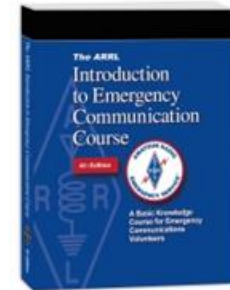# Power Point classroom Teaching Aid
for the Short version of the ARRL
Introduction to Emergency Communication Course

Revision 1.00 - December 2011
**Developed by Jack Tiley AD7FO – ad7fo@arrl.net**

Not counting the first 4 introduction slides this presentation consists of 567 Power point slides. It is expected that it will take 19 to 20 hours to teach this material based on approximately 2 minutes per slide.

This would translate to a three day class or a 10 week class at 2 hours per week to cover the material.

ARRL Amateur Radio
Introduction to Emergency Communication Course
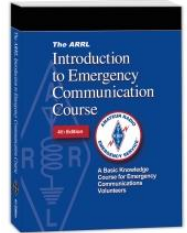
This class is based on the ARRL Introduction Emergency Communication Course, 4th edition available for purchase on the ARRL website and is a basic knowledge course for amateur radio emergency communications volunteer's.

This training was developed by Jack Tiley AD7FO to teach the material in the ARRL course book and contains copyright material from ARRL. It is intended that the person teaching the class will use this presentation and the students will have, or have access to, the league course book. Any other use requires permission from the ARRL.   You may delete or add or change slides to customize this training to your specific needs (note that the material has been changed from the original and your contact information).

Please address comments or corrections to this presentation to the author at ad7fo@arrl.net , not the ARRL.

How to Complete the ARRL Amateur Radio
Introduction to Emergency Communication Course

1ˢᵗ You should complete two DHS/FEMA on line training classes:

- ICS-100 (IS-100.b) (Introduction to the Incident Command System)

- IS -700 (National Incident Management System)

    These are free mini-courses you can take online at: http://training.fema.gov/IS/NIMS.asp

- Also recommended, but not required, are:

    - IS-250, Emergency Support Function 15 (ESF15), External Affairs

    - IS-288, The Role of Voluntary Agencies in Emergency Management

How to Complete the ARRL Amateur Radio
Introduction to Emergency Communication Course

2ⁿᵈ There are six sections of this course covering a total of 29 topics. Read each topic in this course and test yourself with the questions at the end of each unit.

3ʳᵈ Once you have completed the course and the two DHS/FEMA prerequisites, There is a a 35 question final exam which is offered. Field Examiners/locations are listed on the ARRL website at www.arrl.org/emergency-communications-training.

A $15 exam fee, a score is 80% or higher and copies of the ICS completion certificates are required

Topic 1-introduction to emergency communications

What is a Communication Emergency?

- A communication emergency exists when a critical communication system(s) failure puts the public at risk. Examples would be:
  - Loss of telephone service due to failure or overload.
  - Loss of electrical power over a large area.
  - Violent storms & earthquakes that knock out communication coverage.
  - Winter ice and snow storms.
  - 911 phone system failure.
  - Wild fires in areas where there is little or no communication.
  - Hazmat events.

Section 1: The Framework: How You Fit In
Topic 1-introduction to emergency communications

What Makes A Good Emcomm Volunteer?

- Emcomm volunteers come from a wide variety of backgrounds and with a range of skills and experience.

- Adequate personal and family preparation will enable you to get your own situation under control more quickly so that you are in a position to be of service to others.

Where Do You Fit In?

- Amateurs are immediately available communication experts.

- Amateurs can create expedient emergency communication networks under poor conditions.

- A rapid response team is a few folks that can be deployed quickly until a larger response can be launched

Topic 1-introduction to emergency communications

Where Do You Fit In? (continued)

- Emergency communication skills can be very different from those you use in your daily ham radio life.

- Courses like this one help fill that need, as do local training programs and regular training exercises.

- Without specific emergency communication skills, you can easily become part of the problem rather than part of the solution.

- You are there to serve and are not in charge

- Do not make demands of the agency you have been asked to serve.

Communicating is Job #1

- Hams have the ability to rapidly enlarge their communication capacity to meet growing needs in an emergency.

- it is important to remember that your job is "communicating."

- If an agency asks us to deliver a long shelter supply list to headquarters, you should be prepared to use any means required – including the fax machine if it is still working.

- Our job is to get the message through, even if it means using smoke signals.

- The one method of communication that is not appropriate is an informal grapevine.

Communicating is Job #1   (continued)

- When the event it is over it is important to review effectiveness of your response.
  - What went well.
  - What did not go so well.
  - Plan to improve those things that did not go well.
  - Plan to provide specific additional training if needed.

Topic 1-introduction to emergency communications

Review questions

1. **When does a communication emergency exist?**

   a. Whenever the public is at risk.

   b. When there is an earthquake in your area and the public is inconvenienced.

   c. When a critical communication system fails and the public is inconvenienced.

   d. When a critical communication system fails and the public is put at risk.

2. Which of the following actions is the most important for an emcomm group to do at the end of an emergency communication operation?

a. **Review the effectiveness of its response.**

b. Debate who was the most important person in the operation.

c. Tour the area to document the damages.

d. Review the activities of the first responders.

3. Which of the following is _NOT_ a responsibility of emergency communicators?

    a. Making demands on the agency being served.

    b. Having radios, frequencies and basic radio skills.

    c. Being licensed and preauthorized for national and international communications.

    d. Possessing emergency communication skills.

4. Which of the following describes the function of a Rapid Response Team (RRT)?

a. To handle large-scale emergencies over an extended period.

b. To deploy a quick response in a very short time.

c. To establish and operate a storm watch prior to any emergency.

d. To review of the effectiveness of an emergency communication group.

5. **In an emergency situation — when a served agency asks you to forward an urgent message which one of the following methods would you NOT employ?**

   a. CB radio

   b. Family radio

   c. **Informal, conversational grapevine**

   d. The served agency's own radio

- Although our name says that we are "Amateurs," its real reference is to the fact that we are not paid for our efforts. It need not imply that our efforts or demeanor will be anything less than professional. "Professionalism" means getting the job done efficiently—with a minimum of fuss.

Section 1: The Framework: How You Fit In
Topic 2: Amateurs as Professionals

- No matter which agency you serve — emergency management, the Red Cross or others, it is helpful to remember that emcomm volunteers are like unpaid employees.

- If you maintain the attitude that you are an employee of the agency you are serving, with all that employee status implies, there is little chance for you to go astray.

- You are there to help solve their communication problems.

Who Works For Whom?

- The relationship between the volunteer communicator and served agency will vary somewhat from situation to situation, but the fact is that you work for them. It doesn't matter whether you are part of a separate radio group like the Amateur Radio Emergency Service (ARES) . You still work for them.

- Your job is to meet the communication needs of the served agency.

- A "know-it-all" attitude can end your—and our—relationship with the served agency in a hurry. Your attitude is most important during a deployment.

- It is often said that volunteers don't have to take orders. This is true—we do not. However, when you volunteer your services to an organization, you implicitly agree to accept and comply with reasonable orders and requests from your "employer", the served agency.

- There may be times that you find yourself unwilling or unable to comply with a served agency's demands. The reasons may be personal or related to safety or health, or it may be that you do not consider yourself qualified or capable of meeting a particular demand.

- On rare occasions, it may be that you are asked to do something not permitted by FCC rules.

- Regardless of the reason, respectfully explain the situation, and work with the served agency or your superiors in the communication group to come up with an alternative solution.

In general, emcomm groups should be prepared to perform jobs for their served agency that include communication. Here are a few possible job descriptions:

- Radio operator, using Amateur or served agency radio's.
- Dispatcher, organizing the flow of personnel, vehicles & supplies.
- Resource coordinator, organizing the assignments of disaster relief volunteers.
- Field observer, watching and reporting weather or other conditions.
- Damage assessor, evaluating and reporting damage conditions.
- Van driver, moving people or supplies from location to location.
- Searcher, also providing communication for a search and rescue team.

MOU's

- A MOU is a memorandum of understanding and is a document that defines the working relationships and roles for an emcomm unit and a served agency.

ARES and Local MOUs

- Having an MOU is a good thing and can help clarify roles before problems actually happen.

- Local MOUs and agreements must be reviewed before signing off on them. Talk to your DEC or SEC when considering making a local MOU. They can help you do it right.

State and Local Emergency Management: Some state and local emergency management agencies include Radio Amateur Civil Emergency Service (RACES) teams as part of their own emergency communication plan. In a growing trend around the country, ARES members are also RACES and vice versa. Communication assignments may also include government command and control, and inter-agency communications.

SKYWARN is a self-contained program sponsored by the National Weather Service, and not all members are Amateur Radio operators. Many use other radio systems or telephone, fax or email to send in weather observations. SKYWARN volunteers collect on the spot weather observations that will allow forecasters to create forecasts that are more accurate, and issue timely warnings.

©

1. **Which of the following best describes your main job as an emergency communicator?**

   a. Dispatcher, organizing the flow of vehicles, personnel, and supplies.

   b. Weather spotter.

   c. **Radio operator, using Amateur or served-agency radio systems.**

   d. Resource coordinator, organizing the assignments of disaster relief volunteers

2. **Which of following best describes the role of a modern emergency communicator?**

   a. You are strictly limited to communication tasks.

   b. **You may be asked to serve any function that includes communication.**

   c. You do anything a served agency asks.

   d. You transmit and receive messages.

3. If you are asked by a served agency to perform a task that falls outside FCC rules, which of the following is a proper response?

    a. Document the request, and then do what is asked.

    b. Document the request, but refuse to do it.

    c. Leave immediately.

    d. Discuss the situation with the served agency, and develop an alternative solution.

4. An MOU is:

    a. A legal contract between you and the served agency.

    b. Volunteer information and make yourself helpful to them.

    c. A document outlining what you can expect from each other.

    d. Ignore them and hope they will go away.

5. Which of the following will most affect your relationship with a served agency?

      a. Your radio and electronic equipment.

      b. Your knowledge of FCC regulations.

      c. Your attitude.

      d. Your radio skills.

Topic 3:Network Theory and the Design of Emergency Communication Systems

Network Theory

- The study of information transfer between multiple points is known as "network theory."

- During an emergency, messages vary greatly in terms of length, content, complexity and other characteristics.

- Similarly, the available communication pathways vary in how well they handle messages having different characteristics. Network theory can be the process of matching a particular message to the "best" communication pathway.

- The best pathway is that which can transfer the information with the most efficiency, tying up the communication resources the least amount of time, and getting the information transferred accurately and dependably.

High Precision versus Low Precision

- Precision is not the same as accuracy. All messages must be received accurately. But sending a list of names or numbers requires **precision** at the "character" level, while a report that "the lost hiker has been found" does not. Both may be important messages but one involves a need for more **precision**.

- Over low-precision communications channels (such as voice modes) even letters of the alphabet can be misinterpreted unless a phonetic system is used.

- Conversely, typing out a low precision message that "the delivery van containing the coffee has arrived at this location" on a high-precision packet link can be more time consuming (and inefficient) than a simple voice report.
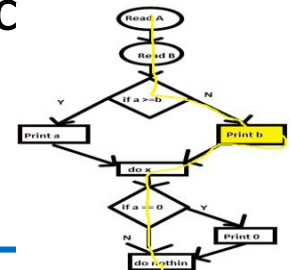
Topic 3:Network Theory and the Design of Emergency Communication Systems

Complexity

- A doctor at a hospital may use a radio to instruct an untrained field volunteer how to splint a fractured leg. A shelter manager may report that he is out of water. The level of complexity varies greatly between these two messages.

- Some messages are so long and complicated that the recipient cannot remember or comprehend the entire message.   Detailed maps, long lists, complicated directions and diagrams are best put in hard copy or electronic storage for later reference.

Topic 3:Network Theory and the Design of Emergency Communication Systems

Timeliness

- Some messages are extremely time-critical, while others can tolerate delays. It is important that highly time-critical messages must get through without delay.

- Timeliness also relates to the establishment of a communications link. An operator of a base station radio may need to track down a key official at the site to deliver a message.

- What matters is the total elapsed time from the time the message originates to the time it is delivered to its final party.

Topic 3:Network Theory and the Design of Emergency Communication Systems

Priority

- The concept of priority as used by Network Theory is better known to hams as QSK, the ability to "break in" on a communication in progress.

- For example:

    a communication pathway is in use with a lengthy, but low-priority, message. A need suddenly arises for a high-priority message:

    Can the high-priority message take precedence and interrupt the low priority one to gain access to the channel?

- Some communications modes allow for this; others do not.

Topic 3:Network Theory and the Design of Emergency Communication Systems

Communications channels

- Now that we have looked at the different message characteristics, let's consider the communication channels that might be used in an emergency.

- In addition to the concepts of destination, precision, complexity, timeliness, and priority, communication channels also can be evaluated in terms of their reliability and ease of use.
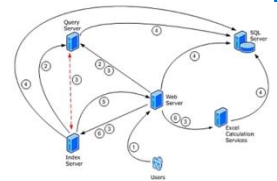
Section 1: The Framework: How You Fit In
Topic 3:Network Theory and the Design of Emergency Communication Systems

Telephones

- The telephone system is a one-to-one communication pathway, meaning it cannot be used for broadcasting.

- The one-to-one relationship between sender and receiver makes it ideal for messages containing sensitive or confidential information, such as casualty lists.

- The exclusive nature of most telephone circuits makes it difficult or impossible to break-in on a conversation to deliver a higher-priority message

Topic 3:Network Theory and the Design of Emergency Communication Systems

Telephones (continued)

- The major drawback to telephones during emergencies is that the sending and receiving station require wires and cables that can be damaged or destroyed.

- When the central switching center goes down or becomes overloaded, all communications on will come to a halt, regardless of priority or criticality.

Network Theory and the Design of Emergency Communication Systems

Fax

- Fax machines overcome the limitations of voice communications when it comes to dealing with high-precision, lengthy and complex information. Fax machines can transfer drawings, pictures, diagrams and maps.

- Today, fax machines are widely available. Most organizations use them as a routine part of their business communications. It is likely that a fax machine will be found at the school, church, hospital, government center, or other institution involved in emergency or disaster-relief efforts.

Topic 3:Network Theory and the Design of Emergency Communication Systems

Fax (continued)

- Most of today's computers (even laptops!) are equipped with modems that can send and receive fax information.

- Another advantage of fax machines is their production of a permanent record of the message as part of the transfer process.

- They also facilitate "time-shifting." But they rely on the phone system, and add one more piece of technology and opportunity for failure.

Topic 3:Network Theory and the Design of Emergency Communication Systems

Two-Way Voice Radios

- Whether on the public service bands, ham frequencies, using SSB or FM, voice radio is simple and easy to operate. Most units can operate on multiple frequencies, making it a simple matter to increase the number of available communication circuits as the need arises. Most importantly, the units are generally portable.

- Radios are ideal for broadcasting.

- Radios suffer from the low precision of voice communication.

Topic 3:Network Theory and the Design of Emergency Communication Systems

Trunked Radio Systems

- These systems are becoming highly popular with public service agencies. They are similar to the standard voice radio systems described above with two exceptions.

  1. Higher utilization of limited frequencies.

  2. Frequencies are shared.
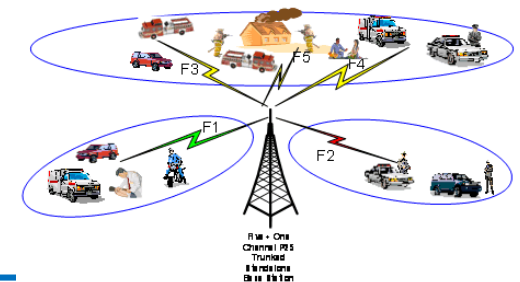
Topic 3:Network Theory and the Design of Emergency Communication Systems

Packet Radio

- As already mentioned, voice modes are ideal for low-precision messages. Digital data modes, on the other hand, facilitate high-precision message transfer.   Packet has the ability to provide a relatively permanent record of the message for later reference.

- The packet mode has an advantage when dealing with information that is in electronic form, there is no need for a conversion step before transmission.
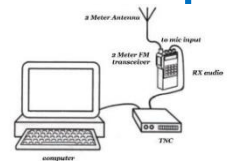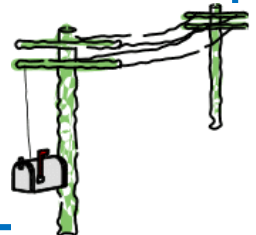
Topic 3:Network Theory and the Design of Emergency Communication Systems

Store-and-Forward Systems

- Sometimes considered a subset of packet radio, store-and-forward systems (bulletin boards, messaging gateways, electronic mailboxes, etc.) can handle non-time-critical messages and reference material, enabling communication in where sender and receiver are not available simultaneously.

Planning and Preparation—The Keys to Success

- Serious communication planners should give advance thought to the kinds of information that might need to be passed during each kind of emergency they wish to consider.

Topic 3:Network Theory and the Design of Emergency Communication Systems

Planning and Preparation (continued)

- You may be able to assist a served agency to prepare for the handling of detailed or complex messages by recommending that preformatted (e.g., fill-in-the-blank) messages and named kit lists be developed and circulated in advance among all parties to a given type of communication, effectively creating a "shorthand" message that can be sent more quickly and is prone to fewer errors.

Topic 3:Network Theory and the Design of Emergency Communication Systems

Planning and Preparation (continued)

- Identify the pathways for the most common messages, the next step is to check that the needed modes will be available during the emergency.

- Insure Your "jump kit" emergency pack has 2-meter radios, extra batteries and roll-up antennas.

- Put a list of critical phone numbers in your kit.

- Make sure your local packet digipeater has battery backup.

- If you are likely to be assigned to a school, church, or office building, see if you can get instructions for using the fax machine to keep in your kit.

Topic 3:Network Theory and the Design of Emergency Communication Systems

Planning and Preparation (continued)

- Contingency planning is also of critical importance. How many times has a repeater gone down, and only then did the communicators wish they had agreed in advance on an alternate simplex frequency?

