

# Computer Automation CAT-100

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## Chapter 1 - Introduction and Specifications

Congratulations on the purchase of the CAT-100 "Automatic Control Operator." You are about to experience a new freedom from the drudgery of day to day repeater controlling.

The CAT-100 will breathe new life into your existing repeater controller. When inserted between the receiver and controller, all your control operator commands can be pre-programmed to activate automatically.

In addition to the pre-programmed command feature, you also get a digital voice clock, five additional user functions, a control operator authorization feature and a RS-232 interface.

Memory space is provided to store 120 different control operator commands. You program the time the command is to be sent. You enter the hours, minutes, day of week, or day of month and month of year.

At the exact time selected by you, the CAT-100 will generate a receiver COR followed by the DTMF tone command string stored at that memory location.

When the board is not sending commands automatically, it is transparent to the system. This permits manual commands to be sent by the repeater's control operators just as before.

The CAT-100 will work with any repeater controller that responds to serial strings of DTMF numbers.

Five power FET switches are included. They can be used to control equipment at the repeater site. These switches operate independently and are under full clock control. They can be programmed to turn OFF, ON, or momentarily change state any time you choose.

The CAT-100 will generate call letter identification and time of day in a digital synthesized voice. It can also be programmed to announce the time and ID on the hour.

The CAT-100 control operator authorization feature allows you to assign 40 different control operator prefix numbers. With each number, you decide which control functions are to be made available to that particular control operator.

The CAT-100 will only pass on to the repeater's controller the DTMF commands pre-determined by you.

An RS-232 interface is provided so you can program the CAT-100 through a computer terminal. You can set the clock, read the time, read and program the voice ID, program the user function and serial commands, and control operator authorization.

## Specifications

Microprocessor	8085A
Memory	EPROM 256K RAM 64K, non volatile
Clock Accuracy	+1 minute per month at +25 degrees C. In the absence of power, data and time will be maintained for five years. 1-1
Voice Synthesizer	Texas Instruments TSP53C30 Linear Predictive Coded
DTMF Transceiver	Silicon Systems 75T2089 Microprocessor Controlled Transceiver
Operating Temperature	0 to +40 degrees C
Call Letter ID	Buffer size (15)
Control Codes	Buffer size (9)
Scheduler	Serial Command (60) User Function Command (60) Control Operator Authorization (40)
Audio Output	Voice Synthesizer 0dBm (Adjustable) DTMF Generator -6dBm
Logic Inputs	Low 0 to .8 volts High 2.4 to 15 volts
Logic Outputs	Open Drain Power FET 60 volts at 200 ma.
Power	11.5 to 15V at 200 mA
Size	5.5" X 8.0"
Warranty	Limited one year parts and labor.

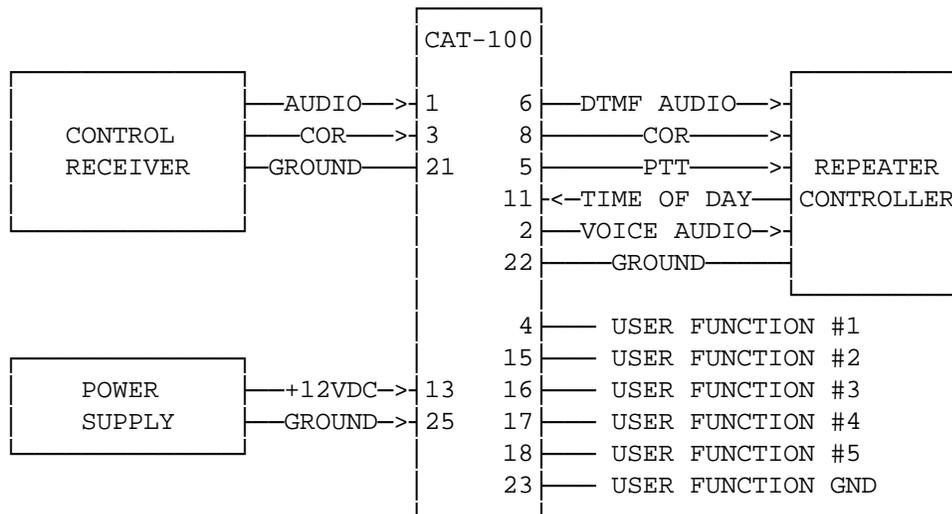
### Control Receiver

In this configuration, the CAT-100 is connected between the control receiver and the repeater's controller. All control operator commands are entered through the control receiver, including programming commands for the CAT-100.

The voice synthesizer is connected to the auxiliary audio input of the repeater's controller. All voice messages, including call letter identification, time of day and user function status are monitored on the repeater's output frequency.

Time of day is requested by programming the repeater's controller to momentarily activate a user function output through the request of bulletin board message or the autopatch hang-up message.

The CAT-100 contains five power FET switches that can be used to control equipment at the repeater site. These switches operate independently and are under full clock control. They can be programmed to turn OFF, ON, or momentarily change state.

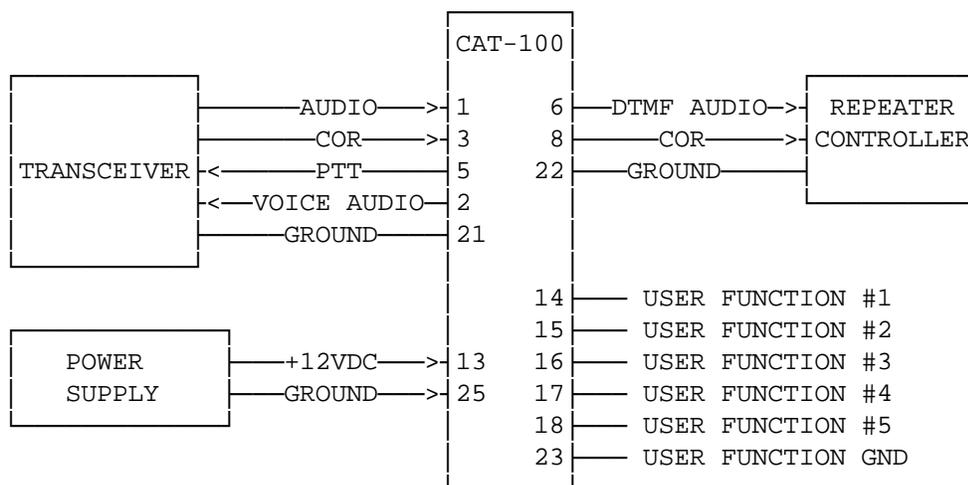


CAT-100 with Control Receiver  
Figure 1

### Control Transceiver

In this configuration, the CAT-100 is connected between a control transceiver and the repeater controller. All control commands are entered through the transceiver, including programming commands for the CAT-100.

The voice synthesizer is connected to the transmit audio input of the transceiver. All voice messages, including call letter identification, time of day and user function status are heard by monitoring the transceiver's output frequency. This configuration provides five user function switches for remote control of equipment at the repeater site.



CAT-100 with Control Transceiver  
Figure 2

NOTE: In this configuration the voice synthesizer is connected to the transceiver. Time of day announcements are not available on the repeater.

#### Dip Switch Settings

A six-position dipswitch is used to configure the CAT-100.

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

**Switch 2** determines PTT output logic. This switch should be ON if the repeater's transmitter PTT is an active low and OFF if PTT is active high.

**Switch 3** determines if the CAT-100 is in the RF control mode or telephone control mode. This switch should be ON for RF control and OFF for telephone control.

**Switch 4** This switch should be ON. If the telephone interface card with modem option is used, set switch 4 to the OFF position.

**Switch 5** This switch should be ON. To program a new unlock number, set switch 5 to OFF. After the ten-digit number is entered, switch 5 should be set to ON.

**Switch 6** This switch should be ON. To activate the RS-232 computer interface, set switch 6 to OFF and apply power. Once communications have been established, set switch 6 to ON.

SWITCH	DESCRIPTION	ON	OFF
1	COR LOGIC	LOGIC LOW	LOGIC HIGH
2	PTT LOGIC	LOGIC LOW	LOGIC HIGH
3	MODE	RF CONTROL	TELEPHONE CONTROL
4	MODEM	NO MODEM	MODEM USED
5	UNLOCK	LOCKED	UNLOCKED
6	TERMINAL	RS-232 OFF	RS-232 ON

Figure 3 (Dip Switch Table)

**Jumper Settings for RF Control**

Jumpers J3 and J4 are preset at the factory for RF operation, with shorting blocks on J3 pins 1 and 2 and J4 pins 1 and 2.

## Chapter 3 - Programming the Controller with DTMF Key Pad

This chapter describes how the CAT-100 control board 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.

### **Programming the Unlock Control Number**

The repeater owner may select and program a ten digit number as the unlock code. However, do not use the same number assigned to the repeater's controller.

To program the UNLOCK code, set dipswitch 5 to the OFF position. The voice synthesizer will say "ENTER CONTROL". Key-up and enter a ten-digit number through the receiver. Un-key, if the number is accepted, the voice will say "CONTROL OK". If the number is rejected, the voice will say, "CONTROL ERROR" followed by "ENTER CONTROL". Key-up and enter the ten-digit number. Set dipswitch 5 to the ON position to LOCK the controller.

### **Unlocking the Controller**

To unlock the controller, key-up and enter the ten digit unlock control number. The voice will say "CAT-100 CONTROL".

NOTE: The unique software registration number appearing on the PROM label will also unlock the CAT-100. However, for security reasons, use of this number should be limited.

