EMSCOM

RADIO COMMUNICATIONS USERS MANUAL

NEW MEXICO DEPARTMENT OF HEALTH

EPIDEMIOLOGY AND RESPONSE DIVISION

EMERGENCY MEDICAL SYSTEMS BUREAU

August 2009

INTRODUCTION TO THIS MANUAL

This manual is provided for the use of all services that may have occasion to use the New Mexico Emergency Medical Services Communications (EMSCOM) System. The intended purpose of the manual is to provide a basic understanding of the capabilities, proper utilization and maintenance policies of the State EMSCOM system. Its content specifically addresses the fundamental knowledge applicable to the EMS provider rather than being an in-depth technical resource relating to system design and operation.

Objectives of this Manual

1) Provide an overview of radio principles and components of radio systems

2) Provide an overview of the New Mexico EMSCOM system

3) Provide a review of basic radio procedures

4) Provide direction on obtaining a unit number on the NM EMSCOM system

5) Provide an overview of maintenance of the EMSCOM System components

6) Clarify the role of the EMS Bureau, EMS Regional Offices, and the EMS Bureau Communications Coordinator

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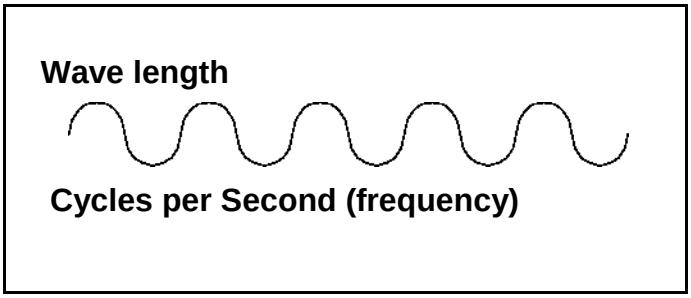
RADIO PRINCIPLES

When any mechanical or electrical action is repeated over and over again, each separate action is called a cycle. A bicycle wheel going around one time completes one cycle; the moon going around the earth completes one cycle. Cycles, by themselves, may not relay much information. If all you are told is that a bicycle wheel has gone around 30 times, what have you learned? Adding the element of time yields useful information. The complete formula would be: how many cycles in how much time? We call this **frequency**. Sound consists of repetitive air vibrations. The faster the vibrations or frequency, the higher the tone. Human beings can hear sounds with frequencies from about 50 cycles per second **(CPS)** to about 20,000 **CPS**. The frequencies we are able to hear are called **audio frequencies**. Radio signals are composed of repetitive waves of electromagnetic energy. Their frequency is so high that they have to be expressed in **kilocycles** (thousands of cycles) or **megacycles** (millions of cycles) per second. Several years ago, it was decided to substitute **Hertz (Hz)** for "cycles per second", honoring Heinrich Hertz, a 19th century physicist who pioneered the study of radio waves. There are abbreviations for **kilohertz (kHz)** and **megahertz (MHz)**. To change kHz to MHz, just move the decimal point three (3) places to the left (<). Thus 1000.0 kHz is equal to 1.0000 MHz.



Drop a rock in a pond of water, and the waves will radiate out in all directions. The measured distance from the top of one wave to the top of the next wave is the **wavelength**. Radio waves radiate out from a transmitting antenna the same way, but travel at a speed of 186,000 miles per second, the same as the speed of light. Remember the higher (greater) the frequency, the shorter the wavelength. No matter what radio frequency (how many waves per second) is transmitted, the length of all the waves sent in one second must add up to 186,000 miles, because that is the distance traveled by the first wave.

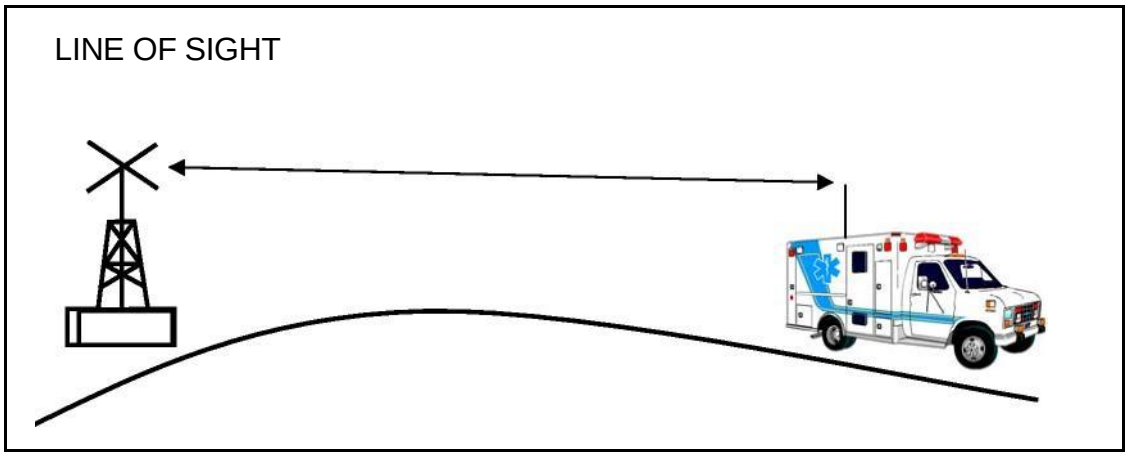
Types of Systems: In a **simplex** system, the user of the radio pushes the microphone button to talk, and releases it to listen. The user cannot talk and receive at the same time. A simplex system may use one frequency or two frequencies. In the latter, base stations, **"talk out"** on one frequency and the mobiles **"talk-back"** on the second. A **"semi-duplex"** system also uses two frequencies, but one or more of the radios (usually the base stations) can receive and transmit at the same time. In a **"full duplex system"**, all the radios may send and receive at the same time. Full duplex is used in mobile telephone systems.