- What will you do if you need to send a map and the fax machine power fails? Suppose you are relying on cellular phones and the cellular network fails?

Topic 3:Network Theory and the Design of Emergency Communication Systems

Training

- The final step is training. Your staffing roster, assignment lists, and contingency plans need to be tied in to the training and proficiency of your volunteers.

- Questions you might want to ask are: Who knows how to best use all the capabilities of today's cellular phones? Who knows how to use fax software? Who knows how to upload or download a file from a packet BBS? Who knows how to touch-type? By matching your needs with your personnel, you can identify areas where training is needed.

Topic 3:Network Theory and the Design of Emergency Communication Systems

Review Questions:

1 What mode should be used to send a list of casualties?

    a. A VHF repeater system.

    b. A secure mode.

    c. Packet radio.

    d. An HF net.

Topic 3:Network Theory and the Design of Emergency Communication Systems

2. **What types of messages are good to send by fax?**

   a. **High precision, lengthy and complex messages.**

   b. Simple low-precision, and short messages.

   c. Messages to many destinations simultaneously.

   d. High detail color photographs.

3. What types of messages should be handled by a packet bulletin board system?

   a. Time sensitive messages of immediate priority.

   b. Low precision messages.

   c. **Non-time-critical messages and reference material, when the sender and receiver cannot be available simultaneously.**

   d. Messages to be "broadcast" to numerous stations.

4. What is the pitfall that is common to telephone, cellular phone and trunked radio systems?

   a. They do not take advantage of the benefits of Amateur Radio.

   b. They are all difficult to use.

   c. They are seldom available at shelters and public safety agencies.

   d. They all require the use of a complex central switching system that is subject to failure in a disaster situation.

5. Which of the following is an example of an efficient communication?

   a. A ham communicating a lengthy list of needed medical supplies over a voice net.

   b. A lengthy exchange between two stations on a primary voice net channel being shared by a large number of users.

   c. Typing out a digital message that "the delivery van containing the coffee has arrived at this location" on a high-precision packet link.

   d. **Sending a shelter list on the office fax machine**

- Emcomm organizations provide training, and a forum to share ideas and develop workable solutions to problems in advance of a real disaster. This way, when the time comes to assist the served agency, you will be as prepared as you can be. The response will occur more smoothly, challenges will be dealt with productively and the served agency's needs met.

- Some of the organizations discussed here do not directly involve Amateur Radio operators, but knowing about them and how they might assist in an emergency may be helpful. Your served agency may utilize or interact with one or more of these systems or organizations.
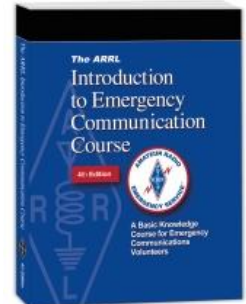
Amateur Radio Emergency Service (ARES)

- Among the largest and oldest emcomm groups is ARES, a program sponsored by the American Radio Relay League (ARRL).

- The elected Section Manager (SM) appoints the ARES leader in each Section, the Section Emergency Coordinator (SEC).

- Some larger Sections, like Wisconsin and Washington, or heavily populated Sections like Connecticut, are further divided into two or more Districts.

- Each District is guided by a District Emergency coordinator.

- The DEC works directly under the SEC.

ARES Organizational Structure
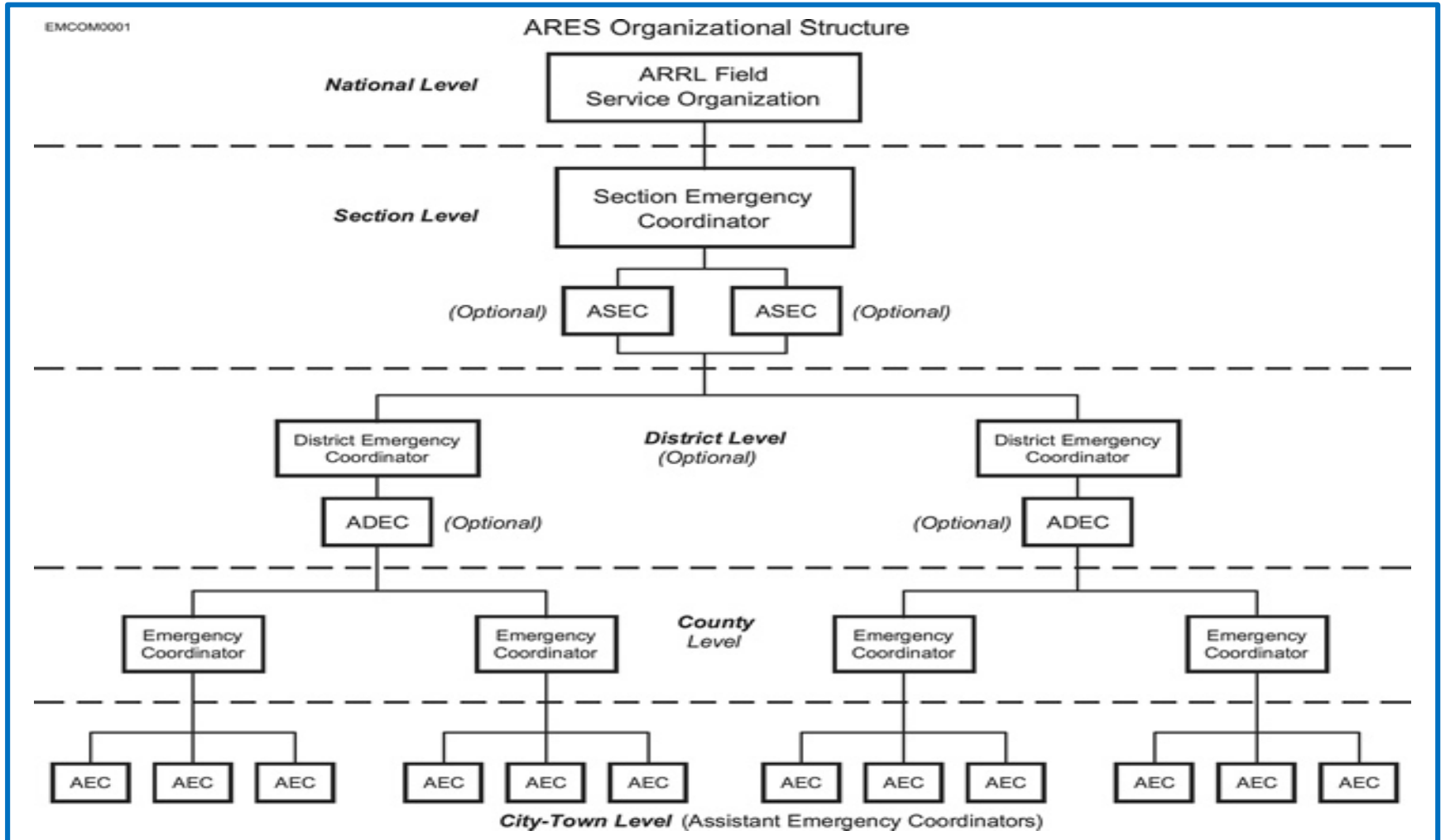
- The next subdivision within ARES is the "county" or similar region assigned to an Emergency Coordinator (EC).

- Most ECs will have one or more Assistant Emergency Coordinators (AEC), who may have responsibility for specific tasks or cities.

- ARES has Memoranda of Understanding (MOUs) with a variety of agencies at the national level.

Insert local District, Section and County organization chart with names here

Radio Amateur Civil Emergency Service (RACES)

- The federal government created RACES after World War II.

- The RACES rules addressed the need for Amateur Radio operators to function as an integral part of a state, county or local Civil Defense (CD) agency in time of national emergency or war.

- Over the years, both "Civil Defense" (now known as "Emergency Management" in most states) and the way it utilizes Amateur Radio operators have changed dramatically.

- Frequently RACES operators also belong to ARES, and can "switch hats" when the need arises.

Topic 4- Emergency Communication Organizations & Systems

The "Rapid Response Team" (RRT)

- In the first minutes of an emergency, a RRT, "Quick Response Team" (QRT), or "Rapid Emergency Deployment Team (RED Team). Is deployed.

- An RRT is small team within a larger emcomm group. Their job is to put a few strategically placed stations on the air within the first half-hour to an hour. These stations will usually include the emergency operations center (EOC), a resource net and often a few field teams where needed most. This is commonly known as a "Level 1 RRT response."

- A Level 2 RRT response team follows within a few hours, bringing additional resources and operators. Level 1 teams have pre-assigned jobs, and short- term (12-24 hour) "jump kits," ready to go whenever the call comes. Level 2 teams have longer term (72 hour) jump kits.

Topic 4- Emergency Communication Organizations & Systems

ARES Mutual Assistance Team (ARESMAT)

- When a communication emergency lasts longer than a day or two, or when the scale of the emergency is beyond the ability of a local ARES group to handle, help can be requested from neighboring areas.

- The ARESMAT concept was created to meet that need. These teams consist of hams who are willing to travel to another area for a period to assist ARES groups in the disaster area.

- If you travel to another area as part of an ARESMAT, remember that the local group is still in charge—you are there to do what they need done. In a sense, the host ARES group becomes a "served agency."

Emergency Communication Organizations & Systems

Radio Emergency Associated Communications Teams (REACT)

- REACT is another national emcomm group, whose members include Citizen's Band (CB) radio operators, hams and others. In addition to CB and Amateur Radio, they may use General Mobile Radio Service (GMRS), Family Radio and the Multiple Use Radio Service (MURS).

- REACT has an organizational structure similar to ARRL/ARES, with local teams who directly serve many of the same agencies served by ARES.

- REACT's mission is broader than that of ARES. They offer crowd and traffic control, logistics, public education, other services that usually (but not always) include a need for radio communication.

Topic 4- Emergency Communication Organizations & Systems

Review Questions:

1. **Which of the following best describes the ARES organizational structure?**

     a. ARRL –District–Section–County

     b. **ARRL—Section–District—County**

     c. ARRL –County–Region–Section

     d. ARRL –State – Region–Section

2. **Which of the following best describes the ARES chain of command *within* a Section?**

a. Section Manager–District Emergency Coordinator–Emergency Coordinator – Assistant Emergency Coordinator – Section Emergency Coordinator.

b. Section Emergency Coordinator– Section Manager—District Emergency Coordinator–Emergency Coordinator–Assistant Emergency Coordinator.

c **Section Manager–Section Emergency Coordinator–District Emergency Coordinator–Emergency Coordinator– Assistant Emergency Coordinator.**

d. Section Manager–Section Emergency Coordinator–Emergency Coordinator – District Emergency Coordinator– Assistant Emergency Coordinator.

3. **Which of the following best describes a Level 2 RRT?**

a. Is a first responder in any emergency.

b. Operates a few strategically placed stations within the first hour of an emergency.

c. **Responds within a few hours and is prepared with longer term (72 hour) jump kits.**

d. Is always affiliated with SATERN.

4. **Which of the following best describes an ARES Mutual Assistance Team (ARESMAT)?**

    a. Is generally available for tasks lasting less than one day.

    b. Is always from the local area.

    c. **An ARES team that is willing and able to travel to another area.**

    d. Is called out only when the President suspends regular Amateur operations.

5. **Which of the following is true about REACT?**

   a. REACT is a part of ARRL.

   b. REACT does not have an MOU with ARRL.

   c. REACT's mission is more restricted than that of ARRL.

   d. REACT's resources include CB, Amateur Radio, GMRS, FRS, and MURS.

TOPIC 5a -Served Agency Communication Systems

State and Local Government Radio Systems

These systems might include those licensed :

- – Police , sheriffs
- – Fire
- – highway and other state, county, or city departments.

- If you are asked to use any of these systems, be sure to learn their standard operating procedures and their "phonetic alphabet" system if one is used.

- Casual conversations are prohibited

- All transmissions must be directly related to the agency's mission.

State and Local Government Radio Systems (continued)

- Many police agencies are licensed for operation on 155.475 MHz, known as the "National Police Frequency."

- Unfortunately, many departments are not aware of its intended use and treat it as their own private "car to car" channel.

- Many will not know they have a common channel since they use "channel designators" rather than frequencies.

- CTCSS was not supposed to be used on this channel to ensure inter-agency compatibility, but many departments use it anyway. This may become important if different police agencies must intercommunicate with each other in an emergency.

TOPIC 5a -Served Agency Communication Systems

Medical Radio Systems

- In order to standardize emergency medical radio systems the FCC assigned a number of dedicated frequencies. In theory, every ambulance in the country should be equipped to use all these frequencies.

- The older system used 10 simplex VHF frequencies with a dial-type pulsed-tone encoder to signal specific hospitals. The newer Emergency Medical Radio Service uses **10 UHF duplex frequency pairs**; one assigned to the hospital, the other to the ambulance and **seven VHF simplex channels**. The UHF channel sequence is designated "Med 1" to "Med 10."

TOPIC 5a -Served Agency Communication Systems

Types of Served-Agency Radio Systems

- In larger jurisdictions, each agency will likely have its own radio system, independent of all other radio users.

- The FCC allocates specific radio frequencies to different types of agencies, and some for multi- agency use.

- A frequency designated for use by police agencies may only be used for police business.

- In addition to "simple" systems, there are three different types of systems that allow multiple user groups to share resources. These are known as 1. "community repeaters," 2. "trunked repeater systems," and 3. "shared simplex systems."

Trunked Systems

- Trunked systems provide an efficient means for several "low volume" users to share a single radio system.

- They use several co-located repeaters tied together, using computer control to automatically switch a call to an available repeater.

- When one radio in a group is switched to a new frequency, all the others in the group automatically follow.

- Trunked Radio systems are not authorized for the Amateur Radio Service.
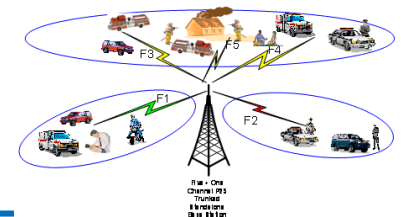
Trunked Systems (continued)

- In emergency situations most trunked systems suffer from a lack of reserve capacity.

- To keep designs cost effective, there are always many more user groups than available channels.

- The number of available channels is designed to handle the normal day-to-day communications load.

- When an emergency occurs, these systems can be quickly overloaded with calls, and finding a clear channel can be difficult or impossible.
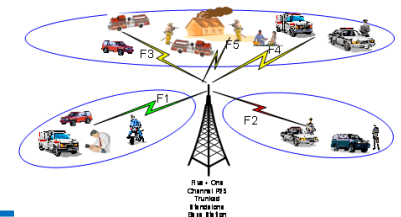
APCO Project 25 Radio Systems

- In the 1990s, a new public safety radio system standard (P25) was developed by APCO (Association of Public Safety Communications Officers) to deal with problems of interoperability between agencies.

- P25 radios are extremely flexible, with both forward and backward compatibility. This means that they can be configured to operate in both analog and digital modes, and as part of trunked and conventional radio systems.

- P25 radio systems are becoming more common across the country .

APCO Project 25

Common Air Interface
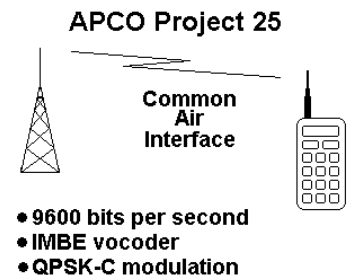
- 9600 bits per second
- IMBE vocoder
- QPSK-C modulation

TOPIC 5a -Served Agency Communication Systems

Telephone Systems

Telephone systems in use by public service agencies vary greatly. The served agency should be able to provide training in its use.

Most business telephone systems allow the following basic functions, with which you should be familiar:

- Answering incoming calls
- Placing outside calls
- Placing and answering intercom calls
- Making "speed dial" calls
- Overhead paging
- Placing calls on hold, and then retrieving them
- Transferring calls to another extension
- Transferring calls to voice mail, if available
- Retrieving calls from a voice mailbox

Satellite Telephones

- Satellite phones and data terminals are becoming more common among served agencies as the cost of ownership and airtime decreases.

- All satellite phones or terminals require that the antenna have a line-of-sight view to the satellite.

- Calls are typically expensive when compared to cellular telephone calls.

- In addition, the number of satellite telephones sold far outstrips the number of satellite channels available, so system overload remains a real possibility.

Other Agency-Owned Equipment

- In addition to radio and telephone systems, you may need to use:
  - fax machines
  - Copiers
  - Computers
  - Similar devices.
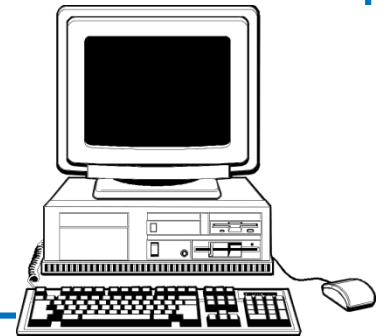
Review Questions

1. **When emcomm team members are called upon to operate on Public Safety Radio Systems, which of the following may they <u>NOT</u> do?**

   a. Use special "10 codes."

   b. Use the served agency's standard operating procedure.

   c. Use the phonetic alphabet employed by the served agency.

   d. **Engage in casual conversations.**

2. **Which of the following modes/devices would not be appropriate for you to use to transmit a message for a served agency?**

    a. Email on a computer with Internet connections.

    b. Fax machine.

    c. Land line telephone.

    d. ALL of these are appropriate and usable if needed.

3. Which of the following best describes the newer Emergency Medical Radio Services?

    a. Ten UHF duplex frequencies and seven VHF simplex channels.

    b. Ten simplex VHF frequencies with pulsed tone encoders
       for each hospital.

    c. Seven UHF duplex frequencies and ten VHF simplex channels.

    d. The Med Star system with channels Med 1 through Med 10.

