CAT-1000
Repeater Controller

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REVISED: 09/15/00

Program: (V3.04A) - (V4.01A
Voice:(V1.02) - (V2.00)

Foreword

For your convenience, this manual is divided into seventeen chapters. A brief description of each chapter and its contents are listed below.

Chapter 1 - This chapter describes some of the CAT-1000 features. Also included are the technical specifications.

Chapter 2 - This chapter describes the various configurations for the CAT-1000, dip-switch settings and modes of operation.

Chapter 3 - This chapter describes how to control the CAT-1000. The control operator prefix code [100] must precede each control command. **Do not unlock the CAT-1000 when changing control channels.**

Chapter 4 - This chapter describes how to use the features of the CAT-1000. These are considered repeater user commands.

Chapter 5 - This chapter describes how to program the CAT-1000 with DTMF tones. **During programming the CAT-1000 must be un-locked.** Key-up and enter [1234567].

Chapter 6 - This chapter describes how to program the CAT-1000 through the 300 baud modem or the local RS-232 computer port.

Chapter 7 - This chapter describes how to interface the CAT-1000 to a RF package and how to adjust the audio levels.

Chapter 8 - This chapter describes the MF-1000 Serial Interface card and how it is used to control a link transceiver or the Ming digital voice recorder.

Chapter 9 - This chapter describes the computer interface and how to control and operate the TS-440 and FT-767GX low band transceivers.

Chapter 10 - This chapter describes the Peet Brothers Ultimeter ® 100, 800 or 2000 weather station and how it interfaces to the CAT-1000.

Chapter 11 - This chapter contains a list of the vocabulary words used to program the voice synthesizer.

Chapter 12 - This chapter contains PC board layouts for part location on both the CAT-1000 and MF-1000 boards.

Chapter 13 - This chapter contains the schematics diagrams (4) sheets for the CAT-1000 and (1) sheet for the MF-1000.

Chapter 14 - This chapter contains part lists for the CAT-1000 and MF-1000 printed circuit boards.

Chapter 15 - This chapter contains a table of Programming commands.

Chapter 16 - This chapter describes how to connect the CAT-1000 through the MF-1000 Serial Interface card to a Kenwood transceiver.

Chapter 17 - This chapter describes how to connect the CAT-1000 through the Doug Hall RBI-1 Interface unit to a Kenwood transceiver.

Chapter 18 - This chapter describes how to connect three transceivers to the remote base input of the CAT-1000 using the optional RLS-1000 Remote Link Switch.

Chapter 19 - This chapter describes how to interface the WX-1000 weather receiver to the CAT-1000.

Chapter 20 - This chapter describes how to connect and set-up the DL-1000B Audio Delay to the CAT-1000.

Chapter 21 - This chapter describes how to connect and set-up the DR-1000 Digital Voice Recorder to the CAT-1000.

I Don't Have Time To Read This Manual

If you are anxious to get the CAT-1000 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-1000 and verify its operation. Now fire-up your soldering iron and lets get started.

1. Open the connector kit, remove the 2.5mm power plug and the 25 pin "D" male 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.

2. Solder five wires to the 25 pin "D" male connector. Connect wires to pins 6, 10, 11, 13 and 25.

3. Connect the pin 10 wire to the transmitter's PTT, the pin 11 wire to the transmitter's modulation input and pin 25 to receiver/transmitter chassis ground.

4. Turn the +12VDC power supply ON, the repeater should transmit and you should hear the voice synthesizer say: "CAT1000 VERSION 3.04 AND 1.02." Adjust R23 TX1 control for proper transmitter deviation. Cycle the power supply and adjust R44 until the voice synthesizer is at the desired level.

5. Turn the +12VDC power supply OFF. Connect pin 6 wire to the receiver's COR or COS output. Connect pin 13 wire to the receiver's RECEIVE audio output.

6. Turn the +12VDC power supply ON. Monitor TP1 with a DC voltmeter. Open and close the repeater's squelch control while observing the voltage on TP1. If TP1 goes from LOW to HIGH dip-switch #1 should be left in the OFF position. If TP1 goes from HIGH to LOW set dip-switch #1 to ON. If TP1 stays LOW, turn the power supply OFF and add a 2200 ohm pull-up resistor on the CAT-1000 at the R74 pull-up resistor position. Note: LOW is any voltage less than 0.8VDC. HIGH is any voltage between 3VDC and 15VDC.

7. Turn the +12VDC power supply ON. Connect an AC voltmeter to TP8. Using a typical transceiver, key-up and send a DTMF tone. Adjust R28 RX1 control for 200mV as indicated on the AC voltmeter. If this causes the repeater to over deviate, readjust R23 TX1. Make sure that RF from the transceiver does not give a false voltmeter indication.

8. Compare the receive and synthesized voice audio and adjust the VOICE Level (R44) as desired. For best quality speech, the synthesized voice should not exceed 3KHz deviation and always be lower than the receive audio.

9. Compare the receive and CW ID audio and adjust the CW LEVEL (R21) 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. Compare the receive and COURTESY TONE audio and adjust the COURTESY BEEP LEVEL (R29) as desired. For best results the COURTESY TONE should not exceed 1.5KHz deviation.

11. 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 number. During the autopatch, adjust the PHONE LEVEL IN (R41) 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 LEVEL (R13) for the desired level of receive audio into the telephone line. Key-up and enter the [#] to disconnect the autopatch.

12. Key-up and enter the seven digit unlock number [1234567]. The voice will say: "CAT-1000 CONTROL."

13. Key-up and send [*3101], followed by the three digit numbers that represents your call letters for voice ID #1. Refer to Chapter 11, Voice Vocabulary Word List. Example: Load Repeater ID #1 with "W4XYZ Repeater"

```
Message NumberÄÄ¿   W   4   X   Y   Z   ÚÄÄRepeater
ProgrammingÄÄ¿  ³   ³   ³   ³   ³   ³   ³
  Command   *31 01 890 004 920 930 950 746
```

14. Key-up and send [*3102], followed by the three digit numbers that represents your call letters for voice ID #2.

15. Key-up and send [*341], followed by the two digit numbers that represents your call letters for CW ID #1. Refer to the CW ID programming table. Example: Load the CW ID memory buffer with W4XYZ/R.

```
ProgrammingÄÄ¿       W  4  X  Y  Z  /  R
  Command   ³        ³  ³  ³  ³  ³  ³  ³
           *341 8 2 32 04 33 34 35 36 27
```

16. Key-up and send [*342], followed by the two digit numbers that represents your call letters for CW ID #2.

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ÉÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ»
º                    CW ID PROGRAMMING TABLE                       º
ÇÄÄÄÄÂÄÄÄÄÂÄÄÄÄÂÄÄÄÄÂÄÄÄÄÂÄÄÄÄÂÄÄÄÄÂÄÄÄÄÂÄÄÄÄÂÄÄÄÄÂÄÄÄÄÂÄÄÄÄÂÄÄÄÄ¶
º00=0³03=3³06=6³09=9³12=C³15=F³18=I³21=L³24=O³27=R³30=U³33=X³36=/º
º01=1³04=4³07=7³10=A³13=D³16=G³19=J³22=M³25-P³28=S³31=V³34=Y³    º
º02=2³05=5³08=8³11=B³14=E³17=H³20=K³23=N³26=Q³29=T³32=W³35=Z³    º
ÈÍÍÍÍÏÍÍÍÍÍÏÍÍÍÍÏÍÍÍÍÏÍÍÍÍÏÍÍÍÍÏÍÍÍÍÏÍÍÍÍÏÍÍÍÍÏÍÍÍÍÏÍÍÍÍÏÍÍÍÍÏÍÍÍÍ¼
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17. 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.

18. 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.

```
                           ÚÄÄÄÄÄÄÄÄÄÄ Day of Week (1-7)
Minutes (00-59)ÄÄÄÄÄÄÄÄÄÄÄ¿  ³  ÚÄÄÄÄÄÄ Day of Month (01-31)
  Hours (00-23)ÄÄÄÄÄÄÄÄ¿  ³  ³  ³  ÚÄÄÄ Month of Year (01-12)
                    *21 14 55 2  25 01
```

19. Key-up and send [*0]. Un-key, the controller will lock-up and the voice will say: "MANUAL EXIT." The CAT-1000 will lock-up automatically when the programming timer expires. The voice will say: "TIMER EXIT."

20. Program a new seven digit UNLOCK code. Set dip-switch #8 to ON and 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 rejected, the voice will say: "ENTER CONTROL." Key-up and enter the seven digit number again. Set dip-switch #8 to the OFF position.

21. DTMF muting is a feature that prevents your DTMF tones from being transmitted. To enable this feature, key-up and enter [100171]. The voice will say: "ONE SEVEN ON."

22. To test your DTMF key-pad, key-up and enter [3751234567890*#ABC]. The voice will read back all the numbers that were decoded.

23. To check the time, key-up and enter [400].

Chapter 1 - Introduction and Specifications

Congratulations on your purchase of the CAT-1000 Repeater Controller. The CAT-1000 is packed with features normally reserved for controllers costing thousands of dollars more. Built on the foundation of the very successful CAT-500, this controller incorporates the features suggested by customers like you.

Programming the CAT-1000 is a snap. It is carefully structured with uniform programming commands throughout. The manual is easy to follow with numerous examples. The voice synthesizer interact with during each control and programming operation. Some of these features are described in the following text.

Scheduler

An advanced 60 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-1000 will do the rest.

Voice Synthesizer

A vocabulary base of 475 words carefully selected for amateur repeater operation are 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.

CW ID

The controller has both "at rest" and "active" CW IDs and will switch to CW when a repeater user talks over the voice ID. When both voice IDs are disabled, the controller will ID in CW only. You program the speed and tone frequency.

Digital Voice Clock

The digital voice clock will announce the time 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 three hundred speed dial number highlights the CAT-1000. Each speed dial location accepts numbers of up to sixteen 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 mic key-click. Last number re-dial, 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 using a number counter and area code discriminator. A twenty position table is provided to store telephone numbers or whole prefixes to be locked-out.

Courtesy Tone

Memory space is provided for the storage of ten custom courtesy tones. Each tone can consist of up to three different tone frequencies of various lengths and separations. Separate courtesy tones denote repeater and remote base receiver activity.

Transceiver Control

The CAT-1000 will control a transceiver. With the optional MF-1000 serial card, the CAT-1000 will accept commands on the repeater input to serial tune your transceiver. You can also turn the transceiver ON or OFF or enable just the receiver to monitor activity on the transceiver frequency. After a preselected period of inactivity the transceiver will automatically disconnect. The CAT-1000 will suppress your repeater identification from being transmitted on the transceiver frequency.

User Function Switches

Eight user function 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.

Digital Voice Recorder

An optional DVR, controlled by the CAT-1000 can be added to your repeater. Control of the DVR is fully integrated into the CAT-1000 control and command structure. The CAT-1000 will permit you to substitute any of the sixteen DVR tracks in place of the messages normally generated by the voice synthesizer. In fact: you can even intermix DVR tracks with voice synthesizer messages. A signal report test is also included. Enter a DTMF command to record a seven second test message. Un-key and the test message will play-back. You instantly know how your signal sounds through the repeater.

DTMF Regenerator

The CAT-1000 will mimic your DTMF input. In sophisticated repeater systems it is often necessary to pass DTMF commands to distant repeaters within the linking system. The CAT-1000 will swallow your DTMF tones and regenerate the tones distortion and noise free as they were received. This will insure reliable control of your linking network.

DTMF Command Generator

Forty DTMF commands can be stored in the CAT-1000 memory. These commands can be sent manually by entering a prefix code or automatically by programming the scheduler.

Hardware Inputs

Eight hardware inputs activated by a positive voltage from other equipment at the repeater site, causes the CAT-1000 to execute any repeater command. External control, or information about the repeater site will be instantly available.

Repeater Control Prefix

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

DTMF Key-Pad Test

A DTMF key-pad test will read back the numbers decoded in a synthesized voice.

Macro

By entering a single macro number, the CAT-1000 will execute up to ten commands in a string. Memory space is provided for the storage of forty macro strings. One Macro can be used to call a second Macro. This feature permits the repeater owner to customize the control functions to suit his or her particular needs.

Active Memory Save

Configure the CAT-1000 to suite your special requirements. Active Memory Save permits you to store the current settings of the control channels, timers, codes and the first twelve voice messages. Memory space is provided for eight memory saves. These memory saves can be later recalled with a simple DTMF command.

LiTZ Emergency Alert

LiTZ is a new system promoted by the ARRL to provide a means for a repeater user to request emergency assistance without being familiar with the operation of the repeater. If a repeater user transmits a DTMF [0] for three seconds, the CAT-1000 will alert the repeater's control operators.

DTMF Access

This feature requires the user to enter a DTMF code, to activate the repeater. The voice will say: "OK UP" and the controller will respond to a carrier input. After a short period of inactivity, the DTMF code will again be required.

Repeater CTCSS Override

When CTCSS is enabled, a user without a CTCSS encoder can activate the repeater by entering the DTMF Access code. The voice will say: "OK UP" and the controller will respond to a carrier input. After a short period of inactivity, the DTMF code will again be required.

Monitor Repeater By Telephone

A control operator can monitor repeater activity through the telephone, join a QSO in progress or conduct intermodulation and desensitivity testing.

Any signal received by the repeater will be heard in the phone and the control operator can turn the transmitter on and off. If a user attempts an autopatch while the repeater is in the monitor mode, the voice will say: "TELEPHONE LINE IN SERVICE". The controller will suspend link operations when the monitor repeater by telephone feature is activated.

HF Remote Base Interface

The CAT-1000 offers a serial port to control a HF transceivers through its computer interface. By entering DTMF commands on the repeater input, the CAT-1000 will generate the required ASCII commands to control the transceiver. Since this serial port is bidirectional it is possible to interrogate the transceiver and receive information concerning the frequency and status. The CAT-1000 acts like a computer providing full control. The CAT-1000 will use its voice to announce the status of the various transceiver functions.

The CAT-1000 receives and sends serial information in both RS-232 and TTL format. The TTL format is available in both inverted and non-inverted outputs. This eliminates the need to purchase an expensive RS-232 to TTL converter card from the transceiver's manufacture.

Specifications

Microprocessor	80C188EB-13
Memory	EPROM 128K X 8 - RAM 32K 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 Receiver	Mitel MT8870 (2)

Operating Temperature	-15 to +55 degrees C
Call Letter ID	Buffer size VOICE (31)(31) - CW (64)(32)
Control Codes	(25) Buffer size (7)
Timers	(19) Short (0.1 to 9.9) - Long (1.0 to 1799) seconds
Scheduler	(60) Commands (one minute resolution)
Macro	(40) Ten Function
Memory Saves	(8) Zone Control Channels, Timers, Codes, First Twelve Voice Messages
Speed Dial (User)	(300) Sixteen Digit Entry - Eleven Position ID
Speed Dial (Emergency)	(10) Sixteen Digit Entry - Eleven Position ID
Voice Synthesizer	Messages (40) Maximum Word Length (31)
Digital Voice Recorder	Tracks (16) Maximum Record Time (2 minutes)
Paging Tones	(20) Two-Tone, One Second - Three Second
User Function Outputs	(8) Switch 40VDC @ 60mA.
Hardware Inputs	(8) 10K ohm input impedance
Audio Input	Receiver 0.2 - 2VAC adjustable 10K ohms
Audio Output	Transmitter 2VAC adjustable 600 ohms
Logic Inputs	Low (0 to 0.8VDC) High (2.4 to 15VDC)
Logic Outputs	Open Collector Relay Driver (60VDC at 80 mA)
Power	9 to 12VDC at 150 mA
Size	7.0" X 10.5"
Warranty	Limited one year, parts and labor.

FCC Part 68 Equipment Registration

Should the CAT-1000 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-300 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-1000 controller to party lines or to be used in conjunction with coin telephone service.

The CAT-1000 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 connect to the same line will be encountered.

Telephone company notification prior to connection of the CAT-1000 controller is no longer required. However, if requested by the telephone company you must provide the registration number: (4H1USA-21626-KX-E), ringer equivalency number: (REN 0.4B) and the line to which the CAT-1000 controller is connected.

In the event the CAT-1000 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-1000 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 Fixed Frequency Transceiver

In this configuration the CAT-1000 supports a repeater with a CTCSS decoder and a transceiver on a fixed frequency, second repeater or control receiver. Also shown is the DVR-1000 Digital Voice Recorder with eight expanded user function switches. Modular jack J3 connects to the telephone line. A positive voltage applied to the phone Busy #1 input will disable autopatch activity, when a shared telephone line is off hook.

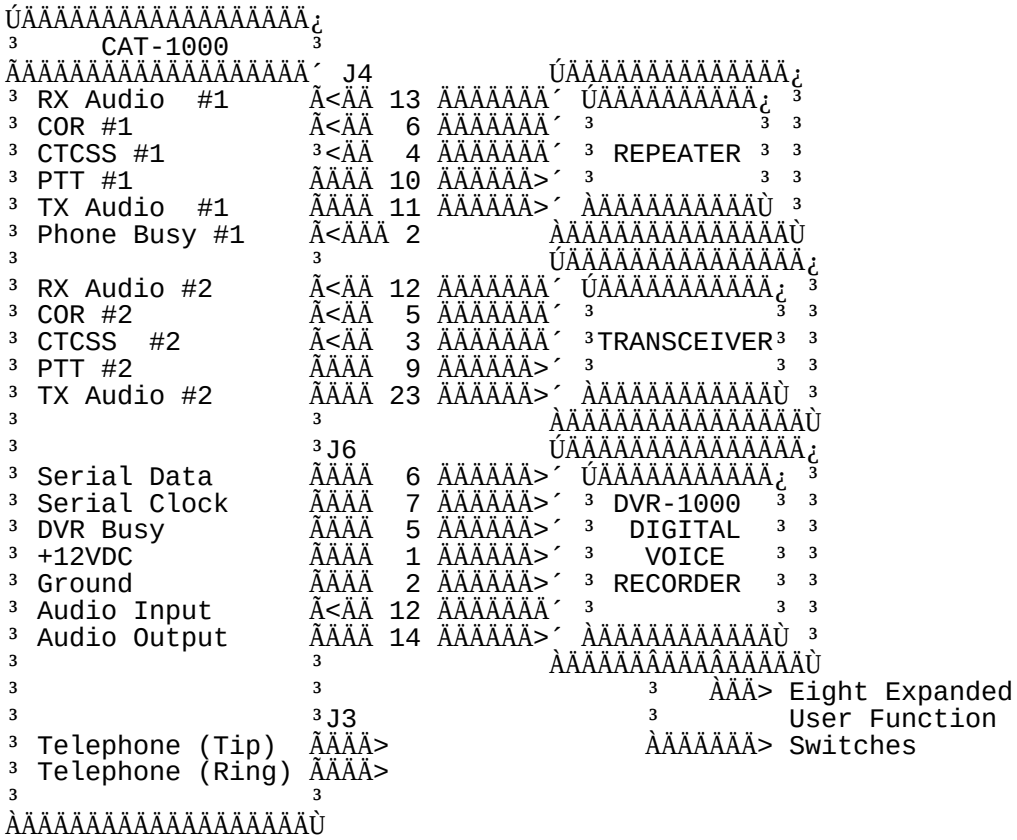


Figure 2-1

Link Transceiver Mode

In the link transceiver mode, the CAT-1000 is optimized to operate in a backbone linking system. When Zone 6 channels 1 and 2 are enabled, the CAT-1000 will only accept the Link Connect [5001] and Link Disconnect [5000] commands from the link side. However, a control bridge can be established using the bridging command. When this command is entered, the voice will say: "CONTROL UP." The CAT-1000 will now accept control and programming commands through the link receiver. When the control bridge is turned OFF the voice will say: "CONTROL DOWN," and the bridging path will be broken. To connect the bridge, enter [15011]. To disconnect the bridge, enter [15010]. The [150] bridge prefix can be changed by using the [*502*] programming command.

Control Receiver Mode

In the control receiver mode, the CAT-1000 will accept a full compliment of control, programming, and user commands on both the repeater and control receiver inputs. Commands entered via the control receiver will not produce a PTT #1. When the voice responds to the commands, PTT #1 will activate. Dip-switches #3, #4 and #5 must be OFF when a control receiver is connected to RF interface #2.

Remote Base Transceiver Mode

In the remote base mode, the CAT-1000 is optimized to operate a transceiver as a remote base controlled through the repeater input. If full control of the repeater is desired through the remote base receiver, the control bridge must be turned on from the repeater side. Use the same control bridge command described in the link transceiver mode section. When a MF-1000 Serial Interface card is connected to the CAT-1000 at J2 the CAT-1000 will support BCD or Push Button tuning of the remote base transceiver.

Repeater With Serial Tuned Transceiver

In this configuration the CAT-1000 supports a repeater and the Doug Hall RBI-1 Interface to control the Kenwood mobile transceivers. The RBI-1 converts the serial data from the CAT-1000 to the format require to control the Kenwood transceivers. All connections to the Kenwood transceivers are made through the microphone jack. In addition to frequency, offset, and CTCSS tone selection, transmitter power can be remotely controlled through the repeater input.

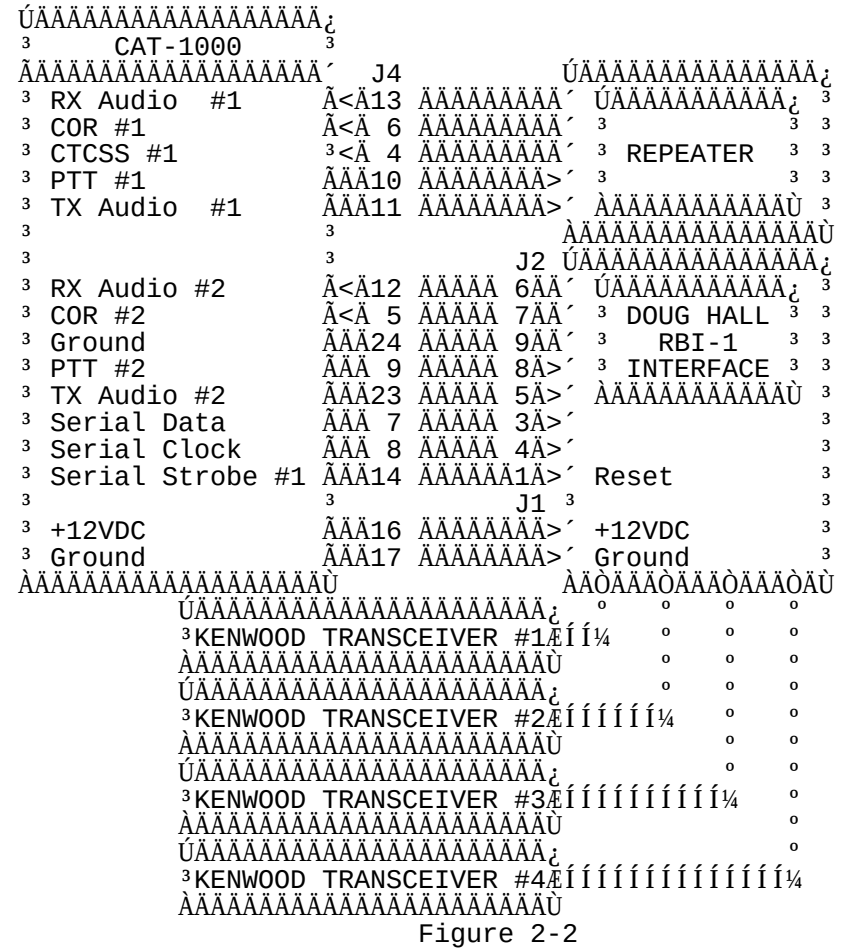


Figure 2-2

The Doug Hall RBI-1 Remote Base Interface supports the Kenwood transceivers listed in Figure 2-3. Not all transceivers are capable of remote control of CTCSS encoder frequency and transmitter power settings. Consult the Kenwood manual.

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

Figure 2-3

Dual Repeater Mode

In the dual repeater mode the CAT-1000 will support a second repeater connected the RF #2 port. PTT #2 will follow the activity of PTT #1. This means the second repeater PTT will remain ON during the squelch tail period. PTT #2 will also be ON when COR #2 is active. The CAT-1000 will support both repeaters in a cross band configuration. To control the second repeater use the Link Connect [5001] and Link Disconnect [5000] commands. If the two repeaters are separated, the second repeater must be switched to another controller.

Dip Switch

A eight position dip switch is used to configure the CAT-1000.

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 Transceiver COR input logic. This switch should be ON if the auxiliary receiver's COR is an active low and OFF if COR is active high.

Switch 3 - Switch 4 - Switch 5

These switches configure the second RF port. They also define the type of serial tuning when the CAT-1000 is set for remote base operation.

Mode	Tuning	Switch #3	Switch #4	Switch #5
Control Receiver	None	OFF	OFF	OFF
Dual Repeater	None	ON	OFF	OFF
Link (Backbone)	None	OFF	ON	OFF
Remote Base	BCD	OFF	OFF	ON
Remote Base	Push Button	ON	OFF	ON
Remote Base	Doug Hall	OFF	ON	ON
Reserved		ON	ON	ON

Figure 2-4

Switch 6

This switch is used to initialize the CAT-1000 when the Program PROM is changed during a software update. This will initialize and flush only the areas of memory affected by the software update. Set this switch to ON and cycle power. The voice will say: "ALTERNATE RESET DATA LOAD COMPLETED." Set switch 6 to the OFF position.

Switch 7

This switch is used to initialize the CAT-1000. 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." Set switch 7 to the OFF position.

Switch 8

This switch 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 OFF.

This switch is also used to activate the CAT-1000 computer interface. This permits programming of the CAT-1000 through the RS-232 serial port. Set dip-switch 8 to ON and apply power to the CAT-1000. After the power up message is complete, the CAT-1000 will automatically switch to the computer terminal programming mode. This RS-232 port is configured for a baud rate of 4800. A special cable must be fabricated, see figures 7-5 and 7-6.

DTMF Command Table

The following table describes the DTMF commands accepted by the CAT-1000 through the second RF port. A [Y] means the command will be accepted. A [N] means the command will not be accepted. Four sets of conditions can exist in the Link and
Remote Base modes. They are:

(1 = Link Off - Bridge Down)
(2 = Link On - Bridge Down)
(3 = Link Off - Bridge Up)
(4 = Link On - Bridge Up)
(5 = Link On - Macro Up)

DTMF Commands Entered Through RF #2 Interface	Control Receiver	Link Backbone 1-2-3-4-5	Remote Base 1-2-3-4-5	Dual Repeater
Programming	Y	N N Y Y N	N N - Y N	Y
Control	Y	N N Y Y N	N N - Y N	Y
Macro	Y	N N N N Y	N N - N Y	Y
Memory Recall	Y	N N N Y N	N N - Y N	Y
DTMF Generator	Y	N N N Y N	N N - Y N	Y
DTMF Access	Y	N N N Y N	N N - Y N	Y
DTMF Pad Test	Y	N N N Y N	N N - Y N	Y
Time of Day	Y	N N N Y N	N N - Y N	Y
Link Control	N	Y Y Y Y Y	Y Y - Y Y	Y
Bridge Command	N	Y Y Y Y Y	N Y - Y Y	N
Link Frequency Load	N	N N N N N	N N - N N	N
User Switch Control	Y	N N N Y N	N N - Y N	Y
Serial BD #1 Switch Control	Y	N N N Y N	N N - Y N	Y
Serial Bd #2 Switch Control	Y	N N N Y N	N N - Y N	Y
Autopatch	Y	N N N N N	N N - N N	Y
Speed Dial	Y	N N N N N	N N - N N	Y
Voice Message Select	Y	N N N Y N	N N - Y N	Y
DVR Track Select	Y	N N N Y N	N N - Y N	Y
Paging Tones	Y	N N N Y N	N N - Y N	Y
Reverse Autopatch	N	N N N N N	N N - N N	Y
HF Transceiver Control	N	N N N N N	N N - N N	N

Figure 2-5

Chapter 3 - Repeater Control

The CAT-1000 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, transceiver 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 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 will say: "ALL CLEAR."

Changing Repeater Control Status by Radio

To change the status of a 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

```
                          ÚÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ Zone     (1 through 8)
            PrefixÄÄÄÄ¿     ³   ÚÄÄÄÄÄÄÄÄÄÄ Channel  (1 through 8)
                      ³     ³   ³   ÚÄÄÄÄÄÄ Activity (0=OFF 1=ON 2=MOMENTARY*)
    Key-up and send: 100   3   5   1
```

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

* The momentary command is limited to Zone 8 channels only.

Changing Repeater Control Status By Telephone

Call the repeater by telephone. When the CAT-1000 answers a beep will be heard. Enter the control operator prefix code followed by a (#) pound. 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

1. Repeater Transmitter	Enable *
2. Repeater CTCSS	Enable
3. DTMF Access	Enable
4. Repeater CTCSS Override	Enable
5. Turn on Delay	Enable
6. DTMF Window	Enable
7. DTMF Muting	Enable
8. Control Operator CTCSS	Enable

Zone 2

1. Repeater Timeout Timer	Enable*
2. Squelch Tail	Enable*
3. Scheduler	Enable*
4. DTMF Pad Test	Enable*
5. LiTZ Emergency Alert	Enable*
6. Grandfather Clock Sleep	Enable
7. Courtesy Beep	Enable*
8. Talk Over Voice Synthesizer	Enable

Zone 3

1. Repeater ID #1 (At Rest)	Enable *
2. Repeater ID #2 (Active)	Enable *
3. Squelch Tail Message #1	Enable
4. Squelch Tail Message #2	Enable
5. Dropout Message #1	Enable
6. Dropout Message #2	Enable
7. Time of Day Request	Enable *
8. Grandfather Clock	Enable *

Zone 4

1. Autopatch	Enable*
2. Autopatch Timeout Timer	Enable*
3. Long Distance	Enable
4. Emergency 911	Enable*
5. Speed Dial	Enable*
6. Phone Number Read Back	Enable*
7. Autopatch Radio Mute	Enable
8. Autopatch Pre-Dial	Enable

Zone 5

1. Autopatch Pulse Dial	Enable
2. Reverse Autopatch	Enable *
3. Long Distance Dial (1)	Enable
4. Telephone Off Hook	Enable
5. Telephone Ring Announcer	Enable
6. Modem Auto Answer	Enable
7. DTMF Generator	Enable *
8. DTMF Regenerator	Enable

Zone 6

1. Transceiver Receive	Enable*
2. Transceiver Transmit	Enable*
3. Transceiver Repeat	Enable
4. Transceiver CTCSS	Enable
5. Transceiver Voice	Enable*
6. Transceiver Auto Disconnect	Enable
7. Computer Interface	Enable
8. Ring Detector	Enable*

Zone 7

1. Input #1	Enable *
2. Input #2	Enable *
3. Input #3	Enable *
4. Input #4	Enable *
5. Input #5	Enable *
6. Input #6	Enable *
7. Input #7	Enable *
8. Input #8	Enable *

Zone 8

1. Output #1	Enable*
2. Output #2	Enable*
3. Output #3	Enable*
4. Output #4	Enable*
5. Output #5	Enable*
6. Output #6	Enable*
7. Output #7	Enable*
8. Output #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-1000 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, a positive logic input from a CTCSS decoder at J4-4 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 J4-4.

3. DTMF Access Enable

When this channel is enabled, a DTMF Access number selected by programming command *505* must be entered to activate the repeater. Once this number is entered and the user un-keys, the voice synthesizer will say: "OK". 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-1000 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.

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". 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-1000 is initialized, this timer defaults to 1.0 seconds. This channel is useful during periods when noise bursts are present on the repeater input.

6. DTMF Window

When this channel is enabled the controller will only accept DTMF entries when the window is open. The pre-window timer programming command [*613*] sets the time the window opens after the presents of COR. The length of the time the window remains open is set by the window timer programming command [*614*]. When the CAT-1000 is initialized the pre-window timer defaults to 2 seconds and the window timer defaults to 8 seconds. Therefore the CAT-1000 will only accept DTMF entries from 2 to 10 seconds after initial COR. The control operator prefix and unlock numbers are exempt from DTMF Window operation.

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*] timer 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 a 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 (#). Refer to Zone 5 Channel 8 for additional information.

8. Control Operator CTCSS Enable

When this channel is enabled, a CTCSS input is required for the CAT-1000 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-1000 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 to Beep and Beep to transmitter drop timers. To make the transmitter turn off 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 key-pad. 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.

5. LiTZ Emergency Alert Enable

When this channel is enabled, the ARRL sanctioned LiTZ Emergency Alert System will be activated. Key-up and send the DTMF [0] for three seconds. The CAT-1000 will execute Macro 40. Use the Internal Command Structure too program Macro 40 to create the desired response. Macro 40 defaults to a two-tone paging tone.

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, the link up and down messages, 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 ID timer. This ID will consist of up to 31 words selected from the voice vocabulary table and is programmed with the [*3101] command.

2. Repeater ID #2 (Active) Enable

When this channel is enabled, the Repeater ID Message #2 will repeat subject to the setting of the ID timer. This ID will consist of up to 31 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 a QSO is in progress.

3. Squelch Tail Message #1 Enable

When this channel is enabled, the voice squelch tail message #1 will occur when a repeater user un-keys their transmitter. This message will repeat subject to the setting of the squelch tail message timer. This message will consist of up to 31 words selected from the voice vocabulary table and is programmed with the [*3103] command.

4. Squelch Tail Message #2 Enable

When this channel is enabled, the voice squelch tail message #2 will occur when a repeater user un-keys their transmitter. This message will repeat subject to the setting of the squelch tail message timer. This message will consist of up to 31 words selected from the voice vocabulary table and is programmed with the [*3104] command. When Squelch Tail Message #1 and #2 are enabled, the messages will alternate.

5. Dropout Message #1 Enable

When this channel is enabled, the voice drop out message #1 will occur just before the repeater transmitter turns off. This message will repeat subject to the setting of the drop out message timer. This message will consist of up to 31 words selected from the voice vocabulary table and is programmed with the [*3105] command.

6. Dropout Message #2 Enable

When this channel is enabled, the voice drop out message #2 will occur just before the repeater transmitter turns off. This message will repeat subject to the setting of the drop out message timer. This message will consist of up to 31 words selected from the voice vocabulary table and is programmed with the [*3106] command. When Dropout Message #1 and #2 are enabled, the messages will alternate.

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 31 words selected from the voice vocabulary table and is programmed with the [*3107] command. When the CAT-1000 is initialized, this message defaults to: "THE TIME IS 7:15 PM."

8. Grandfather Clock Enable

When this channel is enabled, the CAT-1000 will announce the time of day every hour on the hour. This message will consist of up to 31 words selected from the voice synthesizer vocabulary table and programmed with the [*3108] command. When the CAT-1000 is initialized, this message defaults to: "CAT-1000 REPEATER THE TIME IS 7:15 PM."

Zone 4 Autopatch

1. Autopatch Enable

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

2. Autopatch Timer Enable

Autopatch timeout is user programmable with the [*611*] and [*612*] timer programming commands. When the CAT-1000 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. Long Distance Enable

During an autopatch, the CAT-1000 counts the number of entries. Numbers in excess of eight digits are considered a long distance call or an error in dialing. The controller will immediately terminate the autopatch. When this channel is enabled, phone numbers with more than eight digits will be accepted.

4. Emergency 911 Enable

This channel must be enabled to process Emergency 911 requests. The controller examines all three digit entries. When this channel is enabled, 911 calls will be permitted. The autopatch access code must precede 911.

5. Speed Dial Enable

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

6. Phone Number Read Back Enable

This channel will enable phone number read-back prior to dialing. After the repeater user enters the number, the CAT-1000 will read-back the number for verification. If the number was entered correctly, the repeater user does nothing and in two seconds the CAT-1000 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 audio will go directly to the telephone line and not be broadcast on the transmitter. A series of beeps will be heard on the output when the mobile is transmitting. This feature provides a measure of privacy during an autopatch.

8. Autopatch Pre-Dial

When this channel is enabled the CAT-1000 will generate the number stored in the pre-dial buffer," before regenerating the actual telephone number. This feature is useful when the CAT-1000 is connected to a business phone system and a special number is requires to access an outside line. This feature is limited to manually dialed numbers. Use the [*89] programming command to enter a new pre-dial number of up to seven digits.

Zone 5 Autopatch

1. Autopatch Pulse Dial

During normal operation, telephone number regeneration is by DTMF tones. If the controller is connected to a telephone line that does not accept DTMF inputs, the controller will pulse dial when this channel is enabled.

2. Reverse Autopatch Enable

This channel must be enabled for the controller to process a reverse autopatch. Call the repeater by phone, enter the reverse autopatch prefix number followed by the group number (1), (2) or (3) and the speed dial table position number for that group. Terminate the entry with the [#]. 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. Long Distance Dial (1) Enable

When this channel is enabled, the CAT-1000 will accept a (1) as the first entry of the telephone number even when Zone 4 Channel 3 "Long Distance Enable" is not turned ON. A (0) as the first entry will continue to be locked out.

4. Telephone Off Hook Enable

When this channel is enabled, the CAT-1000 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, the CAT-1000 will key-up the transmitter and generate a ringing tone to indicate the repeater's phone is ringing.

6. Modem Auto Answer Enable

When this channel is enabled, the CAT-1000 will answer the telephone and automatically activate the modem.

7. DTMF Generator Enable

This channel will enable the DTMF Generator. DTMF commands stored in the CAT-1000 memory can be accessed by a prefix code followed by the memory table position. The CAT-1000 will key-up the transmitter and sent the DTMF command. This feature is similar to the regeneration of DTMF tones during a speed dial autopatch. It is intended to provide noise and distortion free commands for other repeaters or equipment in a linking system.

8. DTMF Regenerator Enable

When DTMF muting is enabled and a user wants to pass a DTMF command through the repeater, the entry must be preceded by a [#]. If the DTMF regenerator is enabled, the controller will mute the original tones while storing the entry in memory. When the user un-keys, the controller will regenerating the same DTMF command. Like the DTMF generator, this feature is intended to provide noise and distortion free tones at the repeater's output.

Zone 6 Transceiver Control

1. Transceiver Receive Enable

When this channel is enabled, the CAT-1000 will accept the transceiver receive ON command. This feature permits monitoring of the transceiver without transmitting.

2. Transceiver Transmit Enable

When this channel is enabled, the CAT-1000 will accept the transceiver transmitter ON command and repeat any signal received by the repeater's receiver on the transceiver's transmitter. The transceiver's PTT output will follow the repeater's COR input.

3. Transceiver Repeat Enable

When this channel is enabled, and the CAT-1000 is configured for Dual Repeater Mode with dip-switch #3 on and #4 and #5 off, the second RF port will return to link operation. PTT #2 will no longer follow PTT #1 but will only be active when COR #1 is active. Also, PTT #2 will never be active when COR #2 is active. This returns RF port #2 to remote base operation while the dip-switches are still configured for Dual Repeater operation.

4. Transceiver CTCSS Enable

When this channel is enabled, in addition to a COR input, a positive logic input from a CTCSS decoder at J4-3 must be present before the CAT-1000 will recognize an input from the Transceiver. A COR input by itself will have no affect.

5. Transceiver Voice Enable

When this channel is enabled and the remote base is enabled, voice messages will be transmitted by the transceiver. When this channel is off, PTT #2 will not activate unless repeater COR #1 is active.

6. Transceiver Auto Disconnect Enable

When this channel is enabled, the link will disconnect automatically after a period of repeater inactivity. Voice message #16 will be called to announce the transceiver has disconnected. A link or repeater COR input will keep the Transceiver activate until the repeater returns to rest. A rest period of up to 29 minutes can be selected with the [*619*] programming command. When the CAT-1000 is initialized this timer defaults to 600 seconds.

7. Computer Interface Enable

When this channel is enabled, bidirectional communications can be established through the RS-232 and TTL ports to control and program a remote base transceiver with a computer interface.

8. Ring Detector Enable

During control operator call-in, upon receipt of a ring detector input, the CAT-1000 will simulate an off-hook condition. The delay in answering the phone is user programmable with the [*617*] programming command. When the CAT-1000 is initialized, the ring detector timer defaults to 2 seconds. When this channel is turned off, the controller will not answer the phone. This feature is useful when more than one telephone device is sharing the same line.

Zone 7 Hardware Inputs

1. Input #1 Enable

When this channel is enabled the CAT-1000 in response to a positive voltage input on connector J1-1 by executing the command stored in the Input #1 memory buffer.

2. Input #2 Enable
When this channel is enabled, a positive voltage on J1-10 will execute the command stored at the Input #2 memory buffer.

3. Input #3 Enable
When this channel is enabled, a positive voltage on J1-11 will execute the command stored at the Input #3 memory buffer.

4. Input #4 Enable
When this channel is enabled, a positive voltage on J1-12 will execute the command stored at the Input #4 memory buffer.

5. Input #5 Enable
When this channel is enabled, a positive voltage on J1-13 will execute the command stored at the Input #5 memory buffer.

6. Input #6 Enable
When this channel is enabled, a positive voltage on J1-23 will execute the command stored at the Input #6 memory buffer.

7. Input #7 Enable
When this channel is enabled, a positive voltage on J1-24 will execute the command stored at the Input #7 memory buffer.

8. Input #8 Enable
When this channel is enabled, a positive voltage on J1-25 will execute the command stored at the Input #8 memory buffer.

Zone 8 User Function Outputs

1. Output #1 Enable
When this channel is enabled, user function switch #1 is turned on. Connector J1 pin 5 will switch 28VDC and sink 150 MA. This feature provides remote control of other equipment at the repeater site.