Bands: Groups of frequencies are put into sets based on the area of the radio spectrum which stretches from .050 MHz to over 20,000 MHz. These sets are called **bands.** The broadcast receiver in your car probably has two sets of numbers, or bands: AM and FM. The AM band covers from 540 kHz to 1600 kHz. (0.540 -1.600 MHz). The FM Band is 88

- 108 MHz. A few bands are set aside for two - way communications between offices, 2 - way radio equipped vehicles and portable hand held or walkie-talkies. These are the major **land-mobile bands** and their names:

Very High Frequency (VHF) Low Band	**Very High Frequency (VHF) High Band**	**Ultra High Frequency (UHF)**	**"800" Band**
30 – 50 MHz	138 – 174 MHz	406 – 470 MHz	806 – 940 MHz

Frequency Characteristics: Radio reception is not the same on all bands. Each has its advantages and drawbacks. In theory, the range of all the land-mobile bands is **line-of-sight** from the bottom of the antenna to the horizon. Radio waves are slightly bent over the horizon by the earth's atmosphere.



The higher the frequency, the less bending there is, until there is almost none at 800 MHz. The wavelength determines where radio signals can and cannot be received. The lower the frequency (the longer the wavelength), the poorer reception will be inside steel structures. Higher frequencies have a tendency to be able to "bounce" off of metallic objects, and thus reach into areas with large buildings. Such things as the leaves of trees - especially pine needles, may stop the very short wavelengths of UHF and the 800 MHz band. Considering all of the above, it is understandable why VHF - is called the rural and suburban band. UHF and 800 MHz are the first choice for use in central metropolitan areas.

Some of the general characteristics of UHF radio signals should be mentioned in order to understand some of the advantages and limitations of the system. UHF radio signals require line of sight, which means transmissions do not skip over obstructions such as mountain ranges or out of canyons. These signals tend to be absorbed by such obstructions thus decreasing the radio range but also decreasing the interference caused by atmospheric conditions associated with lower frequency radio bands. UHF signals are particularly well suited for long-range transmissions, as the signal will tend to be precise and clear.

Continuous Tone-Controlled Squelch Systems (CTCSS)

The need to minimize radio interference became evident in the 1950's. A solution was devised in which each user group transmitted a distinct sub-audible tone for the duration of each voice message, to signal all associated radio receivers to "open up." These tones are described as sub-audible because their frequency is below the normal audio pass band of the radio (300 – 3,000 Hz), and they are sent at a very low audio level. These systems are generically referred to as Continuous Tone-Controlled Squelch Systems, or CTCSS. They are known by trade names such as Private Line (PL), Channel Guard (CG), Quiet Channel (QC), Private Channel, Call Guard and many others.

The benefit of these CTCSS systems is that they minimize nuisance interference. They do not provide for, or allow "private conversations" and they do not make more channels available. The use of a common or single CTCSS tone throughout a radio system will permit the crew of any vehicle to operate through any base station in the system without being concerned about which tone to use and how to select it.

For this reason, all New Mexico EMSCOM UHF radios on the ten EMS MED channels should be using CTCSS tone 136.5.

Types of Stations:

A base station transmits directly to mobiles and portables. If the base station is at some distance away from the operator it is known as a remote base station. Remote base stations may be controlled over telephone lines, or by another radio known as a control station, using one of the bands we have mentioned, or microwave. The control station sends its signals only to the base station. The remote base station may have a radio transmitter to relay signals from mobiles back to the control station; this type of transmitter is known as a fixed relay.

A **mobile radio** is one that is mounted in some type of vehicle that regularly moves from place to place. **A portable radio** is designed to be hand carried and moved around. A **radio channel** is a communications path. It may use a single frequency, like a country bridge just wide enough for cars to go in one direction at a time. Or, a channel may consist of two frequencies, like a divided highway with separate lanes for each direction of travel.

Repeaters: The line-of-sight rule limits the range of base-to-mobile communications, and even more severely restricts the distance over which one mobile may communicate with another. The **mobile relay**, commonly called a repeater, overcomes both problems. Placed at a high location, it receives signals on one frequency **(input)** and rebroadcasts them on another frequency **(output)**. In effect, it is a semi-duplex radio, because it is receiving and transmitting at the same time.

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NEW MEXICO STATE EMERGENCY MEDICAL SERVICES RADIO (EMSCOM) SYSTEM OVERVIEW

PURPOSE: The purpose of the EMSCOM system is to maintain a statewide radio medical network allowing two-way voice communications between ambulances, rescue units, local emergency and health care facilities, Regional Trauma Centers, and the State Radio Communications Control Center, (commonly known as Santa Fe Control).

EMSCOM SYSTEM DESIGN: The New Mexico EMSCOM System operates on the UHF (ultra-high frequency) radio band and is licensed to operate on the Emergency Medical Radio Service (EMRS) frequencies under the Federal Communications Commission (FCC). In 1993 the FCC created the EMRS in an effort to provide dedicated frequencies for the use of EMS Services only.

