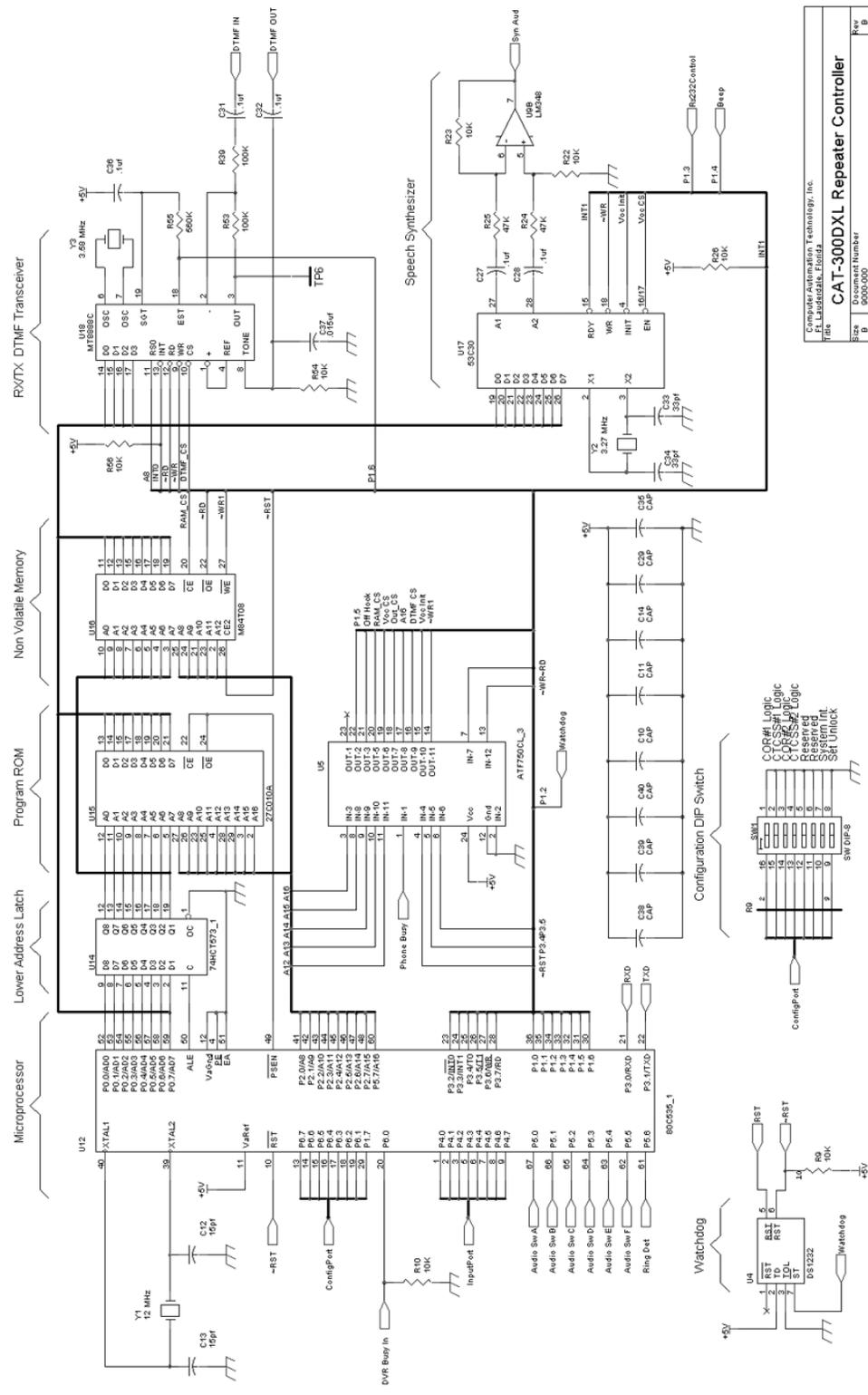
Have	445	Machine	581	Out	664
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Set	782	Use(verb)	877	Good Afternoon	981
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## Chapter 11 - Schematics

