North Carolina Medical Communications Network

NCMCN

GLOSSARY and INFORMATION DOCUMENT

NORTH CAROLINA
OFFICE OF EMERGENCY MEDICAL SERVICES
DIVISION OF HEALTH SERVICE REGULATION
DEPARTMENT OF HEALTH AND HUMAN SERVICES

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Placing a "Local Call" through the NCMCN

1. From the remote control, select MED Channel 10 by pressing the appropriate pushbutton. MED 10 is the primary contact and calling channel used for emergency communication. MED 8 is used for medical and patient care information. MED 8 should not be used unless instruction is received to do so.

2. If the remote is not set to the correct CTCSS tone, select the tone for the HOME repeater by pressing the corresponding tone selection pushbutton. Most of the time the correct tone is highlighted on the remote control

3. Look up in the "DTMF CODES and REFERENCE INFORMATION" document (available from the internet and in the Dial Code Book) and determine the DTMF code for the agency you need to call.

4. Ensure that the LCD display is clear of any DTMF codes that may previously have been entered by momentarily pressing the "CLEAR DISPLAY" pushbutton.

5. Using the "touch tone pad" enter the five digit DTMF code for the agency you need to contact. The code will be displayed in the LCD display.

6. Press the "SEND NUMBER" pushbutton and listen for the DTMF tone transmission from the speaker.

7. Listen for the "warble" tone indicating that the decode was successful at the called agency.

8. Wait about 5 seconds for the alert tone at the called agency to end. Pick up the handset, press the "PTT" pushbutton, speak into the microphone and make a voice announcement giving the radio identification of who you are calling, followed by your radio identification. Provide the channel name that you are calling on.

9. For example, say: "_____ hospital, this is _____ hospital calling on MED 10 Tone ___. We need a radio test. How do you hear this unit? Over." (Fill in the blanks as appropriate.)

10. When your communication is complete, reset the remote control by replacing the handset and clear the LCD display as a courtesy to the next user.

ALWAYS IDENTIFY ALL TRANSMISSIONS ON THE NETWORK USING YOUR RADIO IDENTIFICATION. FAILURE TO IDENTIFY WILL RESULT IN LOSS OF AUTHORIZATION TO USE THE SYSTEM.

IMPORTANT NOTE ABOUT LINKING REPEATERS:

The NCMCN area repeaters are connected through an array of computer controlled switches and microwave systems. Sometimes the computers make the connection to the radio repeaters, but due to timing, the computer voice announcement is not heard at the control station location. Do not assume the connection was not made even if you do not hear the voice connection announcement. If you are in doubt, send the DISCONNECT code (* #) prior to sending the link code a second time. Failure to follow this procedure results in multiple links being made and ties up the system. This results in the voice announcement "unable to connect."

ALWAYS IDENTIFY ALL TRANSMISSIONS ON THE NETWORK. FAILURE TO IDENTIFY WILL RESULT IN LOSS OF AUTHORIZATION TO USE THE SYSTEM.

Placing a "Long Distance Call" through the NCMCN

1. At the remote control, select MED Channel 10 by pressing the appropriate pushbutton. MED 10 is the primary contact channel used for emergency communication. Do not use MED 8 for long distance linking unless instructed, as you may interfere with medical direction communication in process.

2. If the remote is not set to the correct local CTCSS tone, select the proper tone by pressing the tone selection button to turn on the red or green LED for your local "HOME" repeater.

3. Look up the "NCMCN LINK CODE," available in the "DTMF CODES and REFERENCE INFORMATION" document. Determine the DTMF code for the distant repeater that provides coverage in the area of the agency you need to contact. Link codes are three digit numbers preceded by an asterisk (*). The link code is shown both in the DTMF list and on the "NCMCN DTMF LINK MAP."

4. Ensure that the LCD display is clear by pressing the "CLEAR DISPLAY" pushbutton.

5. Enter a star (*) and the three digit DTMF LINK code for the repeater needed to link with. The code will be displayed in the LCD display.

6. Press the "SEND NUMBER" button and listen for the transmission of the code from the speaker.

7. Listen for a "connected" voice announcement indicating that a link connection has been made.

8. Look up the five digit DTMF code for the agency you need to call.

9. Clear the LCD display with the "CLEAR DISPLAY" pushbutton.

10. Enter the five digit DTMF code for the agency that you need to contact. The code should be displayed in the LCD display.

11. Press the "SEND NUMBER" button and listen for the transmission of the code from the speaker.

11. Listen for the "warble" tone indicating the decode was successful at the called agency.

12. Wait about 5 seconds for the alert tone at the called agency to end. Pick up the handset, press the "PTT" pushbutton, speak into the microphone and make a voice announcement giving the radio identification of who you are calling, followed by your radio identification. Provide the channel name that you are calling on. Take care to announce the CTCSS tone letter of the remote "linked" repeater, rather than your own "local" tone letter.

13. For example, say: "_____ hospital, this is _____ hospital calling on a link to MED 10 Tone ___. We need a radio test. How do you hear this unit? Over." (Fill in the blanks as appropriate.)

12. When your communication is completed. Clear the display. Enter the "DISCONNECT" code "* #" (Star Pound) and push the send number button to end the link of the repeaters.