THE TEN UHF PAIRED FREQUENCIES

MEDICAL FREQUENCIES		
CHANNEL	TRANSMIT	RECEIVE
Med One	468.000	463.000
Med Two	468.025	463.025
Med Three	468.050	463.050
Med Four	468.075	463.075
Med Five	468.100	463.100
Med Six	468.125	463.125
Med Seven	468.150	463.150
Med Eight	468.175	463.175
Dispatch Frequencies		
Med Nine	467.950	462.950
Med Ten	467.975	462.975
PL Tone 136.5		

The EMRS allows for the 10 UHF paired frequencies (MED Channels) currently in use by our EMSCOM system as well as several VHF and UHF simplex frequencies for use in dispatch, operations, and paging.

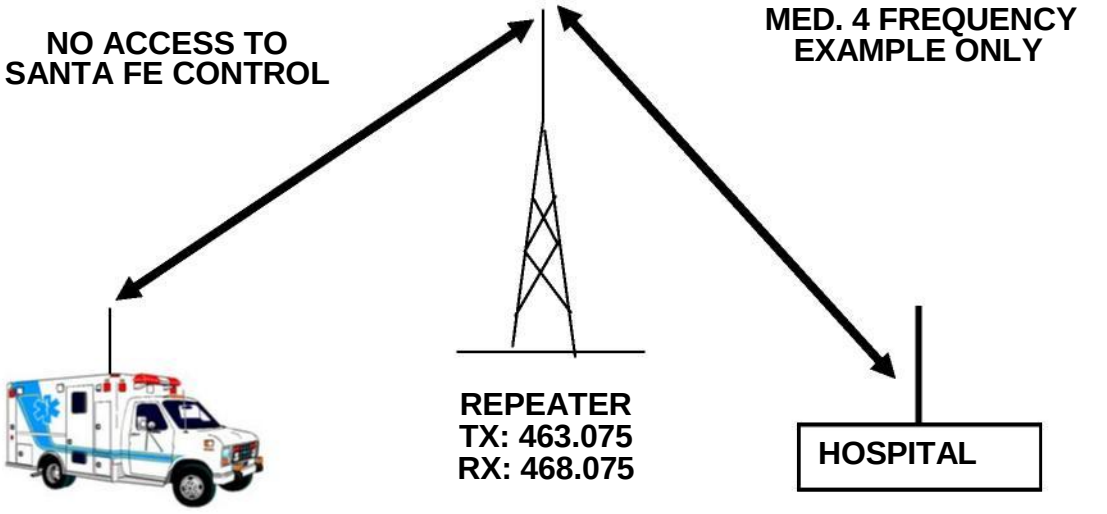
These ten identified EMRS paired frequencies are standardized throughout the country and are designated MED 1 through MED 10. The first eight medical frequencies MED 1-8 are to be used only for medical control radio traffic. The last two medical frequencies, MED 9-10 are available for dispatch radio traffic.

A major component of the EMSCOM system consists of mountain top repeaters.

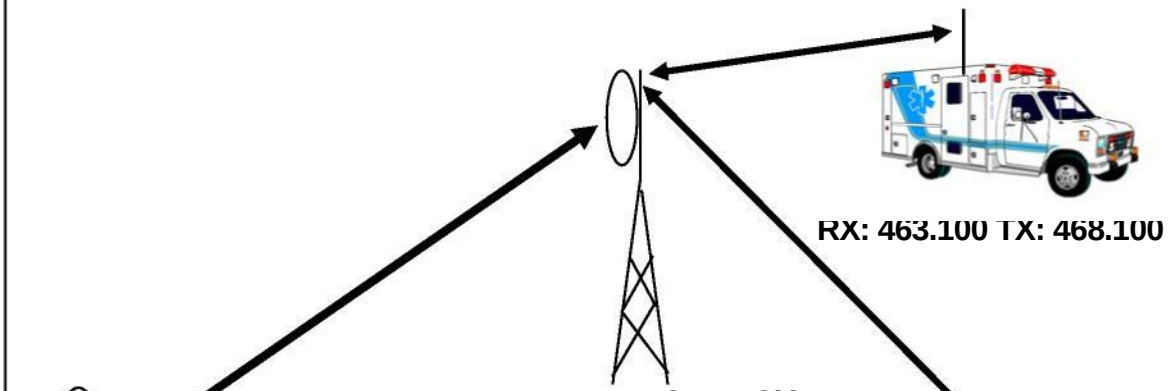
These repeaters are essentially unattended base stations which automatically receive a radio signal on one frequency and repeat the signal on another frequency while boosting the strength of the transmission. The statewide system incorporates the use of a Microwave Network to tie these mountain top repeaters into a central point known as Santa Fe Control.

This network allows direct communication with Santa Fe Control from anywhere in the statewide system. It also provides greater area coverage and increases the communication range of remote base stations, as well as mobile and portable radios. The majority of the repeaters operate on MED 4 or 5 unless otherwise specified.

