

OPERATE COMMUNICATION EQUIPMENT

We acknowledge the input of the
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INTRODUCTION

In this booklet you will be covering how to operate communication equipment.

Throughout your career as a fire fighter, you will be required to use different communication equipment. With the knowledge and information gained from this booklet, you will be able to properly use any communication equipment at any given time.

Knowing the proper procedures of how to receive and transmit will help you during an emergency situation. By knowing your phonetic alphabet, you will be able to spell out critical information, substituting certain standard words for individual letters of the alphabet.

Purposes of two-way radio

Radio systems:

The most efficient communicating system used to direct emergency scene operations is the two-way radio. Radios should have a sufficient number of channels to allow the necessary command, tactical, and support functions to operate on separate channels, and the IC should have the ability to communicate with agencies operating on other frequencies.

Radio procedures

Transceivers:

Usage and testing of transceivers must be done in a professional manner using widely recognized procedures and terminology to ensure that radio communications, a vital component of fire department operations, are effective. To achieve this, the use of terminology peculiar to the purpose and a specific format for transmissions is required, as is the need to practice good manners. In the interest of brevity the message to be passed must be clearly in mind before the microphone is opened.

Procedures:

The procedural format for transceiver use is as follows:

a. Procedures -

- (1) Transmit the call sign of the agency/vehicle/person you wish to contact
- (2) Give your own call sign.

- (3) After the agency/vehicle/person being contacted acknowledges your call, give the text of your message.
 - (4) Give the invitation to reply, eg. "over", unless by the nature of the transmission it would be clearly understood at what point a reply would be expected.
 - (5) If you are going off the air and will not be monitoring any further radio traffic, end your transmission with the word "out".
- b. Manners** - Avoid interrupting other transmissions. This is the most common breach of manners heard in radio communications. It should only be considered in emergencies.
- c. Brevity** -
- (1) Know what you need to transmit prior to opening a microphone.
 - (2) If you receive a request for information that you cannot, on the spur of the moment, provide in a concise manner, advise the caller to stand by. You then take time to compile a suitable reply, which should be passed without undue delay.
 - (3) Use words that have a generally recognized meaning in radio communications.
- d. Professional approach** -
- (1) Do not use profane or obscene language on the air.
 - (2) Use a moderate rate of speaking, never too slow or too fast, designed for easy understanding. This includes not using pauses such as "ah" or "uhm" during the dispatch.
 - (3) Use a moderate expression in speech, not a monotone and not overemphasized, with carefully placed emphasis. Avoid anger or shouting over the radio and be careful to articulate properly. Strive for the correct pronunciation of words.
 - (4) Use a vocal quality that is not too strong or weak. Finish every comment, and avoid a voice that trails off towards the end of the transmission. Keep the pitch in a midrange, not too high or too low. Avoid dialects or regionalism in transmissions and strive for a good voice quality.

- (5) Keep things such as gum and candy out of the mouth. Be confident in what you say, and position the microphone appropriately to make the best use of the system.
 - (6) Be concise and to the point, don't talk around the issue and give the information required in a logical and complete manner that best addresses the service requested.
 - (7) Do not transmit until the airwaves are clear.
 - (8) Think about what is going to be said before transmitting.
 - (9) Remember that any unit working at a fire or rescue scene has priority over any other transmission.
 - (10) Hold the radio/microphone 1 to 2 inches (25mm to 50mm) from the mouth at a 45-degree angle.
 - (11) Avoid laying the microphone on the seat of the vehicle because the switch may become pressed and cause interference.
 - (12) Do not touch the antenna when transmitting. Radio frequency burns might result.
- e. **Transmission Priority** - Remember that any unit working at a fire or rescue scene has priority over any other transmission. When firefighters function as part of a team, they must be able to communicate the need for team assistance through the fire department's communications equipment. The designated supervisor must be in constant communications with the team and follow an incident management system with local SOGs. Some of these communications might be requests for additional personnel or special equipment or to notify others on the fireground of any apparent hazards.
- f. **Emergency Radio Traffic** - At times, it may be necessary to broadcast emergency traffic (urgent message) over the radio. Emergency traffic is necessary when firefighters radio that they are in distress, when additional resources are needed or detailed instructions must be relayed through the telecommunicator. When the need occurs to transmit emergency traffic, the person transmitting the message should make the urgency clear to the telecommunicator. At that point, the telecommunicator should give an attention tone or advise all other units to stand by, and then advise the caller to proceed with the emergency message. After the emergency

communication is complete, the telecommunicator should notify all units to resume normal or routine radio traffic.