### **Locking the Controller**

Key-up and send [\*0]. Un-key, the controller will lockup and the voice synthesizer will say "MANUAL EXIT". The CAT-100 will lockup if the microprocessor does not receive a DTMF entry for 60 seconds. This will cause the controller to timeout and the voice synthesizer will say "TIMER EXIT".

NOTE: The controller must be unlocked to perform the following procedures:

### **Reading the User Function Status**

Key-up and send [\*10]. Un-key and the voice synthesizer will read the USER FUNCTION channels that are turned on. Example: "ONE TWO FIVE". If all USER FUNCTION channels are turned off, the voice synthesizer will say: "ALL CLEAR".

### **Changing the User Function Status**

To change the status of USER FUNCTION #1, key-up and send [\*11]. This will toggle the state of USER FUNCTION #1 from ON to OFF or OFF to ON. Send [\*12,\*13,\*14, or \*15] to toggle USER FUNCTION #2 through USER FUNCTION #5.

### **Momentary Activation of User Function**

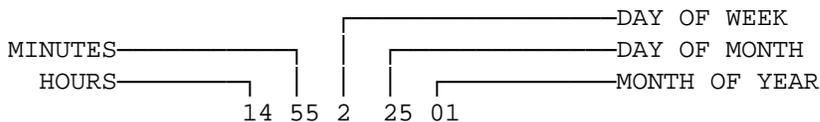
To momentarily activate USER FUNCTION #1, key-up and send [\*16]. This will cause USER FUNCTION #1 to change state for one second and then return to its original condition. Send [\*17,\*18, or \*19] to activate USER FUNCTION #2, #3, or #4.

### **Read the Time of Day**

Key-up and send [\*20]. Un-key and the voice synthesizer will read the time of day. Example: "THE TIME IS TWELVE FIFTEEN PM"

### Setting the Clock

Key-up and send [\*21]. Un-key and the voice synthesizer will say, "ENTER TIME". Key-up and enter hours, minutes, day of week, day of month, and month of year. Hours are entered in 24-hour time. All entries must be double digit, except the day of week. See Figure 4 for the number that represents the day of week. Example: 2:55 PM Monday January 25th



hour	0-23	Sun=1	
minute	0-59	Mon=2	Fri=6
day of week	1-7	Tue=3	Sat=7
day of month	1-31	Wed=4	
month of year	1-12	Thr=5	

Figure 4 (Clock Programming Table)

### Enter Time Request Code

Key-up and send [\*22]. Un-key and the voice will say "ENTER NUMBER". Key-up and enter the time request code number. This number can be between one and nine digits and is used to request the time without activating the (TOD) line.

### Read Call Letter Identification

Key-up and send [\*30]. Un-key and the voice synthesizer will read the call letter identification. Example: "CAT-100 CONTROL".

### Program Call Letter Identification

Key-up and send [\*31]. Un-key and the voice synthesizer will say "ENTER ID". Key-up and enter call letters. Memory space is provided for fifteen entries. See Figure 5 to program the call letter identification. Example: W4XYZ

W 4 X Y Z  
 | | | | |  
 33 04 34 35 36

01=ONE	11=A	21=K	31=U
02=TWO	12=B	22=L	32=V
03=THREE	13=C	23=M	33=W
04=FOUR	14=D	24=N	34=X
05=FIVE	15=E	25=O	35=Y
06=SIX	16=F	26=P	36=Z
07=SEVEN	17=G	27=Q	
08=EIGHT	18=H	28=R	
09=NINE	19=I	29=S	
00=ZERO	20=J	30=T	

Figure 5 (Voice Synthesizer Word Table)

### User Function Memory

The user function memory area is reserved for storage of commands to control the five USER FUNCTIONS. This includes the time the command is to be executed, the user function to be controlled and the action to be taken.

**Read User Function Memory (01 through 60)**

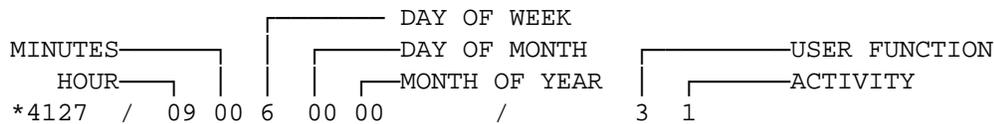
Key-up and send [\*40XX]. Un-key and the voice synthesizer will read back the status of the memory location. If a command is stored at that memory location, the voice will say "POSITION XX IS NOT CLEAR". If there is no command stored at that memory location, the voice will say "POSITION XX IS CLEAR"

**Write User Function Memory (01 through 60)**

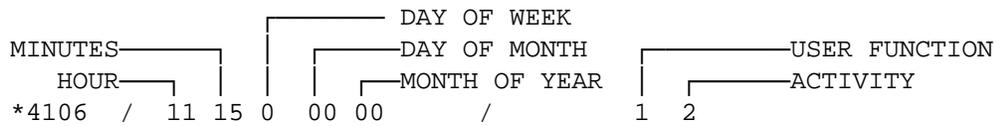
Key-up and send [\*41XX]. Un-key and the voice synthesizer will say, "ENTER TIME FOR POSITION XX". Key-up and enter hours, minutes, day of week, or day of month and month of year. Un-key and the voice will say "ENTER CONTROL". Key-up and enter channel number and activity.

NOTE: In the following examples [/] means to un-key and wait for the next instruction from the voice synthesizer.

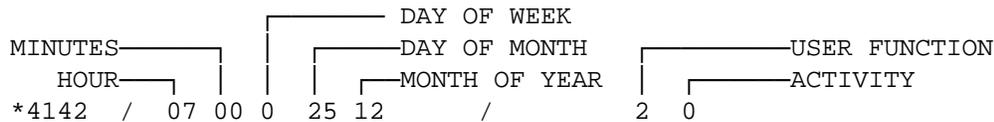
Example: UF3-ON-9:00 AM-FRIDAY (STORE AT TABLE LOCATION 27)



Example: UF1-MOMENTARY ON-11:15 PM-EVERYDAY (STORE AT TABLE LOCATION 6)



Example: UF2-OFF-7:00 AM-DECEMBER-25th (STORE AT TABLE LOCATION 42)



DAY OF WEEK		ACTIVITY
0=DAILY	5=THURSDAY	0=USER FUNCTION OFF
1=SUNDAY	6=FRIDAY	1=USER FUNCTION ON
2=MONDAY	7=SATURDAY	2=USER FUNCTION MOMENTARY
3=TUESDAY	8=WEEKDAYS	(1 SECOND)
4=WEDNESDAY	9=WEEKENDS	

Figure 6 (User Function Programming Table)

**Erase User Function Memory (01 through 60)**

To clear a memory location, key-up and send [\*42XX]. Un-key and the voice will say "CANCEL CLOCK CONTROL POSITION XX".

### Serial Memory

The serial memory area is reserved for storage of DTMF commands and the time when they are to be sent.

NOTE: Some repeater controllers will not accept a control operator command while in the process of sending an ID. To insure commands sent by the CAT-100 are received, program the command twice about two minutes apart.

### Read Serial Memory (01 through 60)

Key-up and send [\*50XX]. Un-key and the voice synthesizer will read back the status of the memory location. If a command is stored at that memory location, the voice will say "POSITION XX IS NOT CLEAR". If there is no command stored at that memory location, the voice will say "POSITION XX IS CLEAR"

### Write Serial Memory (01 through 60)

Key-up and send [\*51XX]. Un-key and the voice will say "ENTER TIME FOR POSITION XX". Key-up and enter hours, minutes, day of week, or day of month and month of year. Un-key and the voice will say "ENTER CONTROL". Key-up and enter the DTMF command string to be sent. Maximum storage per memory location is 31 numbers.

NOTE: In the following examples [/] means to un-key and wait for the next instruction from the voice synthesizer.

Example: SEND 1-5-5-3-6 8:30 AM-WEEKDAYS (STORE AT TABLE LOCATION 3)

MINUTES ——— DAY OF WEEK  
HOUR ——— DAY OF MONTH ——— DTMF SERIAL COMMAND  
MONTH OF YEAR  
\*5103 / 08 30 8 00 00 / 1 5 5 3 6

### Erase Serial Memory (01 through 60)

To clear a memory location, key-up and send [\*52XX]. Un-key and the voice will say "CANCEL CLOCK CONTROL POSITION XX".

### Flush User Function Memory (01 through 60)

To mass erase the 60 user function memory locations, key-up and send [\*61]. Un-key and the voice will say "CLEAR ALL POSITION".

### Flush Serial Memory (01 through 60)

To mass erase the 60 serial memory locations, key-up and send [\*62]. Un-key and the voice will say "CLEAR ALL POSITION".

### Flush Authorization Memory (01 through 40)

To mass erase the 40 authorization memory locations, key-up and send [\*63]. Un-key and the voice will say "CLEAR ALL POSITION".

### Control Authorization Memory

This memory area is reserved for storage of unique control operator prefix numbers and the commands each operator is authorized to send.

### Read Control Authorization (01 through 40)

Key-up and send [\*70XX]. Un-key and the voice will read back the status of the memory location. If a control authorization is stored, the voice will say "POSITION XX IS NOT CLEAR". If there is no control authorization stored at that memory location, the voice will say "POSITION XX IS CLEAR"

### **Write Control Authorization (01 through 40)**

Key-up and send [\*71XX]. Un-key and the voice will say "ENTER CONTROL". Key-up and enter the control operator prefix number followed by the control operator commands authorized for that control operator. The control operator prefix number and each command must be separated with a (\*) star. A (\*) star must also terminate the entry.

NOTE: The control operator prefix number may be any number, however, it must not exceed a total of seven digits.

