CAT-700
Repeater Controller

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I Don't Have Time To Read This Manual

If you are anxious to get the CAT-700 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-700 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 24.

3. Connect the pin 10 wire to the transmitter's PTT, the pin 11 wire to the transmitter's modulation input and pin 24 to receiver/transmitter chassis ground.

4. Turn the +12VDC power supply ON, the repeater should transmit and you should hear the voice synthesizer say: "CAT700 VERSION 2.00" Refer to Figure 7-1 and adjust TX1 control for proper transmitter deviation.

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 TP3 with a DC voltmeter. Open and close the repeater's squelch control while observing the voltage on TP3. If TP3 goes from LOW to HIGH dip-switch #1 should be left in the OFF position. If TP3 goes from HIGH to LOW set dip-switch #1 to ON. If TP3 stays LOW, turn the power supply OFF and add a 2200 ohm pull-up resistor on the CAT-700 at the R1 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 TP5. Using a typical transceiver, key-up and send a DTMF tone. Adjust RX1 control for 200mV as indicated on the AC voltmeter. If this causes the repeater to over deviate, readjust TX1. Make sure that RF from the transceiver does not give a false voltmeter indication.

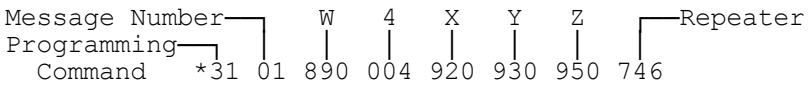
8. Compare the receive and synthesized voice audio and adjust the VOICE Level as desired. For best quality speech, the synthesized voice should not exceed 3KHz deviation and always be lower than the receive audio.

9. Compare the receive and courtesy tone audio and adjust the DTMF TX1 control for the desired courtesy tone level. For best results the courtesy tone should not exceed 1.5KHz deviation. This control also sets the CW ID and 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. Key-up and enter the seven digit unlock number [1234567]. The voice will say: "CAT-700 CONTROL."

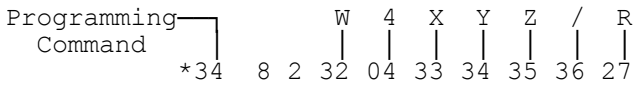
11. Key-up and send [*3101], followed by the three digit numbers that

represents your call letters for voice ID #1. Refer to Chapter 14, Voice Vocabulary Word List. Example: Load Repeater ID #1 with "W4XYZ Repeater"



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

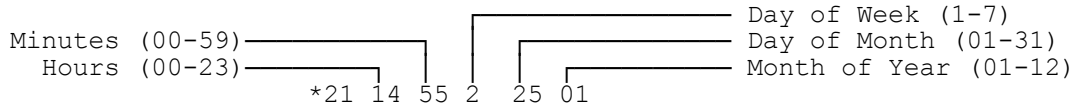
13. Key-up and send [*34], followed by the two digit numbers that represents your call letters for the CW ID. Refer to the CW ID programming table. Example: Load the CW ID memory buffer with W4XYZ/R.



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

14. To read the time, key-up and send [*20]. Un-key, the voice will read the time, day of week, month, day of month and year.

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



16. Key-up and send [*0]. Un-key, the controller will lock-up and the voice will say: "MANUAL EXIT." The CAT-700 will lock-up automatically when the programming timer expires. The voice will say: "TIMER EXIT."

17. 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.

18. 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."

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

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

Foreword

For your convenience, this manual is divided into seventeen chapters. A brief description of each chapter and its contents are listed below. Control and programming of the CAT-700 has been carefully structured. Once you become familiar with the procedures described in this manual, you will find it easy to program and control the CAT-700 to suit your particular requirements.

Chapter 1 - This chapter describes some of the CAT-700 features. Also included are the technical specifications.

Chapter 2 - This chapter describes the various configurations for the CAT-700, dipswitch settings and modes of operation.

Chapter 3 - This chapter describes how to control the CAT-700. The control operator prefix code [100] must precede each control command. **Do not unlock the CAT-700 when changing control channels.**

Chapter 4 - This chapter describes how to use the features of the CAT-700. These are considered repeater user commands.

Chapter 5 - This chapter describes how to program the CAT-700 with DTMF tones. **During programming the CAT-700 must be un-locked.** Key-up and enter [1234567].

Chapter 6 - This chapter describes how to program the CAT-700 through the RS-232 computer port using the Windows editor and Communications program.

Chapter 7 - This chapter describes how to interface the CAT-700 to a RF package. It defines the input - output connections and how to adjust the audio levels.

Chapter 8 - This chapter describes how to connect the MF-1000 to the CAT-700 to obtain 24 additional user function output switches.

Chapter 9 - This chapter describes how to connect and set-up the DL-1000 Audio Delay to the CAT-700.

Chapter 10 - This chapter describes how to connect and set-up the DR-1000 Digital Voice Recorder to the CAT-700.

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 for the CAT-700, MF-1000, DL-1000, DR-1000, RBS-1000 and LPS-1000 boards.

Chapter 13 - This chapter contains the schematics diagrams (3) sheets for the CAT-700 and (1) sheet for the MF-1000, DL-1000B, and DR-1000.

Chapter 14 - This chapter contains part lists for the CAT-700, MF-1000, DL-1000 and DR-1000 boards.

Chapter 15 - This chapter describes how to connect the CAT-700 through the Doug Hall RBI-1 Interface unit to a Kenwood transceiver.

Chapter 1 - Introduction and Specifications

Congratulations on your purchase of the CAT-700 Repeater Controller. The CAT-700 is packed with features normally reserved for controllers costing thousands of dollars more.

Programming the CAT-700 is a snap, with its carefully structured uniform programming commands. The manual is easy to follow with numerous examples. The voice synthesizer interacts with you during control and programming operation.

Scheduler

An advanced [40] position scheduler fully automates repeater operation. Any command that can be manually executed can also be scheduled to one minute accuracy. Program the hours, minutes, day of week, or day of month and month of year. The CAT-700 will do the rest.

Voice Synthesizer

A vocabulary base of 330 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 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.

Courtesy Tone

Memory space is provided for the storage of [8] 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 link receiver activity.

Link Control

The CAT-700 will support a link transceiver. You can enable the transceiver or just the receiver to monitor activity on the transceiver frequency while you use the repeater. After a preselected period of inactivity the transceiver will automatically disconnect. The CAT-700 will suppress your repeater identification from being transmitted on the transceiver frequency.

Digital Voice Recorder

An optional DVR, controlled by the CAT-700 can be added to your repeater. Control of the DVR is fully integrated into the CAT-700 control and command structure. The CAT-700 will permit you to substitute any of the [16] 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.

User Function Output Switches

Four open collector user function output switches 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.

DTMF Regenerator

The CAT-700 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-700 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-700 memory. These commands can be sent manually by entering a prefix code or automatically by the scheduler.

User Function Inputs

Four inputs activated by a voltage change from other equipment at the repeater site, causes the CAT-700 to execute any repeater command. External control, or information about the repeater site will be instantly available.

Repeater Control Prefix

A total of [13] 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 [16] timers control repeater operation. Each timer is user programmable to afford maximum flexibility to suite your special requirements.

DTMF Keypad Test

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

Macro

By entering a macro control number, the CAT-700 will execute up to ten commands in a string. Memory space is provided for the storage of [40] macro strings. This feature permits the repeater owner to customize the control functions.

Active Memory Save

Configure the CAT-700 to suite your special requirements. Active Memory Save permits you to store the current settings of the control channels, timers, codes and the first [10] voice messages. Memory space is provided for [6] memory saves. These memory saves can be later recalled with a simple DTMF command.

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.

Specifications

Microprocessor	80C251SB
Memory	EPROM 512K X 8 - RAM 8K X 8 (non volatile)
Clock Accuracy	±1 minute per month at +25 degrees C.
	In the absence of power, data and time
	will be maintained for ten years.
Voice Synthesizer	Texas Instruments TSP53C30 Linear Predictive Coded
Voice Vocabulary	330 Words
DTMF Receiver	Mitel MT8888 (2)
Operating Temperature	-15 to +55 degrees C
Call Letter ID	Buffer size VOICE (23) - CW (28)
Control Codes	(13) Buffer size (7)
Timers	(16) Short (0.1 to 9.9) - Long (1.0 to 1799) seconds
Scheduler	(40) Commands (one minute resolution)
Macro	(40) Five Function
Memory Saves	(6) Zone Control Channels, Timers, Codes,
	First (10) Voice Messages
Voice Synthesizer	(20) Messages, Maximum Word Length (23)
Digital Voice Recorder	(16) Tracks, Maximum Record Time (2 minutes)
User Function Outputs	(4) Switch 40VDC @ 150mA.
Hardware Inputs	(4) 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 (28VDC at 150mA)
Power	+9 to +12VDC at 80mA
Size	6.5" X 8.5"
Warranty	Limited one year, parts and labor.

FCC Part 15 RF Interference

When installed in the RME-1000 rack mount enclosure, the CAT-700 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-700 supports a repeater with a CTCSS decoder and a transceiver on a fixed frequency.

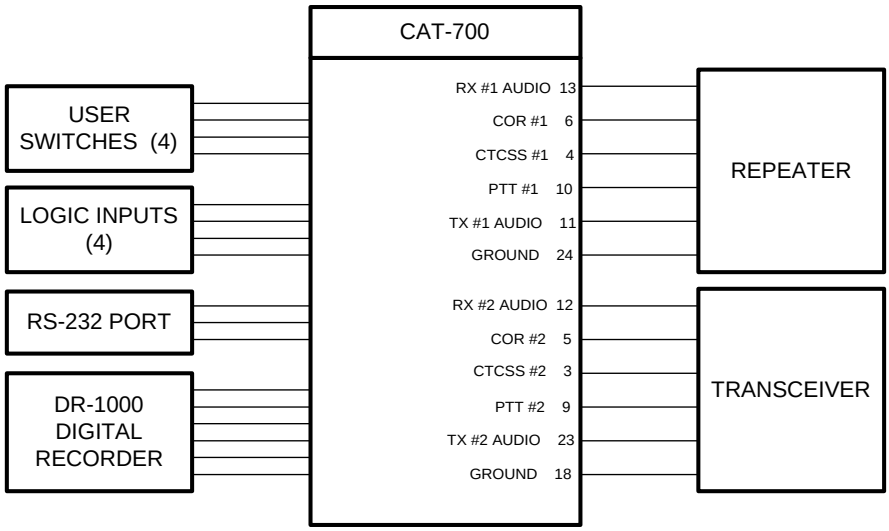


Figure 2-1

Repeater And Transceiver Without COR Output

The CAT-700 will support a repeater and a transceiver that does not supply a COR output signal. If the transceiver outputs discriminator audio the CAT-700's on board COR generator will produce the necessary COR logic. Set jumper J3 between pins 1 and 2.

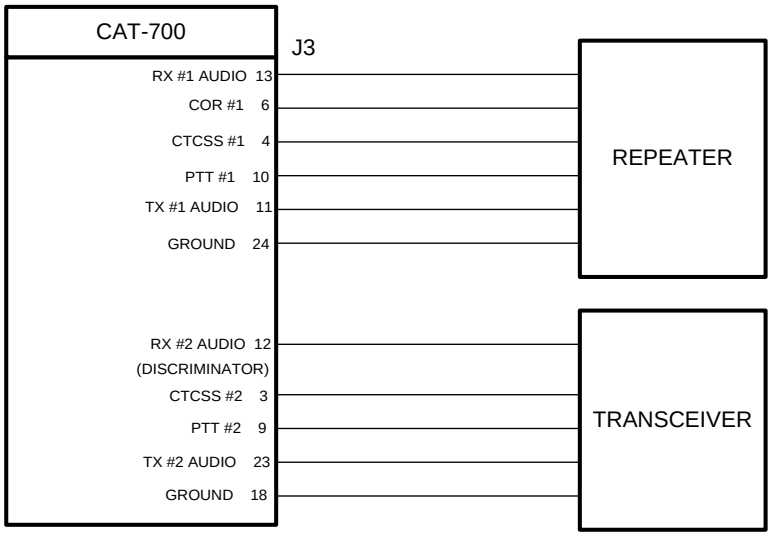


Figure 2-2

Repeater With Serial Tuned Transceiver

In this configuration the CAT-700 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-700 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.

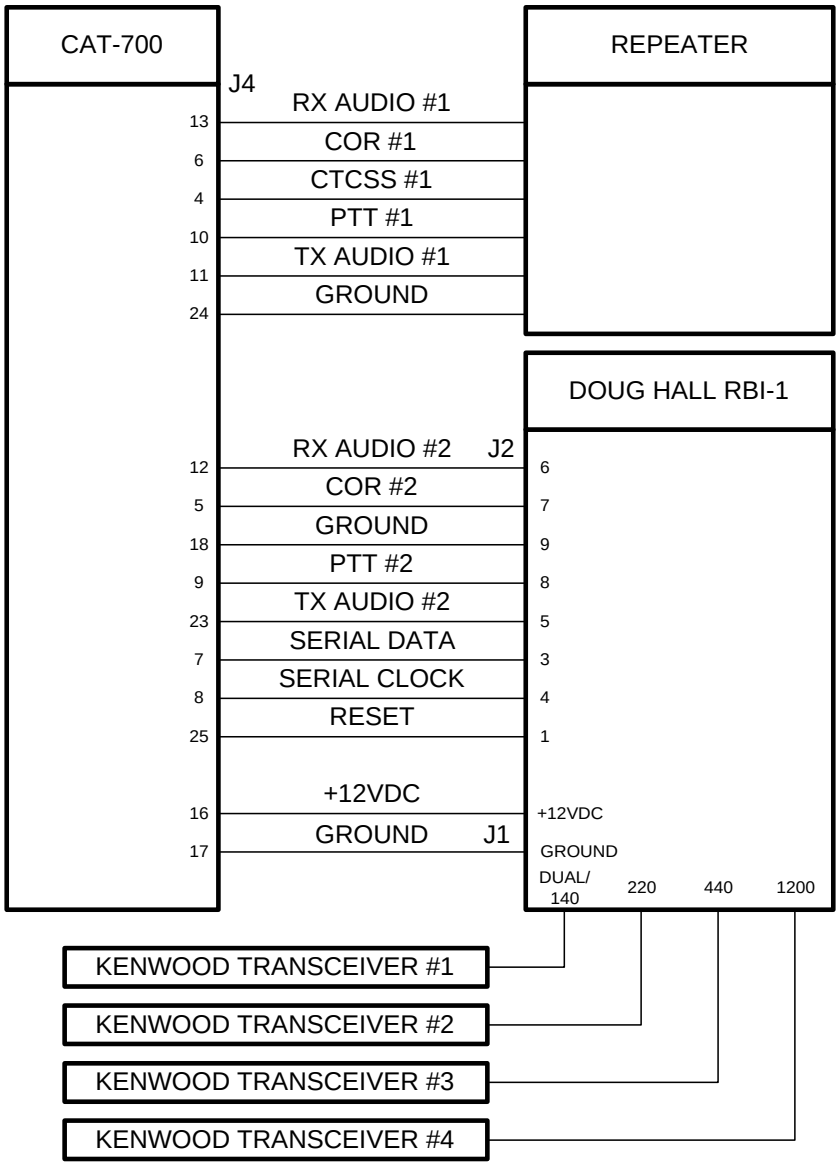


Figure 2-3

The Doug Hall RBI-1 Remote Base Interface supports the Kenwood transceivers listed in Figure 2-4. 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 2-4

Dip Switch

A eight position dip-switch configures various functions of the CAT-700.

Switch 1

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

Switch 2

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

Switch 3

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

Switch 4

This switch determines Link CTCSS input logic. Switch #4 should be ON if the link receiver's CTCSS is an active low and OFF if COR is active high.

Switch 5

This switch is used to set the CAT-700 for dual transceiver mode. In this mode when a signal is received by the port #1 receiver, the CAT-700 will only activate the Port #2 transmitter. When a signal is received by the port #2 receiver, the CAT-700 will only activate the Port #1 transmitter. In this mode the Grandfather clock, Scheduler, User Inputs and Timed Messages are operational. The CAT-700 will accept the following DTMF commands: Unlock Code, Control Operator Codes, Linking Control and all forty Macros.

Switch 6

This switch is used to define the expanded output switch interface. Set the switch OFF for the DR-1000 Digital Voice Recorder and ON for the MF-1000 Interface Card.

Switch 7

This switch is used to initialize the CAT-700. 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 dipswitch #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.

NOTE: When the dipswitch is changed, DC power must be cycled for the microprocessor to read the new setting.

Chapter 3 - Repeater Control

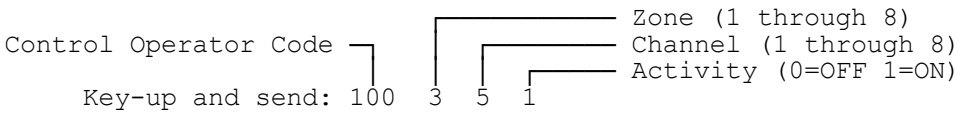
The CAT-700 has 8 Zones for a total of 64 remote control channels. In addition to being controlled by the scheduler, macros or memory saves, these channels can be manually controlled by DTMF commands on the repeater input.