13. When your communication is complete, reset the remote control by replacing the handset and clear the LCD display as a courtesy to the next user.

IMPORTANT NOTE ABOUT LINKING REPEATERS:

The NCMCN area repeaters are connected through an array of computer controlled switches and microwave systems. Sometimes the computers make the connection to the radio repeaters, but due to timing, the computer voice announcement is not heard at the control station location. Do not assume the connection was not made even if you do not hear the voice connection announcement. If you are in doubt, send the DISCONNECT code (* #) prior to sending the link code a second time. Failure to follow this procedure results in multiple links being made and ties up the system. This results in the voice announcement "unable to connect."

ALWAYS IDENTIFY ALL TRANSMISSIONS ON THE NETWORK. FAILURE TO IDENTIFY WILL RESULT IN LOSS OF AUTHORIZATION TO USE THE SYSTEM.

Control Station General Description

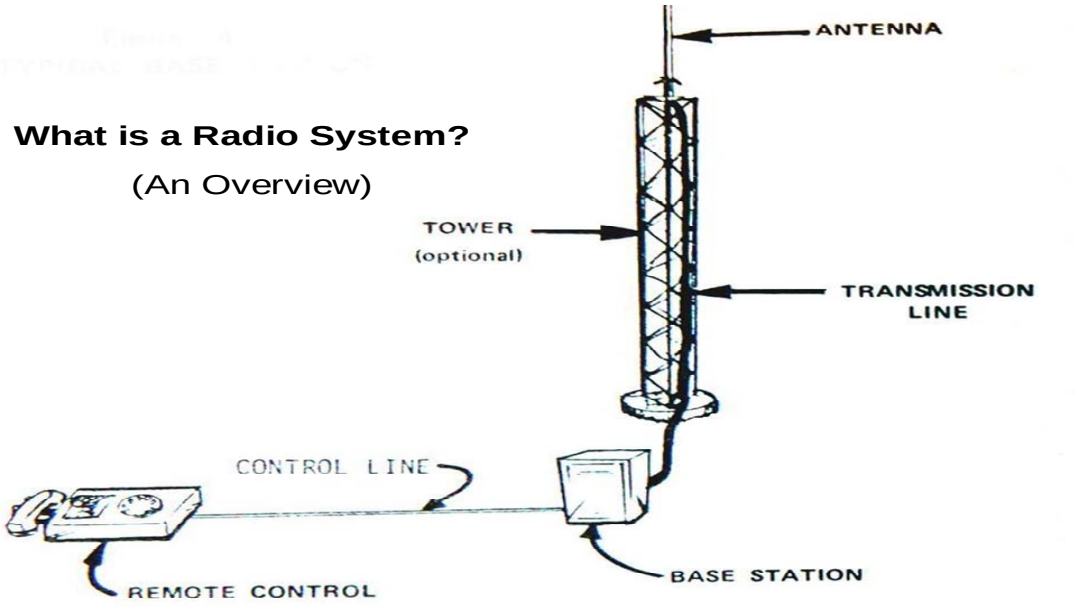

Figure 1

The radio "Control Station" for the North Carolina Medical Communications Network (NCMCN) at a facility usually consists of one or more radio remote controllers, connected through "in house" wiring between the remote control and the control base station, a radio transmitter/receiver station operating on two UHF channels (MED Channel 8 and MED Channel 10), a support for the control station antennas, coaxial transmission lines connecting the radios to antennas, and an antenna. In most hospital NCMCN control stations installations two separate radio transmitters and receivers -- one for MED Channel 8 and one for MED Channel 10 are incorporated. In other installations, a single transmitter/receiver is employed with operation switched between MED 8 and MED 10.

The base station is installed near the roof, close to the antenna. The base station's proximity to the antennas on the roof minimizes power losses which would occur if the transmission lines were excessively long. The remote control enables the user to operate the base station from a remote location, such as the emergency department in the facility.