NOTE: In the following example [/] means to un-key and wait for the next instruction from the voice synthesizer.

Example: Control Operator Number: 455, Authorized to send: Macro 2-3-4, Repeater ENABLE/DISABLE, Autopatch ENABLE/DISABLE, (STORE AT TABLE LOCATION 15

\*7115 / 4 5 5 \* 2 \* 3 \* 4 \* 00 \* 01 \* 19 \* 20 \*

### **Erase Control Authorization (01 through 40)**

To erase a control authorization, key-up and send [\*72XX]. Un-key and the voice will say "CANCEL POSITION XX".

### **Enter Control Authorization Mute Code**

Key-up and send [\*73]. Un-key and the voice will say "ENTER NUMBER". Key-up and enter any one to nine digit mute number. This number must precede the control operator prefix number assigned to each control operator.

### **Enter User Function Code**

Key-up and send [\*74]. Un-key and the voice will say "ENTER NUMBER". Key-up and enter the user function code number. This number can be between one and nine digits and is used to access and toggle USER FUNCTIONS 1 through 5 without having to unlock the CAT-100.

NOTE: Do not select a number for the User Function Code or Control Operator Mute Code that is in the same starting order as either the programmable or fixed unlock codes.

### **User Function Code**

The User Function Code provides a quick method of gaining access to USER FUNCTIONS 1 through 5. Once the proper code is entered, the CAT-100 will say "CAT-100 CONTROL".

Key-up and send [\*10]. Un-key and the voice synthesizer will read the USER FUNCTION channels that are turned on. Example: "ONE TWO FIVE".

To change the status of USER FUNCTION #1, key-up and send [\*11]. This will toggle the state of USER FUNCTION #1 from ON to OFF or OFF to ON. Send [\*12,\*13,\*14, or \*15] to toggle USER FUNCTION #2 through USER FUNCTION #5.

To momentarily activate USER FUNCTION #1, key-up and send [\*16]. This will cause USER FUNCTION #1 to change state for one second and then return to its original condition. Send [\*17,\*18, or \*19] to activate USER FUNCTION #2, #3, or #4.

Key-up and send [\*0]. Un-key, and the voice synthesizer will say "MANUAL EXIT".

**Enter Control Operator Prefix-A (Table positions 1-20)**

Key-up and send [\*75]. Un-key and the voice will say "ENTER NUMBER". Key-up and enter the control operator prefix number. Memory space is provided for a number from one to nine digits. This is the same control operator prefix number that is programmed into the existing repeater controller. The CAT-100 must know this number to properly regenerate the control operator commands.

**Enter Control Operator Prefix-B (Table positions 21-25)**

Key-up and send [\*76]. Un-key and the voice will say "ENTER NUMBER". Key-up and enter a different control operator prefix number. This prefix number will precede the regenerated commands stored at memory locations 21-25.

**Enter Control Operator Prefix-C (Table positions 26-30)**

Key-up and send [\*77]. Un-key and the voice will say "ENTER NUMBER". Key-up and enter a different control operator prefix number. This prefix number will precede the regenerated commands stored at memory locations 26-30.

**Enter Control Operator Prefix-D (Table positions 31-35)**

Key-up and send [\*78]. Un-key and the voice will say "ENTER NUMBER". Key-up and enter a different control operator prefix number. This prefix number will precede the regenerated commands stored at memory locations 31-35.

**Enter Control Operator Prefix-E (Table positions 35-40)**

Key-up and send [\*79]. Un-key and the voice will say "ENTER NUMBER". Key-up and enter a different control operator prefix number. This prefix number will precede the regenerated commands stored at memory locations 35-40.

**Clock Control Disable**

There may be times when it is desirable to temporarily suspend clock control activity. This is accomplished by a series of software switches located in the FLAG CONTROL area.

To disable clock control of the USER FUNCTION memory commands, key-up and send [\*91]. This will toggle the state of FLAG #1 from ON to OFF or OFF to ON. When FLAG #1 is ON clock control of the USER FUNCTION memory commands will be disabled. To disable clock control of the serial memory commands, key-up and send [\*92]. This will toggle the state of FLAG #2 from ON to OFF or OFF to ON. When FLAG #2 is ON, clock control of the serial memory commands will be disabled.

**Serial Command Separation**

Several commands can be sent at the same time. At the programmed time, the command in the lowest table location will be sent first, followed by the remaining commands in ascending order by table location number. A two second delay occurs between each command to provide time for the controller receiving the commands to respond. To increase this time, key-up and send [\*93]. This will toggle the state of FLAG #3 from ON to OFF or OFF to ON. When FLAG #3 is ON, the delay will be ten seconds.

**Time Of Day With Identification**

The CAT-100 voice synthesizer gives the time of day on request. To include the ID, key-up and send [\*94]. This will toggle the state of FLAG #4 from ON to OFF or OFF to ON. When FLAG #4 is ON, the call letter identification will precede the time of day announcement. Example: "W4XYZ REPEATER THE TIME IS 2:30 PM".

### **Grandfather Clock**

The CAT-100 voice synthesizer will give the time of day every hour on the hour.

To activate the grandfather clock, key-up and send [\*95]. This will toggle the state of FLAG #5 from ON to OFF or OFF to ON. When FLAG #5 is ON, the time of day announcement will occur every hour.

### **Transceiver Mode**

The CAT-100 can be connected to a transceiver and control the repeater from a remote location. To do this, the CAT-100 must provide a PTT output at J1-5 when DTMF tones are being sent. To activate the transceiver mode, key-up and send [\*96]. This will toggle the state of FLAG #6 from ON to OFF or OFF to ON.

When FLAG #6 is ON, the PTT output will activate when the DTMF command string is sent.

### **Transceiver Identification**

The CAT-100 will identify the remote transceiver. To activate the transceiver identification, key-up and send [\*97]. This will toggle the state of FLAG #7 from ON to OFF or OFF to ON. When FLAG #7 is ON, transceiver identification will occur after the DTMF command string is sent. If two or more commands are scheduled at the same time, the ID will follow the last command.

### **Autopatch Time Log**

The CAT-100 will announce the time at the termination of an autopatch. To activate the autopatch time log, key-up and send [\*98]. This will toggle the state of FLAG #8 from ON to OFF or OFF to ON. When FLAG #8 is ON, autopatch time logging will occur.

The voice synthesizer will say "AUTOPATCH COMPLETE AT 7:15 PM". NOTE: The CAT-100 must receive a request on the TOD input from the repeater controller.

### **Weather Alert Message**

By connecting the output of the 1050 Hz detector of a NOAA weather monitor receiver to J1-11, the CAT-100 will announce when a weather warning has been sent. To activate the weather alert message, key-up and send [\*99]. This will toggle the state of FLAG #9 from ON to OFF or OFF to ON. When FLAG #9 is ON, the voice synthesizer will say "WEATHER ALERT".

DTMF Programming Table I

ENTRY	DESCRIPTION
*10	READ USER FUNCTION STATUS
*11	TOGGLE USER FUNCTION #1
*12	TOGGLE USER FUNCTION #2
*13	TOGGLE USER FUNCTION #3
*14	TOGGLE USER FUNCTION #4
*15	TOGGLE USER FUNCTION #5
*16	MOMENTARY ACTIVATE USER FUNCTION #1
*17	MOMENTARY ACTIVATE USER FUNCTION #2
*18	MOMENTARY ACTIVATE USER FUNCTION #3
*19	MOMENTARY ACTIVATE USER FUNCTION #4
*20	READ TIME OF DAY
*21	PROGRAM TIME OF DAY
*22	PROGRAM TIME OF DAY REQUEST CODE
*30	READ IDENTIFICATION
*31	PROGRAM IDENTIFICATION
*40XX	READ USER FUNCTION COMMAND
*41XX	WRITE USER FUNCTION COMMAND
*42XX	ERASE USER FUNCTION COMMAND
*50XX	READ SERIAL COMMAND
*51XX	WRITE SERIAL COMMAND
*52XX	ERASE SERIAL COMMAND
*61	FLUSH USER FUNCTION MEMORY POSITIONS 1-60
*62	FLUSH SERIAL MEMORY POSITIONS 1-60
*63	FLUSH AUTHORIZATION MEMORY POSITIONS 1-40
*70XX	READ CONTROL AUTHORIZATION
*71XX	WRITE CONTROL AUTHORIZATION
*72XX	ERASE CONTROL AUTHORIZATION
*73	PROGRAM MUTE CODE
*74	PROGRAM USER FUNCTION CODE
*75	PROGRAM PREFIX-A CODE TABLE POSITION 1-20
*76	PROGRAM PREFIX-B CODE TABLE POSITION 21-25
*77	PROGRAM PREFIX-C CODE TABLE POSITION 26-30
*78	PROGRAM PREFIX-D CODE TABLE POSITION 31-35
*79	PROGRAM PREFIX-E CODE TABLE POSITION 36-40

*80	READ PHONE ANSWER DELAY TIMER
*81	PROGRAM PHONE ANSWER DELAY TIMER
*89	ACTIVATE MODEM (OPTIONAL)
*90	READ FLAG STATUS
*91	TOGGLE USER FUNCTION CLOCK DISABLE
*92	TOGGLE SERIAL CLOCK DISABLE
*93	TOGGLE SERIAL 10 SECOND SEPARATION
*94	TOGGLE TIME OF DAY PLUS ID
*95	TOGGLE TIME OF DAY ON THE HOUR EVERY HOUR
*96	TOGGLE TRANSCEIVER MODE
*97	TOGGLE TRANSCEIVER ID AFTER SERIAL COMMAND
*98	TOGGLE AUTOPATCH TIME LOG MESSAGE
*99	TOGGLE WEATHER ALERT MESSAGE
*0	MANUAL EXIT

NOTE: (XX) REPRESENTS THE MEMORY TABLE LOCATION.