2. Output #2 Enable
When this channel is enabled, user function switch #2 is turned on. Connector J1 pin 6 will switch 28 VDC and sink 150 MA.

3. Output #3 Enable
When this channel is enabled, user function switch #3 is turned on. Connector J1 pin 7 will switch 28 VDC and sink 150 MA.

4. Output #4 Enable
When this channel is enabled, user function switch #4 is turned on. Connector J1 pin 8 will switch 28 VDC and sink 150 MA.

5. Output #5 Enable
When this channel is enabled, user function switch #5 is turned on. Connector J1 pin 9 will switch 28 VDC and sink 150 MA.

6. Output #6 Enable
When this channel is enabled, user function switch #6 is turned on. Connector J1 pin 18 will switch 28 VDC and sink 150 MA.

7. Output #7 Enable
When this channel is enabled, user function switch #7 is turned on. Connector J1 pin 19 will switch 28 VDC and sink 150 MA.

8. Output #8 Enable

When this channel is enabled, user function switch #8 is turned on. Connector J1 pin 20 will switch 28 VDC and sink 150 MA. To prevent damage to the NE5090, do not exceed one watt total power dissipation.

Remote Activation Of The RS-232 Port

To activate the RS-232 port, key-up and enter the control operator prefix code followed by [97]. Unkey and the CAT-1000 will automatically switch to the computer terminal programming mode. This RS-232 port is configured for a baud rate of 4800. A special cable must be fabricated, see figures 7-6 and 7-7.

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]. Unkey and the voice will read the software versions.

Soft Reset

To produce a soft reset, the equivalent of remotely cycling DC power, key-up and enter the control operator prefix code followed by [99]. Unkey and the microprocessor flags will be reset and the voice will say: "CLEAR FLAGS."

Control By Telephone

In the control operator mode the CAT-1000 will accept commands 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	95#	Load memory file 5
92#	Load memory file 2	96#	Load memory file 6
93#	Load memory file 3	97#	Load memory file 7
94#	Load memory file 4	98#	Load memory file 8

Chapter 4 - Repeater Operation

Time of Day Request

Key-up, and enter [400], the time of day access code. Un-key, and the voice synthesizer will announce the time. Example: The voice will say: "THE TIME IS 7:30 PM". The time of day announcement is stored in voice message buffer [07] and can be changed with the [*3107] programming command.

DTMF Key-pad Test

Key-up, and enter [375], the DTMF key-pad access code followed by the key-pad numbers and letters to be tested. Un-key, and the voice will read-back all numbers and letters that were decoded including the "STAR" and "POUND". Note: The "D" key can not 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-1000 will accept the [D] key as an entry command.

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 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 re-entered to activate the repeater. You can bypass the rest period and return the repeater to DTMF access mode by re-entering [325], the DTMF access code. The voice will say: "OK DOWN".

Repeater CTCSS Override

When repeater CTCSS is enabled, a repeater user without a CTCSS encoder can activate the repeater by entering [325], 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 DTMF access mode by re-entering the DTMF access code.

Autopatch Access

To initiate an autopatch, key-up and enter the autopatch access code followed by the number. Un-key, and the CAT-1000 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 *513* programming command. During initialization the autopatch access code defaults to a [*].

Autopatch Access With Phone Number Verification

Key-up, and enter the autopatch access code followed by the number. Un-key, and the voice will read back the number, wait two seconds 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-1000 will immediately start to dial the number.

Telephone Number Lockout

If a repeater user dials a number stored in the Number Lockout table, the autopatch attempt will be rejected and the voice will say: "NUMBER LOCKOUT".

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 and then dial the number. Speed dial capacity is three-hundred numbers, divided into three groups of one-hundred numbers each. The speed dial code can be any number from one to seven digits and is user selectable with the [*515* for group 1], [*516* for group 2] and [*517* for group 3] programming commands. During initialization, the speed dial codes default to [6 for group 1], [7 for group 2] and [8 for group 3]. The speed dial number consists of the speed dial code, and two digit table position 00 through 99.

Autopatch Emergency Speed Dial Access

Key-up, and enter the emergency speed dial number. Un-key, and the voice will read back the identification assigned to that emergency speed dial location, wait two seconds and then dial the number. The emergency speed dial code can be any number from one to seven digits and is user selectable with the *518* programming command. During initialization the emergency speed dial code defaults to [9]. The emergency speed dial number consists of the emergency speed dial code followed by the single digit table position 0 through 9.

Autopatch 911 Access

Key-up, and enter the autopatch access code followed by 911. Un-key, and the voice will say: "AUTOPATCH 911" wait two seconds and then dial the number.

Autopatch Termination

To terminate the autopatch key-up, enter the autopatch termination code. Un-key, the autopatch will terminate and the voice will log the time. Example: "AUTOPATCH COMPLETED AT 7:30PM." The autopatch disconnect code can be any number from one to seven digits and is user selectable. During initialization the autopatch termination code defaults to a [#]. The autopatch termination message is stored in voice message buffer [15] and can be changed with the [*3115] programming command.

Reverse Autopatch

To initiate a reverse autopatch, call the repeater by telephone. When the CAT-1000 answers the phone a beep will be heard. Enter the reverse autopatch code [800], followed by the speed dial group number (1), (2) or (3) and the table position in that group. You must terminate the entry with a [#]) pound. The CAT-1000 will key the transmitter, generate a ringing tone and the voice will say: "CALL FOR W4XYZ." To connect the reverse autopatch the mobile operator must key-up and enter [800], the reverse autopatch code.

Autopatch Timer Extend

If during an autopatch, additional time is needed, key-up and send [*1]. This will reset the autopatch timer. The voice will say: "AUTOPATCH TIMER RESET."

Last Number Redial

If you attempt an autopatch and your call is not completed, the CAT-1000 has last number redial. Redial will remain active for a period of ten minutes after the previous call. To place a last number redial call, key-up and send the autopatch access code followed by a [*].

Hook Flash

If your repeater's telephone line has "call waiting" service, you can intercept the incoming call. Key-up and send [*2], the CAT-1000 will place the phone on-hook for 200 milliseconds. This will signal the telephone company to switch the waiting call onto the repeater's phone line. Key-up and send [*2] to return to the original party.

Autopatch Radio Mute

During an autopatch if additional privacy is required, key-up and send [*3]. This will mute the radio side audio. For the remainder of the autopatch, cover tones will be sent when the mobile transmits.

Monitor Repeater By Telephone

This feature permits a control operator to monitor repeater activity through the telephone. Call the repeater, when the CAT-1000 answers, a beep will be heard. Enter the monitor repeater prefix [850] followed by a [#]. Any signal received by the repeater will be heard on the phone. To make a call or join a conversation in progress, enter [1#]. The repeater will remain in the transmit mode with an audio path to the transmitter. To return to monitor only, enter [4#]. To terminate monitoring by phone, enter [0#]. This mode will disconnect when the [*615*] programming timer, times-out. A series of time-out warning beeps will be sent. You have 30 seconds to reset the timer by entering [9#]. To test for intermod or desensitivity, enter [3#] to turn the transmitter OFF and [2#] to turn the transmitter ON. If an autopatch is attempted while in the monitor mode, the voice will say: "TELEPHONE LINE IN SERVICE". Note: Zone 5 channel 2 must be enabled.

ENTER	CONTROL COMMANDS
0#	Hang-up (Terminate Monitor Mode)
1#	Force Entry (Talk on Repeater)
2#	Turn ON Repeater Transmitter
3#	Turn OFF Repeater Transmitter
4#	Return to monitor only mode
9#	Extend Timer

Telephone Line Busy

If the repeater shares a phone line and a positive voltage is applied to the Busy #1 input J4-2, the voice will say: "TELEPHONE LINE IN SERVICE" and the autopatch will be rejected. You must supply the telephone line monitoring circuit that will provide a positive DC voltage to the CAT-1000 when the telephone is off hook.

Transceiver Control By Repeater Input

This feature permits repeater users to control a transceiver connected to the second RF port of the CAT-1000 with a simple DTMF entry.

Transceiver Disconnect

Key-up on the repeater's input and enter the transceiver control prefix [500], followed by a 0. The CAT-1000 will separate the repeater and transceiver and enable the repeater's time-out timer. The voice will announce the Transceiver disconnect message stored at voice message table position 09. The transceiver disconnect announcement can be changed with the [*3109] programming command. Example: With a transceiver control prefix of 500, turn OFF the transceiver.

```
Key-up and enter: 5 0 0 0
                  ÀÄÅÄÙ ÀÄÄÄÄÄÄÄ Command (OFF)
                    ÀÄÄÄÄÄÄÄÄÄÄÄ Transceiver Control Number
```

Transceiver Connect

Key-up on the repeater's input and enter the transceiver control prefix [500], followed by a 1. The CAT-1000 will connect the repeater and transceiver and disable the repeater's time-out timer. The voice will announce the transceiver connect message stored at voice message table position 10. The transceiver connect announcement can be changed with the [*3110] programming command. Example: With a transceiver control number of 500, turn ON the transceiver.

```
Key-up and enter: 5 0 0 1
                  ÀÄÅÄÙ ÀÄÄÄÄÄÄÄ Command (ON)
                    ÀÄÄÄÄÄÄÄÄÄÄÄ Transceiver Control Number
```

Transceiver Receive Only Connect

To connect just the Transceiver's receiver, Key-up on the repeater's input and enter the transceiver control number [500], followed by a 2. The CAT-1000 will connect the transceiver's receiver to the repeater and disable the repeater's time-out timer. Receiver activity will be repeated on the output of the repeater, however the transceiver's transmitter will be disabled and repeater activity will not be transmitted. Example: With a transceiver control number of 500, turn ON the transceiver's receiver.

```
                Key-up and enter: 5 0 0 2
     Transceiver Control Number ÄÄÄÁÄÁÄÙ ÀÄÄÄÄ Command (Receiver Only ON)
```

Transceiver Entry Clear And RBI-1 Reset

In the Kenwood push-button mode this command will clear a partial frequency entry by pulsing (Pin 15) on the MF-1000 Serial Interface card. In the Doug Hall mode this command will reset the RBI-1 interface.

```
           Key-up and enter: 5 2 5 #
                             ÀÄÅÄÙ ÀÄÄÄÄÄÄÄÄ Command (Entry Clear)
                               ÀÄÄÄÄÄÄÄÄÄÄÄÄ Transceiver Control Prefix Number
```

Read Remote Base Frequency

Key-up and enter the remote base frequency prefix number followed by a 0. Un-key and the voice will read back the current frequency including the offset and the setting of transmitter power. Example: With a prefix number of 525, read the remote base frequency.

```
       Key-up and enter:  5 2 5 0
                          ÀÄÅÄÙ ÀÄÄÄÄ Request Remote Base Frequency Read Back
                            ÀÄÄÄÄÄÄÄÄ Frequency load command prefix.
```

Load Remote Base Frequency

Key-up and enter the remote base frequency prefix, followed by the frequency, offset and transmitter power setting. Example: With a prefix of 525, load 146.625 MHz, minus offset, and transmitter power to HIGH.

```
  Key-up and enter:  5 2 5 6 6 2 5 1 1
       Load Prefix ÄÄÁÄÁÄÙ ³ ³ ³ ³ ³ ÀÄÄÄÄ Transmitter Power (0=LOW, 1=HIGH)
     Megahertz 1's ÄÄÄÄÄÄÄÄÙ ³ ³ ³ ÀÄÄÄÄÄÄ 1=Minus, 2=Simplex, 3=Plus
    Kilohertz 100's ÄÄÄÄÄÄÄÄÄÄÙ ³ ÀÄÄÄÄÄÄÄÄ Kilohertz 1's (0 or 5)
                               ÀÄÄÄÄÄÄÄÄÄÄ Kilohertz 10's
```

Load RBI-1 Remote Base Frequency

Key-up and enter the remote base frequency prefix, followed by the band, frequency, offset and CTCSS encoder frequency if desired. Example: With a prefix of 525, load 146.820 MHz, minus offset, and CTCSS tone 151.4 Hz.

```
  Key-up and enter:  5 2 5 2 6 8 2 0 1
                     ÀÄÅÄÙ ³ ³ ³ ³ ³ ÀÄÄÄÄÄÄÄÄ 1=Minus, 2=Simplex, 3=Plus
       Load Prefix ÄÄÄÄÙ   ³ ³ ³ ³ ÀÄÄÄÄÄÄÄÄÄ Kilohertz 1's (0 or 5)
       Frequency BandÄÄÄÄÄÄÄÙ ³ ³ ÀÄÄÄÄÄÄÄÄÄÄ Kilohertz 10's
       Megahertz 1 ÄÄÄÄÄÄÄÄÄÙ ÀÄÄÄÄÄÄÄÄÄÄÄ Kilohertz 100's

  Key-up and enter:  5 2 5 5 2 4
                     ÀÄÄÄÙ ³ ÀÄÄÁÄÄÄ CTCSS tone 151.4 Hz (See Figure 17-3)
       Load Prefix ÄÄÄÄÙ   ÀÄÄÄÄÄÄÄÄ CTCSS Tone Load Command
```

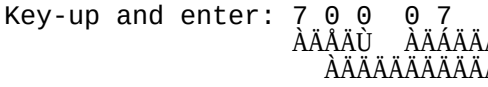
Load Remote Base Frequency From CAT-1000 Memory

Key-up and enter the remote base frequency prefix, followed by the memory table position. Example: With a prefix of 525, load contents of memory 22. The voice will say: "FREQUENCY LOAD 22."

```
            Key-up and enter:  5 2 5   2 2
      Frequency Load Prefix ÄÄÄÁÄÄÁÄÙ   ÀÄÄÁÄÄÄ Memory location
```

Voice Message Selection

Key-up and enter the VOICE prefix followed by the message number. The CAT-1000 will key the transmitter and play the message stored at that location. Example: With a VOICE prefix number of 700, play message stored at table position seven.



DVR Track Selection

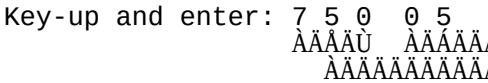
Key-up and enter the DVR prefix followed by the track number. The CAT-1000 will key the transmitter and play the message pre-recorded at that track. Example: With a DVR prefix number of 725, play track seven.

DVR Signal Report

Key-up and enter the DVR prefix followed by a [*]. Un-key, the voice will say: "START TEST NOW". Key-up and record a seven second message. Un-key and the message will play back. You instantly know how your signal sounds through the repeater. This feature does not work with the Ming digital voice recorder.

Paging Tone Selection

Key-up and enter the PAGING TONE prefix followed by the table location number. The CAT-1000 will key the transmitter and transmit the tones stored at that location. Example: With a PAGING TONE prefix number of 750, send tone pair stored at table position five.

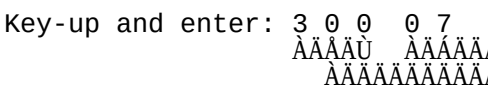


Macro Execute

A macro is a series of commands, defined by the repeater owner. Macros permit the owner to customize certain aspects of repeater operation. Once the CAT-1000 decodes the macro number, the commands will execute in the order they were stored within the macro.

DTMF Tone Generator

Key-up and enter the DTMF Generator Prefix number followed by the table location number. The controller will key the transmitter and send the DTMF tones stored at that location. Example: With a DTMF tone generator prefix number of 300, send the DTMF command stored at table position seven.



Memory Files

Space is provided for eight memory files. Each memory file includes: control channel settings, codes, timer values, and voice messages one through twelve. When the CAT-1000 is initialized, all files are filled with the default values. The memory recall prefix number will permit the user to copy into active memory a file from storage. To store active memory as a memory file, you must unlock the CAT-1000 and use the [*19X] programming commands.

Active Memory Identification

Key-up and enter the memory recall prefix number followed by a 0. Un-key and the voice synthesizer will read back the memory file number. Example: With memory recall prefix number of 175, and current memory compares to file 5.

```
Key-up and enter:  1 7 5 0
                   ÀÄÅÄÙ ÀÄÄÄÄ Memory File Read Back
                     ÀÄÄÄÄÄÄÄÄ Memory Recall Prefix Number.
```

The voice will say: "FILE ID IS FIVE." If changes were made to active memory and it no longer agrees with the original file in storage, the voice will say: "FILE FIVE DATA MODIFIED."

Memory Recall

To copy a memory file into active memory, key-up and enter the memory recall prefix number followed by the file number to be loaded into active memory. Example: With a memory recall prefix of 175, move file 3 to active memory.

```
Key-up and enter: 1 7 5 3
                  ÀÄÅÄÙ ÀÄÄÄÄÄÄÄÄÄMemory File Number
                    ÀÄÄÄÄÄÄÄÄÄÄÄÄÄMemory Recall Prefix Number
```

User Function Control By Repeater Input

This feature permits repeater users to control the eight user function switches with a simple DTMF entry. To control one of the switches, Key-up and enter the user function control number followed by the switch number to be controlled and a [0] to turn the switch OFF, a [1] to turn the switch ON or a [2] to momentary change the switch for 0.5 seconds. Example: With a user function control number of 550, turn ON switch five.

```
Key-up and enter: 5 5 0 5 1
                  ³ ³ ³ ³ ÀÄÄÄÄÄ Command  0=Off 1=On 2=Change For 0.5 Seconds
                  ÀÄÅÄÙ ÀÄÄÄÄÄÄÄ User Function Switch Number 1 through 8
                    ÀÄÄÄÄÄÄÄÄÄÄÄ User Function Control Number
```

Serial Board #1 Switch Control By Repeater Input

This feature permits repeater users to control the eight user function switches located on Serial Board #1. Key-up and enter the Serial board #1 prefix number followed by the table location number. The CAT-1000 will change the settings of the eight switches to conform to the pattern stored by the [*44XX] programming command. Example: With a Serial Board #1 prefix number of 575, set the switches to the conditions previously stored in memory at table position fifteen.

```
Key-up and enter:    5 7 5 1 5
                     ÀÄÅÄÙ ÀÄÁÄÄÄÄÄ Serial Board #1 Table Location Number
                       ÀÄÄÄÄÄÄÄÄÄÄÄ Serial Board #1 Switch Prefix Number
```

Serial Board #2 Or DVR-1000 Switch Control By Repeater Input

This feature permits repeater users to control the eight user function switches located on Serial Board #2 or the DVR-1000 digital voice recorder. Key-up and enter the Serial board #2 prefix number followed by the table location number. The CAT-1000 will change the settings of the eight switches to conform to the pattern stored by the [*47XX] programming command. Example: With a prefix number of 580, set the switches to the conditions previously stored in memory at table position three.

```
Key-up and enter:    5 8 0 0 3
                     ÀÄÅÄÙ ÀÄÁÄÄÄÄÄ Serial Board #2 Table Location Number
                       ÀÄÄÄÄÄÄÄÄÄÄÄ Serial Board #2 Switch Prefix Number
```

Control By Telephone

To control the CAT-1000, call the repeater by telephone. When the controller answers, a beep will be heard. Enter the control operator prefix code [100], followed by a (#) pound. 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 by phone send [*0#].

Programming By Telephone

Call the repeater by telephone. When the controller answers, a beep will be heard. Enter the seven digit unlock number [1234567], followed by a (#) pound. The voice will say: "CAT-1000 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#].

300 Baud Modem Connect

Call the repeater by telephone. When the CAT-1000 answers the phone a beep will be heard. Enter the control operator prefix code [100], followed by a [#]. The voice will say: "CONTROL READY." Enter the modem activation command [*9#] to hear the modem tone. Connect your modem to the line and check for a lock indication. Press the carriage return and the screen will request the password. The default password is "cat1000."

300 Baud Modem Auto Answer

Call the repeater by telephone. When the CAT-1000 answers the phone a beep will be heard. Enter the control operator prefix code [100], followed by a [#]. The voice will say: "CONTROL READY." Turn on Zone 5 channel 6, enter [561#], (Modem Automatic Answer Enable). Exit the control operator mode by entering [*0#]. The CAT-1000 is now set to answer the next telephone ring by automatically placing the modem tone on the line. This mode is identical to calling a computer store bulletin board service. Program your computer to dial the repeater's telephone line. Watch for the "CONNECT" prompt. Press the carriage return and the screen will display the "PASSWORD" prompt. Enter the default password "cat1000."

Power Up Macro

Whenever +12VDC is applied to the controller and the voice power-up message is finished, the CAT-1000 will execute macro 39. This macro can be programmed to perform a series of commands. (See Figure 5-2).

LiTZ Emergency Alert

LiTZ is a new system promoted by the ARRL to provide a means for a repeater user to request emergency assistance without being familiar with the operation of the repeater. If a repeater user transmits a DTMF [0] for three seconds, the CAT-1000 will alert the repeater's control operators. Upon receipt of a LiTZ request, the CAT-1000 executes macro 40. Macro 40 defaults to a paging tone. This macro can be reprogrammed to alert the control operators with a voice message and or DTMF tones.

Repeater ID #1 (At Rest)

If the repeater has been at rest for a period in excess of the ID timer setting, typically ten minutes, when the repeater is keyed, the CAT-1000 will send ID #1. This ID should be longer than ID #2 and include additional information about the repeater or sponsoring organization. Example: "WITH ONE HUNDRED WATTS OF RF POWER AT YOUR SERVICE THIS IS THE W4XYZ REPEATER SYSTEM -- GOOD AFTERNOON".

Repeater ID #2 (Active)

If a QSO is in progress and it's time to identify the repeater, the CAT-1000 will wait until COR drops to send ID #2. This ID should be short so as not to interfere with the QSO in progress. Example: "W4XYZ REPEATER." This ID is also called as the final ID of the ten minute period.

Unique Courtesy Tones

The CAT-1000 determines which courtesy tone to send by reading Voice Message Buffers 11 and 12. Since the courtesy tones are assigned a three digit number and called from a voice message, any three digit voice word in the vocabulary list from Chapter 11 can be used as the courtesy tone. This includes: chimes, sound effects and even words like "OVER". The choice is yours.

Link Bridging Command

When the link is in the backbone mode, the CAT-1000 will only respond to DTMF command from the backbone to turn the link on and off. This greatly reduces the possibility of the CAT-1000 responding to a command meant for another repeater on the backbone. However, there may be times when it is desirable to control the CAT-1000 through the link input. This can be accomplished by using the link bridging command.

Example: With a bridge command number of 150, turn ON the bridge.

```
Key-up and enter:    1 5 0 1 1
                     ³ ³ ³ ³ ÀÄÄÄÄÄ Command  0=Off  1=On
                     ÀÄÅÄÙ ÀÄÄÄÄÄÄÄ Control  1=Full 2=Macro only
                       ÀÄÄÄÄÄÄÄÄÄÄÄ Link bridge control number
```

This is a toggle command and is confirmed by the voice saying: "CONTROL UP" or "CONTROL DOWN." When the bridge is "UP" the CAT-1000 will accept all control and programming commands from the link receiver except macros.

To acceptance macros during link operations, key-up and enter: [15021]. The voice will say: "MACRO UP" or "MACRO DOWN." In addition to the link on and off commands, the controller will respond to any macro command appearing on the link receiver input. The link bridging command is also used when the CAT-1000 is configured for remote base operation.

Reverse DTMF Paging

To initiate a reverse DTMF page, call the repeater by phone. When the CAT-1000 answers, a beep will be heard. Enter the reverse paging prefix code followed by the desired DTMF pager number. Terminate the entry with a (#) pound. The CAT-1000 will key the transmitter and regenerate the DTMF pager number. Example: Reverse page a transceiver with a squelch programmed to open on [123].

```
Key-up and enter:    8 7 5 1 2 3 #
                     ³ ³ ³ ³ ³ ³ ÀÄ Termination
                     ÀÄÅÄÙ ÀÄÁÄÁÄÄÄ DTMF Pager Number
                       ÀÄÄÄÄÄÄÄÄÄÄÄ Reverse DTMF Prefix Number
```

Chapter 5 - Repeater Programming By DTMF Tone

This chapter describes how the CAT-1000 controller is programmed by the repeater owner using a DTMF key-pad. The various types of program commands are described in detail and examples are given in the following text.

Initialization

To initialize the CAT-1000, set dip-switch #7 to ON and cycle DC power. During power-up, the voice will say: "RESET DATA LOAD COMPLETED." Set dip-switch #7 to OFF. To initialize the CAT-1000 during a software update, set dip-switch #6 to ON and cycle DC power. Initialization consists of the following operations:

Dip-switch #7 Initialization

1. All memory locations are cleared.
2. The control channels marked with an [*] are enabled.
3. The unlock number is loaded with the default value [1234567].
4. The computer password is loaded with [cat1000]
5. The control operator prefix code is loaded with the default value [100].
6. The control numbers are set to default values see Figure 5-10.
7. The timers are set to default values see Figure 5-11.
8. The voice message buffers are loaded with default messages.
9. ID #1 is loaded with "CAT1000 AUTOMATIC REPEATER CONTROL."
10. ID #2 is loaded with "CAT1000 REPEATER."
11. All active memory saves are filled with default values.

Dip-switch #6 Initialization

1. The control channels marked with an [*] are enabled.
2. The unlock number is loaded with the default value [1234567].
3. The computer password is loaded with [cat1000]
4. The control operator prefix code is loaded with the default value [100].

Programming the Unlock Control Number

To program the UNLOCK code, set dip-switch #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: "CONTROL ERROR" followed by "ENTER CONTROL." Key-up and enter the seven digit number. Set dip-switch #8 to the OFF position. NOTE: When the CAT-1000 is powered up with dip-switch #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-1000 CONTROL."

Locking the Controller By Radio

Key-up and send [*0]. Un-key, the controller will lockup and the voice will say: "MANUAL EXIT." The CAT-1000 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-1000, call the repeater by telephone. When the CAT-1000 answers, a beep will be heard. Enter the seven digit unlock number followed by a (#) pound. The voice will say: "CONTROL READY." 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-1000 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, eight hardware input switch buffers and the macro strings. Each command is limited to four digits. Even number pointer commands will interrupt a QSO, while odd number pointers commands will not execute if PTT is active. The following CAT-1000 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 (0.2 second)				
	Pointer	Table Position		
Send Time of Day	20	21		00
Send Day of Week	22	23		00
Send Day and Month	24	25		00
Send Salutation	26	27		00
Send Voice Message	30	31		01-40
Play DVR Track	32	33		01-16
Send CW Buffer	34	35		01-02
Send CW Character	36	37		00-46 50-96
Send Voice Message (PTT #1 & PTT #2)	38	39		01-40
Send DTMF Tones	40	41		01-40
Send Paging Tones	42	43		01-20
Copy To Voice Message 11	44			00-09 20-40
Copy To Voice Message 12	46			00-09 20-40
Execute Macro	50	51		01-40
Load Memory File	52	53		01-08
Time Delay Control Seconds	60			01-99
PTT #1 Control	62			00-01
PTT #2 Control	64			00-01
DVR Play - TX Audio	66			00-01
Link Control Off/On/Receive	70	71		00-01-02
Link Reset	70	71		03
Link Bridge Up/Down	70	71		04-05
Load Link Frequency (CAT-1000 Memory)	72	73		01-40
Load Link Frequency (Kenwood Memory)	74	75		01-20
Load Link TX Power Low/Med/High	76	77		01-02-03
HF Transceiver Control	78	79		01
Set MF-1000 #1 Switches	80	81		01-40
Set MF-1000 #2 Switches	82	83		01-40
Send Voice Vocabulary	9			000-999

Figure 5-1

CW Character

The Internal Command Structure can be used to send CW characters. If the CW character is programmed using pointers 36 or 37 and 00-through 49, the CW character will have a frequency and speed determined by the settings of CW buffer #1. If the CW character is programmed using 50 through 96, the frequency and speed will be determined by the settings of CW buffer #2.

Copy To Courtesy Tone Buffers

The Internal Command Structure can be used to change the repeater and transceiver courtesy tone buffers. The commands consists of pointers 44 and 46 followed by the courtesy tone number 00-09 or voice message number 20-40.

Scheduler Command Memory

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

Read Scheduler Locations (01-60)

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 (01-60)

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)

```
                                        ÚÄÄÄÄÄÄÄÄPointer
                    ÚÄÄÄÄÄÄÄDay of Week  ³ ÚÄÄÄÄÄÄÄZone #
        MinutesÄÄÄÄÄÄÄ¿ ³ ÚÄÄÄÄDay of Month  ³ ³ ÚÄÄÄÄChannel #
           HourÄÄÄ¿  ³  ³ ³  ÚÄMonth of Year  ³ ³ ³ ÚÄÄÄActivity
            *1127 09 00 6 00 00               1 1 5 1
```

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

```
                    ÚÄÄÄÄÄÄÄÄ Day of Week   ÚÄÄÄÄÄÄÄÄDVR Pointer
        MinutesÄÄÄÄÄÄÄ¿  ³  ÚÄÄÄÄÄÄDay of Month  ³  ÚÄÄÄÄÄDVR Table Position
           HourÄÄÄ¿  ³  ³  ³  ÚÄÄMonth of Year ³  ³
           *1106  18 00 0  00 00               32 07
```

Example: Announce Time of Day - 7:30 AM - ON December 25th (Store at Table Location 42)

```
                    ÚÄÄÄÄÄÄÄÄDay of Week
        MinutesÄÄÄÄÄÄÄ¿  ³  ÚÄÄÄÄÄDay of Month  ÚÄÄÄÄÄTime of Day Prefix
          HoursÄÄÄ¿  ³  ³  ³  ÚÄMonth of Year ³
           *1142  07 30 0  25 12             2000
```

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

```
                    ÚÄÄÄÄÄÄÄÄ Day of Week   ÚÄÄÄÄÄÄÄÄDVR Pointer
        MinutesÄÄÄÄÄÄÄ¿  ³  ÚÄÄÄÄÄÄDay of Month  ³  ÚÄÄÄÄÄDVR Table Position
           HourÄÄÄ¿  ³  ³  ³  ÚÄÄMonth of Year ³  ³
           *1126  ** 30 0  00 00               32 09
```

```
É͸
º          DAY OF WEEK SCHEDULER PROGRAMMING TABLE          º
Ì͹
º 0=Daily   2=Monday   4=Wednesday  6=Friday    8=Weekdays º
º 1=Sunday  3=Tuesday  5=Thursday   7=Saturday  9=Weekends º
Èͼ
```

Figure 5-2

Erase Scheduler Locations (01-60)

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

Macro Command Memory

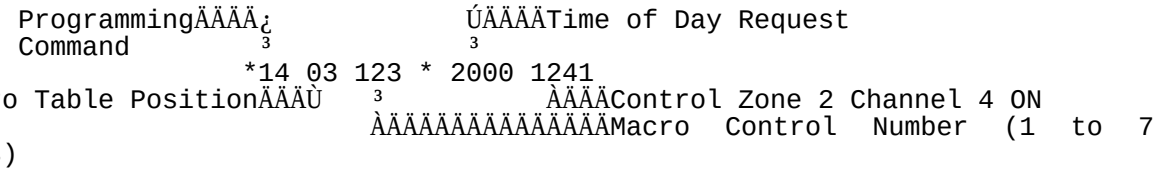
Macros are used to store custom commands of up to ten operations that will execute with a single DTMF entry. Macro #39 is a power-up macro and will execute anytime power is restored to the controller. Macro #40 is assigned to the LiTZ alert system.

Read Macro Locations (01-40)

Key-up and send [*13XX]. Un-key and voice will read back the macro control number followed by the macro data commands stored at that memory location. If the location is empty, the voice will say: "POSITION XX IS CLEAR."

Program Macro Locations (01-40)

Key-up and send [*14XX] followed by the macro control number and the string of internal commands (See Figure 5-1) to be executed. 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).



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

Erase Macro Locations (01-40)

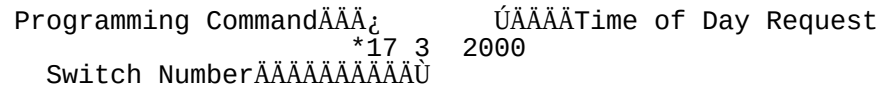
Key-up and send [*15XX]. Un-key, the voice will say: "CANCEL MACRO POSITION XX."

Read Hardware Input Switch Locations (1-8)

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: "POSITION X IS CLEAR."

Program Hardware Input Switch Locations (1-8)

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 when switch 3 is activated.



Erase Hardware Input Switch Locations (1-8)

Key-up and send [*18X]. Un-key and the voice will say: "CANCEL POSITION X."

Save Active Memory (1-8)

Save the current settings of active memory to be recalled later. Memory space is provided for eight 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 twelve voice messages. Example: Save active memory as File #5. Key-up and send [*195]. Un-key and the voice will say: "PROGRAM FILE FIVE OK."

Load Active Memory With Default Values

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

Send the Time of Day

Key-up and send [*20]. Un-key, the voice will read the time, day of week, day of month, and month. Example: "THE TIME IS TWELVE FIFTEEN 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 "CLOCK SET OK." Example: 2:55 PM Monday January 25th. All entries must be double digit, except the day of week.

```
                                ÚÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄDay of Week   (1-7)
Minutes (0-59)ÄÄÄÄÄÄÄÄÄÄÄÄ¿ ³  ÚÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄDay of Month  (01-31)
  Hours (0-23)ÄÄÄÄÄÄÄÄÄ¿  ³ ³  ³  ÚÄÄÄÄÄÄÄÄÄÄÄÄMonth of Year (01-12)
               *21 14 55 2  25 01
```

```
ÉÍÍÍÍÍÍÍÍÍÍÍÍÍÍÑÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ»
º  Day of Week ³ Sun=1 Mon=2 Tue=3 Wed=4 Thr=5 Fri=6 Sat=7 º
ÈÍÍÍÍÍÍÍÍÍÍÍÍÍÍÏÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ¼
```

Figure 5-3

Voice Synthesizer Memory Storage

Space is provided for forty user programmable messages of up to 31 words each. Repeater ID #1 and ID #2 can be turned on at the same time. This is also true for the Squelch Tail and Drop Out messages. The Squelch Tail and Drop Out messages will alternate.

Send Synthesized Voice Message Locations (01-40)

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 (01-40)

Key-up and send [*31XX], followed by the three digit numbers that represents the words required to construct the message. Memory space is provided for thirty-one entries. Refer to Chapter 11, Voice Vocabulary Word List. Example: Load Repeater ID #1 with "W4XYZ Repeater"

```
     Message NumberÄÄ¿   W   4   X   Y   Z   ÚÄÄRepeater
     ProgrammingÄÄ¿  ³   ³   ³   ³   ³   ³   ³
       Command   *31 01 890 004 920 930 950 746
```

```
ÉÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ»
º                      VOICE MESSAGE NUMBER TABLE                        º
ÌÍÍÍÍÑÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÑÍÍÍÍÑÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ¹
º 01 ³ Repeater ID #1              ³ 02 ³ Repeater ID #2                 º
º 03 ³ Squelch Tail #1             ³ 04 ³ Squelch Tail #2                º
º 05 ³ Transmitter Drop #1         ³ 06 ³ Transmitter Drop #2            º
º 07 ³ Time of Day                 ³ 08 ³ Grandfather Clock              º
º 09 ³ Transceiver Disconnect      ³ 10 ³ Transceiver Connect            º
º 11 ³ Courtesy Tone Repeater      ³ 12 ³ Courtesy Tone Transceiver      º
º 13 ³ Repeater Time Out           ³ 14 ³ Repeater Time In               º
º 15 ³ A/P Disconnect              ³ 16 ³ Transceiver Auto Disconnect    º
º 17 ³ Message #17                 ³ 18 ³ Message #18                    º
º 19 ³ Message #19                 ³ 20 ³ Message #20                    º
º 21 ³ Message #21                 ³ 22 ³ Message #22                    º
º 23 ³ Message #23                 ³ 24 ³ Message #24                    º
º 25 ³ Message #25                 ³ 26 ³ Message #26                    º
º 27 ³ Message #27                 ³ 28 ³ Message #28                    º
º 29 ³ Message #29                 ³ 30 ³ Message #30                    º
º 31 ³ Message #31                 ³ 32 ³ Message #32                    º
º 33 ³ Message #33                 ³ 34 ³ Message #34                    º
º 35 ³ Message #35                 ³ 36 ³ Message #36                    º
º 37 ³ Message #37                 ³ 38 ³ Message #38                    º
º 39 ³ Message #39                 ³ 40 ³ Message #40                    º
ÈÍÍÍÍÏÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÏÍÍÍÍÏÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ¼
```

Figure 5-4

Program Voice Message With Time Variables

To insert the time-of-day into a voice messages load the number [100]. Example: Load ID #1 with "THE TIME IS [ACTUAL TIME] AND THIS IS THE W4XYZ REPEATER." Other time variables include: [101 - Day of the Week], [102 - Day and Month] and [103 - Salutation].

```
 Message NumberÄ¿                ÚÄÄÄÄÄ[Actual Time]
                ³                ³
           *31 01 830 838 482 100 231 833 482 830 890 004 920 930 950 746
```

User Function Control by Voice Message.

The voice message buffers can also control the eight User Function switches. If during the execution of a voice message, a User Function switch command (111 through 135) is encountered, the CAT-1000 will set the switch and then continue with the remainder of the voice message.

USER FUNCTION VOICE CONTROL COMMANDS			
111 UF#1 OFF	117 UF#3 OFF	123 UF#5 OFF	129 UF#7 OFF
112 UF#1 ON	118 UF#3 ON	124 UF#5 ON	130 UF#7 ON
113 UF#1 MOM	119 UF#3 MOM	125 UF#5 MOM	131 UF#7 MOM
114 UF#2 OFF	120 UF#4 OFF	126 UF#6 OFF	132 UF#8 OFF
115 UF#2 ON	121 UF#4 ON	127 UF#6 ON	133 UF#8 ON
116 UF#2 MOM	122 UF#4 MOM	128 UF#6 MOM	134 UF#8 MON
135 0.5 SEC DELAY		MOM = MOMENTARY 0.5 SECONDS	

Figure 5-5

DVR Track Selection by Voice Message

The voice message buffers can be used to select one of the sixteen DVR voice tracks. If during the execution of a voice message, a DVR track command (140 through 155) is encountered, the CAT-1000 will play the recorded message stored at that track. The MF-1000 Serial Card is required to operate the DVR.

DIGITAL VOICE RECORDER TRACK CONTROL COMMANDS			
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 5-6

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 (160 through 169) is encountered, the CAT-1000 will generate the courtesy tone stored at that memory location. See Figure 5-7.

COURTESY TONE CONTROL COMMANDS				
160 TONE #0	162 TONE #2	164 TONE #4	166 TONE #6	168 TONE #8
161 TONE #1	163 TONE #3	165 TONE #5	167 TONE #7	169 TONE #9

Figure 5-7

Load Courtesy Tone Repeater Receiver

Key-up and send [*3111], followed by the three digit number that represents the desired courtesy tone from the courtesy tone command table at Figure 5-7. Un-key and the voice will say: "CONTROL OK." Example: Select courtesy tone #3.

Programming Command	*31	11	163	Message Number Courtesy Tone #3
Command				

Load Courtesy Tone Transceiver

Key-up and send [*3112], followed by the three digit number that represents the desired courtesy tone from the courtesy tone command table at Figure 5-7. Un-key and the voice will say: "CONTROL OK." Example: Select courtesy tone #5.

Programming Command	*31	12	165	Message Number Courtesy Tone #5
Command				

Courtesy tones [160] and [161] are programmed with default values. Tones [162] through [169] are blank. Use the [*92X] programming command to create a series of custom tones before programming voice message buffers 11 and 12 with tones [162] through [169].

Program Synthesized Voice Message With CW ID

To send the CW ID in place of a voice messages, load the number [170] or [171] in the voice message buffer. Example: Send the CW ID as ID #2.

Message Number				CW ID command
Programming Command	*31	02	171	
Command				

Macro Control by Voice Message

To execute a MACRO from within a voice message, load the number [172] through [179] in a voice message buffer. Do not call a macro containing a voice message. [172] will execute the macro stored in macro table position two.

Erase Synthesized Voice Message Locations (01-40)

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

CW ID Memory Storage

Memory space is provided for two CW identifications. Buffer #1 will accept 64 characters while buffer #2 will accept 32 characters. If a repeater user talks over a voice ID, the CAT-1000 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. During initialization, buffer #1 is loaded with "CAT1000 REPEATER CONTROLLER," while buffer #2 is loaded with "CAT1000."

Send Repeater CW ID (1-2)

Key-up and send [*33X]. Un-key and the CAT-1000 will send the CW ID at the frequency and speed programmed.

Program Repeater CW ID (1-2)

Key-up and send [*34X], followed by the frequency, speed and two digit numbers that represents the call letter identification. Memory space is provided for (64) and (32) entries. Refer to the CW ID programming table Figure 5-8. Example: Load CW ID memory buffer #1 with DE W4XYZ/R at 1200 Hz and 20 WPM.

Programming Command	Frequency	20wpm	D	E	SPACE	W	4	X	Y	Z	/	R
*341	8	2	13	14	38	32	04	33	34	35	36	27

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= -		

Sending Speed 1=25 2=20 3=18 4=15 5=13 6=10 Words Per Minute

Tone Frequency 1=500 2=600 3=700 4=800 5=900 6=1000 7=1100 8=1200 Hz

Figure 5-8

Erase Repeater CW ID (1-2)

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

Read DTMF Generator Locations (01-40)

Key-up and send [*36XX]. Un-key and the voice will read back the DTMF command stored at that memory location. If the location is empty, the voice will say: "POSITION XX IS CLEAR."