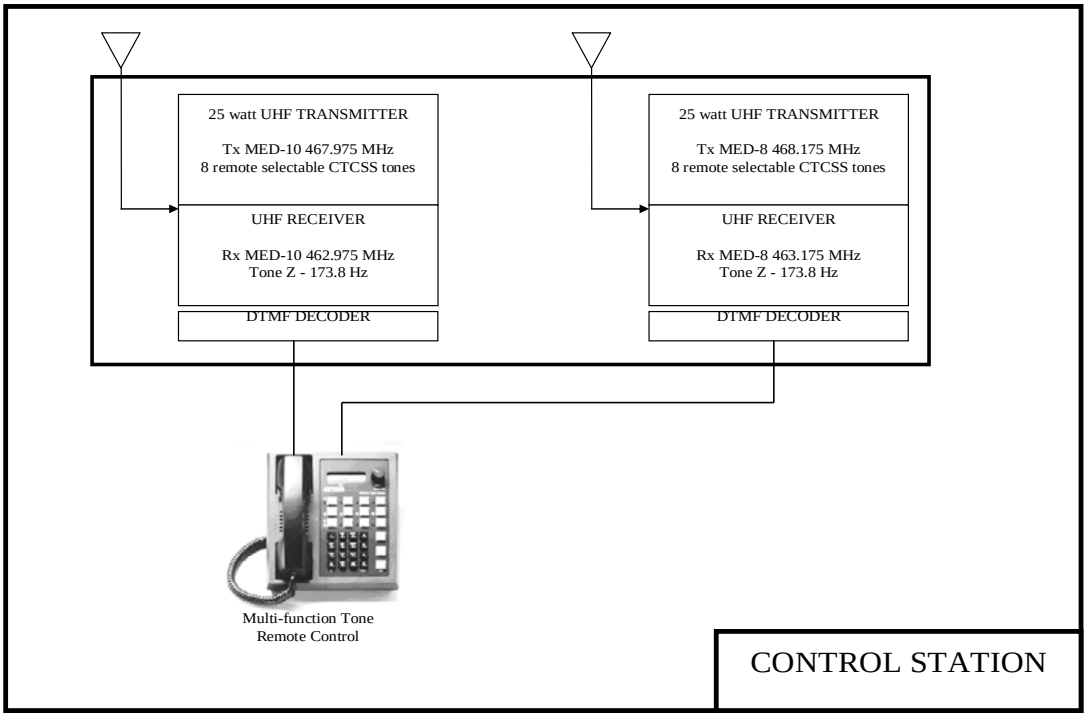

Figure 2

A “radio control station” or simply “control station” are other terms used to define a radio system. *Figure 2* is shows more detail of what the MED channel control station consists. Each MED channel has a DTMF decoder used to decode codes generated at and transmitted from a calling facility or field unit. The decoder, interfacing with the remote controller, is what is used to alert the recipient of a call.

The UHF receiver receives radio traffic from a facility or field unit by way of a repeater. As illustrated in *Figure 2*, the receive frequency is: 463.175MHz on MED 8 or 462.975MHz on MED 10.

The UHF transmitter transmits when the remote controller at a facility is “keyed”. This occurs by pressing the “PTT” (push-to-talk) pushbutton contained in the remote’s handset, or when the remote control “SEND NUMBER” pushbutton is pressed. As shown in *Figure 2*, the frequency of transmission is: 468.175 MHz on MED 8 or 467.975 MHz on MED 10.

The UHF transmitter radiates its radio signal through the antenna. This radio signal is then received at the repeater and rebroadcast to the surrounding area.

Radio Remote Controller Functions Description

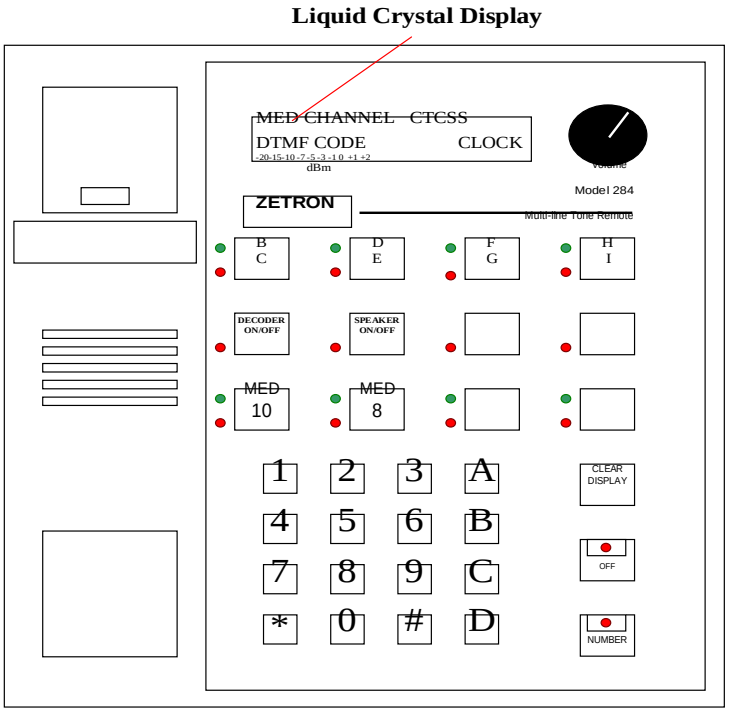

Figure 3

Liquid Crystal Display (LCD)

The LCD provides information about how the radio remote control and therefore the control station, is configured. Referencing *Figure 3*, the LCD displays the channel the radio is set to (MED Channel 8 or MED Channel 10), the selected CTCSS (sub-audible) tone, the DTMF code that is entered for calling a facility or linking through a repeater, and the time that the remote's internal clock is set to.