Interrogation of Repeater Control Status by Radio

Key-up and send the control operator code [100] followed by the zone number and a zero. Un-key and the voice will read back the channels that are turned on in that zone. Example: "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 code [100] followed by the zone number, channel number and a [1] to turn the channel ON or a [0] to turn the channel OFF. Un-key and the voice will read back the zone, channel number and control activity. The voice will say: "ONE ONE ON." or "THREE FIVE OFF." Example: With a control operator prefix of 100, turn Zone 3 Channel 5 ON.



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

Repeater Control Channels

Zone 1

1. Repeater Transmit	Enable*
2. Repeater CTCSS	Enable
3. DTMF Access	Enable
4. CTCSS Override	Enable
5. Turn on Delay	Enable
6. CTCSS or COR Logic	Enable
7. DTMF Muting	Enable
8. Control Operator CTCSS	Enable

Zone 2

1. Repeater Time-out Timer	Enable*
2. Transmitter Hang Time	Enable*
3. DTMF Regenerator Link	Enable
4. DTMF Pad Test	Enable*
5. Scheduler	Enable*
6. Courtesy Tone	Enable*
7. DTMF Generator	Enable*
8. DTMF Regenerator	Enable

Zone 3

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

Zone 4

1. Link Receive	Enable*
2. Link Transmit	Enable*
3. Link Auto Disconnect	Enable
4. Link CTCSS	Enable
5. Link Control	Enable*
6. Link Activity Check	Enable
7. Link Macro	Enable
8. Link Control Operator	Enable*

Zone 5

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

Zone 6

1. Expanded Output #1	Enable
2. Expanded Output #2	Enable
3. Expanded Output #3	Enable
4. Expanded Output #4	Enable
5. Expanded Output #5	Enable
6. Expanded Output #6	Enable
7. Expanded Output #7	Enable
8. Expanded Output #8	Enable

Zone 7		Zone 8	
1. Expanded Output #9	Enable	1. Expanded Output #17	Enable
2. Expanded Output #10	Enable	2. Expanded Output #18	Enable
3. Expanded Output #11	Enable	3. Expanded Output #19	Enable
4. Expanded Output #12	Enable	4. Expanded Output #20	Enable
5. Expanded Output #13	Enable	5. Expanded Output #21	Enable
6. Expanded Output #14	Enable	6. Expanded Output #22	Enable
7. Expanded Output #15	Enable	7. Expanded Output #23	Enable
8. Expanded Output #16	Enable	8. Expanded Output #24	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-700 will continue to respond to control operator commands even when the repeater's transmitter is disabled. This channel will automatically be enabled after a dip-switch #7 initialization reset.

2. Repeater CTCSS Enable

When this channel is enabled, in addition to a COR input, a input from a CTCSS decoder at J3-4 must also be present before the repeater will activate. A COR input by itself will have no affect. To prevent loss of control, DO NOT ENABLE THIS CHANNEL unless a CTCSS decoder is connected to 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-700 is initialized this timer default to 60 seconds. To return to DTMF Access mode key-up and enter the same 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. Once active, input less than one second will not produce a courtesy tone or a squelch tail. A time delay of 0.1 to 9.9 seconds can be selected with the [*603*] programming commands. When the CAT-700 is initialized, this timer defaults to 1.0 second. Use this channel during periods when noise is present on the repeater input.

6. Repeater CTCSS OR Logic Enable

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

7. DTMF Muting Enable

When this channel is enabled, anytime a DTMF tone is received the audio will be turned off to the repeater's transmitter. The transmit audio will remain muted until a pre-determined time after the last DTMF tone is received. This time is set by the [*606*] programming command. During the mute period, cover beeps are transmitted each second to indicate repeater activity. This feature prevents control commands from being repeated. It provides 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 2 Channel 8 for additional information.

8. Control Operator CTCSS Enable

When this channel is enabled, a CTCSS input is required for the CAT-700 to accept control or program commands from the control operator.

Zone 2 Repeater Control

1. Repeater Timer Enable

Repeater time-out is user programmable with the [*601*] timer programming commands. When the CAT-700 is initialized, this timer default to 3 minutes. When this channel is turned off, the repeater will not time-out.

2. Transmitter Hang Time 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. DTMF Regenerator Link Only Enable

When DTMF muting Zone 1 Channel 7 and DTMF Regenerator Zone 2 Channel 8 are 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 on the repeater’s transmitter. If this channel is enabled, the controller will regenerate the DTMF command on the Link transmitter only.

4. DTMF Pad Test Enable

When this channel is enabled, a repeater user can test their radio's key-pad. As the numbers decode, they are stored in memory. When the repeater user stops transmitting the controller will read back all the numbers that were decoded.

5. Scheduler Enable

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

6. 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.

7. DTMF Generator Enable

This channel enables the DTMF Generator. DTMF commands stored in memory can be accessed by a prefix code followed by the memory table position. The CAT-700 will key-up the transmitter and sent the DTMF command. This feature is similar to the regeneration of DTMF tones during an autopatch. It provides 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 3 Voice Message 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 23 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 23 words selected from the voice vocabulary table and is programmed with the [*3102*] command. When Repeater ID #1 and #2 are enabled, ID messages selection will be determined by whether the repeater is at rest or a QSO is in progress.

3. Squelch Tail Message Enable

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

4. Transmitter Drop Out Message Enable

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

5. Timed Message #1 Enabled

When this channel is enabled, the voice timed message will occur on a regular schedule subject to the setting of the timed message timer. This message will consist of up to 23 words selected from the voice vocabulary table and is programmed with the [*3105*] command.

6. Timed Message #2 Enabled

When this channel is enabled, the voice timed message will occur on a regular schedule subject to the setting of the timed message timer. This message will consist of up to 23 words selected from the voice vocabulary table and is programmed with the [*3106*] command.

7. Time of Day Request Enable

When this channel is enabled, repeater users can request a time of day announcement by entering the time of day request number. This message will consist of up to 23 words selected from the voice vocabulary table and is programmed with the [*3107*] command. When the CAT-700 is initialized, this message defaults to: "THE TIME IS 7:15 PM."

8. Grandfather Clock Enable

When this channel is enabled, the CAT-700 will announce the time of day every hour on the hour. This message will consist of up to 23 words selected from the voice synthesizer vocabulary table and programmed with the [*3108*] command. When the CAT-700 is initialized, this message defaults to: "CAT-700 REPEATER THE TIME IS 7:15 PM."

Zone 4 Transceiver Control

1. Link Receive Enable

When this channel is enabled, the CAT-700 will accept the [5002] link receive command. This feature permits monitoring of the Link receiver without transmitting on the Link transmitter.

2. Link Transmit Enable

When this channel is enabled, the CAT-700 will accept the [5001] link transmit command. This feature permits monitoring of the Link receiver and activation of the Link transmitter.

3. Link Auto Disconnect Enable

When this channel is enabled, the link will disconnect automatically after a period of repeater inactivity. Voice message #15 will announce the link has disconnected. This message will consist of up to 23 words selected from the vocabulary table and programmed with the [*3115*] command. A repeater or transceiver COR will keep the Link activate until the repeater returns to rest. A rest period of up to 29 minutes can be selected with the [*616*] programming command. When the CAT-700 is initialized this timer default to 10 minutes.

4. Link CTCSS Enable

When this channel is enabled, in addition to a Link COR input at J3-5, a input from a CTCSS decoder at J3-3 must also be present before the controller will activate the repeater. A COR input by itself will have no affect. DO NOT ENABLE THIS CHANNEL unless a CTCSS decoder is connected to J4-3.

5. Link Control Enable

The CAT-700 will only respond to the Link control commands [5000] and [5001] through the Repeater input. This greatly reduces the possibility of the CAT-700 responding to a command meant for another repeater in the linking system. When this channel is enabled, Link control commands will be accepted through the Link receiver input.

6. Link Activity Check Enable

When this channel is enabled, the CAT-700 will check for link activity before transmitting on the link frequency. This will reduce interference on the link system.

7. Link Macro Enable

When this channel is enabled, the CAT-700 will accept macro commands from the link side.

8. Link Control Operator Enable

When this channel is enabled, the CAT-700 will accept control operator commands to change the settings of the zone channels from the link side. The default code is [200]. This code can be changed with the [*513*] programming command.

Zone 5 User Function Inputs

1. User Function Input #1 Enable

When this channel is enabled, a logic input on connector J3-1 by executing the command stored in the Input #1 memory buffer.

2. User Function Input #2 Enable

When this channel is enabled, a logic input on connector J3-2 will execute the command stored at the Input #2 memory buffer.

3. User Function Input #3 Enable

When this channel is enabled, a logic input on connector J3-21 will execute the command stored at the Input #3 memory buffer.

4. User Function Input #4 Enable

When this channel is enabled, a logic input on connector J3-22 will execute the command stored at the Input #4 memory buffer.

5. User Function Output #1 Enable

When this channel is enabled, user function switch #1 is turned on. Connector J3 pin 14 will sink 150 MA.

6. User Function Output #2 Enable

When this channel is enabled, user function switch #2 is turned on. Connector J3 pin 15 will sink 150 MA.

7. User Function Output #3 Enable

When this channel is enabled, user function switch #3 is turned on. Connector J3 pin 19 will sink 150 MA.

8. User Function Output #4 Enable

When this channel is enabled, user function switch #4 is turned on. Connector J3 pin 20 will sink 150 MA.

Zone 6 Expanded Outputs 1 Thru 8

1. Expanded Output #1 Enable

When this channel is enabled, expanded output switch #1 is turned on. Connector J3 pin 1 on the DVR-1000 or J1 pin 1 on the MF-1000 will sink 150 MA.

2. Expanded Output #2 Enable

When this channel is enabled, expanded output switch #2 is turned on. Connector J3 pin 3 on the DVR-1000 or J1 pin 2 on the MF-1000 will sink 150 MA.

3. Expanded Output #3 Enable
When this channel is enabled, expanded output switch #3 is turned on. Connector J3 pin 5 on the DVR-1000 or J1 pin 3 on the MF-1000 will sink 150 MA.

4. Expanded Output #4 Enable
When this channel is enabled, expanded output switch #4 is turned on. Connector J3 pin 7 on the DVR-1000 or J1 pin 4 on the MF-1000 will sink 150 MA.

5. Expanded Output #5 Enable
When this channel is enabled, expanded output switch #5 is turned on. Connector J3 pin 8 on the DVR-1000 or J1 pin 5 on the MF-1000 will sink 150 MA.

6. Expanded Output #6 Enable
When this channel is enabled, expanded output switch #6 is turned on. Connector J3 pin 6 on the DVR-1000 or J1 pin 6 on the MF-1000 will sink 150 MA.

7. Expanded Output #7 Enable
When this channel is enabled, expanded output switch #7 is turned on. Connector J3 pin 4 on the DVR-1000 or J1 pin 7 on the MF-1000 will sink 150 MA.

8. Expanded Output #8 Enable
When this channel is enabled, expanded output switch #8 is turned on. Connector J3 pin 2 on the DVR-1000 or J1 pin 8 on the MF-1000 will sink 150 MA.

Zone 7 Expanded Outputs 9 Thru 16

1. Expanded Output #9 Enable
When this channel is enabled, expanded user function switch #9 is turned on. Connector J1 pin 9 on the MF-1000 will sink 150 MA.

2. Expanded Output #10 Enable
When this channel is enabled, expanded user function switch #10 is turned on. Connector J1 pin 10 on the MF-1000 will sink 150 MA.

3. Expanded Output #11 Enable
When this channel is enabled, expanded user function switch #11 is turned on. Connector J1 pin 11 on the MF-1000 will sink 150 MA.

4. Expanded Output #12 Enable
When this channel is enabled, expanded user function switch #12 is turned on. Connector J1 pin 12 on the MF-1000 will sink 150 MA.

5. Expanded Output #13 Enable
When this channel is enabled, expanded user function switch #13 is turned on. Connector J1 pin 13 on the MF-1000 will sink 150 MA.

6. Expanded Output #14 Enable
When this channel is enabled, expanded user function switch #14 is turned on. Connector J1 pin 14 on the MF-1000 will sink 150 MA.

7. Expanded Output #15 Enable
When this channel is enabled, expanded user function switch #15 is turned on.

Connector J1 pin 15 on the MF-1000 will sink 150 MA.

8. Expanded Output #16 Enable

When this channel is enabled, expanded user function switch #16 is turned on. Connector J1 pin 16 on the MF-1000 will sink 150 MA.

Zone 8 Expanded Outputs 17 Thru 24

1. Expanded Output #17 Enable

When this channel is enabled, expanded user function switch #17 is turned on. Connector J1 pin 17 on the MF-1000 will sink 150 MA.

2. Expanded Output #18 Enable

When this channel is enabled, expanded user function switch #18 is turned on. Connector J1 pin 18 on the MF-1000 will sink 150 MA.

3. Expanded Output #19 Enable

When this channel is enabled, expanded user function switch #19 is turned on. Connector J1 pin 19 on the MF-1000 will sink 150 MA.

4. Expanded Output #20 Enable

When this channel is enabled, expanded user function switch #20 is turned on. Connector J1 pin 20 on the MF-1000 will sink 150 MA.

5. Expanded Output #21 Enable

When this channel is enabled, expanded user function switch #21 is turned on. Connector J1 pin 21 on the MF-1000 will sink 150 MA.

6. Expanded Output #22 Enable

When this channel is enabled, expanded user function switch #22 is turned on. Connector J1 pin 22 on the MF-1000 will sink 150 MA.

7. Expanded Output #23 Enable

When this channel is enabled, expanded user function switch #23 is turned on. Connector J1 pin 23 on the MF-1000 will sink 150 MA.

8. Expanded Output #24 Enable

When this channel is enabled, expanded user function switch #24 is turned on. Connector J1 pin 24 on the MF-1000 will sink 150 MA.

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 7 and can be changed with the [*3107] programming command.

DTMF Keypad Test

Key-up, and enter [375], the DTMF keypad access code followed by the keypad numbers and letters to be tested. The entries can be in any order. Un-key, and the voice will read-back all numbers and letters that were decoded including the "STAR" and "POUND". Note: The "D" key cannot be tested. See Forced DTMF Command Entry.

Forced DTMF Command Entry

During normal operation a DTMF command is entered at the drop of receiver COR. It is possible to force a DTMF command entry even while COR is present. The CAT-700 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

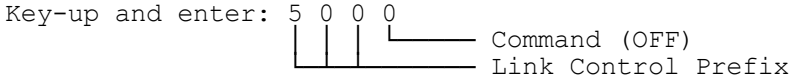
When repeater CTCSS is enabled, a repeater user without a CTCSS encoder can activate the repeater by entering [325], the DTMF Access number. The voice will say: "OK UP" and the repeater will respond to a carrier input. After a rest period, the DTMF Access code must be re-entered to override the CTCSS requirement. You can bypass the rest period and return the repeater to DTMF access mode by re-entering the DTMF access code. The voice will say: "OK DOWN".

Link Control By Repeater Input

This feature permits an interconnect between Repeater and Link for link operation.

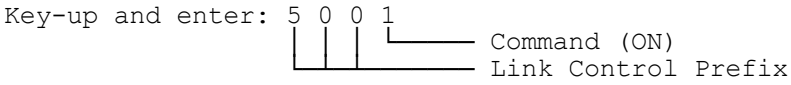
Link Disconnect

Key-up on the repeater's input and enter the link control prefix [500], followed by a [0]. The CAT-700 will disconnect the link and the voice will announce the link disconnect message 13. This message can be changed with the [*3113] programming command. Example: With a link control prefix of [500], turn off the link.



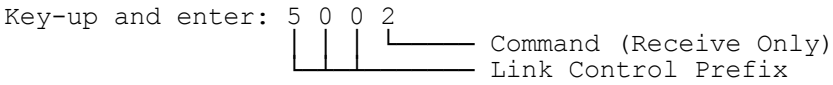
Link Connect

Key-up on the repeater's input and enter the link control prefix [500], followed by a [1]. The CAT-700 will connect the repeater and link and the voice will announce the link connect message 14. This message can be changed with the [*3114] programming command. Example: With a link control prefix of [500], turn on the link.



Link Receive Only

Key-up on the repeater's input and enter the link control prefix [500], followed by a [2]. The CAT-700 will connect the repeater and link receiver and the voice will say: "RECEIVER CONNECT." This mode is identical to link connect, except the link transmitter is disabled. Example: With a link control number of [500], turn on the link receiver.

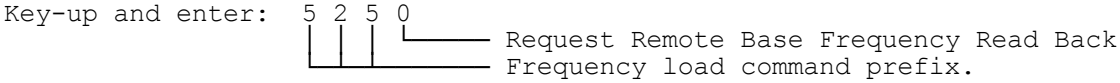


RBI-1 Reset

This command will reset the RBI-1 interface.

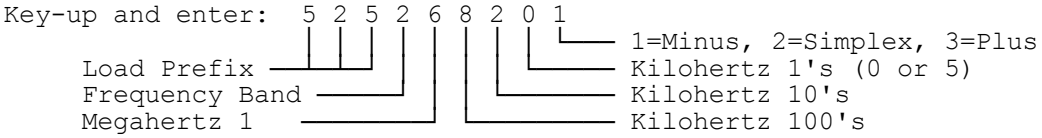
Read Remote Base Frequency

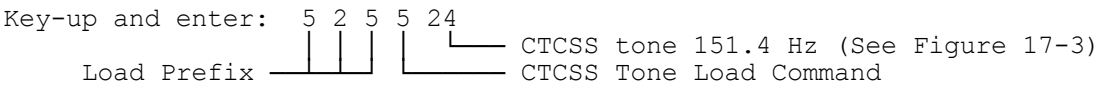
Key-up and enter the remote base frequency prefix number followed by a 0. Un-key and the voice will read back the current frequency including the offset and the setting of transmitter power. Example: With a prefix number of 525, read the remote base frequency.