4. Which one of the following statements is true about trunked systems?

   a. Trunked systems are able to operate without the use of computer controllers.

   b. The number of frequencies on a trunked system is always a multiple of 10.

   c. Amateur radio does not currently use this type of system.

   d. Most trunked systems have ample reserve capacity.

5. When emcomm teams work with a served agency, a number of assumptions are made. Which of the following assumptions are true?

   a. Amateur Radio operators can operate any communication equipment they encounter.

   b. There are NO significant differences between Amateur Radio operating procedures and the procedures used by the served agencies.

   c. **Served agencies must provide training if Amateur Radio operators are to be used effectively.**

   d. All phonetic alphabets are essentially the same and are thus interchangeable.

Where do I Get Started?

- Neighbors may band together in a variety of ways to help one another. Some have formal associations with a defined leadership structure.

- Law enforcement agencies often sponsor a Neighborhood Watch programs, designed to deter local crime in residential areas.

- Many areas have implemented Community Emergency Response Team ("CERT") programs, which teach basic skills – such as fire suppression, triage, first aid and light search & rescue – needed to survive when a disaster swamps the resources of official first responders.

Topic 5b:Working Directly with the Public

How Do I Get Started?

- Find out what preparedness activities are going on in your area and join a local group.

- Let the other participants know that you are a licensed Amateur Radio operator and want to help develop or improve the group's communication resources.

- It's also a good idea to take whatever local training is already offered in disaster preparedness so that your understanding will be at least equal to that of your neighbors

- Participation in local preparedness courses will also let you meet like-minded individuals with whom you can share ideas.

Start Now!

Topic 5b:Working Directly with the Public

Using FRS and GMRS Radios

- The most popular and ubiquitous communication tools not dependent on the telephone system or the Internet are Family Radio Service ("FRS") and General Mobile Radio Service ("GMRS") radios.

- FRS radios may be operated without a license. GMRS radios requires a license. If you are going to use a GMRS radio, get the license!

- Channel numbering can be a source of confusion for FRS and GMRS users because different manufacturers or models may assign a different number to a given frequency.

- Every radio owner should be able to power his or her transceiver from standard alkaline batteries.

Radio Protocol

Here are some basic practices to consider.

- Fire, police and military radio operators use of tactical call signs, usually associated with a specific function or location, and civilian groups can do the same.

- Descriptive tactical call signs such as "Utility One", "Farmington Command" or "Elm St, Fire" can reduce confusion.   Your group's communications plan should include any tactical call signs you decide to use.

Radio Protocol (Continued)

- It is also good practice to use the proword "Over" at the end of each transmission to another station. Since most FRS and GMRS is simplex.

- Speak – don't yell – slowly and distinctly. Yelling into an FM transceiver usually produces distortion rather than making one louder.

- Speaking across rather than into the microphone will produce clearer speech on the receiving end.

- Avoid noisy locations when possible.

- People not accustomed to using radios should practice these techniques.

Topic 5b:Working Directly with the Public

Linking To the Outside

- In addition to helping with neighborhood communications plans, Radio Amateurs may be called upon or expected to provide a link to adjacent areas or to first responders.

- You should set realistic expectations as to what you can accomplish. Surrounding areas may be experiencing the same problems you have locally. .

- Learn more by getting to know the formal Emcomm organizations in your area. Even if you are not a member you need to find out where they are likely to be stationed and how you can contact them.

Community Emergency Response Teams (CERT)

- The Community Emergency Response Team (CERT) Program educates people about disaster preparedness for hazards that may impact their area and trains them in basic disaster response skills.

- an independent study course "Introduction to Community Emergency Response Teams", IS-317 serves as an introduction to CERT for those wanting to complete training. It takes between six and eight hours to complete the course. .

Community Emergency Response Teams (CERT) (continued)

- IS-317 can be taken by anyone interested in CERT. However, to become a CERT volunteer, one **must complete the classroom training** offered by a local government agency such as the emergency management agency, fire or police department.

- For more information on CERT and REACT you can go to the following web sites.

  CERT http://www.citizencorps.gov/cert/training_mat.shtm#basictraining

  REACT http://www.reactintl.org/

Review Questions

1. **Which of the following is not a good practice when using FRS / GMRS radios?**

    a. Using tactical call signs.

    b. Operating away from sources of loud noise.

    c. Waiting for a frequency to be cleared by other users before transmitting.

    d. **Speaking very loudly directly into the microphone.**

2. **Which group might an Amateur contact about community-preparedness efforts?**

    a. Neighborhood Watch.

    b. Homeowners association.

    c. CERT team.

    d. All the above.

3. CERT is:

    a. A national certification program for ICS

    b. A volunteer program of trained people operating in teams under ICS protocols.

    c. A program mandated by FEMA for all parts of the country.

    d. An auxiliary of local Fire Department

Topic 6 Basic Communication Skills

Introduction

- An emergency communicator must do his or her part to get every message to its intended recipient, quickly, accurately.

- A number of factors can affect your ability to do this, including your own operating skills, and those of others.

- Life–and-death communications are not part of our daily experience.

- An unclear message, or one that is modified, delayed, mis-delivered or never delivered at all can have disastrous results.

Topic 6 Basic Communication Skills

Listening

- Listening is at least 50% to 90% of communication. Discipline yourself to focus on your job and "tune out" distractions.   A wise person once said, "A man has two ears and one mouth. Therefore he should listen twice as much as he talks."

- Sometimes the job of listening is complicated by noise. You might be operating from a noisy location Headphones can minimize local noise and help you concentrate on the radio signal.

- Digital Signal Processing (DSP), filters and other technologies may also help to reduce radio noise and interference.

Topic 6 Basic Communication Skills

Microphone Techniques

Even something as simple as using your microphone correctly can make a big difference in intelligibility.

- Talk across, rather than into, the microphone.

- Speak in a normal, clear, calm voice.

- Speak at a normal pace

- Pronounce words carefully

- A noise-canceling microphone is a good choice since it blocks out nearly all unwanted background noise

- Headset boom microphones with a noise-canceling type element Will help on the other end.

Topic 6 Basic Communication Skills

Microphone Techniques

- "Voice operated transmission" (VOX) is **not** recommended for emergency communication. Use a hand or foot switch.

- When using a repeater, be sure to leave a little extra time between pressing the push-to- talk switch and speaking to allow for system delays.

- A momentary delay in speaking after keying up will ensure that your entire message is transmitted, avoiding repeats for lost first words.

- Pause a little longer than usual between transmissions if there is a possibility that other stations may have emergency traffic to pass.

Pause
Break

Plain Language

- Not everyone involved in an emergency communication situation will understand our slang and technical jargon. Even terms used by hams vary from one region to another.

- For this reasons, all messages and communications during an emergency should be in plain language. "Q" signals (except in CW communication), 10 codes and similar jargon should be avoided. The one exception to this is the list of standard "pro-words" (often called "pro-signs") used in Amateur traffic nets, such as "clear", "say again all after" and so on.

Topic 6 Basic Communication Skills

Phonetics

- Certain words in a message may not be immediately understood. The best way to be sure it is understood correctly is to spell it.

- To reduce requests to repeat words, use phonetics anytime a word has an unusual or difficult spelling, or may be easily misunderstood. In some cases the receiving station may ask for the phonetic spelling.   Standard practice is to first say the word, say "I spell," and then spell the word phonetically.

Phonetics (continued)

ITU Phonetic Alphabet:

- A—alfa (AL-fa)
- B—bravo (BRAH-voh)
- C—charlie (CHAR-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—juliet (JU-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 (kay-BECK)
R—romeo (ROW-me-oh)
S—sierra (SEE-air-rah)
T—tango (TANG-go)
U—uniform (YOU-ni-form)
V—victor (VIK-tor)
W—whiskey (WISS-key)
X—x-ray (ECKS-ray)
Y—yankee (YANG-key)
Z—zulu (ZOO-loo

Phonetics (continued)

Pro-words

Pro-words, called "pro-signs" when sent in Morse code or digital modes, are procedural terms with specific meanings. ("Pro" is short for "procedural.") They are used to save time and ensure that everyone understands precisely what is being said.   Some pro-words are used in general communication, others while sending and receiving formal messages.

Voice	Morse	Meaning and Digital function
Clear	SK*	End of contact. In CW, SK is sent before final identification
Over	KN*	Used to let a specific station know to respond
Go ahead	K	Used to indicate that any station may respond
Out	CL*	Leaving the air, will not be listening
Stand by	AS*	A temporary interruption of the contact
Roger	R	Indicates that a transmission has been received correctly and in full

* Two letters are sent as one character in CW

Topic 6 Basic Communication Skills

Tactical Call Signs

- Tactical call signs can identify the station's location or its purpose during an event, regardless of who is operating the station. The tactical call sign allows you to contact a station without knowing the FCC call sign of the operator and eliminates confusion at shift changes or at stations with multiple operators.

- Tactical call signs should be used for all emergency nets and public service events if there are more than just a few participants.   Tactical call signs will usually provide some information about the location or its purpose.

Topic 6 Basic Communication Skills

Station Identification

- The FCC requires that you identify at ten-minute intervals during a conversation *and* at the end of your last transmission.

- The easiest way to be sure you fulfill FCC station identification requirements during a net is to give your FCC call sign as you complete each exchange. Most exchanges will be far shorter than ten minutes. This serves two important functions:

- It tells the NCS that you consider the exchange complete and It fulfills all FCC identification requirements.

Topic 6 Basic Communication Skills

A Review of <u>Habits to Avoid</u>

- Thinking aloud on the air: "Ahhh, let me see. Hmm. Well, you know, if…"

- On-air arguments, criticism, or rambling commentaries

- Shouting into your microphone

- "Cute" phonetics

- Identifying every time you key or un-key the mic

- Using "10" codes, Q-signals on phone, or anything other than "plain language"

- Speaking without planning your message in advance

- Talking just to pass the time.

Review Questions:

1. **In emergency communication, which one of the following is <u>NOT true</u>?**

    a. **Listening is only about 10% of communication.**

    b. Message errors can have huge and unintended consequences.

    c. A message that is never delivered can yield disastrous results.

    d Listening also means avoiding unnecessary communications.

Topic 6 Basic Communication Skills

2. **Which of the following procedures is best for using a microphone?**

   a. Hold the microphone just off the tip of your nose.

   b. Talk across, rather than into, your microphone.

   c. Shout into the microphone to insure that you are heard at the receiving end.

   d. Whenever possible, use voice operated transmission (VOX).

3. In emergency communications, which of the following is true?

   a. **Never use "10 codes" on Amateur Radio.**

   b. Use "Q signals" on served-agency radio systems.

   c. Under NO circumstances use "Q" signals on a CW net.

   d. Use technical jargon when you feel that it is appropriate.

4. Which of the following is always true of a tactical net?

   a. Personal call signs are never used.

   b. Personal call signs are always preferred over tactical call signs (such as "Aid 3").

   c. Personal call signs are required at ten- minute intervals during a conversation or at the end of your last transmission.

   d. Personal call signs are required at ten- minute intervals during a conversation and at the end of your last transmission.

5. Which of the following is the most efficient way to end an exchange on a tactical net?

    a. Say "Over".

    b. Say "Roger".

    c. Give your FCC call sign.

    d. Ask Net Control if there are any further messages for you.

Topic 7a - Basic Net Operations

Why We Have Nets

- Any list of the major strengths of Amateur Radio in an emergency setting includes our abilities to share information in a "group setting" in real time across multiple locations and even multiple served agencies. Unlike many other types of communications, our radio messages can be heard by everyone in the group at once - and they can respond. This gives flexibility to emergency response managers that is very useful. But, it can cause a problem if not organized.

Why We Have Nets (continued)

- During an emergency communication situation, a high volume of disorganized messages can quickly turn an overloaded communication system into a disaster of its own.

- To prevent this from happening, Amateur Radio operators use regular protocols called a "network" or "net" to organize the flow of messages.

- The mission of the net is to effectively move as much traffic accurately and quickly as possible. Nets can be either formal or informal as needs dictate.

Net Operations

- The Net Manager is the person in charge of a net, but is most often not the person who actually conducts the net on the air.

- Net Managers may be responsible for a regularly scheduled net, or may be temporarily appointed to manage one or more ad hoc nets created for a particular emergency incident.

- An NCS directs the minute-by-minute operation of the net on the air.

- Liaison Stations handle messages that need to be passed from one net to another. The NCS or Net Manager may assign one or more stations to act as liaisons between two specific nets. These stations can monitor one or both nets.

Net Types:

Open (Informal) Nets

- During an open emergency net, there is minimal central control by a Net Control Station, if there is an NCS at all.

Directed (Formal) Nets

- A directed emergency net is created whenever large numbers of stations are participating, or where the volume of traffic cannot be dealt with on a first-come first-served basis.

- In a directed net, the NCS controls all net operations. Check-ins may not "break into" (interrupt) the net or transmit unless specifically instructed to do so by the NCS

Traffic Net: Handles formatted written messages between served agency locations or between other nets. In emergency operations, these nets may handle the majority of message originations and deliveries. During an emergency ARES and the National Traffic System (NTS) work together closely, so it's a good idea to understand emergency traffic from the NTS operator's perspective.

Tactical Net: Tactical net(s) handle the primary on-site emergency communication. Their mission may be handling communications for a served agency, weather monitoring and reporting, river gauging, or a variety of other tasks that do not require a formal written message.

A resource net: may also be used to locate needed equipment, or operators with specific skills. Several different resource nets may be used in large-scale events.

Logistical Net: If required due to geography or high net activity, a third net could handle on-going logistical support needs.

Tactical Net: Tactical net(s) handle the primary on-site emergency communication. Their mission may be handling communications for a served agency, weather monitoring and reporting, river gauging, or a variety of other tasks that do not require a formal written message.

Information Net: An information net might be used to make regular announcements, disseminate official bulletins or answer general questions that might otherwise tie up other nets that are busy handling incident-related communications.

Health and Welfare (H&W) Nets: Usually handle messages between concerned friends, families and persons in the disaster area. Most H&W nets will be on HF bands, but local VHF or UHF "feeder" nets may be needed within a disaster area.

1. **Which of the following requires no NCS to control net operations?**

    a. **An Open Net.**

    b. A Directed Net.

    c. An NTS Net.

    d. A Health and Welfare Net.

2. Which of the following is true of Directed Nets?

a. There is minimal direction from a Net Control Station.

b. There is no clearly assigned mission.

c. They serve only as Liaison Nets between several simultaneous nets during large operations.

d. They are used when the volume of traffic is too great to be handled on a first-come, first-served basis.

3. **Who is responsible for ensuring a smooth flow of traffic within and between nets?**

    a. The Official Observer.

    b. The Net Manager.

    c. The Liaison Station.

    d. The NTS Emergency Coordinator.

4. Which type of net would handle non-formal communications for a served agency?

     a. Health and Welfare Net.

     b. Tactical Net.

     c. Resource Net.

     d. Traffic Net.

5. Which of the following statements concerning nets is true?

a. **Resource Nets are used to assign operators as they become available.**

b. Health and Welfare Nets operate only on HF bands.

c. NTS Traffic Nets handle both formal and informal long distance messages.

d. Tactical Nets handle only formatted, written messages.

Topic 7b – Introduction to Emergency Nets

Nets: The purpose of any net is to provide a means for orderly communication within a group of stations.

- **Emergency net:** may be a directed formal or informal, depending on the number of participants and volume of messages.

- **Directed (formal) Nets:** In a directed net, a "net control station" (NCS) organizes and controls all activity.

- **Open (informal) Nets:** In an open net, the NCS is optional. Stations may call each other directly. When an NCS is used at all, he/she usually exerts minimal control over the net.

Types of Emergency Nets: Emergency nets may have different purposes, and a given emergency may require one or more of each type of net.

- **Traffic nets** handle formal written messages in a specified (i.e. ARRL) format. The nets operated by the National Traffic System (NTS) are an excellent example of traffic nets.

- **Tactical Nets** – In general, the tactical net(s) handle the primary on-site emergency communication. Their mission may be handling communications for a served agency, weather monitoring and reporting, river gauging, or a variety of other tasks that do not require a formal written message.

Types of Emergency Nets (continued)

- **A "resource" or "logistics" net** may be needed to acquire resources and volunteers, and handle assignments. It is usually a directed net. It might also be used to locate needed resources, such as equipment, food, water and other supplies for emcomm volunteers.

- **An information net** is usually an open net used to collect or share information on a developing situation, without overly restricting use of the frequency by others.

Checking Into an Emergency Net

- If you are *not* part of the organization operating the net, do not just check in and offer to assist.

- Listen for a while. Be sure you have something specific to offer before checking in.

- If they really do seem to need help that you feel you can provide, you might check in briefly to ask if they have a "resource" net in operation, then switch to that frequency. If not, make a brief offer of assistance to the NCS.

Passing Messages

- If you told the NCS you have traffic to send when you checked in, he/she will probably ask you to "list your traffic" with its destination and priority.

- After you send your list, the NCS will direct you to pass each message to the appropriate station in the net, either on the net frequency, or another frequency to avoid tying up the net. When moving to another frequency to pass the message, always check to see if the frequency is in use.

- When you are asked by the NCS to send your message, the standard procedure is for the NCS to tell the receiving station to call the sending station.

Checking Out of an Emergency Net

Always let the NCS know if you are leaving the net, even if only for a few minutes. If the NCS believes you are still in the net, they may become concerned about absence.

Reasons for checking out of (leaving) a net are:

1. The location of your station is closing.

2. If the NCS has given you directions to close the location, simply acknowledge the request, and sign with your tactical call sign, if you are using one, and your FCC call sign.

3. If the order to close has come from a local official, state that your location has been closed, along with the name and title of the official who ordered it, and sign off as above.

Checking Out of an Emergency Net (continued)

4. You need a break and there is no relief operator.
   Tell the NCS that you will be away from the radio for a certain length of time, the reason and sign with your tactical call sign, if you are using one, and your FCC call sign.