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11-3	Controller Board (CAT-300DXL)	Sheet 2 of 3
11-4	Controller Board (CAT-300DXL)	Sheet 3 of 3

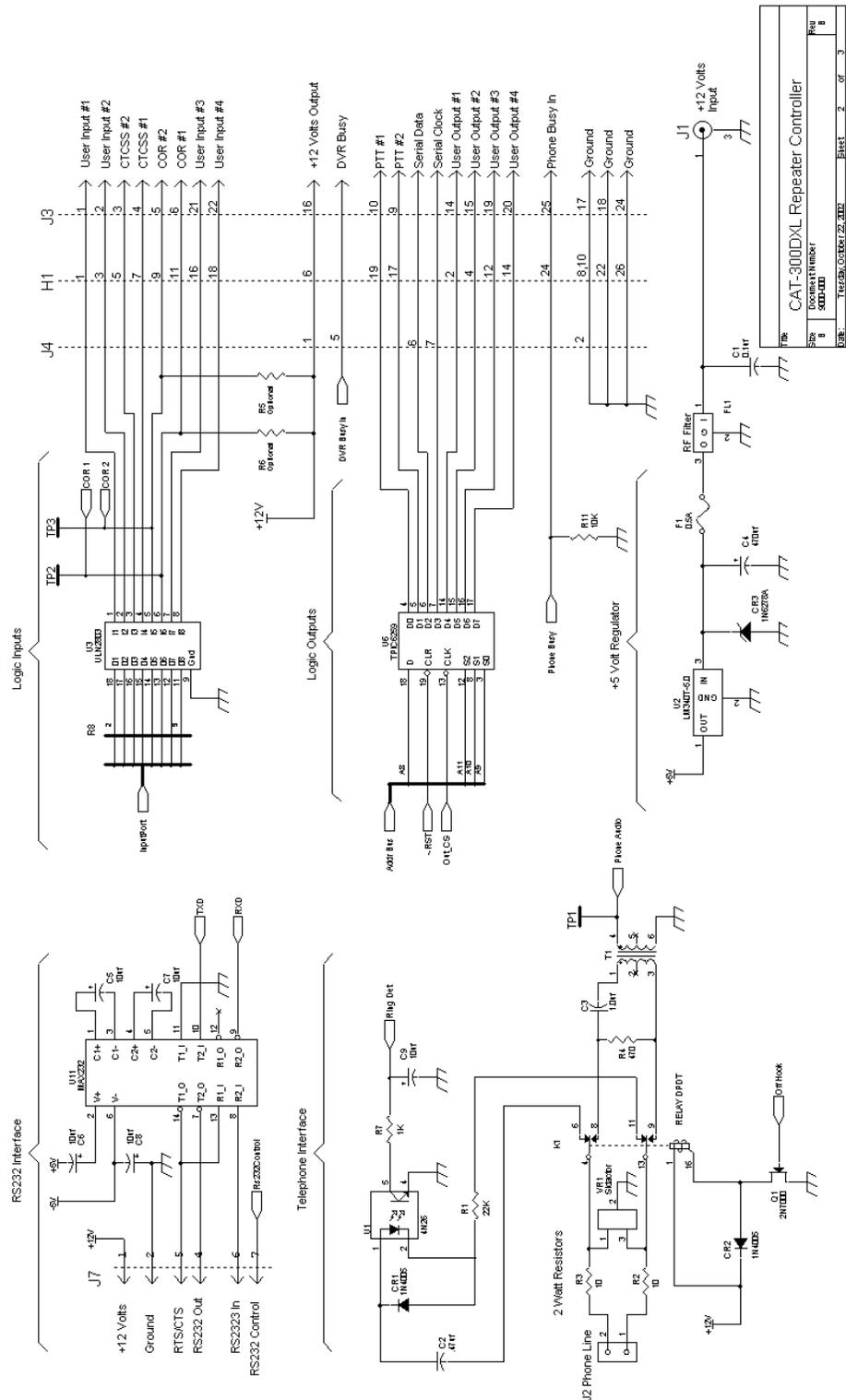


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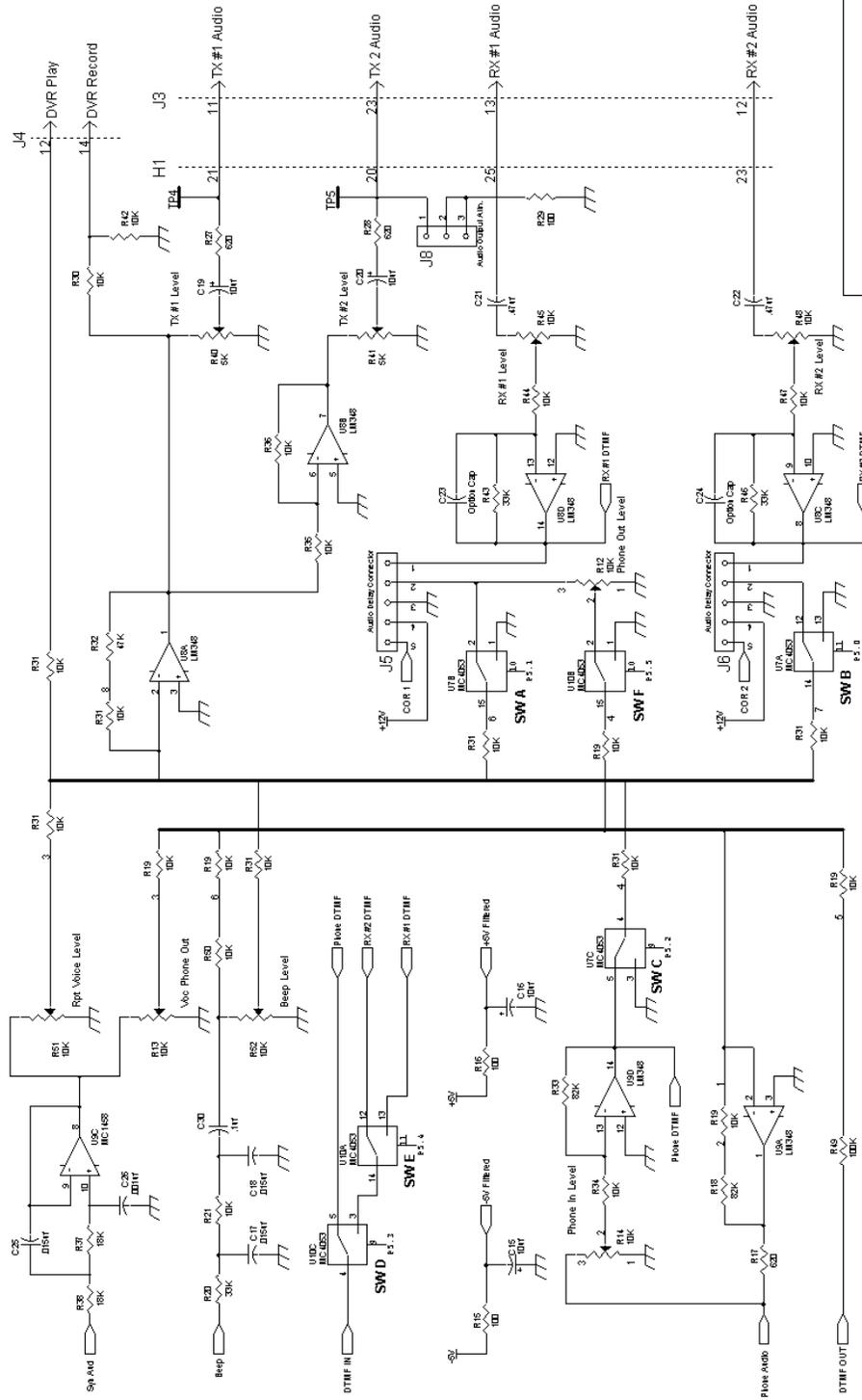
**CAT-300DXL Repeater Controller**