Load RBI-1 Remote Base Frequency

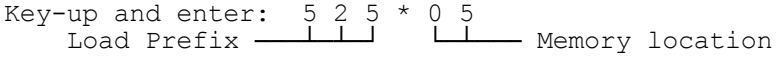
Key-up and enter the remote base frequency prefix, followed by the band, frequency, offset and CTCSS encoder frequency if desired. Example: With a prefix of 525, load 146.820 MHz, minus offset, and CTCSS tone 151.4 Hz. To suppress the voice read back add a [#] at the end of the entry.





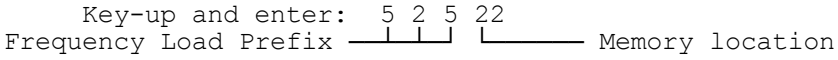
Select Transceiver Memory

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"



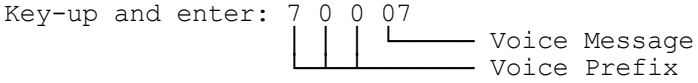
Load Remote Base Frequency From CAT-700 Memory

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."



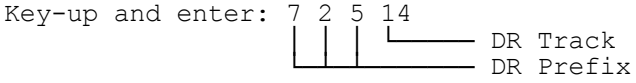
Voice Message Demo

Key-up and enter the voice prefix followed by a message number. The CAT-700 will key the transmitter and say the message stored at that location. Example: With a voice prefix number of 700, play message 7.



DR Track Selection

Key-up and enter the DVR prefix followed by a DVR track number. The CAT-700 will key the transmitter and play the digital voice recorder track. Example: With a DVR prefix number of 725 play track 14.



DVR Signal Report

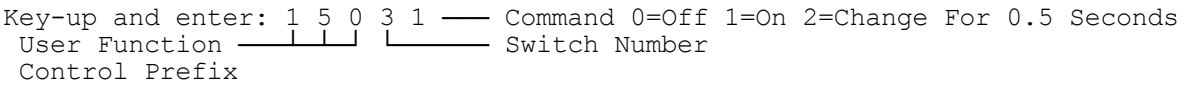
Key-up and enter the DVR prefix [725] followed by a [*]. Un-key, the voice will say: "START TEST NOW". Key-up and record a seven second message. Un-key and the message will play back. You instantly know how your signal sounds.

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-700 decodes the macro number, the commands will execute in the order they were stored within the macro string.

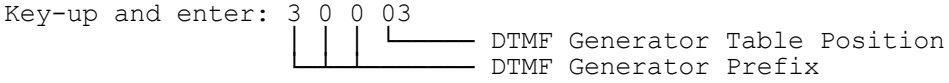
User Function Control By Repeater Input

This feature permits repeater users to control the four 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 [150], turn on switch three.



DTMF Tone Generator

Key-up and enter the DTMF Generator prefix followed by a table position. The controller will key the transmitter and send the DTMF tones stored at that location. Example: With a DTMF tone generator prefix of [300], send the DTMF command stored at table position [3].

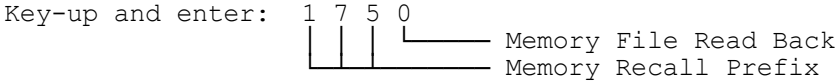


Memory Files

Space is provided for six memory files. Each memory file includes: control channel settings, codes, timer values, and voice messages 1 through 6. When the CAT-700 is initialized, all memory files are filled with the default values. To store active memory as a memory file, you must unlock the CAT-700 and use the [*19X] programming commands.

Active Memory Identification

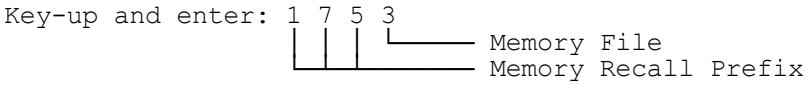
Key-up and enter the memory recall prefix [175] followed by [0]. Un-key and the voice will read back the memory file number. Example: With a memory recall prefix of [175], and active memory compares to file 3.



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

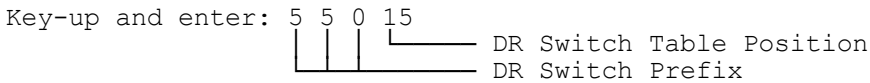
Memory Recall

To copy a memory file into active memory, key-up and enter the memory recall prefix [175] followed by the file number [1] through [6]. Example: With a memory recall prefix of [175], move file [3] to active memory.



Expanded Output Switch Control

To control the eight user function switches located on DR-1000, or the twenty-four switches on the MF-1000 Interface Card, key-up and enter the Expanded Output Switch prefix [550] followed by the table position. The CAT-700 will change the settings of the switches to conform to the pattern stored by the [*44XX] or [*47X] programming commands. Example: With a prefix number of [550], set the switches to the conditions previously stored in memory at table position [15].



Repeater ID #1 (At Rest)

If the repeater has been at rest for a period in excess of the ID timer setting, when the repeater is keyed, the CAT-700 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-700 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-700 determines which courtesy tone to send by reading voice messages 9 and 10. Since the courtesy tones are assigned a three-digit number and called from a voice message, any word, tone, chime or sound effect listed in Chapter 11 can be used as a courtesy tone. The choice is yours.

Read Firmware Version

To check the firmware version, enter the control operator prefix code followed by 98. Example: Key-up and enter [10098]. The voice synthesizer will announce the power-up message that includes the ROM version.

Chapter 5 - Repeater Programming By DTMF Tone

This chapter describes how the CAT-700 controller is programmed by the repeater owner using a DTMF keypad. The various types of program commands are described in detail and examples are given in the following text.

Initialization

To initialize the CAT-700, set dipswitch #7 to on and cycle DC power. During power-up, the voice will say: "RESET DATA LOAD COMPLETED." Set dip-switch #7 to off. Initialization consists of the following operations:

Dipswitch #7 Initialization

1. All memory locations are cleared.
2. The control channels marked with a [*] are enabled.
3. The unlock number is loaded with the default value [1234567].
4. The control operator prefix code is loaded with [100].
5. The control numbers are set to default values.
6. The timers are set to default values.
7. The voice message buffers are loaded with default messages.
8. All six memory saves are loaded with default values.

Programming the Unlock Control Number

To program the UNLOCK code, set dipswitch #8 to the on position. The voice will say: "ENTER CONTROL." Key-up and enter a seven-digit number. Un-key, if the number is accepted, the voice will say: "DATA INPUTS OK." If the number is rejected, the voice will say: "CONTROL ERROR" followed by "ENTER CONTROL." Key-up and enter the seven-digit number. Set dipswitch #8 to off. When the CAT-700 is powered up with dipswitch #7 set to on, the unlock number defaults to: [1234567].

Unlocking the Controller By Radio

To unlock the controller, key-up and enter the seven digit unlock number. The voice will say: "CAT 700 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 controller 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.

NOTE: The CAT-700 must be <u>unlocked</u> to perform the following programming functions.

Internal Commands

The Internal Command Structure is a series of commands used to program the scheduler, user function input switches and macros. Each command is four digits. The following operations are controlled by the Internal Commands.

INTERNAL COMMANDS			
	POINTER	CHANNEL	ACTION
Control Repeater Zone 1	11	1-8	0-1
Control Repeater Zone 2	12	1-8	0-1
Control Repeater Zone 3	13	1-8	0-1
Control Repeater Zone 4	14	1-8	0-1
Control Repeater Zone 5	15	1-8	0-1
Control Repeater Zone 6	16	1-8	0-1
Control Repeater Zone 7	17	1-8	0-1
Control Repeater Zone 8	18	1-8	0-1
		Action 0=OFF 1=ON	
Send Voice Message Repeater	30	01-20	
Send Voice Message Repeater & Link	31	01-20	
Send Time of Day Repeater	32	00	
Send Time of Day Repeater & Link	33	00	
Send Day of Week	33	01	
Send Day and Month	33	02	
Send Salutation	33	03	
Send DTMF Tones Repeater	34	01-20	
Send DTMF Tones Repeater & Link	35	01-20	
Send DTMF Tones Link	36	01-20	
Play DVR Track Repeater	37	01-16	
Play DVR Track Repeater & Link	38	01-16	
Set DVR Switches	39	01-20	
Load Repeater Courtesy Tone	50	01-08	
Load Link Courtesy Tone	51	01-08	
Set MF-1000 Switches	57	1-8	
Execute Macro	58	01-40	
Load Memory File	59	01-06	
Time Delay Control (Seconds)	60	01-99	
PTT#1 Control	61	00-01	
PTT#2 Control	62	00-01	
PTT#1-PTT#2 Control	63	00-01	
PTT#1 Control with Voice Delay	64	00-01	
PTT#2 Control with Voice Delay	65	00-01	
PTT#1-PTT#2 Control Voice Delay	66	00-01	
Link Control OFF/ON/RECEIVE	70	00-01-02	
Kenwood Memory Channel Select	74	01-20	
Kenwood RF Power Set [LO-MED-HI]	76	01-02-03	
Kenwood DC Power [OFF-ON]	78	00-01	
Send Voice Word Repeater	8	000-999	
Send Voice Word Link	9	000-999	

Figure 5-1

* Macro commands 5801-5840 can only be activated by the scheduler or hardware logic input. One macro cannot call another macro.

Load Courtesy Tones

Use the internal command to change the Repeater and Link courtesy tones. Use [50] followed by the courtesy tone number [01-08] for the repeater and [51] followed by the courtesy tone number [01-08] for link input.

Scheduler Command Memory

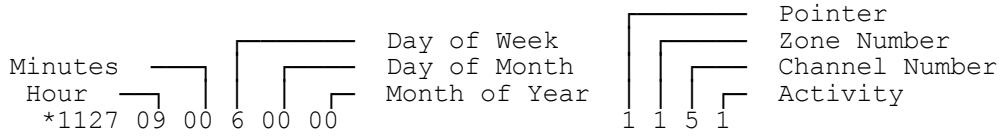
This memory area is reserved for storage of scheduler activity. This includes the time the command is to be executed, and the action to be taken.

Read Scheduler Locations (01-40)

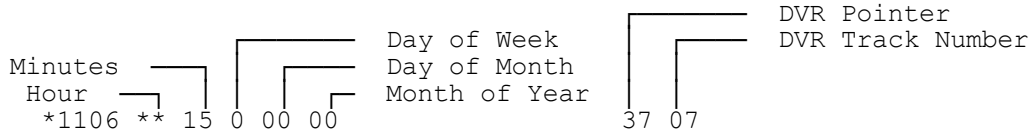
Key-up and send [*10XX]. Un-key and the voice will read back the status of the memory location. If there is no command stored at that memory location, the voice will say: "All CLEAR." If a command is stored at that memory location, the voice will read back the time, day, and command stored.

Program Scheduler Locations (01-40)

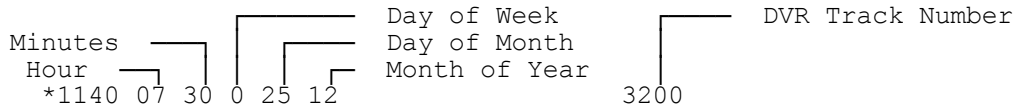
Key-up and send [*11XX] followed by the hours, minutes, day of week, or day of month and month of year, and the command to be executed. Un-key and the voice will say: "CONTROL OK." Example: Set Zone 1 Channel 5 (ON) - 9:00 AM Every Friday (Store at Table Location 27)



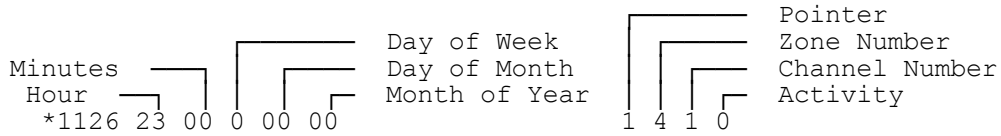
Example: Play DVR Track 7 on the repeater transmitter, 15 minutes after every hour, (Stored at Table Location 6)



Example: Announce Time of Day on the repeater transmitter at 7:30 AM on December 25th (Store at Table Location 40)



Example: Set Zone 4 Channel 1 (OFF) at 11:00 PM every day (Store at Table Location 26)



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

Erase Scheduler Locations (01-40)

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

Macro Command Memory

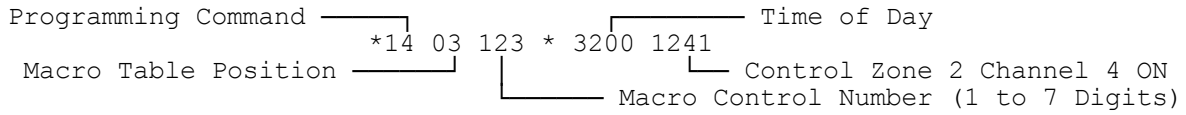
Macros are used to store custom commands of up to ten operations that will execute with a single DTMF entry. Macro [40] is a power-up macro and will execute anytime power is applied to the controller.

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: "NO MACRO."

Program Macro Locations (01-40)

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

User Function Inputs

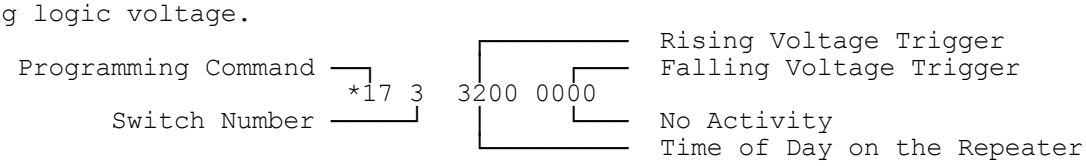
The CAT-700 has 4 logic inputs and 2 memories are provided for each input. The first location executes on the rising voltage while the second executes on the falling voltage. If a location is loaded with [0000] no action will take place.

Read User Function Inputs (1-4)

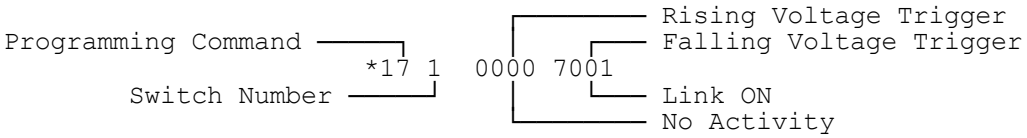
Key-up and send [*16X]. Un-key and voice will read back the Internal command stored at that switch memory location. If the location is empty, the voice will say: "ALL CLEAR."

Program User Function Inputs (1-4)

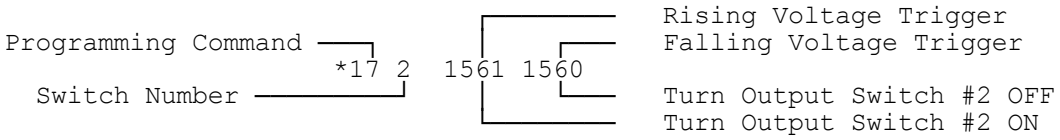
Key-up and send [*17X] followed by the internal command to be stored. See Figure 5-1. Un-key and the voice will say: "CONTROL OK." Example: Announce the time of day on the repeater transmitter when switch #3 is activated by a rising logic voltage.



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



Example: Turn user function output switch #2 [Zone 5 Channel 6] on when input switch #2 is activated by a rising voltage and off with a falling voltage.



Erase User Function Switches (1-4)

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

Save Active Memory File (1-6)

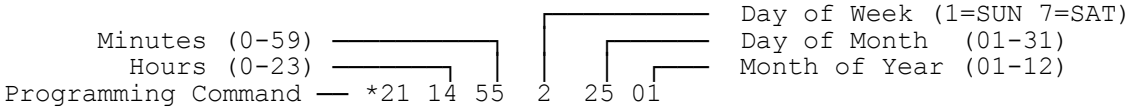
Save the current settings of active memory to be recalled later. Memory space is provided for six files. Configure the active memory to suite your special requirements. Use the [*19X] programming command to save the current settings of the control channels, codes, timers and first ten voice messages. Example: Save active memory as File #3. Key-up and send [*193]. Un-key and the voice will say: "CONTROL OK."

Check Time of Day

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

Setting the Clock

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



Increase - Decrease Hour

Key-up and send [*22] to advance the clock one hour at the start of daylight savings time. Key-up and send [*23] to set the clock back one hour at the end of daylight savings time.