## Chapter 4 - Programming the Controller by Computer Terminal

The CAT-100 can be programmed through the RS-232 interface port. Turn off power and connect the CAT-100 controller to the computer terminal through a special cable fabricated per the schematic in chapter 7.

Set dip switch 6 to OFF. Turn the power ON. Press the (C/R) on the computer key-board. The screen will display:

**CAT-100, Software version 2.2. 17:52 Friday Feb, 23**

Set dip switch 6 to ON. The following commands will be accepted by the CAT-100 through the RS-232 interface:

### Command      Definition

**auth** Write, Erase, display control operator authorization list.  
**call** Display and change the call letter identification.  
**code** Display and change the User code, Time code, Mute number and authorization prefix groups **A, B, C, D, E**.  
**flsh** User function, Serial function, and control operator Authorization memory flush.  
**menu** Displays this menu of terminal commands.  
**quit** Exit the terminal mode.  
**ring** Display and change the telephone answer delay timer.  
**serl** Write, Erase, display serial clock control program.  
**time** Display and set the clock.  
**unlk** Write and display unlock numbers.  
**user** Write, Erase, display user function clock control program.

### **Computer's serial port set-up:**

Mode	ORIGINATE
Baud Rate	300
Data Bits	7
Parity	S (SPACE) or N (NONE)
Stop Bits	1

### **Notes:**

1. The command prompt is: ->
2. In examples, a carriage return will be displayed as (C/R)

### **AUTH**

To display the Control operator authorization list: Type: auth (C/R)  
The terminal will display page one of the table of the control authorization commands. There are a total of two pages containing twenty positions each. At each position is displayed the control operator prefix number and the commands authorized to be sent with that prefix number.

To program a control operator authorization command:

Example: At table position [5] load prefix number 456, commands 1 2 00 01 19 20 33 68 72 90, Type: auth/w5/456/1,2,00,01,19,20,33,68,72,90 (C/R)

To erase a control operator authorization command at table position [12]:  
Type: auth/e12 (C/R)

NOTE: Operands for AUTH commands are: w=write e=erase h=help

**CALL**

To read the call letter ID: Example: W4XYZ Type: call (C/R)  
Display: Call letters: W4XYZ

To program the call letters: Example: W4ABC Type: call/W4ABC (C/R)

NOTE: Operand for CALL command is: h=help

**CODE**

To list Control codes: Type: code (C/R)

The terminal will display: Control codes are:  
Control mute = 100  
User function = 200  
Prefix A code = 300  
Prefix B code = 400  
Prefix C code = 500  
Prefix D code = 600  
Prefix E code = 700  
Time request = 800

To change PREFIX A code: Example: [555] Type: code/a555 (C/R)

To change MUTE code: Example: [234] Type: code/m234 (C/R)

To change USER code: Example: [755] Type: code/u755 (C/R)

NOTE: Operands for CODE command are: m=mute, a=prefix-A, b=prefix-B,  
c=prefix-C, d=prefix-D, e=prefix-E, u=user, t=time, h=help.

NOTE: Do not select a number for the User Function Code or Control Operator Mute Code that is in the same starting order as either the programmable or fixed unlock codes.

**FLSH**

To flush the user function memory table: Type: flsh/u (C/R)

To flush the serial memory table: Type: flsh/s (C/R)

To flush the authorization memory table: Type: flsh/a (C/R)

NOTE: Operands for FLSH command are: u=user function, s=serial,  
a=authorization, h=help

**MENU**

To display the menu of terminal commands: Type: menu (C/R)

**RING**

To read the telephone answer delay timer: Example: 2 seconds Type: ring (C/R)

Display: Ring timer set for 2 seconds. To set the ring timer: Example: 10 seconds Type: ring/10 (C/R)

**SERL**

To display the serial clock control table: Type: serl (C/R). The terminal will display page one of the table of serial control commands. There are a total of three pages containing twenty positions each. At each position is displayed the time the command is to be sent and the string of DTMF digits that make up the command.

To program a serial clock control command, Example: Store at table position 5, the command 34504 to be sent at 7:15 AM, every day of the week. Type: serl/w5/7,15,0,0,0/34504 (C/R)

Example: Store at table position 12, the command 12388 to be sent at 11:30 PM every Monday. Type: serl/w12/23,30,2,0,0/12388 (C/R)

Example: Store at table position 3, the command 55613 to be sent at 3:52 PM May 25th. Type: serl/w3/15,52,0,25,5/55613 (C/R)

To erase a serial clock control command, Example: Erase command stored at table position 5 Type: serl/e5 (C/R)

table position	1-60	day of week	0-9
hour	0-23	day of month	1-31
minutes	0-59	month of year	1-12

Figure 8 (Serial Programming table)

NOTE: Operands for SERL commands are: w=write e=erase h=help

**TIME** (24 HOUR FORMAT)

To read the time: Example: [8:46 PM NOVEMBER 28 FRIDAY] Type: time (C/R)

Display: current time: 20:46 Fri, Nov. 28

To set time: Example: [1:30 PM MONDAY 7 DECEMBER] Type: time/13,30,2,7,12 (C/R)

Entry: time/hr,min,dow,dom,moy

hour	0-23	Sun=1	
minute	0-59	Mon=2	Fri=6
day of week	1-7	Tue=3	Sat=7
day of month	1-31	Wed=4	
month of year	1-12	Thr=5	

Figure 9 (Clock Programming Table)

**QUIT**

To exit the terminal mode and return to normal operation, Type: quit (C/R)  
The sign-off message will appear on the screen.

**UNLK**

To display the CAT-100 unlock codes: Example: Display unlock codes: Type: unlk (C/R). The terminal will display: Unlock numbers are: Fixed programmed = 4061245700 User programmed = 123ABC5678

To change the program unlock code: Example: [0987654321], Type: unlk/w0987654321 (C/R)

NOTE: Operand for UNLK command is: w=write

## USER

To display the user function clock control table, Example: Display the user function clock control table: Type: user (C/R)

The terminal will display page one of the table of user function control commands. There are a total of three pages containing twenty positions each. At each position is displayed the time the command is to be sent, the USER FUNCTION number and the command.

To program the user function clock control, Example: Store at table position 5, the command to turn user function #3 on at 7:15 AM, every day of the week. Type: user/w5/7,15,0,0,0/3,1 (C/R)

Example: Store at table position 12, the command to turn user function #1 off at 11:30 PM every Monday. Type: user/w12/23,30,2,0,0/1,0 (C/R)

Example: Store at table position 3, the command to turn user function #4 momentary on at 3:52 PM May 25th. Type: user/w3/15,52,0,25,5/4,2 (C/R)

To erase a user function under clock control, Example: Erase command stored at table position 5. Type: user/e5 (C/R)

table position 1-60	0=DAILY	
user function number 1-5		1=SUNDAY
off/on/momentary 0-1-2		2=MONDAY
hour 0-23		3=TUESDAY
minutes 0-59		4=WEDNESDAY
day of week 0-9		5=THURSDAY
day of month 1-31		6=FRIDAY
month of year 1-12		7=SATURDAY
		8=WEEKDAYS
		9=WEEKENDS

Figure 10 (User Function Programming Table)

NOTE: Operands for USER commands are: w=write e=erase h=help

## Chapter 5 - Interfacing to Other Equipment

Interfacing the CAT-100 to your repeater controller is a simple matter. Insert the CAT-100 between the receiver and the controller. Connect the receiver audio output to (J1-1) and the COR to (J1-3).

The CAT-100 audio output (J1-6) is connected to the existing repeater's receiver audio input. The CAT-100 COR output (J1-8) is connected to the controller's receiver COR input.

A 10K ohm resistor (R13), located on the CAT-100, pulls up the COR line to +5VDC. If your receiver's COR circuit is an open collector switch or relay contact closure, simply connect to the CAT-100 COR input (J1-3), and set dip switch #1 to the ON position.

If your receiver's COR circuit provides a voltage output that swings from zero to a positive voltage when a signal is received, set dip switch #1 to the OFF position. With no signal present, if the COR line does not measure less than 0.8VDC it may be necessary to remove the 10K pull up resistor (R13).

The output of the CAT-100 voice synthesizer (J1-2) must be connected to the repeater's transmit audio input. If an auxiliary transmit audio input is available, connection should be made to it.

If a dedicated auxiliary transmit audio input is not available, sum the CAT-100 voice audio with the transmitter audio from the existing controller. A large value resistor should provide the necessary isolation.

To request the time at the termination of an autopatch, the existing repeater controller must have an output switch that can be programmed to momentarily switch to a logic low.

Connect a spare user function or remote control switch on the existing repeater's controller to the time of day (TOD) input line (J1-11) of the CAT-100. The (TOD) line is active low. The TOD line is pulled up to +5VDC with a 10k ohm resistor (R4) located on the CAT-100.

The CAT-100 User Function output switches may be connected to any equipment at the repeater site. They are ideally suited as relay drivers and can sink 200 milliamps of current with supply voltages of 60 volts. When switching inductive loads, such as relays, install diodes across the relay coils with the cathode to the power supply side.

Control (R5) adjusts the voice synthesizer output level. While continuing to request the time of day, adjust (R5) for the desired transmitter deviation. If the existing controller has a voice synthesizer, adjust (R5) for a comparable level.

The CAT-100 is powered by an external 12VDC power supply. Connect the positive lead to (J1-13) and the negative lead to (J1-25).