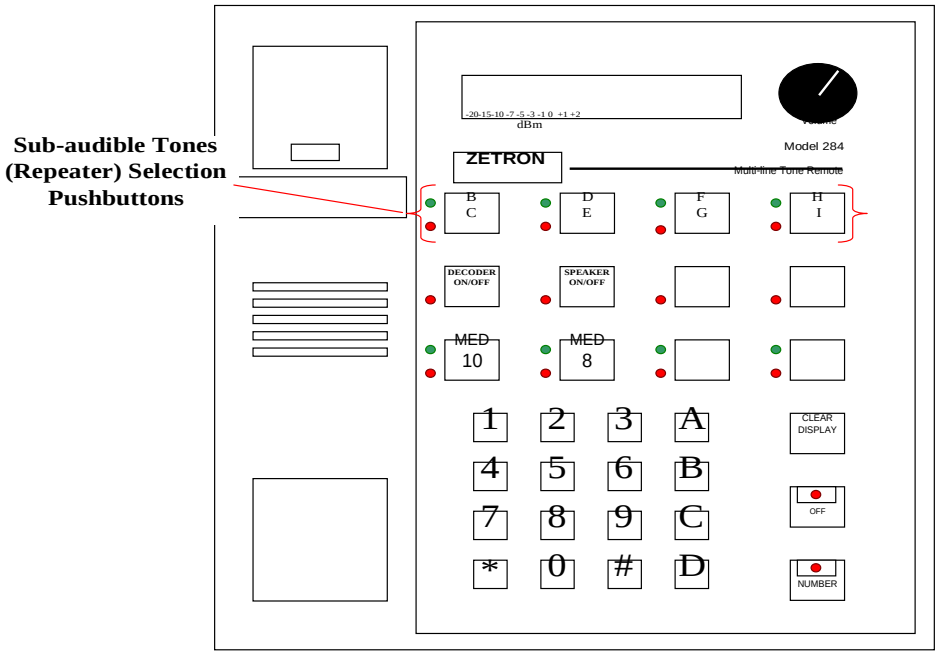

Figure 4

CTCSS or Sub-audible Tone Selection

The radio remote control is equipped with four pushbuttons used to configure the unit for transmission of a sub-audible tone. This allows a user to talk (or communicate) through a specific repeater when properly selected. The four pushbuttons give the user a choice of eight sub-audible tones. Referencing *Figure 4*, note that each pushbutton has two letters; these letters range from “B” through “I”. Each letter corresponds to a specific sub-audible tone.

To select a sub-audible tone, first choose the pushbutton that includes the letter of the tone of interest. Take note of the “green” and “red” lights (LEDs) to the left of the pushbutton. To select the appropriate tone for transmission, press the pushbutton displaying the letter designation for that tone. Pressing the pushbutton will cause the “green” or “red” LED to come on alternately. Only one sub-audible tone can be selected at any time. Therefore, only one LED will be lit indicating the selected sub-audible tone when the LED next to that letter is on.

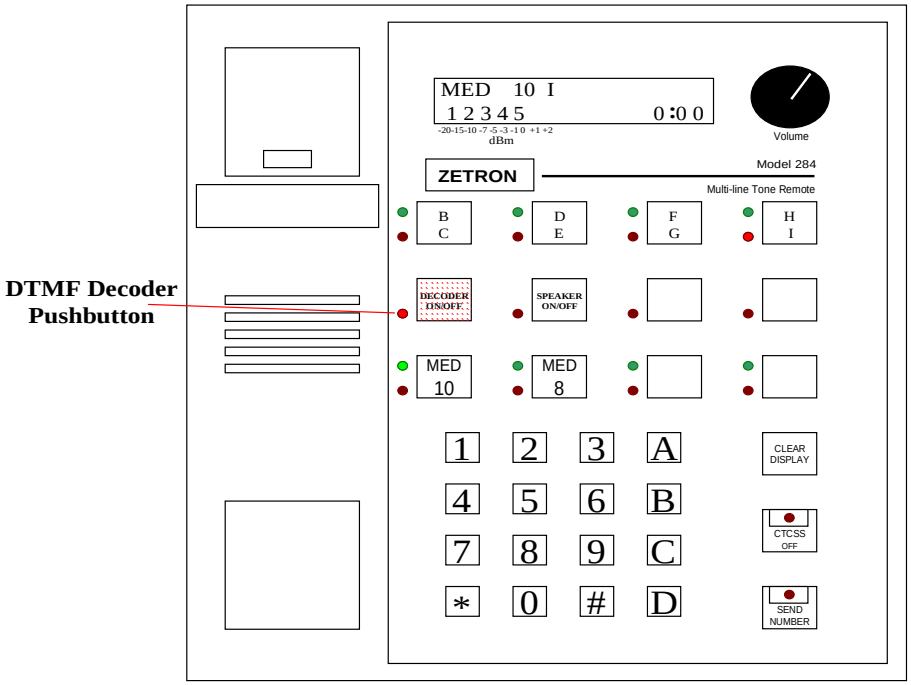

Figure 5

DTMF Decoder Control

The remote control station uses a DTMF decoder to determine when someone is calling it. The decoder is considered to be “engaged” when the “red” LED to the left of the “DECODER ON/OFF” pushbutton is “ON”. This is considered to be the normal state for standby operation of the unit. In this mode, radio traffic does not reach the speaker until the decoder’s DTMF code is dialed. Once the decoder “sees” that the proper DTMF code has been received, the “red” LED will turn “OFF.”

A user has the ability to manually “disengage” the DTMF decoder by pressing the “DECODER ON/OFF” pushbutton. With the “red” LED lit, pressing this pushbutton will turn “OFF” the LED indicating that the decoder has been “disengaged.” In this mode, any transmission on a selected channel (MED 8 or MED 10) in the range of the control station will be heard.