- g. Evacuation Signal** - Evacuation signals are used when command personnel decide that all firefighters should be pulled from building or other hazardous area because conditions have deteriorated beyond the point of reasonable safety. All firefighters should be familiar with their department's method of sounding an evacuation signal. There are several ways this communication may be done. The two most common are to broadcast a radio message ordering them to evacuate or to sound the audible warning devices on the apparatus at the fire scene for an extended period of time. The radio broadcast of an evacuation signal should be handled in a manner similar to radio emergency traffic. The message should be broadcast several times to make sure that everyone hears it. The use of audible warning devices on apparatus, such as sirens and air horns, will work outside small structures, but everyone working in a large building may not hear them.
- h. Personnel Accountability System** - Each department must develop its own system of accountability that identifies and tracks all personnel working at an incident. The system should be standardized so that it is used at every incident. All personnel must be familiar with the system and participate when operating at an emergency incident. The system must also account for those individuals who respond to the scene in vehicles other than fire department apparatus.
- i. Provincial Mobile Communication Centre (PMCC)** - The Provincial Mobile Communications Centre (PMCC) at 453-7171 is the control centre for the Integrated Radio Communications System (IRCS). The PMCC operates the network on a 24-hour basis, providing call answering, dispatch and alerting services for EMO and other government and volunteer agencies. PMCC operators can interconnect any user on any repeater in the province and can also connect to the telephone system, as follows:

Procedures

Telephone Interconnect. Any telephone can be used to connect to the system.

1. On a standard telephone, dial 453-7171
2. Identify yourself
3. Specify the agency and location to be called
4. Stand-by while call is transferred; the operator will advise you to "go ahead"

5. Transmit a brief message; be brief because you are tying up the repeater.
6. When finished, hang up.

Radio Interconnect. From any radio with a keypad:

1. Press 0#
2. Wait while the repeater dials and connects to PMCC
3. Identify yourself
4. Specify the telephone number or agency and repeater to be called
5. Stand-by while call is transferred; the operator will advise you to "go ahead"
6. Transmit a brief message; be brief because you are tying up the repeater
7. When finished, press**

Emergency Calls. (For life and death emergencies only). From any radio with a keypad:

1. Press 9#
2. Wait while the repeater dials and connects to PMCC
3. Your call will be answered immediately

Terminology

Radio call signs

Purpose and importance of call signs:

Radio call signs used by Fire Department shall be as given by the authority having jurisdiction. The highest number for each vehicle type shall be allocated to a vehicle of the same type that is established as a reserve. On vehicles painted a colour other than red the call sign numbers shall be red and the overall height of numbers are to be a minimum of 500 mm. Where possible, the number selected, as the vehicle call sign should differ from those numbers assigned to the local airport runways.

Identification

Fire Chief

Deputy Fire Chief

Platoon Chief

Call Sign examples

Red Chief, Incident Commander, city/village name and Chief

Red Deputy, Deputy Incident Commander, city/village name and Deputy Chief

Red Leader, city/village name and Platoon Chief or Captain

Emergency dispatcher (PMCC)	Fire Control
Fire Department	Fire Hall, or name of RQ Base. Red Dispatch, Fire Dispatch,
Structural Fire Fighting Vehicles	Red One, Engine one, Quick respond, ladder one
Portable radio	Portable and the #

Radio Terminology

Common words and meaning - radio communication:

The following sample vocabulary is not all-inclusive but is representative of the words and phrases in most common usage in the airport environment. To be effective in radio communication, personnel must be thoroughly familiar with these terms and their meanings

"A"

Acknowledge - Confirm that you have received and have understood the message.

Advise intentions - Explain what you plan to do.

Affirmative - Yes, permission is granted, or that is correct.

"B"

Blind (dead) spot - An area from which radio transmission cannot be received. May also be used to describe portions of an airport not visible from the control tower.

Broadcast - Transmission of information for which an acknowledgement is not expected.

"C"

Confirm - Verify or recheck.

Correction - An error has been made in the transmission and the corrected version follows.

"D"

"E"

ETA - Estimated time of arrival

Expedite - Prompt compliance is required.

"F"

Final approach - A flight path in the direction of landing along the extended runway centerline.