5. IF you have turned the location over to another operator.
   Tell the NCS that you have turned the station over to (give the new operator's name and FCC call sign), and that you are leaving. Sign with your tactical call sign, if you are using one, and your FCC call sign.

Exit

Checking Out of an Emergency Net (continued)

There are two special situations to be aware of:

- If someone in authority asks you, such as a law enforcement officer, to move your station, then move immediately and without argument. Notify the NCS of the situation at the first appropriate opportunity.

- If requested by someone in authority to turn off your radio, or to refrain from transmitting, do so immediately and without question. Notify Net Control when you have permission to transmit again, and can do so safely.
There is usually a good reason for such a request.

Review Questions:

1. **Which of the following best describes a net?**

   a. A group of stations who purposely frequent the airwaves.

   b. **A group of stations who gather on one frequency with a purpose.**

   c. A group of stations who occasionally meet on various frequencies.

   d. A group of stations who propose to meet at a particular time.

2. **What is a major difference between an "open net" and a "directed net"?**

    a. **The presence or absence of full control by a Net Control Station.**

    b. The presence or absence of formal traffic.

    c. The type of radio traffic on the net.

    d. The approval or sanction of net operations by the FCC.

3. Which of the following is true of a "tactical net"?

   a. The net is used to acquire volunteers and to handle assignments.

   b. The net is used for the coordination of activities associated with future emergencies.

   c. The net may be directed or open, but will usually have a Net Control Station.

   d. The net handles only formal traffic.

4. When should you check in to an emergency net?

   a. When you want to comment on something that someone else has said.

   b. When you are tired of listening.

   c. When you first join the net and when you have messages, questions or relevant information.

   d. When you first join the net and when you would like to send greetings to one of the participating stations.

5. What should you do if someone in authority asks you to move your station?

    a. **Do so immediately without argument and report to the NCS as soon as possible.**

    b. Call the NCS for advice before moving.

    c. Tell the person in authority how difficult it is for you to comply.

    d. Demand a written order before complying.

Introduction

- Every organization needs an executive-level manager to oversee the entire operation and ensure that everything runs smoothly. Depending on the type of net, the Net Manager will be responsible for recruiting and training NCS operators, liaison stations and other net members.

- In a long-term emergency net, the Net Manager may also arrange for relief operators and support services. Some net managers may be responsible for more than one net.

The NCS

- Think of the NCS as a "traffic cop." The NCS decides what happens in the net, and when. It is the NCS's job to make sure that the Emergency message is sent first.

- The NCS is in charge of one specific net. NCS is not responsible for the entire emcomm operation. That is the job of the EC. It is not possible to be in command of all aspects of an emergency response, and still run a net effectively.

Topic 7c – Net Operating Guidelines

Acting as a "fill-in" NCS

- Even before you have had a chance to be trained by your group to act as a NCS operator, an opportunity might arise for you to handle the job temporarily. Fortunately, basic NCS skills are not difficult to teach or learn. Here are some basic dos and don'ts:

    - Remember that although you are in control of the net, you are not "God." Treat members with respect and accept suggestions from other experienced members.

    - If you are taking over an existing net, try to run it much as the previous NCS did.

    - Always follow a script if one is provided.

Topic 7c – Net Operating Guidelines

Acting as a "fill-in" NCS (continued)

- Handle messages in order of precedence: Emergency—Priority—Welfare—Routine.

- Speak clearly and in a normal tone of voice. Use good mic. technique.

- Make all instructions clear and concise, using as few words as possible.

- Keep notes as you go along. Do not let your log fall behind.

- Write down which operators are at which locations. When one leaves or is replaced, update your notes.

- Ask stations to pass messages off the main net frequency whenever possible.

- All the reading and study in the world will not replace actual experience. You should look for opportunities to practice being the NCS operator well before an emergency occurs.

Topic 7c – Net Operating Guidelines

Bulletin Stations

- In some nets, the NCS does not send out bulletins and other incident related information. That is the role of the "bulletin station." This station relays ARRL bulletins or those authorized by the served agency to all stations in the net. They may also be transmitted on a preset schedule, such as at the top and bottom of each hour. The bulletin station must be located at the served agency or have a reliable communication link to them.

Topic 7c – Net Operating Guidelines

Liaison Stations

- Liaison stations pass messages between two different nets. The NCS or Net Manager usually assigns these stations. Messages may be passed as needed, or on a pre-set schedule. The other net has a liaison station who does exactly the same thing, but in reverse.

- In other situations, a single liaison station may need to handle messages going both ways between two nets. There are two ways to do this. You can use two radios to monitor both nets at the same time, a difficult task if either or both nets are busy.
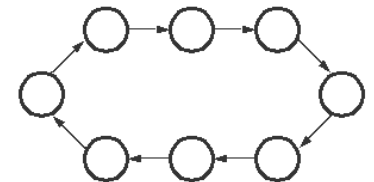
Relay Stations

- While not a regular net position, a relay station is one that passes messages between two stations in the net that cannot hear each other. Relay stations are generally designated by the NCS on an "as needed" basis.

- If you can hear a station or stations that the NCS cannot, it is OK to volunteer to act as a relay station.

Workload and Shift Changes

- Although it happens frequently, no operator should try to work excessively long hours. When you become tired, your efficiency and effectiveness decline, and your served agency is not getting the best possible service.

Non-voice Modes

- **Packet** modes include FM packet, HF packet and PACTOR. Because packet modes can provide an automatic connection between two stations, it is not really proper to speak of a "packet net." Although messages can be transmitted between two stations "keyboard to keyboard" as with RTTY or PSK31, it is usually better to transmit them as "traffic," using the bulletin board or mailbox facility of the terminal node controller (TNC).

- Packet messages are automatically routed and stored without any action by the receiving station's operator or a NCS.

Non-voice Modes (continued)

- **Non-packet** digital modes are not automatic, and may require a NCS operator to manage the net in much the same way as a phone or CW net. These include RTTY, PSK31, AMTOR and GTOR.

Interference Problems

- If your net experiences interference, the NCS has several options. If the interference is coming from adjacent or co-channel stations that may be unaware of the emergency net, the NCS should politely inform them of the net and ask for their cooperation.

- Alternatively, the NCS might ask an HF net to move over a few kHz. If the problem cannot be resolved in this manner, each net should have one or more alternative frequencies that it can move if required. If possible, the frequencies themselves should not be published or mentioned on the air.
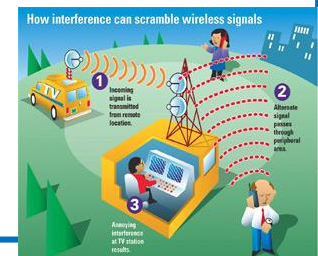
Interference Problems (continued)

- Never discuss, acknowledge or try to speak with an intentionally interfering station. Experience has proven that this only encourages the offender. If the interference makes communication difficult, simply announce to the net that everyone should move to the alternate frequency and sign off.

- Put a plan in place so that when interference occurs, all net members know to move to the alternate frequency without being told to do so on the air.

- If intentional interference persists, the Net Manager or NCS can contact an elected League official or an Official Observer Station, and ask that the FCC be notified of the interference.

1. **Which of the following best describes the responsibilities of the NCS in an emcomm operation?**

   a. The NCS is responsible for all aspects of the emcomm operation.

   b. The NCS is responsible for station check in.

   c. **The NCS is responsible for all aspects of the net's operation.**

   d. The NCS is responsible for writing the net script.

2. **As acting "fill in" NCS, which of the following practices would you *avoid*?**

   a. Try to run an existing net much as the previous NCS did.

   b. Handle messages in order of precedence: Emergency-Priority-Welfare.

   c. Keep notes as you go along: do not let your log fall behind.

   d. **Ask stations to pass messages on the main net frequency whenever possible.**

3. Which of the following is true of a liaison station?

a. The liaison station mainly relays bulletins authorized by the served agency to all stations on the net.

b. A liaison station passes messages only on a pre-set schedule.

c. A liaison station handles only one-way traffic.

d. A liaison station passes messages between two nets.

4. Packet modes include which of the following groups?

   a. FM packet, HF packet and PACTOR.

   b. HF packet, PACTOR and PSK31.

   c. PACTOR, PSK31 and RTTY.

   d. PSK31, RTTY and PACTOR.

5. **You are the NCS of a net involved in an emcomm operation and you notice that some other station is intentionally interfering with your net. Which of the following represents your best course of action?**

   a. Shut down the net and go home.

   b. Address the interfering station directly and inform them of the error of their ways.

   c. **Move the net to an alternate frequency.**

   d. Contact the EOC and continue to operate.

Introduction

- On July 14, 2010 the FCC issued a Report and Order amending the rules to permit amateur radio operators to transmit messages, ***under certain limited circumstances***, during either government-sponsored or non-government sponsored emergency and disaster preparedness drills, regardless of whether the operators are employees of entities participating in the drill.

- Tests or drills that are not government-sponsored are limited to a total time of one hour per week; except that no more than twice in any calendar year, they may be conducted for a period not to exceed 72 hours.

RULES

Topic 7d – The FCC Ruling on Drills and Employees

Federal Communications Commission FCC 10-124

- Although public safety land mobile radio systems are the primary means of radio-based communications for emergency responders, experience has shown that amateur radio has played an important role in preparation for, during, and in the aftermath of, natural and man-made emergencies and disasters.

- The amendment does not permit communications unrelated to the drill or exercise being conducted.

- For more information what is allowed in the Final Rules see the FCC rules part 97.113 Prohibited transmissions

Review Questions:

1. **What is a maximum amount of time a radio amateur can participate in a government sponsored drill on behalf of their employer?**

   a. One hour.

   b. 72 hours twice a year.

   c. **There is no limit.**

   d. Never.

2. What is the maximum amount of time a radio amateur can participate in a non-government sponsored drill on behalf of their employer?

a. **One hour a week.**

b. Never.

c. There is no limit.

d. No limit if it is for a hospital.

3. Your employer wants you to design and operate an Amateur Radio system between office buildings so his business can still function even if the phones and intranet are down. He says that, for him, "No phones is an emergency." Should you do it?

a. Yes

b. No

Topic 8 – The Net Control Station (NCS)

The NCS

- A Formal (directed) nets will always have one station "in control." This station is known as the *"Net Control Station" (NCS)*, and its operator as the "*NCS operator*."

- Think of the NCS operator as sort of a "traffic cop," directing the orderly flow of messages. His or her skills are critical to the success of any emergency communication net.

- Practice sessions are often helpful for this purpose, and many ARES groups schedule regular weekly practice sessions.

When Do You Need An NCS?

- All formal (directed) nets require an NCS. Formal nets are used to maintain order when a large number of stations are in the net, or when a large volume of messages are being sent.

- Some informal nets will have a "standby" NCS, although by definition informal nets are not controlled. This person is there to keep things organized when necessary, to answer questions, keep the frequency clear, and to step in and "upgrade" the net to "formal" status if it becomes necessary.

How Important Is A Well-Trained NCS Operator?

- The value of the NCS operator's skill is unquestionable. A well run net meets the needs of the served agency – a poorly run net can end Amateur Radio's relationship with the agency.

- The NCS operator must be a good organizer, and know how to defuse tension and stress.

The Right Stuff

Do you have what it takes to become a good NCS operator? Here is a short list of basic pre-requisites:

– A clear speaking voice –

– The ability to handle mental and physical stress for long periods. Information and demands will be coming at you from all directions all at once.

– The ability to think and act quickly , and are you able to make decisions under pressure?

– The ability to listen and comprehend in an often noisy and chaotic environment. Can you tune out all the distractions and focus only on the job at hand?

– Above-average general knowledge and operating skills in the modes used (phone, digital, or CW).

Learning and Practicing Your Skills

- Book learning alone will not make you a competent NCS operator. It takes practice to learn these skills.

- Net control skills can be learned through regularly scheduled training nets. Actual emergency conditions can be simulated with periodic drills and simulations such as the annual Simulated Emergency Tests (SET).

- A real emergency is not the time to learn or practice new skills, unless there is no other option. A poorly trained or inexperienced NCS operator can do as much harm as good.

The NCS Operator

- The duties of the NCS operator should be limited to running the net. This is a full-time job all by itself.

- The NCS operator should not be in charge of the overall communication effort, or of any portion of the response beyond his or her own net and shift.

- The Net Manager generally handles the assignment of NCS operators, frequencies, and schedules, and may also recruit members for the net.

- It is best for the Net Control Station to work away from any location that is also a significant originator or destination of message traffic.

Review Questions:

1. **Which is the primary purpose of a "standby" NCS in an informal net?**

    a. To make certain that the informal sharing of information flows smoothly.

    b To encourage others to join in the informal conversations.

    c. **To upgrade the net to formal status if it becomes necessary.**

    d To acquire monthly service points.

2. The NCS operator is responsible for which of the following?

   a. Being in charge of the overall communication effort.

   b. Being in charge of the net during his shift.

   c. Being in charge of net operations beyond his net and shift.

   d. Being in charge of frequencies, schedules and recruiting.

3. Which is <u>least desirable</u> time to train new operators?

a. **During an emergency.**

b. During a tabletop exercise.

c. During a public service event.

d. During a regularly scheduled training

4. Which best describes the <u>primary</u> mission of the NCS operator?

    a. To train net operators.

    b. To understand the Incident Command System (ICS).

    c. To help the net move as much traffic as possible in the least amount of time, accurately and effectively.

    d. To tune out all distractions and to focus on the job at hand in an often noisy and chaotic environment.

5. **Which of the following does *not* represent "the right stuff" to become a good NCS operator?**

a. The ability to handle mental and physical stress for long periods.

b. The ability to write legibly.

c. **The desire to be seen as important in a response despite lack of training.**

d Above average operating skills.

The following is a list of questions the NCS operator should answer before opening the net.

- Can the NCS hear all the stations in the net at their location?

- Is the NCS location sufficiently separated from the served agency's operations?

- Do you have the best performing antenna for the conditions?

- Are you using a headset with a noise-canceling microphone?

- Do you have sufficient pencils/pens and paper to run the net for your shift?

The following is a list of questions the NCS operator should answer before opening the net. (continued)

- For VHF/UHF repeater operation, are you familiar with the characteristics and control commands of the repeater system hosting your net?

- Do you have a runner, liaison, or logging person to support you?

- Do you have a designated back-up net control station?

- Do you have a designated relief operator?

Topic 9 – Net Control Station (NCS) Operator Practices)

Opening and Closing the Net

- Nets may be opened or closed on a specific schedule, or when the situation dictates.

- Each net session should begin with the reading of a standard script that describes the purpose of the net and its basic procedures and protocols.

- At the end of each net session, you can read a similar script, also briefly thanking members for participating, and reminding them of any future nets or other obligations.

- All scripts should be kept short and to the point

The Importance of Message Precedence

- In a communication emergency, one of the NCS operator's primary concerns is "information overload."

- **There are four message precedence's**:

    – **Emergency** (relating to the immediate protection of life or property)

    – **Priority** (served agency and ARES messages directly related to the emergency, but not as time sensitive as an Emergency precedence message.

    – **Health & Welfare** (Inquiries or information about the whereabouts or condition of persons in the affected area.

    – **Routine** (Messages unrelated to any emergency: birthday greetings, net activity reports, etc.)

Topic 9 – Net Control Station (NCS) Operator Practices)

Highest Precedence

- The primary job of the NCS operator is to ensure that messages with the highest precedence are sent first – *emergency*, then *priority*, then *health and welfare*, then *routine*.

Asking for Check-Ins

- Ask for check-ins immediately after reading the opening script, and then periodically during the net's operation.

- If the net is handling only *emergency and priority* messages, but not *welfare* or *routine* messages, it is important to state this in the opening script.

- If *emergency* messages are likely, it is a good idea to ask for them first, then go to *priority*, and finally *welfare*.

- Try to ask for "check-ins with traffic only" as often as possible.

- When taking check-ins, NCS should read back the calls they received, and then ask if they missed anyone. This method can cut the time required for check-ins.

Time Tested Techniques

- **Listen!** When asking for reports or soliciting traffic, ***listen carefully***! It is easy to miss critical information when operating under the stress of an emergency.

- **Wear headphones** and reduce any distractions around you.

- **Check-ins** - After asking for check-ins, note on your net worksheet as many calls as you can before you acknowledge anyone. Acknowledge all stations heard by call, ask for fills on any partial calls heard and then ask if you've missed anyone.

- **Pair up stations to pass traffic** on a different frequency whenever possible. This practice results in net "multi-tasking" and a higher rate of traffic handling.

Time Tested Techniques (continued)

- **Be as concise as possible**. Use the fewest words that will completely say what you mean.

- **Control the tone of your voice**. Be as calm as possible. Tension tends to cause voices to increase in pitch, and net members will detect this change..

- **Legally Identify Yourself**. In the heat of things, especially using tactical call signs, it is easy to forget the requirement to identify.

- **When conducting a net using a repeater with a PL tone,** don't forget to announce the PL tone! Valuable time can be lost trying to find it, and emergency messages missed.

Topic 9 – Net Control Station (NCS) Operator Practices)

Microphone Technique

- Know how to use your microphone. The worst NCS is one that can not be understood due to poor microphone technique.

- Articulate, don't slur. If your natural speech is rapid-fire, you may want to train yourself to slow down a bit on the air.

- Three major categories of microphones are commonly used in amateur stations

    1. noise-canceling,

    2. unidirectional,

    3. omnidirectional

- If you are using a ***noise-canceling*** microphone, you have to get quite close to it for best effect.

Microphone Technique (continued)

- If you are using a *unidirectional* microphone, you'll probably want to speak directly into it (on axis) for best performance.

- The common electret mics that are supplied with most rigs are *omnidirectional* - equally sensitive in all directions. These microphoness often pick up unwanted background noise.