STAND ALONE REPEATER SYSTEM



MICROWAVE REPEATER SYSTEM



SANTA FE CONTROL

- PHONE PATCH
- OTHER MED REPEATERS
- OTHER STATE AGENCIES
- MEDICAL CONTROL COORDINATION
- AIR AMBULANCE COORDINATION

Unit Numbers:

All mobile/portable radios in the New Mexico State EMSCOM system have been assigned a four-digit identification number, and while operating on the system, the assigned number must be used rather than other vehicle numbers. Example: A fire department rescue unit may use Rescue 6 as the unit identification on the fire department frequency; however when using the State EMSCOM System this unit should identify itself by "2526 Bernalillo County Rescue 6" or "2526".

All units are listed by this four-digit number at the Radio Communication Bureau of the Department of Information Technology in Santa Fe. This allows immediate identification of the unit anywhere in the state and will comply with F.C.C Regulations. **If your service obtains additional radios, you must have a unit number assigned to each radio.** Unit numbers may be obtained from the State Radio Communications Dispatch Supervisor in Santa Fe at 827-9381. **If you no longer need an assigned unit number be sure to notify Santa Fe Control to take that number out of service.**

Call Signs: The New Mexico State EMSCOM System has a great deal of radio equipment throughout the state, and each piece of equipment is assigned an FCC “call sign” which should be used to sign off at the end of your transmission. Example: Base station units in most cases will have a three letter - three digit number call sign such as "WAU 123" to sign off. Mobile/portable units, four channels or less, use "KU 2140" to sign off and eight channels or more use "KU 7891" to sign off. Note: A base station may have two call signs. One is for local transmission use and one for repeater transmission use. Every base station operator will be responsible for knowing which transmission route (channel) is being used and using the FCC call sign assigned to that channel (local or repeater).

Frequency Requests: The EMS Bureau, in coordination with the State Radio Communications Bureau, is the State Frequency Manager for EMRS frequencies. As such, the Bureau must approve all EMRS access requests before the FCC can authorize them.

The State Radio Communications Bureau holds the license that allows EMS services to operate all EMSCOM radios. They also provide maintenance to State owned radio equipment and provide radio unit numbers for all radio operations on the EMSCOM system.

To request a license to access a separate (non-EMSCOM) EMRS VHF/UHF frequency a service would need to fill out an FCC license application and forward it to the EMS Bureau for approval. Once approved, the Bureau will forward the license request to the Fire/EMS Frequency Coordination Office for final approval.

The Major Functions Of The EMSCOM System Are To Provide:

Communications between Ambulance/Rescue and Hospital Emergency Rooms to allow:

- Notification of incoming injured patients to health care facilities. This will allow the facility to properly prepare for the arrival of the patient.

- On-line medical control direction and consultation from emergency health care physicians to EMS providers.

- Ambulance diversion to specialized health care facilities when the original facility does not have the necessary care capabilities available.

- Continuous communications of vital patient information from field to emergency care facilities to enhance patient care, as well as possible initiation of further field treatment.

Ambulance/Rescue to Radio Communications Control Center (Santa Fe Control):

- Provide a base station communications back-up for dispatching, direct phone line patching and coordinating EMS information in cases where local base station control fails or is not available.

- Provide dispatching services for ambulances in more remote areas of the state.

- Provide ambulances with assistance when mechanical or navigational problems arise.

- Provide ambulances with immediate assistance or information from Law Enforcement, Fire, Highway Department, or other agencies. (Road conditions, weather conditions, etc...). This may include contact with CHEMTREC, UNM Poison Control Center, U.S. Dept. of Energy, etc.

- Provide a central coordinating center in cases of regional or statewide disaster response. (E.g. Hazardous Materials Incident.)

- Provide dispatching service for the State Crisis Support Team.

- Request air ambulance for EMS field units and provide flight following/coordination for certified air ambulance operations within the state.

- Relaying information to Medical Control

Hospital to Hospital Communications:

- Provide direct communication for medical resources and patient transfers.
- Provide back-up communications if telephone service is lost.

9-1-1 Dispatch to Ambulance Communications:

- Provide direct communication for coordination of patient location and medical status.
- Provide backup communications between the ambulance and receiving hospital or an intercepting ambulance if the transporting vehicle cannot communicate directly with them.
- Provide patient status updates to the ambulance in regards to the patient's response to dispatcher provided Emergency Medical Dispatch (EMD).
- Coordinate the need for dispatch of additional EMS Services and Public Safety resources to include Fire and Law Enforcement.

SPECIFIC OPERATING INSTRUCTIONS FOR THE ALBUQUERQUE AND BERNALILLO COUNTY AREA

The Albuquerque and Bernalillo County EMS system uses two state microwave repeaters, which operate on MED 2 and MED 3. All hospitals, which participate in the EMSCOM system, have the capability to communicate on these two channels. Some hospitals within the Albuquerque area have the capability of receiving multiple MED Channels, but generally only monitor the channel designated for their primary use. All MED Channels (except Med 7) utilize repeaters at the present time.

Albuquerque Ambulance Service has exclusive use of Med 9 as their ambulance dispatch/tracking system frequency but has the capability of operating on any MED channel to interface with the statewide EMSCOM system. **To prevent confusion due to the large number of EMS units and hospitals in the local area, any service entering the Albuquerque Metropolitan and Bernalillo County areas should contact Albuquerque Ambulance Dispatch (known as "Albuquerque Base") on MED 2 for medical frequency assignment with the hospital of their choice. If you are unable to contact them on MED 2 then your next attempt should be on Med 4.**

The procedures for out-of-town EMS units transporting patients to Albuquerque area hospitals are as follows:

- When in radio range, contact "Albuquerque Base" on MED 2, Sandia (repeater).
- Give them your Unit Number and the name of the hospital you wish to contact.