"G"

Go ahead - Proceed with your transmission.

"H"

Hold your position - Do not proceed! Remain where you are.

How do you hear (read/copy) me? - A question relating to the quality of the transmission or to determine how well the transmission is being received.

"I"

Immediately - Action is required without delay

I say again - the message will be repeated.

"L"

"M"

Make your best time - Expedite.

Mayday - The international radio distress signal.

"N"

Negative - No. Permission not granted. That is not correct.

"O"

Out - The conversation is ended and no response is expected.

Over - My transmission is ended; I expect a response.

"P"

Pan Pan - message of urgency

Proceed - Go or go to.

"R"

Read back - Repeat the message back to the sender.

Received (copied) - Message has been received and understood.

Repeat - Request operator to say again.

Roger - Message received and understood. (NOTE: "Roger should not be used to answer a question requiring a "yes" or "no" answer. Use affirmative or negative).

"S"

Say again - Request a repeat of last transmission.

Speak slower - Request to reduce rate of speech.

Standby - The person transmitting will pause and those receiving transmission should await further transmission.
Stand by to copy - Prepare to receive detailed information that should be written down.

"T"

That is correct - Indicates agreement with whose message is understood.

"U"

Unable to - Indicates inability to comply with a specific instruction, or request.

"V"

Verify - Request confirmation of information.

"W"

Words twice - Indicates that communication is difficult; request that every phrase be said twice.

Phonetic alphabet:

When conditions make radio transmissions difficult to hear, it is standard practice to spell out critical information, substituting certain standard words for individual letters of the alphabet. This practice reduces the confusion created by certain letters of the alphabet that sound alike. The ICAO and ITU phonetic alphabet is used exclusively for this purpose. Also, a specialized vocabulary of words and phrases has been developed to simplify and clarify radio messages as well as keep them brief. Personnel operating radios should use this vocabulary and the phonetic alphabet, when necessary, to help ensure that messages are understood correctly.

International Civil Aviation Organization (ICAO) and International Telecommunication Union (ITU) Phonetic Alphabet

Note: The syllables to be emphasized are in bold.

A - Alpha (**al**-fah)

B - Bravo (**brah**-voh)

C - Charlie (**char**-lee or **shar**-lee)

D - Delta (**dell**-tah)

E - Echo (**eck**-oh)

F - Foxtrot (**foks**-trot)

G - Golf - (golf)

H - Hotel (hoh-**tell**)

I - India (**in**-dee-ah)

J - Juliett (**jew**-lee-**ett**)

K - Kilo (**key**-loh)

L - Lima (**lee**-mah)

M - Mike (mike)

N - November (no-**vem**-ber)

O - Oscar (**oss**-cah)

P - Papa (pah-**pah**)

Q - Quebec (keh-**beck**)

R - Romeo (**row**-me-oh)

S - Sierra (see-**air**-rah)
T - Tango (**tang**-go)
U - Uniform (**you**-nee-form)
V - Victor - (**vik**-tah)

W - Whiskey (**wiss**-key)
X - X-ray (**ecks**-ray)
Y - Yankee (**yang**-key)
Z - Zulu (**zoo**-loo)

1 - Wun	4 - Fow-er	7 - Sev-en	0 - Zero
2 - Too	5 - Five	8 - Ait	
3 - Tree	6 - Six	9 - Nin-er	

Battery Care and Maintenance - Strengthening the Weakest Link

Advancements in battery technology has not kept up nor has it been as impressive as those in microelectronics. Today's batteries are a reliable and economical energy source, provided they receive the care and attention that the manufacturer recommends.

The need for battery maintenance cannot be emphasized strongly enough, both in terms of prolonging battery life and in keeping the batteries in good working condition. Without any means of measuring the performance of aging batteries, the packs eventually deteriorate to a point where they become unusable.

There is a time when a battery must be retired and a battery maintenance system helps to determine when the time is right. With scheduled battery maintenance, the number of batteries discarded are fewer, providing substantial savings while reducing the environmental impact of battery disposal. More importantly, well-managed batteries provide the user with the highest level of confidence that is so essential in today's demanding society.

Organizations using a battery maintenance system have experienced real increases in the life of a Nickel Cadmium battery of approximately one-year and a decrease of general equipment failure by up to 50%. The majority of batteries in the Fire Service are the Nickel Cadmium (NiCd) battery. Although there are many other battery types on the market and new formulations are introduced every year, the NiCd battery is still probably the most cost effective and reliable.