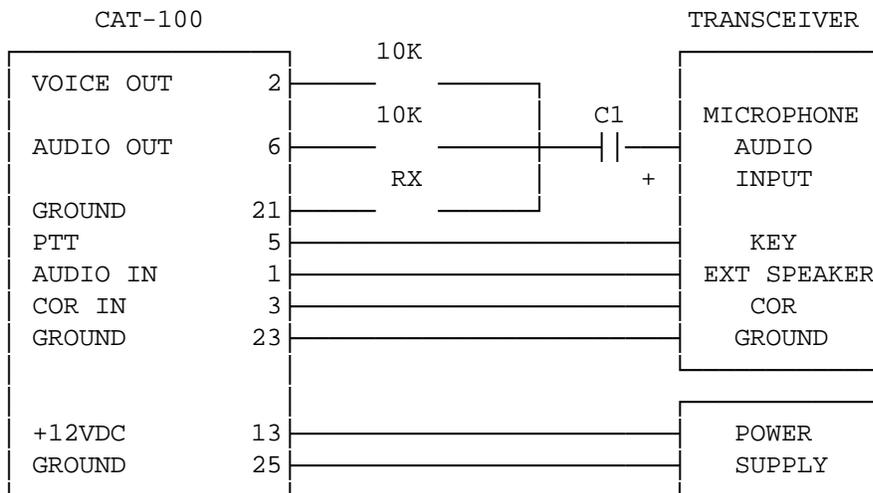
Access to the RS-232 Interface is through (J1-9) and (J1-10). Connect the serial port of your computer or terminal through the special interface cable described in Chapter 7 at Figure 14.

### Remote Location of CAT-100

It's not necessary to install the CAT-100 at your repeater site. When connected to a transceiver the CAT-100 will control your repeater from your home.

Connect the CAT-100 to your transceiver. Tune the transceiver to your repeater frequency. Refer to the diagram for connections.

The VOICE OUT (J1-2) is summed with the AUDIO OUT (J1-6) through 10K ohm isolation resistors. RX is a select value to reduce the combined audio output to the level required for 3 KHz deviation at the transceiver's transmitter output. This combined audio is connected to the transceiver's MIC input. Blocking capacitor C1 may be required if a DC voltage is present on the MIC input pin.



After the DTMF deviation level is established, adjust R5 on the CAT-100 for the desired voice level.

PTT J1-5 is connected to the KEY pin on the transceiver.

If you desire to program and control the CAT-100 by radio directly or through the repeater you must provide an audio input and COR signal for the CAT-100.

An excellent source of receiver audio is the EXT speaker output of the transceiver. Connect the EXT speaker to J1-3 on the CAT-100.

Finding a useable COR signal is more involved. Take measurements at various points in the squelch circuit of your transceiver. Locate a point where the voltage changes from zero to some positive voltage when a signal is being received. This voltage must exceed 3 volts when the receiver is active. Connect this logic signal to J1-1 on the CAT-100 and set dip switch one OFF (to the left).

NOTE: After the connection is made, check the COR line is low with no receive signal. If not, it may be necessary to remove the pull-up resistor R13 on the CAT-100 board.

To activate the transceiver mode, key-up and send [\*96]. This will toggle FLAG #6 ON. When FLAG #6 is ON, the PTT output will activate when the DTMF command string is sent.

To identify your transceiver after the serial command is sent, key-up and send [\*97]. This will toggle FLAG #7 ON. When FLAG #7 is ON, transceiver identification will occur after the DTMF command string is sent.

To activate the Grandfather clock and have the transceiver send the time to your repeater on the hour, key-up and send [\*95]. This will toggle FLAG #5 ON. When FLAG #5 is ON, the time of day announcement will occur every hour.

NOTE: The CAT-100 will check for the presence of COR from the transceiver. If the repeater is in use it will not send the time over a QSO in progress.

Program the scheduler with the times and the DTMF control commands required to automatically control your repeater. At the appropriate times, the CAT-100 will key-up the transceiver and send the command.

To activate the transceiver identification, key-up and send [\*97]. This will toggle the state of FLAG #7 from ON to OFF or OFF to ON. When FLAG #7 is ON, the CAT-100 will ID your transceiver after the DTMF command string is sent.

#### **RC-85 With Control Receiver**

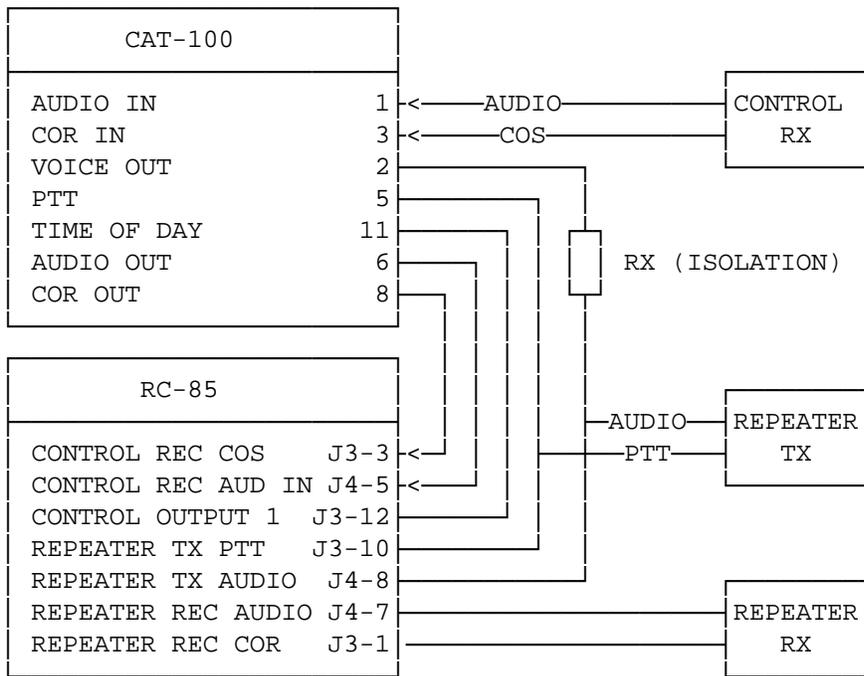
In this configuration, the CAT-100 is connected between the control receiver and the RC-85 control receiver input. Both control receiver audio and COS signals are routed through the CAT-100.

The voice output (J1-2) is connected to the RC-85 Direct Transmitter Mixer Audio input (J4-2). If this audio input is being used, the CAT-100 voice audio can be connected to the Repeater Transmitter Audio Output (J4-8) through RX a large value isolation resistor.

The PPT output J1-5 is connected in parallel with the existing PTT line between the RC-85 and the repeater transmitter.

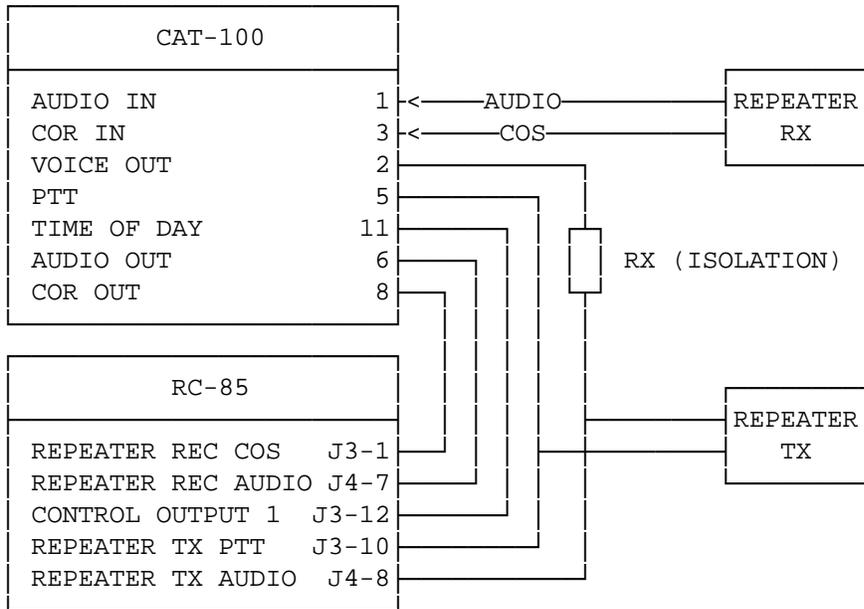
The time of day input (J1-11) is connected to one of the RC-85 Control Outputs, CX1, CX2 or CX3. Program the RC-85 to momentarily activate a control output through the request of bulletin board and autopatch hang-up messages.

The CAT-100 five User Functions are available for control of equipment at the repeater site.



**RC-85 Without Control Receiver**

In this configuration, the CAT-100 is connected between the repeater receiver and the RC-85 repeater receiver input. Both repeater receiver audio and COS signals are routed through the CAT-100.