Program DTMF Generator Locations (01-40)

Key-up and send [*37XX] followed by the DTMF command to be stored. Un-key and the voice will say: "CONTROL OK." Example: Store the DTMF command [523A67] at table position 8.

Table Position	DTMF Command
*37 08	523A67

Erase DTMF Generator Locations (01-40)

Key-up and send [*38XX]. Un-key and the voice will say: "CANCEL POSITION XX."

Read Remote Base Frequency Locations (01-40)

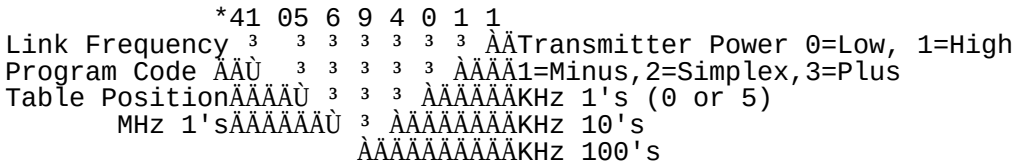
Key-up and send [*40XX]. Un-key and the voice synthesizer will announce the frequency, offset, and the transmitter power setting stored at memory location [XX]. If the memory location is empty, the voice will say: "ALL CLEAR".

Read Remote Base Frequency Locations RBI-1 Interface (01-40)

Key-up and send [*40XX]. Un-key and the voice will announce the frequency, offset, and CTCSS encoder setting stored at memory [XX]. Example: The voice will say: "ONE FORTY SIX POINT NINE FOUR MINUS CTCSS 20 ON OFF." or "ONE FORTY SIX POINT NINE FOUR MINUS NO CTCSS." If the memory location is empty, the voice will say: "FREQUENCY POSITION XX IS CLEAR".

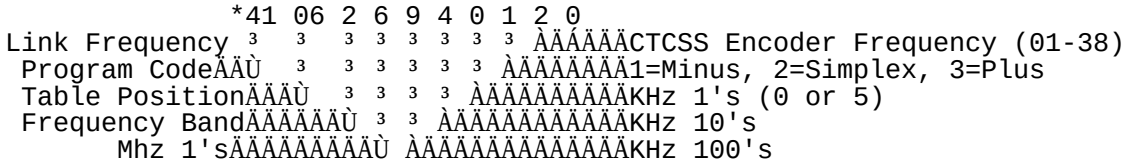
Program Remote Base Frequency Locations (01-40)

Key-up and send [*41XX] followed by the frequency (4 digits), offset, and the transmitter power setting. Un-key and the voice synthesizer will read back the frequency, offset and transmitter power setting. Example: At table position 5, load frequency of 146.940 MHz, minus offset, with transmitter power HIGH.



Program Remote Base Frequency Locations RBI-1 Interface (01-40)

Key-up and send [*41XX] followed by the band, frequency (4 digits), offset, and CTCSS encoder frequency. Un-key and the voice will say: "CONTROL OK." Example: At table position 6, load frequency of 146.940 MHz, minus offset, with CTCSS encoder enabled and set to 131.8 Hz. For Band and CTCSS tone selection see Figures 17-2 and 17-3.



Erase Remote Base Frequency Locations (01-40)

Key-up and send [*42XX]. Un-key and the voice will say: "CONTROL OK."

Expanded User Function Switches

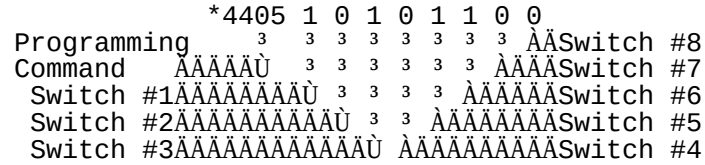
The MF-1000 Serial Interface Card and the DVR-1000 Digital Voice Recorder boards makes available an additional eight switches to control a CTCSS encoder-decoder or any other equipment at the repeater site. The switch settings are stored as a group. Two forty position tables are provided, one for each set of switches. These switches can be changed by a DTMF command or automatically by the action of the scheduler. The switches on the DVR-1000 board are programmed with the Serial Card #2 commands.

Read Serial Card #1, #2 and DVR-1000 Switch Locations (01-40)

Key-up and send [*43XX] or [*46XX]. 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: "ALL CLEAR". If some switches are ON the voice will read back those switches in order from switch #1 to switch #8.

Program Serial Card #1, #2 and DVR-1000 Switch Locations (01-40)

Key-up and send [*44XX] or [*47XX] followed by the settings of the eight switches. Un-key and the voice synthesizer will say: "CONTROL OK". Example: On serial card #1, at table position 5, set switches 1,3,5 and 6 to ON.



Erase Serial Card #1, #2 and DVR-1000 Switch Locations (1-40)

Key-up and send [*45XX] or [*48XX]. 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-1000 is powered up with dip-switch #7 set to the ON position. See the Control Number Table Figure 5-10 for default values.

Control Operator Prefix Number [*501*]

This number must precede the command used to change the settings of REPEATER #1 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.

Link Bridge Number [*502*]

When the second RF port is configured for link operation, this number must be entered to have the CAT-1000 accept control, programming and user commands via the link receiver. Example: To program a Link Bridge Number of 150, key-up and send [*502*150], 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 Generator Prefix [*504*]

This number must precede the DTMF Generator table position number. When entered by a repeater user the CAT-1000 will generate the DTMF command stored at that table position. Example: To program a DTMF Generator Prefix Number of 300, key-up and send [*504*300], Un-key and the voice will say: "CONTROL OK."

DTMF Access Number [*505*]

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 [*505*325]. Un-key and the voice will say: "CONTROL OK."

DTMF Pad Test Number [*506*]

This number must be entered to initiate a DTMF key-pad test. Example: To program a DTMF Pad Test Number of 375, key-up and send [*506*375]. Un-key and the voice will say: "CONTROL OK."

Time Request Number [*507*]

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 [*507*400]. Un-key and the voice will say: "CONTROL OK."

Transceiver Control Number [*508*]

This number must precede the command used to activate or deactivate the transceiver. Example: To program a Transceiver Control Number of 500, key-up and send [*508*500]. Un-key and the voice will say: "CONTROL OK."

Remote Base Frequency Load Number [*509*]

This number must precede the command used to change the frequency of the serial tuned remote base transceiver. Example: To program a remote base Frequency Load Number of 525, key-up and send [*509*525]. Un-key and the voice will say: "CONTROL OK."

User Function Switch Number [*510*]

This number must precede the command to change the settings of the user function switches on the CAT-1000. Example: To program a User Function Switch Number of 550, key-up and send [*510*550]. Un-key and the voice will say: "CONTROL OK."

MF-1000 Serial Card #1 Switch Number [*511*]

This number must precede the command to change the settings of the expanded user function switches on Serial Interface Card #1. Serial Card #1 is used to tune the Link Transceiver and is controlled by output strobe #1. Example: To program Serial Card #1 switch prefix number of 575, key-up and send [*511*575]. Un-key and the voice will say: "CONTROL OK."

MF-1000 Serial Card #2 and DVR-1000 Switch Number [*512*]

This number must precede the command to change the settings of the expanded user function switches on Serial Interface Card #2 or the DVR-1000 board. Serial Card #2 is used to control the Ming DVR and is controlled by output strobe #2. Example: To program a Serial Card #2 switch prefix number of 580, key-up and send [*512*580]. Un-key and the voice will say: "CONTROL OK."

Autopatch Access Number [*513*]

This number must be entered to access the autopatch. Example: To program an autopatch access number of *, key-up and send [*513**]. Un-key and the voice will say: "CONTROL OK."

Autopatch Disconnect Number [*514*]

This number must be entered to terminate the autopatch. Example: To program an autopatch termination number of #, key-up and send [*514*#]. Un-key and the voice will say: "CONTROL OK."

User Speed Dial Prefix Number (Block #1) [*515*]

This number must be entered to access a user speed dial location. Example: To program the speed dial prefix 6, key-up and send [*515*6]. Un-key and the voice will say: "CONTROL OK." This number must precede the block 1 speed dial table location. With the prefix 6, the speed dial numbers will be 600 through 699.

User Speed Dial Prefix Number (Block #2) [*516*]

This number must be entered to access a user speed dial location. Example: To program the speed dial prefix 7, key-up and send [*516*7]. Un-key and the voice will say: "CONTROL OK." This number must precede the block 2 speed dial table location. With the prefix 7, the speed dial numbers will be 700 through 799.

User Speed Dial Prefix Number (Block #3) [*517*]

This number must be entered to access a user speed dial. Example: To program the speed dial prefix 8, key-up and send [*517*8]. Un-key and the voice will say: "CONTROL OK." This number must precede the block 3 speed dial table location. With the prefix 8, the speed dial numbers will be 800 through 899.

Emergency Speed Dial Prefix Number [*518*]

This number must be entered to access an emergency speed dial location. Example: To program the speed dial prefix 9, key-up and send [*518*9]. Un-key and the voice will say: "CONTROL OK." This number must precede the speed dial location number. With the prefix 9, the speed dial numbers will be 90 through 99.

Voice Demonstration Control Number [*519*]

This number must be entered to PLAY one of the voice messages. This number must precede the voice message number. Example: To program a Voice Demonstration Control Number of 700, key-up and send [*519*700]. Un-key and the voice will say: "CONTROL OK."

DVR Control Number [520*]

This number must be entered to PLAY one of the DVR tracks. This number must precede the track number. Example: To program a DVR Control Number of 725, key-up and send [*520*725]. Un-key and the voice will say: "CONTROL OK."

Paging Tone Number [*521*]

This number must be entered to make the CAT-1000 transmit a paging tone. This number must precede the paging tone memory location. Example: To program a Paging Tone Number of 750, key-up and send [*521*750]. Un-key and the voice will say: "CONTROL OK."

Reverse Autopatch Access Number [*522*]

This number must be entered to access the reverse autopatch. Example: To program the reverse autopatch access number 800, key-up and send [*522*800]. Un-key and the voice will say: "CONTROL OK." This number must precede the speed dial group and table position numbers.

HF Remote Base Access Number [*523*]

This number must precede each HF Remote Base command. Example: To program the HF Remote Base access number 560, key-up and send [*523*560]. Un-key and the voice will say: "CONTROL OK."

Monitor Repeater By Telephone [*524*]

This number must be entered to monitor the repeater through the telephone. Example: To program the monitor repeater access number 850, key-up and send [*524*850]. Un-key and the voice will say: "CONTROL OK."

Reverse DTMF Paging Access Number [*525*]

This number must be entered to access reverse DTMF Paging. Example: To program the reverse DTMF paging access number 875, key-up and send [*525*875]. Un-key and the voice will say: "CONTROL OK." This number must precede the pager number.

Read Control Number [*501 - *525]

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."

COMMAND	CONTROL NUMBER DESCRIPTION	DEFAULT
501	CONTROL OPERATOR PREFIX	100
502	LINK BRIDGE CODE	150
503	MEMORY RECALL PREFIX	175
504	DTMF GENERATOR PREFIX	300
505	DTMF ACCESS CODE	325
506	DTMF PAD TEST CODE	375
507	TIME OF DAY REQUEST CODE	400
508	TRANSCEIVER CONTROL PREFIX	500
509	REMOTE BASE FREQUENCY LOAD PREFIX	525
510	USER FUNCTION SWITCH PREFIX	550
511	SERIAL CARD #1 SWITCH PREFIX	575
512	SERIAL CARD #2 SWITCH PREFIX	580
513	AUTOPATCH ACCESS CODE	*
514	AUTOPATCH DISCONNECT CODE	#
515	USER SPEED DIAL PREFIX (BLOCK 1)	6
516	USER SPEED DIAL PREFIX (BLOCK 2)	7
517	USER SPEED DIAL PREFIX (BLOCK 3)	8
518	EMERGENCY SPEED DIAL PREFIX	9
519	VOICE PREFIX	700
520	DVR CONTROL PREFIX	725
521	PAGING TONE PREFIX	750
522	REVERSE AUTOPATCH CODE	800
523	HF REMOTE BASE CODE	560
524	MONITOR REPEATER BY TELEPHONE	850
525	REVERSE DTMF PAGING CODE	875

Control Number Table
Figure 5-10

Timer Memory

This memory area is reserved for storage of nineteen timers. These timers are user programmable. If the CAT-1000 is initialize by applying power with dip-switch #7 in the ON position, the timers will be automatically loaded with default times. See Figure 5-11.

Repeater Time-out [*601*]

The maximum length of a transmission is limited by the repeater 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.

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 initialize, this timer will default to 1.0 seconds.

COR Drop to Courtesy Beep Timer [*604*]

This timer determines the time between loss of COR and the generation of the courtesy beep. This timer is programmable between 0.1 and 9.9 seconds. When initialize, 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 initialize, 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 initialize, 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 initialize, 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 initialize, 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 initialize, the timer defaults to 1799 seconds.

Voice Delay Timer [*610*]

The CAT-1000 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 initialize, the timer defaults to 1.0 seconds.

Autopatch Timer [*611*]

This timer sets the maximum length of an autopatch. This timer is programmable between 1.0 and 1799 seconds. When initialize, 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 initialize, this timer will default to 30 seconds.

DTMF Pre-window Timer [*613*]

This timer determines the time between the presence of COR and the point where the DTMF window opens to accept DTMF entries. This timer is programmable between 0.1 and 9.9 seconds. When initialized, this timer will default to 1 second.

DTMF Window Timer [*614*]

This timer sets the length of time the window will remain open to accept DTMF entry. This timer is programmable between 0.1 and 9.9 seconds. When initialized, this timer will default to 8 second.

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 initialize, this timer will default to 300 second.

Audio Test Tone Timer [*616*]

The courtesy beep tone generator will produce a continuous tone to adjust audio levels to the transmitter. This timer is programmable between 1 and 1799 seconds. When initialize, this timer will default to 30 seconds.

Ring Detector Timer [*617*]

This timer sets the delay between detection of the first ring and when the CAT-1000 answers a control operator call in. This timer is programmable between 1.0 and 1799 seconds. When initialize, the timer defaults to 2.0 seconds.

Modem Connect Timer [*618*]

During programming by computer terminal, this timer determines the maximum time the modem will remain on line. This timer is programmable between 1 and 1799 seconds. When initialize, this timer will default to 1200 second.

Link Auto Disconnect Timer [*619*]

During link operation if Zone 6 channel 6 is enabled the link will disconnect automatically after a period inactivity. Voice message #16 will be called to announce the transceiver has disconnected. This timer is programmable between 1.0 and 1799 seconds. When initialize, this timer will default to 600 seconds.

Read Timer Setting [*601 - *619]

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."

COMMAND	TIMER DESCRIPTION	RANGE	DEFAULT
601	REPEATER TIME-OUT	1.0-1799	180
602	REPEATER SLEEP TIME	1.0-1799	60
603	TURN ON DELAY TIME	0.1-9.9	1.0
604	COR DROP TO BEEP TIME	0.1-9.9	1.0
605	BEEP TO PTT DROP TIME	0.1-9.9	4.0
606	DTMF MUTE DELAY TIME	0.1-9.9	1.0
607	REPEATER ID TIME	1.0-1799	480
608	SQUELCH MESSAGE TIME	1.0-1799	1799
609	DROP OUT MESSAGE TIME	1.0-1799	1799
610	VOICE DELAY TIMER	0.1-9.9	1.0
611	AUTOPATCH LENGTH TIME	1.0-1799	180
612	AUTOPATCH ACTIVITY TIME	1.0-1799	30
613	DTMF PRE-WINDOW TIME	0.1-9.9	2.0
614	DTMF WINDOW TIME	0.1-9.9	8.0
615	PROGRAM MAX LENGTH TIME	1.0-1799	300
616	AUDIO TEST TONE LENGTH	1.0-1799	30
617	RING DETECTOR TIME	1.0-1799	2.0
618	MODEM CONNECT TIME	1.0-1799	1200
619	LINK AUTO DISCONNECT TIME	1.0-1799	600

Timer Table (Seconds)
Figure 5-11

User Speed Dial Memory

This memory area is reserved for storage of three-hundred phone numbers with call letter identification. The memory is divided into three groups of one-hundred numbers each. Space is provided for a sixteen digit phone number with an ID of eleven numbers, letters or words from the Voice Vocabulary Word List.

Read User Speed Dial (Block 1) 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 (Block 2) Locations (00-99)

Key-up and send [*74XX] followed by up to a sixteen digit phone number, a [*] separator and up to eleven 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).

Table Position	Phone Number	W	4	X	Y	Z
*74 15	9786171 *	890	004	920	930	950

To program a dialing delay, enter a [**]. Example: 9 978-6171 W4XYZ (Store at table position 5).

```
                  Phone NumberÄÄ¿       W    4    X    Y    Z
          Table PositionÄÄÄÄÄ¿ ³       ³    ³    ³    ³    ³
                     *74 05 9 ** 9786171 * 890  004  920  930  950
          Pre-Dial NumberÄÄÄÄÄÄÙ  ÀÄÄÄÄÄOne Second Dialing Delay
```

Erase User Speed Dial (Block 3) Locations (00-99)

Key-up and send [*78XX]. Un-key and the voice will say: "POSITION XX IS CLEAR"

COMMAND	DEFINITION
*70XX	READ USER SPEED DIAL (BLOCK 1)
*71XX	PROGRAM USER SPEED DIAL (BLOCK 1)
*72XX	ERASE USER SPEED DIAL (BLOCK 1)
*73XX	READ USER SPEED DIAL (BLOCK 2)
*74XX	PROGRAM USER SPEED DIAL (BLOCK 2)
*75XX	ERASE USER SPEED DIAL (BLOCK 2)
*76XX	READ USER SPEED DIAL (BLOCK 3)
*77XX	PROGRAM USER SPEED DIAL (BLOCK 3)
*78XX	ERASE USER SPEED DIAL (BLOCK 3)

Figure 5-12

Emergency Speed Dial Memory

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

Read Emergency Speed Dial Locations (0-9)

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 identification.

Program Emergency Speed Dial Locations (0-9)

Key-up and send [*81X] followed by a seven digit 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)

```
          Phone NumberÄ¿      FIRE  ÚÄÄÄDEPARTMENT
                       ³       ³     ³
              *813  5252500 * 381  321
```

Erase Emergency Speed Dial Locations (0-9)

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

Telephone Lock-Out Memory

This memory area is reserved for storage of twenty phone numbers or phone number prefixes. Space is provided for an eleven digit number.

Read Lock-Out Number Locations (01-20)

Key-up and send [*83XX]. 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 [*84XX] followed by the seven digit phone number. Un-key and the voice will say: "CONTROL OK." Example: Lock-out number 555-1212. (Store at table position 3)

```
Program Command ÄÄ¿       ÚÄÄÄÄPhone Number
                *8403  5551212
```

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

```
Program Command ÄÄ¿       ÚÄÄÄÄPhone Number
                *8417  976****
```

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

```
Program Command ÄÄ¿     ÚÄÄÄÄPhone Number
                *8405  ***
```

Erase Lock-Out Number Locations (01-20)

Key-up and send [*85XX]. Un-key and the voice will say: "POSITION XX IS CLEAR"

Area Code Memory

Memory space is provided for a twenty position look-up table. This table stores area codes that may be direct dialed on the repeater autopatch. This feature may be necessary when the repeater is located on an area code border zone.

Read Area Code Number Location (01-20)

Key-up and send [*86XX]. Un-key and the voice 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: "POSITION XX IS CLEAR."

Program Area Code Number Location (01-20)

Key-up and send [*87XX] followed by the three digit area code number. Un-key and the voice will say: "CONTROL OK." Example: Load area code number 305. (Store at table position 3).

```
Program Command ÄÄ¿      ÚÄÄÄÄArea Code Number
                *87 03 305
                     ÀÄÄÄÄÄÄÄÄÄÄTable Position
```

Erase Area Code Number Location (01-20)

Key-up and send [*88XX]. Un-key and the voice will say: "POSITION XX IS CLEAR"

Pre-Dial Number

When the CAT-1000 is initialized, the pre-dial number is loaded with "9". If Zone 4 Channel 8 is enabled, this number will precede all manually dialed phone numbers. Memory space is provided for a pre-dial number of up to seven digits.

Read Pre-Dial Number

Key-up and enter [*89]. Un-key and the voice will read back the number.

Program Pre-Dial Number

Key-up and enter [*89] followed by the number. Space is provided for a pre-dial 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".

Suppress Caller ID

To suppress caller ID key-up and enter [*89*67], un-key and the voice will say: "CONTROL OK".

Audio Test Tone

The CAT-1000 will generate a 1000Hz test tone. This tone is use as a reference when setting audio levels. To activate the tone, key-up and enter [*90]. The frequency of the tone is fixed. The length of the tone is determined by the setting of the Audio Test Tone Timer [*616*].

Courtesy Tone

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

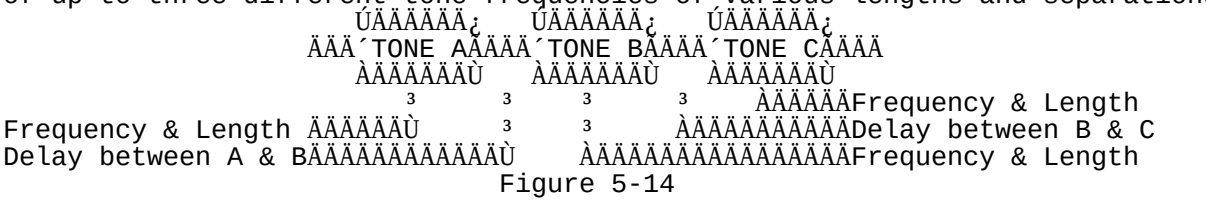


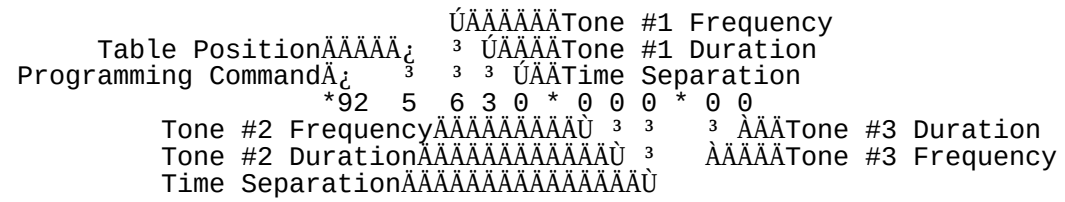
Figure 5-14

Send Courtesy Tone Location (0-9)

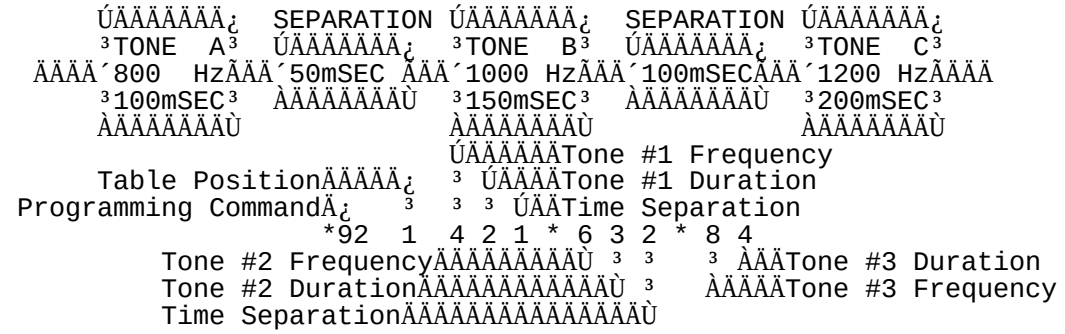
Key-up and send [*91X]. Un-key and the CAT-1000 will transmit the courtesy tone. "X" represents the courtesy tone table location. After initialization, only courtesy tones 0 and 1 are loaded with default tones.

Program Courtesy Tone Location (0-9)

Key-up and send [*92X], followed by the frequency, duration and separation from table at Figure 5-15. This programming command is used to develop ten custom courtesy tones 160 through 169. The tone created with the [*925] programming command is identified as tone "165". Example: Program courtesy tone table location 5 with a tone of 1000Hz and 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.



TONE FREQUENCY TABLE (Hertz)								
0=OFF	1=500	2=600	3=700	4=800	5=900	6=1000	7=1100	8=1200

TONE DURATION - TONE SEPARATION TABLE (Milliseconds)								
0=0	1=50	2=100	3=150	4=200	5=250	6=300	7=350	8=400	9=450

Figure 5-15

Erase Courtesy Tone Location (0-9)

Key-up and send [*93X]. Un-key and the voice will say: "POSITION X IS CLEAR"

Select Courtesy Tone

To select tone "163" as the repeater's courtesy beep, load Voice Message buffer #11 with "163." Example: Enter *3111 163. To select tone "167" as the remote base courtesy beep, load Voice Message buffer #12 with "167". Enter *3112 167.

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:

```
É͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸»
º  [*926 694*494*59]                                  º
ÇÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ¶
º  [*927 299*294*59]                                  º
ÇÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ¶
º  [*928 694*490*00]                                  º
ÇÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ¶
º  [*3108 166 963 167 963 168 963 100]  º
È͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸͸¼
```

Figure 5-16

Digital Voice Recorder

The CAT-1000 will support the DVR-1000 Digital Voice Recorder for true voice message announcements. Substitute DVR tracks for voice messages, speed dial identifications and courtesy tones. For additional information on how to record tracks over the telephone line, consult Chapter 21 of this manual. The CAT-1000 also supports the Ming DVM-58, however the MF-1000 Serial Interface Card and a special cable are required. See Chapter 8 of this manual. The erase command and recording by telephone do not work with the Ming DVM-58.

Play Digital Voice Recorder Tracks (01-16)

Key-up and send [*94XX]. Un-key and the CAT-1000 will play the prerecorded 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".

Paging Tone Memory

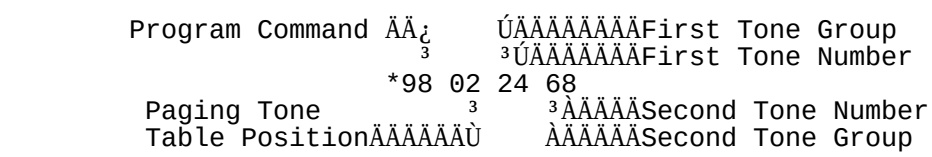
The CAT-1000 will generate two-tone sequential paging tones. The first tone will be on for one second while the second tone will be on for three seconds. Memory space is provided for twenty paging tones. See figure 5-17.

Send Paging Tone Locations (01-20)

Key-up and send [*97XX]. Un-key and the CAT-1000 will send the paging tones stored at that memory location. If the location is empty, the voice will say: "POSITION XX IS CLEAR." During this send command, the length of each tone is increased to four seconds to provide time to measure the frequency on a counter.

Program Paging Tone Locations (01-20)

Key-up and send [*98XX] followed by the paging tone group and tone number. See figure 5-17. Un-key and the voice will say: "CONTROL OK." Example: Program [707 - 1395Hz] tones at table position 2.



TWO-TONE SEQUENTIAL PAGING FREQUENCIES

Tone	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
1	349.0	600.9	288.5	339.6	584.8	1153.4
2	368.5	634.5	296.5	358.6	617.4	1185.2
3	389.0	669.9	304.7	378.6	651.9	1217.8
4	410.8	707.3	313.0	399.8	688.3	1251.4
5	433.7	746.8	953.7	422.1	726.8	1285.8
6	457.9	788.5	979.9	445.7	767.4	1321.2
7	483.5	832.5	1006.9	470.5	810.2	1357.6
8	510.5	879.0	1034.7	496.8	855.5	1395.0
9	539.0	928.1	1063.2	524.6	903.2	1433.4
0	330.5	569.1	1092.4	321.7	553.9	1122.5

Figure 5-17

Erase Paging Tone Locations (01-20)

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

Pulse Dialing

The CAT-1000 will dial in DTMF or PULSE. If Zone 5 Channel 1 is enabled, the controller will be in the pulse dialing mode. Use the [*298] and [*299] programming commands to select between the 10 and 20 pulse per second rate.

Read Pulse Dialing Rate

Key-up and enter [*298], un-key and the voice will say: "TELEPHONE SET FOR TEN PPS" or "TELEPHONE SET FOR TWENTY PPS".

Program Pulse Dialing Rate

To change the pulse dialing rate setting, key-up and enter [*299]. Use this command to toggle between the ten and twenty pulse per second rates. The voice will announce the rate each time it is toggled.

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-1000 will automatically return to normal repeater operation. The voice will say: "TIMER EXIT."

Chapter 6 - Repeater Programming By Modem

This chapter describes how to program the CAT-1000 controller using the computer interface through the on board 300 baud modem or RS-232 port.

300 Baud Modem Connect

Call the repeater by telephone. When the CAT-1000 answers the phone a beep will be heard. Enter the control operator prefix code followed by a [#]. The voice will say: "CONTROL READY." Enter the modem activation command [*9#] to hear the modem tone. Connect your modem to the line and check for a lock indication. Press the carriage return and the screen will display Password. The default password is "cat1000." Type: **cat1000(C/R)**

300 Baud Modem Auto Answer

Call the repeater by telephone. When the CAT-1000 answers the phone a beep will be heard. Enter the control operator prefix code followed by a [#]. The voice will say: "CONTROL READY." Turn on Zone 5 channel 6. (Modem Automatic Answer Enable). Exit the control operator mode by entering [*0#]. The CAT-1000 is now set to answer the next telephone ring by automatically placing the modem tone on the line. This mode is identical to calling a computer store bulletin board service. Program your computer to dial the repeater and watch for the "CONNECT" prompt. Press the carriage return and the screen will display Password. Type: **cat1000(C/R)**

Command	Definition
area	Display and change AREA CODE numbers.
call	Display and change CW ID.
clck	Display and set the CLOCK.
code	Display and change CODE and PREFIX numbers.
dial	Display and program SPEED DIAL numbers.
dtmf	Display and program DTMF commands.
extn	Extend modem program timer.
flsh	FLUSH selected memory areas.
hdwr	Display and program HARDWARE input switch action.
link	Display and program LINK SERIAL TUNE frequencies.
lock	Display and program LOCK-OUT phone numbers.
mcro	Display and program MACRO commands.
menu	Displays this MENU of computer terminal commands.
page	Display and program PAGING tones.
pass	Enter a new PASSWORD to establish modem communications.
quit	EXIT the computer terminal mode.
schd	Display and program SCHEDULER activity.
stat	Display ACTIVITY counters.
talk	Display and program VOICE synthesizer messages.
test	Perform diagnostic TEST of controller.
time	Display and change TIMER settings.
tone	Display and program COURTESY tone.
ufsw	Display and program SWITCHES on MF-1000 card.
vers	Display current software VERSION and release date.
xfer	Xmodem file UPLOAD and DOWNLOAD to save to disk.

Computer Modem Parameters		RS-232 Serial Port
Mode	ORIGINATE	
Baud Rate	300	4800
Data Bits	8	8
Parity	N	N
Stop Bits	1	1

Default Password: **cat1000** Password Buffer: (15 Characters Max)

Notes:

The command prompt is: **->** The password is case sensitive. Entries can be in upper or lower case. In the examples, all prefix numbers are default values and the carriage return is displayed as (C/R).

Area Code - area

To DISPLAY the AREA CODE table Type: **area(C/R)**. The terminal will display the list of AREA CODES.

To **READ** an individual AREA CODE stored at table position 12 Type: **area/r12(C/R)**.

To **PROGRAM** an AREA CODE at table position 2, Example:305 Type: **area/w2,305(C/R)**.

To **ERASE** an AREA CODE at table position 5 Type: **area/e5(C/R)**.

Call Letter Identification - call

To **READ** the CW call letter identification buffers, including tone frequency and speed, Type: **call(C/R)**.

To **PROGRAM** the CW call letter identification, Example: [W4XYZ-800Hz-20WPM] Type: **call/w1,4,2,w4xyz(C/R)**.

To **ERASE** the CW ID Type: **call/e1(C/R)**. To transmit CW ID Type: **call/t1(C/R)**. CW selection is limited to the frequencies and speeds listed in Figure 6-1.

Tone Frequency Hz 1=500 2=600 3=700 4=800 5=900 6=1000 7=1100 8=1200	
W.P.M. 1=25 2=20 3=18 4=15 5=13 6=10	Entry 0-9 A-Z / . , ; : ? (SPACE

Figure 6-1

Time Clock - clck

To **READ** the time Type: **clck(C/R)**. The terminal will display the current time in hours, minutes, day of week, day of month and month of year.

To **SET** time: Example: [1:30 PM MONDAY 7 DECEMBER] Type: **clck/13,30,2,7,12(C/R)**. Refer to the Clock Programming Table Figure 6-2 for inputs.

hour	00-23	Sun=1
minute	00-59	Mon=2 Fri=6
day of week	1-7	Tue=3 Sat=7
day of month	01-31	Wed=4
month of year	01-12	Thr=5

Clock Programming Table
Figure 6-2

Control And Prefix Numbers - code

To **LIST** and display all CAT-1000 prefix codes Type: **code(C/R)**.

To **READ** the setting of the autopatch access code [*513*].
Type: **code/r513(C/R)**. The terminal will display: [code 513 set to *].

To **PROGRAM** code [*513*] to 456 Type: **code/w513,456(C/R)**.

Speed Dial - dial

To **DISPLAY** the speed dial list for group 2, Type: **dial/2(C/R)**. Numbers and letters will be displayed. Other voice words will be displayed as [*]. The terminal will display page one of the group 2 speed dial table. There are a total of five pages containing twenty numbers with call letter identifications.

To **DISPLAY** the emergency speed dial list, Type: **dial/4(C/R)**.

To **READ** an individual speed dial number stored in group 1, position 22 Type: **dial/r122(C/R)**. The voice words are displayed as three digit numbers from the voice vocabulary list.

To **PROGRAM** a phone number at speed dial number in group 3, position 15, Example: 978-6171 W4XYZ. Type: **dial/w315,9786171,890,004,920,930,950(C/R)**.

To **PROGRAM** an emergency speed dial number at position 5, Example: 722-5500 POLICE DEPARTMENT. Type: **dial/w405,7225500,692,321(C/R)**.

To **PROGRAM** a speed dial number with dialing delays enter [$] at the desired location. Each [$] represents a one second delay. To program a phone number at speed dial number in group 1, position 5, Example: 9, 2 second delay, 978-6171 W4XYZ. Type: **dial/w315,9$$9786171,890,004,920,930,950(C/R)**.

To **ERASE** a speed dial number stored in group 2, position 55 Type: **dial/e255(C/R)**. Emergency speed dial numbers are assigned group 4 positions 00 to 09.

DTMF Generator - dtmf

To **DISPLAY** the DTMF GENERATOR table Type: **dtmf(C/R)**. The terminal will display the list of DTMF commands.

To **READ** an individual DTMF command stored at table position 9 Type: **dtmf/r9(C/R)**.

To **PROGRAM** a DTMF command at table position 15, Example: 4075*2AB Type: **dtmf/w2,4075*2ab(C/R)**.

To **ERASE** the DTMF command at table position 2 Type: **dtmf/e2(C/R)**.

Extend Modem Connect Timer - extn

The modem connect time is determined by the [*618*] timer. To reset the timer type: **extn(C/R)**. A warning is given one minute prior to the system timing out. During X-Modem file transfers, the CRT will not time out. When the file transfer is complete, the timer will be reset to one minute and a warning message will be issued to the user. During initialization, the [*618*] defaults to 20 minutes.

Flush Selected Memory Area - flsh

This command is used to flush certain blocks of memory without disturbing others. To flush Speed Dial Block #1 type: **flsh/1(C/R)**.

```
ÉÍÍÍÍÍÍÍÑÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÑÍÍÍÍÍÍÍÑÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ»
ºCOMMAND ³        DESCRIPTION          ³COMMAND ³         DESCRIPTION        º
ÌÍÍÍÍÍÍÍØÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍØÍÍÍÍÍÍÍØÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ¹
º flsh/1 ³ Flush Speed Dial Block #1. ³ flsh/4 ³ Flush Emergency Speed Dials º
º flsh/2 ³ Flush Speed Dial Block #2. ³ flsh/5 ³ Flush Schedular Memory      º
º flsh/3 ³ Flush Speed Dial Block #3. ³ flsh/6 ³ Flush Macro Memory          º
ÈÍÍÍÍÍÍÍÏÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÏÍÍÍÍÍÍÍÏÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ¼
```

Hardware Input Switches - hdwr

To **DISPLAY** the HARDWARE input switch table Type: **hdwr(C/R)**. The terminal will display a list of eight commands that are programmed to activate when a positive input is applied to one of the CAT-1000 input lines.

To **READ** an HARDWARE command activated by input switch 3, Type: **hdwr/r3(C/R)**.

To **PROGRAM** a HARDWARE command to be activated by input switch 8, Example: Turn on Zone 3 channel 5. Type: **hdwr/w8,1351(C/R)**.

```
                                   ÀÁÁÁÄÄInternal Command (See Figure 5-1)
```

To **ERASE** the HARDWARE command for switch 5 Type: **hdwr/e5(C/R)**.

Remote Base Serial Tuning - link

To **DISPLAY** the Remote Base Serial Frequency list Type: **link(C/R)**. The terminal will display the remote base frequency load commands.

To **READ** a Remote Base Frequency stored at table position 18 Type: **link/r18(C/R)**

To **PROGRAM** a Remote Base Frequency memory, Example: At table position 5, load 146.940 MHz, offset (-), transmitter power HIGH.

```
        Type: link/w5,694011(C/R)
                     ³ ³³³³³ÀÄÄ Transmitter Power 0=Low,1=High)
   Table Position ÄÄÙ ³³³³ÀÄÄÄÄ Offset 1=Minus,2=Simplex,3=Plus
          MHz 1'sÄÄÄÄÄÙ³³ÀÄÄÄÄÄ Khz 1's (0 or 5)
       KHz 100'sÄÄÄÄÄÄÙÀÄÄÄÄÄÄÄÄ Khz 10's
```

To **PROGRAM** a Remote Base Frequency memory for the RBI-1 Interface. Example: At table position 3, load 443.175 MHz, offset (+), CTCSS encoder frequency 131.8 Hz.

```
      Type: link/w3,4,4,1,7,5,3,20 (C/R)
   Table PositionÄÙ ³ ³ ³ ³ ³ ³ ÀÁÄÄ CTCSS Tone (See Figure 17-3)
     Band NumberÄÄÄÄÙ ³ ³ ³ ³ ÀÄÄÄÄÄ Offset 1=Minus,2=Simplex,3=Plus
         MHz 1'sÄÄÄÄÄÄÙ ³ ³ ÀÄÄÄÄÄÄÄ Khz 1's (0 or 5)
      KHz 100'sÄÄÄÄÄÄÄÄÙ ÀÄÄÄÄÄÄÄÄÄ Khz 10's
```

To **ERASE** a Remote Base Frequency at table position 2 Type: **link/e2(C/R)**

Telephone Number Lock-out - lock

To **DISPLAY** the lock-out phone number list Type: **lock(C/R)**.

To **READ** a locked out number stored at table position 3 Type: **lock/r3(C/R)**.

To **PROGRAM** a number at table position 15, Example: 555-1212
Type: **lock/w15,5551212(C/R)**.

To lock-out an entire telephone prefix at table position 15, Example: All 976 numbers Type: **lock/w15,976****(C/R)**.

To **ERASE** a lock-out number stored at table position 1 Type: **lock/e01(C/R)**.

Macro - mcro

To **DISPLAY** the MACRO command table Type: **mcro(C/R)**. The terminal will display the macro command strings stored at each of the forty table positions. Each table will hold ten commands.

To **READ** the MACRO command stored at table position 15 Type: **mcro/r15(C/R)**.

To **PROGRAM** a MACRO at table position 6, Example: With a macro command number of 84163, turn on repeater CTCSS Zone 1 CH 2, turn off autopatch Zone 4 CH 1, Turn on User Function switch 5, and announce the time.

```
    Type: mcro/w6,84163/1121,1410,1851,2000(C/R).
  Macro Code NumberÄÙ   ÀÁÁÁÁÁÁÁÁÁÁÁÁÁÁÁÁÁÁÁÁÄInternal Command (See Figure 5-1)
```

To **ERASE** a MACRO command at table position 2 Type: **mcro/e2(C/R)**.

Menu - menu

To **DISPLAY** this menu of terminal commands Type: **menu(C/R)**.

Paging Tone - page

To **DISPLAY** the PAGING TONE table Type: **page(C/R)**. The terminal will display the list of PAGING TONES.

To **READ** the PAGING TONE stored at table position 19 Type: **page/r19(C/R).**

To **PROGRAM** a PAGING TONE at table position 2, Example: 879Hz-1395Hz
Type: **page/w2,28,68(C/R)**. See figure 5-16.

To **TRANSMIT** a PAGING TONE at table position 14, Type: **page/t14(C/R).**

To **ERASE** a PAGING TONE at table position 16 Type: **page/e16(C/R)**.

Enter New Password - pass

To provide security, a password must be entered to establish communications with the CAT-1000 through the 300 baud modem or the local RS-232 Serial port. The default password is **cat1000.**

To **CHANGE** the password, Example: w4xyz Type: **pass(C/R).**
The terminal will display the prompt: Enter new password: Type: **w4xyz(C/R).**
The terminal will display the prompt: Please retype it: Type: **w4xyz(C/R).**
The terminal will display: Password has been changed.