Voice Synthesizer Memory Storage

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

Send Synthesized Voice Message Locations (01-20)

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

Program Synthesized Voice Message Locations (01-20)

Key-up and send [*31XX], followed by the three digit numbers that represents the words required to construct the message. Memory space is provided for 23 entries. Refer to Chapter 13, Voice Vocabulary Word List. Example: Load Repeater ID #1 with "W4XYZ Repeater"

```
Message Number ──┐   W   4   X   Y   Z   ┌── Repeater
Programming ─┐   │   │   │   │   │   │   │
  Command    *31 01 890 004 920 930 950 746
```

VOICE MESSAGE NUMBER TABLE			
01	Repeater ID #1 (AT REST)	11	Remote Base Off
02	Repeater ID #2 (ACTIVE)	12	Remote Base On
03	Squelch Tail Message	13	Link Clear
04	Transmitter Drop Message	14	Repeater Time Out Exit
05	Timed Message #1	15	Repeater Time Out Clear
06	Timed Message #2	16	Message #16
07	Time of Day Message	17	Message #17
08	Grandfather Clock Message	18	Message #18
09	Courtesy Tone Repeater	19	Message #19
10	Courtesy Tone Link	20	Message #20

Program Voice Message With Time Variables

To insert the time-of-day into a voice messages load the number [100]. Example: Load the grandfather clock message with "THE TIME IS [ACTUAL TIME] AND THIS IS THE W4XYZ REPEATER." Other time variables include: [102 - Day of the Week], [103 - Day and Month], [104 - Year] and [105 - Salutation].

```
Message Number ──┐                    ┌── [Actual Time]
                 *31 08 830 838 482 100 231 833 482 830 890 004 920 930 950 746
```

User Function Switch Control by Voice Message

The voice message buffers can also control the seven user function output switches. If during the execution of a voice message, a user function output switch command (111 through 122) is encountered, the CAT-700 will set the switch and then continue with the remainder of the voice message.

USER FUNCTION SWITCH VOICE CONTROL COMMANDS			
111=UF#1 OFF	114=UF#2 OFF	117=UF#3 OFF	120=UF#4 OFF
112=UF#1 ON	115=UF#2 ON	118=UF#3 ON	121=UF#4 ON
113=UF#1 MOM	116=UF#2 MON	119=UF#3 MON	122=UF#4 MON

DVR Track Selection by Voice Message

The voice message buffers can be used to play one of the sixteen DVR tracks. If during the execution of a voice message, a DVR track command (131 through 146) is encountered the CAT-700 will play the recorded message stored at that track.

DIGITAL VOICE RECORDER TRACK CONTROL COMMANDS			
131=TRACK #1	135=TRACK #5	139=TRACK #9	143=TRACK #13
132=TRACK #2	136=TRACK #6	140=TRACK #10	144=TRACK #14
133=TRACK #3	137=TRACK #7	141=TRACK #11	145=TRACK #15
134=TRACK #4	138=TRACK #8	142=TRACK #12	146=TRACK #16

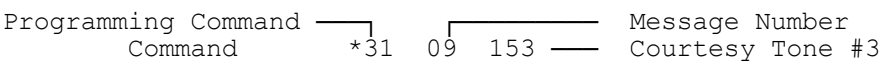
Courtesy Tone Selection by Voice Message

The voice message buffers can be used to generate courtesy tones. If during the execution of a voice message, a courtesy tone command (151 through 158) is encountered, the CAT-700 will generate the courtesy tone stored at that memory location.

COURTESY TONE CONTROL COMMAND			
151=TONE #1	152=TONE #2	153=TONE #3	154=TONE #4
155=TONE #5	156=TONE #6	157=TONE #7	158=TONE #8

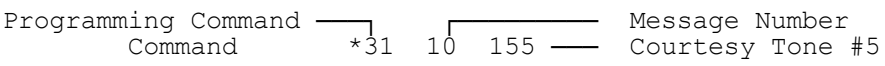
Load Courtesy Tone For Repeater Receiver

Key-up and send [*3109], followed by the three-digit number that represents the desired courtesy tone from the courtesy tone command table. Un-key and the voice will say: "CONTROL OK." Example: Select courtesy tone #3.



Load Courtesy Tone For Link Receiver

Key-up and send [*3110], followed by the three-digit number that represents the desired courtesy tone from the courtesy tone command table. Un-key and the voice will say: "CONTROL OK." Example: Select courtesy tone #5.



Erase Synthesized Voice Message Locations (01-20)

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

CW ID Memory Storage

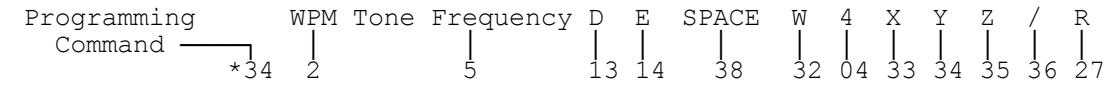
Memory space is provided for a CW identification. The buffer will accept 28 characters. If a repeater user talks over a voice ID, the CAT-700 will switch to the CW ID. If the voice ID messages are disabled, (Zone 3 Channels 1, 2 are off), the controller will ID in CW only. During initialization, the CW buffers are loaded with "CAT700 REPEATER."

Send Repeater CW ID

Key-up and send [*33]. Un-key and the CAT-700 will send the CW ID at the frequency and speed programmed.

Program Repeater CW ID

Key-up and send [*34] followed by the frequency, speed and two digit numbers that represent the call letter identification. Memory space is provided for (28) entries. Refer to the CW ID programming table. Example: Load CW ID memory buffer with DE W4XYZ/R at 20 WPM and a tone frequency of 1206Hz.



CW ID PROGRAMMING TABLE						
00=ZERO	10=A	20=K	30=U	40=;	1=24 WPM	1=697 Hz
01=ONE	11=B	21=L	31=V	41=,	2=20 WPM	2=770 Hz
02=TWO	12=C	22=M	32=W	42=:	3=18 WPM	3=852 Hz
03=THREE	13=D	23=N	33=X	43=?	4=15 WPM	4=941 Hz
04=FOUR	14=E	24=O	34=Y	44= -	5=13 WPM	5=1206 Hz
05=FIVE	15=F	25=P	35=Z	45=(	6=10 WPM	6=1336 Hz
06=SIX	16=G	26=Q	36=/	46=SK		7=1477 Hz
07=SEVEN	17=H	27=R	37=AR			8=1633 Hz
08=EIGHT	18=I	28=S	38=SPACE			
09=NINE	19=J	29=T	39=[.]			

Erase Repeater CW ID

Key-up and send [*35]. 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 (01-20)

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: "ALL CLEAR."

Program DTMF Generator Locations (01-20)

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.

Erase DTMF Generator Locations (01-20)

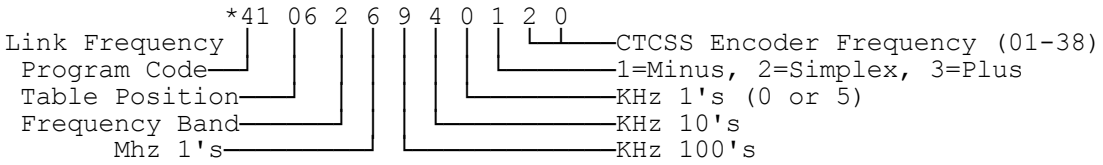
Key-up and send [*38XX]. Un-key and the voice will say: "CONTROL OK."

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 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 15-2 and 15-3.



Erase Remote Base Frequency Locations (01-40)

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

DR-1000 Expanded Output Switches

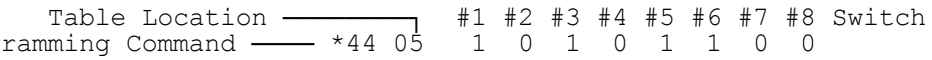
The DR-1000 contains eight switches to control other equipment at the repeater site. A twenty-position table stores the switch settings. These switches can be changed by a DTMF command, scheduler, macro or user function input switch.

Read DR-1000 Expanded Switch Locations (01-20)

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

Program DR-1000 Expanded Switch Locations (01-20)

Key-up and send [*44XX] followed by the settings of the eight switches. Un-key and the voice synthesizer will say: "CONTROL OK". Example: On DR-1000, at table position 5, set switches 1,3,5 and 6 to on.



Erase DR-1000 Expanded Switch Locations (1-20)

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

MF-1000 Expanded Switches

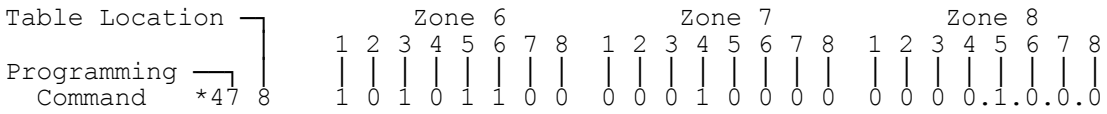
The MF-1000 Interface Card contains twenty-four switches to control other equipment at the repeater site. An eight-position table stores the switch settings. These switches can be changed by a DTMF command, scheduler, macro or user function input switch.

Read MF-1000 Expanded Switch Locations (1-8)

Key-up and send [*46X]. Un-key and the voice will announce the settings of each switch stored at memory location [X]. If all switches are off, the voice will say: "ALL CLEAR". If some switches are on, the voice will read back the switches from switch #1 to switch #24.

Program MF-1000 Expanded Switch Locations (1-8)

Key-up and send [*47X] followed by the settings of the twenty-four switches. Un-key and the voice synthesizer will say: "CONTROL OK". Example: On MF-1000, at table position 8, set switches 1,3,5,6,12, and 21 to on.



Erase MF-1000 Expanded Switch Locations (1-8)

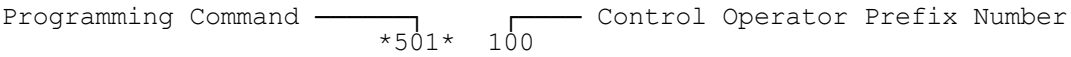
Key-up and send [*48XX]. Un-key and the voice will say: "CONTROL OK".

Control Code And Prefix Number Memory

This memory area is reserved for storage of control and prefix numbers. These numbers can be from one to seven digits and will change to a default value when the CAT-700 is powered up with dip-switch #7 set to the on position.

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

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



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

User Output Switch Prefix Number [*502*]

This programming command selects the user function switch prefix number. This number precedes the switch and activity numbers. The default number is [150].

Memory Recall Prefix Number [*503*]

This programming command selects the memory recall prefix number. This number precedes the memory save number being moved into active memory. The default number is [175].

DTMF Generator Prefix Number [*504*]

This programming command selects the DTMF generator prefix number. This number precedes the DTMF generator table position number. The default number is [300].

DTMF Access Code [*505*]

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

DTMF Pad Test Code [*506*]

This programming command selects the DTMF pad test prefix number. This number must be entered to initiate a DTMF keypad test. The default number is [375].

Time Of Day Request Code [*507*]

This programming command selects the time request number. This number must be entered to request a time of day announcement. The default number is [400].

Link Control Prefix Number [*508*]

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

Control Operator Port #2 Prefix Number [*509*]

This programming command selects the control operator prefix number for the link port. This number must precede the command to change the zone control channels through the link input. The default number is [200].

Expanded Output Switch Prefix [*510*]

This programming command selects the expanded user function prefix number. This number must precede the command to change the settings of the expanded user function switches on the DR-1000 or the MF-1000 determined by the setting of dipswitch #6. The default number is [550].

Voice Demonstration Prefix Number [*511*]

This programming command selects the voice demo prefix number. This number must precede the message number to play a voice message. The default number is [700].

DVR Track Play Prefix Number [*512*]

This programming command selects the DVR prefix number. This number must precede the DVR track number to play a DVR track. The default number is [725].

External Modem Connect Code [*513*]

This programming command selects the external modem connect number. When this number is entered, user function switch #4 will turn on. Connect switch #4 to a relay to enable an external modem. Exit the computer communications mode and the switch #4 will turn off. The default number is [825]. Note: This feature must be selected in the windows editor configuration section.

Remote Base Frequency Load Number [*514*]

This number must precede the command used to change the frequency of the Kenwood transceiver through the RBI-1 interface. Example: To program a remote base Frequency Load Number of 525, key-up and send [*514*525]. Un-key and the voice will say: "CONTROL OK."

Read Control And Prefix Numbers [*501 - *514]

Use any of these programming commands to read the assigned prefix number. Example: Read the voice demo prefix number. Key-up and enter [*511], un-key and the voice will say: "PRESET CODE FIVE ELEVEN IS SEVEN ZERO ZERO."

Timer Memory

This memory area is reserved for storage of [20] timers. These timers are user programmable. If the CAT-700 is initialize by applying power with dip-switch #7 in the on position, the timers will be automatically loaded with default times.

Repeater Time-out [*601*]

The repeater time-out timer limits the maximum length of a transmission. This timer is programmable between 1.0 and 1799 seconds. Example: To program the timer for 3 minutes, key-up and enter [*601*180]. Un-key and the voice will say: "CONTROL OK." When initialize, this timer defaults 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. The timer default is 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 activates. It 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." The timer default is 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. The timer default is 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. The timer default is 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. The timer default is 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. The timer default is 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. The timer default is 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. The timer default is 1799 seconds.

Voice Delay Timer [*610*]

The CAT-700 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. The timer default is 1.0 seconds.

Program Max Length Timer [*611*]

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

Test Tone Length Timer [*612*]

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. The timer default is 30 seconds.

Timed Message #1 Timer [*613*]

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

Timed Message #2 Timer [*614*]

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

RS-232 Port Connect Timer [*615*]

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. The timer default is 1200 seconds.

Link Auto Disconnect Timer [*616*]

During link operation if Zone 6 channel 3 is enabled the link will disconnect automatically after a period inactivity. Voice message #15 will be called to announce the transceiver has disconnected. This timer is programmable between 1.0 and 1799 seconds. The timer default is 600 seconds.

Read Timer Settings [*601 - *616]

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

Audio Test Tone

The CAT-700 will generate a 941Hz test tone. This tone is used as a reference when setting audio levels on the CAT-700. To activate the tone, key-up and enter [*901] for the repeater tone and [*902] for the link tone. The tone length is set by the [*612*] timer.

Courtesy Tone

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

Send Courtesy Tone (1-8)

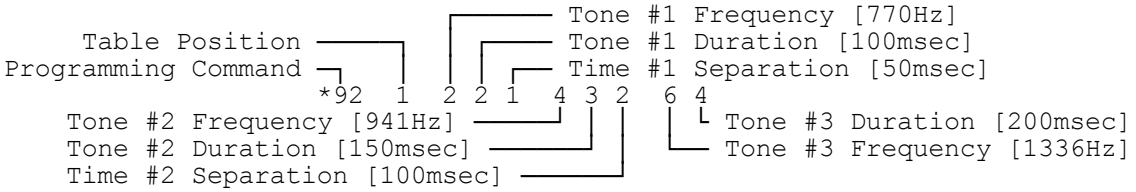
Key-up and send [*91X]. Un-key and the CAT-700 will transmit the courtesy tone. "X" represents the courtesy tone table location.

Program Courtesy Tone (1-8)

Key-up and send [*92X], followed by the frequency, duration and separation numbers from the courtesy tone table. This programming command is used to develop eight custom courtesy tones 151 through 158. The tone created with the [*925] programming command is identified as tone "155". Example: Program courtesy tone table location 5 with a tone of 941Hz and a duration of 150msec.

TONE FREQUENCY							
1=697Hz	2=770Hz	3=852Hz	4=941Hz	5=1206Hz	6=1336Hz	7=1477Hz	8=1633Hz
TONE TIMING (milliseconds)							
0=0	1=50	2=100	3=150	4=200	5=250	6=300	7=350	8=400	9=450

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



Erase Courtesy Tone (1-8)

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

Select Courtesy Tone

To select tone "153" as the Repeater courtesy beep, load Voice Message 9 with "153." Example: Enter *3109 153. To select tone "157" as the Link courtesy beep, load Voice Message 10 with "157". Enter *3110 157.

Digital Voice Recorder

The CAT-700 supports the DR-1000 Digital Voice Recorder for true voice message announcements. Substitute DVR tracks for voice messages, speed dial IDs and courtesy tones. For additional information on how to record tracks over the telephone line, consult Chapter 10.

Play Digital Voice Recorder Tracks (01-16)

Key-up and send [*94XX]. Un-key and the CAT-700 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".

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 [*611*] expires, the CAT-700 will return to normal repeater operation. The voice will say: TIMER EXIT."

