

BASIC RADIO TECHNIQUES
UNIT 1 - FCC RULES AND DISPATCH EQUIPMENT

FCC RULES AND PUBLIC SAFETY COMMUNICATIONS

FCC Rules

Public Safety radio frequencies are governed by FCC regulations, specifically, Part 90, 47CFR, Chapter 1. The following regulations are cited for information:

FCC 90.403C: COMMUNICATIONS BREVITY

"Each Licensee shall restrict all transmissions to the minimum practicable transmission time and shall employ an efficient operating procedure to maximize the utilization of the spectrum."

Point: Keep it short

FCC 90.403D: MESSAGE PRIORITY

"Communications involving the imminent safety of life or property are to be afforded priority by all Licensees."

Point: Life safety has first priority

FCC 90.403E: HARMFUL INTERFERENCE

"Licensees shall take reasonable precautions to avoid causing harmful interference. This includes monitoring the transmitting frequency for communications in progress and such other measures as may be necessary to minimize the potential for causing interference."

Point: Don't interfere

FCC 90.405: PERMISSIBLE COMMUNICATIONS

"Stations licensed under this part may transmit only the following types of communications:

Any communication related directly to the imminent safety of life or property.

Communications directly related and necessary to those activities that make the Licensee eligible for the station license held under this part.

Communications for testing purposes required for proper station and system maintenance. However, each Licensee shall keep such tests to a minimum and shall employ every measure to avoid harmful interference."

Point: Transmit only what is necessary

BASIC RADIO TECHNIQUES

UNIT 1 - FCC RULES AND DISPATCH EQUIPMENT

WHAT THIS MEANS TO THE OFFICER

FCC Rules include the following:

It is unlawful to:

- Transmit unnecessary signals, messages, or communications of any kind
- Use profane, indecent or obscene language
- Willfully damage or permit radio apparatus to be damaged
- Cause unlawful or malicious interference with any other radio communication
- Intercept, use, and/or publish the contents of any radio communication without the express permission of the proper authority within your department
- Make unnecessary or unidentified transmissions
- Transmit without first making sure that the intended transmission will not cause harmful interference

EQUIPMENT

Many public safety radios broadcast in the **VHF Hi-Band** range from approximately **145-159 MHz** (megahertz). Other frequencies operate at *UHF band*, between **450-470 MHz**. These bands may have limited access to new frequencies, which is why **800 MHz** frequencies became attractive to public safety.

800 MHz frequencies may employ a “*trunked*” radio system. This system uses several frequencies. A transmission may be made on one frequency and received on another. This is transparent to the user. A group of users has radios that are programmed to particular “*talk groups*”. There may be several talk groups on one system. Many different agencies can use the same group of frequencies without hearing each other because they are programmed for different talk groups. Trunked systems use a computerized controller that “searches” for an available frequency for the transmission. If there is no frequency available, the user will get a beep, indicating they need to stand-by. The radio will beep again when there is an available frequency. Trunked systems use fewer frequencies with higher efficiency. All channels are available for use all of the time, rather than low traffic channels going for hours without activity.

PL (Private Line – Motorola Brand Term) or **CG** (Channel Guard – G.E. Brand Term): Transmission must be on the right frequency and emit a tone that is recognized by the receiver and “allows” the transmission to be heard. This equipment helps eliminate “skip” interference. Occasionally, radio transmissions from agencies located some distance away may be received. This is referred to as **skip**. Atmospheric conditions, equipment, and proximity may play a part for skip to be heard. PL or CG systems require a tone, acting like a password to tell the receiver the signal is “authorized”, thereby activating the equipment. Transmissions (skip) from other agencies can be eliminated because they do not emit the required tone to activate the receiver. Blocked transmissions do not have to originate from a great distance; *any* radio without the proper tone will be unheard by the receiver and, thus, the dispatcher.

MOBILE/PORTABLE RADIOS - A *mobile* radio is the radio unit installed in a vehicle. A *portable* radio is that which is carried and used by responders in the field. The

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BASIC RADIO TECHNIQUES

UNIT 1 - FCC RULES AND DISPATCH EQUIPMENT

mobile radio has more power (wattage) than a portable and can usually transmit further without degradation of quality.