- They will assign you a MED channel for that facility, and advise you if that channel is presently available or not (due to someone else's use at that time).

- If it's not immediately available, stand by on MED 2, you will be told by Albuquerque Base when it is clear for your use.

- When advised that it is clear, change to the designated channel and contact the hospital.

- Give the hospital your inbound patient report, receive medical instructions, etc., and sign off.

- After completing your report, return to MED 2 and advise Albuquerque Base that you are clear of the hospital channel. Please remember to do this, as other units may be waiting to contact that hospital as well.

BASIC RADIO PROCEDURES:

- Be calm and polite;

- Be firm but speak in a normal tone of voice;

- All conversations need to be brief, easily understood and use plain English. Plain English avoids confusion when communicating with agencies unfamiliar with codes.

- Avoid dropping the sound level of your voice;

- DO NOT USE THE PHRASES, "over and out", "roger", "okay", "received", "clear", "wilco". The appropriate response to a message received is “Copy”.

- Long messages should be broken into short phrases to give the person receiving the message time to copy the message and to prevent repeater “time outs”. During “time outs”, the repeater shuts down to prevent a keyed transmitter (stuck mike) from disabling the whole system. Our EMSCOM repeaters are set to allow about three (3) minutes of continuous transmission.

- You should be specific with time; use a.m. or p.m. unless you are familiar with 24-hour time (0000 – 2400 hours);

- You should transmit numbers twice with the word "repeating" between transmissions. Example: "9,9,3 repeating 9,9,3". The number "0" is pronounced zero; and,

- Use the Phonetic Alphabet when spelling difficult words or names. They should be spoken as "A - ALPHA." etc.

Verbal Communications Usage And Protocols

International Phonetic Alphabet (Code Words Used):

A – ALPHA	J – JULIA	S – SIERRA
B – BRAVO	K – KILO	T – TANGO
C – CHARLIE	L – LIMA	U – UNIFORM
D – DELTA	M – MIKE	V – VICTOR
E – ECHO	N – NOVEMBER	W – WHISKEY
F – FOXTROT	O – OSCAR	X – X-RAY
G – GOLF	P - PAPA	Y – YANKEE
H – HOTEL	Q – QUEBEC	Z – ZULU
I – INDIA	R – ROMERO	

Phonetic Alphabet: The phonetic alphabet can be used to spell out words and names that are difficult to understand. These should be spoken as "A" ALPHA, "B" BRAVO. Do not say "'A' as in ALPHA".

Radio Language: Avoid phrases and words that are difficult to understand on the radio. Some poor examples and preferred words are:

Poor	**Preferred**	**Poor**	**Preferred**
Want	Desire	Do you want	Advise if
Can't	Unable	Find out	Ascertain
Get	Obtain	How do I	Advise if
Send	Forward	Call and find out	Ascertain

Radio Jargon: There are a few words used quite often in radio work with which you should be familiar.

Word or phrase	**Meaning**
Traffic	Messages
Covered	Interference with transmission
Copy	Message received and understood
E.T.A.	Estimated Time of Arrival
Radio check or test	Person checking radio
Short test or 5 count	A slow count 1 through 5
Long test or 10 count	A slow count 1 through 10
Key Transmitter	Depress transmit bar or button
Patch	Connection of a telephone line and a radio communications network to allow direct communications between field providers and a person on the phone.

Microphone Techniques:

- Base and mobile operators should speak directly into the microphone.

- In cases of loud background noise, the operator should shield the microphone by turning the face of the mike away from the noise, or cupping the hand around it.

- Shouting or yelling into the microphone may cause a distorted signal and must be avoided even in the presence of a great deal of background noise.

- It is essential that the operator's voice maintain a constant volume that does not trail off at the end of sentences.

- To avoid "clipping" words, depress transmit bar for a few seconds before speaking and do not release it for a few seconds after completion of your last word. Otherwise, a portion of your last word will be lost.

- Do not mumble or speak too fast. Do not become excited or try to transmit while someone else is transmitting.

The Stuck Mike:

- Beware of the stuck microphone button. If your mike is stuck "on the air" no one will be able to transmit or receive on that frequency. Everything you say will be picked up by the microphone and transmitted for ALL to hear.

- The microphone transmit bar or button could accidentally be depressed if a heavy object such as a book is placed on the base station microphone, or if a mobile mike is placed on the seat of a vehicle.

- Check the transmit light on the radio occasionally to see if your set is accidentally "on the air". A good operator should place base station microphones in a safe place and should hang up the mike on mobile units.

- The success of the medical communications system will be determined by how it is used, thus participants are encouraged to exercise good judgement, courtesy, and cooperation in their daily use of the system.

SUGGESTED CALLING PROCEDURES FOR USE ON THE EMSCOM SYSTEM

- When you are calling on the radio always identify whom you are calling and give unit number, name of service, and repeater in use. For example:

Mobile to base - Call up using a repeater transmission route.

- Mobile: "Lincoln County, (this is) 2409 (using) Buck Mountain."

- Base: "2409, Lincoln County go ahead."

Mobile to base - call up using local/direct transmission.