- On HF, it is critical to adjust the microphone gain and compression to achieve a good signal. Misadjustment can cause over-modulation and distortion. All band radios have speech compression that can be turned on and off. It is meant to be used with SSB, and should never be used with FM.

Topic 9 – Net Control Station (NCS) Operator Practices)

Hints for Successful NET Operation:

- *Keep transmissions as short as possible without losing message clarity*.

- *For voice nets, use only plain English and standard "prowords" (procedure words).* "Q" signals are only for CW, and 10-codes are passé even for CB - Keep the net formal and professional, but friendly.

- If the net is a scheduled net, start on time! *Tardiness indicates poor management and doesn't inspire confidence in the NCS.*

- *Use a script to promote clear and concise communication.* Scripts can be used to open and close the net, and for periodic "housekeeping" announcements.

Hints for Successful Operation: (continued)

- Frequently identify the name and purpose of the net. Advise listeners of the sub-audible squelch tone (CTCSS or DCS) required, if applicable.

- If the net is an emergency operation, use your scripts to tell listeners where to find other nets, such as resource or specialized nets. Be friendly, yet in control. Speak slowly and clearly with a calm, even, tone – not a monotone. Speak with confidence, even if you are inwardly nervous.

- Acknowledge requests promptly and specifically so that net participants are not left wondering if they were heard or which one of several callers was recognized.

- Ask specific questions – give specific instructions. This reduces the need for "repeats" and prevents confusion.

Topic 9 – Net Control Station (NCS) Operator Practices)

Hints for Successful Operation: (continued)

- Have pencil and paper ready – write down ALL calls and tactical call signs. Practice writing down everyone's calls when you are not the NCS.

- Read your radio's owner's manual and know your radio before an emergency occurs.

- During check-ins, recognize participants by their tactical call sign whenever possible—it helps to let everyone else know which stations are on the air and become familiar with what the tactical call signs are.

Topic 9 – Net Control Station (NCS) Operator Practices)

Hints for Successful Operation: (continued)

- Don't be afraid to ask for assistance if you need it.

- Transmit only facts. If there is a <u>real</u> need to make an educated guess, make it clear to others that it is <u>only</u> speculation and not fact.

- When necessary, use standard ITU phonetics. There is no such thing as "common spelling." Send all numbers as individual numbers, e.g., 334 is "three three four"

Review Questions

1. **Which of the following statements is *true*?**

   a. The NCS should ask for check-ins immediately before reading the opening script.

   b. The NCS should ask for check-ins just before reading the closing script.

   c. **The NCS should ask for check-ins immediately after reading the opening script and periodically thereafter.**

   d. The NCS should ask for check-ins every ten minutes during the operation of the net.

2. In which order should messages be handled during an emergency?

   a. Priority, Emergency, Health & Welfare, Routine.

   b. Emergency, Priority, Health & Welfare, Routine.

   c. Emergency, Health & Welfare, Priority, Routine.

   d. Health & Welfare, Emergency, Routine, Priority.

3. Which of the following should the NCS operator *not* expect of trained net members?

    a. To ask the NCS operator for permission to call another station.

    b. To answer promptly when called by the NCS operator.

    c. To follow established net protocols.

    d. To rely exclusively on FCC call signs during net operations.

4. **Which of the following are appropriate to use in an emergency phone net?**

   a. Plain English and 10-Codes.

   b. **Plain English and prowords.**

   c. Q-signals and prowords.

   d. Q-Signals and 10-Codes.

5. Which is the best way to enlist the cooperation of the net?

a. Immediately criticize net operators who make a mistake so that other operators will learn from the error.

b. Issue an order demanding the cooperation of all net operators.

c. **Explain what you are doing in a calm and straightforward manner.**

d. Immediately expel operators from the net who do not follow net protocol.

- The Net Manager (NM) has overall responsibility for the planning and operation of one or more nets.

- Net Managers are used in both the National Traffic System (NTS) and in ARES organizations.

- In NTS, he or she also handles human resource and training issues, but this may not be true in ARES organizations.

- Whether you have one net or a dozen, you need a Net Manager. You might ask, "Could the NCS (Net Control Station) operator do this job as well?" During an emergency, NCS operators might change every few hours. In addition, both jobs must be done simultaneously.

Topic 10 – The Net Manager

The NTS Net Manger is a full ARRL member appointed by the Section Manager

- Usually on the recommendation of the Section Traffic Manager.

- In ARES, the appointment is recommended to the SM by either the SEC, DEC, or EC, depending on the level of the net.

- It is also the NM's responsibility to make sure that the NCS operators on the roster have received the proper training in the way nets should be conducted before appointing them as NCS.

- During an emergency, "ad hoc" nets may be created to meet specific needs.

Organization

- Net Managers may be assigned to handle only one net, or many.

- Separate NMs should be appointed for ARES and NTS, since the needs and functions of the nets of the two organizations can be quite different.

- All ARRL NMs, both NTS and ARES, should work under the Section Traffic Manager (STM) and/or Section Emergency Coordinator (SEC).

Topic 10 – The Net Manager

Duties

- The Net Manager's duties include resource management and quality control. He/she makes certain that a NCS operator is assigned to each session

- Recruit net members for certain types of nets to ensure that delivery of messages is possible everywhere.

- The nature of this job, like other leadership positions, demands excellent people and management skills. The NM's own operating and message handling skills should be superior so that the NM can help teach others.

Leadership
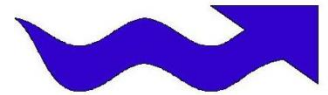
Training

The Net Frequency

- The **Net Manager (NM)** will choose the net's frequency(s).

- Scheduled and pre-planned nets usually operate on designated frequencies

- Net frequencies on HF should always be listed as "plus or minus 5 kHz" to allow for interference.

- FM simplex nets should use a frequency that is seldom used by local hams for day-to-day conversations.

- Nets that use repeaters should make prior arrangements with the repeater's owner. If a net uses a repeater as its primary meeting place, a backup simplex frequency should be chosen and in the event the repeater fails.

Some Points for Net Managers to Remember:

- You are responsible for managing the net net discipline by setting a good example, and take the net yourself from time to time to do so.

- Ensure that traffic on the net is handled in a timely manner. Do not let the net become too informal and waste time.

- Know how and where your net fits into the overall net structure at all times, since the situation may change periodically. Working with SEC's, DEC's and EC's will help produce good results.

Key points

Some Points for Net Managers to Remember: (continued)

- Assign or identify liaison stations to move traffic from one net to the other(s).

- Assign alternate NCS in case the primary NCS goes off the air.

- Get all the information you can before you put a net into service.

- Provide direction in the routing and handling of various types of messages. Determine the physical location of each served agency site early on to ensure proper routing.

- Monitor the net(s) to be sure proper procedures and message formats are being used.

- Training is crucial to success "when the big one hits." A varied and interesting training schedule will help keep net members ready to go.

Key points

Review Questions:

1. **What are the requirements and qualifications of the ARRL Net Manager position?**

   a. There are no specific requirements or qualifications for the position.

   b. **Amateur Radio license; full ARRL membership; and any appropriate local or Section qualifications.**

   c. An Amateur Extra Class license; and the approval of ARRL Headquarters.

   d. The approval of the emergency management agency holding jurisdiction in the area.

2. Which statement best describes the Section Net Manager's job?

a. Coordinate public information in the Section.

b. Provide technical information to members of ARES and/or NTS.

c. Appoint the local Emergency Coordinators.

d. Coordinate and supervise traffic handling and net activities in the Section.

3. **Which factor <u>does not</u> affect the number of Net Managers appointed in each Section?**

   a. The Section's geographical size.

   b. The number of nets operating in the Section.

   c. Other factors having to do with the way the Section is organized.

   d. The ARRL Emergency Preparedness Manager.

4. **Who appoints the NTS Net Manager?**

a. **Section Manager.**

b. Division Director.

c. ARRL Headquarters staff.

d. Local EC.

5. To whom does the Section Net Manager report?

   a. Division Director is responsible for supervising all Field Organization activity.

   b. ARRL HQ staff is responsible for supervising all Field Organization activity.

   c. Section NMs work under the STM and/or SEC, guided by a coordinated Section traffic or ARES communications plan.

   d. Emergency Management personnel.

Topic 11 – Introduction to The National Traffic System (NTS)

What is the NTS?

- The National Traffic System (NTS) is a unique arrangement for handling messages.   Organized traffic handling was a central purpose of ARRL at its founding in 1914. Its goal is to enable a message to be passed across the continent within 24 hours.

- One of the most important features of the NTS is the "system concept." Each net performs a specific function in the overall organization.

- Daily traffic kept NTS members in practice for handling large volumes of traffic during emergencies and disasters, the reason for the NTS's existence.

Topic 11 – Introduction to The National Traffic System (NTS)

What is the NTS? (continued)

- The NTS is not part of ARES, but is a separate and distinct ARRL program. The NTS and ARES work together. Think of the NTS as a "long distance carrier," and of ARES as the "local exchange carrier."

Topic 11 – Introduction to The National Traffic System (NTS)

How the NTS Works

- The National Traffic System consists of four different levels of nets. These operate in an orderly time sequence to move messages in a definite pattern from origin to destination.

- A transcontinental message starts with the originating station in a local net, is carried up to the "Section" net, then up to the "Region" net, then up to the "Area" net, across to another "Area" net, and then back down the line to the point of delivery.

Section Nets

- The purpose of the "Section" net is to handle messages within the Section, and to handle messages moving to and from the "Region" nets.

- The Section may have more than one net (e.g. a CW net, a VHF net, an SSB net, or a Section packet BBS).

Region Nets

- "Region" nets cover a wider area, such as a call area.

- The purpose of the Region net is to exchange traffic between the Sections in the Region and distribute traffic coming into the Region among the Section net representatives.

Transcontinental Corps

- The handling of higher priority messages between "Area Nets" is accomplished through the facilities of the Transcontinental Corps (TCC).

- TCC members handle "routine" messages only in times of extreme overload. This is not a net, but a group of designated liaison stations that have the responsibility for seeing that inter-Area traffic reaches its destination Area.

NTS Sequencing

Section / Local Nets

Region Net

TCC ⟷ Area Net ⟷ TCC

Region Net

Nets Section / Local

Topic 11 – Introduction to The National Traffic System (NTS)

"Hotline" Circuits

- In certain situations, a large volume of traffic may be moving between two locations, such as from a large refugee center to an American Red Cross office.

- Rather than attempting to move these messages through the normal system, a "hotline" circuit is established between two or more stations at or near these locations.

- This avoids overloading normal nets, and speeds delivery of critical messages.

Topic 11 – Introduction to The National Traffic System (NTS)

Increased Operations During Disasters

- In day-to-day operation, the National Traffic System passes routine messages around the country.

- In its emergency role, the NTS is dedicated to disaster communication on behalf of ARES. The NTS is capable of expanding its cyclic operation partially or fully depending on the level of need.

- The normal cycles can be expanded to handle an increasing volume of messages with greater speed. In extreme cases, the cycles can operate continuously.

NTS Alerting Plan

Section Traffic Manager (STM) and Section Net Manager Roles:

- During a disaster, the STM and certain Section net managers may be contacted by the Section Emergency Coordinator or the Section Manager to activate needed Section NTS and ARES nets, either to provide Section-wide contact or, in the case of NTS nets, to provide liaison with the nets outside the Section.

- The STM and Section Net Managers make contact with NTS Region Net Managers in the event that messages connected with the disaster need to cross Section

- Specific Section net stations are designated to conduct liaison with the NTS Region net.

Review Questions :

1. **Which of the following statements about the National Traffic System is *true*?**

    a. It is highly reliant upon CW.

    b. It was designed within the last 25 years.

    c. Each net within the System is an independent, "stand alone" entity.

    d. It is a unique system for efficiently handling messages.

2. The Area Nets include which of the following?

    a. The Eastern, the Central, the Canadian, and the Pacific.

    b. The Eastern, the Central, the Mountain, and the Pacific.

    c. The Central, the Mountain, and the Canadian.

    d. The Eastern, the Central, and the Pacific.

3. **Which is the purpose of a "hotline circuit?**

   a. To move a modest amount of routine traffic between two locations in a small town.

   b To move a moderate amount of traffic between two served agencies across the country.

   c. To move a high volume of traffic between two locations during a disaster.

   d. To move a high volume of holiday traffic across the country.

4. Which of the following statements is *true*?

    a. NTS was designed to compete with independent traffic networks.

    b. NTS generally encompasses five different levels of operation.

    c. Section nets exclusively handle traffic between Local and Regional nets.

    d. Regional Nets exclusively handle traffic among Sections within their Region.

Why We Have Specialized Nets

- Specialized nets are created to serve specific agencies that are served by Amateur Radio emergency communications. These vary from region to region. The most common served agencies are The American Red Cross, The Salvation Army, the National Weather Service (NWS) and other national organizations that have MOUs with the ARRL and ARES.

- These nets are customized to fit the needs of an individual served agency, and are most often quite different in nature from the basic net, resource net or other general types of net operations that we have discussed so far.

Specialized Nets

- In the many sections and districts, we work for and with different served agencies.

- Also you must remember that traffic that contains sensitive information must be confined to a SECURE communications method and never be transmitted through direct voice.

- Amateur Radio is not a secure method of communication. Using various digital modes we can greatly decrease the possibility of interception, but these are also not secure nor should we ever allow a served agency to assume that they are. The most secure methods to be used for sensitive materials are telephone, fax, text message and email.

Specialized Nets (continued)

- After the first several hours of an event, Health and Welfare traffic may be the most valuable type of traffic for your served agency.

- Working with a local EOC can be different. Most Emergency Managers are looking for different kinds of information to be passed. Since the creation of the Department of Homeland Security (DHS), the NIMS or ICS system has become widely used. For this reason being familiar with the ICS 213 and other such forms used in that system is also good practice.

- We must be accustomed to the proper format and protocol which is dictated by the served agency.

Health-Oriented Served Agencies

- During the last few years, many health organizations such as hospitals and health departments have discovered the value of amateur radio communications.

- Working with these types of served agencies can present some unique methods and challenges. For example, some elect to involve amateur radio for the relay of information while engaged in "Point of Dispensing or "PODs" for mass inoculation and vaccination.

- Often they will ask that we link to an area hospital, EOC and/or health department so that they can track how many doses have been expended and in what length of time.

Health-Oriented Served Agencies (continued)

- NCS operators must be sensitive to accuracy of the information being relayed from each point. It can be noted that this application is also a good workout for packet and digital communication systems with specially assigned frequencies so that normal traffic does not conflict with the POD voice traffic in progress.

Advance Planning and Drills

- Working with different served agencies and providing nets to each can be difficult. In addition, the agencies often interact with each other, so advance planning and knowing assignments such as NCS operators can make a huge impact on the success of our operations with such agencies.

- Sitting down in advance with agency leadership to determine their needs and requirements will help to make things flow smoothly during an actual event or emergency.

- One good way to handle such advance training would be a tabletop exercise during which demonstrations of Amateur Radio, and interaction between agencies can take place.

Working Together

- Finally, remember that this is not the place for "my group, my repeaters, my plan" small mindedness.

- The NCS of a specialized net reports to both the EC and liaison directly involved with the agency for which the net was created and (usually via that liaison) to the leadership of the agency for which the net was created.

- We serve the public, not our egos, and the best service we can render in a truly major event is to provide and distribute a corps of trained operators into the right places of the scene in that first, critical 48 hours.

Review Questions:

1. **What is the purpose of a specialized net?**

   a. To work with a government agency or EOC.

   b. To determine what resources are available for service.

   c. **To serve and be customized for a specific served agency.**

   d. For passing of health and welfare traffic only.

2. Which statement best describes a Specialized Net?

a. **A net geared to a specific agency and its unique requirements.**

b. A net for finding out which resources are available for service.

c. Communications with ARES personnel only.

d. Passing of Health & Welfare traffic only.

3. How should a NCS plan prior to a Specialized Net?

    a. Work with the SEC, DEC and EC.

    b. Meet and plan with the served agency itself.

    c. Work with a liaison specially assigned to the actual agency.

    d. All of the above.

4. To whom does the NCS of a specialized net report?

a. **The EC or liaison directly involved with the agency for which the net was created, and also to the leadership of that agency.**

b. The SM or SEC.

c. Only to the top leadership of the agency for which the net was created.

d. The ARES team leaders.

SKYWARN®

- The SKYWARN® program is sponsored by the National Weather Service (NWS). Like ARES, it is a program and not a club or organization.

- Amateur Radio operators and other SKYWARN® volunteers report actual weather conditions in their own communities. Accurate information and rapid communication during extreme weather situations have proven to be indispensable to the NWS. Amateur Radio SKYWARN®

®

What is generally reported

- Reports on a severe-weather net are limited to specific critical weather observations, unless the NWS office requests other information.
- Amateurs without SKYWARN® training should monitor the net and transmit only when they can offer needed help.
- If they are members, they should report as requested and as needed by their local leadership and NWS office, and using their assigned SKYWARN® spotter number.

What is generally reported

During the summer and thunderstorm season, SKYWARN® observers report:

- Tornadoes, funnel clouds, and wall clouds
- Hail – usually measured with a specific size
- Strong winds, usually 50 miles per hour or greater
- Flash flooding
- Heavy rain, with a sustained rate of 1 inch per hour or more
- Damage.
- Adverse traffic and driving conditions affecting travel

During the winter they report:

- High winds
- Heavy snowfall
- Freezing precipitation
- Sleet
- New snow accumulation of 2 or more inches per hour
- Damage caused by snow or ice.

Here is a four-step method to describe severe weather you see:

- **What:** Tornadoes, funnel clouds, heavy rain, etc.

- **Where:** Direction and distance from a well-known location; for example "3 miles south of Ritzville, on Route 395".

- **When:** Time of observation.