Portables and mobiles can usually transmit on a number of frequencies. Agencies may use primary, secondary, car-to-car (not thru dispatch), and other frequencies. Many agencies will include the LERN (Law Enforcement Radio Network) as an available frequency. LERN is administered by the Washington State Patrol and is for use cross-agency.

REPEATERS - receive a signal and then re-transmit it to other radios. The repeater gives the signal a boost in power so it will get to where it is directed. Most radio systems include multiple repeaters. Portable or mobile radios may use different repeaters as they move through different geographical areas. **Voting receivers** are receivers that choose the strongest signal and relay that signal by surface line to the center.

DEAD SPOTS - most jurisdictions include areas where radio communications will not work. These may be spots in-between repeaters, or where structures and materials block the radio waves (elevator shafts, basements of cement buildings). Officers should know where these spots are within and near their jurisdiction.

ALERT TONES - are sometimes used to precede a high priority voice dispatch. Each agency should have their own procedure on the use of the alert tones. The alert tones are activated from the dispatcher console.

Alert tones are normally used on law enforcement calls that indicate an immediate threat to life or on other calls as dictated by agency policy. Some examples of calls where alert tones may precede the dispatch:

- Serious Crimes-in progress or just occurred
- Mass Casualty Incidents
- Riots or large fights
- Officer needs assistance

CHANNEL MARKER TONES - are activated from the dispatch console and are used to alert radio users that a particular channel is restricted for an emergency and that non-emergency traffic should not be broadcast at that time.

This marker is an intermittent "beep" on the channel. A voice transmission overrides the beeping. This beep indicates the channel is **not clear for non-emergency radio traffic**. You may hear these channel marker tones or beeps on LERN or other frequencies that you monitor, even if your agency does not have the capability of activating them.

EQUIPMENT USE

Part of the ability to effectively communicate comes from proper usage of the equipment. Areas of importance include, voice projection, tone, modulation, speed of delivery and clarity.

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BASIC RADIO TECHNIQUES

UNIT 1 - FCC RULES AND DISPATCH EQUIPMENT

An officer must be able to use proper tone, rate of speech, and voice modulation on the radio. Officers should **maintain a calm, clear, crisp speaking voice without, when possible, displays of excitability.**

- **LISTEN before you transmit-** make sure the radio channel is clear before you key the radio to speak. If you think you covered someone when you spoke, advise a unit that you covered them and ask them to go ahead with their transmission.
- **THINK** - before you transmit - it is important to determine what you are going to say before you transmit.
- **BREVITY** - Radio transmissions should be brief, concise and to the point. A *general* rule is that each transmission segment should be no more than 15-20 seconds. If a transmission is going to go longer, pause every 15-20 seconds (releasing the transmit button), listen for anyone who may need to use the radio for emergency radio traffic and then continue with the transmission. Some agencies precede a break by announcing, "break" or "also". This lets users know there is more information to follow. By outlining what you are going to say before transmitting, the breaks will come in a natural "resting place" in the transmission.
- **SPEED OF DELIVERY-** it should be one that can be easily heard and understood by others and if necessary, should allow them to write down pertinent information. Keeping the "brevity rule" in mind when transmitting, deliver information at this rate of speed for no more than 20 seconds, when possible.
- **MODULATION VOLUME** - should be in a mid-speaking range. Overly loud voice volume may cause others to turn down radios, potentially missing traffic or pertinent information. Likewise, a soft, whispery voice is neither appropriate nor professional sounding and other users may have to adjust radios in order to accommodate the low volume.

Avoid using a voice tone or style that is:

- **SING-SONG** – continuously changing the tenor of a voice during the transmission from high to low
- **CLIPPING** - is a term used to describe the problem of speaking before the transmitter or repeater is actually "open" or clipping off the last word by releasing the transmit button too soon. When speaking on the radio, key the radio for ½ to 1 full second before speaking into the microphone. Finish speaking before releasing the transmit button.
- **FADING** - term used when the voice volume fades or drops at the last part of a transmission. The entire radio transmission should be spoken at the same level.