- Mobile: " Lincoln County (this is) 2409, local"

- Base: "2409, Lincoln County, go ahead"

When you give your transmission route, those whom you are calling will know which channel on their radio to use when responding to your call, e.g. either the local or repeater channel.

In the above examples, the Carrizozo ambulance is calling the Lincoln County Hospital in Ruidoso. The words "this is" in parentheses is understood and not necessarily spoken, but may be. The same applies to the word "using" in parentheses; it is understood and not necessarily spoken.

When making transmissions through a repeater, use the assigned channel on the radio. Identify your unit and the repeater in use. This will help base stations and Santa Fe Control identify who is calling and what channel to use to communicate with the unit calling.

Procedures For Transmitting To Santa Fe Control (S.F.C.):

- Identify "Santa Fe Control" and give unit number, name of service and mountain top repeater you are using.

- After Santa Fe Control answers you are cleared to transmit your message to them.

- Allow Santa Fe Control time to initiate services as requested or to suggest a service you may not be aware of such as:

- Phone relay (phone to phone) patch service;

- Repeater to repeater (radio to radio) patch service;

- Radio to phone patch;
- Phone to radio patch; and,
- Dispatch service of other agencies as needed.
- Do not forget to sign off with your call sign.

NOTE: See pages 23 and 24 for a full listing of the capabilities and services provided by Santa Fe Control.

Procedure For Receiving Radio Calls:

- Acknowledge unit calling and identify receiver, give caller "go ahead" to transmit.
- After receiving a transmission from a caller, then the receiver responds with instructions or message.
- After transmitting a message the receiver stands by for confirmation.
- After confirmation be sure to sign off using your call sign.

PATIENT INFORMATION PRESENTATION PROTOCOL

As stated earlier, one of the main purposes of the EMSCOM system is to provide a mechanism for EMS providers in the field to communicate vital patient information directly to the physician in the Emergency Department or to an intercepting ALS crew. The following format for patient presentation is one that is generally recognized for use. However, EMS providers should contact their local medical director and discuss possible changes in this format to meet specific needs of their EMS system.

Patient Radio Report for Receiving Hospital Emergency Department:

- Establish contact with appropriate facility;
- Identify yourself (unit # and service and level as a provider);
- Estimated time of arrival (ETA);
- Identify your patient(s) (age, sex, weight);
- Briefly describe situation;
- Identify chief complaints/mechanism of injuries;
- Pertinent history of the present illnesses;
- Mental status;
- Baseline vital signs;
- Pertinent findings of the physical exam;
- Emergency medical care given;
- Patients' response to emergency medical care;
- Request medical direction if required or if you have questions; and,
- Sign off with your call sign.

Several points should be made concerning the radio transmission of this information.

- Each patient transport will require important information. The EMS Provider must use judgement as to the pertinent amount of information to be given. The ultimate goal is to provide the quickest, most accurate description of the patients' overall condition.

- When reporting on multiple patients, number each patient and present complete information on each patient before continuing to the next. You should start with the most serious injured patient.

- Avoid ongoing radio transmission. If your report will take you longer than one minute of airtime, stop transmitting and find out if receiving station has copied presented information, then resume your report. REMEMBER the receiving station cannot interrupt your transmission if there are questions while you are still talking.

- If you are uncomfortable in presenting this information over the radio, a good practice is to write down all the information in the order you want to present it, before you start transmitting.

- When transmitting numbers such as vital signs, repeat the numbers to insure there are no mistakes. Use the Phonetic Alphabet when spelling names of patients or names of medications.

- Transmitting patient names over the EMSCOM is permitted, if requested. This should be done only if it pertains to the patient's management, such as a direct admit, or other specific reason that causes the hospital to need to know prior to patient arrival. **The FCC views the EMSCOM as a "closed system" and anyone using this information improperly is subject to federal prosecution.**

EMSCOM SYSTEM EQUIPMENT OPERATIONS

Because of the variety of radio makes, models and styles, you are encouraged to read and follow the Owner/Operator Manual and directions that came with your specific radio equipment. Listed below is a summary of the basic operations of most radio controls.

Mobile Radio Controls:

On-Off Switch: The on-off switch controls power to the transceiver. This switch may also control the volume of the radio.

Volume Control: Set the volume to the desired listening level, which will be audible over loud noises during operation. The volume controls the sound output of the speaker but does not change the volume of voice transmission from the radio.

Squelch Control: The squelch is used to eliminate background noise and should be set by the squelch control. Turn the squelch control until the "rushing" or "static" noise is no longer heard.

CHANNEL SELECTOR (FREQUENCY SELECTOR): All medical radios are capable of multi-frequency operation and most radios are set up in a way that channel numbers correspond to the medical channels or frequencies (F4 or Channel 4 = MED 4). The operator must select the MED channel of choice by turning the knob to the correctly numbered channel. If you are not sure how your services' radios are set up, check with your service director or training coordinator.

Transmission Indicator Light: The transmission indicator light illuminates when the radio is transmitting while "keying the microphone". If the transmit light is on and the microphone key is not depressed, turn the radio "off" and take the radio to a qualified repair shop. Always check to make sure the microphone is not "keyed" and always hang the microphone in its proper carrier to prevent accidental "keying" of the microphone. NOTE: Some portable radios may not have a transmission indicator light. In this case you will normally be able to hear the squelch break, indicating that you are beginning or ending transmission.