Exit Terminal Routine - quit

To **EXIT** the terminal mode and return the CAT-1000 to normal operation
Type: **quit(C/R)**. The sign-off message will appear.

Scheduler - schd

To **DISPLAY** the CAT-1000 scheduler Type: **schd(C/R)**. The terminal will display page one of the scheduler table. There are three pages containing twenty positions each. Each position displays the time and scheduled command. To schedule a command Example: Turn off the autopatch every night at 11:00 P.M.

```
                                       ÚÂÂÂÄÄInternal Command Structure
            Type: schd/w5/23,00,0,0,0/1410(C/R)  (See Figure 5-1)
       Table PositionÄÄÄÙ  ³   ³ ³ ³ ³ ³³³ÀÄOff
                HoursÄÄÄÄÄÄÙ   ³ ³ ³ ³ ³³ÀÄÄChannel Number
             MinutesÄÄÄÄÄÄÄÄÄÙ ³ ³ ³ ³ÀÄÄÄZone Number
         Day of WeekÄÄÄÄÄÄÄÄÄÄÄÙ ³ ³ ÀÄÄÄÄPointer Number
       Day of MonthÄÄÄÄÄÄÄÄÄÄÄÄÄÙ ÀÄÄÄÄÄÄMonth of Year
```

Example: Transmit voice message 9, Tuesday night at 7:30 P.M.

```
                                       ÚÂÂÂÄInternal Command Structure
            Type: schd/w6/19,30,3,0,0/3009(C/R).  (See figure 5-1)
                           ³   ³   ³ ³ ³ ³ ³ À´À´
       Table PositionÄÄÄÙ  ³   ³ ³ ³ ³ ³  ³ ³
                HoursÄÄÄÄÄÄÙ   ³ ³ ³ ³ ³  ³ ³
             MinutesÄÄÄÄÄÄÄÄÄÙ ³ ³ ³  ³ ÀÄÄÄMessage Number
         Day of WeekÄÄÄÄÄÄÄÄÄÄÄÙ ³ ³  ÀÄÄÄÄPointer
       Day of MonthÄÄÄÄÄÄÄÄÄÄÄÄÄÙ ÀÄÄÄÄÄÄÄMonth of Year
```

```
 ÉÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ»
 º                                 ÚÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ¿                  º
 º Table Position   1-60     ÚÄÄÄÄ´ *=Every Hour ³                   º
 º Hour             0-23-* ÄÄÄÙ    ÀÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÙ                   º
 º Minutes          0-59  ÚÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄ¿ º
 º Day of Week      0-9 ÄÄ´ 0=Daily    4=Tuesday    8=Weekdays ³ º
 º Day of Month     1-31  ³ 1=Sunday   5=Wednesday  9=Weekends ³ º
 º Month of Year    1-12  ³ 2=Monday   6=Thursday              ³ º
 º                        ³ 3=Tuesday  7=Saturday              ³ º
 º                        ÀÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÄÙ º
 ÈÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ¼
```

Scheduler Programming Table
Figure 6-3

To **ERASE** a scheduler command at table position 2 Type: **schd/e2(C/R).**

Statistics - stat

The CAT-1000 counts various repeater activities. Once the counters reach 9999 they will roll over to 0000. The counters can be reset with the erase command. To **LIST** the status counters Type: **stat(C/R)**. The terminal will display the following status report:

```
Repeater operation status report:
     Manual autopatch:  0059
          Speed dials:  0023
Emergency speed dials:  0011
    Reverse autopatch:  0012
      Off air control:  0009
    Telephone control:  0003
  Off air programming:  0000
Telephone programming:  0015
 Telephone ring detect:  0122
           CRT logins:  0005
```

To manually **RESET** the counters to 0000 Type: **stat/e(C/R)**.

Voice Synthesizer - talk

To **READ** voice message [12], Type: **talk/r12(C/R)**.

To **PROGRAM** voice message [5], Type: **talk/w5,890,004,920,930,950,746(C/R)**.

```
                                            ³   ³   ³   ³   ³   ³   ³
                          Table PositionÄÄÙ  W   4   X   Y   Z   ÀÄÄREPEATER
```

To **ERASE** voice message [7], Type: **talk/e7(C/R)**.

To **TRANSMIT** voice message [14], Type: **talk/t14(C/R)**. The CAT-1000 will key the transmitter and say the message.

Diagnostics Test - test

The CAT-1000 contains a series of diagnostics test designed to evaluate operational performance of the controller and the over all repeater system.

To perform a checksum test on both the program and voice ROM's Type: **test/c(C/R)**. The terminal will display:

```
Checksum ROM1 (Program): 4752
Checksum ROM2   (Voice): 5DAC
```

Checksum will vary with different software revisions.

To perform an extensive bit test of the 32K RAM Type: **test/m(C/R)**. The terminal will display:

```
32K RAM memory test: Passed
```

To perform a barber pole data shift to the MF-1000 Serial Interface Card Type: **test/s(C/R)**.

To exercise the sixteen output ports Type: **test/o(C/R)**. Each output will be switched on for a half second in the order listed below.

1. PTT #1	5. Strobe #1	9. UF Switch #1	13. UF Switch #5
2. PTT #2	6. Strobe #2	10. UF Switch #2	14. UF Switch #6
3. Serial Data	7. Off Hook *	11. UF Switch #3	15. UF Switch #7
4. Serial Clock	8. Modem *	12. UF Switch #4	16. UF Switch #8

* Off Hook and Modem outputs are not exercised when this test is conducted through the modem.

To perform a test and display the twenty-four input ports Type: **test/i(C/R)**. Each of the inputs will be displayed. A [0] indicates the port is low, while a [1] indicates the port is high. Figure 6-7 defines the terminal display. The 0 - 1 display is an example only and may very with each repeater configuration. Key-up on the repeater input and watch COR #1 display change state. Strike any key to terminate the input display.

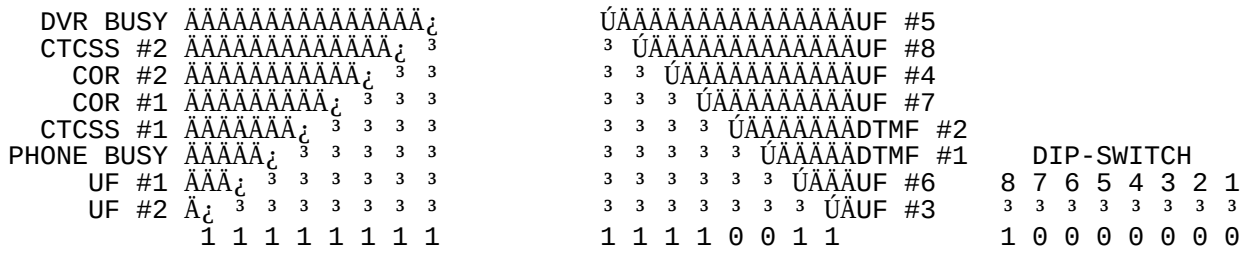


Figure 6-7

Timer Set - time

To **LIST** and display all CAT-1000 timers Type: **time(C/R)**.

To **READ** the setting of the time-out timer [*601*]. Type: **time/r601(C/R)**. The terminal will display: [timer 601 set for 600 seconds].

To **PROGRAM** timer [*601*] for five minutes Type: **time/w601,300(C/R)**

Courtesy Tone - tone

To **READ** the frequency and duration of the courtesy tone at table location 4, Type: **tone/r4(C/R)**.

To **PROGRAM** a single courtesy tone, Example: Program courtesy tone table at location 1 with 800Hz frequency and 150mSEC duration. Type: **tone/w1,4,3(C/R)**.

To **PROGRAM** a multiple courtesy tone, Example: Program courtesy tone table location 5 with a three frequency tone described in Figure 6-4. Type: **tone/w5,4,2,1,6,3,2,8,4(C/R)**.

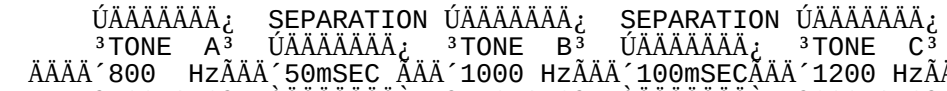


Figure 6-4

To **ERASE** the courtesy tone stored at table position 8, Type: **tone/e8(C/R)**

To **TRANSMIT** the courtesy tone at table position 6, Type: **tone/t6(C/R)** Tone selection is limited to the frequencies and times listed in Figure 6-5.

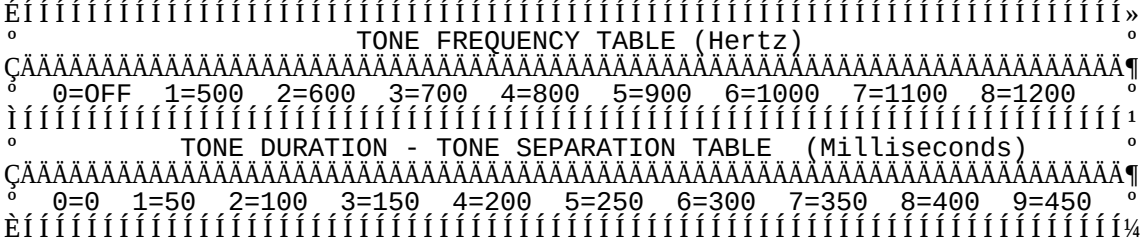


Figure 6-5

MF-1000 Board #1, #2 and DVR-1000 Switches - ufsw

To DISPLAY the serial board switch logic command table Type: **ufsw(C/R)**. The terminal will display the logic switch assignments for the eight expanded user function switches on the MF-1000 Serial Interface Card and the DVR-1000 Digital Voice Recorder. Table positions 01-40 are reserved for the eight logic switches on Serial Card #1 (Link Transceiver Tuning). Table positions 41-80 are reserved for the eight logic switches on Serial Card #2 and the Digital Voice Recorder. The CAT-1000 must be in the remote base mode. Set dip-switch #3 or #4 to ON.

To **READ** an individual serial board switch logic command stored at table position 9 Type: **ufsw/r9(C/R)**.

To **PROGRAM** a serial board switch logic command at table position 15, Example: set switches [1-2-6-7 ON], switches [3-4-5-8 OFF].

Type: **ufsw/w15,11000110(C/R)**.

```
Table PositionÄÄÙ ³³³³³³³ÀÄÄÄÄÄÄSwitch #8
 Switch #1ÄÄÄÄÄÄÄÄÙ³³³³³ÀÄÄÄÄÄÄÄSwitch #7
 Switch #2ÄÄÄÄÄÄÄÄÄÙ³³³ÀÄÄÄÄÄÄÄÄSwitch #6
 Switch #3ÄÄÄÄÄÄÄÄÄÄÙ³ÀÄÄÄÄÄÄÄÄÄSwitch #5
                      ÀÄÄÄÄÄÄÄÄÄÄSwitch #4
```

To **ERASE** a serial board switch logic command at table position 2
Type: **ufsw/e2(C/R)**.

Version - vers

The CAT-1000 will display on the terminal, the current software version and release date for both the program and voice PROMs. To list and display the software version Type: **vers(C/R)**.

Transfer Data Up/Down - xfer

This command is used to transfer the contents of the CAT-1000 memory between the controller and a computer were it can be stored on disk as a back-up file or used with the editor program. The memory is divided into eight blocks. Data transfer is limited to one block at a time using the [xfer] command. Three and a half minutes are required to transfer each block using the internal 300 baud modem. If the RS-232 4800 baud port is used, block transfer takes approximately twenty seconds. You may change the file name however you must keep the [.001 through .008] extensions.

To **DOWNLOAD** memory block #1 of the CAT-1000 RAM memory and save it to disk, Type: **xfer/d1(C/R)**. The CAT-1000 will send the block using Xmodem download protocol. Select the Xmodem transfer function on your computer. Type the file name: **cat.001(C/R)**. Once the download sequence starts, monitor the activity display of packet count, until the download is complete.

To **UPLOAD** memory block #4 to the CAT-1000 RAM memory from disk, Type: **xfer/u4(C/R)**. The CAT-1000 will send: [select Xmodem download protocol]. Select the Xmodem transfer function on your computer. Type the file name: **cat.004(C/R)**. Once the upload sequence starts, monitor the activity display of packet count, until the upload is complete. Memory is transferred in blocks. Each block contains 4096 bytes of data. Select the block number to be transferred.

CAT-1000 Memory Map

BLOCK	HEX ADDRESS	DEFINITION
1	0000 - 0FFF	Temporary Storage, Process Flags
2	1000 - 1FFF	Memory Save 1, 2, and 3
3	2000 - 2FFF	Memory Save 3, 4, 5, 6 and 7
4	3000 - 3FFF	Memory Save 7 and 8, Zone 1 thru 8, Timer Values, Control Codes, Voice Messages 1 thru 40
5	4000 - 4FFF	Voice Message 40, Macro Table, CW ID, Lockout Number Table, Schedular Table, Area Code Table, Link Frequency Table, Expanded User Function Switch Table User Function Input Switches, DTMF Generator Table, Page Tones, Telephone Pre-Dial, Speed Dial Group #1
6	5000 - 5FFF	Speed Dial Group #1, Speed Dial Group #2
7	6000 - 6FFF	Speed Dial Group #2, Speed Dial Group #3
8	7000 - 7FFF	Speed Dial Group #3, Emergency Speed Dial

Memory Table
Figure 6-6

CAT-1000 Windows Editor

The CAT Windows Editor offers a monumental break through in repeater controller programming. No endless string of DTMF tones to enter of confusing script files to write. Completely mouse driven, just point and click.

Voice Messages

From the voice message display window, place the hand on the message cell and double click. The voice synthesizer editor dialogue box window will appear. From the voice message display window, place the hand on the message cell and double click. The voice synthesizer editor dialogue box window will appear. Double click the letters, words and numbers in the voice word table.

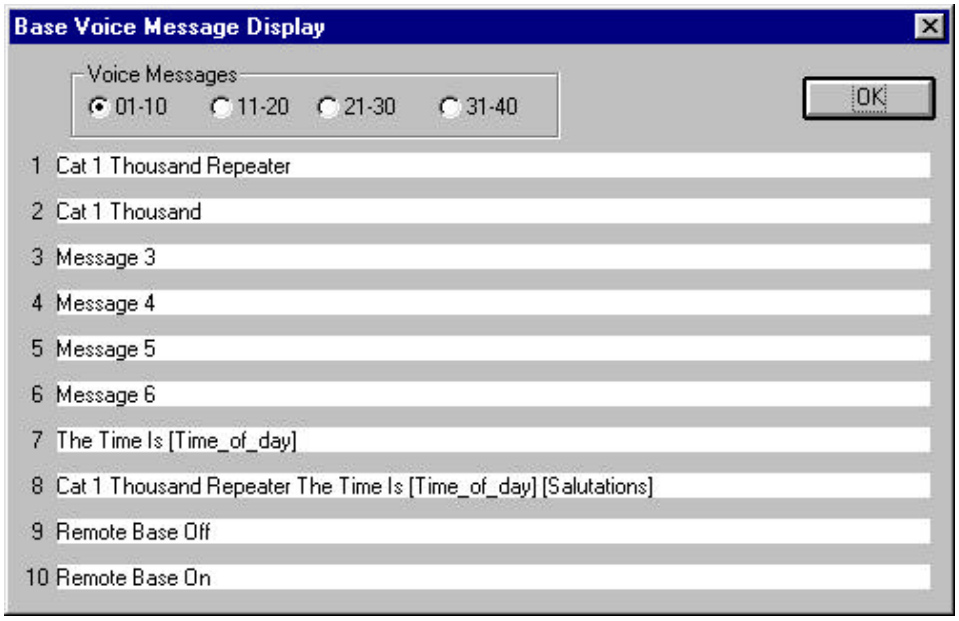


Figure 6-7

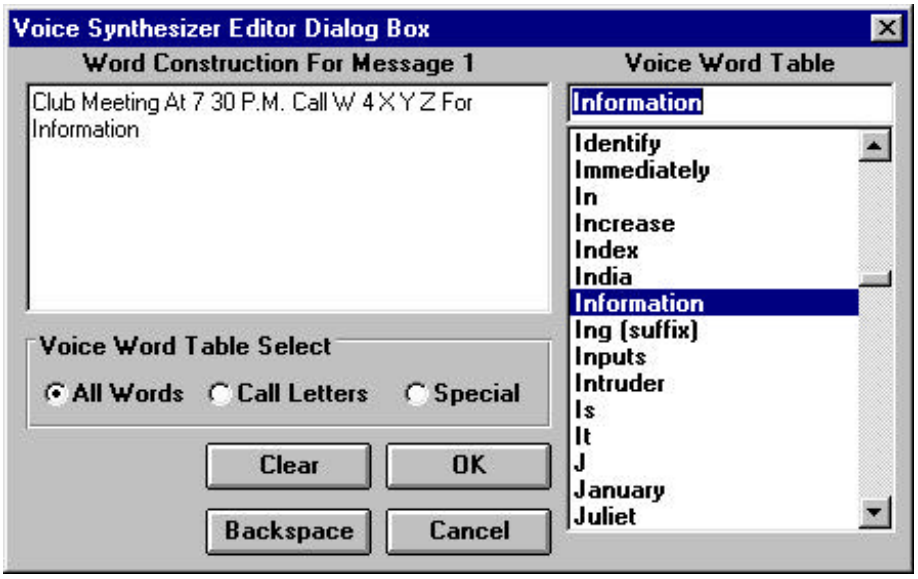


Figure 6-8

Print Driver

The CAT-1000 Windows Editor Program includes a print driver to produce a hard copy 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 1-8	Macros	Scheduler	Speed Dials
Paging Tones	Courtesy Tones	CW Messages	DTMF Tones
Telephone Lockout	Area Codes	Remote Base Frequencies	

User Speed Dial

To program a speed dial window, place the hand 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.

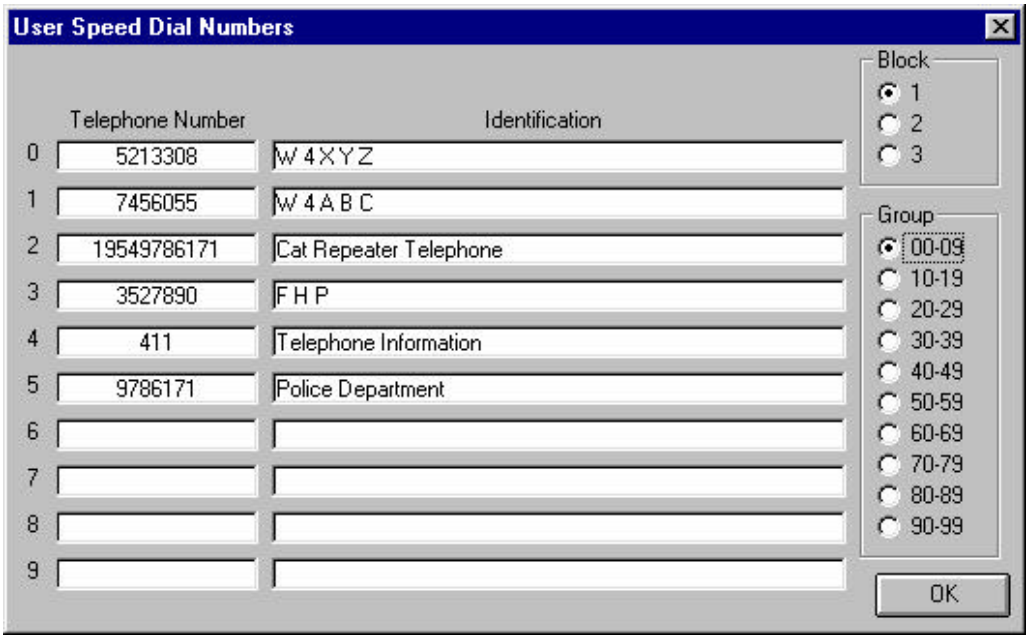


Figure 6-9

Emergency Speed Dial

To program an emergency speed dial location, use the emergency speed dial window.

Figure 6-10

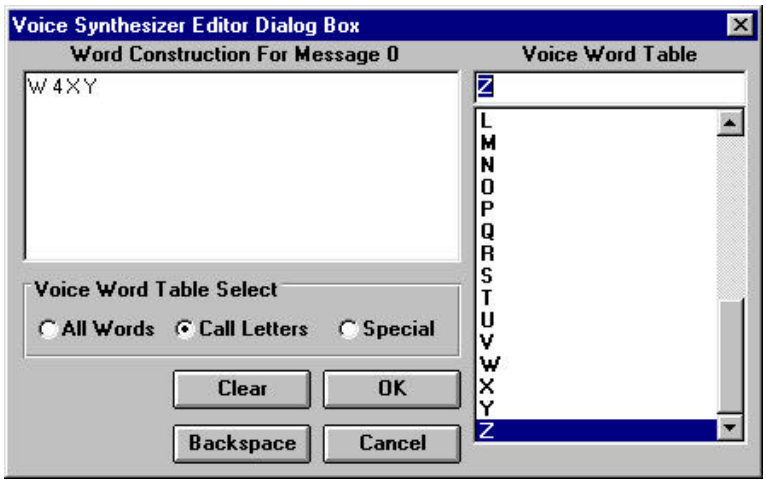


Figure 6-11

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.

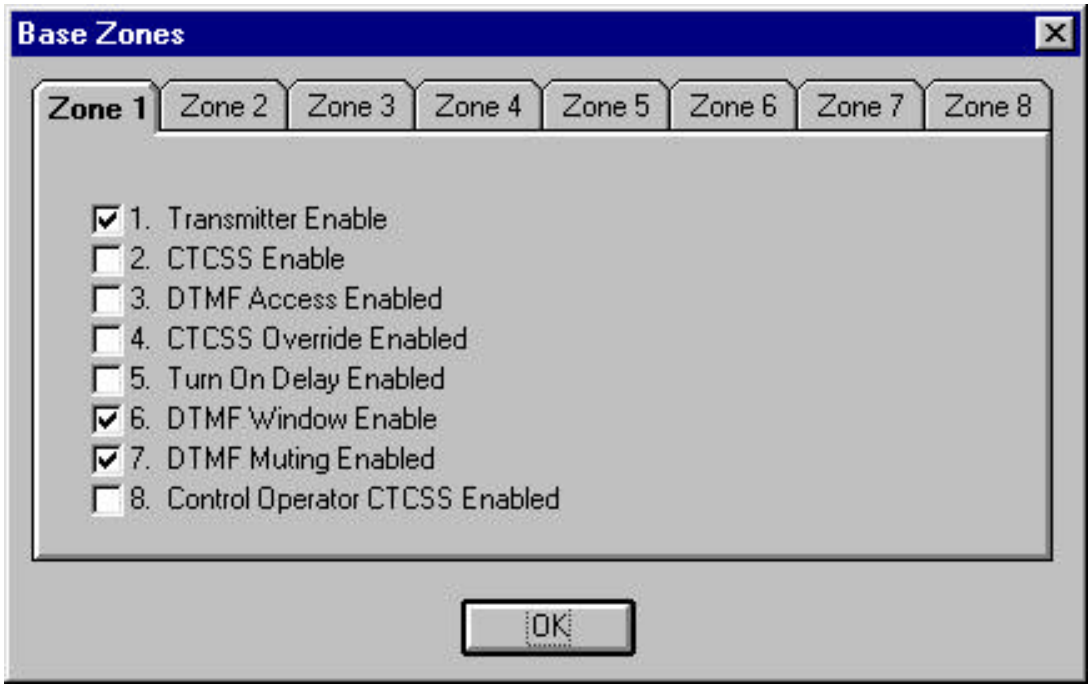


Figure 6-12

Remote Base Frequencies

To program a remote base memory location, from the remote base frequency window, place the hand on the remote base frequency window, place the hand on the frequency cell to be programmed and double click. The frequency position window will appear. Place the arrow in the frequency cell and click on the frequency and click on the frequency numbers to advance the frequency to the desired setting. Place the arrow in the TX OFFSET box and click to select MINUS, PLUS or SIMPLEX offset. Place the arrow in the POWER box and click on the desired POWER setting. Place the arrow in the CTCSS box and click to select ON. Place the arrow in the CTCSS cell and click on the CTCSS tone frequency numbers to advance the CTCSS tone frequency to the desired setting. Click OK to return to the REMOTE BASE FREQUENCY window.

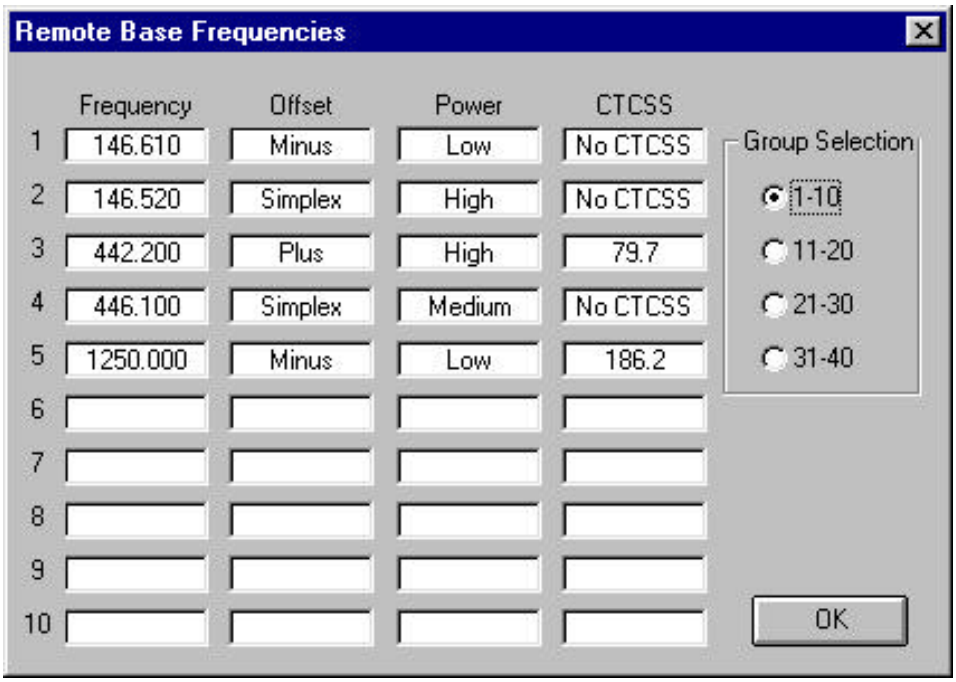


Figure 6-13

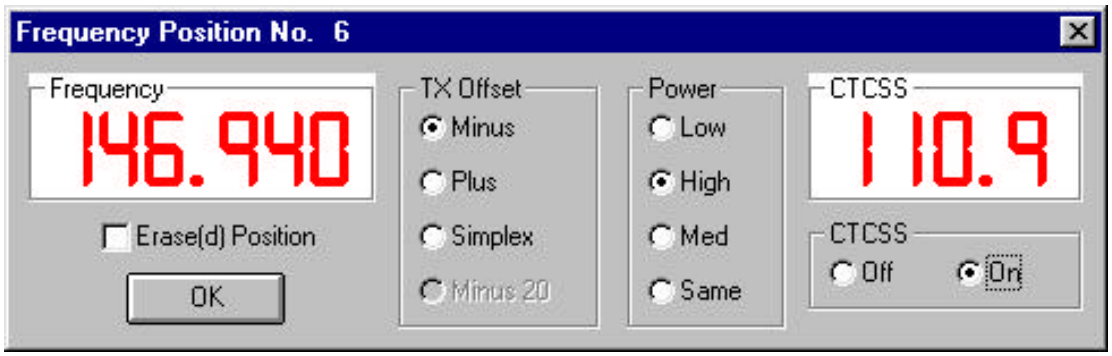


Figure 6-14

Scheduler

From the scheduler window, p[lace the hand 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.

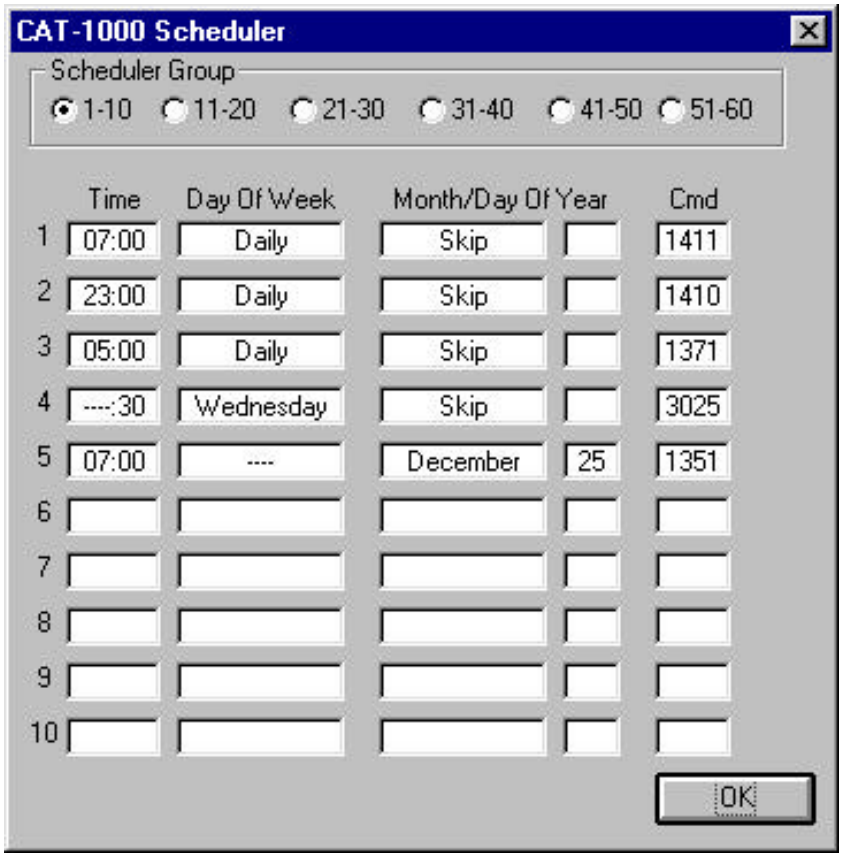


Figure 6-15

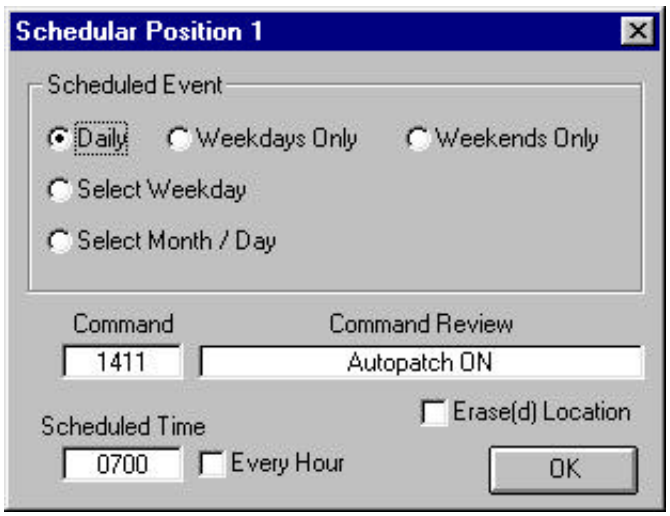


Figure 6-16

Control Codes

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

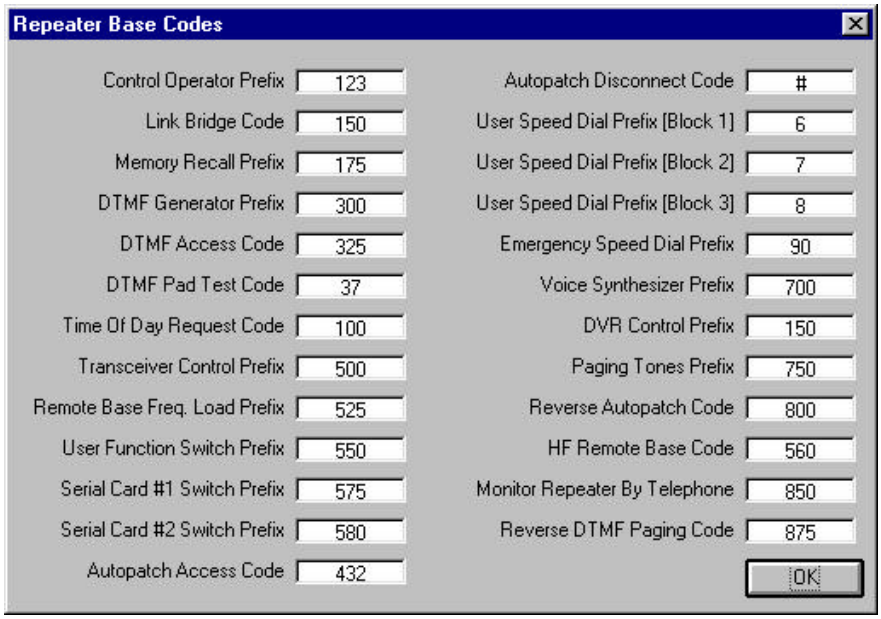


Figure 6-17

Figure 6-18

Windows-95 Serial Port Communications Problem.

When communicating with the CAT-1000, if you experience difficulties during memory file transfers, a hardware flow problem may exist. Computers running under the Windows-95 operating system default the UART (Universal Asynchronous Receiver Transmitter) transmitter buffer to sixteen character bytes. The UART will not stop transmitting until it's buffer is empty. This causes a hardware overflow condition. To resolve this problem, the UART buffer needs to be reduced to one character byte to match the CAT-1000.

1. At Windows-95 desk top, double click on the **My Computer** icon.

2. At My Computer window double click on the **Dial-Up Networking** icon.

3. From the DIAL-Up Networking window, Highlight **Your Connection** icon and click **File** and **Properties.**

4. Click on the **Configure** button.

5. Click on the **Connection** tab.

6. Click on the **Port Settings** button to display the **Advanced Port Settings** window.

7. From the Advanced Port Settings window, move the **receiver** and **transmitte**r buffer sliders to the Low (1) position. See Figure 6-14.

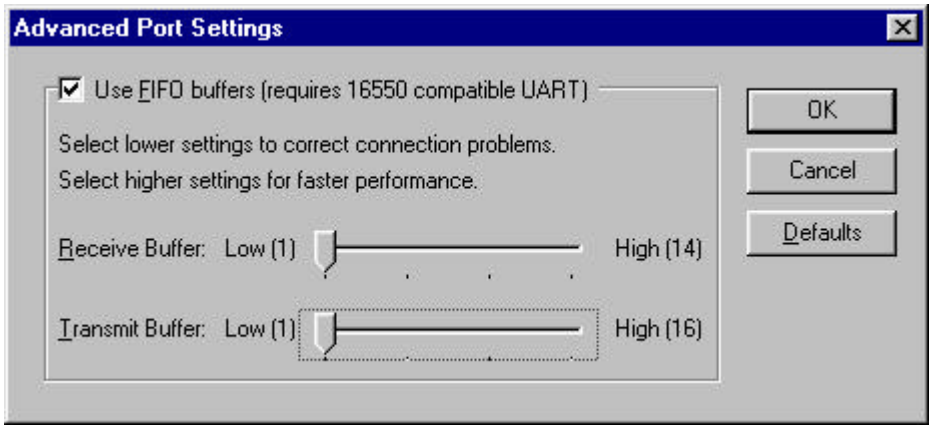


Figure 6-19

CAT-1000 DOS Editor Program

The CAT-1000 DOS Editor Program is used to manage the eight data files off line. This editor will work with any "XT" or "AT" type computer using a DOS operating system. The programming commands described in this chapter can be exercised locally without communicating directly with the CAT-1000. Once the files have been changed and saved to disk, they can be uploaded to the CAT-1000 at the repeater site using the **xfer/u1** through **xfer/u8** commands.

The CAT-1000 Editor disk contains the following files: CAT.EXE, CAT1000.WRD, CAT1000.HLP, CAT.001 through CAT.008. CAT.EXE is the "CAT-1000 Editor program." CAT1000.WRD contains the vocabulary word list used to program the voice messages and speed dial identifications. CAT1000.HLP is used to display the Internal Command four digit numbers, during schedular programming.

Also included is a sample memory consisting of eight memory blocks titled: CAT.001 through CAT.008. When you substitute your existing repeater's memory files they must be named .001 through .008.

To start the editor type: cat cat.001 [ENTER]. Some monochrome displays may require you to start the program by typing: cat cat.001/m [ENTER].

The first memory block (CAT.001) must be listed after the executable file. The editor will check for all eight memory blocks and the CAT1000.WRD voice file. Press the [INS] key to insert new data. Press the [ESC] key to back-up through the screens. When programming the scheduler, press the [F1] key to display a window of Internal Command Numbers.

A check mark on the main menu indicates operations that can be preserved during a memory save. This includes the 64 Control Channels, Prefix codes, Timer settings and first twelve voice messages.

This program will not communicate with the CAT-1000 through the 300 baud modem. The CAT-1000 Editor is used to program and manipulate the memory files off line of the controller. Use any popular communications program to up-loaded the files using X-Modem protocol. The files are in binary format.

Chapter 7 - Interfacing to Other Equipment

Interfacing the CAT-1000 to your repeater system is a simple matter. A minimum of two inputs and two outputs are required for the CAT-1000 to control a repeater. They are:

1. A COR signal to indicate when a signal is being received.
2. A receive 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-1000.

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 is any voltage less than 0.8VDC. A positive voltage is any voltage greater than 3.0VDC. Set dip switch #1 on the CAT-1000 to ON for (negative logic) and OFF for (positive logic).

Connection to Receiver

Connect the repeater receiver audio output to J4-13 and the COR to J4-6 of the CAT-1000. Measure the COR 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 to the COR #1 line. This may also be true for the COR #2 and CTCSS inputs.

Connection to Transmitter

Locate your repeater's Push-To-Talk input. When grounded, this line will make the repeater transmit. Connect the CAT-1000 PTT #1 output (J4-10) to this line. Locate your repeater's TX audio input. This is the line were the audio signal used to modulate the transmitter is applied. Connect the TX #1 AUDIO (J4-11) to this line.

Connection to CTCSS Decoder

If your repeater receiver has a CTCSS decoder output, connect it to J4-4. In addition to COR, the CAT-1000 requires a positive logic input to represent a CTCSS input.

Interface Review

1. Are dip-switches #1 through #8 in their proper positions?
2. Is the PTT #1 output at J4-10 connected to the transmitter PTT input?
3. Is the TX #1 Audio at J4-11 connected to the transmitter audio input?
4. Is the COR #1 at J4-6 connected to the repeater receiver COR output?
5. Is dip-switch #1 ON for active low COR or OFF for active high COR?
6. Is the COR level changing from less than 0.8 VDC to greater than 3.0 VDC?
7. Is the RX #1 AUDIO at J4-13 connected to the receiver audio output?
8. Is the audio input level sufficient for the DTMF decoder?

Power Supply

The CAT-1000 is powered by an external 12VDC power supply. Connect the positive lead of the supply to the center pin of the coaxial power connector J2 and the negative lead to the outer conductor.

Audio Level Adjustment (Radio)

The audio mixing-switching circuits of the CAT-1000 are optimized around an input and output of -10dBM (220mV RMS). For best results the receiver audio input should be 220mV when a DTMF tone is being received.

Unlock the CAT-1000 and enter the [*90] programming command to produce the 1000Hz test tone. Adjust the TX #1 Audio level control (R23) for a transmit audio output level of -16dBM (120mV RMS) at TP5. (R23) has a range of adjustment from -6dBM (350mV RMS) to -26dBM (40mV RMS). Enter the [*90] programming command to produce the 1000Hz test tone. Adjust the TX #2 Audio level control (R31) for a transmit audio output level of -16dBM (120mV RMS) at TP4. (R31) has a range of adjustment from -6dBM (350mV RMS) to -26dBM (40mV RMS). Lock the CAT-1000 with the [*0] command.

While providing a DTMF audio input at J4-13, adjust the RX #1 Audio level control (R28) for an audio level at TP8 of -10dBM (220mV RMS). While providing a DTMF audio input at J4-12, adjust the RX #2 Audio level control (R36) for an audio level at TP7 of -10dBM (220mV RMS).

Once the RX #1, RX #2 and TEST Tone Audios are balanced, adjust the TX #1 Audio level control (R23) for the desired level of modulation while monitoring the repeater's transmitter. Adjust the TX #2 Audio level control (R31) for the desired level of modulation while monitoring the transceiver's transmitter. Compare the receive and synthesized voice audio and adjust the VOICE Level (R44) as desired. Adjust R21 for the desired CW ID level and R29 for the desired courtesy beep tone level during an autopatch or DTMF muting.

If your repeater's transmit audio input is very sensitive and you find the TX #1 or TX #2 Audio level control is set to minimum, it is strongly recommended that an external voltage divider be installed at the input of the transmitter. This will insure an acceptable transmit audio signal to noise ratio.

Audio Level Adjustment (Autopatch)

Access the autopatch. While providing a DTMF audio input at J4-13, adjust (R13) on the CAT-1000 for a level at TP3 of -6dBM (300mV RMS). With the CAT-1000 in the autopatch mode, adjust the PHONE Audio (R41) for the desired level of phone audio at the transmitter audio outputs TP5 and TP4.

Test Point TP1 - COR #1 Input

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

Test Point TP2 - Ring Detector

This test point displays the output of the ring detector circuit. Normally at +5VDC, each time the telephone rings, this voltage will quickly drop to zero. Between rings, the voltage will slowly drift up towards +5VDC. However, it will be driven back to zero with the next ring.