- **Details:** Storm's direction, speed of travel, size, intensity, and destructiveness. Include any uncertainty as needed e.g. "Funnel cloud, but too far away to be certain if it is on the ground." Indicate if amounts are measured or estimated; i.e. wind gauge vs. visual estimate.

Activation

- SKYWARN® observers are usually aware that the potential for severe weather has been forecast.

- As conditions begin to deteriorate, they should monitor the primary net frequency and the NOAA All Hazards Weather Radio (NWR), a system on VHF-FM radio transmitters operated nationwide by the NWS on seven channels between 162.400 and 162.550 MHz.

- The SKYWARN® net may be formally activated upon the request of the local NWS office, or by net members if conditions warrant immediate action.

The Hurricane Watch Net (HWN) - http://www.hwn.org

- The Hurricane Watch Net serves as eyes and ears for the NWS in the Caribbean, Gulf of Mexico, US Atlantic and Pacific coasts. The National Hurricane Center has an on-site amateur station, WX4NHC.

- HWN differs from SKYWARN® in two ways. First, its volunteers are exclusively Amateur Radio operators. Second, its operations are primarily HF-SSB rather than VHF or UHF-FM.

- Amateur operators outside hurricane-prone areas can participate as relays or net control stations. The net has an urgent need for stations in the Midwest and on the west coast as propagation shifts westward.

The Hurricane Watch Net (HWN) (continued)

- If you live in a hurricane-prone area, and your Amateur license class will not allow operation on the 20-meter band, you can still participate in the system.
  - The National Hurricane Center monitors the APRS packet reporting system. You can submit your information manually via APRS, or better yet, connect a weather station to your packet station for automatic reporting.
  - In some areas, local FM nets relay observations to NWS through HF operators on the HWN net.
- Activation – The Hurricane Watch Net activates for all hurricanes that are a threat to land in the Atlantic and eastern Pacific Oceans. The net will normally activate when a hurricane is moving toward land at a range of 300 miles. On occasion, it may activate for tropical storms, or at any time when requested by the National Hurricane Center.

The Hurricane Watch Net (HWN) (continued)

- Before checking into the net to determine the nature and immediacy of events. If the storm is hours from impact, the net control will provide a window of opportunity to check in. If a hurricane is within an hour of landfall, check in ONLY if you are in the affected area, can assist with a relay, or supply information of immediate value to the net or Hurricane Center.

- Net Operations – The Hurricane Watch Net, and WX4NHC at the National Hurricane Center in Miami, are staffed entirely by volunteers. Net operations are normally conducted on 14.325 MHz USB, the net may move to 3.950 MHz LSB if band conditions warrant.

The primary functions of the HWN are to:

- Disseminate hurricane advisory information to marine interests, Caribbean island nations, emergency operations centers, maritime mobile Amateur stations, and other interests for the Atlantic and Eastern Pacific as released by the National Hurricane Center in Miami, Florida.

- Obtain ground-level weather observations and damage reports from reporting stations and observers who are not part of the routine network for the National Weather Service, or the World Meteorological Organization, and forward it quickly and accurately to the National Hurricane Center.

The primary functions of the HWN are to: (continued)

- Function as a backup wide-area communication link for the National Hurricane Center, Emergency Operation Centers, the NWS, and other vital interests involved in the protection of life and property before, during, and after hurricane events.

- Relay initial assessments of hurricane damage to the National Hurricane Center. Damage assessments about roads, power outages, structural damage, phone and communication problems, and reports on the number of injuries and deaths. These non-weather report items are usually relayed to the appropriate agencies via other nets in operation on 20, 40, and 80 meters, or by the crew at WX4NHC.

Weather Net Operating Tips

- For nets spanning more than one time zone, use UTC time in all reports, not local time.

- If you are going to give a damage, injury, or casualty report and it is not based on your own personal observation, be prepared to provide the time, the name of the person providing it, their call sign or official position if any, and if possible, a telephone number, address or other means of contact so it can be confirmed later.

Topic 13 – Severe Weather Nets

Review Questions:

1. **When is the Hurricane Watch Net normally activated?**

   a. Every morning at 1000 UTC during hurricane season only.

   b. **When a hurricane is within 300 miles of making landfall.**

   c. When a tropical storm approaches a populated land mass.

   d. When a tropical wave develops west of Africa.

2. Who should check in to the Hurricane Watch Net an hour before a hurricane makes landfall?

    a. All amateurs should check in.

    b. Amateurs with weather stations only.

    c. Only those stations on the net roster.

    d. **Only amateurs in the affected area, or amateurs with important information that would be needed by the net or the National Hurricane Center.**

3. Does a station have to be located in a hurricane area to be a member of the Hurricane Watch Net?

   a. Yes, the net is made up solely of stations in hurricane areas.

   b. There is no membership in the Hurricane Watch Net. Anybody can check in at any time.

   c. No. The net has a need for stations in Canada and on the west coast that can control the net as propagation shifts to he north and to the west.

   d. No. The net has a need for stations in the Midwest and west coast that can control the net as propagation shifts to the west.

4. **Which answer best describes the four step method to describe severe weather?**

   a. Who, What, When, Why.

   b. **What, Where, When, Details.**

   c. What, Where, Why, General Comments.

   d. What, When, Why, Where.

5. **SKYWARN® participants would generally not report which of the following?**

   a. **Fog.**

   b. High winds.

   c. Sleet.

   d. Hail size.

Topic 14 – Basic Message Handling Part I

Formal vs. Informal Messages

- Both formal (written in a specific format, i.e. ARRL) and informal (oral or written but not in a specific format) messages have their place in emergency communication.

- In general, informal messages are best used for non-critical and simple messages, or messages that require immediate action, those are delivered directly from the author to the recipient.

- Formal messages are more appropriate when two or more people will handle them before reaching the recipient, or where the contents are critical or contain important details. The most common formal message format is that used by ARRL's NTS.

Topic 14 – Basic Message Handling Part I

Informal Oral Messages

- Some emergency messages are best sent informally in the interest of saving precious seconds. If you need an ambulance for a severely bleeding victim, you do not have time to compose and send a formal message. The resulting delay could cause the patient's death.

- Other messages do not require a formal written message because they have little value beyond the moment. Letting the net control station know where you are or when you will arrive need not be formal. The message is going directly to its recipient, is simple and clear, and has little detail.

Topic 14 – Basic Message Handling Part I

Formal Written Message Formats

- A standard written message format is used so that everyone knows what to expect. This increases the speed and accuracy with which you can handle messages.

- The ARRL message form, or "Radiogram," is a standard format used for passing messages on various nets, and is required for all messages sent through the National Traffic System.

- The ARRL Message format may not be perfect for all applications, but it serves as a baseline that can be readily adapted for use within a specific served agency.

- Regular practice with creating and sending messages in any standard format is recommended.

THE AMERICAN RADIO RELAY LEAGUE
RADIOGRAM
VIA AMATEUR RADIO

NUMBER	PRECEDENCE	HX	STATION OF ORIGIN	CHECK	PLACE OF ORIGIN	TIME FILED	DATE

Preamble

TO

THIS RADIO MESSAGE WAS RECEIVED AT

AMATEUR STATION_____ PHONE_____

NAME _____

STREET _____

CITY, STATE, ZIP_____

TELEPHONE NUMBER

Address

Text

FROM	DATE	TIME	TO	DATE	TIME
REC'D			SENT		

Signature

THIS MESSAGE WAS HANDLED FREE OF CHARGE BY A LICENSED AMATEUR RADIO OPERATOR WHOSE ADDRESS IS SHOWN IN THE PRINT ABOVE. AS SUCH MESSAGES ARE HANDLED SOLELY FOR THE PLEASURE OF OPERATING, NO COMPENSATION CAN BE ACCEPTED BY A "HAM" OPERATOR. A RETURN MESSAGE MAY BE FILED WITH THE "HAM" DELIVERING THIS MESSAGE TO YOU. FURTHER INFORMATION ON AMATEUR RADIO MAY BE OBTAINED FROM ARRL HEADQUARTERS, 225 MAIN STREET, NEWINGTON, CT 06111

THE AMERICAN RADIO RELAY LEAGUE, INC, IS THE NATIONAL MEMBERSHIP SOCIETY FUNCTIONS IS PROMOTION OF PUBLIC SERVICE COMMUNICATION AMONG AMATEUR OPERATORS. TO THAT END, THE LEAGUE HAS ORGANIZED THE NATIONAL TRAFFIC SYSTEM FOR DAILY NATIONWIDE MESSAGE HANDLING.

PRINTED IN USA

Topic 14 – Basic Message Handling Part I

Components of a Standard ARRL Radiogram

The ARRL form has places for the following information:

- **The "Preamble"** sometimes referred to as "the header," consists of administrative data such as the message number, originating station, message precedence (importance) , date and time of origination. The combination of the message number and the originating station serves as a unique message identifier, which can be traced if necessary.

- **The "Address"** includes the name, street address or post office box, city, state, and zip code of the recipient. The address should include the telephone number with area code since many Radiograms are delivered with a local phone call.

Topic 14 – Basic Message Handling Part I

Components of a Standard ARRL Radiogram (continued)

The "Text"

- Should be brief and to the point, limited to 25 words if possible.

- The text should be written in lines of five words to make it easier and faster to count them for the "check."

- Commas and other punctuation are not used in formal messages.

- Where needed, the "period" can be sent as an "X" in CW and digital modes, and spoken as "X-RAY." The "X" may be used to separate phrases or sentences but never at the end of the text.

Components of a Standard ARRL Radiogram (continued)

The "Text" (continued)

- Question marks can be used as needed, and are usually spoken as "question mark," Both the X and question mark should be used only when the meaning of the message would not be clear without them.

Topic 14 – Basic Message Handling Part I

Components of a Standard ARRL Radiogram (continued)

- **The "Signature"** can be a single name, a name and call sign, a full name and a title, "Mom and Dad," and occasionally a return address and phone number – whatever is needed to ensure that the recipient can identify the sender and that a reply message can be sent if necessary.

Topic 14 – Basic Message Handling Part I

Details of the Preamble:

The preamble or "header" is the section of the ARRL message form where all the administrative details of the message are recorded. There are **eight sections** or "blocks" in the preamble. Two of them, "time filed" and "handling instructions," are optional for most messages.

- **Block #1** - **Message Number:** This is any number assigned by the station that first puts the message into ARRL format. While any alphanumeric combination is acceptable, a common practice is to use a numeric sequence starting with the number "1" at the beginning of the emergency operation. Stations who are involved in day-to-day message handling may start numbering at the beginning of each year or each month.

Topic 14 – Basic Message Handling Part I

Details of the Preamble: (continued)

Block #2 - **Precedence:**

The precedence tells everyone the relative urgency of a message.   Within the ARRL format, there are four levels:

1. Routine – abbreviated with the letter "R."   In a disaster situation, routine messages are seldom sent.

2. Welfare – abbreviated as "W." Used for an inquiry as to the health and welfare of an individual in a disaster area, or a message from a disaster victim to friends or family.

3. Priority – abbreviated as "P." For important messages with a time limit; any official or emergency-related messages not covered by the EMERGENCY precedence.

Topic 14 – Basic Message Handling Part I

Details of the Preamble: (continued)

Block #2 - **Precedence:**

4. EMERGENCY – there is no abbreviation – the word EMERGENCY is always spelled out. Use this for any message having life or death urgency. This includes official messages from agencies requesting critical supplies or assistance during emergencies, or other official instructions to provide aid or relief in a disaster area. The use of this precedence should generally be limited to traffic originated and signed by authorized agency officials. Due to the lack of privacy on radio, EMERGENCY messages should only be sent via Amateur Radio when regular communication facilities are unavailable.

Topic 14 – Basic Message Handling Part I

Details of the Preamble: (continued)

Block #3 - Handling Instructions:

1. This is an optional field used at the discretion of the originating station. The seven standard HX pro-signs are:

2. HXA – (Followed by number.) "Collect" telephone delivery authorized by addressee within (X) miles. If no number is sent, authorization is unlimited.

3. HXB – (Followed by number.) Cancel message if not delivered within (X) hours of filing time; service (notify) originating station.

4. HXC – Report date and "time of delivery" (TOD) to originating station.

Details of the Preamble: (continued)

Block #3 - Handling Instructions:

5. HXD – Report to originating station the identity of the station who delivered the message, date, time and method of delivery. Also report station to which relayed (date and time)

6. HXE – Delivering station to get and send reply from addressee.

7. HXF – (Followed by date in numbers.) Hold delivery until (specify date).

8. HXG – Delivery by mail or telephone - toll call not required. If toll or other expense involved, cancel message, and send service message to originating station.

Topic 14 – Basic Message Handling Part I

Details of the Preamble: (continued)

Block #4 – Station of Origin:

- This is the FCC call sign of the first station that put the message into NTS format.   For instance, you are the radio operator for a Red Cross shelter. The fire station down the street sends a runner with a message to be passed and you format and send the message. You are the "Station of Origin," and fire station is the "Place of Origin," which will be listed in Block 6.

Details of the Preamble: (continued)

Block #5 - The Check:

- The "check" is the number of words in the text section only. Include any "periods". The preamble, address and signature are not included. After receiving a message count the words in the message and compare the word count to the "check" number in the preamble. If they do not agree, the message should be re-read by the sending station to verify that all words were copied correctly. If the message was copied correctly and an error in the check number exists, do not replace the old count with the new count. Instead, update the count by adding a "slash" followed by the new count ie. 5/6.

Details of the Preamble: (continued)

Block #6 - Place of Origin:

- This is the name of the community, building, or agency where the originator of the message is located. . This is not the location of the station that first handled the message, which is listed in Block 4, "Station of Origin."

Block #7 - Time Filed: (UTC,EDT, PST, etc.)

- This is an optional field, unless handling instruction "Bravo" (HXB) is used. HXB means "cancel if not delivered within X hours of filing time." This field may be left blank for routine messages, but completing the time field is generally recommended for Welfare, Priority, and Emergency messages.

Details of the Preamble: (continued)

Block #8 – Date:

- This is the date the message was first placed into the traffic system.

Header Examples:

- This is how a complete header might look for a CW or digital message:

NR207	P	HXE	W1FN	10
LEBANON NH		1200 EST		JAN 4

- The header would be spoken: "Number two zero seven Priority HX Echo Whiskey One Foxtrot November One Zero Lebanon NH One Two Zero Zero EST January four."

The American Radio Relay League
RADIOGRAM
Via Amateur Radio

Number	Precedence	Hx	Station of Origin	Check	Place of Origin	Time Filed	Date
207	P	E	W1FN	10	LEBANON NH	1200 EST	JAN 4

To:
MARK DOE
RED CROSS DISASTER OFFICE
123 MAIN ST
RUTLAND VT 05701

Telephone Number: 802-555-1212

This Radio Message was received at:
Amateur Station_____ Date_____
Name_____
Street Address_____
City, State, Zip_____

NEED   MORE   COTS   AND   SANITATION
KITS   AT   ALL   FIVE   SHELTERS

JOAN SMITH SHELTER MANAGER

	From	Date	Time		To	Date	Time
REC'D				SENT			

Topic 14 – Basic Message Handling Part I

Pro-Words and Pro-Signs

When sending formal traffic, standard "pro- words" or pro-signs" (CW) are used to begin or end parts of the message, and to ask for portions of the message to be repeated. In addition to adding clarity, the use of standard pro-words and pro-signs saves time. Some pro-words and pro-signs tell the receiving station what to expect next in the address, text, and signature portions of the message – they are not used while reading the header, since the header follows a pre- determined format. Examples of commonly used pro-words are, "figures" sent before a group consisting of all numerals, "initial" to indicate that a single letter will follow, or "break" to signal the transition between the address and the text, and the text and the signature.

Topic 14 – Basic Message Handling Part I

Some Message Handling Pro-Words, Prosigns and Abbreviations:

Pro-Word	Pro-Sign	Meaning or Example
BREAK	(CW) BT*	Separates address from text and text from signature.
CORRECTION	HH*	"I am going to correct an error".
END	AR*	End of message.
MORE	B	Additional messages to follow.
NO MORE	N	No additional messages. In CW can also mean "negative" or "no"
FIGURES	Not Needed	Used before a word group consisting of all numerals
INITIAL	Not Needed	Used to indicate a single letter will follow.
I SAY AGAIN	IMI*	Used to indicate a single phrase will follow.
I SPELL	Not Needed	"I am going to spell a word phonetically".
LETTER	Not Needed	Several letters together in a group will follow. Example: ARES, SCTN.
X-RAY	X	Used to indicate end of sentence, as with a "period".
BREAK	BK*	Break; break-in; interrupt current transmission on CW
CORRECT	C	Correct, yes
THIS IS	DE	Used preceding identification of your station

Topic 14 – Basic Message Handling Part I

Sending a Message with Voice

- When the receiving station is ready to copy, read the message at a pace that allows the receiving station to write it down.

- Once you are done, if the receiving station has missed any portion of the message they will say, "say again all after____," "say all before," or "say again all between____ and ____."

- In some nets, the practice is to say "break" and then unkey between sections of the message so that a station can ask for missing words to be repeated before going on.

Topic 14 – Basic Message Handling Part I

Sending a Message with Voice (CONTINUED)

- In many nets the entire message is read first before any fills are requested, to save time.

- All numbers in groups are spoken individually, as in "three two one five," not "thirty-two fifteen," or "three thousand two hundred and five."

Time Savers

What NOT to say:

When passing formal traffic, do not add unnecessary words. Since the parts of the header are always sent in the same order, there is no need to identify each of them. The only exception is the word "number" at the beginning of the header. Here is an example of how not to read the header of a message on the air:

- "Number two zero seven precedence, Priority handling instructions, HX Echo station of origin W1FN check one zero place of origin, Lebanon NH time one two zero zero EST date, January 4. Going to Mark Doe Red Cross Disaster Office Address figures one two three Main Street Rutland VT, ZIP figures zero five seven zero one. Telephone Figures eight zero two five five five one two one two"

Review Questions

1. **The preamble to an ARRL Radiogram message contains a block called "Precedence." Which of the following represents the correct precedence for an EMERGENCY message?**

    a. "URGENT."

    b. "U."

    c. **"EMERGENCY."**

    d. "E."