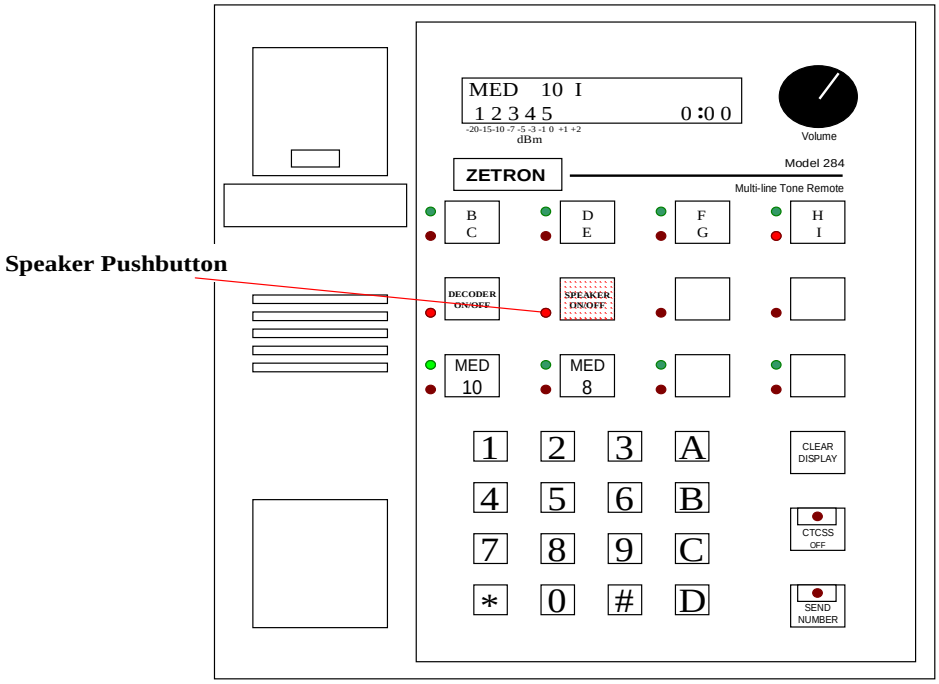

Figure 6

Speaker Control

The remote control unit includes a panel speaker in addition to the earphone speaker in the handset. The panel speaker can be turned “OFF” or “ON” by pressing the “SPEAKER ON/OFF” pushbutton. The speaker is turned “OFF” when the “red” LED to the left of the pushbutton is illuminated. The normal mode of operation for the remote unit is with the “red” LED turned “OFF” therefore, the speaker is active. In this mode sound will be heard through the self-contained speaker as well as handset earphone when the handset is removed from its cradle.

If the self-contained speaker is turned “OFF” (red LED is illuminated), radio traffic can still be heard through it on an initial call until the handset is removed from its cradle. When this occurs the speaker will disengage and sound will only be heard through the earphone in the handset. Pressing the “SPEAKER ON/OFF” pushbutton has no affect on the earphone speaker in the handset.

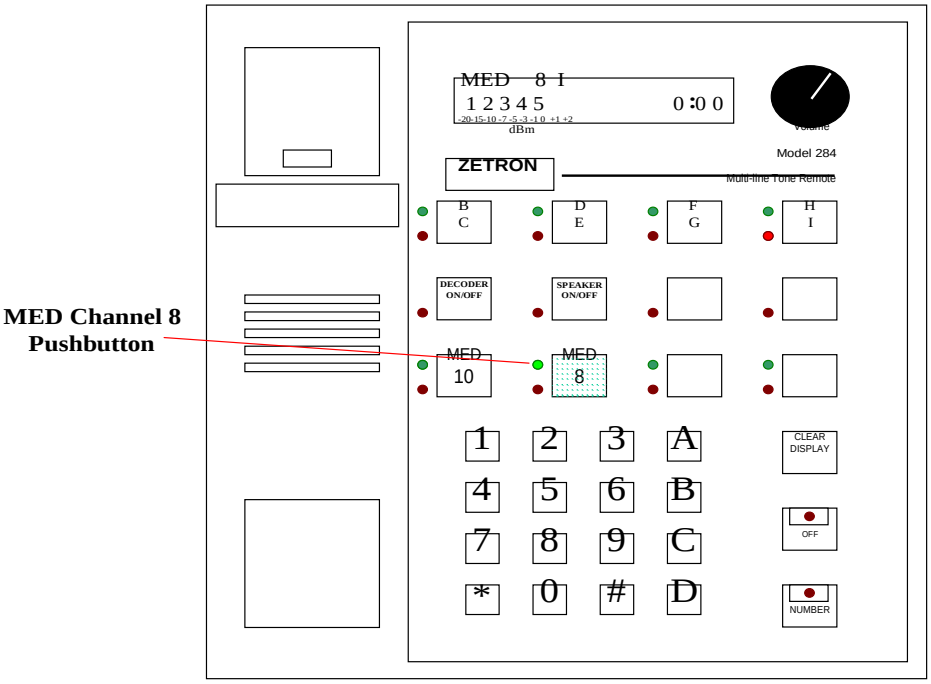

Figure 7

MED 8 & MED 10 Channel Selection

The control station consists of two UHF radios: One transmits and receives on MED Channel 8 and the other on MED Channel 10. A MED Channel is selectable using the “MED Channel Select” pushbuttons. The selected channel is indicated by the “green” LED to the left of the pushbutton illuminating when the pushbutton is pressed. The LCD display will also indicate the channel that has been selected as illustrated in *Figure 7*. Only one channel (MED 8 or MED 10) is accessible at a time.