Characteristics of the most commonly used rechargeable batteries.

1 Cycle life is based on battery receiving regular maintenance. Failing to apply periodic full discharge cycles may reduce the cycle life by a factor of three on the NiCd.

2 Cycle life is based on the depth of discharge. Shallow discharges provide more cycles than deep discharges.

- 3 The discharge is highest after the first 24h, then tapers off. The NiCd discharges 10% in the first 24h, then drops to about 10% every 30 days thereafter. Self-discharge increases with higher temperature and age.
- 4 Internal protection circuits typically consume 3% per month.
- 5 Some NiCd and NiMH batteries are based on 1.25V per cell. There is no difference between the cells; it is simply a method of rating.
- 6 Capable of pulsed load currents of up to 1C.
- 7 Applies to discharge only; charging temperature range is more confined.
- 8 Maintenance be in the form of topping charge is advised.
- 9 Derived from the price of the battery divided by cycle life. Does not include the cost of electricity and chargers.

Memory: Myth or Fact

The word memory was originally derived from cyclic memory, meaning that a NiCd Battery can remember how much discharge was required on previous discharges. Improvements in battery technology have virtually eliminated this phenomenon.

The problem with the modern NiCd battery is not so much cyclic memory but the effects of crystalline formation. In most cases, however, there is a combination of the two phenomena. The active materials of a NiCd battery are present in finely divided crystals. In a good cell, these crystals remain small, obtaining maximum surface area. When the memory phenomenon occurs, the crystals grow and drastically reduce the surface area. The result is a voltage depression, which leads to a loss of performance.

Another form of memory that occurs on some cells is the formation of an intermetallic compound of nickel and cadmium and creates extra resistance in the cell. Reconditioning by deep discharge helps break up this compound and reverses the capacity loss.

Regular Exercise

The effects of crystalline formation are most pronounced if a NiCd battery is left in the charger for days, or is repeatedly recharged without a periodic full discharge. Since most applications do not use up all energy before a recharge a periodic discharge to one volt per cell (known as exercise) is essential for the NiCd to prevent the buildup of crystalline formation on the cell plates.

All NiCd batteries in regular use and on standby mode (sitting on a charger for operational readiness) should be exercised once per month. Between these monthly exercise cycles, no further attention is needed and the battery can be used with any desired user pattern without the concern of memory.

New NiCd cell. The anode is in fresh condition (capacity of 8.1Ah). Hexagonal cadmium hydroxide crystals are about 1micron in cross section, exposing large surface area to the liquid electrolyte for maximum performance.

Cell with crystalline formation. Crystals have grown to an enormous 50 to 100 microns in cross section, concealing large portions of the active material from the electrolyte (capacity of 6.5Ah). Jagged edges and sharp corners may pierce the separator which can lead to increased self-discharge or electrical short.

Restored cell. After pulse charge, the crystals are reduced to 3 to 5 microns, an almost 100% restoration (capacity of 8.0A). (Exercise or recondition are needed if the pulse charge alone is not).

It is not advisable to discharge a NiCd before each charge because of excessive cycling puts extra strain on the battery. If no exercise is applied for several months, the crystals ingrain themselves, making them more difficult to breakup. In such a case, exercise is no longer effective in restoring a battery and reconditioning is required. Reconditioning is a slow, deep discharge that removes the remaining battery energy down to less than 1 volt per cell. Then the battery is slowly brought up to maximum capacity through a series of charges and discharges. If the battery is in good condition, it can be reconditioned back to 95 to 120 percent of battery capacity. As batteries age or continued misuse, this percentage can decrease to a point where reconditioning cannot improve battery capacity. Some agencies will take batteries out of service once it reaches 80 percent or less. A well-maintained battery will remain in service for several years if properly cared for.

Fire Departments should seriously consider setting up proper maintenance programs for battery care and maintenance to ensure the best performance from tools, radios and other devices that require battery power supplies. A well-maintained program will reduce costs and increase operational time of equipment. Battery maintenance is the best way to "strengthen the weakest link", the rechargeable battery, upon which ultimate reliability depends.

CONCLUSION

Once again, proper use of transmitting messages is very important. In an emergency situation, the radio procedures are vital. The driver not only needs to know where the emergency is taking place, but also how to get to the emergency quickly and safely. That is why it is extremely important to memorize the PHONETIC ALPHABET.