2. **The preamble to an ARRL Radiogram message contains a block called "Handling Instructions." What is the meaning of the handling instruction "HXE"?**

   a. **Delivering station to get and send reply from addressee.**

   b. Report date and time of delivery to originating station.

   c. Cancel message if not delivered within (X) hours of filing time.

   d. Collect telephone delivery authorized.

3. **ARRL Radiogram messages contains a block called "Time Filed." Which of the following is true of entries in that block?**

   a. This field is always completed.

   b. Time entries are always Universal Coordinated Time.

   c. **During emergencies its best to use and indicate "local time.**

   d. During emergencies "local time" along with the local date is used.

4. **ARRL Radiogram messages contain a block called "The Check." Which of the following is true of entries in that block?**

   a. The check contains a count of the words in the entire message.

   b. The check contains a count of the words in the preamble and the text of the message.

   c. The check contain a count of the words in the preamble, address and text of the message.

   d. The check contains a count of the words in the text of the message.

5. Which of the following statements is true of punctuation within an ARRL Radiogram?

a. Punctuation is always helpful; it should be used whenever possible.

b. Punctuation is rarely helpful; it should never be used.

c. Punctuation should be used only when it is essential to the meaning of the message.

d. The comma and apostrophe are the most common punctuation signs used in NTS messages.

Topic 15 – Basic Message Handling Part II

Message Handling Rules

- Do not speculate on anything relating to an emergency! There may be hundreds of people listening to what you say (other Amateurs, and the media and general public using scanners). Any incorrect information could cause serious problems for the served agency or others. You do not want to be the source of any rumor.

- If your served agency requests an estimate, you can provide that information as long as you make it very clear that it is only an estimate when you send it. For example, saying "The estimated number of homes damaged is twelve" would be acceptable.

.

Message Handling Rules (CONTINUED)

- Pass messages exactly as written or spoken. Your job as a communicator is to deliver each message as accurately as possible. You must not change any message as you handle it. Only the original author may make changes.

- If you note an inaccurate word count in a NTS format message, you must maintain the original count and follow it with the actual count received at your station, i.e.: "12/11."

- Should you return a message to the author before first sending it if it seems incorrect or confusing? This is a judgment call.

Non-Standard Format Messages

- Much of the tactical information being passed during a major emergency will not be in ARRL format. It may have much of the same information, but will be in a non-standard format or no format at all. These messages should also be passed exactly as received. If necessary, use the ARRL format and place the entire non-standard message in the "text" section.

The Importance of the Signature

- During an emergency, the messages you handle can easily contain requests for expensive supplies that have a very limited "shelf life" (such as blood for a field hospital), or for agencies that will only respond to properly authorized requests (i.e.: for medevac helicopters). For this reason, it is critical that you include the signature and title of the sender in every message.

Topic 15 – Basic Message Handling Part II

ARRL Numbered Radiograms

- ARRL Numbered Radiograms are a standardized list of often-used phrases. Each phrase on the list is assigned a number. There are two groups: Group One is for emergency relief and consists of 26 phrases by number proceeded by the letters "ARL." For example, "ARL SIX" means "will contact you as soon as possible." Group Two contains 21 routine messages.

- In the text of the message, the numbered radiogram is inserted by using the letters "ARL" as one word, followed by the number written out in text, not numerals. For example: "ARL FIFTY SIX."

ARRL Numbered Radiograms (Continued)

- When using numbered radiograms, the letters "ARL" are placed in the "check" block of the preamble, just prior to the number indicating the word count, as in "ARL7."

- "ARL FIFTY SIX" is counted as three words for the "check" block. Two common receiving errors are to write "ARL-56" and count it as one word, or "ARL 56" and count it as two words. It is important to spell out the numbers letter by letter when sending using voice. This allows the receiving station to correctly copy what is being sent, and not inadvertently write the figures out as "FIVE SIX" instead of "FIFTY SIX."

Topic 15 – Basic Message Handling Part II

Modified Message Form for Disasters

- While ARRL format messages can handle many different types of information flow, there can be requirements for formats that are unique to an individual agency or type of emergency. Your emcomm group should work with each served agency before the emergency to see which format will best fulfill their needs. A good example is the popular Incident Command System (ICS) form ICS-213 used by most government agencies.

Logging and Record Keeping

- An accurate record of formal messages handled and various aspects of your station's operation can be very useful, and is required by law in some cases.

What to Log

- Log all incoming and outgoing messages. Record the name of the sender, addressee, the station that passed the message to you, the station to whom the message was sent, the message number, and the times in and out.

- Also, log which operators are on duty for any given period, and record any significant events at your station.

Topic 15 – Basic Message Handling Part II

Message Security & Privacy

- Information transmitted over Amateur Radio can never be totally secure, since FCC rules strictly prohibit us from using any code designed to obscure a message's actual meaning.

- Reporters in disaster-prone areas have been known to purchase scanners and digital-mode decoding software for laptops in order to intercept ham radio communications .

- you can not discuss any message you send or receive with others. Messages sent via Amateur Radio should be treated as privileged information, and revealed only to those directly involved with sending, handling, or receiving them.

Section 3: Message Handling
Topic 15 – Basic Message Handling Part II

Message Security & Privacy (continued)

- Your served agency should be made aware that amateur radio communication is not secure and must decide the types of messages to be sent via Amateur Radio.

- Sensitive messages should be sent using telephone, landline fax, courier, or a secure served-agency radio or data circuit.

Topic 15 – Basic Message Handling Part II

Informal Messages

- When we send a written ARRL-format message, we do it to preserve accuracy no matter how many people pass the message along.

- Informal or "tactical" messages are not written out in ARRL format, or not written at all. However, this does not mean that accuracy is any less important.

- If someone gives you a short message to relay to someone else, you should repeat it as closely to the original as possible.

- Messages that will be relayed more than once should always be sent in ARRL format. to prevent multiple modifications.

Review Questions:

1. **As part of an EMCOMM group handling message traffic in an emergency, you are asked to forward a message that contains typographical errors. Which of the following is your best course of action?**

   a. Delay sending the message.

   b. **Forward the message exactly as received.**

   c. Return the message to the originating station.

   d. On your own, correct the error in the message and forward it.

Topic 15 – Basic Message Handling Part II

2. **As part of an Emcomm net handling message traffic in an emergency, you are asked to forward a message in a non-standard format. Which of the following is your best course of action?**

    a. Delay sending the message until you have conferred with the originator.

    b. Return the message to the originator.

    c. On your own, rewrite the message in proper format and forward it.

    d. **Forward the message exactly as received.**

3. **You have been asked to send an ARRL Radiogram dealing with birthday greetings. Which of the following is the correct way to write it in the message text?**

   a. ARRL 46.

   b. ARL 46.

   c. **ARL FORTY SIX.**

   d. ARRL FORTY SIX.

Topic 15 – Basic Message Handling Part II

4. When delivering an ARRL numbered radiogram, which should be done?

   a. Deliver the message exactly as received.

   b. Deliver the message exactly as received but add your own written explanation.

   c. Decode the message into plain language before delivery.

   d. Deliver the message exactly as received but add your own verbal explanation.

5. **During an emergency, service messages should only be sent for which of the following categories of message?**

    a. Emergency, Priority, Welfare and Routine.

    b. Emergency, Priority and Welfare.

    c. Priority and Welfare.

    d. Emergency and Priority.

- In the early 1970s, a disorganized and ineffective multi-agency response to a series of major wild fires in California prompted municipal, county, state and federal fire authorities to form an organization known as Firefighting Resources of California Organized for Potential Emergencies (FIRESCOPE).

- California authorities had found that a lack of coordination and cooperation between the various responding agencies resulted in over-lapping efforts, and gaps in overall response.

- Many specific problems involving multi-agency responses were identified by FIRESCOPE. These included poor overall organization, ineffective communication between agencies, lack of accountability, and the lack of a single, universal, and well-defined command structure.

- Their efforts to address these difficulties resulted in the development of the original Incident Command System.

- Although developed for wild fires, the system ultimately evolved into an "all-risk" system, appropriate for all types of fire and non-fire emergencies.

- The Incident Command System (ICS), as developed by the National Fire Academy (NFA), has been widely recognized as a model tool for the command, control, and coordination of resources and personnel at the scene of an emergency and is used by most fire, police, and other agencies around the country.

- The use of the ICS is now required by various federal laws for all hazardous material incidents, and in other situations by many state and local laws. The ICS has also been adopted for use in many other countries.

- Looking at a larger scale, the success of the ICS also led to development of protocols that would guide whole regions of the country, including non-government responders.

- This became NIMS – the National Incident Management System.
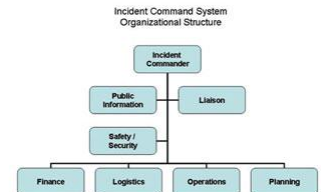
Topic 16 – The Incident Command System

NIMS

- The National Incident Management System (NIMS) provides a systematic, proactive approach to guide departments and agencies at all levels to allow them to work seamlessly together to prevent, protect against, respond to, recover from, and mitigate the effects of incidents, regardless of cause, size, location, or complexity.

What is the ICS?

- The Incident Command System is a management tool designed to bring multiple responding agencies, including those from different jurisdictions, together under a single overall command structure. Before the use of the ICS became commonplace, various agencies responding to a disaster often fought for control, duplicated efforts, missed critical needs, and generally reduced the potential effectiveness of the response.

- Under ICS, each agency recognizes one "lead" coordinating agency and that person will handle one or more tasks that are part of a single over-all plan, and interact with other agencies in defined ways.

Topic 16 – The Incident Command System

What is the ICS? (continued)

- The Incident Command System is based upon simple and proven business management principles.

- In a business or government agency, managers and leaders perform the basic daily tasks of planning, directing, organizing, coordinating, communicating, delegating and evaluating.

- The same is true for the Incident Command System, but the responsibilities are often shared among several agencies. These tasks, or functional areas as they are known in the ICS, are performed under the overall direction of a single Incident Commander (IC) in a coordinated manner, even with multiple agencies and across jurisdictional lines.

- The ICS also features common terminology, scalability of structure and clear lines of authority.

Topic 16 – The Incident Command System

What the ICS is Not

- Many people who have not been introduced to the Incident Command System have a variety of erroneous perceptions about what the system means to them and their agencies. To set the record straight, the Incident Command System **is not**:

  - A fixed and unchangeable system for managing an incident.

  - A means to take control or authority away from agencies or departments that participate in the response.

  - A way to subvert the normal chain of command within a department or agency.

  - Too big or cumbersome to be used in small, everyday events.

  - Restricted to use by government agencies and departments.
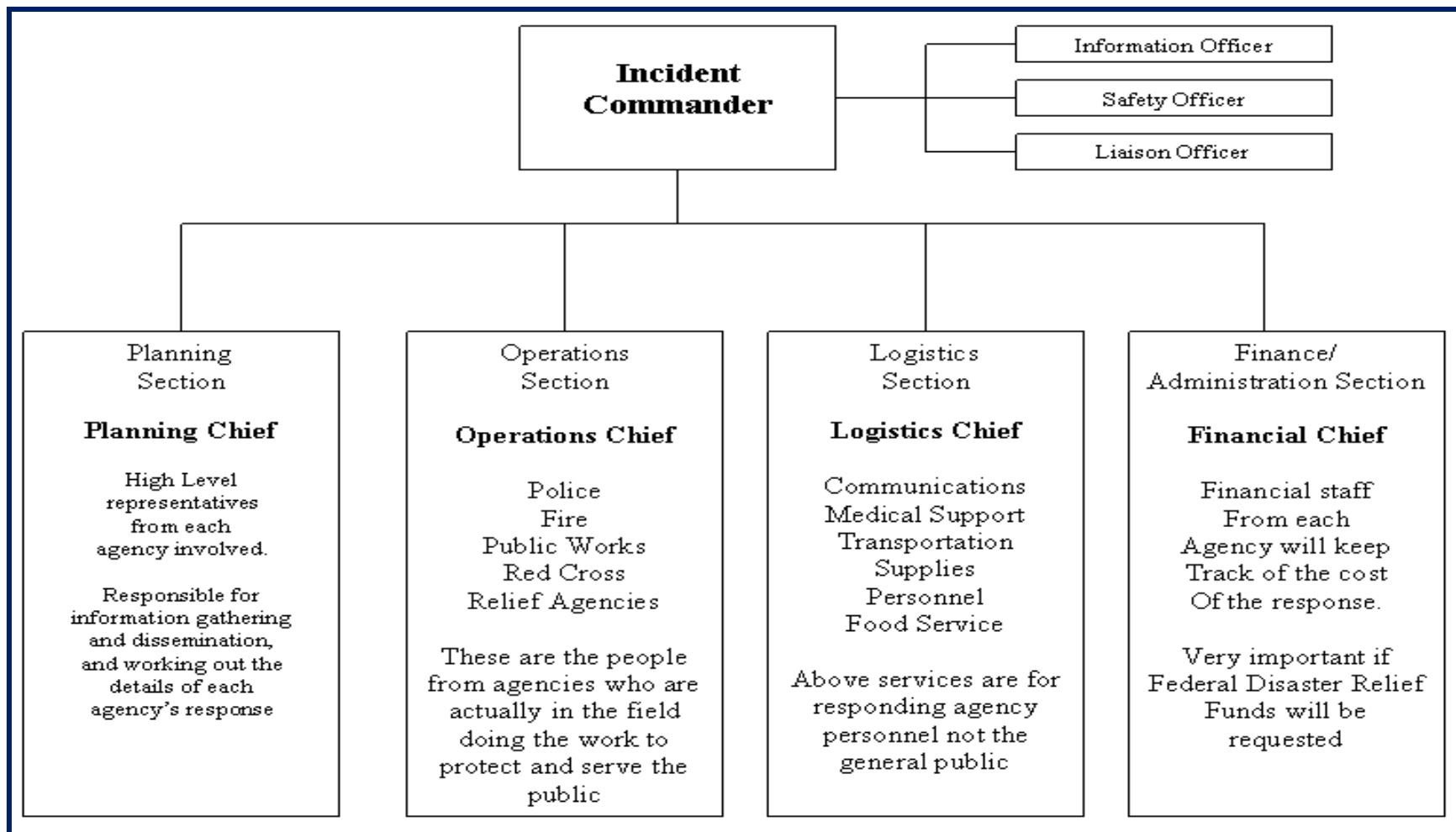
Topic 16 – The Incident Command System

The ICS Structure

- The Incident Command System has two interrelated parts. They are "**management by objectives,**" and the "**organizational structure**."

Management by objectives:

- Four essential steps are used in developing the response to every incident, regardless of size or complexity:

  1. Understand the policies, procedures and statutes that affect the official response.

  2. Establish incident objectives (the desired outcome of the agencies' efforts).

  3. Select appropriate strategies for cooperation and resource utilization.

  4. Apply tactics most likely to accomplish objectives (assign the correct resources and monitor the results).

The ICS Structure

- The complexity of the incident will determine how formally the "management by objectives" portion will be handled.

- If the incident is small and uncomplicated, the process can be handled by oral communication between appropriate people.

- As the incident and response become more complex, differences between the individual agencies' or departments' goals, objectives, and methods will need to be resolved in writing.

The ICS Structure: Organizational Structure

- The ICS supports the creation of a flexible organizational structure that can be modified to meet changing conditions. Under the ICS, the one person in charge is always called the "Incident Commander" (IC). In large responses, the IC may have a "General Staff" consisting of the Information, Safety and Liaison Officers.

The ICS Structure: Organizational Structure (continued)

- Various other tasks within the ICS are subdivided into four major operating sections:

  1. Planning
  2. Operations
  3. Logistics and
  4. Finance/ Administration.

  Each operating section has its own "chief," and may have various branches or units working on specific goals.

- The Logistics section handles the coordination of all interagency communication infrastructures involved in the response, including Amateur Radio when it is used in that capacity.

The Incident Commander

- The initial IC is usually the most senior on- scene officer from the first responding agency.

- The IC is responsible for the management of the incident and starts the process by helping to set initial incident objectives, followed by an "Incident Action Plan" (IAP).

- In a small incident, the IC may perform all the ICS functions without aid, but in a larger incident, he or she will usually delegate responsibilities to others.

- The IC still has overall responsibility for the incident, regardless of any duties delegated.

How Does an Emcomm Group "Fit Into" The ICS?

- Involvement in any incident where ICS is used is by "invitation only"—there is no role for off- the-street volunteers.

- The relationship of an emcomm group to the ICS structure will vary with the specific situation. If your group is providing internal communication support to only one responding agency, and has no need to communicate with other agencies that are part of the ICS, you may not have any part in the ICS structure itself except through your served agency.

How Does an Emcomm Group "Fit Into" The ICS? (continued)

- If your group is tasked with handling inter-agency communications, or serves more than one agency's internal communication needs, it is likely your group will have a representative on the Logistics Section's "communication unit." In certain situations, an emcomm group might serve one or more agencies simultaneously.

- As the responsibility for managing the incident shifts from one agency to another, the emcomm group's mission may shift to assisting the new lead agency, or simply end.