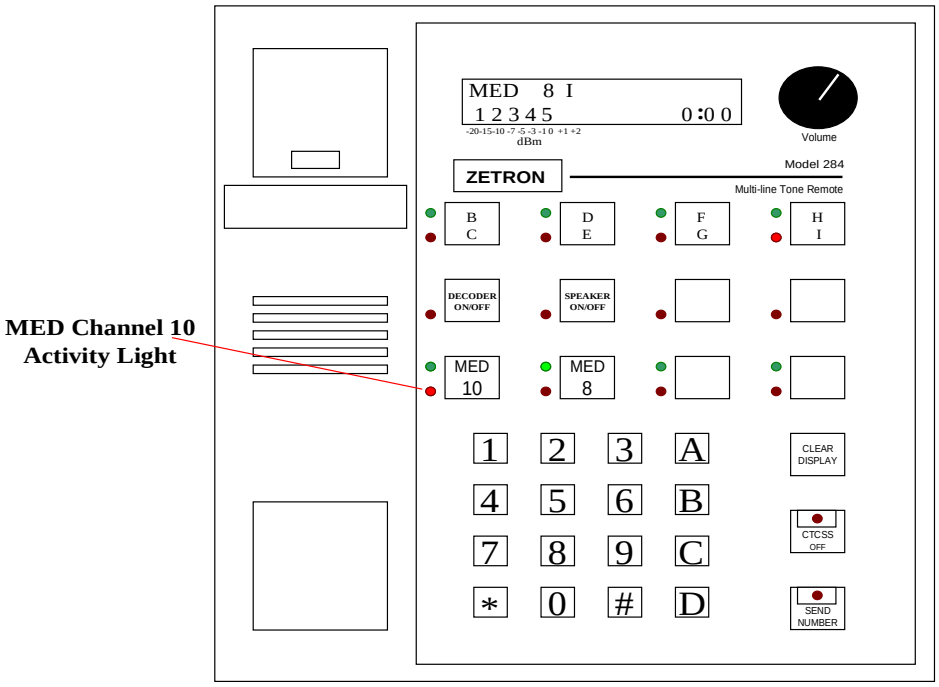

Figure 8

MED 8 & MED 10 Activity Lights

The remote control unit provides an indication when there is activity (radio traffic) on a channel. This is shown when the “red” LED to the left of the “MED Channel Select” pushbutton blinks. The activity on a channel will be indicated whether or not the station is being called. If there is radio traffic on either channel, these LEDs will blink or flash slowly.

The purpose of the activity light is to alleviate the chances of the user “stepping on” someone else’s radio transmission. Only one person can use a channel at a time. Prior to using the radio remote control to make a call, the channel activity LEDs should be observed for radio traffic.

If a call has been made to a facility and the DTMF decoder activated, the corresponding channel activity LED will blink rapidly. If there is radio traffic on a channel but a call was not initiated, the activity LED will blink slowly. The slowly blinking LED is to be watched for when intending to transmit on a channel.

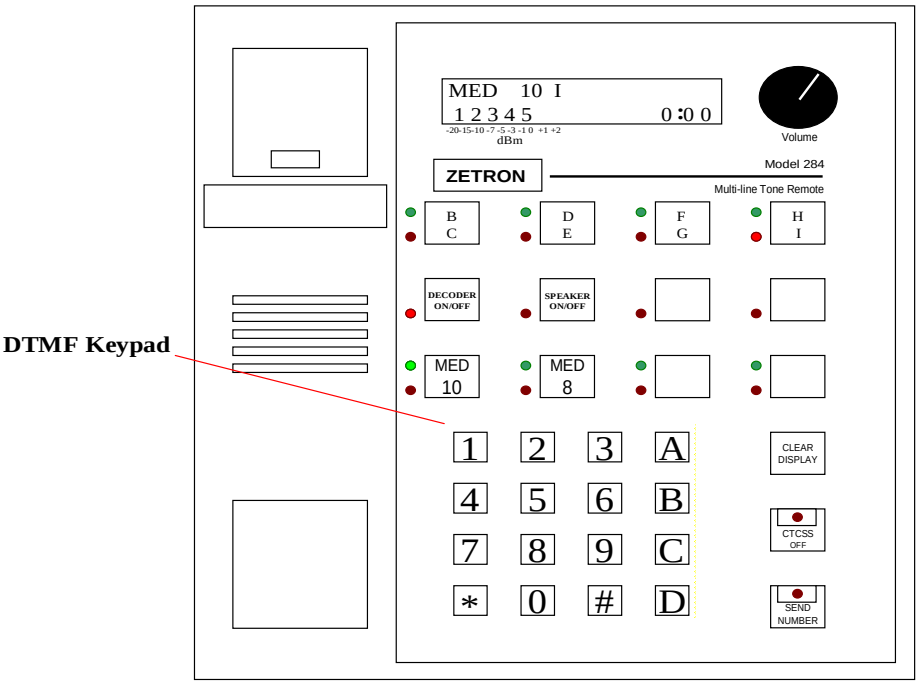

Figure 9

DTMF Keypad

The DTMF keypad is used to send DTMF (Touchtone) codes to alert and contact other facilities using the “Home Repeater” and to establish links between repeaters to contact facilities at long distances. Pressing a keypad pushbuttons stores the number to generate the DTMF tones when the “Send Number” button is pressed. These tones are interpreted by the NCMCN system as numbers and will be displayed in the LCD display as they are being entered. The keypad letters “B” through “D” used for special purposes. Do not confuse these letters with the letter designations for the sub-audible tones. The letter “A” is used to test the system without actually alerting an agency affiliated with the system.