Test Point TP3 - Telephone Audio Output

This test point displays the audio generated by the controller and sent out the phone line during an autopatch or control operator call in. Also displayed is the modem transmitter tone.

Test Point TP4 - Transmitter Audio (TX2)

This test point displays the audio generated by the controller to modulate the Transceiver's transmitter.

Test Point TP5 - Transmitter Audio (TX1)

This test point displays the audio generated by the controller to modulate the Repeater transmitter.

Test Point TP6 - COR #2 Input

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

Test Point TP7 - Receiver Audio (RX2)

This test point displays the audio from the Transceiver's receiver.

Test Point TP8 - Receiver Audio (RX1)

This test point displays the audio from the repeater receiver.

Test Point TP9 - DTMF Strobe (RX2)

This test point displays Transceiver's receiver DTMF decoder activity. Each time a DTMF tone is detected, this test point will change from zero to +5VDC. It will remain at +5VDC for the duration of the DTMF tone.

Test Point TP10 - DTMF Strobe (RX1)

This test point displays Repeater receiver DTMF decoder activity. Each time a DTMF tone is detected, this test point will change from zero to +5VDC. It will remain at +5VDC for the duration of the tone.

Repeater Interface (J1) - (J4)

Connector J4 provides an interface to the repeater and transceiver. The number one serial interface card is also connected to J4. Connector J1 provides eight Hardware Inputs, eight User Function outputs and a RS-232 Serial Port. On board jumper selection converts the RS-232 to a TTL Port.

J4 (DB25-F)	J1 (DB25-M)
1. BUSY #2 (DVR)	1. INPUT #1
2. BUSY #1 (TELEPHONE)	2. TTL OUTPUT
3. CTCSS #2	3. TTL INPUT
4. CTCSS #1	4. RS-232 INPUT
5. COR #2	5. OUTPUT #1
6. COR #1	6. OUTPUT #2
7. SERIAL DATA	7. OUTPUT #3
8. SERIAL CLOCK	8. OUTPUT #4
9. PTT #2	9. OUTPUT #5
10. PTT #1	10. INPUT #2
11. TX AUDIO #1	11. INPUT #3
12. RX AUDIO #2	12. INPUT #4
13. RX AUDIO #1	13. INPUT #5
14. SERIAL STROBE #1	14. GROUND
15. SERIAL STROBE #2	15. GROUND
16. +12VDC	16. TTL OUTPUT
17. GROUND	17. RS-232 OUTPUT
18. GROUND	18. OUTPUT #6
19. GROUND	19. OUTPUT #7
20. GROUND	20. OUTPUT #8
21. AUX AUDIO INPUT	21. GROUND
22. AUX AUDIO OUTPUT	22. GROUND
23. TX AUDIO #2	23. INPUT #6
24. GROUND	24. INPUT #7
25. GROUND	25. INPUT #8

Figure 7-1

Accessory Interface (J6)

Connector J6 provides the interface for the MF-1000 Serial Card.

Accessory Interface (J6)

1. +12 VOLTS	2. GROUND	3. NOT USED	4. STROBE #2
5. BUSY #2 DVR	6. SERIAL DATA	7. SERIAL CLOCK	8. NOT USED
9. NOT USED	10. STROBE #1	11. NOT USED	12. PLAY DVR
13. NOT USED	14. RECORD DVR		

Figure 7-2

Audio Delay Interface (J8 - J9)

This interface is used to connect a audio delay board. The CAT-1000 is shipped from the factory with jumpers installed across J8 and J9 at pins 1 and 2. This completes the receive audio path. Audio delay boards connected to J8 and J9 will eliminate the receiver squelch noise crash and the chirp of the first DTMF tone when muting is enabled.

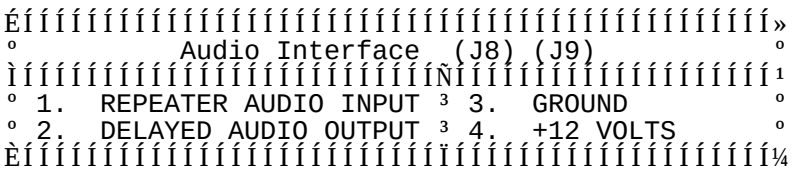


Figure 7-3

RS-232 Interface (J10)

This interface is used to connect a computer to the CAT-1000 controller. When power is applied to the CAT-1000 with dip-switch 8 set to ON, programming can be accomplished directly through this serial port bypassing the internal 300 baud modem. The serial port of the computer or terminal must be configured for 4800 baud, 8 bit, NO parity, 1 stop bit. Pins 2 and 3 of J7 must be jumpered. Fabricate a computer interface cable as shown in Figure 7-5.

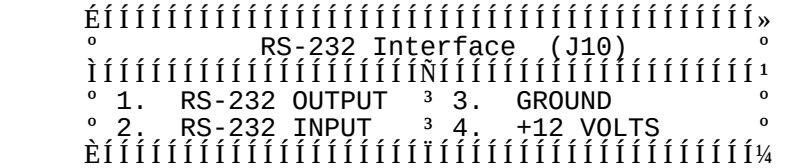
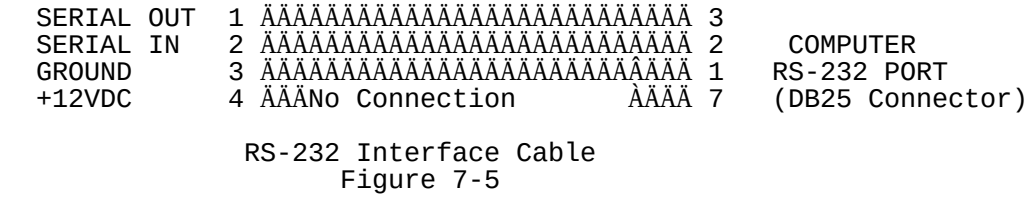


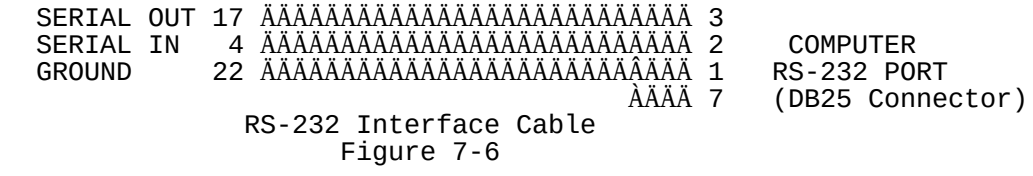
Figure 7-4



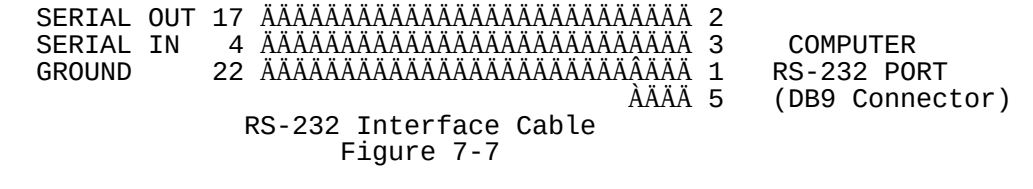
RS-232 Interface Cable
Figure 7-5

RS-232 Interface (J1)

This interface is used to connect a computer to the CAT-1000 controller. When power is applied to the CAT-1000 with dip-switch 8 set to ON, programming can be accomplished directly through this serial port bypassing the internal 300 baud modem. The serial port of the computer or terminal must be configured for 4800 baud, 8 bit, NO parity, 1 stop bit. Pins 2 and 3 of J7 must be jumpered. Fabricate a computer interface cable as shown in Figure 7-6.



RS-232 Interface Cable
Figure 7-6



RS-232 Interface Cable
Figure 7-7

Front Panel Display Interface (J11)

This interface is used to connect a front panel LED to the CAT-1000. The LED will be on whenever 12VDC is applied. Current limiting is provided by R62 on the CAT-1000 board. Additional inputs include PTT #1, PTT #2, Off Hook and DTMF Strobe #1 and #2. The DTMF strobe outputs must be buffered with an external NPN transistor to prevent loading.

Front Panel Interface			
1.	+12VDC	6.	PTT #1
2.	GROUND	7.	OFF HOOK
3.	DTMF STROBE #1	8.	PTT #2
4.	POWER INDICATOR	9.	GROUND
5.	DTMF STROBE #2	10.	GROUND

Figure 7-8

Power Switch Interface JP1

This interface is used when a front panel power switch is added to the CAT-1000 repeater controller. On the track side of the printed circuit board, cut the track connecting the two pins of JP1. This will break the +12VDC path to the voltage regulator. Connect a front panel power switch to JP1.

Internal Interface (H1) and (H4)

When the CAT-1000 is mounted in the RME-1000 rack mount enclosure the J1 and J4 connectors extend through the rear panel to the outside. Headers H1 and H4 provide access to these inputs and outputs for connection to accessory equipment such as the RBS-1000 when located inside the enclosure.

Header (H4)				Header (H1)			
1.	CTCSS #1	9.	PTT #2	1.	USER IN #5	9.	USER IN #3
2.	CTCSS #2	10.	PTT #1	2.	USER OUT #4	10.	USER OUT #7
3.	TX AUDIO	11.	RX AUDIO #1	3.	USER IN #8	11.	USER IN #6
4.	+12VDC	12.	RX AUDIO #1	4.	USER OUT #5	12.	USER OUT #2
5.	COR #2	13.	RX AUDIO #2	5.	USER IN #4	13.	USER IN #2
6.	COR #2	14.	RX AUDIO #2	6.	USER OUT #8	14.	USER OUT #6
7.	COR #1	15.	GROUND	7.	USER IN #7	15.	GROUND
8.	COR #1	16.	GROUND	8.	USER OUT #3	16.	GROUND

Figure 7-9

Header Pin Assignments

Header connectors on the CAT-1000, MF-1000 and RBS-1000 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. See Figure 7-10.

Component Side View Of Headers

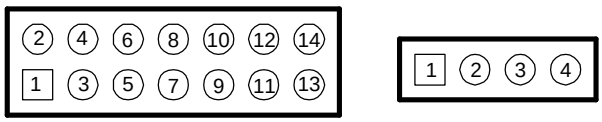


Figure 7-10

CTCSS Decoder

Connect the TS-64 CTCSS Encoder/Decoder assembly to the CAT-1000 as described in Figure 7-11. The decoder must be connected to discriminator audio. Speaker or volume control audio will have insufficient low frequency CTCSS tone content.

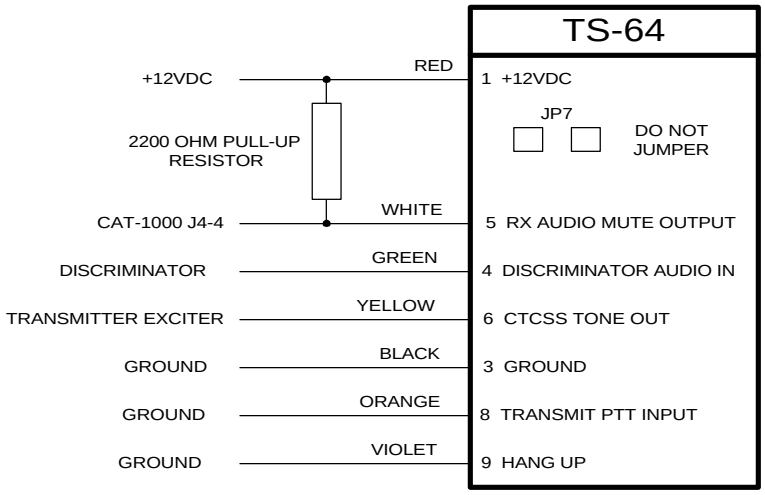


Figure 7-11

Positive Current Transmitter PTT

The CAT-1000 keys the transmitter by grounding the PTT line. Some transmitters require a DC current usually from a 12 volt DC supply to key. In these cases a switching device must be installed between the transmitter and the CAT-1000 Push-to Talk output at J4-10. Figure 7-12 describes two possible circuits that will supply the transmitter. Use caution when connecting this circuit. Do not apply +12VDC directly to J4-10. This will result in damage to U7.

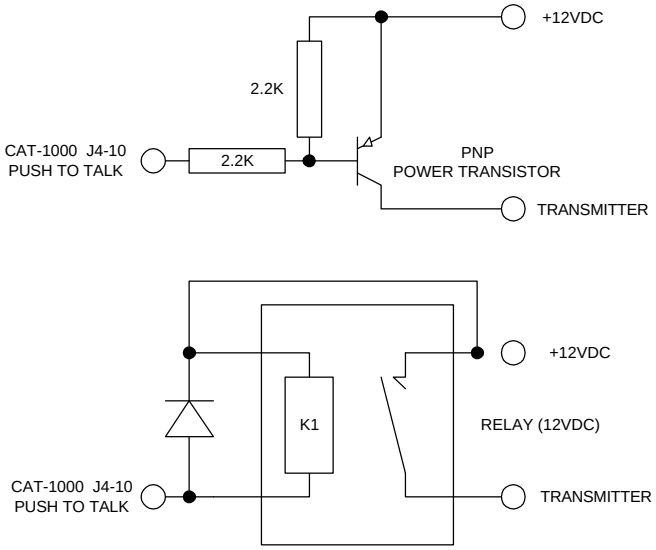


Figure 7-12

Chapter 8 - Serial Interface Card

The CAT-1000 supports two MF-1000 Serial Interface Cards. Card #1 will serial tune a Remote Base transceiver. Card #2 will control an optional Ming DVM-58 Digital Voice Recorder. Both cards are identical, with their function determined by strobe signal selection with an on board jumper. The serial word is available on connector J4 and internally on header connector J6.

Driven by a 24 bit serial word with supporting clock, data, and strobe signals, the MF-1000 card will convert the serial signal to a series of parallel outputs. Table 8-1 defines the 24 outputs for BCD and PUSH-BUTTON tuning and DVR control.

OUTPUT	BCD	PUSH-BUTTON	DVR
1	MHz 8	1	(not used)
2	Mhz 4	2	(not used)
3	Mhz 2	3	(not used)
4	Mhz 1	4	(not used)
5	KHz 100's 8	5	Track 8
6	KHz 100's 4	6	Track 4
7	KHz 100's 2	7	Track 2
8	KHz 100's 1	8	Track 1
9	KHz 10's 8	9	(not used)
10	KHz 10's 4	0	(not used)
11	KHz 10's 2	Simplex	(not used)
12	KHz 10's 1	(-) Offset	(not used)
13	KHz 1's 5/0	(+) Offset	(not used)
14	Duplex/Simplex	(not used)	Reset
15	Plus/Minus	(Clear)	Record
16	HI/LO Power	HI/LO Power	Play
17	Expanded User #8		
18	Expanded User #7		
19	Expanded User #6		
20	Expanded User #5		
21	Expanded User #4		
22	Expanded User #3		
23	Expanded User #2		
24	Expanded User #1		

MF-1000 Output Definitions
Table 8-1

The twenty-four outputs are open collector darlington relay drivers. Each driver can sink up to 200 ma. and switch 40 VDC. Place diodes across the relay coils to protect the driver from negative spikes produced when the relay coil collapses.

In the push-button mode the outputs are turned on in sequence for a time duration of two hundred milliseconds. The transmitter output power control (Pin 16) is latched. When connected to the transceiver's clear key, (Pin 15), a pulsed output, will clear the frequency entry with the [500#] command.

Transceivers that determine the offset by the frequency entered, do not require an external input. However to fulfill the six number entry requirements of the CAT-1000, a 1, 2, or 3 must be entered.

Jumper Selection

Jumper JP1 sets the logic level of the twenty-four outputs. With the jumper in position "C" all outputs are pulled up to +12VDC through 4700 ohm resistors. In position "B" the outputs are pulled up to +5VDC. In position "A" the outputs are pulled down to ground. JP2 selects the serial strobe input. With the MF-1000 connected to control a Link transceiver, this jumper should be between JP2 pins 1 and 2. When the MF-1000 is connected to control the DVR, this jumper should be between pins 2 and 3.

Serial Tuning (BCD) Output Logic

	FREQ 1.0 MHz	FREQ 0.1 MHz	FREQ .01 MHz	KHz
ENTRY	1 2 3 4 5 6 7 8 9 10 11 12 13			
0	L L L L L L L L L L L L L			
1	L L L H L L L H L L L H -			
2	L L H L L L H L L L H L -			
3	L L H H L L H H L L H H -			
4	L H L L L H L L L H L L -			
5	L H L H L H L H L H L H H			
6	L H H L L H H L L H H L -			
7	L H H H L H H H L H H H -			
8	H L L L H L L L H L L L -			
9	H L L H H L L H H L L H -			

OFFSET / POWER		EXPANDED USER FUNCTIONS												
ENTRY	14	15	16	CTCSS	17	18	19	20	21	22	23	24		
Minus (-)	L	L	-	#1 ON									L	
Simplex	H	H	-	#2 ON								L		
Plus (+)	L	H	-	#3 ON							L			
Power HI	-	-	L	#4 ON						L				
Power LO	-	-	H	#5 ON					L					
				#6 ON				L						
				#7 ON			L							
				#8 ON	L									

BCD Output Logic
Figure 8-2

Chapter 9 - Computer Accessed Transceiver Interface

The CAT-1000 offers a bidirectional serial port to control a HF transceivers through the computer interface. Upon receipt of a DTMF command the CAT-1000 will generate the required ASCII commands to control the transceiver. Since this serial port is bidirectional it is possible to interrogate the transceiver and receive information concerning the frequency and status. The CAT-1000 acts like a computer providing full control. The CAT-1000 will use its voice synthesizer to announce the status of the various transceiver functions. Zone 6 Channel 7 must be enabled to activate the computer interface. If the CAT-1000 is unable to establish a communications link with the transceiver, the voice will say: "HF DATA CONNECT ERROR." The Link Automatic Disconnect feature Zone 6 Channel 5 does operate during HF Remote Base operation. However, the inactivity timer is fixed at thirty minutes.

The CAT-1000 receives and sends serial information in both RS-232 and TTL format. The TTL format is available in both inverted and non-inverted outputs. This eliminates the need to purchase an expensive RS-232 to TTL converter card from the transceiver's manufacture.

To control the transceiver through the computer interface, the HF remote base must be in the receive only mode. The CAT-1000 will not activate the transceiver's transmitter. PTT #2 will be disabled. However, a bidirectional communication link in RS-232 or TTL (user selected) will be established. In response to DTMF inputs from the repeater operator the CAT-1000 will issue control and programming commands to the transceiver. The CAT-1000 will convert ASCII information received from the transceiver into voice messages describing the frequency and control settings of the transceiver. Use any of the commands described below to control the transceiver through the computer interface.

HF Transceiver Control Selection

When the CAT-1000 is initialized, transceiver selection is cleared. Enter the programming mode, (un-lock the controller) and use the programming commands listed in Figure 9-1 to select the desired HF transceiver.

```
ÉÍÍÍÍÍÑÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ»
º *290 ³ Read   HF Control Selection                                    º
º *291 ³ Select HF Control of Kenwood TS-440S  Transceiver             º
º *292 ³ Select HF Control of Yaesu   FT-767GX Transceiver             º
ÈÍÍÍÍÍÏÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍÍ¼
```

Figure 9-1

HF Transceiver Control Commands

The following commands control the operation of the HF Transceiver. These commands are only active when the Remote Base is in the "Receive Only Mode."

Read Selected VFO Frequency or Memory

To read the current setting of the HF transceiver's frequency, key-up and send the Remote Base Prefix number followed by [30]. Un-key and the voice will read the active VFO frequency and mode or selected memory channel number. For the Yaesu FT-767GX only the selected frequency will be read.

Program VFO Frequency

To program the HF transceiver's frequency, key-up and send the Remote Base Prefix number followed by [31] for VFO-A or [32] for VFO-B and the desired frequency. Example: With a remote base prefix of [560], program the HF transceiver's VFO-A frequency to 14.250 MHz.

```
                        CommandÄÄÄÄ¿    ÚÄÄÄFrequency (* = decimal point)
Remote Base PrefixÄÄÄ560    31  14*25
```

Select a Preset Memory

To select one of the preset memory channels, key-up and send the Remote Base Prefix number followed by and the memory channel number. Example: With a remote base prefix of [560], select memory 9. The Yaesu FT-767GX only has ten memories. Enter the memory number as a single digit number. The transceiver must be in memory mode before a memory can be selected. Key-up and send [56043].

	Command	Memory Number
Remote Base Prefix	560	33 09

Program a CTCSS Frequency (FT-767GX only)

The CTCSS encoder must be enabled by setting the front panel switch. To program a CTCSS frequency, key-up and send the Remote Base Prefix number followed by the CTCSS programming command and the desired CTCSS frequency entered as a four digit number. Example: Select the CTCSS frequency of 88.5 Hz.

	CTCSS Programming Command	CTCSS Frequency
Remote Base Prefix	560	34 0885

Read Transceiver Mode

To read the HF transceiver's mode, key-up and send the Remote Base Prefix number followed by the read command [40]. (U=USB), (L=LSB), (A=AM), (F=FM) and (C=CW).

Select Transceiver Operation

To select the HF transceiver's operation, key-up and send the Remote Base Prefix followed by the operation command from Figure 9-2. Example: Select VFO-B.

	Operation Command
Remote Base Prefix	560 42

41=VFO-A 42=VFO-B 43=MEMORY

Figure 9-2

Select Mode

To select the HF mode, key-up and send the Remote Base Prefix number followed by the mode number from Figure 9-3. Un-key and the voice will read back the mode. Example: Select FM Mode.

	Operation Command
Remote Base Prefix	560 47

44=USB 45=LSB 46=AM 47=FM 48=CW

Figure 9-3

Frequency Scan

To set the frequency scan rate and direction, key-up and enter the Remote Base Prefix number followed by the scan command from Figure 9-4. To terminate frequency scanning, key-up. The scan rate per step is defined as: slow = 2.5 seconds, medium = 0.5 seconds, fast = 0.1 seconds.

61=Scan-Up Slow	62=Scan-Up Medium	63=Scan-Up Fast
64=Scan-Down Slow	65=Scan-Down Medium	66=Scan-Down Fast

Figure 9-4

Frequency Jump

To manually jump the frequency of the HF transceiver, key-up and send the Remote Base Prefix number followed by the jump command from Figure 9-5.

71	Jump-Up 200Hz	74	Jump-Down 200Hz
72	Jump-Up 500Hz	75	Jump-Down 500Hz
73	Jump-Up 1000Hz	76	Jump-Down 1000Hz

Figure 9-5

HF Remote Base Control Commands

COMMAND	FUNCTION
(Prefix) 0	Remote HF Base Off
(Prefix) 1	Remote HF Base Receive Mode Only
(Prefix) 2	Remote HF Base Receive/Transmit Mode
(Prefix) 30	Read Selected VFO Frequency or Memory Channel
(Prefix) 31	Program VFO - A Frequency
(Prefix) 32	Program VFO - B Frequency
(Prefix) 33	Select Preset Memory Channel
(prefix) 34	Program CTCSS Frequency (FT-767GX only)
(Prefix) 40	Read Mode
(Prefix) 41	Select VFO - A Active
(Prefix) 42	Select VFO - B Active
(Prefix) 43	Select Memory
(Prefix) 44	Select USB Mode Active
(Prefix) 45	Select LSB Mode Active
(Prefix) 46	Select AM Mode Active
(Prefix) 47	Select FM Mode Active
(Prefix) 48	Select CW Mode Active
(Prefix) 50	Select Squelch Off (COR#2 Inactive)
(Prefix) 51	Select Squelch On (COR#2 Active)
(Prefix) 61	Scan-Up Active VFO/Memory Channel Slow
(Prefix) 62	Scan-Up Active VFO/Memory Channel Medium
(Prefix) 63	Scan-Up Active VFO/Memory Channel Fast
(Prefix) 64	Scan-Down Active VFO/Memory Channel Slow
(Prefix) 65	Scan-Down Active VFO/Memory Channel Medium
(Prefix) 66	Scan-Down Active VFO/Memory Channel Fast
(Prefix) 71	Jump-Up Frequency Step 200Hz
(Prefix) 72	Jump-Up Frequency Step 500Hz
(Prefix) 73	Jump-Up Frequency Step 1000Hz
(Prefix) 74	Jump-Down Frequency Step 200Hz
(Prefix) 75	Jump-Down Frequency Step 500Hz
(Prefix) 76	Jump-Down Frequency Step 1000Hz
(Prefix) 80	Turn OFF Frequency Split
(Prefix) 81	Turn ON Frequency Split

Figure 9-6

CAT-1000 To Kenwood TS-440S Interface

Install the 8251A UART and CD4040B frequency divider as described in the Kenwood Transceiver manual. The CAT-1000 provides a serial interface in both RS-232 and TTL formats. The special RS-232 to TTL converter board recommended by Kenwood is not required.

Use shielded cables to connect between the CAT-1000 and the TS-440S. Configure the serial interface for TTL communications. At J5 jump pins 2 and 3. At J7 jump pins 1 and 2.

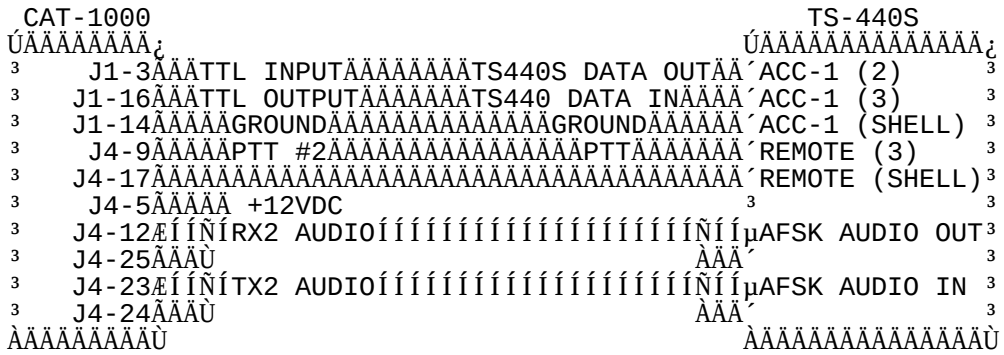


Figure 9-7

Terminate transmitter audio at the AFSK AUDIO input of the TS-440S by installing a resistive voltage divider. Connect a 1000 ohm resistor in series with the transmit audio. Connect a 100 ohm resistor across the AFSK AUDIO input to ground. In addition to terminating the transmit audio line it will also protect the transceiver from being over driven by the audio output of the CAT-1000.

Transceiver PTT is derived from the CAT-1000 controller. The VOX feature on the TS-440S must be disabled for proper operation.

CAT-1000 To Yaesu FT-767GX Interface

The CAT-1000 provides a serial interface in both RS-232 and TTL formats. The special RS-232 to TTL converter board recommended by Yaesu is not required.

Use shielded cables to connect between the CAT-1000 and the FT-767GX. Configure the serial interface for TTL communications. At J5 jump pins 1 and 2. At J7 jump pins 1 and 2.

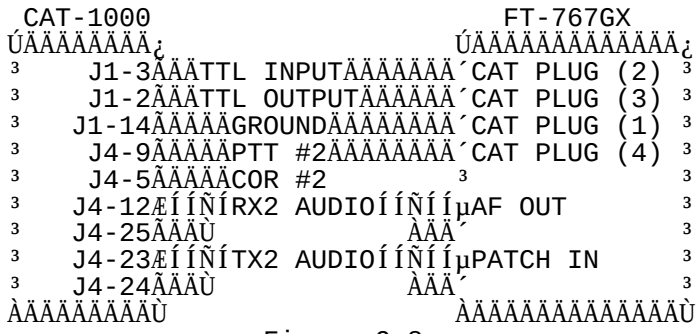


Figure 9-8

Terminate TX2 AUDIO at the PATCH IN of the FT-767GX. Install a resistive voltage divider. Connect a 1000 ohm resistor in series with the transmit audio. Connect a 100 ohm resistor across the PATCH IN input to ground.

Chapter 10 - WS-1000 Weather Station Interface

Provide timely weather announcements on your repeater system. Connect a Peet Brothers Ultimeter ® U-100, U-800 or U-2000 Weather Station or a Davis Weather Wizard III to the serial port of your CAT-1000 and install the WS-1000 firmware.

Integrate temperature, wind speed, direction, high and low temperature and rain fall rate into any of the CAT-1000 voice messages. Program special weather report messages or make the weather part of your identifications, grandfather clock or tail messages.

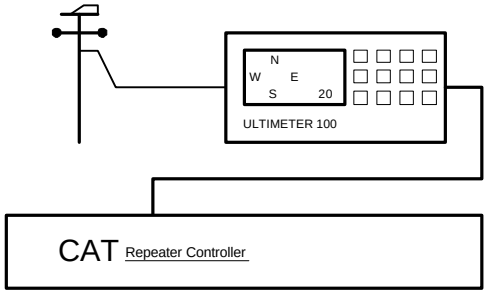


Figure 10-1

WS-1000 Weather Interface

The interface consists of a Program ROM V4.00, Voice ROM V2.00, 4700 ohm termination resistor and a three conductor cable terminated on one end with a header plug.

CAT-1000 Setup

Replace the Program ROM (U25) and the Voice ROM (U26) with the WS-1000 firmware. Set the CAT-1000 dip-switch #6 to "OFF" for the Peet Brothers and "ON" for the Davis weather station. Select the following jumper settings:

```
ÉÍÍÍÍÍÍÍÍÍÍÑÍÍÍÍÍÍÍÍÍÑÍÍÍÍÍÍÍÍÍ»  ÉÍÍÍÍÍÍÍÍÍÍÑÍÍÍÍÍÍÍÍÍÑÍÍÍÍÍÍÍÍÍ»
º JUMPER J5 ³ PEET 2-3 ³ DAVIS 1-2 º  º JUMPER J7 ³ PEET 1-2 ³ DAVIS 2-3 º
ÈÍÍÍÍÍÍÍÍÍÍÏÍÍÍÍÍÍÍÍÍÏÍÍÍÍÍÍÍÍÍ¼  ÈÍÍÍÍÍÍÍÍÍÍÏÍÍÍÍÍÍÍÍÍÏÍÍÍÍÍÍÍÍÍ¼
```

Peet Brothers Interconnect

Purchase a four conductor telephone cable. Hold the modular connector with the latch down and the gold contacts up. See figure 10-2. Check that the black wire is on the left side of the modular connector. Cut the modular connector off of the other end of the telephone cable. Strip the cable and cut off the red and yellow wires. Strip the green and black wires. Solder the 4700 ohm resistor between pins 3 and 14 of a 25 pin "D" female connector. Connect the green wire to pin 3 and the black wire to pin 14. Plug the 25 pin "D" connector into J1 on the CAT-1000 controller. See figure 10-3.

To test the interface, unlock the CAT-1000 and enter the [*27] programming command. If the controller and the weather station are communicating, the voice synthesizer will say: "CONTROL OK." If a problem exists the voice will say "ERROR NO DATA."

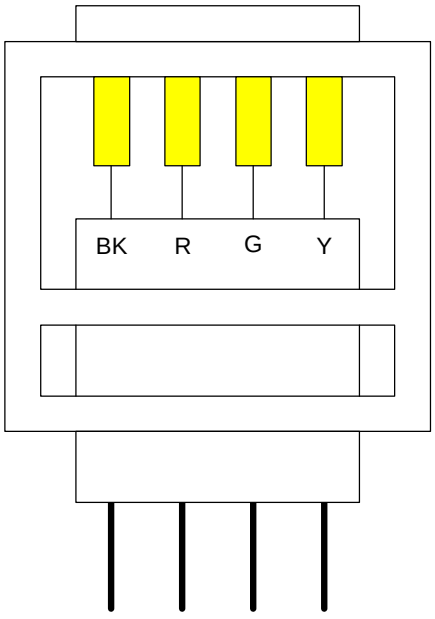


Figure 10-2

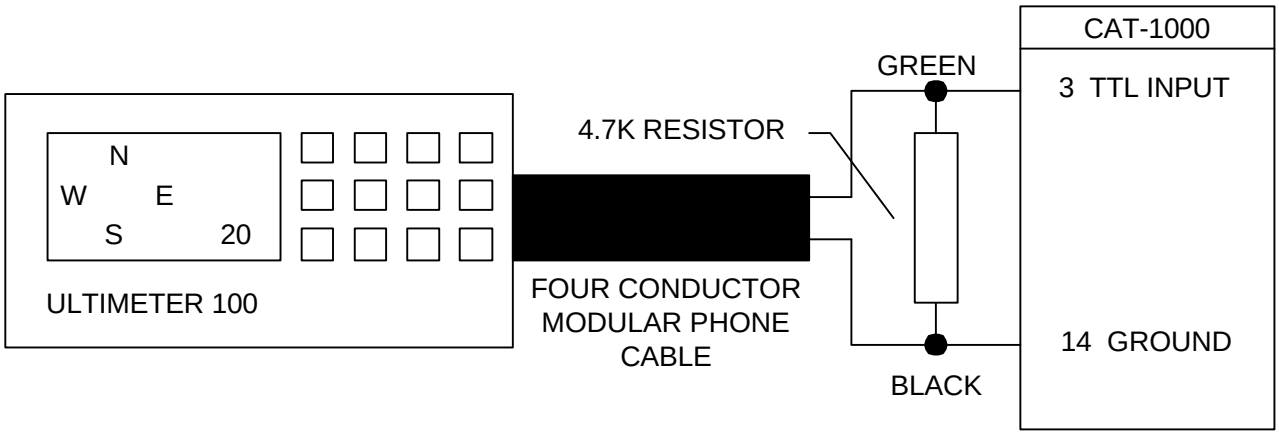


Figure 10-3

Peet Brothers Weather Station Setup

Connect the weather station component cables as described in the weather station owners manual. Install the 9 volt battery. If you use the rain gage it will be necessary to set the weather station's clock so the rain fall will clear at midnight. To provide continuous weather information to the CAT-1000, the weather station must be in the DATA LOGGING MODE. On the Keyboard Display unit: press and hold the CLEAR and WIND SPEED keys for three seconds.

Davis Weather Wizard III Interconnect

Install the Weather Link in the base of the display unit. Adapt the modular phone plug to the CAT-1000 J1 connector as described in Figure 10-4. Note: the 25 pin "D" adapter can not be connected directly to J1. You must prepare an adapter cable or use a modular wall jack. Connect the black wire on pin 14, the green wire to pin 4 and the yellow wire to pin 17 of J1. To test the interface, unlock the CAT-1000 and enter the [*27] programming command. If the controller and the weather station are communicating, the voice synthesizer will say: "CONTROL OK." If a problem exists the voice will say "ERROR NO DATA." This command will also reset the high and low temperature to the current reading.

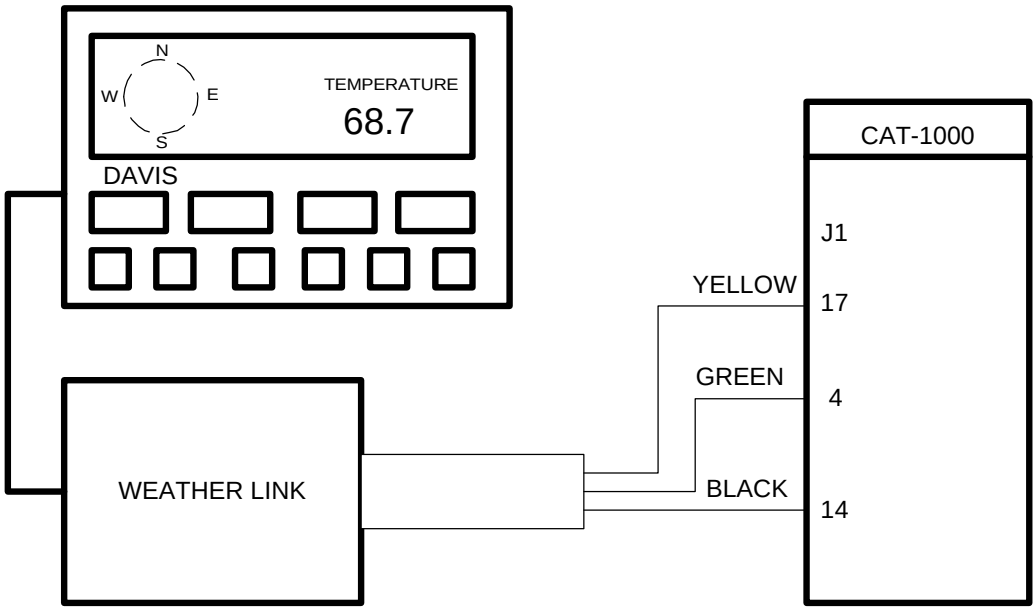


Figure 10-4

RS-232 Computer Interface

The WS-1000 firmware will support the computer interface to upload and download the eight memory blocks. HF transceiver control is not supported. If you intend to use the computer interface, jumper J7 must be changed. TTL for the Peet Brothers Weather Station and RS232 for the computer interface. Solder a single pole double throw toggle switch to the three conductor cable provided in the WS-1000 kit. Connect the header plug to J7 and mount the switch in a convenient location. This will simplify changing between the weather station and the computer interface when the CAT-1000 is in the rack mount enclosure.

The Davis Weather Wizard III operates through the RS-232 port so the change over switch is not required.

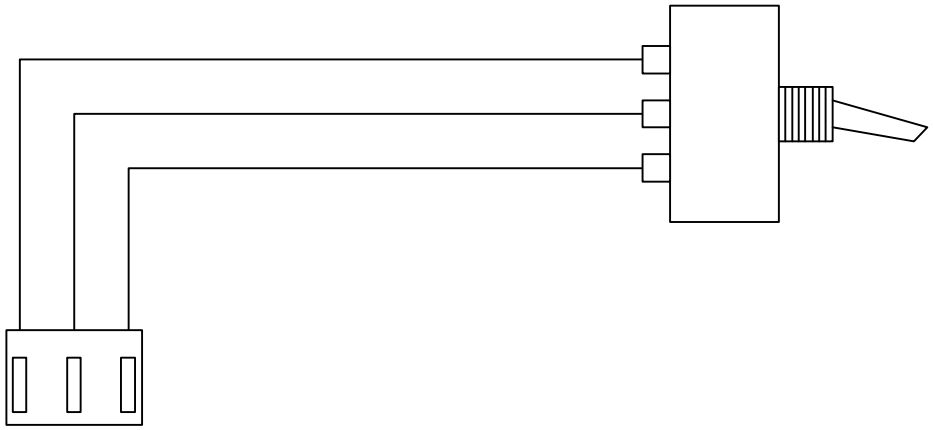


Figure 10-5

CAT-1000 Programming Information

Four new voice variables have been added to the vocabulary list to announce weather information. See Figure 10-6.

VARIABLE	DESCRIPTION	EXAMPLE (variable in bold)
104	inside temperature	**75** Degrees
105	outside temperature	**40** Degrees
106	wind speed and direction	The wind is out of the **EAST** at **10** miles per hour
107	high and low temperature	Today's high temperature is **81** degrees and the low temperature is **61** degrees
108	rain fall	Today's rain fall is **.15** inches

Figure 10-6

Program Voice Message With Temperature Variables

To program a voice message with the temperature load the number [105]. Example: Load message 30 with the actual temperature. The voice will say: "THE TEMPERATURE IS **75** DEGREES]"

Message Number ÄÄÄÄÄ¿ ÚÄÄ Actual Temperature

*31 30 830 824 482 105

Program Voice Message With Wind Speed And Direction Variables

To program a voice message with the wind speed and direction load the number [106]. Example: Load message 31 with the actual wind speed and direction. The Voice will Say: "THE WIND IS OUT OF THE **EAST** AT **10** MILES PER HOUR]." If the wind speed is 0 miles per hour, the voice will say: "THE WIND IS **CALM**".

```
Message Number ÄÄÄÄÄ¿   ÚÄÄ Actual Wind Direction and Speed
                *31 31 106
```

Program Voice Message With High - Low Temperature Variables

To program a voice message with the temperature stats load the number [107]. Example: Load message 32 with the day's high and low temperature. The voice will say: "TODAY'S HIGH TEMPERATURE IS **81** DEGREES AND THE LOW TEMPERATURE IS **61** DEGREES"

```
Message Number ÄÄÄÄÄ¿   ÚÄÄ Today's High and Low Temperature
                *31 32 107
```

The temperature stats automatically reset each day at 12:02 A.M. To manually reset the high and low temperature to the current temperature enter [*27].

Program Voice Message With Rain Fall Variables

To program a voice message with the rain fall load the number [108]. Example: Load message 33 with the rain fall. The voice will say: "TODAY'S RAIN FALL IS **.15** INCHES]"

```
Message Number ÄÄÄÄ¿   ÚÄÄ Today's Rain Fall since midnight
                *31 33 108
```

The Peet Brothers weather station resets the rain gauge at 12:00 A.M. and is under the control of the Peet Brothers weather station clock. The Davis weather station rain gauge is reset at 12:02 A.M. and is under the control of the CAT-1000 clock. To manually reset the Davis rain gauge unlock the controller and enter [*26].