DTMF Programming Commands

COMMAND	DESCRIPTION
*10XX	READ SCHEDULER COMMAND
*11XX	PROGRAM SCHEDULER COMMAND
*12XX	ERASE SCHEDULER COMMAND
*13XX	READ MACRO
*14XX	PROGRAM MACRO
*15XX	ERASE MACRO
*16X	READ LOGIC INPUT SWITCH
*17X	PROGRAM LOGIC INPUT SWITCH
*18X	ERASE LOGIC INPUT SWITCH
*19X	SAVE ACTIVE MEMORY
*20	SEND TIME OF DAY
*21	PROGRAM TIME OF DAY
*22	INCREASE CLOCK ONE HOUR
*23	DECREASE CLOCK ONE HOUR
*30XX	SEND VOICE SYNTHESIZER
*31XX	PROGRAM VOICE SYNTHESIZER
*32XX	ERASE VOICE SYNTHESIZER
*33	SEND CW ID

COMMAND	DESCRIPTION
*34	PROGRAM CW ID
*35	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 DVR SWITCHES
*44XX	PROGRAM DVR SWITCHES
*45XX	ERASE DVR SWITCHES
*46XX	READ MF-1000 SWITCHES
*47XX	PROGRAM MF-1000 SWITCHES
*48XX	ERASE MF-1000 SWITCHES

COMMAND	CONTROL NUMBER DESCRIPTION	DEFAULT
501	CONTROL OPERATOR CODE (RPT)	100
502	USER OUTPUT SWITCH	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	LINK CONTROL PREFIX	500
509	CONTROL OPERATOR CODE(LINK)	200
510	EXPANDED OUTPUT SWITCH	550
511	VOICE DEMO PREFIX	700
512	DVR PREFIX	725
513	RS-232 PORT CONNECT CODE	825

COMMAND	TIMER DESCRIPTION	RANGE	DEFAULT
601	REPEATER TIME-OUT	1-1799	180
602	REPEATER SLEEP	1-1799	60
603	TURN ON DELAY	.1-9.9	1.0
604	COR DROP TO BEEP	.1-9.9	1.0
605	BEEP TO PTT DROP	.1-9.9	4.0
606	DTMF MUTE DELAY	.1-9.9	1.0
607	REPEATER ID	1-1799	480
608	SQUELCH TAIL MESSAGE	1-1799	1799
609	DROP OUT MESSAGE	1-1799	1799
610	VOICE DELAY	.1-9.9	1.0
611	PROGRAM MAX LENGTH	1-1799	300

COMMAND	TIMER DESCRIPTION	RANGE	DEFAULT
612	TEST TONE LENGTH	1-1799	30
613	TIMED MESSAGE #1	1-1799	1799
614	TIMED MESSAGE #2	1-1799	1799
615	EXT MODEM CONNECT	1-1799	1200
616	LINK AUTO DISCONNECT	1-1799	600

COMMAND	DESCRIPTION
*901	GENERATE 941Hz TONE [REPEATER]
*902	GENERATE 941Hz TONE [LINK]
*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
*0	MANUAL EXIT

Chapter 6 - Repeater Programming By Computer

This chapter describes how to communicate with the CAT-700 through the RS-232 computer interface. The rate is fixed at [4800] baud with [8] bits, no parity and [1] stop bit. The default password is [cat700]. The password is case sensitive. The command prompt is: [**->**]. Entries must be in lower case. In the examples the carriage return is displayed as (C/R). The following commands are described in Figure 6-1 below:

COMMAND	DEFINITION
u	Xmodem file UPLOAD to send to CAT-700 memory.
d	Xmoden file DOWNLOAD to save CAT-700 memory to disk.
q	QUIT the computer terminal mode.

Figure 6-1

Fabricate the cable described in Figure 7-7 of this manual. Use the cable to connect the computer's serial port to the J10 header on the CAT-700 controller. Start the [COMM32] communications program. Click on "Configuration" and "Comm Setup." Select the Port, 4800 baud, Parity NONE, Data Bits 8 and Stop Bits 1. Click OK. Select Program Setup and select CAT-700 communications. Click OK.

Press **(C/R)** and the CAT-700 will send: **Enter Password:** Enter the default password cat700. The controller will send: **Data Transfer, D=Download... U=Upload... Q=Quit. Select>**

These commands are used to transfer the contents of the CAT-700 memory between the controller and computer, where it can be stored on disk as a back-up file or used with the editor program.

Data Transfer Download

To **DOWNLOAD** the memory and save it to disk, Type: **d (C/R)**. The CAT-700 will send: **Select Xmodem download protocol.** Place the arrow on the download button and click the left mouse button. Name the file to be down loaded and click OK. Once the download sequence starts, monitor the download window display until the download is complete.

Data Transfer Upload

To **UPLOAD** the memory from disk, Type: **u (C/R)**. The CAT-700 will send: **Select Xmodem upload protocol.** Place the arrow on the upload button and click the left mouse button. Select the file to be uploaded and click OK. Once the upload sequence starts, monitor the upload window display until the upload is complete.

Exit Terminal Routine

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

CAT-700 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.

Print Driver

The CAT-700 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 1-6], [Remote Base Frequencies], [Macros], [Scheduler], [Courtesy Tones], [CW Message], [DTMF Tones].

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.

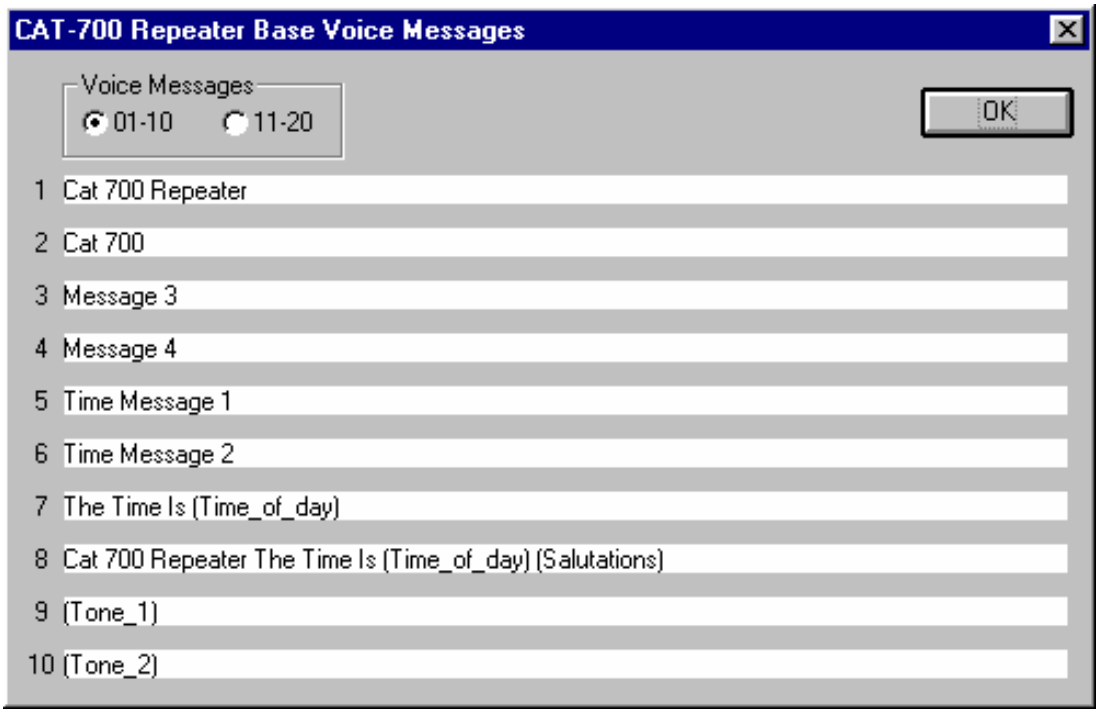


Figure 6-2

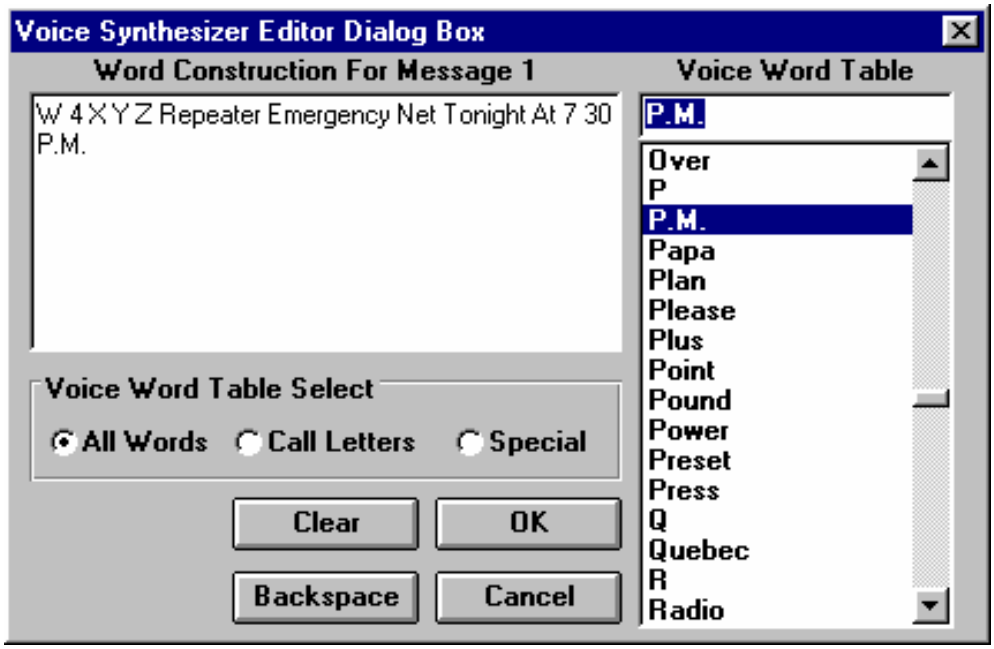


Figure 6-3

Scheduler

From the scheduler window, place 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.

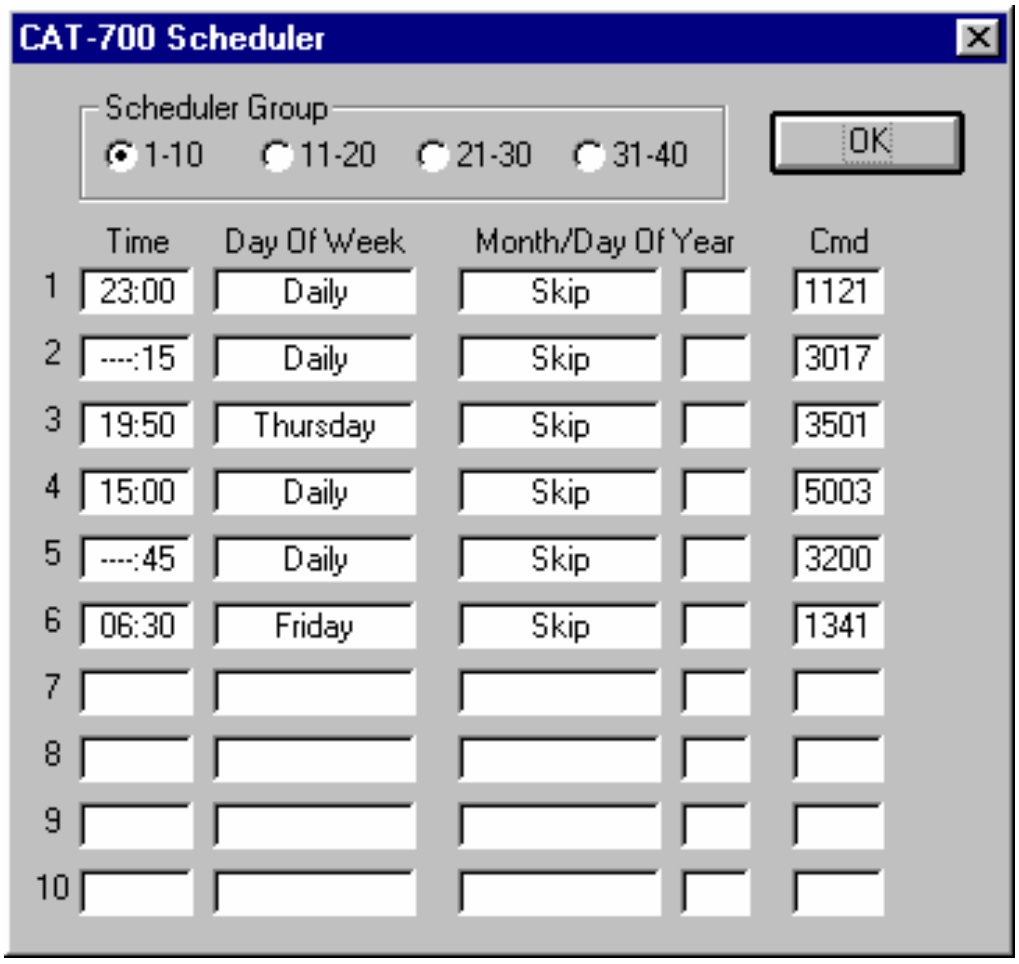


Figure 6-4

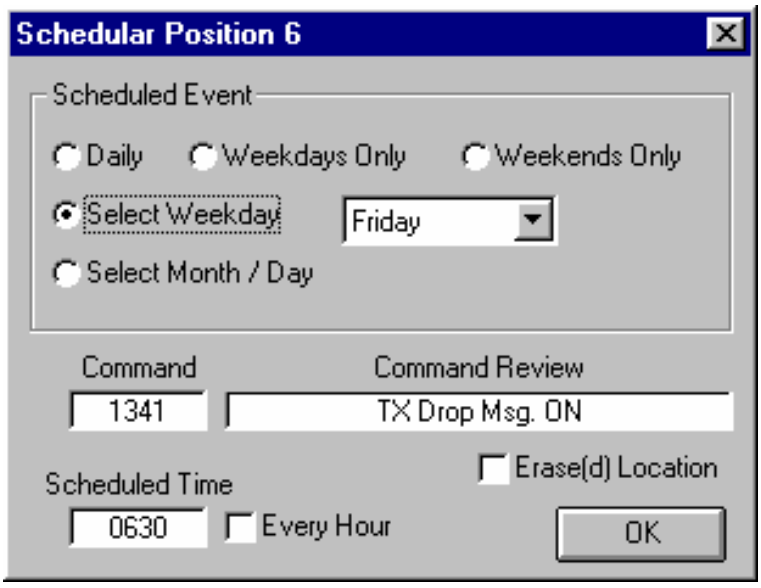


Figure 6-5

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.

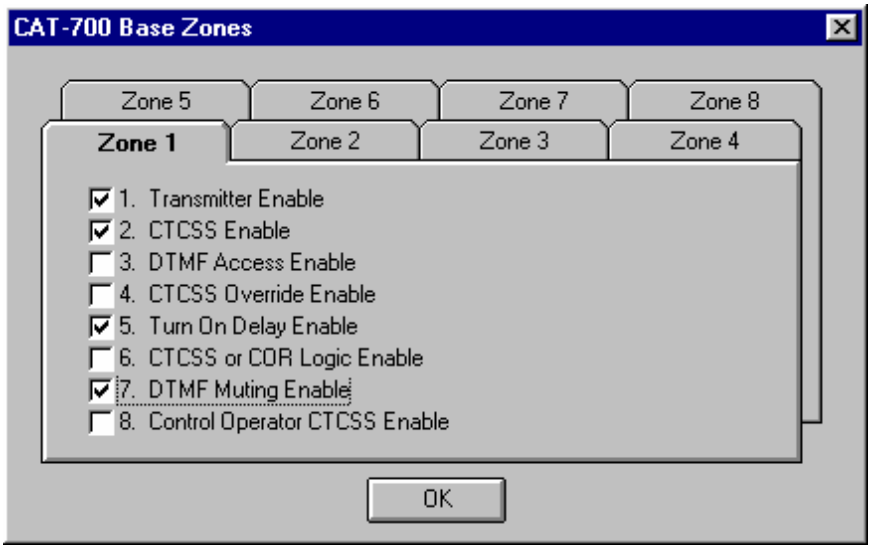


Figure 6-6

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.

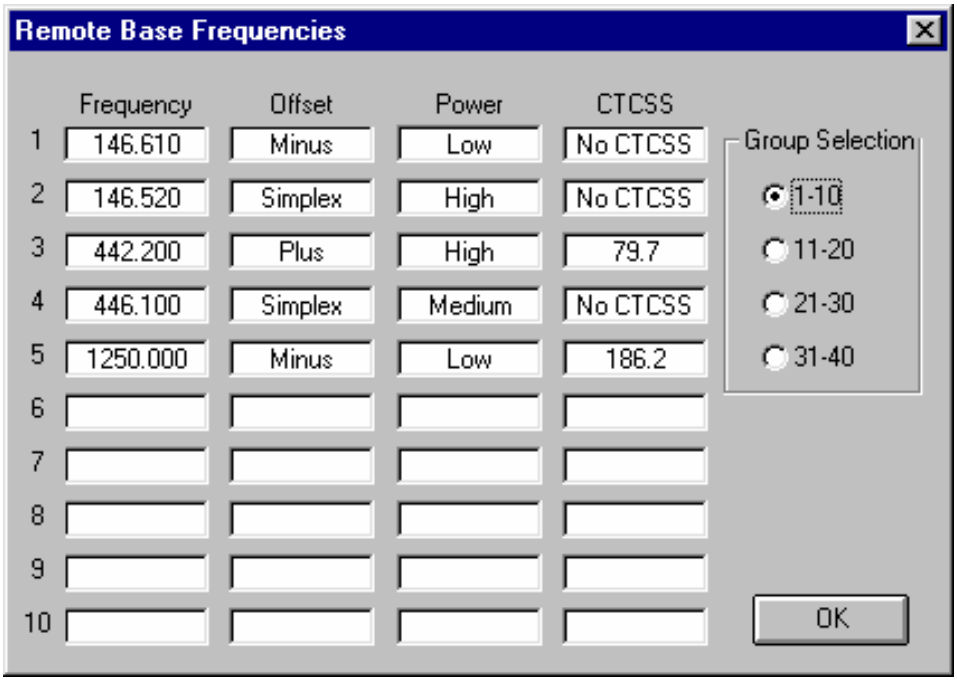


Figure 6-7

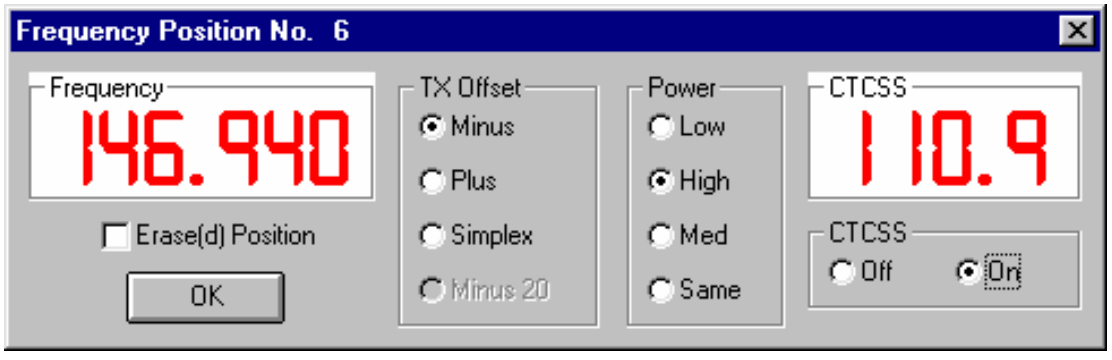


Figure 6-8

Hardware Inputs

From the hardware input window, place the hand on the RISING or FALLING EDGE cell and double click. The KEYPAD window will appear. Use the keypad to enter a new hardware input command and click OK.