SCAN: Some mobile radios are equipped with a scan option, this function is to receive or monitor several different channels at one time. In order to transmit the operator must select the appropriate medical channel using the channel selector control.

Front or Rear Control Button: The control button must be selected to the control head position you wish to use.

To Operate: (Mobile Unit):

1. Turn the power on

2. Adjust the squelch and the volume

3. Select the appropriate channel using the channel selector.

4. To transmit, push the button on the side of the microphone. Release the button to listen. Keep the microphone approximately 2" from your mouth. Speak in a normal tone of voice.

5. Allow one second after depressing the microphone key before starting to talk. (This allows sufficient time for the repeater to activate.)

6. After completing your message, sign off (KU-2140 or KU-7891). Return the microphone to its hanger. For mobile / portable units with four (4) channels or less, use “KU – 2140”. For units with eight or more channels use “KU – 7891”.

Hospital Radio Operations - Base Station Console

A base station is a radio installed permanently at a fixed location. All EMS base stations include a transmitter and receiver packaged as a single unit. The EMS base station will vary to some degree between health care facilities depending on the manufacturer and the equipment design. In a hospital the base station is usually installed on the top floor of the building. The radio is operated through a remote control console, which contains a speaker and operating controls. The control console is usually located in the Emergency Department, nurses' station or possibly the CCU/ICU. All personnel responsible for operating the EMS Base Station should become familiar with the particular equipment used in their facility. See your Training Coordinator for operating instructions and/or training on this equipment.

Hospital Base Station Console Controls:

On-Off Switch: The on-off switch should always be left "ON". It consists of a toggle switch or knob usually located in the front of the unit. (THE EMS BASE RADIO SHOULD BE CONNECTED TO THE EMERGENCY ELECTRICAL GENERATOR CIRCUIT TO ENSURE OPERATION DURING POWER FAILURE.)

Volume Control: Set the volume to the desired listening level, which will be audible over background noises. The volume controls the sound output of the speaker and it does not affect the sound quality of voice transmission of the radio.

Squelch Control: The squelch is used to eliminate background noise and can be set by turning the knob until the "rushing" or "static" noise is no longer heard. Some EMS Base station radios have squelch pre-set within the radio and therefore will not have a squelch control.

Channel Selector: Most EMS Base station radios are capable of at least two-channel operation. The channel selector should be set on the local primary channel as used in

your area. The channel select button must be depressed in order to transmit on the selected frequency. NOTE: In some areas, base station radios are equipped with scan capabilities and have two or more channels available. In this case base station channels will not necessarily correspond to MED channels. (E.g. F1 may not equal MED 1).

Transmission Indicator Light: The transmission indicator light illuminates when the radio is transmitting by "keying the microphone". If the transmit light is on and the microphone is not depressed, turn your radio "OFF" and call a qualified radio repair shop. Always check to make sure it is not "keyed" and always keep the microphone in a safe location to prevent accidental "keying" of the microphone.

Scan Function Switch: Some base station radios are equipped with a scan option, which monitors several different channels at one time. The scan only functions to receive incoming traffic. To transmit the operator must select the appropriate medical channel by using the channel selector control.

To Operate: (Base Station Console):

1. Turn the power on (should be left on).

2. Adjust the volume control.

3. Select the appropriate channel.

4. To transmit, depress the transmit bar at the base of the microphone and release the bar to listen. Keep the microphone approximately six inches from your mouth. Speak in a normal tone of voice.

5. Allow one second after depressing the microphone key before starting to speak. This will allow sufficient time for the repeater to activate.

6. After completing your message, sign off (WAU-665, KXO-865 etc.) and return the microphone to its place so that accidental "keying" will not occur.

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NEW MEXICO RADIO CONTROL CENTER
(SANTA FE CONTROL)

The Radio Control Center in Santa Fe was developed in 1970 and the EMS Radio Communications System became a part of the Control Center around 1974. The official name of the center is New Mexico Radio Control Center, a branch of the State Radio Communications Bureau. It is better known to all of us as "Santa Fe Control" and is located within the Law Enforcement Academy/State Police Complex in Santa Fe. Santa Fe Control is staffed by trained radio dispatch operators and is operational 24 hours a day, 7 days a week. In addition, each operator is required to complete an Emergency Medical Dispatch Course.

In order to communicate with Santa Fe Control, you must select a repeater channel. Bases and mobiles who have their local channel selected will be able to communicate with one another, but not with Santa Fe Control. You must select a repeater frequency (channel) to speak with Santa Fe Control. Not all geographic areas of the state have repeaters to enable one to speak with Santa Fe Control, but most areas do. The EMSCOM System is designed so each service is capable of communicating not only on a local basis, but also through mountain top repeaters for longer-range communication. Through these microwave repeaters, Santa Fe Control is equipped to be able to provide radio to telephone; radio to radio; and telephone to radio patching service.

Santa Fe Control plays several important roles within the EMS Radio Communication System:

Support - Santa Fe Control supports all EMS providers within the system whether it is a routine radio check or a full-scale disaster. These services include relaying messages, public service phone number requests, phone and radio patch services, repeater-to-repeater patching services, routine radio checks and flight following of air ambulances to name a few. They could also be called upon to link an ambulance to medical control or to request an air ambulance intercept. Santa Fe Control is also an emergency communications link between emergency service agencies and the State Emergency Operations Center during large-scale disasters. **EMS Agencies should take full advantage of these services.**

Dispatch - Santa Fe Control dispatches as required within the EMS system. It has a telephone reference book with a list of all hospitals, ambulances, rescue units and air ambulances in the State system and can dispatch them from their communications center quickly.