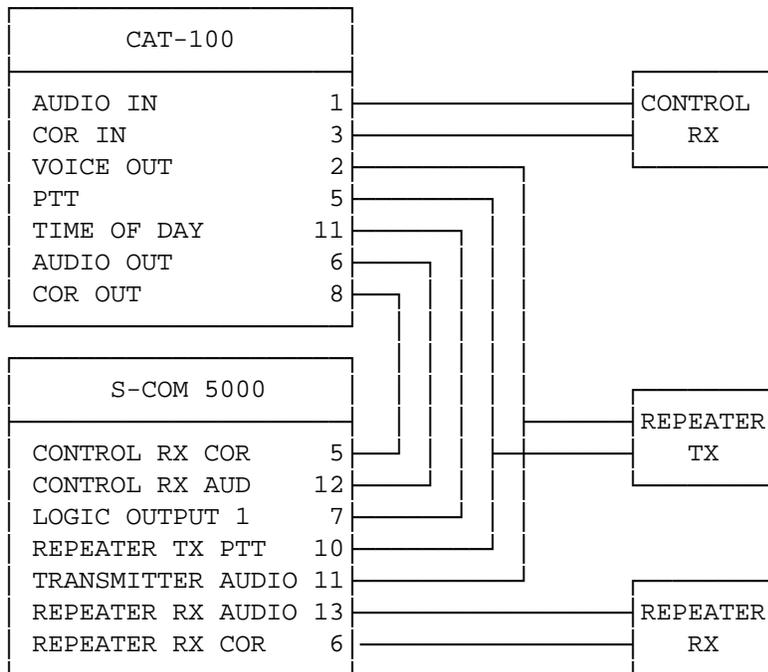


### S-COM 5000 With Control Receiver

In this configuration, the CAT-100 is connected between the control receiver and the S-COM 5000 control receiver input. Both control receiver audio and COR signals are routed through the CAT-100.

The voice output (J1-2) is connected to the transmitter audio (PIN-11) through a large isolation resistor.

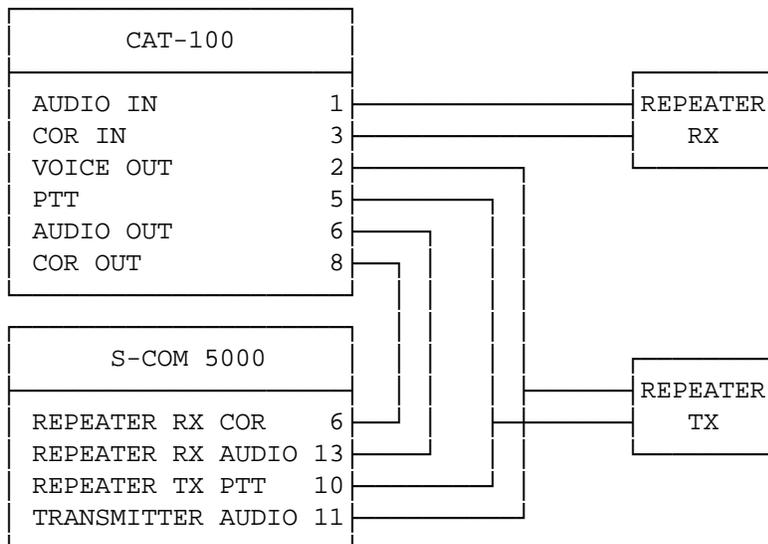
The time of day input (J1-11) is connected to one of the S-COM 5000 logic output switches. The S-COM 5000 is programmed to momentarily activate one of its logic outputs.



### S-COM 5000 Without Control Receiver

In this configuration, the CAT-100 is connected between the repeater receiver and the S-COM 5000 repeater receiver input. Both repeater receiver audio and COS signals are routed through the CAT-100.

The time of day input (J1-11) is not connected to a Logic Output on the S-COM 5000 because the time can be requested directly from the CAT-100.



### REP-200 Without Control Receiver

In this configuration, the CAT-100 is connected between the receiver board and the COR-5 board of the REP-200. Both repeater receiver audio and COR are routed through the CAT-100.

At the Receiver box feed-thru (E4) remove the blue wire. Connect the blue wire to the CAT-100 at J1-8. Connect the CAT-100 J1-3 to the receiver box feed-thru (E4).

Connect the CAT-100 J1-1 to the receiver box feed-thru (E6) and J1-6 to the COR-5 board J6 (AUX AUDIO).

Connect the CAT-100 J1-2 through a 10K ohm resistor to the transmitter box feed-thru (E11) and J1-13 to the transmitter box feed-thru (E10).

Connect the CAT-100 J1-25 to the COR-5 board ground with a ground lug under the mounting screw near the voltage regulator.

Connect the CAT-100 J1-5 to the junction of R34 and R35 on the COR-5 board.

Set DIP switch #1 to OFF (to the left) and switches #2 through #6 to ON (to the right)

Remove the 10K ohm pull-up resistor R13 on the CAT-100.

Disable the REP-200 Auxiliary receiver input. Set the front panel volume control knob so that the white line is between 9 and 12 O'Clock.

## Chapter - 6 Theory of Operation

### **Memory Blocks**

The memory is separated into three blocks. Block one is assigned the User Function Command Scheduler for the five remote control channels. Block two is assigned the Serial Command Scheduler information. Block three is assigned the control operator authorization information.

### **User Function Command Scheduler**

Memory is provided for sixty table positions. Each position provides space to store the time the command is to be sent. This includes hours, minutes, day of week, or day of month and month of year if required. Additional space is provided to store the User Function number and the command.

### **Serial Command Scheduler**

Memory is provided for sixty table positions. Each position provides space to store the time the command is to be sent. This includes hours, minutes, day of week, or day of month and month of year if required. Additional space is provided to store a string of up to 31 DTMF numbers.

Several commands can be sent at the same time. At the programmed time, the command in the lowest table location will be sent first, followed by the remaining commands in ascending order by table location number. A two or ten second delay determined by command [\*93], occurs between each command to provide time for the controller receiving the commands to respond.

Before the start of each command an artificial control receiver COR is produced. This makes the CAT-100 compatible with controllers that do not respond to a (\*) or (#) to simulate drop in COR.

### **Control Operator Authorization**

When the CAT-100 is at rest, control operator DTMF commands are passed directly through to the repeater's controller.

In order for the CAT-100 to screen the control operator commands it must intercept the entry, verify the control operator number is correct and analyze the command to see if the control operator is authorized to send that particular command.

To do this, the control operator number must start with a special mute code. When the CAT-100 detects this mute code it immediately breaks the audio path to the repeater's controller. The remaining numbers are stored in the CAT-100 memory. When the control operator stops transmitting, the CAT-100 checks the unique control operator number and verifies the command is authorized. If every thing is in order the CAT-100 will regenerate the command just as it was initially sent but with the proper prefix number for the repeater's controller.

Select a mute number and program it with the DTMF command [\*73] or the terminal [code/m]. This will represent the first digits of the control operator number. The remaining digits can be any numbers you choose.

Program the control operator prefix-A number with the DTMF command [\*75] or the terminal [code/a]. This is the same number programmed into the repeater's controller.

The authorization table consists of two pages of twenty positions each. Commands stored in page one positions 1-20 will be preceded by the prefix number stored by command [\*75] or code/a.

The second page, table positions 21-40 is divided into four groups of five positions each. Commands stored in positions 21-25 will be preceded by the prefix number stored by command [\*76] or code/b. Commands stored in positions 25-30 will be preceded by the prefix number stored by command [\*77] or code/c.

Commands stored in positions 31-35 will be preceded by the prefix number stored by command [\*78] or code/d. Commands stored in positions 36-40 will be preceded by the prefix number stored by command [\*79] or code/e.

#### **User Function Control Code**

Program the user function code number with the DTMF command [\*74] or the terminal [code/u]. This number permits access to the five user function channels without using the ten digit unlock number. However, after making changes to the user functions, it is still necessary to exit with the [\*0].

#### **Input Port Definition**

The CAT-100 has one input port with eight discrete inputs.

##### **Input 1**

VOICE BUSY is reserved for the voice synthesizer and is used to tell the microprocessor not to issue any more instructions until the voice is through speaking.

##### **Input 2**

COR/Ring Detector tells the microprocessor to expect a DTMF command from the control operator. When dip switch position 3 is in the phone position, input 2 will signal the microprocessor of ring detector activity.

##### **Input 3 through 8**

These inputs are connected to a six-position dip switch. This switch is used to configure the CAT-100 for various modes of operation.

The first dipswitch "COR LOGIC" sets the input logic of the COR line. This eliminates the need to build an external inverter circuit by making the CAT-100 compatible with any receiver COR, whether active high or low.

The second dipswitch "PTT LOGIC" sets the output logic of the PTT line. Most transmitters are keyed by grounding their PTT line. However, some transmitters are activated by a positive voltage on a DC power switch circuit. With the addition of an external pull-up resistor, and the setting of this dip switch to the OFF position, transmitters of this type can be accommodated.

The third dipswitch "MODE" selects the CAT-100 mode of operation, either RF or PHONE control. In the telephone control position, an optional telephone interface card must be connected to connector J2.

The fourth dipswitch "MODEM" informs the microprocessor if a modem is installed on an optional telephone interface card.

The fifth dipswitch "UNLOCK" informs the microprocessor that a new ten digit UNLOCK code is to be entered into memory. Set the switch to the UNLOCK position OFF, enter the new ten digit code and then reset the switch to ON.

The sixth dipswitch "TERMINAL" instructs the microprocessor to establish a communication link through the RS-232 interface. The microprocessor only looks at this switch setting during initial power up. Therefore, it is necessary to turn power off, set the switch to the TERMINAL position, and turn power on. Once the link is established set the TERMINAL switch to off.

**Output 1 (PTT/OFF HOOK)**

This line goes low whenever the CAT-100's voice synthesizer speaks. It should be connected in parallel with the repeater's PTT input. This assures the transmitter will be turned on so voice messages and requests for time of day will be heard on the repeater's output.

When dipswitch three is in the PHONE position, output 1 will activate the OFF HOOK relay on a telephone interface card. There should be no external connection to this line when a telephone card is installed.

**Output 2 (COR OUT)**

This line activates whenever a DTMF command string is being sent. This simulates control receiver COR. The line will go high or low depending on the setting of dipswitch one.