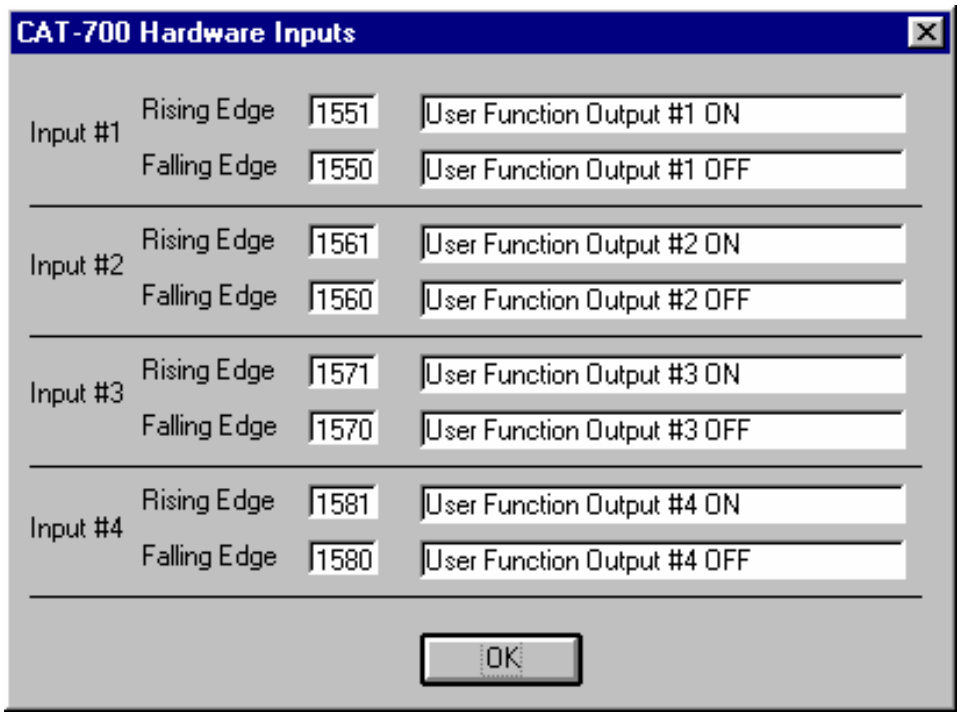


Figure 6-9

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 keypad to enter a new control operator prefix code and click OK.

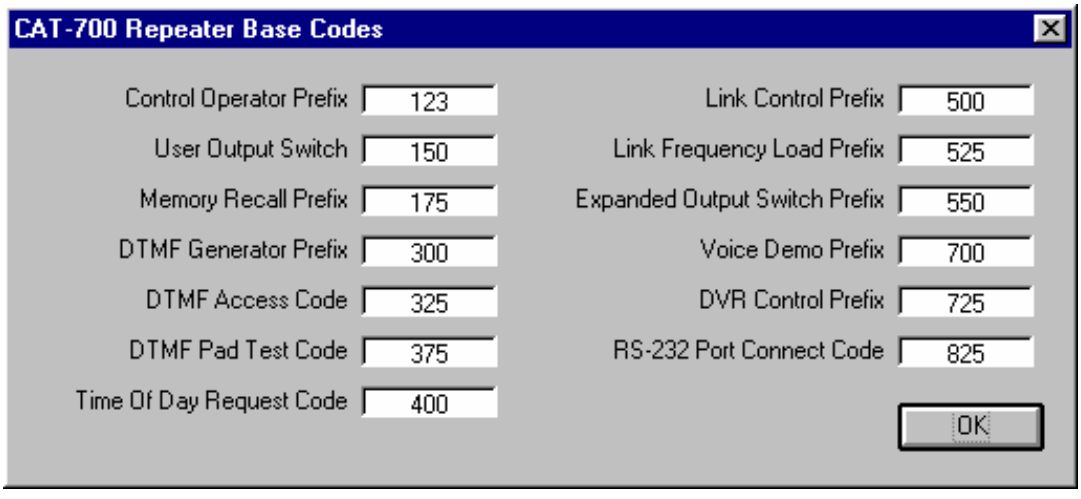


Figure 6-10

Figure 6-11

CAT-700 Repeater

From the Repeater CRT Password cell use the computer keyboard to enter a new password. From the Repeater 7 Digit Unlock Number cell use the computer keyboard to enter a new seven digit unlock number.

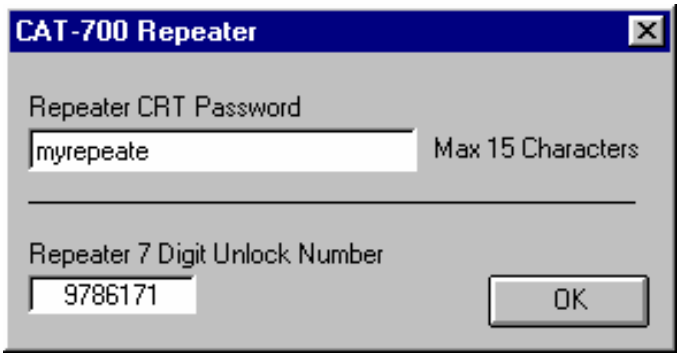


Figure 6-12

Chapter 7 - Interfacing to Other Equipment

Interfacing the CAT-700 to your repeater system is a simple matter. A minimum of two inputs and two outputs are required for the CAT-700 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-700.

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-700 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-700. Measure the COR level at TP3 when the repeater's 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 a pull-up resistor to the COR #1 line. This may also be true for the COR #2 input. Space is provided on the CAT-700 board.

Connection to Transmitter

Locate your repeater's Push-To-Talk input. When grounded, this line will make the repeater transmit. Connect the CAT-700 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 TX1 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-700 requires a positive logic input to represent a CTCSS input.

Interface Review

1. Are dipswitches #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 TX1 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 dipswitch #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 RX1 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-700 is powered by an external 12VDC power supply. Connect the positive lead of the supply to the center pin of the coaxial power connector J1 and the negative lead to the outer conductor.

Audio Level Adjustment

The audio mixing-switching circuits of the CAT-700 are optimized around an input and output of -10dBM (220mV RMS). For best results the receiver audio input at J4 pin 13 should be 220mV when a test signal of 1000Hz 3Khz deviation is being received by the repeater.

Connect a signal generator to the repeater's receiver input. Adjust the signal generator's output for a test tone signal of 1000 Hz at 3 KHz deviation. If a signal generator is not available, select a handi-talkie that you suspect has the DTMF tone pad adjusted for approximately 3 KHz deviation.

Key-up on the repeater's receiver input and send a DTMF tone. Adjust the RX1 control R24 for 220 mVAC at TP5. Key-up and send the LINK enable command [5001]. Key-up on the repeater's receiver input and send a DTMF tone. Adjust the TX1 control R11 for 220 mVAC at TP1. Adjust the TX2 control R12 for 220 mVAC at TP2. Key-up on the LINK receiver input and send a DTMF tone. Adjust RX2 control R37 for 220 mVAC at TP6. Verify the transmit audio at TP1 is 220 mVAC.

Unlock the CAT700 by keying-up on the repeater's receiver input and entering [1234567]. Key-up and enter the [*901] REPEATER test tone programming command. Adjust DTMF TX1 control R55 for 90 mVAC at TP1. Key-up and enter the [*902] LINK test tone programming command. Adjust DTMF TX2 control R56 for 90 mVAC at TP2.

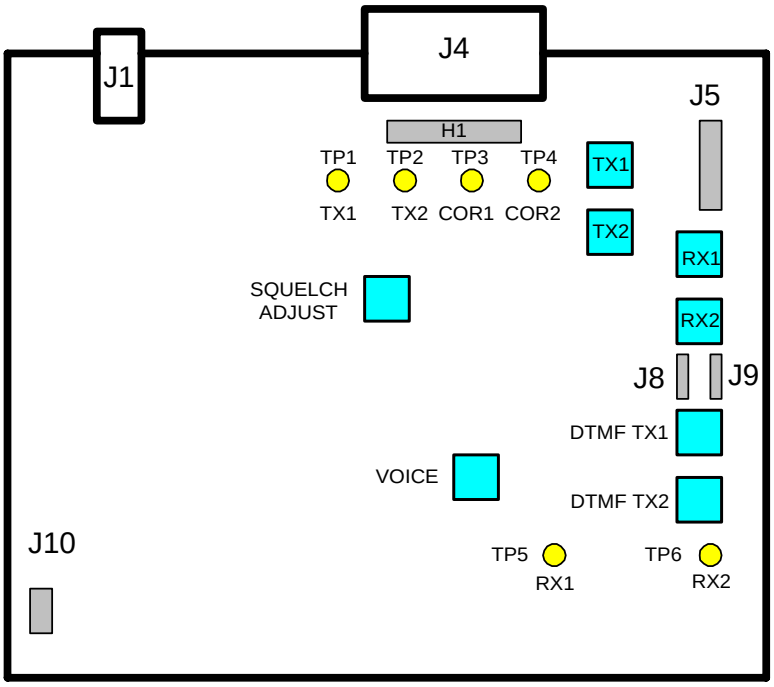


Figure 7-1

Once the RX1, RX2, DTMF TX1, and DTMF TX2 audios are balanced, key-up on the repeater's receiver input and send a DTMF tone. Monitor the REPEATER transmitter. Adjust the TX1 Audio level control (R11) as required to set the repeater transmitter deviation to 3 KHz or as desired. If the repeater transmit audio input is very sensitive and you find the TX1 Audio level control near minimum, it is strongly recommended that an external voltage divider be installed at the audio input of the repeater's transmitter.

Key-up on the repeater's receiver input and send a DTMF tone. Monitor the LINK transmitter. Adjust the TX2 Audio level control (R12) as required to set the link transmitter deviation to 3 KHz or as desired. If the link transmit audio input is very sensitive and you find the TX2 Audio level control is near minimum, set the jumper plug at J7 between pins 1 and 2.

Compare the receive and synthesized voice audio and adjust the voice Level (R48) as desired. The synthesized voice should be slightly lower than the receive audio. Adjust R55 for the repeater's desired CW ID and courtesy beep levels.

Test Point TP1 - Transmitter Audio (TX1)

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

Test Point TP2 - Transmitter Audio (TX2)

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

Test Point TP3 - COR #1

This test point displays the COR logic level from the REPEATER receiver.

Test Point TP4 - COR #2

This test point displays the COR logic level from the LINK receiver.

Test Point TP5 - Receiver Audio (RX1)

This test point displays the audio received from the REPEATER receiver at the input of the DTMF decoder #1.

Test Point TP6 - Receiver Audio (RX2)

This test point displays the audio received from the LINK receiver at the input of the DTMF decoder #2.

Repeater Interface (J4)

Connector J4 provides an interface to the repeater and transceiver.

REPEATER INTERFACE J4 (DB25-F)		
1. USER INPUT #1	10. PTT #1	19. USER OUTPUT #3
2. USER INPUT #2	11. TX AUDIO #1	20. USER OUTPUT #4
3. CTCSS #2	12. RX AUDIO #2	21. USER INPUT #3
4. CTCSS #1	13. RX AUDIO #1	22. USER INPUT #4
5. COR #2	14. USER OUTPUT #1	23. TX AUDIO #2
6. COR #1	15. USER OUTPUT #2	24. GROUND
7. RBI-1 DATA	16. +12VDC OUTPUT	25. RBI-1 RESET
8. RBI-1 CLOCK	17. GROUND	
9. PTT #2	18. GROUND	

Figure 7-2

Internal Interface Header H1

Header H1 provides an internal interface to all the signals on the J4 connector and the three RBS Control outputs. Extra ground pins are also provided.

INTERNAL INTERFACE H1		
1. USER INPUT #1	2. USER OUTPUT #1	3. USER INPUT #2
4. USER OUTPUT #2	5. CTCSS #2	6. +12VDC OUTPUT
7. CTCSS #1	8. GROUND	9. COR #2
10. GROUND	11. COR #1	12. USER OUTPUT #3
13. RBI-1 DATA	14. USER OUTPUT #4	15. RBI-1 CLOCK
16. USER INPUT #3	17. PTT #2	18. USER INPUT #4
19. PTT #1	20. TX AUDIO #2	21. TX AUDIO #1
22. GROUND	23. RX AUDIO #2	24. RBI-1 RESET
25. RX AUDIO #1	26. GROUND	

Figure 7-3

Accessory Interface (J5)

Connector J5 provides the interface for the DVR-1000 Digital Voice Recorder.

DVR INTERFACE (J5)	
1. +12VDC	7. SERIAL CLOCK
2. GROUND	12. DVR PLAY AUDIO
5. DVR BUSY	14. DVR RECORD AUDIO
6. SERIAL DATA	

Figure 7-4

Audio Delay Interface (J9) (J8)

This interface is used to connect a audio delay board. The CAT-700 is shipped from the factory with jumpers installed across J9 REPEATER and J8 LINK at pins 1 and 2. This jumper completes the receive audio path. The audio delay board will eliminate the receiver squelch noise crash and the chirp of the first DTMF tone when muting is enabled.

AUDIO DELAY INTERFACE (J9) (J8)			
1. AUDIO INPUT	2. AUDIO OUTPUT	3. GROUND	4. +12VDC

Figure 7-5

RS-232 Interface (J10)

This interface is used to connect a computer or an external modem to the CAT-700 controller. Programming is accomplished through this serial port. The serial port of the computer or terminal must be configured for 4800 baud, 8 bit, NO parity, 1 stop bit. Fabricate the computer interface cable as shown in Figure 7-7.

RS-232 INTERFACE (J10)				
1. +12VDC	3. N/C	5. RTS/CTS	7. USER OUT #4	9. N/C
2. GROUND	4. RS232 OUT	6. RS232 IN	8. N/C	10. N/C

Figure 7-6

RS-232 Interface Cable

The CAT-700 controller's RS-232 port is available at header J10. Included in the connector kit is a three-wire cable terminated with a header plug on one end. Solder a "DB" connector of your choice per Figure 7-7A.

			DB-25		DB-9
RS-232 OUT	4	———	3	RXD	2
RS-232 IN	6	———	2	TXD	3
GROUND	2	———	1	GND	5

Figure 7-7A

If you intend to operate the CAT-700 with an external modem, some additional connection may be required. Add the jumpers described in Figure 7-7B. Some computers may require these jumpers for proper serial port operation.

			DB-25		DB-9
RS-232 OUT	4	———	3	RXD	2
RS-232 IN	6	———	2	TXD	3
GROUND	2	———	1	GND	5
		——	7	GND	
		——	4	RTS	7
		——	5	CTS	8
		——	6	DSR	6
		——	8	DCD	1
		——	20	DTR	4

RS-232 Interface Cable
Figure 7-7B

CTCSS Decoder

Connect the TS-64 CTCSS Encoder/Decoder assembly to the CAT-700 as described in Figure 7-8. The decoder must be connected to discriminator audio. Speaker or volume control audio will have insufficient low frequency CTCSS tone content.