Program Voice Message With Complete Weather Report

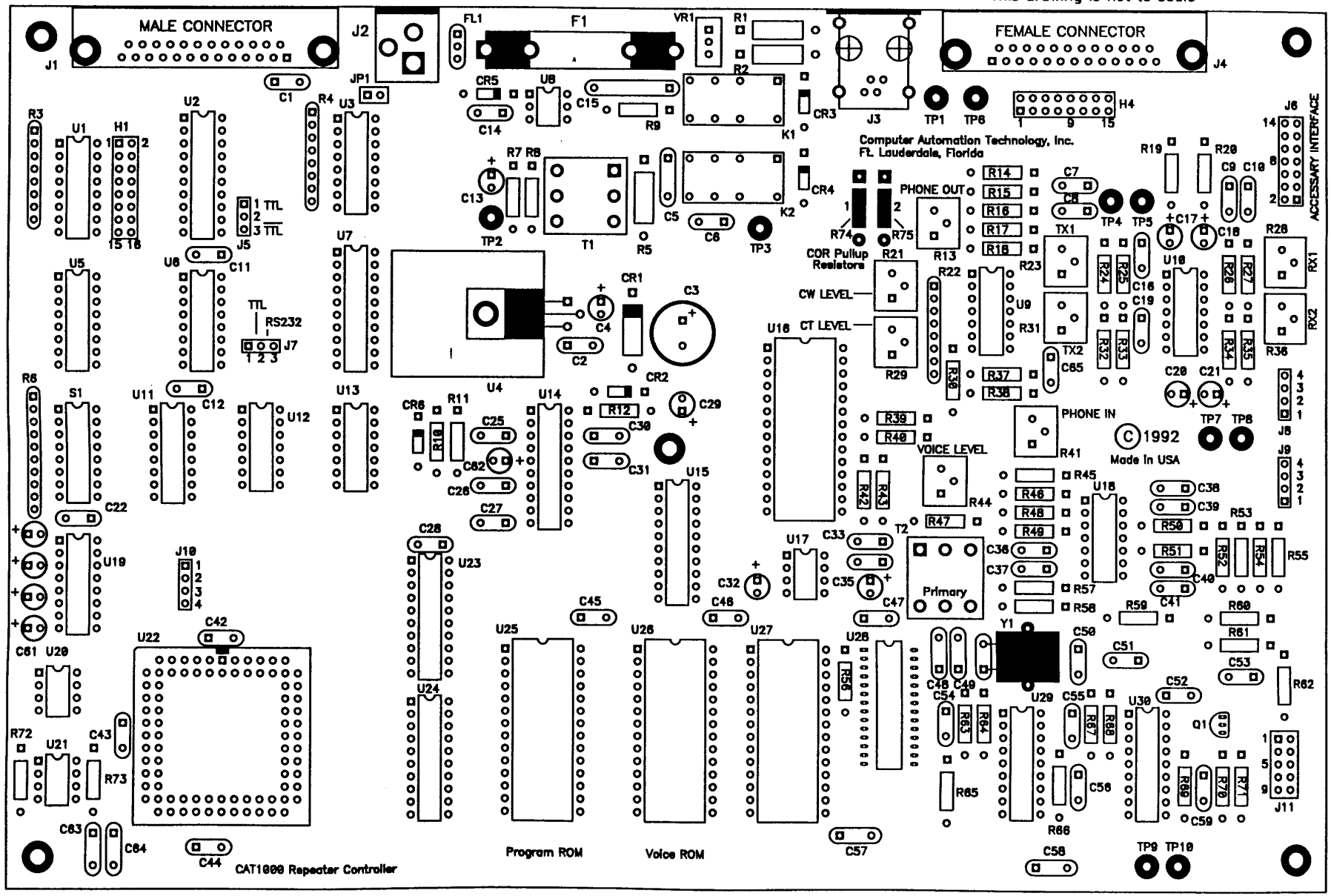
To program a voice message with a complete weather report load message 34 with: "THE TEMPERATURE IS **75** DEGREES THE WIND IS OUT OF THE **EAST** AT **10** MILES PER HOUR TODAY'S HIGH TEMPERATURE IS **81** DEGREES AND THE LOW TEMPERATURE IS **60** DEGREES"

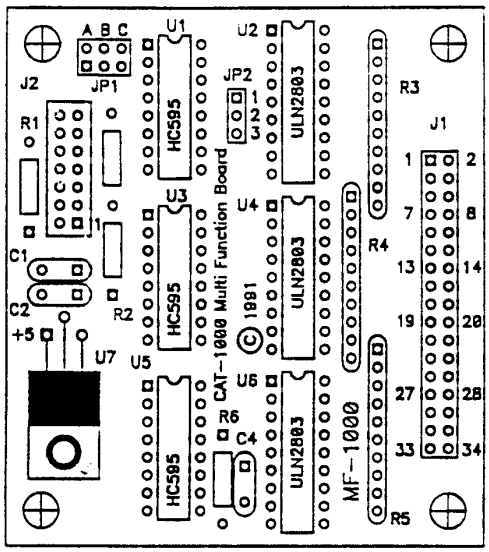
```
Message Number ÄÄÄÄ¿
                *31 34 830 824 482 105 135 106 135 107
```

CAT-1000 Word Listing

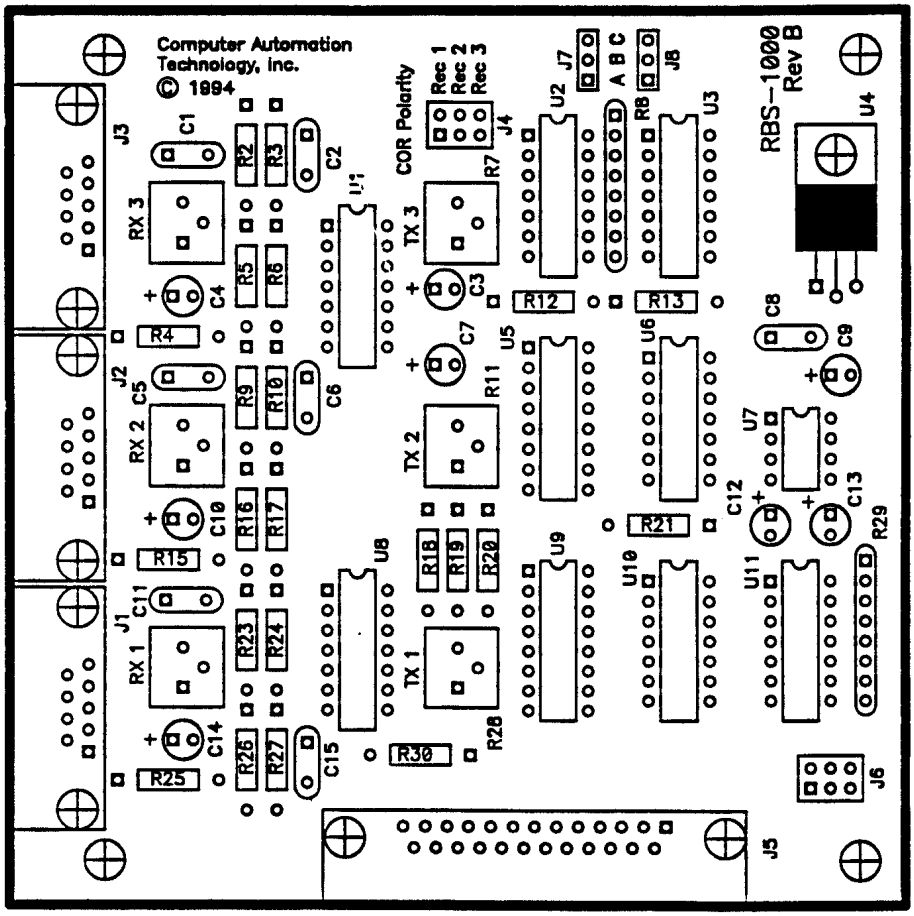
Chapter 12 - Drawings

This drawing is not to scale

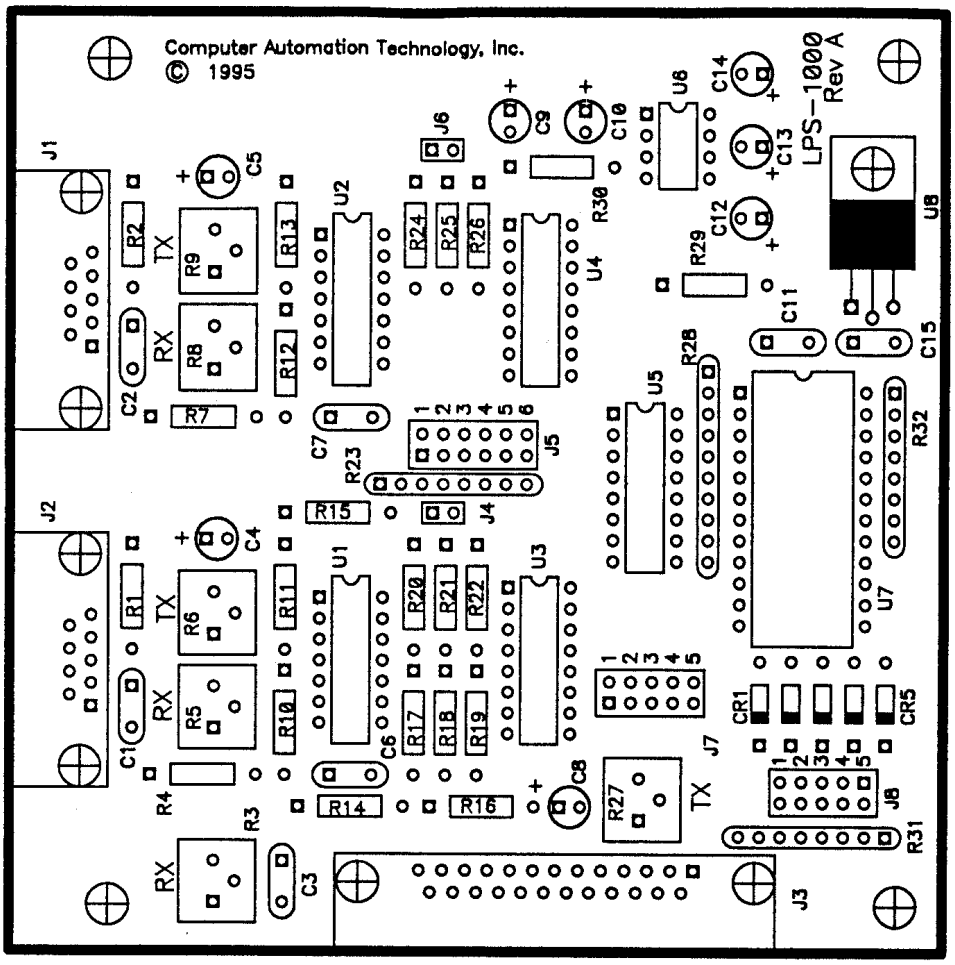




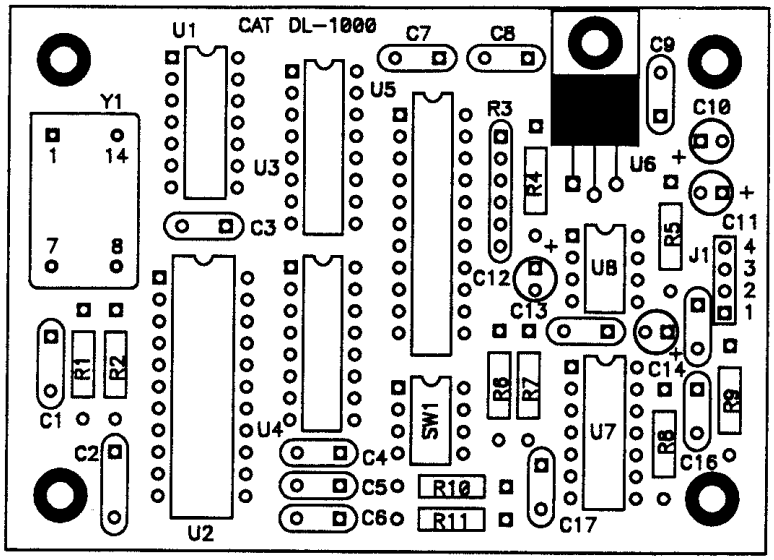
MF-1000 Serial Interface Board
Figure 12-2



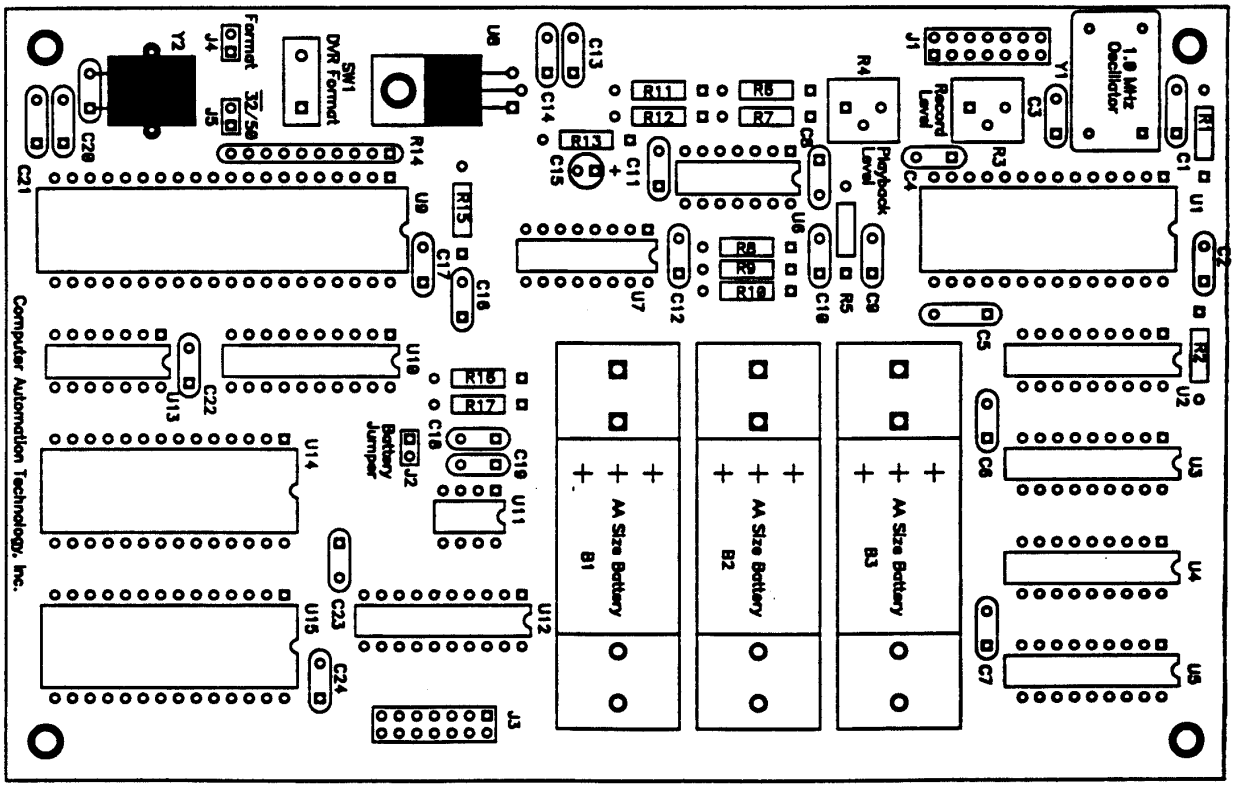
RBS-1000 Remote Base Switch Board
Figure 12-3



LPS-1000 Link Port Switch Board
Figure 12-4

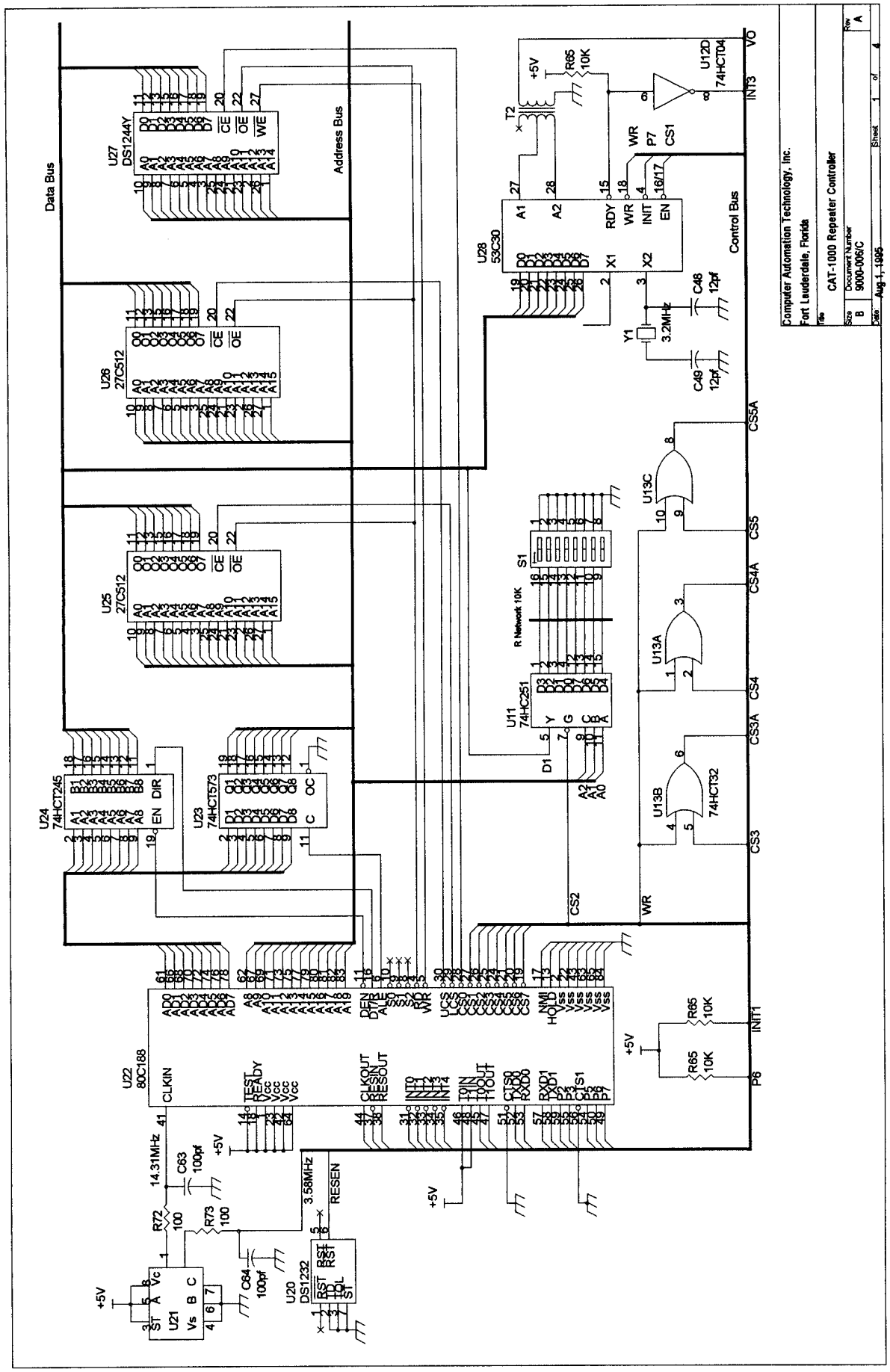


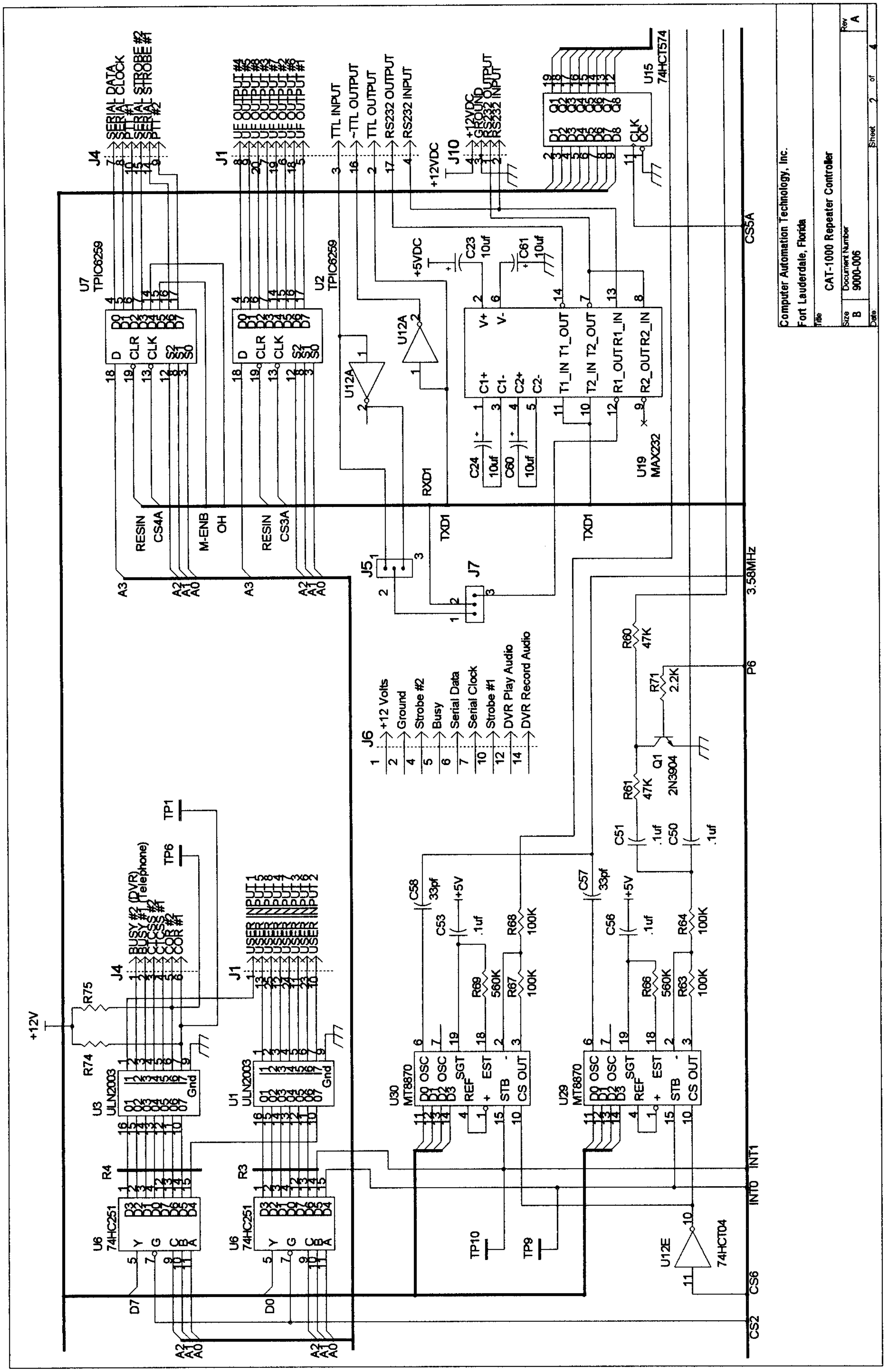
DL-1000 Audio Delay Board
Figure 12-5

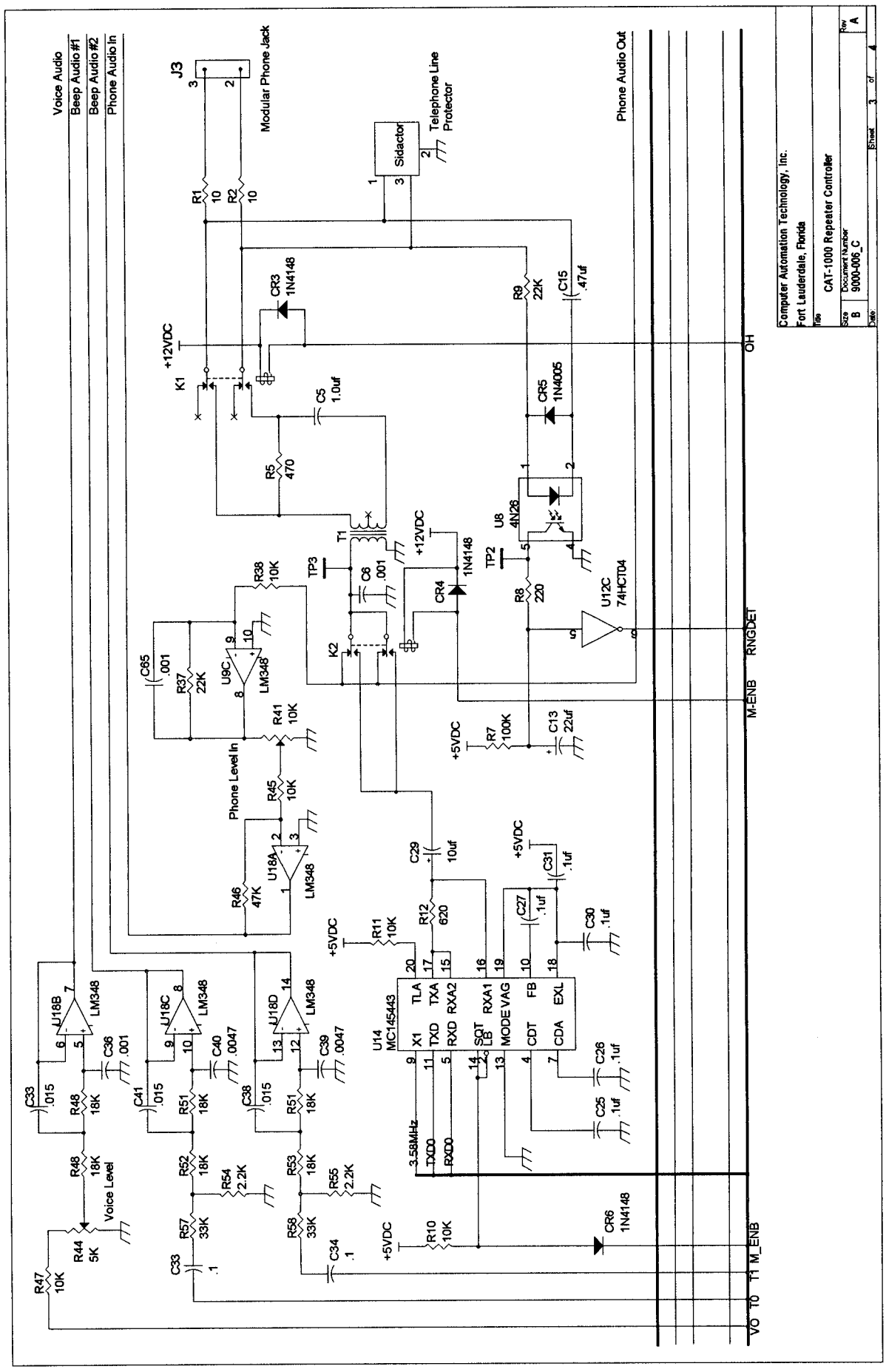


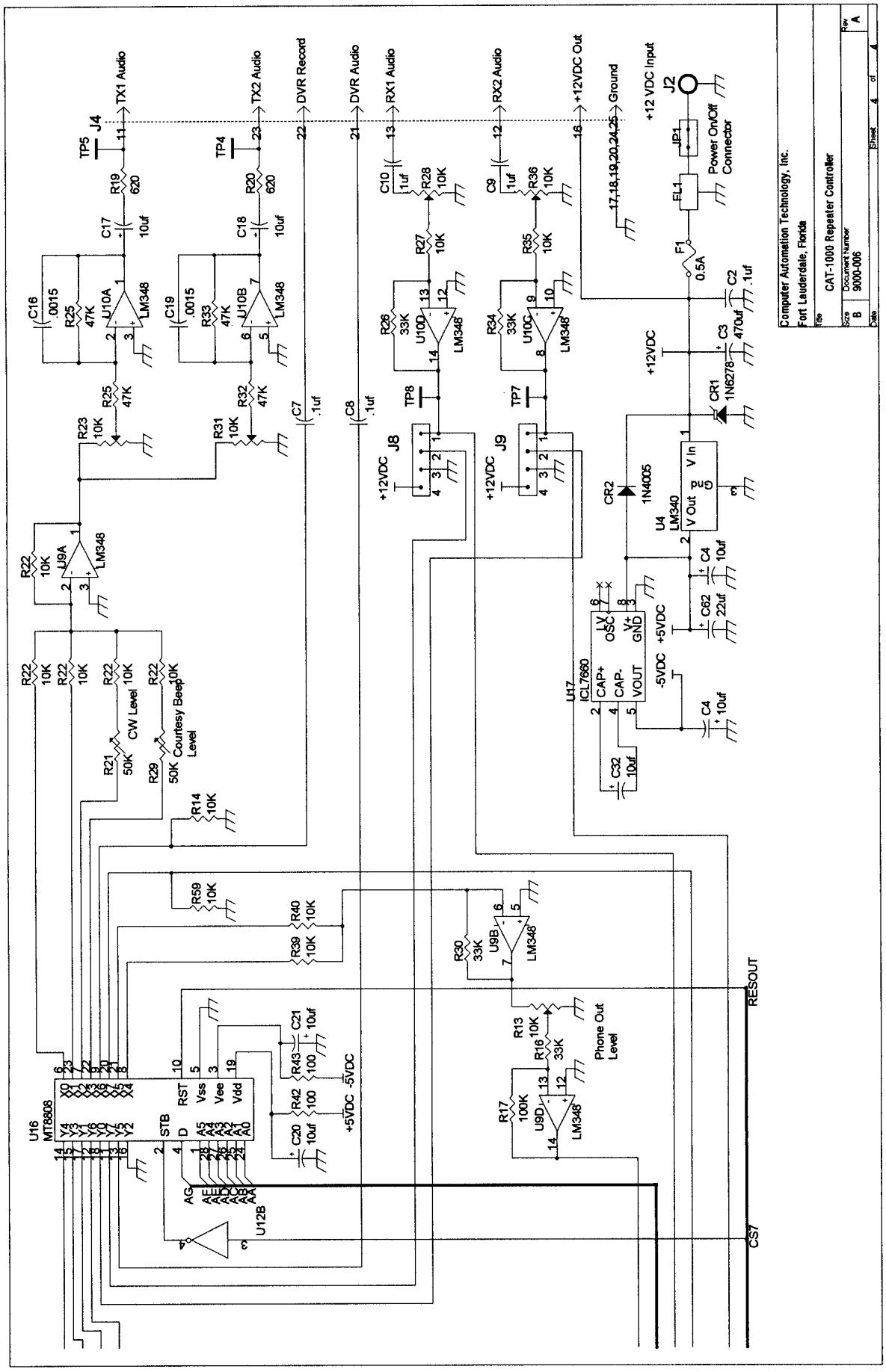
DVR-1000 Digital Voice Recorder Board
Figure 12-6

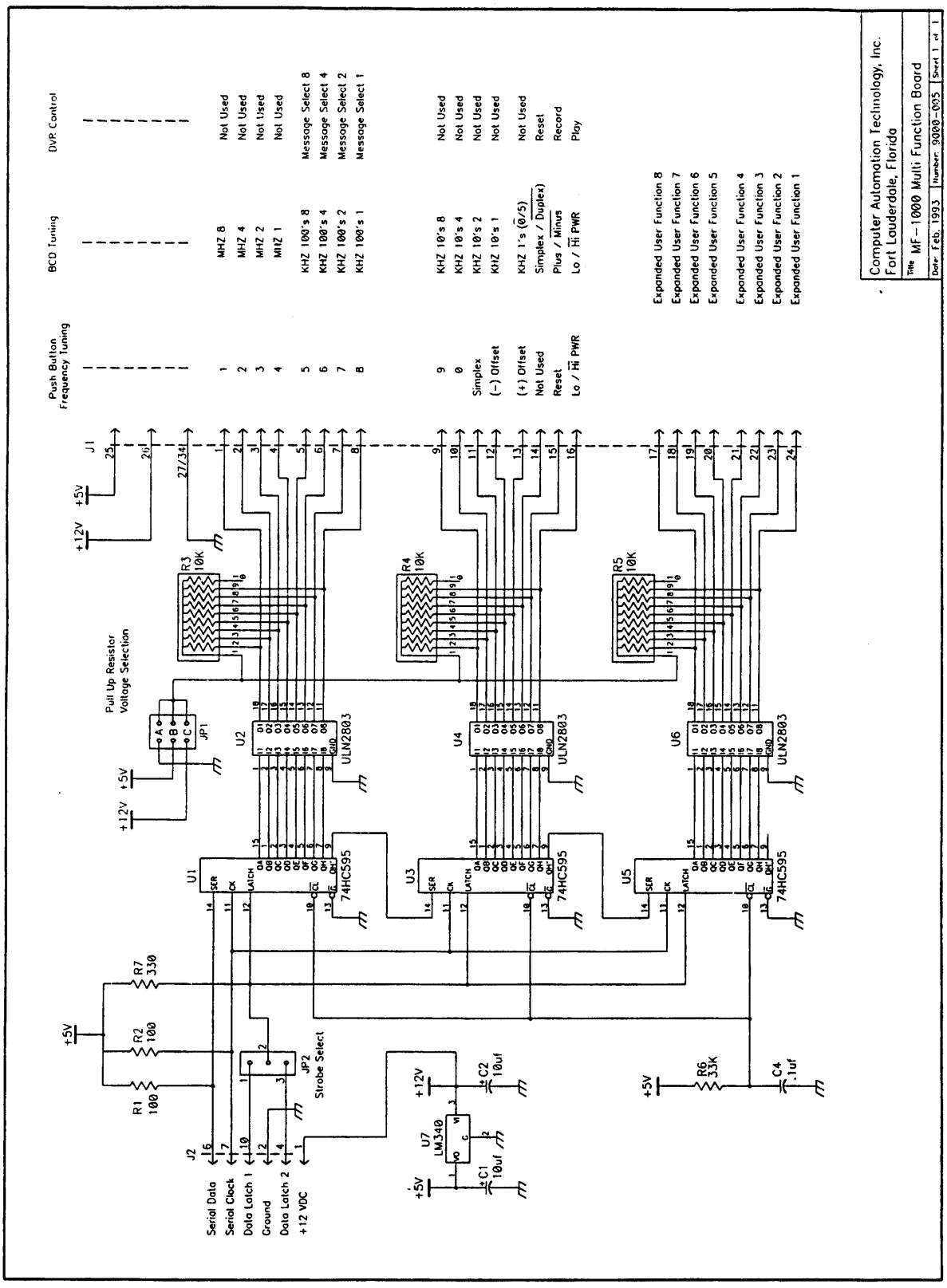
Chapter 13 - Schematic

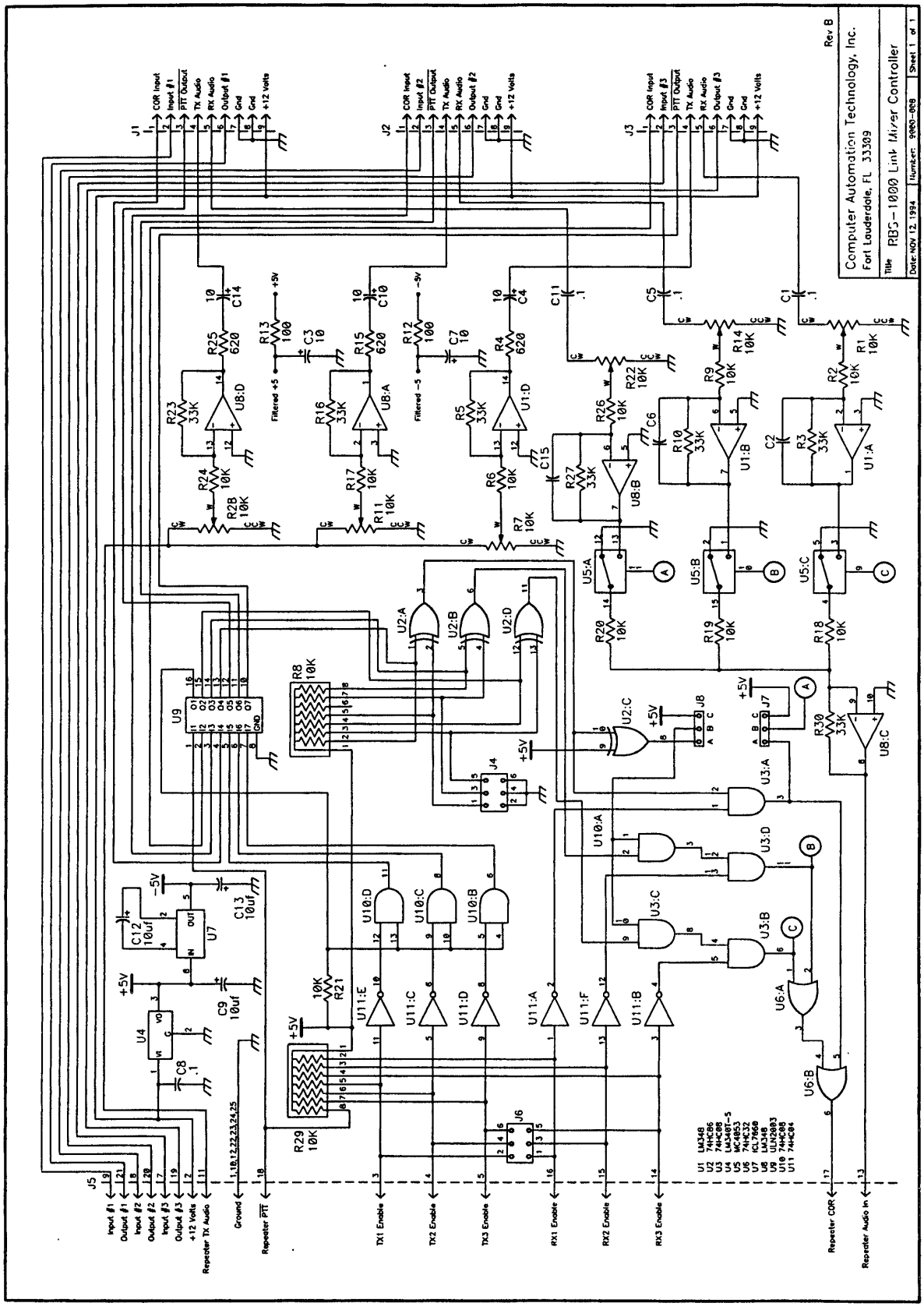

Data Bus
Address Bus
Control Bus
U22
80C188
U25
27C512
U26
27C512
U27
DS1244Y
U28
53C30
U24
74HCT245
U23
74HCT573
U11
74HC251
U13A
U13B
74HCT32
U13C
U12D
74HCT04
U20
DS1232
U21
14.31MHz
3.58MHz
3.2MHz
R Network 10K
Computer Automation Technology, Inc.
Fort Lauderdale, Florida
CAT-1000 Repeater Controller
Document Number
9000-006/C
Aug 1, 1995


Computer Automation Technology, Inc.
Fort Lauderdale, Florida
CAT-1000 Repeater Controller
B
9000-006
A
Sheet 2 of 4


Voice Audio
Beep Audio #1
Beep Audio #2
Phone Audio In
Phone Audio Out
Modular Phone Jack
Telephone Line Protector
Sidactor
+12VDC
+5VDC
Phone Level In
Voice Level
3.58MHz
TXDO
RXDO
OH
M-ENB
RNGDET
M_ENB
T1
T0
VO
Computer Automation Technology, Inc.
Fort Lauderdale, Florida
CAT-1000 Repeater Controller
Document Number
9000-006_C
Rev
A
Sheet 3 of 4


Computer Automation Technology, Inc.
Fort Lauderdale, Florida
CAT-1000 Repeater Controller
Document Number 9000-006
TX1 Audio
TX2 Audio
DVR Record
DVR Audio
RX1 Audio
RX2 Audio
+12VDC Out
Ground
+12 VDC Input
Power On/Off Connector
CW Level
Courtesy Beep Level
Phone Out Level
RESOUT
CS7