**Output 3 (COR RELAY DRIVE)**

When the CAT-100 is locked, this output will be high and relay (K1) will be at rest. Control operator commands will be passed directly through to the repeater's controller. When the proper ten digit unlock code is entered, this output will go low, energizing (K1). This will prevent DTMF programming commands from being passed on to the repeater's controller. (K1) will also be energized during the control operator authorization function, after receiving the mute code.

**Outputs 4 through 8 (USER FUNCTIONS 1 through 5)**

When the CAT-100 is unlocked or the user function code is entered, these switches can be interrogated by DTMF command [\*10] or toggle ON or OFF with commands [\*11] through [\*15]. They are also under full automatic clock control by programming positions in the user function memory table.

INPUT PORT #1	OUTPUT PORT #1
1. VOICE BUSY	1. PPT/OFF HOOK
2. COR/RING DET	2. COR OUT
3. TIME OF DAY	3. K1 RELAY
4. SW1 (COR LOGIC)	4. USER FUNCTION #1
5. SW2 (PTT LOGIC)	5. USER FUNCTION #2
6. SW3 (MODE)	6. USER FUNCTION #3
7. SW4 (MODEM)	7. USER FUNCTION #4
8. SW5 (UNLOCK)	8. USER FUNCTION #5

Figure 11 (Port Assignments)

**Microprocessor**

The 8085 microprocessor is the heart of the CAT-100. The 8085 receives instructions from the control operator through the DTMF transceiver, monitors the time from the on-board digital clock, and produces responses in accordance to the software program stored in the PROM.

**PROM**

The 27256 is a UV erasable 256K PROM. In addition to the program, this PROM contains data used by the voice synthesizer for word construction. Each PROM contains a unique ten-digit software registration number. In addition to the field programmable number this number will also unlock the CAT-100.

**RAM Real Time Clock**

The DS1243Y is a static nonvolatile 8K RAM with a built-in clock. This memory and real time clock has a self-contained lithium energy source and control circuitry that constantly monitors the power supply for out-of-tolerance.

When such a condition occurs, the lithium energy source is automatically switched on and write protection is enabled to prevent loss of data and time. In the absence of power, the energy cell will maintain the data and time for five years. Clock accuracy is  $\pm$  one minute per month at an ambient temperature of +25 degrees centigrade.

**DTMF Transceiver**

The 75T2089 is a complete Dual Tone Multi-Frequency (DTMF) transceiver that can both generate and detect all 16 DTMF tones. The receiver outputs to the microprocessor bus, a 4-bit hexadecimal code. The transceiver exhibits excellent speech immunity. The generator section produces DTMF tones in response to a hex code received from the microprocessor. A 3.58 MHz color burst crystal frequency source determines tone accuracy.

**Watchdog**

The DS1232 monitors the performance of the microprocessor. If for any reason the microprocessor stops executing the program, the DS1232 will generate an automatic reset.

**RS-232 Driver - Receiver**

The DS1228 interfaces the SERIAL ports of the microprocessor with the assigned serial communication pins on connector J1. It contains an on-board charge pump voltage converter which converts the +5V input power to the  $\pm$ 10 volts needed to generate the RS-232 output levels.

**Voice Synthesizer**

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

**Accessory Connector (J2)**

Connector J2 is provided as an interface for an optional telephone card.

**Jumper (J3)**

The jumper block should be installed between pins 1 and 2 of J3. This connects the RS-232 input to serial input data pin of the microprocessor. If a telephone interface card is used, and the optional modem is installed, this jumper should be moved between pins 2 and 3.

**Jumper (J4)**

The jumper block should be installed between pins 1 and 2 of J4. This connects COR to the input of the microprocessor. If a telephone interface card is used, this jumper block should be removed to prevent an interference problem between the COR interface circuit (Q1) and the ring detector on the telephone card.



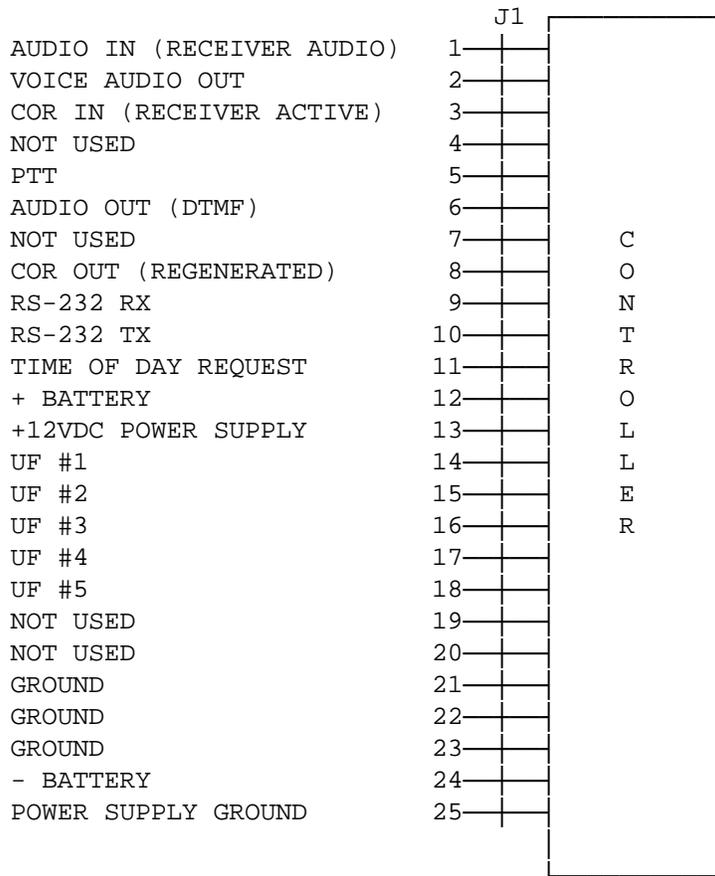


Figure 13 (Connector Plug Definitions)

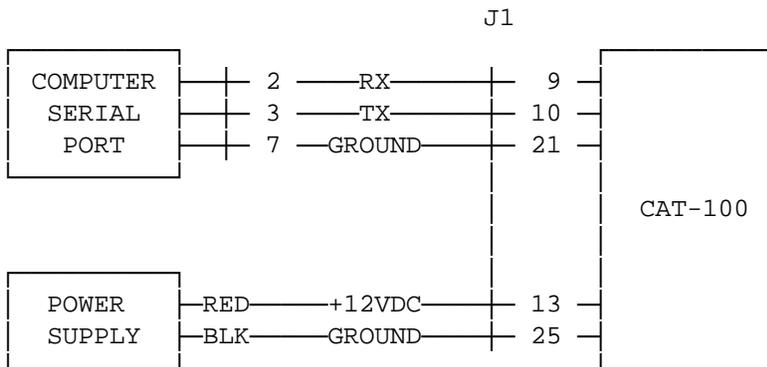
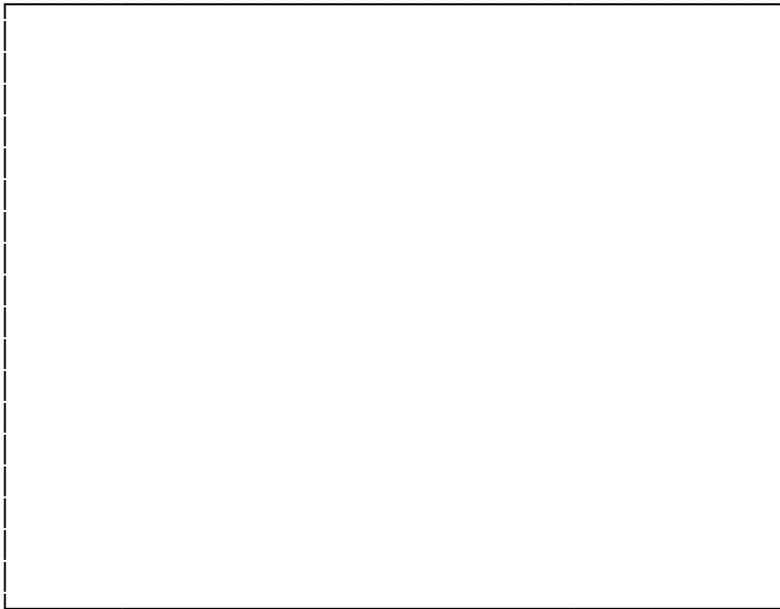


Figure 14 (RS-232 Interface Cable)



CAT-100 Control Board  
Figure 15

Chapter 8 - Schematic

Control Board                      Sheet 8-2

Control Board                      Sheet 8-3

Control Board                      Sheet 8-4

Note: Schematics are not available for on-line viewing.