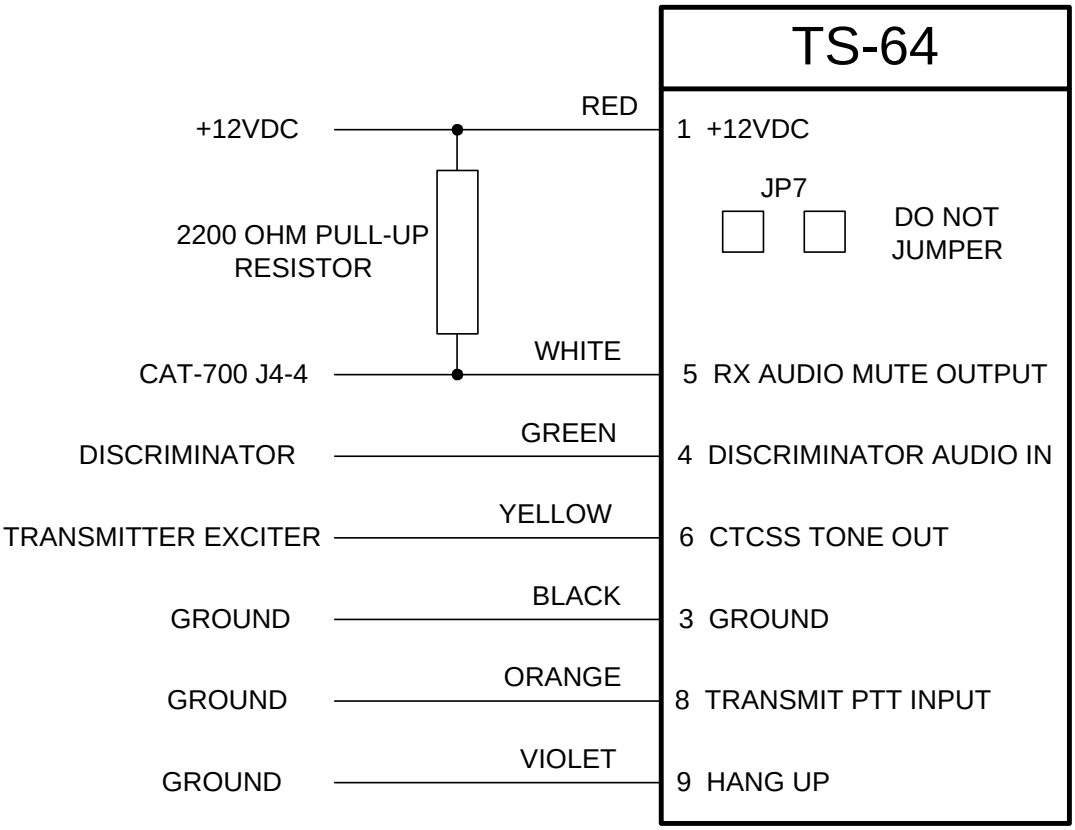


Figure 7-8

P-700 Connector Kit

The connector kit contains a DB25 male connector with hood, a 2.5 mm DC power plug, a three-wire cable terminated with a header plug for the RS-232 interface and a .0082uF capacitor. If the CAT-700 is supplied with discriminator audio, install the .0082uF capacitor on the board at position C19.

Positive Current Transmitter PTT

The CAT-700 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-700 Push-to Talk output at J4-10. Figure 7-9 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 U3.

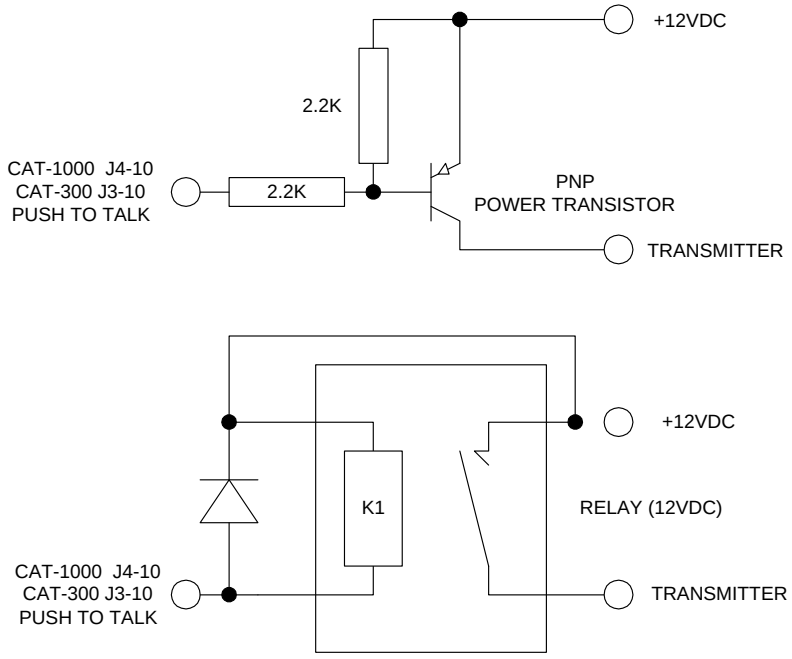


Figure 7-9

Header Pin Assignments

Header connectors on the CAT-700, DL-1000, and DVR-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 is always pin one. One row of pins are assigned odd numbers while the other row are assigned even numbers. See Figure 7-10.

Component Side View Of Headers

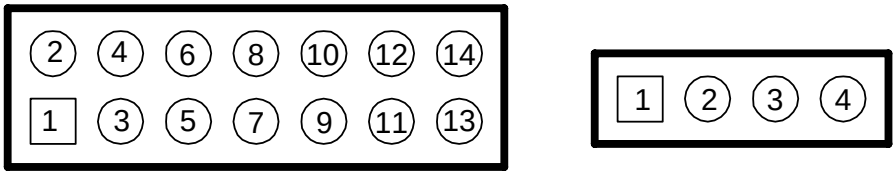


Figure 7-10

Chapter 8 - MF-1000 Serial Interface Card

The CAT-700 supports the MF-1000 Serial Interface Card. 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 latched parallel outputs. Table 8-1 defines the 24 output.

OUTPUT	DESCRIPTION
J1-1	Expanded User Function Output Zone #8 Channel #8
J1-2	Expanded User Function Output Zone #8 Channel #7
J1-3	Expanded User Function Output Zone #8 Channel #6
J1-4	Expanded User Function Output Zone #8 Channel #5
J1-5	Expanded User Function Output Zone #8 Channel #4
J1-6	Expanded User Function Output Zone #8 Channel #3
J1-7	Expanded User Function Output Zone #8 Channel #2
J1-8	Expanded User Function Output Zone #8 Channel #1
J1-9	Expanded User Function Output Zone #7 Channel #8
J1-10	Expanded User Function Output Zone #7 Channel #7
J1-11	Expanded User Function Output Zone #7 Channel #6
J1-12	Expanded User Function Output Zone #7 Channel #5
J1-13	Expanded User Function Output Zone #7 Channel #4
J1-14	Expanded User Function Output Zone #7 Channel #3
J1-15	Expanded User Function Output Zone #7 Channel #2
J1-16	Expanded User Function Output Zone #7 Channel #1
J1-17	Expanded User Function Output Zone #6 Channel #8
J1-18	Expanded User Function Output Zone #6 Channel #7
J1-19	Expanded User Function Output Zone #6 Channel #6
J1-20	Expanded User Function Output Zone #6 Channel #5
J1-21	Expanded User Function Output Zone #6 Channel #4
J1-22	Expanded User Function Output Zone #6 Channel #3
J1-23	Expanded User Function Output Zone #6 Channel #2
J1-24	Expanded User Function Output Zone #6 Channel #1
J1-25	+5VDC Output
J1-26	+12VDC Output
J1-27	Ground
J1-28	Ground
J1-29	Ground
J1-30	Ground
J1-31	Ground
J1-32	Ground
J1-33	Ground
J1-34	Ground

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.

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. This jumper should be between JP2 pins 1 and 2.

Chapter 9 - 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 dipswitch selects delays of 62.5, 125, 250 or 500 milliseconds. With an audio sampling rate 60 KHz, the delayed audio is faithfully reproduced.

Remove the jumper plug from the CAT-700 at J9 Connect the cable from the DL-1000B to header connector J9 to delay repeater audio. To delay remote base audio, remove the jumper plug from the CAT-700 at J8. Connect the cable from a second DL-1000B to the header connector J8.

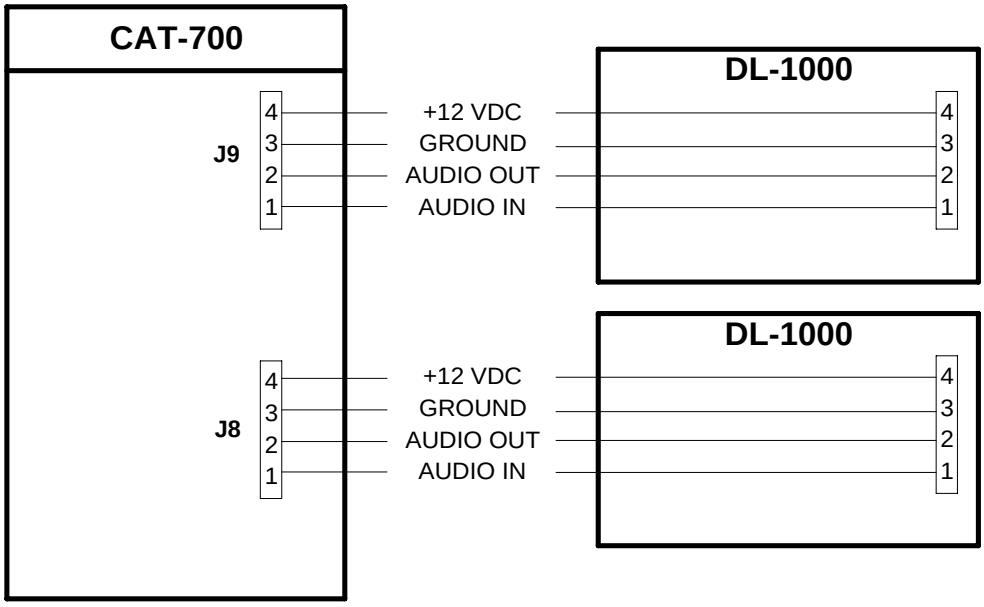


Figure 9-1

Select Delay

The amount of delay is determined by the setting of dipswitch. 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 9-2.

MILLISECONDS	SW1	SW1	SW1	SW1
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 9-2

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.

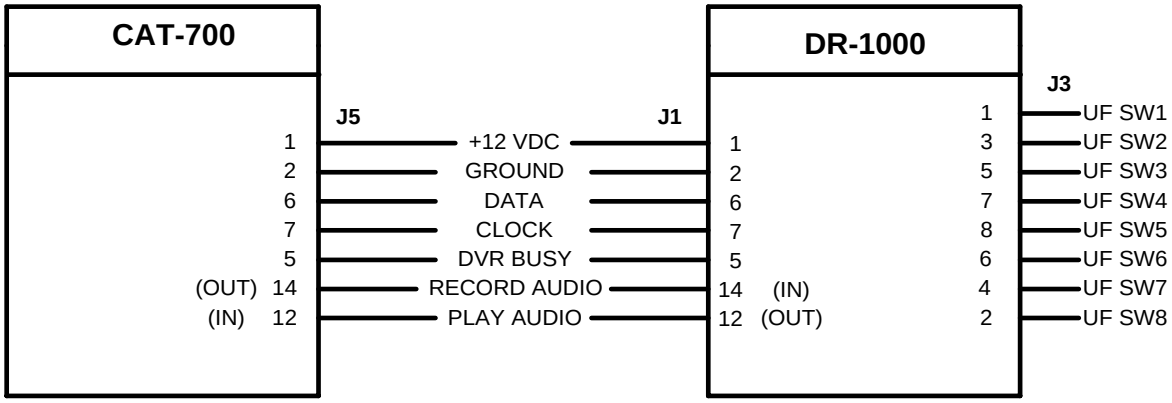
Discriminator Switch

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 10 - Digital Voice Recorder

The DR-1000 provides true voice message announcements on your repeater system. Substitute DVR tracks for voice messages 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-700 at J5. See Figure 10-1 below. Apply power to the controller.



DR-1000 Interface
Figure 10-1

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 (01-16)

The CAT-700 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-700 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.

Audio Level Adjustment

Set the RECORD level control R2 and the PLAYBACK level control R3 to mid-range. This sets 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 TP1. Adjust R3 so the playback audio at TP1 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 100 ma. and switch 40 VDC. Use Zone 6 Channels 1 through 8 to control the user function switches on the DR-1000 or the [550] default prefix code. Place diodes across the relay coils to protect the driver from negative spikes produced when the relay coil collapses.

Chapter 11 - Voice Vocabulary

CAT-700 Word Listing

Welcome..... 900
West..... 902
What..... 903
Whiskey..... 904
Will..... 905
Wind..... 906
With..... 908

X

X..... 920
X-Ray..... 921

Y

Y..... 930
Yankee..... 931
Year..... 932
Yellow..... 933
Yes..... 934
You..... 936
Your..... 937

Z

Z..... 950
Zed..... 951
Zero..... 952
Zone..... 953
Zulu..... 954

Pause

Pause 1..... 960
Pause 2..... 961
Pause 3..... 962
Pause 4..... 963

Female

Good Morning..... 980
Good Afternoon... 981
Good Evening..... 982

Time Variables

Time of Day..... 100
Day of Week..... 101
Day and Month.... 102
Salutation.....103

User Switch Control

500 mSEC Delay... 110
UF #1 OFF..... 111
UF #1 ON..... 112
UF #1 MON..... 113
UF #2 OFF..... 114
UF #2 ON..... 115
UF #2 MON..... 116
UF #3 OFF..... 117
UF #3 ON..... 118
UF #3 MON..... 119
UF #4 OFF..... 120
UF #4 ON..... 121
UF #4 MON..... 122

DVR Tracks

DVR Track #1..... 131
DVR Track #2..... 132
DVR Track #3..... 133
DVR Track #4..... 134
DVR Track #5..... 135
DVR Track #6..... 136
DVR Track #7..... 137
DVR Track #8..... 138
DVR Track #9..... 139
DVR Track #10.... 140
DVR Track #11.... 141
DVR Track #12.... 142
DVR Track #13.... 143
DVR Track #14.... 144
DVR Track #15.... 145
DVR Track #16.... 146

Courtesy Tones

Courtesy Tone #1. 151
Courtesy Tone #2. 152
Courtesy Tone #3. 153
Courtesy Tone #4. 154
Courtesy Tone #5. 155
Courtesy Tone #6. 156
Courtesy Tone #7. 157
Courtesy Tone #8. 158

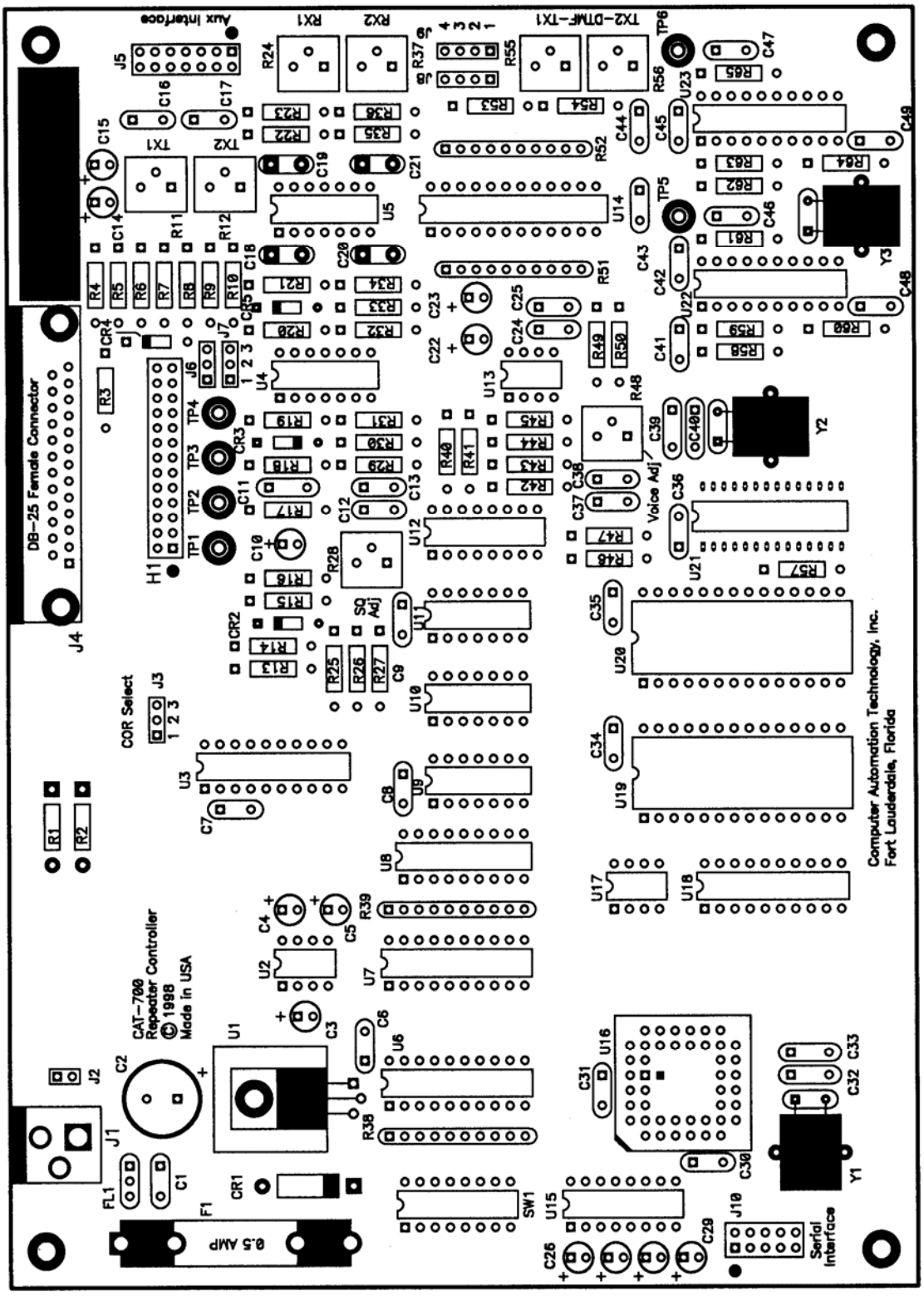
DTMF Tones TX #1

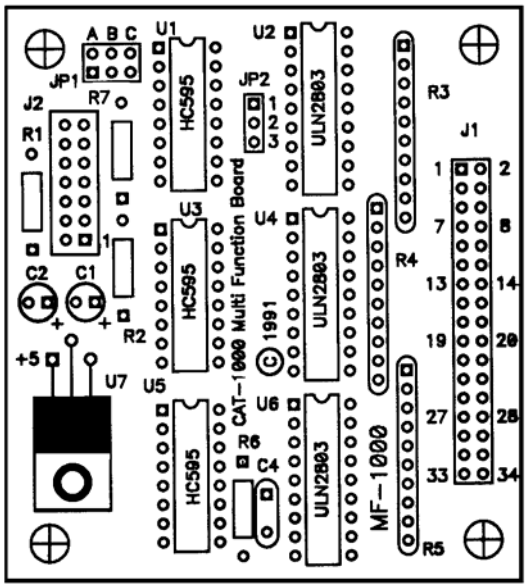
DTMF Digit 1..... 161
DTMF Digit 2..... 162
DTMF Digit 3..... 163
DTMF Digit 4..... 164
DTMF Digit 5..... 165
DTMF Digit 6..... 166
DTMF Digit 7..... 167
DTMF Digit 8..... 168
DTMF Digit 9..... 169
DTMF Digit 0..... 170
DTMF Digit *..... 171
DTMF Digit #..... 172
DTMF Digit A..... 173
DTMF Digit B..... 174
DTMF Digit C..... 175
DTMF Digit D..... 176