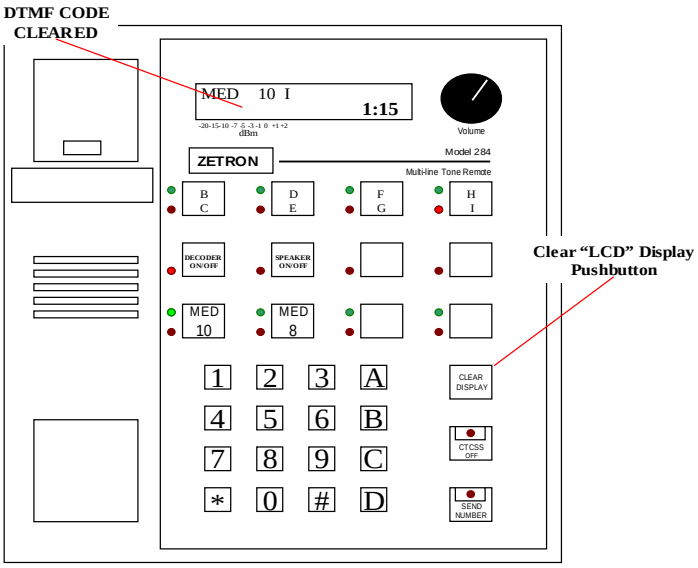

Figure 10

Clear LCD Display

This pushbutton is used to clear the "LCD" display of the DTMF codes previously entered. Press the "CLEAR DISPLAY" pushbutton each time before entering the DTMF code. Not clearing the display of previous entries will cause an erroneous response when the entered DTMF "numbers" are transmitted. The "CLEAR DISPLAY" pushbutton only clears the DTMF codes values and not the channel, CTCSS or clock settings. See *Figure 10*.

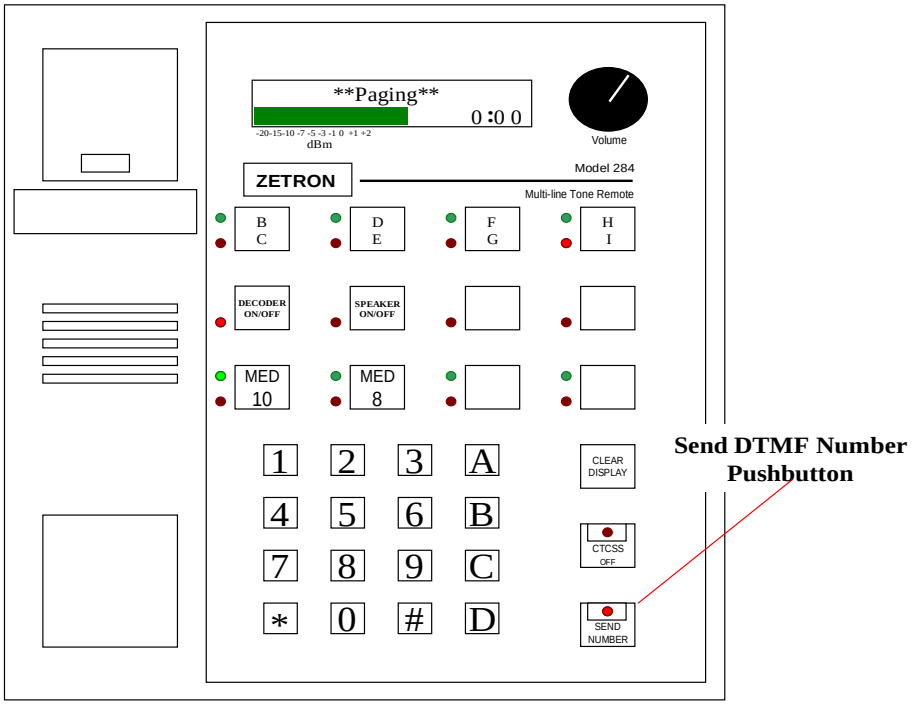

Figure 11

Send DTMF Number

Once the DTMF number has been entered, pressing the “SEND NUMBER” pushbutton sends the code through the system via the control station and an NCMCN system repeater. As the DTMF numbers are being transmitted, the “SEND NUMBER” pushbutton’s “red” LED will illuminate and stay on until all of the digits are sent. The remote unit’s speaker will produce the sound of each DTMF tone as they are being transmitted. The LCD display in *Figure 11* shows the display during this transition.

Glossary of Terms

Antenna Diplexer - Device used to couple two radio signals into a single antenna.

Base Station – Radio at a fixed location including a transmitter and a receiver, also see Control Station and Repeater.

Control Station – Radio transmitter/receiver used to operate a distant radio system, such as a repeater, by using radio signals.

CTCSS (Continuous Tone Controlled-Squelch System) – A low frequency or "sub-audible" tone that controls reception of undesired radio signals.