Push Button Frequency Tuning
BCD Tuning
DVR Control
1 MHZ 8 Not Used
2 MHZ 4 Not Used
3 MHZ 2 Not Used
4 MHZ 1 Not Used
5 KHZ 100's 8 Message Select 8
6 KHZ 100's 4 Message Select 4
7 KHZ 100's 2 Message Select 2
8 KHZ 100's 1 Message Select 1
9 KHZ 10's 8 Not Used
0 KHZ 10's 4 Not Used
Simplex KHZ 10's 2 Not Used
(-) Offset KHZ 10's 1 Not Used
(+) Offset KHZ 1's (Ø/5) Not Used
Not Used Simplex / Duplex) Reset
Reset Plus / Minus Record
Lo / Hi PWR Lo / Hi PWR Play
Expanded User Function 8
Expanded User Function 7
Expanded User Function 6
Expanded User Function 5
Expanded User Function 4
Expanded User Function 3
Expanded User Function 2
Expanded User Function 1
Pull Up Resistor Voltage Selection
Strobe Select
Serial Data
Serial Clock
Data Latch 1
Ground
Data Latch 2
+12 VDC
ULN2803
74HC595
LM340
Computer Automation Technology, Inc.
Fort Lauderdale, Florida
Title MF-1000 Multi Function Board
Date: Feb, 1993 Number: 9000-005 Sheet 1 of 1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Fort Lauderdale, FL 33309
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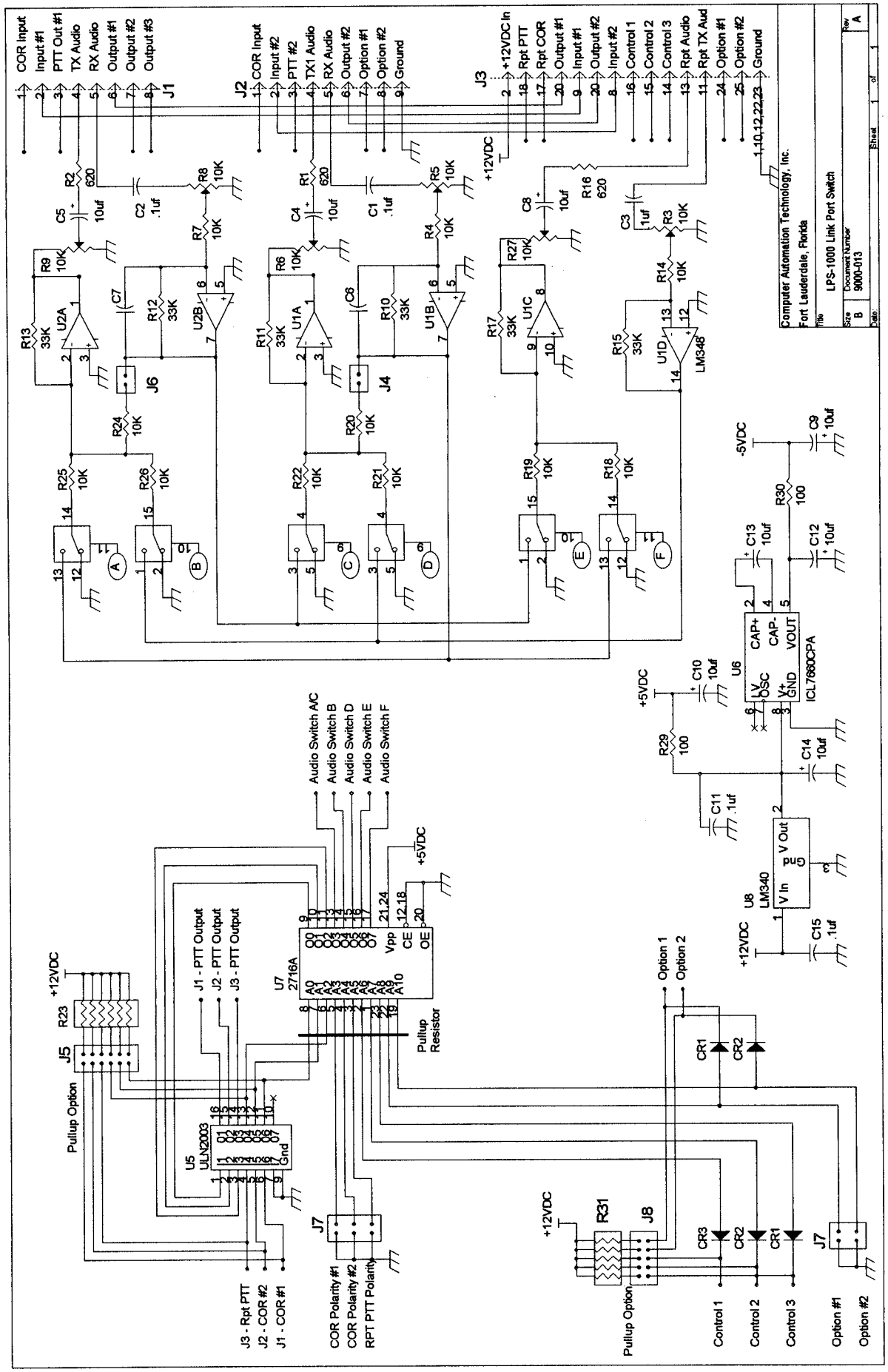
Date: NOV 12, 1994
Number: 9980-008
Sheet 1 of 1
Rev B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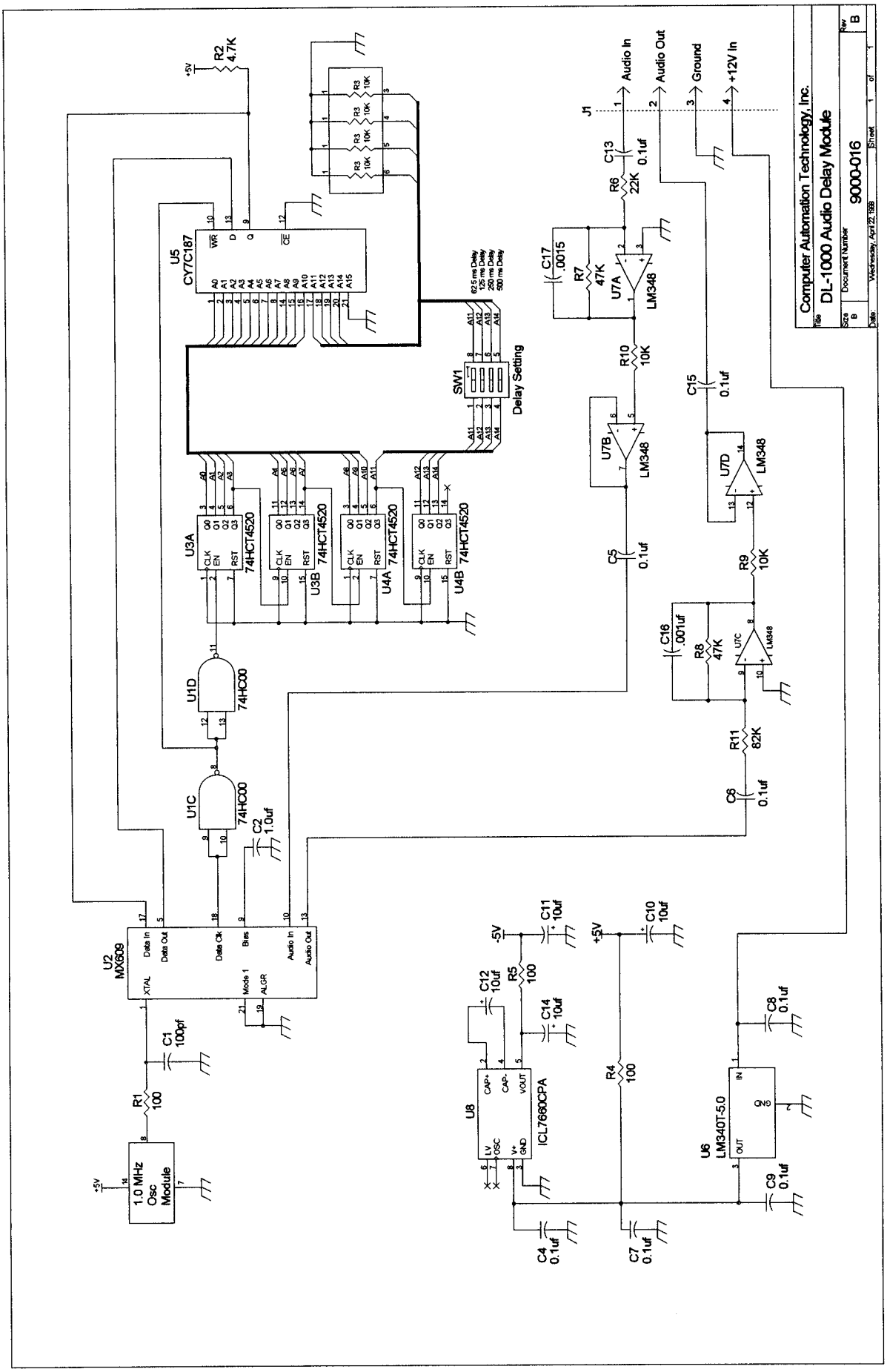
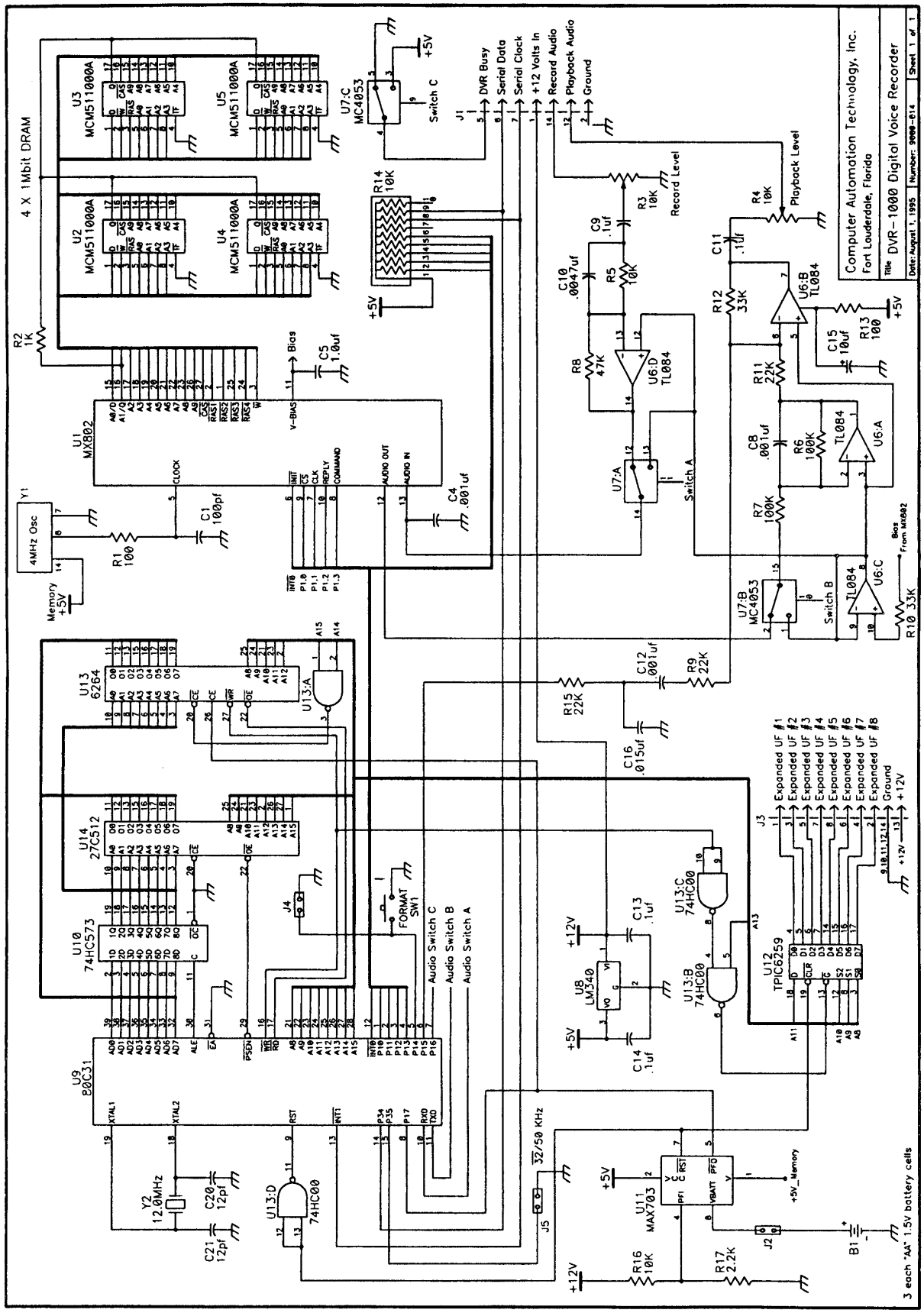
Input #1
PTT Out #1
TX Audio
RX Audio
Output #1
Output #2
Output #3
J1
COR Input
Input #2
PTT #2
TX1 Audio
RX Audio
Output #2
Option #1
Option #2
Ground
J2
+12VDC In
Rpt PTT
Rpt COR
Output #1
Input #1
Output #2
Input #2
Control 1
Control 2
Control 3
Rpt Audio
Rpt TX Aud
Option #1
Option #2
Ground
J3
+12VDC
Computer Automation Technology, Inc.
Fort Lauderdale, Florida
LPS-1000 Link Port Switch
Document Number
9000-013
Audio Switch A/C
Audio Switch B
Audio Switch D
Audio Switch E
Audio Switch F
J1 - PTT Output
J2 - PTT Output
J3 - PTT Output
Pullup Option
Pullup Resistor
Option 1
Option 2
J3 - Rpt PTT
J2 - COR #2
J1 - COR #1
COR Polarity #1
COR Polarity #2
RPT PTT Polarity
Control 1
Control 2
Control 3
Option #1
Option #2
+5VDC
-5VDC
ICL7660CPA
LM340
LM348
ULN2003
2716A


Computer Automation Technology, Inc.
DL-1000 Audio Delay Module
9000-016
Rev B
Audio In
Audio Out
Ground
+12V In
Delay Setting
625 ms Delay
125 ms Delay
250 ms Delay
500 ms Delay
74HCT4520
74HC00
LM348
ICL7660CPA
LM340T-5.0
MX608
1.0 MHz Osc Module


4 X 1Mbit DRAM
U3 MCM511000A
U5 MCM511000A
U2 MCM511000A
U4 MCM511000A
U7:C MC4053
Switch C
+5V
J1
DVR Busy
Serial Data
Serial Clock
+12 Volts In
Record Audio
Playback Audio
Ground
R14 10K
R2 1K
U1 MX802
V-BIAS
Bias
C5 1.0uf
CLOCK
AUDIO OUT
AUDIO IN
C4 .001uf
Y1 4MHz Osc
C1 100pf
R1 100
Memory +5V
INT0
P1.0
P1.1
P1.2
P1.3
U13 6264
U13:A
A15
A14
U14 27C512
U10 74HC573
J4
FORMAT SW1
Audio Switch C
Audio Switch B
Audio Switch A
U9 80C31
XTAL1
XTAL2
RST
INT1
P3.4
P3.5
P1.7
RXD
TXD
Y2 12.0MHz
C20 12pf
C21 12pf
U13:D 74HC00
32/50 KHz
J5
U11 MAX703
+5V_Memory
J2
B1
3 each "AA" 1.5V battery cells
R16 10K
R17 2.2K
+12V
U8 LM340
C13 .1uf
C14 .1uf
U13:C 74HC00
U13:B 74HC00
U12 TPIC6259
J3
Expanded UF #1
Expanded UF #2
Expanded UF #3
Expanded UF #4
Expanded UF #5
Expanded UF #6
Expanded UF #7
Expanded UF #8
Ground
+12V
R15 22K
C12 .001uf
R9 22K
C16 .015uf
U7:A
Switch A
U7:B MC4053
Switch B
U6:D TL084
U6:A TL084
U6:C TL084
U6:B TL084
C10 .0047uf
R5 10K
C9 .1uf
R3 10K
Record Level
R4 10K
Playback Level
C11 .1uf
R12 33K
R8 47K
R11 22K
C8 .001uf
R6 100K
R7 100K
R10 33K
C15 10uf
R13 100
Bias From MX802
Computer Automation Technology, Inc.
Fort Lauderdale, Florida
Title DVR-1000 Digital Voice Recorder
Date: August 1, 1995
Number: 3000-014
Sheet 1 of 1

Chapter 14 - Part List

CAT-1000 Controller Board

3	Capacitor	.015uF 50V	C37,C38,C41
2	Capacitor	.0047uF 50V	C39,C40
4	Capacitor	.001uF 50V	C6,C14,C36,C65
2	Capacitor	.0015uF 50V	C16,C19
2	Capacitor	12pF 50V	C48,C49
2	Capacitor	33pF 50V	C57,C58
2	Capacitor	100pF 50V	C63,C64
12	Capacitor	10uF 16V	C4,C17,C18,C20,C21,C23 C24,C29,C32,C35,C60,C61
2	Capacitor	22uF 16V	C13,C62
1	Capacitor	470uF 25V	C3
1	Capacitor	1uF 50V	C5
1	Capacitor	.47uF 200V	C15
29	Capacitor	0.1uF 50V	C1,C2,C7,C8,C9,C10,C11,C12 C22,C25,C26,C27,C28,C30,C31 C33,C34,C42,C43,C44,C45,C46 C47,C50,C51,C52,C53,C56,C59
2	Capacitor	(Not Used)	C54,C55
1	Crystal	3.27 MHz	Y1
1	Connector	25D (F)	J4
1	Connector	25D (M)	J1
1	Connector	(DC PWR)	J2
1	Connector	(PHONE)	J3
1	Connector	Header 2x7	J6
3	Connector	Header 1x4	J8,J9,J10
1	Connector	Header 1X2	JP1
2	Connector	Header 1X3	J5,J7
1	Connector	Header 2X5	J11
2	Connector	Header 2X8	H1,H4
1	Diode	Transorb	CR1
2	Diode	1N4005	CR2,CR5
3	Diode	1N4148	CR3,CR4,CR6
1	Fuse	0.5AMP	F1
1	Filter RF		FL1
1	I.C.	TN80C188EB-13	U22
2	I.C.	27C512	U25,U26
1	I.C.	74HCT245	U24
1	I.C.	74HCT573	U23
1	I.C.	74HCT574	U15
3	I.C.	74HCT251	U5,U6,U11
1	I.C.	74HCT04	U12
1	I.C.	74HCT32	U13
1	I.C.	DS1244Y	U27
1	I.C.	DS1232	U20
1	I.C.	MAX232	U19
2	I.C.	TPIC6259	U2,U7
1	I.C.	ICL7660	U17
3	I.C.	LM348	U9,U10,U18
2	I.C.	ULN2003	U1,U3
2	I.C.	MT8870	U29,U30
1	I.C.	MT8808AE	U16
1	I.C.	TSP53C30AN2L	U28
1	I.C.	MC145443P	U14
1	I.C.	LM340T-5	U4

1	I.C.	4N26	U8
1	I.C.	14.318MHz OSC.	U21
4	Jumper	Plug	P5,P7,P8,P9
6	Resistor	620 5% 1/4W	R12,R18,R19,R20,R38,R62
1	Resistor	220 5% 1/4W	R8
1	Resistor	1K 5% 1/4W	R37
3	Resister	2.2K 5% 1/4W	R54,R55,R71
2	Resistor	22K 5% 1/4W	R9,R46
4	Resistor	100 5% 1/4W	R42,R43,R72,R73
1	Resistor	820 5% 1/2W	R5
2	Resistor	10 5% 1/2W	R1,R2
18	Resistor	10K 5% 1/4W	R10,R11,R14,R15,R24,R27 R32,R35,R39,R40,R45,R47 R50,R53,R56,R59,R65,R70
4	Resistor	18K 5% 1/4W	R48,R49,R51,R52
6	Resistor	33K 5% 1/4W	R16,R26,R30,R34,R57,R58
2	Resistor	560K 5% 1/4W	R66,R69
6	Resistor	100K 5% 1/4W	R7,R17,R63,R64,R67,R68
4	Resistor	47K 5% 1/4W	R25,R33,R60,R61
6	Resistor	10K Variable	R13,R23,R28,R31,R36,R41
2	Resistor	50K Variable	R21,R29
1	Resistor	5K Variable	R44
1	Resistor	10K 10pin	R6
3	Resistor	10K 8pin	R3,R4,R22
2	Resistor	(Not Used)	R74,R75
2	Relay	12VDC DPDT	K1,K2
1	Switch,	Dip-8 Pole	S1
1	Sidactor		VR1
10	Test Points		TP1,TP2,TP3,TP4,TP5,TP6 TP7,TP8,TP9,TP10
2	Transformer	600 ohm	T1,T2
1	Transistor	2N3904	Q1

MF-1000 Serial Interface Board

2	Resistor	100 5% 1/4W	R1,R2
3	Resistor	4.7K 10 pin	R3,R4,R5
1	Resistor	33K 5% 1/4W	R6
1	Resistor	330 5% 1/4W	R7
2	Capacitor	10uF 15V	C1,C2
1	Capacitor	0.1uF 50V	C4
3	I.C.	74HC595	U1,U3,U5
3	I.C.	ULN2803A	U2,U4,U6
1	I.C.	7805	U7
1	Header	2X17	J1
1	Header	2x7	J2
1	Header	2X3	JP1
1	Header	1X3	JP2
2	Jumper		
1	Cable	Ribbon 2X7	

RBS-1000 Remote Base Switch

8	Capacitor	10uF 16V	C4,C5,C8,C9,C10,C12,C13,C14
4	Capacitor	0.1uF 50V	C1,C2,C3,C11,C15
3	Connector	DB-9F	J1,J2,J3
1	Connector	DB-25F	J5
2	Header	2X3	J4,J6
2	Header	1X3	J7,J8

1	I.C.	LM340T-5	U4
1	I.C.	ICL7660	U7
1	I.C.	74HC04	U11
2	I.C.	74HC08	U3,U10
1	I.C.	74HC32	U6
1	I.C.	74HC86	U2
2	I.C.	LM348	U1,U8
1	I.C.	MC4053	U5
1	I.C.	ULN2003	U9
8	Jumpers		JP4,JP6,JP7,JP8
6	Resistor	10K Variable	R1,R7,R11,R14,R22,R28
2	Resistor	10K Network 8Pin	R8,R29
7	Resistor	33K .25W	R3,R5,R10,R16,R23,R27,R30
2	Resistor	100 .25W	R12,R13
3	Resistor	620 .25W	R4,R15,R25
10	Resistor	10K .25W	R2,R6,R9,R17,R18,R19,R20,R21,R24,R26

LPS-1000B Link Port Switch

5	Capacitor	0.1uF 50V	C1,C2,C3,C11,C15
7	Capacitor	10uF 16V	C4,C5,C8,C9,C10,C12,C13,C14
2	Capacitor	Select Value	C6,C7
2	Connector	DB-9F	J1,J2
1	Connector	DB-25F	J3
5	Diode	1N4005	CR1,CR2,CR3,CR4,CR5
1	Header	1X2	J4,J6
2	Header	2X5	J7,J8
1	Header	2X6	J5
1	I.C.	LM340T-5	U8
1	I.C.	ICL7660	U6
2	I.C.	LM348	U1,U2
2	I.C.	MC4053	U3,U4
1	I.C.	ULN2003	U5
1	I.C.	D2716	U7
18	Jumpers		JP4,JP6,JP5-(6),JP7-(5),JP8-(5)
6	Resistor	10K Variable	R3,R5,R6,R8,R9,R27
3	Resistor	10K Network 8Pin	R23,R31,R32
6	Resistor	33K .25W	R10,R11,R12,R13,R15,R17
2	Resistor	100 .25W	R29,R30
3	Resistor	620 .25W	R1,R2,R16
11	Resistor	10K .25W	R4,R7,R14,R18,R19,R20,R21,R22,R24,R25,R26

DL-1000 Audio Delay Board

9	Capacitor	0.1uF 50V	C3,C4,C5,C6,C7,C8,C9,C13,C15
1	Capacitor	1.0uF 50V	C2
4	Capacitor	10uF 16V	C10,C11,C12,C14
1	Capacitor	100pF 50V	C1
1	Capacitor	.001uF 50V	C16
1	Capacitor	.0015uF 50V	C17
1	Header	1X4	J1
1	I.C.	74HCT00	U1
2	I.C.	74HCT4520	U3,U4
1	I.C.	CY7C187	U5
1	I.C.	LM340-5	U6
1	I.C.	TL084	U7
1	I.C.	LM-348	U2
1	Module	1.00MHz	Y1
2	Resistor	10K 5% 1/4W	R9,R10

1	Resistor	4.7K 5% 1/4W	R2
1	Resistor	22K 5% 1/4W	R6
3	Resistor	100 5% 1/4W	R1,R4,R5
2	Resistor	47K 5% 1/4W	R7,R8
1	Resistor	82K 5% 1/4W	R11
1	Resistor	10K 6pin	R3
1	Switch	Dip 4 Pole	SW1

DVR-1000 Digital Voice Recorder Board

1	Capacitor	1.0uF 50V	C5
1	Capacitor	10uF 16V	C15
2	Capacitor	12pF 50V	C20,C21
1	Capacitor	100pF 50V	C1
3	Capacitor	.001uF 50V	C4,C8,C12
1	Capacitor	.0047uF 50V	C10
1	Capacitor	.015uF 50V	C16
14	Capacitor	0.1uF 50V	C2,C3,C6,C7,C9,C11,C13,C14, C17,C18,C19,C22,C23,C24
1	Crystal	12MHz	Y2
2	Header	2X7	J1,J3
3	Header	1X2	J2,J4,J5
1	I.C.	74HC00	U13
1	I.C.	74HCT573	U10
1	I.C.	27C512	U14
1	I.C.	MC6264	U15
4	I.C.	MCM511000A	U2,U3,U4,U5
1	I.C.	MC4053	U7
1	I.C.	80C31	U9
1	I.C.	LM340-5	U8
1	I.C.	TL084	U6
1	I.C.	MX-703	U11
1	I.C.	MX-802	U1
1	I.C.	TPIC6259	U12
1	Module	4.00MHz	Y1
1	Resistor	1K 5% 1/4W	R2
1	Resistor	2.2K 5% 1/4W	R17
2	Resistor	10K 5% 1/4W	R5,R16
1	Resistor	33K 5% 1/4W	R12
4	Resistor	22K 5% 1/4W	R9,R10,R11,R15
1	Resistor	47K 5% 1/4W	R8
2	Resistor	100 5% 1/4W	R1,R13
2	Resistor	100K 5% 1/4W	R6,R7
1	Resistor	10K 12pin	R14
2	Resistor	10K Variable	R3,R4
1	Switch	Push-Button	SW1

Chapter 15 - Tables

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. LiTZ Emergency Alert	Enable*
6. DTMF Window	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

Zone 3		Zone 4	
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 #1	Enable	3. Long Distance	Enable
4. Squelch Tail Message #2	Enable	4. Emergency 911	Enable*
5. Dropout Message #1	Enable	5. Speed Dial	Enable*
6. Dropout Message #2	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

Zone 5		Zone 6	
1. Autopatch Pulse Dial	Enable	1. Transceiver Receive	Enable*
2. Reverse Autopatch	Enable *	2. Transceiver Transmit	Enable*
3. Long Distance Dial (1)	Enable	3. Transceiver Repeat	Enable
4. Telephone Off Hook	Enable	4. Transceiver CTCSS	Enable
5. Telephone Ring Announcer	Enable	5. Transceiver Voice	Enable*
6. Modem Auto Answer	Enable	6. Transceiver Auto Disconnect	Enable
7. DTMF Generator	Enable *	7. Computer Interface	Enable
8. DTMF Regenerator	Enable	8. Ring Detector	Enable*

Zone 7		Zone 8	
1. Input #1	Enable *	1. Output #1	Enable*
2. Input #2	Enable *	2. Output #2	Enable*
3. Input #3	Enable *	3. Output #3	Enable*
4. Input #4	Enable *	4. Output #4	Enable*
5. Input #5	Enable *	5. Output #5	Enable*
6. Input #6	Enable *	6. Output #6	Enable*
7. Input #7	Enable *	7. Output #7	Enable*
8. Input #8	Enable *	8. Output #8	Enable*

VOICE MESSAGE NUMBER TABLE

01	Repeater ID #1		02	Repeater ID #2	
03	Squelch Tail #1		04	Squelch Tail #2	
05	Transmitter Drop #1		06	Transmitter Drop #2	
07	Time of Day		08	Grandfather Clock	
09	Transceiver Disconnect		10	Transceiver Connect	
11	Courtesy Tone Repeater		12	Courtesy Tone Transceiver	
13	Repeater Time Out		14	Repeater Time In	
15	A/P Disconnect		16	Transceiver Auto Disconnect	
17	Message #17		18	Message #18	
19	Message #19		20	Message #20	
21	Message #21		22	Message #22	
23	Message #23		24	Message #24	
25	Message #25		26	Message #26	
27	Message #27		28	Message #28	
29	Message #29		30	Message #30	
31	Message #31		32	Message #32	
33	Message #33		34	Message #34	
35	Message #35		36	Message #36	
37	Message #37		38	Message #38	
39	Message #39		40	Message #40	

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= -			

Sending Speed	1=25	2=20	3=18	4=15	5=13	6=10	Words Per Minute
Tone Frequency	1=500	2=600	3=700	4=800	5=900	6=1000	7=1100 8=1200 Hz

TONE FREQUENCY TABLE (Hertz)

0=OFF	1=500	2=600	3=700	4=800	5=900	6=1000	7=1100	8=1200

TONE DURATION - TONE SEPARATION TABLE (Milliseconds)

0=0	1=50	2=100	3=150	4=200	5=250	6=300	7=350	8=400	9=450

TWO-TONE SEQUENTIAL PAGING FREQUENCIES

Tone	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6
1	349.0	600.9	288.5	339.6	584.8	1153.4
2	368.5	634.5	296.5	358.6	617.4	1185.2
3	389.0	669.9	304.7	378.6	651.9	1217.8
4	410.8	707.3	313.0	399.8	688.3	1251.4
5	433.7	746.8	953.7	422.1	726.8	1285.8
6	457.9	788.5	979.9	445.7	767.4	1321.2
7	483.5	832.5	1006.9	470.5	810.2	1357.6
8	510.5	879.0	1034.7	496.8	855.5	1395.0
9	539.0	928.1	1063.2	524.6	903.2	1433.4
0	330.5	569.1	1092.4	321.7	553.9	1122.5

INTERNAL COMMAND STRUCTURE

	Pointer	Zone	Channel	Action
Control Repeater	1	1-8	1-8	0-1-2

Action 0 = OFF 1 = ON 2 = Momentary (0.2 second)

	Pointer	Table Position
Send Time of Day	20	21	00
Send Day of Week	22	23	00
Send Day and Month	24	25	00
Send Salutation	26	27	00
Send Voice Message	30	31	01-40
Play DVR Track	32	33	01-16
Send CW Buffer	34	35	01-02
Send CW Character	36	37	00-46 50-96
Send Voice Message (PTT #1 & PTT #2)	38	39	01-40
Send DTMF Tones	40	41	01-40
Send Paging Tones	42	43	01-20
Copy To Voice Message 11	44		00-09 20-40
Copy To Voice Message 12	46		00-09 20-40
Execute Macro	50	51	01-40
Load Memory File	52	53	01-08
Time Delay Control Seconds	60		01-99
PTT #1 Control	62		00-01
PTT #2 Control	64		00-01
DVR Play - TX Audio	66		00-01
Link Control Off/On/Receive	70	71	00-01-02
Link Reset	70	71	03
Link Bridge Up/Down	70	71	04-05
Load Link Frequency (CAT-1000 Memory)	72	73	01-40
Load Link Frequency (Kenwood Memory)	74	75	01-20
Load Link TX Power Low/Med/High	76	77	01-02-03
HF Transceiver Control	78	79	01
Set MF-1000 #1 Switches	80	81	01-40
Set MF-1000 #2 Switches	82	83	01-40
Send Voice Vocabulary	9		000-999

ENTRY DESCRIPTION (DTMF Programming Table)

*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
*190	INITIALIZE ACTIVE MEMORY
*19X	SAVE ACTIVE MEMORY
*20	SEND TIME OF DAY
*21	PROGRAM TIME OF DAY
*280	READ DVR SELECTION
*281	SELECT DVR-1000
*282	SELECT DVM-58
*290	READ HF CONTROL SELECTION
*291	SELECT HF CONTROL KENWOOD TS-440
*292	SELECT HF CONTROL YAESU FT-767GX
*298	READ PULSE DIAL RATE
*299	PROGRAM PULSE DIAL RATE
*30XX	SEND VOICE SYNTHESIZER
*31XX	PROGRAM VOICE SYNTHESIZER
*32XX	ERASE VOICE SYNTHESIZER
*33X	SEND CW ID
*34X	PROGRAM CW ID
*35X	ERASE CW ID
*36XX	READ DTMF GENERATOR
*37XX	PROGRAM DTMF GENERATOR
*38XX	ERASE DTMF GENERATOR
*40XX	READ LINK FREQUENCY
*41XX	PROGRAM LINK FREQUENCY
*42XX	ERASE LINK FREQUENCY
*43XX	READ SERIAL CARD #1 SWITCH COMMANDS
*44XX	PROGRAM SERIAL CARD #1 SWITCH COMMANDS
*45XX	ERASE SERIAL CARD #1 SWITCH COMMANDS
*46XX	READ SERIAL CARD #2 SWITCH COMMANDS
*47XX	PROGRAM SERIAL CARD #2 SWITCH COMMANDS
*48XX	ERASE SERIAL CARD #2 SWITCH COMMANDS
501	PROGRAM CONTROL OPERATOR PREFIX [100]
502	PROGRAM LINK BRIDGE CODE [150]
503	PROGRAM MEMORY RECALL PREFIX [175]
504	PROGRAM DTMF GENERATOR PREFIX [300]
505	PROGRAM DTMF ACCESS PREFIX [325]
506	PROGRAM DTMF PAD TEST PREFIX [375]
507	PROGRAM TIME OF DAY REQUEST PREFIX [400]
508	PROGRAM LINK CONTROL PREFIX [500]
509	PROGRAM LINK FREQUENCY LOAD PREFIX [525]
510	PROGRAM USER FUNCTION SWITCH PREFIX [550]
511	PROGRAM SERIAL CARD #1 SWITCH PREFIX [575]
512	PROGRAM SERIAL CARD #2 SWITCH PREFIX [580]
513	PROGRAM AUTOPATCH ACCESS CODE [*]
514	PROGRAM AUTOPATCH DISCONNECT PREFIX [#]
515	PROGRAM USER SPEED DIAL (BLK #1) PREFIX [6]
516	PROGRAM USER SPEED DIAL (BLK #2) PREFIX [7]
517	PROGRAM USER SPEED DIAL (BLK #3) PREFIX [8]
518	PROGRAM EMERGENCY SPEED DIAL PREFIX [9]
519	PROGRAM VOICE PREFIX [700]
520	PROGRAM DVR PREFIX [725]
521	PROGRAM PAGING TONE PREFIX [750]
522	PROGRAM REVERSE AUTOPATCH PREFIX [800]
523	PROGRAM HF REMOTE BASE PREFIX [560]
524	PROGRAM MONITOR REPEATER BY PHONE CODE [850]
525	PROGRAM DTMF PAGING PREFIX CODE [875]
601	PROGRAM REPEATER TIME-OUT [180]
602	PROGRAM REPEATER SLEEP TIME [60]
603	PROGRAM REPEATER TURN ON DELAY TIME [1.0]
604	PROGRAM COR DROP TO COURTESY BEEP TIME [1.0]
605	PROGRAM COURTESY BEEP TO PTT DROP TIME [4.0]
606	PROGRAM DTMF MUTE DELAY TIME [1.0]
607	PROGRAM REPEATER ID TIME [480]
608	PROGRAM SQUELCH TAIL MESSAGE TIME [1799]
609	PROGRAM DROP OUT MESSAGE TIME [1799]
610	PROGRAM VOICE DELAY TIMER [1.0]
611	PROGRAM AUTOPATCH TIME [180]
612	PROGRAM AUTOPATCH ACTIVITY TIME [30]
613	PROGRAM DTMF PRE-WINDOW TIME [2.0]
614	PROGRAM DTMF WINDOW TIME [8.0]
615	PROGRAM PROGRAMMING MAX LENGTH TIME [300]
616	PROGRAM AUDIO TEST TONE LENGTH [30]
617	PROGRAM RING DETECTOR TIME [2.0]
618	PROGRAM MODEM CONNECT TIME [1200]
619	PROGRAM LINK AUTO DISCONNECT TIME [600]
*70XX	READ USER SPEED DIAL (BLOCK 1)
*71XX	PROGRAM USER SPEED DIAL (BLOCK 1)
*72XX	ERASE USER SPEED DIAL (BLOCK 1)
*73XX	READ USER SPEED DIAL (BLOCK 2)
*74XX	PROGRAM USER SPEED DIAL (BLOCK 2)
*75XX	ERASE USER SPEED DIAL (BLOCK 2)
*76XX	READ USER SPEED DIAL (BLOCK 3)
*77XX	PROGRAM USER SPEED DIAL (BLOCK 3)
*78XX	ERASE USER SPEED DIAL (BLOCK 3)
*80X	READ EMERGENCY SPEED DIAL
*81X	PROGRAM EMERGENCY SPEED DIAL
*82X	ERASE EMERGENCY SPEED DIAL
*83XX	READ LOCKED OUT PHONE NUMBER
*84XX	PROGRAM LOCKED OUT PHONE NUMBER
*85XX	ERASE LOCKED OUT PHONE NUMBER
*86XX	READ AREA CODE NUMBER
*87XX	PROGRAM AREA CODE NUMBER
*88XX	ERASE AREA CODE NUMBER
*89	PROGRAM PRE-DIAL NUMBER
*90	GENERATE 1000Hz TEST TONE
*91X	SEND COURTESY TONE
*92X	PROGRAM COURTESY TONE
*93X	ERASE COURTESY TONE
*94XX	PLAY DIGITAL VOICE RECORDER
*95XX	RECORD DIGITAL VOICE RECORDER
*96XX	ERASE DIGITAL VOICE RECORDED
*97XX	SEND PAGING TONE
*98XX	PROGRAM PAGING TONE
*99XX	ERASE PAGING TONE
*0	MANUAL EXIT

CAT-1000 Word List

Zero	000	C	270	Friday	389	Malfunction	584	Preset	697	Then	832
One	001	Calibrate	271	From	390	Manual	585	Press	698	This	833
Two	002	Call	272	Front	391	Many	586	Program	699	This-is	834
Three	003	Calling	273	Full	392	March	587	Pull	700	Thousand	835
Four	004	Cancel	274	G	410	May	588	Push	701	Thunderstorms	836
Five	005	Cat	275	Gear	411	Mayday	589	Put	702	Thursday	837
Six	006	Caution	276	Get	412	Me	590	Q	720	Time	838
Seven	007	Center	277	Go	413	Measure	591	Quebec	721	Timer	839
Eight	008	Celsius	278	Golf	414	Measured	592	R	730	Today	840
Nine	009	Change	279	Good	415	Meeting	593	Radio	731	Tomorrow	841
Ten	010	Charlie	280	Green	416	Mega	594	Radios	732	Tonight	842
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Twelve	012	Circuit	282	H	440	Meter	596	Raise	734	Tower	844
Thirteen	013	Clear	283	Hail	441	Meters	597	Range	735	Traffic	845
Fourteen	014	Clock	284	Half	442	Micro	598	Rate	736	Transmit	846
Fifteen	015	Closed	285	Ham	443	Mike	599	Ready	737	Transmitter	847
Sixteen	016	Club	286	Hamfest	444	Miles	600	Receive	738	Try	848
Seventeen	017	Code	287	Have	445	Milli	601	Receiver	739	Tuesday	849
Eighteen	018	Come	288	Hazardous	446	Million	602	Red	740	Turn	850
Nineteen	019	Complete	289	Heavy	447	Minus	603	Release	741	Type	851
Twenty	020	Completed	290	Henry	448	Minute	604	Remark	742	U	870
Thirty	030	Computer	291	Hertz	449	Minutes	605	Remote	743	Uniform	871
Forty	040	Condition	292	High	450	Mobile	606	Repair	744	Unit	872
Fifty	050	Congratulations	293	Hold	451	Modified	607	Repeat	745	Unlimited	873
Sixty	060	Connect	294	Home	452	Monday	608	Repeater	746	Until	874
Seventy	070	Contact	295	Hotel	453	Month	609	Reset	747	Up	875
Eighty	080	Control	296	Hour	454	More than	610	Rig	748	Use(noun)	876
Ninety	090	Current	297	Hours	455	Move	611	Right	749	Use(verb)	877
A	210	Cycle	298	Hundred	456	Much	612	Road	750	V	880
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Above	214	Date	313	Identify	473	Net	623	S	770	Victor	884
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Advise	218	Decrease	317	India	477	No	627	Seconds	774	Warning	892
Aerial	219	Degree	318	Information	478	Normal	628	Security	775	Watch	893
Affirmative	220	Delay	319	Ing(suffix)	479	North	629	Select	776	Watts	894
Again	221	Delta	320	Inputs	480	Not	630	Send	777	Way	895
Air	222	Department	321	Intruder	481	November	631	Sent	778	Weather	896
Alert	223	Direction	322	Is	482	Now	632	September	779	Wednesday	897
All	224	Do	323	It	483	Number	633	Sequence	780	Week	898
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And	231	Echo	342	Key	531	On	656	Side	787	Will	905
Answer	232	Ed(suffix)	343	Keypad	532	Open	657	Sierra	788	Wind	906
April	233	Emergency	344	Kilo	533	Operation	658	Sleet	789	Windows	907
Are	234	End	345	Knots	534	Operator	659	Slow	790	With	908
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Autopatch	244	Fahrenheit	373	Lima	559	Papa	682	Switch	800	You	936
Auxiliary	245	Fast	374	Line	560	Pass	683	System	801	Your	937
Avenue	246	February	375	Link	561	Patch	684	S (plural)	802	Z	950
Average	247	Feet	376	List	562	Per	685	T	820	Zed	951
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Bravo	257	Foxhunt	385	M	580	Position	693	Thank-You	828	<u>Sound Effects</u>	
Break	258	Foxtrot	386	Machine	581	Pound	694	That	829	Chime 1	964
Button	259	Freezing	387	Macro	582	Power	695	The(shortE)	830	Chime 2	965
By	260	Frequency	388	Make	583	Practice	696	The(longE)	831	Chime 3	966

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DTMF 9	189
DTMF *	190
DTMF #	191
DTMF A	192
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DTMF C	194
DTMF D	195

Chapter 16 - Serial Tuned Transceiver Interface

Kenwood TM-2550A Transceiver Interface

This chapter describes how to interface the TM-2550A transceiver to the CAT-1000 repeater controller through the MF-1000 Serial Interface Card. In response to DTMF commands, the CAT-1000 will generate serial data, clock and strobe signals. The MF-1000 card will control the frequency of the TM-2550A transceiver.

Construct a card containing twelve single pole relays. Each relay is assigned a key-pad switch position with its normally open contacts placed across that switch. When a DTMF frequency load command is received, the MF-1000 pulses each relay in the proper order to load the frequency.