DTMF Tones TX #2

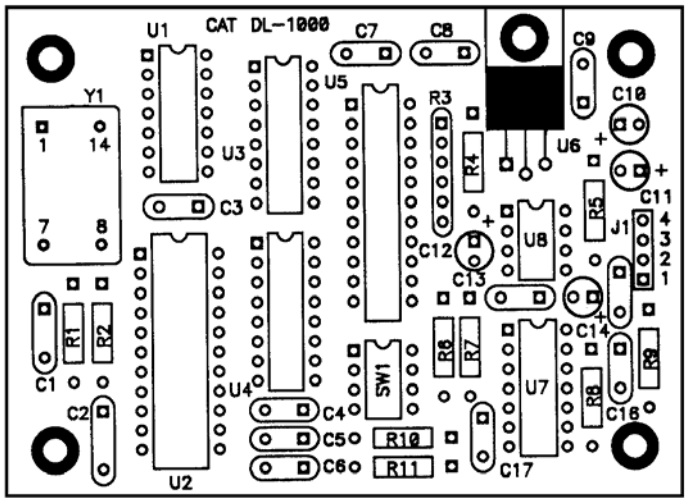
DTMF Digit 1..... 181
DTMF Digit 2..... 182
DTMF Digit 3..... 183
DTMF Digit 4..... 184
DTMF Digit 5..... 185
DTMF Digit 6..... 186
DTMF Digit 7..... 187
DTMF Digit 8..... 188
DTMF Digit 9..... 189
DTMF Digit 0..... 190
DTMF Digit *..... 191
DTMF Digit #..... 192
DTMF Digit A..... 193
DTMF Digit B..... 194
DTMF Digit C..... 195
DTMF Digit D..... 196

Chapter 12 - Drawings

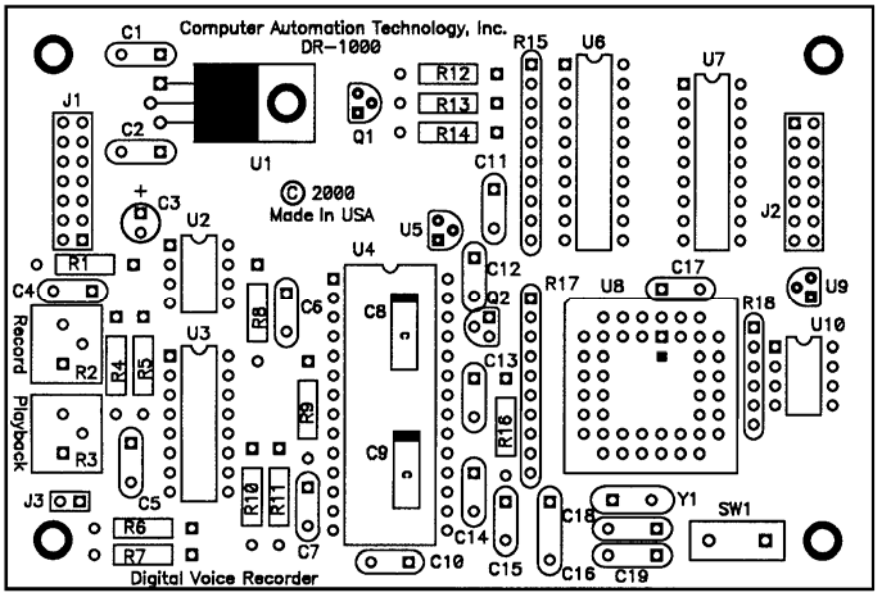

CAT-700
Repeater Controller
© 1998
Made in USA
Computer Automation Technology, Inc.
Fort Lauderdale, Florida
DB-25 Female Connector
Aux Interface
COR Select
Voice Adj
SQ Adj
Serial Interface
0.5 AMP
TX2-DTMF-TX1
RX1
RX2
TX1
TX2



MF-1000 Serial Interface Board
Figure 12-2



DL-1000 Audio Delay Board
Figure 12-3



DR-1000 Digital Voice Recorder Board
Figure 12-4

Chapter 13 - Schematic

Chapter 14 - Part List

CAT-700 Controller Board

1	Capacitor	.001uF 50V	C24
4	Capacitor	.0015uF 50V	C12,C13,C18,C20
3	Capacitor	.015uF 50V	C25,C48,C49
21	Capacitor	0.1uF 50V	C1,C6,C7,C8,C9,C16,C17, C30,C31,C34,C35,C36,C37,C38 C41,C42,C43,C44,C45,C46,C47
2	Capacitor	(Not Used)	C19,C21
1	Capacitor	470pF 50V	C11
12	Capacitor	10uF 16V	C3,C4,C5,C10,C14,C15 C22,C23,C26,C27,C28,C29
1	Capacitor	470uF 25V	C2
4	Capacitor	33pF 50V	C32,C33,C39,C40
1	Connector	25D (F)	J4
1	Connector	(DC Power)	J1
1	Connector	Header 1X2	J2
2	Connector	Header 1X3	J3,J7
1	Connector	Header 1X3	J6 (NOT USED)
1	Connector	Header 1x4	J8,J9
1	Connector	Header 2X5	J10
1	Connector	Header 2x7	J5
1	Connector	Header 2X13	H1
1	Crystal	12.0 MHz	Y1
1	Crystal	3.27 MHz	Y2
1	Crystal	3.58 MHz	Y3
1	Diode	Transorb	CR1
1	Diode	1N4733A	CR4 (NOT USED)
3	Diode	1N4148	CR2,CR3,CR5
1	Fuse	0.5AMP	F1
1	Filter RF		FL1
1	I.C.	N80C251SB16	U16
1	I.C.	27C512	U19
1	I.C.	74HCT573	U18
2	I.C.	74HCT540	U6,U7
1	I.C.	74HCT00	U9
1	I.C.	MODULE	U11
1	I.C.	74HCT32	U10
1	I.C.	74HC138	U12
1	I.C.	DS1643Y	U20
1	I.C.	DS1232	U17
1	I.C.	TC232CPE	U15
1	I.C.	TPIC6259	U3
1	I.C.	ICL7660	U2
1	I.C.	LM348	U5
1	I.C.	LM1458	U13
1	I.C.	TL084CN	U4
1	I.C.	ULN2803A	U8
2	I.C.	MT8888C	U22,U23
1	I.C.	MAX335	U14
1	I.C.	TSP53C30AN2L	U21
1	I.C.	LM340T-5.0	U1
5	JumperPlug		P3,P6,P7,P8,P9
3	Resistor	100 5% 1/4W	R10,R40,R41
1	Resistor	330 5% 1/4W	R3 (NOT USED)
3	Resistor	620 5% 1/4W	R4,R5,R29
4	Resistor	1K 5% 1/4W	R17,R25,R26,R27
1	Resistor	2.2K 5% 1/4W	R30

15	Resistor	10K 5% 1/4W	R6,R7,R8,R23,R33,R36,R44 R45,R46,R47,R53,R54,R57,R60,R64
1	Resistor	10K 5% 1/4W	R9 (NOT USED)
2	Resistor	18K 5% 1/4W	R49,R50
3	Resistor	22K 5% 1/4W	R15,R18,R32
2	Resistor	33K 5% 1/4W	R22,R35
7	Resistor	47K 5% 1/4W	R13,R14,R16,R21,R34,R42,R43
5	Resistor	100K 5% 1/4W	R19,R58,R59,R62,R63
2	Resistor	220K 5% 1/4W	R20,R31
2	Resistor	560K 5% 1/4W	R61,R65
2	Resistor	5K Variable	R11,R12
6	Resistor	10K Variable	R24,R28,R37,R48,R55,R56
4	Resistor	10K 10pin	R38,R39,R51,R52
2	Resistor	(Not Used)	R1,R2
1	Switch,	Dip-8 Pole	SW1
6	Test Points		TP1,TP2,TP3,TP4,TP5,TP6

MF-1000 Multi Function 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	

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	C17
1	Capacitor	.0015uF 50V	C16
1	Header1X4	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	Module1.00MHz	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	SwitchDip 4 Pole	SW1	

DR-1000 Digital Voice Recorder Board

1	Capacitor	1.0uF 50V	C16
1	Capacitor	10uF 16V	C3
2	Capacitor	10uF (SM)	C8,C9
2	Capacitor	33PF 50V	C18,C19
2	Capacitor	.001uF 50V	C6,C13
2	Capacitor	.22uF 50V	C12,C14
8	Capacitor	0.1uF 50V	C1,C2,C4,C5,C7,C10,C11,C15
1	Crystal	12MHz	Y1
2	Header2X7		J1,J2
1	Header1X2		J3
1	I.C.	ISD 4003-04MP	U4
1	I.C.	74HC540	U6
1	I.C.	LT1121CZ-3.3	U5
1	I.C.	MC4053	U3
1	I.C.	MCP101-485	U9
1	I.C.	AT89C51-12JC	U8
1	I.C.	NM25C040	U10
1	I.C.	LM340-5	U1
1	I.C.	TLC2272CP	U2
1	I.C.	ULN2803A	U7
1	Resistor	330 5% 1/4W	R12
1	Resistor	3.9K 5% 1/4W	R13
4	Resistor	10K 5% 1/4W	R1,R6,R7,R10
2	Resistor	33K 5% 1/4W	R4,R9
1	Resistor	82K 5% 1/4W	R5
4	Resistor	100K 5% 1/4W	R8,R11,R14,R16
2	Resistor	10K 10pin	R15,R17
1	Resistor	10K 6pin	R18
2	Resistor	10K Variable	R2,R3
1	SwitchPush-Button		SW1
1	Transistor	2N3906	Q1
1	Transistor	2N3904	Q2

Chapter 15 - Remote Base Interface

Remote Base Transceiver With RBI-1 Interface

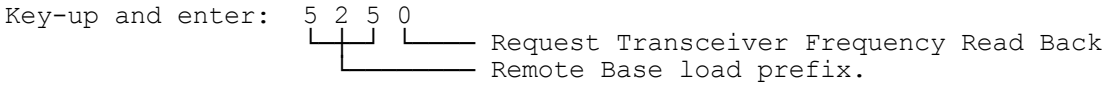
In this mode the CAT-700 supports the Doug Hall RBI-1 Interface. The RBI-1 receives serial data and clock information from the CAT-700 and converts it to the format required to control the Kenwood transceivers. All connections to the transceivers are made through the mic jack. In addition to band, frequency, 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-231 TM-241	TM-321 TM-331	TM-421 TM-431 TM-441	TM-521 TM-531 TM-541	TM-621 TM-731 TM-631 TM-701 TM-721

Figure 15-1

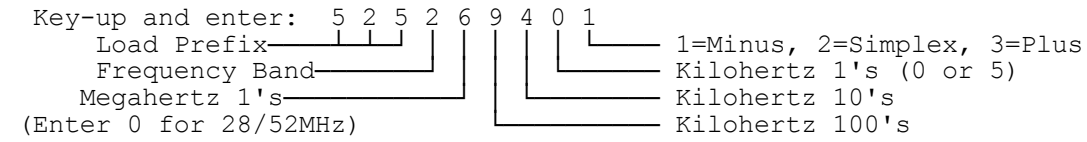
Read Remote Base Frequency

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.



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."



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 15-2

During a frequency load, the CAT-700 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-700 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 — 5 2 5; 0 5 — Memory location

Load Transceiver Frequency From CAT-700 Memory

To load a transceiver frequency from one of the CAT-700 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 — 5 2 5; 2 2 — 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 15-3. 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
Load Prefix — 5 2 5; 5 — CTCSS Tone Load Command; 2 4 — CTCSS Tone From Table

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		

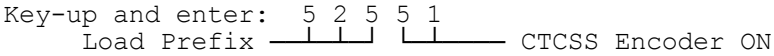
Figure 15-3

During a CTCSS load, the CAT-700 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 — 5 2 5; 5 3 — 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 15-4. The voice will say: "CTCSS-ON."



CTCSS Control			
50 Encoder OFF	51 Encoder ON	52 Decoder OFF	53 Decoder ON

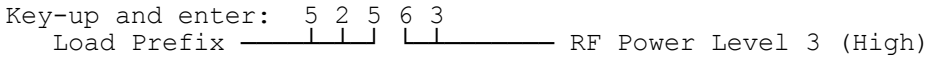
Figure 15-4

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 15-5. Example: With a prefix of 525, set RF power to high. The voice will say: "RF-POWER-HIGH."



Remote Base RF Power Control		
61 Level 1 (Low)	62 Level 2 (Medium)	63 Level 3 (High)

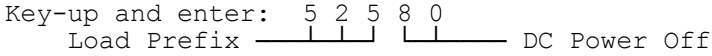
Figure 15-5

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."

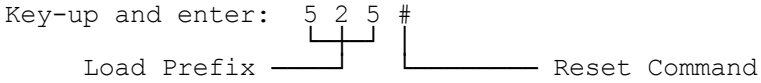


Remote Base DC Power Control	
80 DC Power OFF	81 DC Power ON

Figure 15-6

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 [#].



CAT-700 - RBI-1 Interface

Fabricate a cable between J4 on the CAT-700 and J2 on the RBI-1 Remote Base Interface. Follow the wiring described in Figure 15-7. 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.

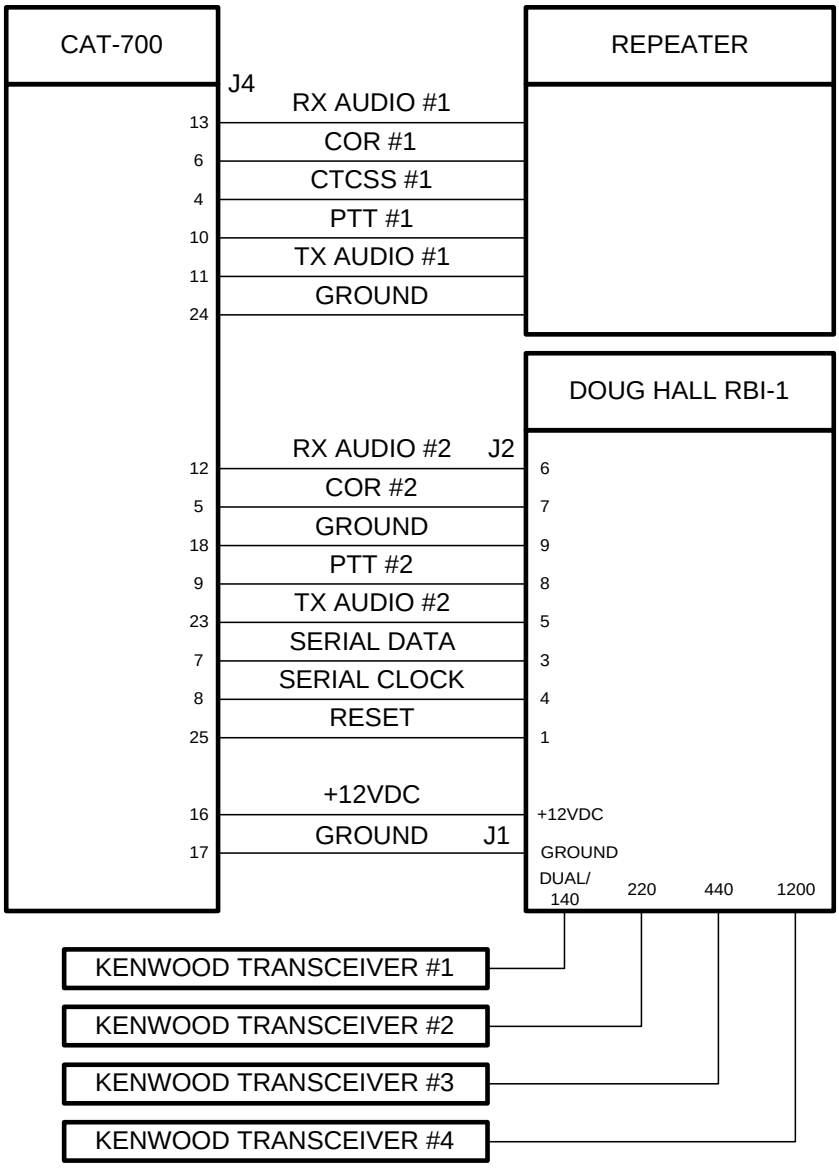


Figure 15-7

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:

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