Record Keeping - Santa Fe Control records all communications going through each mountain top repeater, which is microwaved into Santa Fe Control. The reason for this is to maintain records, policing of the system and development of transcripts on court cases if needed.

With other state agencies, Santa Fe Control's main purpose is to dispatch. This capability is accomplished by mountain top repeaters and microwave link system that was set up by the Radio Communications Bureau of General Services Division and financed by the various agencies including the Department of Health. These other agencies include Game and Fish, Highway Department crews, State Forestry, State Fire Marshal's Office, Crisis Support Team, and Air Ambulances. With 24-hour coverage and trained dispatchers, each agency is able to maintain constant communications between their field personnel and the main office. They can also readily contact 9-1-1 dispatch centers or State Police and County Sheriff dispatchers, should you need law enforcement assistance.

For EMS, Santa Fe Control plays a limited role as a direct EMS dispatch, but plays a strong supportive role for all EMS providers as mentioned above. NOTE: Please keep Santa Fe Control informed of any changes on your emergency phone numbers. They can be contacted by dialing (505) 827-9378, 24 hours a day.

EXAMPLES: When an EMS service is transporting patients within the state, Santa Fe Control can assist the service by relaying inclement weather information, providing phone patch service for calling back to home base, dispatching another ambulance in case of breakdown of the transporting unit, dispatch law enforcement assistance, or dispatching an air ambulance, etc.

The EMS System is considered a priority system in cases of emergency radio communications traffic and Santa Fe Control will assist any EMS provider as needed during that emergency. They can also dispatch EMS for any area as requested by State Police, Sheriff, other agencies, or private parties.

SERVICING OF EMS RADIO COMMUNICATIONS SYSTEM

- Base station and repeaters - State Radio Communications is responsible for the maintenance of all State owned equipment. All Emergency Medical Service providers experiencing problems with **state owned equipment**, to include base stations, consoles, repeaters, and microwave systems are authorized to have the repairs made at state expense. **Services that purchase their own equipment from a vendor are responsible for their own maintenance costs. If the equipment was purchased with EMS Fund Act monies, the requesting/purchasing agency becomes responsible for maintenance as well.**

- Mobile and Portable - Local entity is responsible for maintenance.

- Service Representatives - In cases of emergency or other EMSCOM System difficulties, contact should be made with Santa Fe Control; the nearest State Service Representative from the Radio Communications Bureau; the Radio Communications Chief of Maintenance. **For after-hours assistance, contact Santa Fe Control at 505-827-9378.**

Santa Fe Control: 505-827-9378 **(24 hours a day)**	**State Radio Communications Bureau:** Chief of Radio Maintenance: 505-827-9350
Roswell Area: (Southern half of New Mexico) Supervisor: 505-827-9391 Las Cruces/Silver City 505-827-9385	**Santa Fe Area:** (NE and North Central New Mexico) Area Supervisor: 505-827-9380 Las Vegas/Tucumcari, NM Contact: 505-827-9398
EMS Communications Coordinator (505) 476-8200	**Albuquerque Area:** (Central and Northwest New Mexico) Supervisor: 505-827-9383

EMERGENCY MEDICAL SYSTEMS BUREAU
COMMUNICATIONS COORDINATOR

The purpose of the EMS Bureau Communications Coordinator is to oversee the Emergency Medical Services Communications (EMSCOM) System, a subset of the overall statewide radio communications system. The Coordinator has direct input to the State Radio Communications Bureau for the purpose of requesting equipment additions, equipment replacement and the maintenance of existing equipment in an effort to improve the EMSCOM system. This includes equipment such as mountain top repeaters, antennas, backup power supplies for repeater sites, microwave radio links, and consoles and base stations for medical facilities. Mobile and portable (handheld) radios and pagers **do not** qualify for repair or replacement by the State Radio Communications Bureau.

The EMS Communications Coordinator also manages the Emergency Medical Dispatch (EMD) Program for the Department of Health. The Coordinator has a number of other duties related to EMS communications issues. These include:

- assisting EMS services in resolving dispatch related issues with dispatch centers;
- assisting 9-1-1 dispatch centers and communications equipment vendors with consolidation efforts in areas relating to fire and EMS communications;
- reviewing and providing recommendations for EMS Fund Act applications that request funding for communications equipment;
- providing EMSCOM training for EMS and medical facility emergency department personnel;
- Screening and/or approving EMS Service requests for Emergency Medical Radio Service (EMRS) radio frequencies.

Services who wish to be licensed by the FCC to use an EMRS radio frequency must meet the following criteria listed in the FCC Regulations: “persons or entities engaged in the provision of basic or advanced life support services on an ongoing basis are eligible to hold authorization in the Emergency Medical Radio Service to operate stations for transmission of communications essential for the delivery or rendition of emergency medical services for the provision of basic or advanced life support.”

“Applications submitted by persons or organizations other than governmental entities must be accompanied by a statement prepared by the government body having jurisdiction over the state’s emergency plan or otherwise supporting the application”.

In other words, if a service has a valid need to use an EMRS Frequency and meets the above criteria they must first submit a written request to the EMS Bureau EMSCOM Coordinator for approval.