Frequency loading of the TM-2550A is accomplished by pressing the front panel key-pad while the transceiver is in the receive mode. The switches on the keypad are set up in row/column matrix.

In addition to the MF-1000 card you will need the following items:

1.	12 single pole double throw 12VDC relays.	Radio Shack 275-248.
2.	Ribbon Cable	Radio Shack 278-772.
3.	One shielded 1/8" mini size phone plug.	Radio Shack 274-288.
4.	One .01uF capacitor	Radio Shack 272-1065.
5.	Assorted lengths of shielded audio cable.	Radio Shack 278-511.
6.	Eight pin microphone connector	Radio Shack 274-025
7.	One 39K ohm 1/4W resistor.	
8.	Perfboard, wire, shrink tubing and tie wraps.	

Relay Board Construction

Mount the 12 relays on the perfboard. Connect +12VDC to one side of each relay coil. Solder a 1N4005 diode across each coil with the diode's cathode on the +12VDC side. Connect the +12VDC buss to J1-26 on the MF-1000 card. Connect the other side of each relay coil to J1 on the MF-1000 Serial card. Connect the relays in a common row column configuration. Label the output wires K1 through K8. Please note that K4 is not used. In addition to the seven frequency control wires and two power set wires, five additional connections are required. They are: COR, RX AUDIO, TX AUDIO, PTT and GROUND.

MF-1000 Serial Interface Card

Set jumper JP1 on the MF-1000 card to position "A". Set jumper JP2 between pins 1 and 2. Configure the CAT-1000 for link mode and push button serial tuning by setting dip-switches 4 off and 3 and 5 on.

Installation Frequency Selection

Open the top of the TM-2550A transceiver. Locate the plug-in connector strip at the front of the transceiver on the control unit board. Connect the wires from the relay contacts K1 through K8 in parallel with the wires on this connector strip. Note: no connection to K4.

Installation High - Low Power Control

Connect a pair of wires from the PWR relay to the front panel High - Low power switch on the front panel of the TM-2550A transceiver. Remove the transceiver's bottom cover. Remove the four mounting screws to tilt the front cover enough to gain access to solder the two wires across the high - low power switch.

COR Interface

With the bottom cover removed locate the orange wire connected to "BD" on the three pin connector plug. This point goes low when a signal is received or when the squelch is manually opened. This point will serve as Link COR and should be connect to the CAT-1000 at J1-5 as AUX COR input. Set dip-switch 2 to the ON position to accommodate the negative going COR input.

Receiver Audio Interface

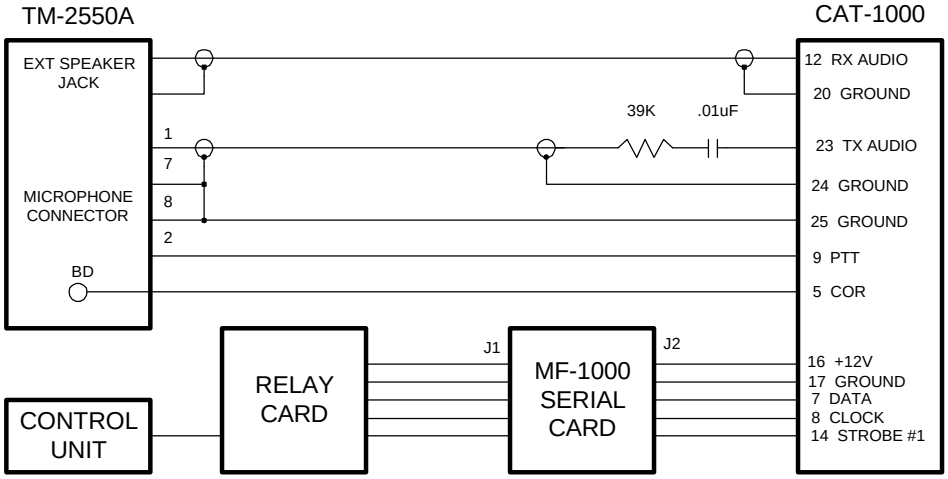
Fabricate a shielded audio cable with the 1/8 inch phono plug on one end. Connect the other end to the CAT-1000 at J4-12 RX AUDIO #2. Plug the phono plug into the external speaker jack on the TM-2550A transceiver.

Transmitter Audio Interface

Fabricate a shielded audio cable with the microphone connector. Connect the center lead to pin 1 and the shield to pin 7 of the 8 pin microphone connector. Connect the other end of the cable to the CAT-1000 at J4-23 TX AUDIO #2 through a 39K resistor and .01uF capacitor.

Push-To-Talk Interface

Connect a PTT wire to pin 2 of the 8 pin microphone connector and a GROUND wire to pin 8. Also connect a jumper between pin 8 and pin 7. Connect the other end of the PTT wire to the CAT-1000 at J4-9 PTT #2 and the GROUND wire to one of the ground pins J4-24 or J4-25.



CAT-1000 / TM-2550A Interconnect
Figure 16-1

Maximum Transmitter Power

The TM-2550A transmitter is not rated for continuous output. Power output control VR4 located near the rear of the unit will set the maximum power output when the transceiver is in the low power position. Power output control VR3 located next the VR4 will set the maximum power output when the transceiver is in the high power position. Maximum power output should be limited to a safe level. Consider a cooling fan on the heat sink of the transceiver.

Transceiver Adjustments

Apply +12VDC power to the repeater system. Enter a DTMF tone on the link receiver input. Adjust the TM-2550A volume control for a level of 250mV at the RX AUDIO #2 input on the CAT-1000 at J4-12. Use the link control command to enable the link receiver and transmitter functions. Enter a DTMF tone on the link receiver and adjust R35 on the CAT-1000 for the desired level of deviation at the repeater's transmitter. Check the DTMF tone level at J9-1. Verify the level is greater than 100mV. Enter a DTMF tone on the repeater's receiver. Use the microphone gain control VR7 on the TM-2550A to set the deviation level.

Frequency Load

Enter a frequency load command. The CAT-1000 will pulse the relays in the appropriate order. The new frequency should be displayed in the window of the TM-2550A transceiver.

Chapter 17 - Remote Base Interface

Remote Base Transceiver With RBI-1 Interface

In this mode the CAT-1000 supports the Doug Hall RBI-1 Interface. The RBI-1 receives serial data and clock information from the CAT-1000 and converts it to the format required to control the Kenwood transceivers. All connections to the transceivers are made through the mic jack. In addition to band, frequency, offset and transmitter power, CTCSS tones can be selected remotely. By using the RBI-1 "GENERIC FORMAT" future enhancements will include squelch adjustments and audio level control. The RBI-1 supports the following Kenwood Transceivers:

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

Figure 17-1

Configure the CAT-1000 for RBI-1 operation by setting dip-switch #4 and #5 to on. Zone 6 channels 1 and 2 must be on and the link must be enabled with the [5001] command. The RBI-1 also has eight expanded user function switches. These switches are controlled by the CAT-1000 using the control commands normally reserved for the User function switches on the MF-1000 Serial Interface card.

Read Remote Base Frequency

To read the transceiver frequency, key-up and enter the Remote Base Frequency Load prefix number followed by a 0. Un-key and the voice will read back the current frequency including the offset. Example: With a prefix number of 525, read the transceiver frequency.

```
Key-up and enter:  5 2 5 0
                   ÀÄÅÄÙ ÀÄÄÄÄ Request Transceiver Frequency Read Back
                     ÀÄÄÄÄÄÄÄÄÄ Remote Base load prefix.
```

Load Remote Base Frequency

To load a transceiver frequency, key-up and enter the Remote Base Frequency Load prefix, followed by the band, frequency, and offset. Example: With a prefix of 525, load 146.940 MHz, minus offset. The voice will say: "FREQUENCY-ONE-FORTY-SIX-POINT-NINE-FOUR-ZERO-MINUS."

```
Key-up and enter:  5 2 5 2 6 9 4 0 1
    Load PrefixÄÄÄÄÄÄÄÄÙ ³ ³ ³ ³ ³ ÀÄÄÄÄÄÄ 1=Minus, 2=Simplex, 3=Plus
    Frequency BandÄÄÄÄÄÄÄÙ ³ ³ ³ ÀÄÄÄÄÄÄÄÄ Kilohertz 1's (0 or 5)
    Megahertz 1'ÄÄÄÄÄÄÄÄÄÄÄÙ ³ ÀÄÄÄÄÄÄÄÄÄ Kilohertz 10's
(Enter 0 for 28/52MHz)        ÀÄÄÄÄÄÄÄÄÄÄÄ Kilohertz 100's
```

To suppress the voice read-back add a [#] at the end of the entry.

Frequency Band Selection Table (RBI-1 V3.0 Software)

Band 0	430	Band 3	220	Band 6	1280	Band 9	1240	Band C	52
Band 1	1250	Band 4	440	Band 7	1290	Band A	420	Band *	28
Band 2	140	Band 5	1270	Band 8	1260	Band B	900	Band #	130

Figure 17-2

During a frequency load, the CAT-1000 will automatically send the commands to turn on DC power, set transmitter power to low and disable the CTCSS encoder and decoder. If a frequency load includes a change in band, the CAT-1000 will send the DC power off command before loading the frequency and turning on the new band unit.

Select Transceiver Memory

To select a transceiver memory, key-up and enter the Remote Base Frequency Load prefix, followed by a [*] and the memory number. Example: With a prefix of 525, select memory 5. The voice will say: "M5"

```
Key-up and enter:  5 2 5 * 0 5
    Load Prefix ÄÄÄÁÄÁÄÙ   ÀÄÁÄÄÄ Memory location
```

Load Transceiver Frequency From CAT-1000 Memory

To load a transceiver frequency from one of the CAT-1000 forty memory locations, key-up and enter the Remote Base Frequency Load prefix, followed by the memory table position. Example: With a prefix of 525, load contents of memory 22. The voice will say: "FREQUENCY LOAD 22."

```
Key-up and enter:  5 2 5   2 2
    Load Prefix ÄÄÄÁÄÁÄÙ   ÀÄÁÄÄÄ Memory location
```

Read CTCSS Frequency

To read a CTCSS frequency. Key-up and enter the prefix, followed by [5].

Load CTCSS Frequency

To load a CTCSS frequency, key-up and enter the Remote Base Frequency Load prefix, followed by a [5] and the two digit number that represents the CTCSS tone frequency from the table at Figure 17-3. Example: With a prefix of 525, load 151.4 Hz tone. The voice will say: "CTCSS-TWENTY-FOUR-ON-OFF."

```
Key-up and enter:  5 2 5 5 2 4
                     ÀÄÅÄÙ ³ ÀÄÁÄÄÄÄÄÄ CTCSS Tone From Table
          Load Prefix ÄÄÄÄÙ   ÀÄÄÄÄÄÄÄÄÄÄÄ CTCSS Tone Load Command
```

CTCSS TONE TABLE Hz

Tone	Freq	Tone	Freq	Tone	Freq	Tone	Freq	Tone	Freq	Tone	Freq
01	67.0	08	88.5	15	110.9	22	141.3	29	179.9	36	233.6
02	71.9	09	91.5	16	114.8	23	146.2	30	186.2	37	241.5
03	74.4	10	94.8	17	118.8	24	151.4	31	192.5	38	250.3
04	77.0	11	97.4	18	123.0	25	156.7	32	203.5		
05	79.7	12	100.0	19	127.3	26	162.2	33	210.7		
06	82.5	13	103.5	20	131.8	27	167.9	34	216.1		
07	85.4	14	107.2	21	136.5	28	173.8	35	225.7		

Figure 17-3

During a CTCSS load, the CAT-1000 will automatically send the commands to turn on the CTCSS Encoder. If the CTCSS Decoder is desired, it must be manually enabled.

```
Key-up and enter:  5 2 5 5 3
    Load Prefix ÄÄÁÄÄÄÙ ÀÄÁÄÄÄÄ CTCSS Decoder ON
```

Set CTCSS Encoder - Decoder

To set the CTCSS Encoder to on, key-up and enter the Remote Base Frequency Load prefix, followed by the two digit number that represents CTCSS Encoder ON from Figure 17-4. The voice will say: "CTCSS-ON."

Key-up and enter: 5 2 5 5 1
Load Prefix ÄÄÁÄÄÄÙ ÀÄÁÄÄÄÄ CTCSS Encoder ON

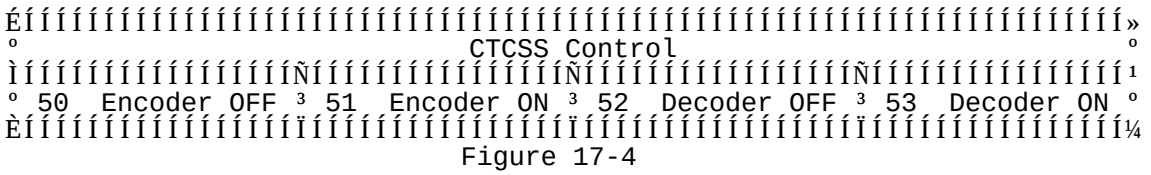


Figure 17-4

Read Remote Base RF Power

To check the setting of the Remote Base RF power, key-up and enter the Remote Base Frequency Load prefix, followed by [6].

Set Remote Base RF Power

To set the RF power, key-up and enter the Remote Base Frequency Load prefix, followed by the two digit number that represents the desired power setting from Figure 17-5. Example: With a prefix of 525, set RF power to high. The voice will say: "RF-POWER-HIGH."

Key-up and enter: 5 2 5 6 3
Load Prefix ÄÄÄÄÁÄÄÄÙ ÀÄÁÄÄÄÄÄÄÄ RF Power Level 3 (High)

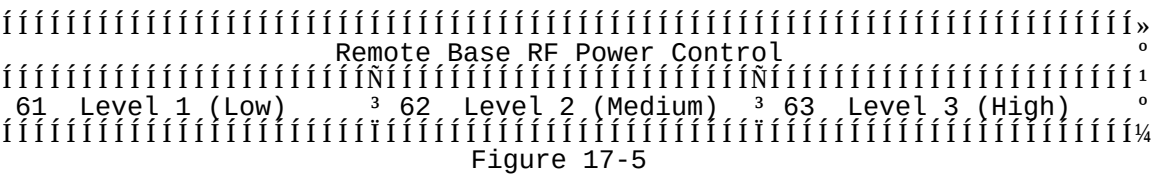


Figure 17-5

Read Remote Base DC Power

To check the setting of the Remote Base DC power, key-up and enter the Remote Base Load prefix, followed by [8].

Set Remote Base DC Power

To set the remote base DC power, key-up and enter the Remote Base Frequency Load prefix, followed by the two digit number that represents the DC power command. Example: With a prefix of 525, turn off the DC power. The voice will say: "DC POWER OFF."

Key-up and enter: 5 2 5 8 0
Load Prefix ÄÄÄÄÁÄÄÙ ÀÄÁÄÄÄÄÄÄÄ DC Power Off

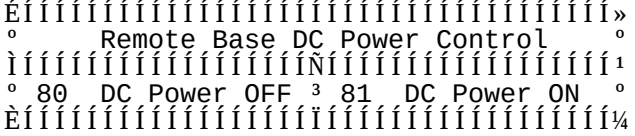


Figure 17-6

Reset the RBI-1 Interface

To reset the RBI-1 by remote control, (push the reset switch on the back of the RBI-1), key-up and enter the Remote Base Frequency Load prefix, followed by the [#].

Key-up and enter: 5 2 5 #
ÀÄÅÄÙ ³
Load Prefix ÄÄÄÄÙ ÀÄÄÄÄÄÄÄÄ Reset Command

CAT-1000 - RBI-1 Interface

Fabricate a cable between J4 on the CAT-1000 and J2 on the RBI-1 Remote Base Interface. Follow the wiring described in Figure 17-7. Provide +12VDC and GROUND to the PHONO jack on the rear of the RBI-1 interface. Connect the Kenwood interface cables between the RBI-1 and the various MIC connectors on the Kenwood transceivers. Consult the RBI-1 Manual to determine if all the control features are available on a particular transceiver.

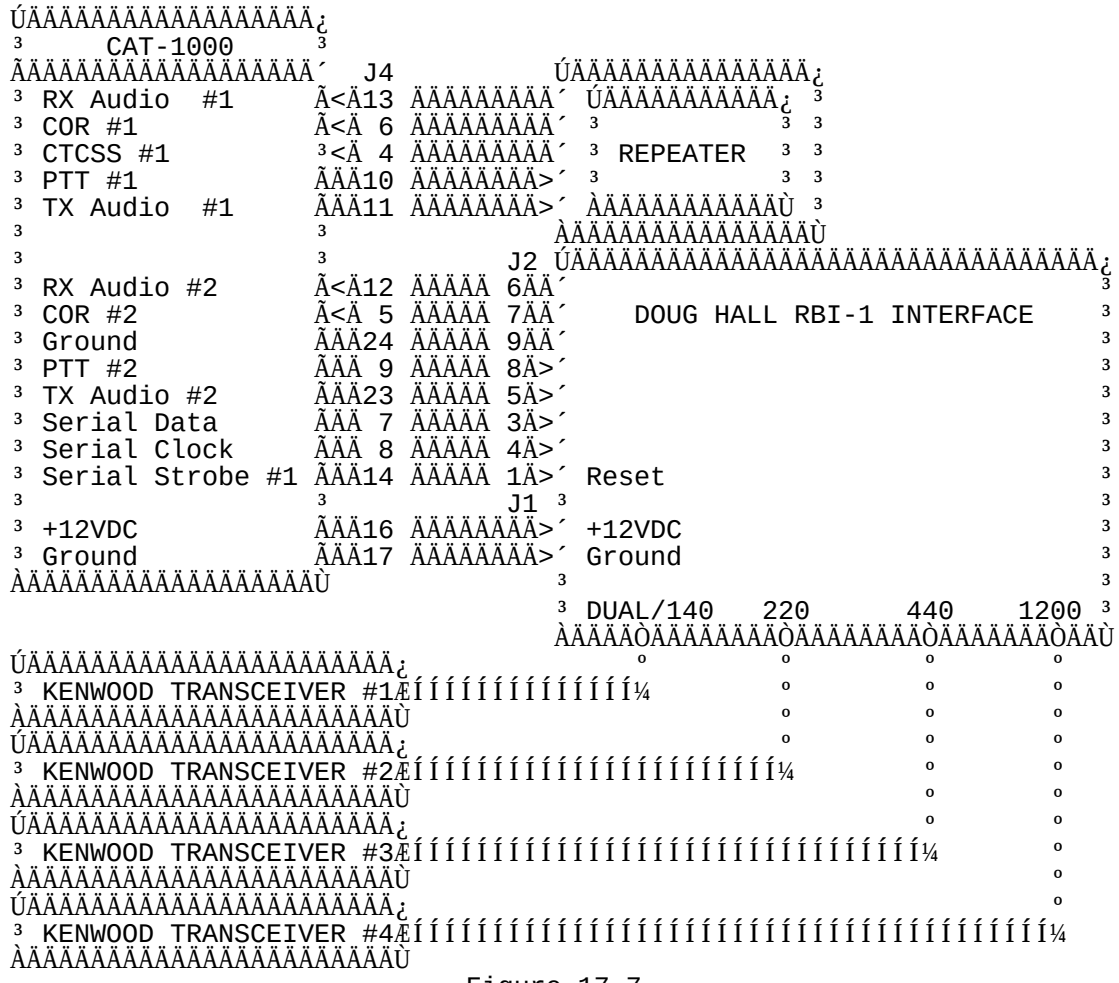


Figure 17-7

Link Audio Frequency Response

If the transmit audio out of the Kenwood remote base is muffled or has little or no high frequency response, remove capacitor C17 or both C17 and C16 on the RBI-1 Interface board.

For more information concerning the RBI-1 Interface contact:

Doug Hall Electronics
815 E. Hudson Street
Columbus, Ohio 43211
(614) 261-8871

Chapter 18 - RLS-1000 Remote Link Switch

The RLS-1000 provides a method to connect up to three transceivers to the remote base port of the CAT-1000 repeater controller. Transceiver selection is accomplished by grounding three control lines. Since the receiver audio and COR inputs are mixed, all three transceivers can be selected at the same time. To select a transceiver, connect the CAT-1000 user function switch outputs to the control line inputs on the RLS-1000.

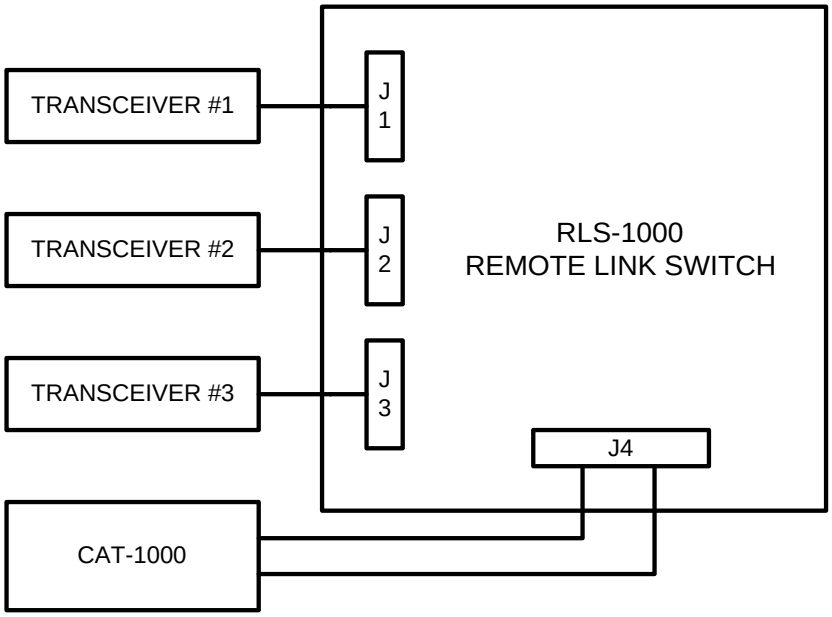


Figure 18-1

COR Output Polarity

The COR output will always be active HIGH. The COR polarity dip-switch on the CAT-1000 must be set to the OFF position.

Audio Input Output

The audio input and output circuits are identical to the CAT-1000 controller. Level adjustments on both the input and output amplifiers makes it easy to compensate for varying input and output requirements. The audio input impedance is 10K ohms while the output is 600 ohms.

Receiver Audio Response

Each receiver input has a buffer amplifier with a gain of three. The frequency response is flat over a range of 300 to 3000 Hz. If discriminator audio is being used, it may be necessary to add some high frequency roll off. Space has been provided to install a capacitor across the feedback resistor on each receive audio amplifier. These locations are identified on the RLS-1000 board as C2, C11 and C16. Start with a .0047uF capacitor. Increase the value to provide more high frequency roll off or decrease the value to provide less high frequency roll off.

Dip Switch Selection

Switch #1 - Port #1 COR Polarity
This switch determines COR input logic for the RLS-1000 port #1 input. Switch #1 should be ON if the COR input is active low and OFF if the COR input is active high. For an active low COR input a pull-up resistor may be required. Install a 2200 ohm .25W resistor on the RLS-1000 board at the R33 position.

Switch #2 - Port #2 COR Polarity
This switch determines COR input logic for the RLS-1000 port #2 input. Switch #2 should be ON if the COR input is active low and OFF if the COR input is active high. For an active low COR input a pull-up resistor may be required. Install a 2200 ohm .25W resistor on the RLS-1000 board at the R34 position.

Switch #3 - Port #3 COR Polarity
This switch determines COR input logic for the RLS-1000 port #3 input. Switch #3 should be ON if the COR input is active low and OFF if the COR input is active high. For an active low COR input a pull-up resistor may be required. Install a 2200 ohm .25W resistor on the RLS-1000 board at the R35 position.

Switch #4 - Port #1 Configuration
This switch configures port #1. If a transceiver is connected to the RLS-1000 at port #1, dip switch #4 should be in the OFF position. If a repeater is connected to port #1, dip switch #4 should be in the ON position.

Switch #5 - Port #2 Configuration
This switch configures port #2. If a transceiver is connected to the RLS-1000 at port #2, dip switch #5 should be in the OFF position. If a repeater is connected to port #2, dip switch #5 should be in the ON position.

Switch #6 - Port #3 Configuration
This switch configures port #3. If a transceiver is connected to the RLS-1000 at port #3, dip switch #6 should be in the OFF position. If a repeater is connected to port #3, dip switch #6 should be in the ON position.

Switch #7 - Port #1 Priority Enable
Switch #7 provides a method of assigning port #1 with priority over ports #2 and #3. If switch #7 is OFF the RLS-1000 will be configured for normal operation. Any COR input will enable the corresponding audio switch and pass the receive audio to the mixer. If switch #7 is ON port #1 will have priority. Audio switches for ports #2 and #3 will be disabled when port #1 COR is active.

Switch #8 - Port #1 CAT-300 Mode Enable
Switch #8 provides a method of forcing on the port #1 audio switches. This switch should be on when using the RLS-1000 with the CAT-300 in the one repeater, two transceiver mode. This mode is not used when the RLS-1000 is connected to the CAT-1000 controller.

CAT-1000 - RLS-1000 Interconnect

Figure 18-2 describes how to connect three remote base transceivers to the link port of the CAT-1000 controller. Control of the remote base is through user function switches one, two and three.

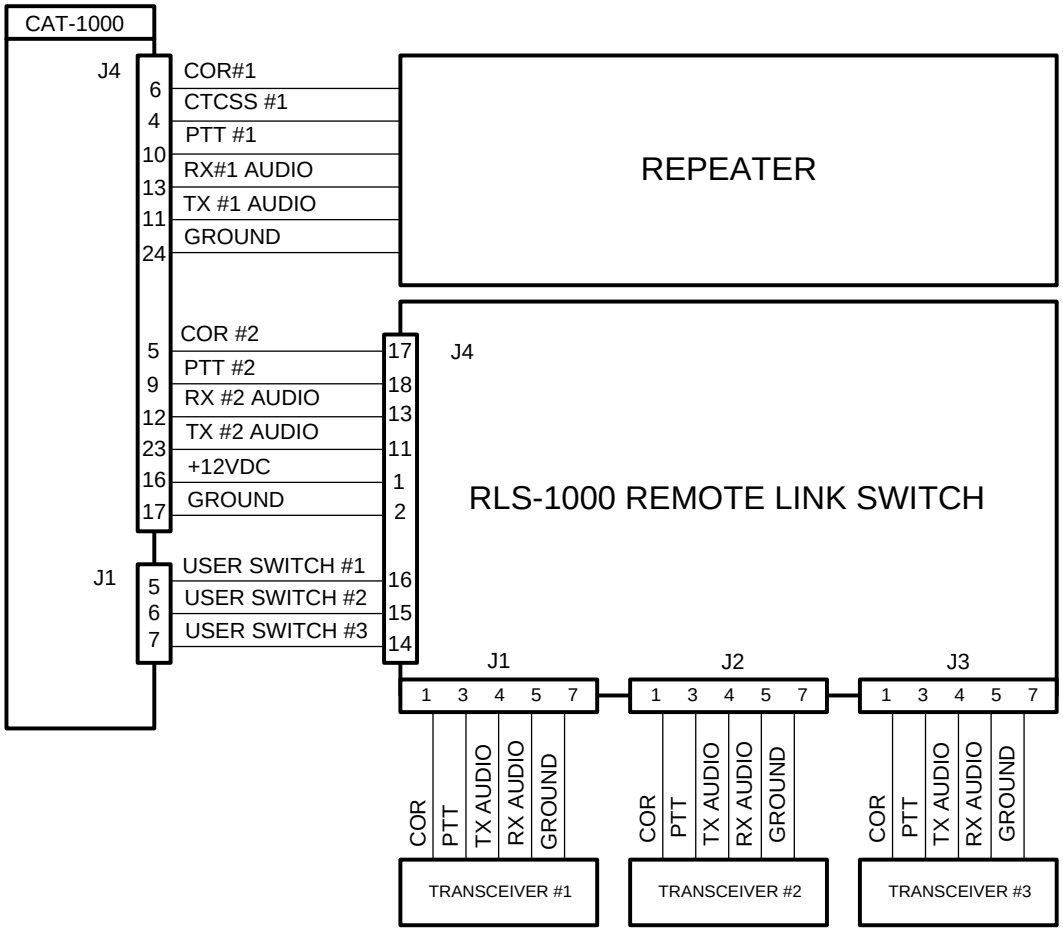


Figure 18-2

Chapter 19 - WX-1000 Weather Receiver Interface

The WX-1000 is a highly sensitive, quality receiver, with good front-end protection designed to function in the high RF environment typical of many repeater sites. A digital decoder responds to Specific Area Message Encoded SAME) alerts transmitted by the NOAA weather station located in your geographic area. Select your county code and the type of alert. Select warnings and or watches. During a weather alert, a relay in the WX-1000 will disconnect the transmitter from the controller and connect it to the weather receiver. The relay provides a ground for the transmitter PTT line. Weather audio will be transmitted for the period of the alert announcement. A programmable alert timer provides back-up protection.

CAT-1000 Interface

Connect the WX-1000 to the CAT-1000 and the repeater as shown in Figure 19-1. PTT and transmit audio from the CAT-1000 are connected to the repeater's transmitter through the normally closed contacts of the double pole double throw relay located in the WX-1000. When a weather alert is received, the relay will switch the weather alert audio to the TX audio input and provide a PTT signal to key the transmitter.

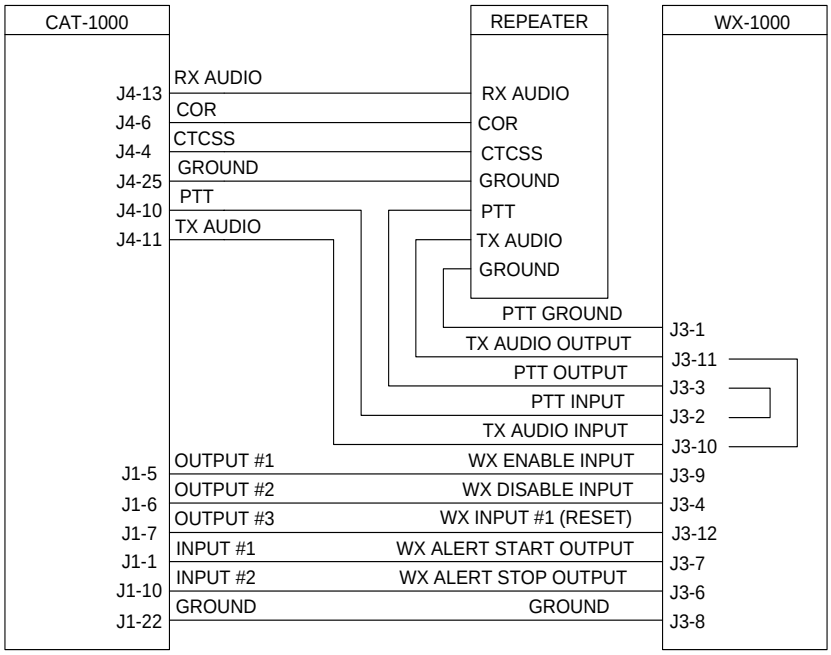


Figure 19-1

When a weather alert is received, the WX ALERT START OUTPUT will provide a one second positive DC voltage [TTL] level to the CAT-1000 at INPUT #1. This input can be programmed to load a memory save pre-programmed for several weather conditions. Follow the example: Unlock the controller and program INPUT #1 to load memory save #4 by entering [*171 5204]. Control operator Zone 7 Channel 1 must be enabled for INPUT #1 to function.

NOTE: Do not operate the WX-1000 with Zone 7 channel 1 enabled unless you have saved the current repeater settings as memory save #1 and programmed memory save #4 as a severe weather memory save.

The WX-1000 receiver can be tested at anytime, by turning on the CAT-1000 user function output #1 which grounds the WX ENABLE pin on the WX-1000 receiver. Key-up and enter: [100811]. To stop the weather broadcast key-up and enter: [100810].

The weather bureau tests the system every Wednesday between 11 AM and 12 noon. The test message will be transmitted on your repeater. However you may not want to load memory file #4 when its just a test. To prevent the memory file load use the scheduler to disable hardware input #1 at 11AM and enable hardware input #1 at 12 noon.

Program scheduler position #1 at 11:00 AM on Wednesday to turn off Zone 7 Channel #1. Unlock the controller. Key-up and enter: [*1101 11 00 4 00 00 1710].

Program scheduler position #2 at 12:00 NOON on Wednesday to turn on Zone 7 Channel #1. Key-up and enter: [*1102 12 00 4 00 00 1711].

Chapter 20 - DL-1000B Audio Delay Board

When placed in the receive audio path, the DL-1000B will eliminate the first chirp of DTMF tone during muting and the squelch crash noise present on many repeater systems. A dip-switch selects delays of 62.5, 125, 250 or 500 milliseconds. The delayed audio is faithfully reproduced. With the addition of an audio gate, the DL-1000B is fully compatible with discriminator audio.

Remove the jumper plug from the CAT-1000 at J8. Connect the cable from the DL-1000B to header connector J8 to delay repeater audio or J9 to delay remote base audio.

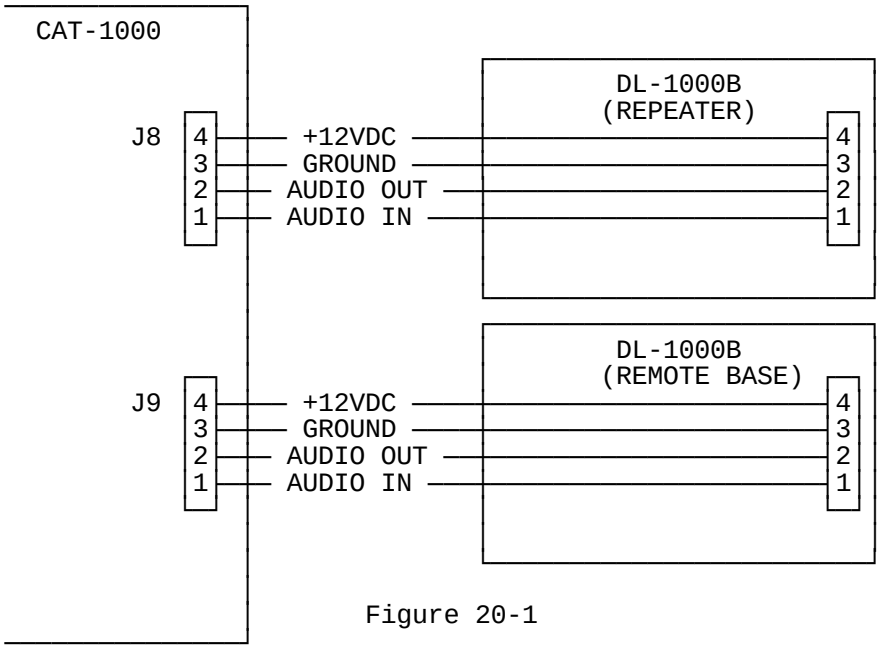


Figure 20-1

Select Delay

The amount of delay is determined by the setting of dip-switch. The typical repeater receiver has a squelch crash noise of 40 milliseconds. The 62.5 millisecond setting should be sufficient to eliminate the noise. If not increase the delay to the next setting. See Figure 20-2.

MILLISECONDS	SW1	SW2	SW3	SW4
0.0	OFF	OFF	OFF	OFF
62.5	ON	OFF	OFF	OFF
125.0	ON	ON	OFF	OFF
250.0	ON	ON	ON	OFF
500.0	ON	ON	ON	ON

Figure 20-2

The DL-1000B is inserted in the receive audio path before the controller's audio switch. This audio switch is controlled by the COR logic signal. Loss of COR will cause the audio switch to open, preventing the receive audio from reaching the transmitter. The DL-1000B provides time for the switch to open before the squelch crash noise reaches the switch's input.

During DTMF muting, 40 milliseconds of the first tone will sneak through before the DTMF decoder can tell the microprocessor to open the audio switch. The DL-1000B provides the necessary delay to overcome this problem.

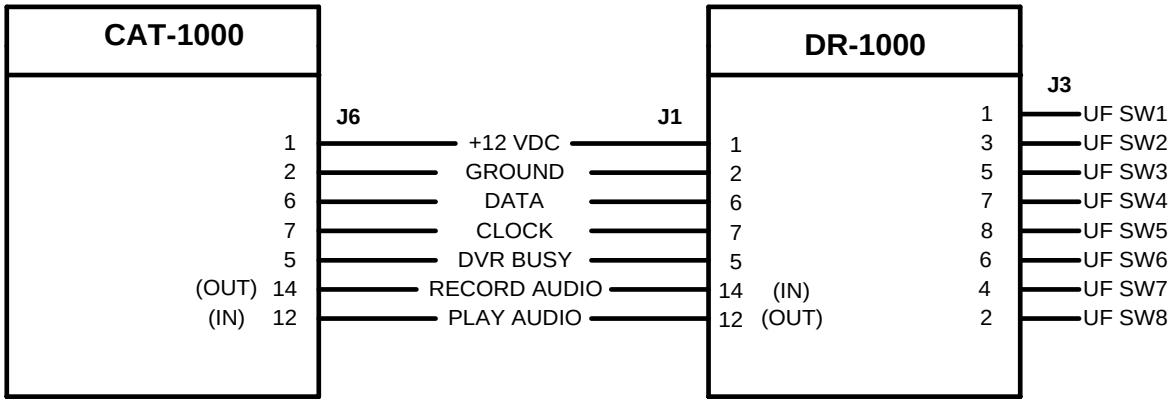
Discriminator Switch

The DL-1000B can be used with discriminator audio. A FET switch Q1 is included on the board. If the repeater’s COR logic is connected to the J2 header, the white noise hiss will be eliminated during key-up. If the COR logic is active high it should be connected to J2 pin 1. If the COR is active low it should be connected to J2 pin 3. If this feature is not used, the jumper must remain on J2 pins 2 and 3 to keep the switch turned on for normal operations.

Chapter 21 - Digital Voice Recorder

The DR-1000 provides true voice message announcements on your repeater system. Substitute DVR tracks for voice messages, speed dial identifications and courtesy tones. With four minutes of total record time, sixteen audio tracks provide sufficient message capacity. Eight expanded user function switches are also included.

Connect the cable to the CAT-1000 at J6. See Figure 21-1 below. Apply power to the controller.



DR-1000 Interface
Figure 21-1

DVR Control Selection

When the CAT-1000 is initialized, selection defaults to the DVR-1000. Make sure the DVR-1000 is selected. Enter the programming mode, (unlock the controller) and use the [*280] programming command. If necessary enter the [*281] programming command to select the DVR-1000.

Format Digital Voice Recorder Memory

When power is first applied, format the DR-1000 memory. Memory is protected during power failures. To format the DR-1000, press the Format switch SW1 located on the board.

Signal Report Test

Key-up and send the DVR prefix code [725] followed by a [*]. Un-key and the voice will say: "START TEST NOW." Key-up and record a seven second message. Un-key and the test message will play back. You instantly know how your signal sounds through the repeater.

Track length

The DR-1000 consists of sixteen tracks of fixed lengths. They are:

Track #1	30 seconds	Track #9	10 Seconds
Track #2	30 seconds	Track #10	10 Seconds
Track #3	30 seconds	Track #11	6 Seconds
Track #4	30 seconds	Track #12	6 Seconds
Track #5	15 seconds	Track #13	6 Seconds
Track #6	15 seconds	Track #14	6 Seconds
Track #7	10 seconds	Track #15	6 Seconds
Track #8	10 seconds	Track #16	6 Seconds

Record DVR Tracks By Radio (01-16)

The CAT-1000 must be in the programming mode to record DVR tracks. Key-up and enter the seven digit unlock code. Once unlocked, 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". Un-key and the voice will say: "CONTROL OK". To review the message, key-up and send [*94XX]. Un-key and the CAT-1000 will play the message stored at track "XX". To erase a message, key-up and send [*96XX]. Un-key and the voice will say: "CONTROL OK". Tracks can be recorded, played or erased in any order. Total record time is four minutes. Maximum track length is thirty seconds. The DR-1000 cannot be used in a mailbox type application. It can only be used for announcement type messages.

Record DVR Tracks By Telephone (01-16)

Call the repeater by telephone. The CAT-1000 will answer and send a beep. Enter the seven digit unlock code followed by the [#]. Once unlocked, enter [*95XX#]. The voice will say: "START MESSAGE" and the record function will start. Speak into the phone to record the message. To stop the recording, press the [#]. Press and release the [#] quickly. The DVR is programmed to automatically back-up and erase the [#] tone from the end of the message. The voice will say: "CONTROL OK". To review the message, enter [*94XX#]. Un-key and the CAT-1000 will play the message stored at track "XX" over the telephone. The CAT-300 will play the message over the transmitter. To erase a message, enter [*96XX#]. The voice will say: "CONTROL OK".

Audio Level Adjustment

Set the RECORD level control R2 and the PLAYBACK level control R3 to mid-range. This set the audio path through the DVR at approximately unity gain. Use R2 and R3 to adjust the audio levels as desired. Measure the TX1 audio level at TP5. Adjust R3 so the playback audio at TP5 is the same level as the audio of the original signal.

Expanded User Function Switches

The eight expanded user function switches are open collector relay drivers. Each driver can sink up to 80 ma. and switch 40 VDC. When connected to the CAT-1000, use the second expanded user function table, controlled by the [580] default prefix code. Place diodes across the relay coils to protect the driver from negative spikes produced when the relay coil collapses.

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