Rev	00000000	Rev	B
Part Number		Part Number	
File		File	

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File	CAT-300DXL Repeater Controller		
Proj	300DXL		
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Rev	CAT-300DXL Repeater Controller		
Size	Sheet Number	3	of 3
Rev	500-000		
URL	Tel: 508.338.22.200 Fax: 508.338.22.200		

## Chapter 12 - Parts List

### CAT-300DXL Controller

2	Capacitor	15pF 100VDC	C12,C13
2	Capacitor	33pF 100VDC	C33,C34
1	Capacitor	.001uF 50VDC	C26
4	Capacitor	.015uF 50VDC	C17,C18,C25,C37
0	Capacitor	User Select	C23,C24
15	Capacitor	0.1uF 50VDC	C1,C10,C11,C14,C27,C28,C29,C30, C31,C32,C35,C36,C38,C39,C40
2	Capacitor	0.47uF 50V	C21,C22
1	Capacitor	0.47uF 250V	C2
1	Capacitor	1.0uF 50VDC	C3
9	Capacitor	10uF 16VDC	C5,C6,C7,C8,C9,C15,C16,C19,C20
1	Capacitor	470uF 25VDC	C4
1	Connector	Phone Jack	J2
1	Connector	DC Power 2.5mm	J1
1	Connector	"D" 25pin Female	J3
1	Connector	Header 2X7	J4
1	Connector	Header 2X5	J7
1	Connector	Header 2X13	H1
1	Connector	Header 1X3	J8
2	Connector	Header 1X5	J5,J6
1	Crystal	3.58 MHz	Y3
1	Crystal	12.0 MHz	Y1
1	Crystal	3.27 MHz	Y2
2	Diode	1N4005	CR1,CR2
1	Filter	Low Pass	FL1
1	Fuse	0.5A	F1
1	I.C.	4N26	U1
1	I.C.	ULN2804A	U3
2	I.C.	LM348	U8,U9
2	I.C.	MC4053	U7,U10
1	I.C.	LM340T-5	U2
1	I.C.	MT8888	U18
1	I.C.	ATF750CL-15PC	U5
1	I.C.	TPIC6259N	U6
1	I.C.	DS1232	U4
1	I.C.	SAB80C535N	U12
1	I.C.	74HCT573	U14
1	I.C.	M27C1001-10B1	U15
1	I.C.	M84T08-100PC1	U16
1	I.C.	TSP53C30	U17
1	I.C.	MAX232	U11
1	Relay	DPDT 12V	K1

2	Resistor	10 2W	R2,R3
2	Resistor	22K 0.25W	R1
1	Resistor	470 0.5W	R4
3	Resistor	620 0.25W	R17,R27,R28
1	Resistor	1000 0.25W	R7
3	Resistor	100K 0.25W	R39,R49,R53
1	Resistor	560K 0.25W	R55
3	Resistor	33K 0.25W	R20,R43,R46
16	Resistor	10K 0.25W	R10,R11,R21,R22,R23,R26,R30, R34,R35,R36,R42,R44,R47,R50, R54,R56
3	Resistor	47K 0.25W	R24,R25,R32
2	Resistor	82K 0.25W	R18,R33
2	Resistor	18K 0.25W	R37,R38
3	Resistor	100 0.25W	R15,R16,R29
7	Resistor	10K Variable	R12,R13,R14,R45,R48,R51,R52
2	Resistor	5K Variable	R40,R41
2	Resistor	10K 10 PIN Network	R8,R9
1	Resistor	10K 8 PIN Network	R31
1	Resistor	10K 6 PIN Network	R19
1	Sidactor	P2353AB	VR1
1	Switch	8 Position (DIP)	S1
1	Transformer	600:600 ohm CT	T1
1	Transistor	2N7000	Q1
1	Transorb	1N6278A	CR3
6	Test Point		TP1,TP2,TP3,TP4,TP5,TP6