DTMF (Dual-Tone Multiple Frequency) – Tones generated by a keypad for creating a number similar to Touchtone numbers in a telephone system.

DTMF decoder – An electronic device used to decode, or recognize the unique code generated and transmitted from a calling facility or field unit.

Duplex Communication - Transmission on one frequency and reception on a second, different frequency. The use of two frequencies enables simultaneous transmission and reception which is required for repeater operation.

ERP (Effective Radiated Power) - Term given for the equivalent power being radiated or transmitted through an antenna after considering transmission-line losses, output stage efficiency, and antenna gain.

Home Repeater - Usually the mobile relay in the NCMCN system that is nearest the hospital or agency control station, or the repeater providing the best signal. The primary repeater used by the for the best radio coverage

LED (Light-Emitting Diode) - A semi conductor device that emits light when a voltage is applied to it.

Link Code - DTMF tones used to link or "connect" two or more repeater sites for establishing long distanced communication.

MED (UHF) Channel - A specific group of ultra high (UHF) radio frequencies identified by the FCC for medical operations; each channel consists of two different frequencies.

Megahertz (MHz) - A term meaning one-million cycles in one second. A unit of measurement for radio frequency. 1 Hertz (Hz) = 1 cycle per second.

Mobile Relay – A radio station that receives a mobile radio transmission on one frequency and retransmits it on a second frequency to extend the range of the mobile radio.

Modulation - A method or process where information (voice) is applied to a radio frequency to carry the information over the airwaves.

Monitor - To listen for radio traffic or to observe radio transmission activity on a channel before transmitting. Also, a radio receiver used to listen to a frequency.

PDF (Portable Document Format) - a computer file that is a self-contained cross-platform document. In plain language, it is a file that will look the same on the screen and in print, regardless of what kind of computer or printer someone is using and regardless of what software package was originally used to create it.

PTT (Push-to-Talk) - Pushbutton in handset or on a portable radio that keys (turns on) the transmitter so voice information or DTMF codes are sent.

Receiver – Radio equipment that processes radio signals from an antenna and converts it to desired audio or voice.

Radio Remote Controller - Unit used to operate and control a remote radio station.

Repeater - A radio base station that automatically retransmits (repeats) a radio signal to a larger coverage area at a higher power.

Simplex Communication - Transmission and reception on a single frequency, alternating between the communicating parties.

Squelch - Techniques used to reduce the noise (static) produced by a radio receiver.

Transmitter - Equipment used to send radio signals through an antenna.

Watt - Unit of measurement used to indicate the amount of power radiated or absorbed by a system.

VHF Frequency - the frequency band or spectrum between 30 and 300 MHz. In public safety radio systems generally those frequencies in the 30 MHz or 155 MHz range.

There are currently three statewide medical radio systems within North Carolina.
These are:
The “Very High Frequency” (VHF) hospital emergency radio system operating on the frequencies 155.280 & 155.340 MHz; and, the “Ultra High Frequency” (UHF) North Carolina Medical Communications Network (NCMCN) which provides ten UHF channels and the 800 MHz VIPER Medical Network (VMN) functioning within the NC State VIPER trunked radio network.

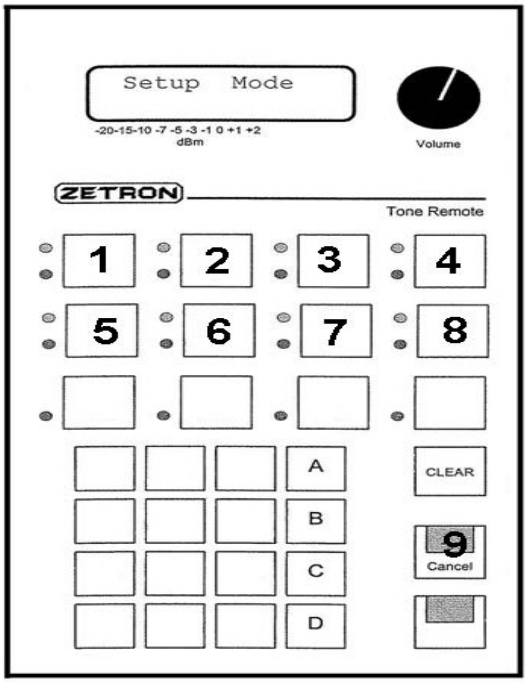

Figure 12

Setting the Remote Controller Clock

To set the time in the NCMCN remote control, it is necessary to first enter the "setup mode." This involves the top two rows of keys on the front of the remote control.

To enter the setup mode, simultaneously press the keys numbered "1" and "8" in the above figure. NOTE: DO NOT USE THE NUMBERED "Touch Pad" KEYS. Use only the top two rows of keys (marked B/C D/E, etc.) The LCD display should say "Setup Mode" on the top line.

Once in setup mode, use the key labeled "1" in the above figure for setting the time. Repeatedly press this key to cycle the hours upward. Holding the key instead will cycle the hours at an increasing rate.

Use the "5" key to set the hours down.

Use the ""2" key to set the minutes up.

Use the "6" key to set the minutes down.

The "8" key may be used to select either 12 or 24 hour mode for the clock.

When the clock is properly set, to end the setup mode, press the cancel key, marked "9" in the above figure.