Chapter 9 - Part List

**CONTROL BOARD**

1	620	5%	1/4W	Resistor	R11
1	1M	5%	1/4W	Resistor	R10
6	10K	5%	1/4W	Resistor	R1,R2,R3,R4,R13
1	2.2K	5%	1/4W	Resistor	R12
1	5K	Variable		Resistor	R5
4	10K	Network		Resistor	R6,R7,R8,R9
10	0.1	uF	50V	Capacitor	C2,C5,C6,C7,C13,C14, C15,C16,C17,C19
2	33	pF		Capacitor	C20,C21
2	12	pF		Capacitor	C11,C12
1	1000	pF		Capacitor	C22
7	10	uF	25V	Capacitor	C1,C3,C4,C8,C9,C10,C23
1	1.0	uF	50V	Capacitor	C18
2	1N4005			Diode	CR1,CR2
3	1N4148			Diode	CR3,CR4,CR5
8	VN10KM			Transistor	Q2,Q3,Q4,Q5,Q6,Q7,Q8,Q9
1	MPSA14			Transistor	Q1
1	8085A-2			I.C.	U9
1	27256			I.C.	U11
1	HC573			I.C.	U10
1	HC541			I.C.	U5
1	HC259			I.C.	U6
1	HC138			I.C.	U4
1	HC00			I.C.	U3
1	DS1243Y			I.C.	U12
1	DS1232			I.C.	U8
1	TSP53C30			I.C.	U7
1	75T2089			I.C.	U13
1	DS1228			I.C.	U2
1	7805T			Regulator	U1
1	3.58MHz			Crystal	Y1
1	3.00MHz			Crystal	Y2
1	600/600			Transformer	T1
1	DPDT (12V)			Relay	K1
1	6POS (DIP)			Switch	SW1
1	DB25F			Connector	P1
1	Connector			Hood	
1	DB25S			Connector	J1
1	2x5			Header	J2
1	1x3			Header	J3
1	1x2			Header	J4
1	Heat sink				
2	Plug			Jumper	
3	#4			Nut	
3	4-40			Screw	
3	#4			Lock washer	

**Computer Interface Cable**

The package contains a computer interface cable to connect the CAT-100 to the RS-232 serial port of a computer or terminal. A 300-baud communications link can be established using any of the popular software packages. Refer to Chapter 4 for information on programming the CAT-100 through the computer interface. For a schematic of the computer interface cable, see figure 14.

**Telephone Interface Cable**

The package also includes a telephone interface cable. You can use this cable to connect any touch-tone telephone to the CAT-100 through connector J2. Supply +12VDC and GROUND to J1 pins 13 and 25. This can be accomplished with the computer interface cable.

Use the telephone to familiarize yourself with the control and programming procedures of the CAT-100, without fabricating a test cable or installing the CAT-100 at your repeater site.

Follow the directions carefully. Control by telephone is identical to radio control, except you must end each entry with a (#) pound to simulate loss of COR.

All control and programming commands are entered by the telephone's touch-tone pad and all voice synthesizer responses are heard in the handset.

You will find the telephone interface cable useful even after the CAT-100 is installed at your repeater site.

**Programming and Control through the Telephone Interface.**

Connect the CAT-100 to a +12VDC power supply and any touch-tone telephone as shown in figure 17.

Note the present settings of the dip-switches. Set dip-switch 3 to OFF, all other dip-switches should be ON.

Remove the shorting block from J4. Connect the telephone interface cable to J2 with white dot at pin 1. Turn ON the +12VDC power supply.

NOTE: The power supply must be set for +12VDC to properly bias the telephone's touch-tone pad. This will insure the tones are distortion free.

Blow into telephone and check for sidetone. Press the telephone touch-tone buttons and check for tones.

Press and hold the ring push-button on the telephone interface box until you hear the CAT-100 identify in the telephone. This may take from 2 to 30 seconds depending on the setting of the telephone answer timer.

Once the CAT-100 says [CAT-100 CONTROL] use the touch-tone pad on the telephone to enter the PROM label unlock number followed by a (#) pound.

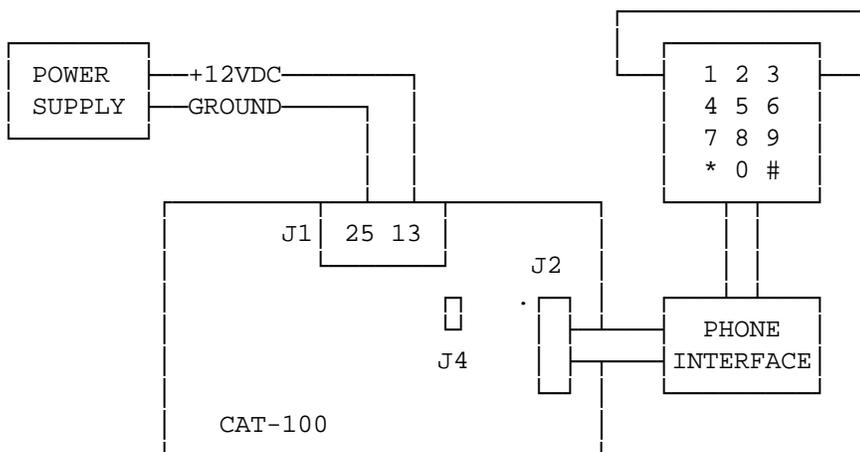
NOTE: During telephone control a COR signal is not available to signify loss of carrier and end of entry. Therefore, you must end every entry with the (#) pound.

Check the setting of the telephone answer timer by sending [\*80#]. Set the telephone answer timer for 2 seconds by sending [\*81#]. The voice will say [ENTER NUMBER]. Send [2#].

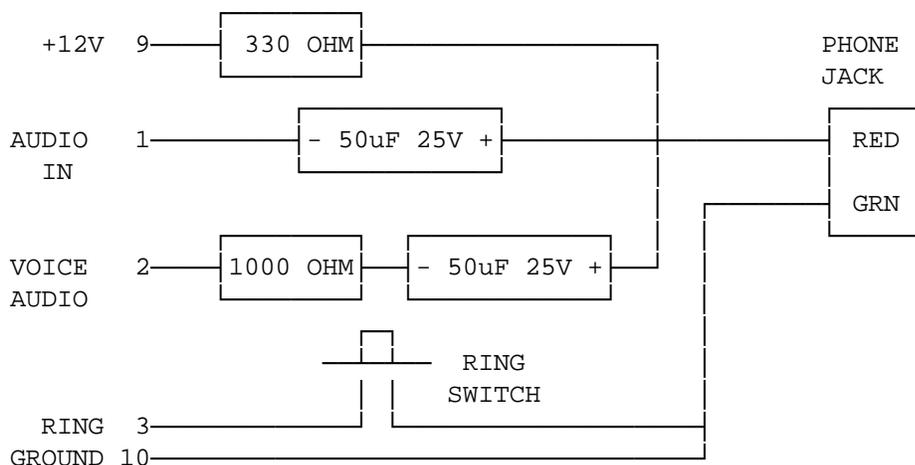
You may program and interrogate the CAT-100 as if you were using a radio on the control frequency. Remember the (#) pound after each entry.

To exit control, send [\*0#]. The CAT-100 will say [MANUAL EXIT]. The CAT-100 will say [TIMER EXIT] if no touch-tone command is received for sixty seconds.

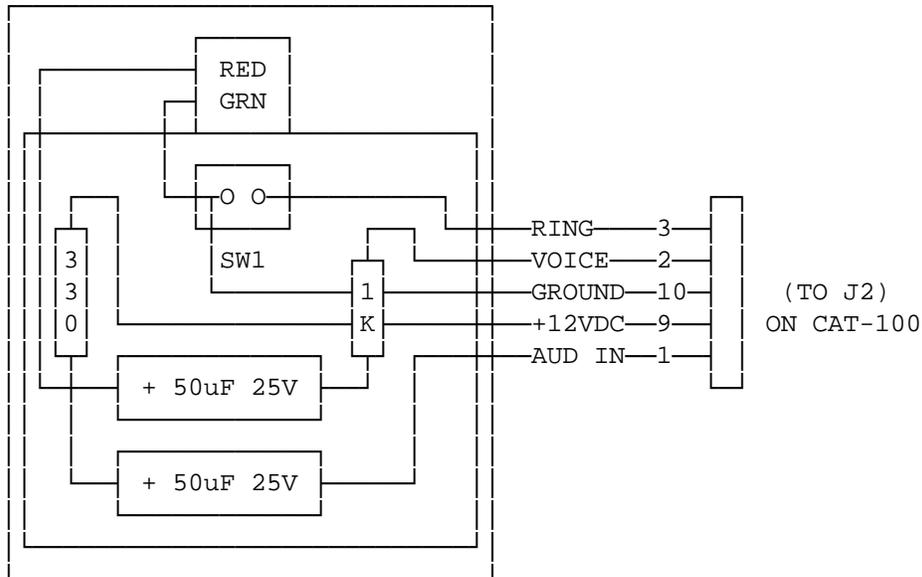
Turn the power supply to off. Remove the telephone interface cable from J2. Install the shorting block at J4 and reset the dipswitches to their original positions.



Telephone Interface Diagram  
Figure 16



Telephone Interface Schematic  
Figure 17



Telephone Interface Wiring  
Figure 18

10-3

Should you desire to fabricate your own telephone interface cable construction information and part list is provided for your convenience.

Cut the yellow and black modular jack wires and discard.

Drill a hole and mount the push button switch on the front cover of the telephone box between the modular jack and the mounting screw.

Viewed from the rear, drill a clearance hole in the right side of the telephone box for the wiring cable to J2.

Drill a 1/2 inch hole in the prototype board to provide clearance for the push button switch.

Drill a clearance hole in the center of the prototype board for the telephone box mounting screw.

Mount C1, C2, R1, and R2 on the prototype board per figure 18.

Solder the wiring cable, push button switch and red and green wires from the modular jack as described in figure 18.

Fold the wires and board into the telephone box and secure the board to the cover by using a 6-32 nut.

## Part List

Quantity	Description	Part Number
1	Modular Telephone Jack	Radio Shack 279-355
1	Push Button Switch (NO)	Radio Shack 275-1547B
2	Capacitor 50uf 25VDC	
1	Resistor 330 ohm .25W	
1	Resistor 1000 ohm .25W	
1	Connector Header (2X5)	
1	Prototype Board 1.9" by 1.9"	
1	Hardware 6-32 Nut	