Logistics Section Organization
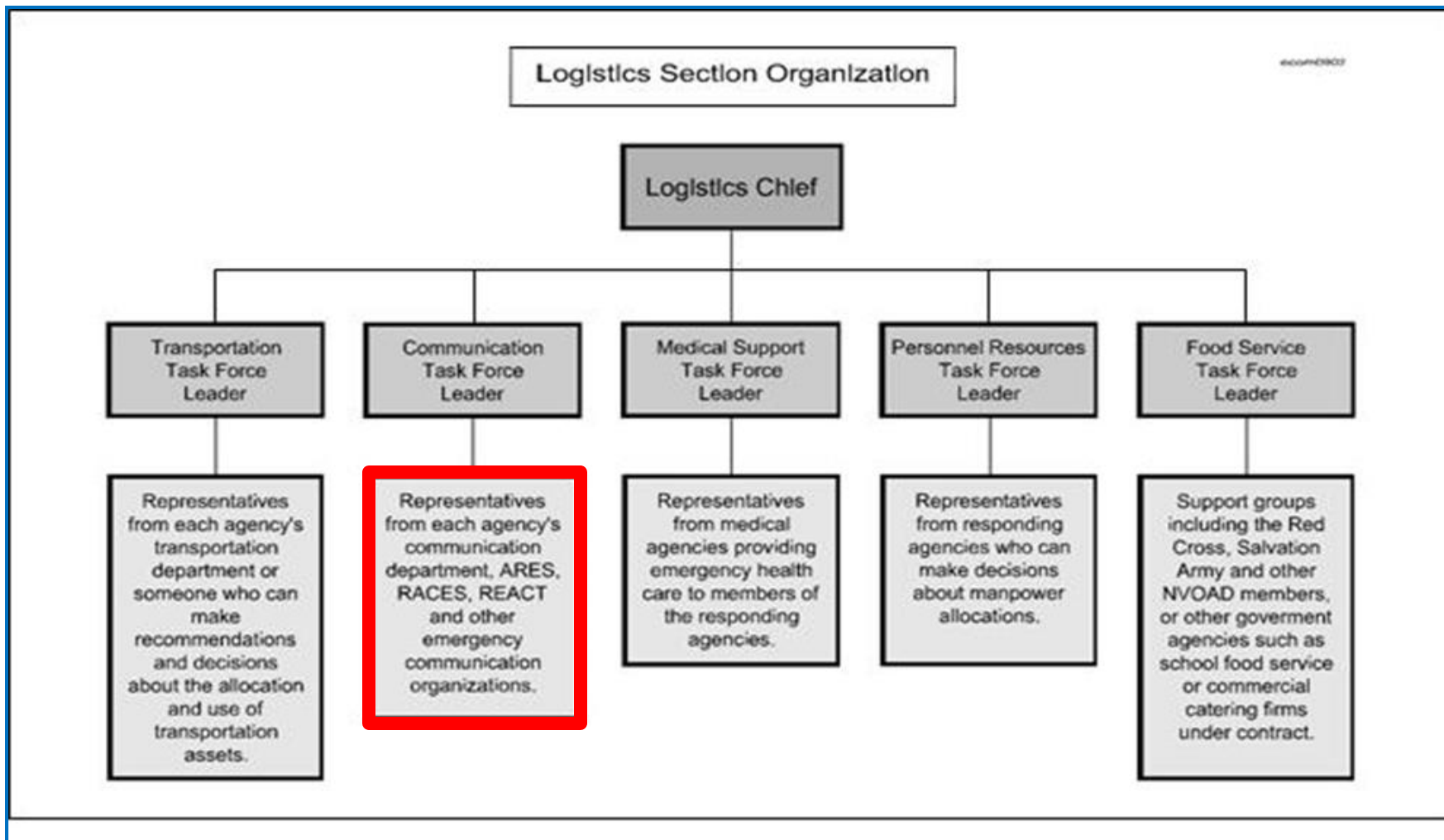
Topic 16 – The Incident Command System

Review Questions:

1. **What do the letters "ICS" stand for?**

    a. International Correspondence School.

    b. **Incident Command System.**

    c. Institutional Control System.

    d. Internal Control Sequence.

Topic 16 – The Incident Command System

2. What is ICS?

a. **A management tool for coordinating the resources of several agencies within a single command structure.**

b. A fixed and unchangeable system for managing an incident.

c. A means of subverting the normal command structure within an agency or department.

d. A management system restricted to use by government agencies and departments.

3. The ICS has two interrelated parts. What are they?

    a. A mission statement and management objectives.

    b. Management by objectives and organizational structure.

    c. Organizational structure and a financial plan.

    d. A financial plan and an operational plan.

4. **Aside from the Incident Commander, there are four other major operating sections within an ICS. What are they?**

   a. Planning, Operations, Logistics and Public Relations.

   b. Personnel, Planning, Operations and Finance/Administration.

   c. **Planning, Operations, Logistics, and Finance/Administration.**

   d. Payroll, Finance/Administration, Logistics and Operations.

5. **What is an emcomm group's relationship to the ICS structure during an incident?**

   a. **The emcomm group always serves within the Logistics area.**

   b. The emcomm group may or may not be a formal part of the ICS structure.

   c. The emcomm group always serves the Task Force leader directly.

   d The emcomm group always serves the Incident Commander directly.

Topic 17 – Preparing for Deployment

Prepared for What?

- Remember the Boy Scout motto, "Be Prepared"? what exactly should we should be prepared for? "Why, for any old thing, of course!"

- The same should be true of emcomm volunteers. You never know which challenges an emergency situation

- Being prepared for an emergency communication deployment involves a wide range of considerations, including radio equipment, power sources, clothing and personal gear, food and water, information, and specialized training.

Topic 17 – Preparing for Deployment

Jump Kits

- An experienced emergency responder knows how important it is to keep a kit of the items they need ready to go at a moment's notice. This is often called a "jump kit" or "go kit."

- Without a jump kit, you will almost certainly leave something important at home, or bring items that will not do the job.

- Gathering and packing your equipment at the last moment wastes precious time.

- It is important to think through a probable deployment ahead of time, and the range of situations you might encounter.

Here are a few basic questions you will need to answer:

- Which networks will you need to join, and which equipment will you need to do so?

- Will you need to be able to relocate quickly, or can you bring a ton of gear?

- Will you be on foot, or near your vehicle?

- Is your assignment at a fixed location or will you be mobile?

- How long might you be deployed?

- Will you be in a building with reliable power and working toilets, or in a tent away from civilization?

Topic 17 – Preparing for Deployment

Jump Kits:

- Most people seem to divide jump kits into two categories:
  - one for deployments under 24 hours,
  - one for up to 72 hours.
- For deployments longer than 72 hours, many people will just add more of the items that they will use up, such as clothing, food, water and batteries.
- Can be packaged in one or more backpacks, suitcases, plastic storage tubs, etc.
- Package individual items in zip-lock bags or plastic kitchen containers

Topic 17 – Preparing for Deployment

Radios and Accessories:

- Hand-held VHF or dual-band radio with Spare batteries.

- Alkaline battery pack for handhelds

- Supply of alkaline batteries

- Speaker-microphone and earphone for handhelds

- Battery chargers, ac and dc for handhelds

- Mobile VHF or dual-band radio (recommended for fixed location)

- HF radio, multiband antenna (bring parachute cord or nylon line to hang dipoles or NVIS antennas), and antenna tuner.

Topic 17 – Preparing for Deployment

Radios and Accessories: (Continued)

- VHF/UHF gain antennas and adapters (roll- up J-Pole, mobile magnetic mount, etc)

- Coaxial feed lines and short coax jumpers

- Ground rod, pipe clamp and wire

- Ac power supplies for VHF/UHF mobile and HF radios, accessories

- Large battery source for VHF/UHF mobile and HF radios, with charger or ac operated power supply.

- All related power, data, audio and RF cables and adapters

- Small repair kit: hand tools, soldering iron, multi-meter, connectors, adapters, fuses, key parts

Topic 17 – Preparing for Deployment

Radios and Accessories: (Continued)

- Duct tape, etc.

- Photocopies of manuals for all equipment

- Headphones, for noisy areas and privacy with proper connector, adaptors

- Specialized gear for packet, ATV or other modes

- Multi-band scanner, weather radio

- Personal cell phone, pager, spare batteries and chargers

- Pencils, legal pads, pencil sharpener

Topic 17 – Preparing for Deployment

Personal Gear: (continued)

- Clothing for the season, weather, and length of deployment

- Toilet kit: soap, razor, deodorant, comb, toilet paper

- Foul-weather or protective gear, warm coats, hats, etc. as needed

- Sleeping bag, closed-cell foam pad, pillow, earplugs

- High-energy snacks

- Easily prepared dried foods that will store for long periods

- Eating and cooking equipment if needed

- Water containers, filled before departure

Topic 17 – Preparing for Deployment

Personal Gear:

- First aid kit, personal medications and prescriptions for up to one week

- Money, including a large quantity of quarters for vending machines, tolls, etc.

- Telephone calling card

Information:

- ID cards and other authorizations
- Copy of Amateur Radio license
- Frequency lists and net schedules
- Maps, both street and topographic
- Key phone numbers, e-mail and Internet addresses
- Contact information for other members in your group, EC, DEC, SEC and others
- Copy of emergency plans
- Resource lists: who to call for which kinds of problems
- Log sheets, message forms
- Operating Supplies
- Preprinted message forms
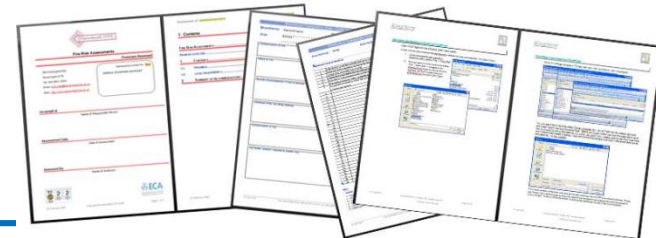
Topic 17 – Preparing for Deployment

Sub-Dividing Your Kits

You may want to divide your jump kit into smaller packages:

- Quick deployment kit: hand-held radio kit, personal essentials, in a large daypack

- VHF/UHF, HF kits for fixed locations

- Accessory and tool kit

- Emergency power kit

- Short and long term personal kits in duffel bags

- Field kitchen and food box in plastic storage tubs

- Field shelter kit (tents, tarps, tables, chairs, battery/gas lights) in plastic storage tubs

Topic 17 – Preparing for Deployment

Pre-Planning

When the time comes, you need to know where to go, and what to do. Having this information readily available will help you respond more quickly and effectively. It will not always be possible to know these things in advance, particularly if you do not have a specific assignment. **Answering the following basic questions may help**.

- Which frequency should you check in on initially?
- Is there a "backup" frequency?
- If a repeater is out of service, which simplex frequency is used for the net?
- Which nets will be activated first?
- Should you report to a pre-determined location or will your assignment be made as needed?

Topic 17 – Preparing for Deployment

Pre-Planning (continued)

- Learn about any place to which you may be deployed to familiarize yourself with its resources, requirements and limitations. .

- Will you need a long antenna cable to get from your operating position to the roof?

- Will you be in one room with everyone else, or in a separate room?

- Is there dependable emergency power to circuits at possible operating positions?

Topic 17 – Preparing for Deployment

Pre-Planning (continued)

- Does the building have an independent and dependable water supply?

- Is there good cell phone or beeper coverage inside the building?

- Can you reach local repeaters reliably with only a rubber duck antenna, or do you need a more efficient antenna or one with gain?

- If the repeaters are out of service, how far can you reach on a simplex channel?

- Will you need an HF radio to reach the net?

Topic 17 – Preparing for Deployment

Pre-Planning (continued)

- In addition to radios, consider copiers, computers, fax machines, phone systems and other potentially equipment.

- Consider escape routes. If you could be in the path of a storm surge or other dangerous condition.

Topic 17 – Preparing for Deployment

Training & Education

- If the served agency offers emcomm volunteers job-specific training in areas related to communication, take it.

- Your emcomm managers should help you to learn how the served agency's organization works.

- Work within your own emcomm organization to get any additional training or information you might need.

- The Federal Emergency Management Agency's Emergency Management Institute offers a wide range of courses, some of which may be related to your agency's mission.

- Your own group may offer training in message handling and net operations under emergency conditions.

Emergency Management Institute | FEMA

Topic 17 – Preparing for Deployment

Training & Education (continued)

- If your group has its own equipment, it should offer opportunities for members to become familiar with its setup and operation in the field.

- On your own, set up and test your personal equipment under field conditions to be sure it works as expected.

- Participate in any drills or exercises offered in your area. Some are designed to introduce or test specific skills or systems, others to test the entire response.

- ARRL's Field Day and Simulated Emergency Test are two good nation-wide examples, but local organizations may have their own as well.

Review Questions

1. **Of the following, which is the *best* reason for preparing a jump kit in advance?**

    a. **You will not leave something important at home or waste valuable time.**

    b. You are spared the added expense of shopping for something after an emergency arises.

    c. You can be fully rested on the day of the emergency.

    d. You can test the batteries on your hand-held VHF before leaving home.

2. Which of the following would you omit from a jump kit prepared for a 12-hour deployment?

    a. Hand-held VHF or dual-band radio.

    b. Spare batteries for the hand- held radio.

    c. High energy snacks.

    d. Camp cot and tent.

3. Among the following, which are the most important items of information to include in your jump kit?

a. ID cards and other authorizations.

b. Field cookbook.

c. Automobile repair manual.

d. Instruction book for your chain saw.

4. Among the following, which is the least important item of personal gear to include in your jump kit?

   a. Frequency lists and net schedules.

   b. Contact information for other members of your group, EC, DEC, and SEC.

   c. Key phone numbers, email and Internet addresses.

   d. A deck of playing cards.

5. **If you are assigned in advance to a particular location for emcomm operations, what is the *least* important thing to know in advance?**

   a. The escape routes from the facility itself.

   b. **The regular business hours maintained at the facility.**

   c. The availability of radio equipment at the facility.

   d. The location of your operating position and the planned location of the antenna.

Topic 18: Equipment Choices for Emergency Communication

ARRL – ARES® Branded Apparel Standard

- There are many articles of ARES branded clothing on the market. Some is from ARRL itself, but much more is from other manufacturers and sellers with the ARES logo added.

- When on actual deployments, there is a great need for a uniformed look to ARES volunteers. Other organizations have instituted standards for volunteers that provide identity, support public relations and comply with new emcomm standards. ARES people, however, continue to appear in all sorts of garb, are not easily recognized, and may fail to meet the increasing clothing and ID requirements of NIMS applications.

Topic 18: Equipment Choices for Emergency Communication

ARRL – ARES® Branded Apparel Standard (continued)

- This standard (adopted January 2010, specifics in following pages) does not affect or change the availability or marketing of ARES branded clothing in non-deployed uses. It refers only to periods when ARES volunteer personnel are deployed for public service or emergency response situations.

- The result is easier identification, better recognition of the services that ARES performs by and for the public, more professional and peer acceptance, and an espirit de corps across ARES groups that surpass localized identities.

Topic 18: Equipment Choices for Emergency Communication

Apparel:

The Specifics:

Garment colors
Safety Green (many people call it yellow) with silver reflective tape that meets ANSI Class 2 standards.

Garment Types

- 3 types to accommodate climate conditions:
  - Tee shirts - long and short sleeve, 50/50 cotton/poly.
  - Vests - Velcro or zip front, break away, 100% polyester, solid or mesh.
  - Jacket or coat

Apparel:

The Specifics:

The Back

- All garments shall be imprinted on the back with 2 inch tall Arial Black font, black in color, three lines, center justified:

AMATEUR RADIO
EMERGENCY
COMMUNICATIONS

- If the size of the vest does not allow for that size font, the next closest Arial Black font size that fits should be used.

- Those in a leadership position may add their title (SEC, DIRECTOR, EC, PIO, etc) below Emergency Communications not less than 3" tall Serpentine font, black.

Apparel: The Specifics: The Front

- Front left chest shall be imprinted with the ARES logo, no less than 3.5", and black in color. If the vest size is such that it does not allow room for that size logo, the closest size to it that fits there shall be used.

- The right chest area of the garment shall be left blank to allow wearer to affix their name/call badge or official ID badge.

Apparel: The Specifics: Adding Organizational Names

Local jurisdictions may elect to add their organization name in the either or both of two places:

- On the front below the ARES logo, Arial Black, black color, in not larger than 1/2" lettering.

- On the back by adding their organization name (such as SUSSEX COUNTY, DELAWARE ARES) above Amateur Radio Emergency Communications with no larger than 1" Arial Black lettering, color black.

Apparel: The Specifics: Implementation

- A three year period has been given for the attrition of deployment clothing purchased before these standards were adopted. Three years or older deployment clothing should be replaced by clothing meeting the standards above.

- **Beginning January 1, 2013, ARES volunteers in deployments, both emergency and community service related, will be encouraged _and expected_ to wear outermost garments meeting these standards.**

- Waivers for these standards may be granted by the SEC for good cause and should be in writing.

Apparel: The Specifics: Implementation (continued)

- Clubs and other groups are encouraged to make ***group buys*** through ARRL which may provide discounts for such purchases for ARRL affiliated clubs and groups. ARES members who may note merchants still selling ARES deployment clothing (intended for outerwear while on actual deployment) not meeting these standards are requested to politely inform the merchant of the new standards.

Topic 18: Equipment Choices for Emergency Communication

Transceivers: VHF/UHF

- The most universal choice for emcomm is a dual band FM 35 to 50 watt mobile transceiver (2 meter single band if no UHF is used in the group).

- Radios in this class are usually rugged and reliable, and can operate at reasonably high duty cycles, although an external cooling fan is always a good idea if one is not built-in.

- Handheld transceivers should be used only when extreme portability is needed, such as when "shadowing" an official or when adequate battery or other dc power is not available.

- Handheld radios should not be relied upon to operate with a high duty-cycle at maximum power, since they can overheat and fail.

Transceivers: VHF/UHF (continued)

- Both portable and mobile dual-band radios can be used to monitor more than one net, and some models allow simultaneous reception on more than one frequency on the same band (Sometimes known as "dual watch" capability).

- Some mobiles have separate external speaker outputs for each band. For high traffic locations, such as a Net Control or Emergency Operations Center, a separate radio for each net is a better choice since it allows both to be used simultaneously by different operators.

- Many dual-band transceivers also offer a "cross-band repeater" function, useful for linking local portables with distant repeaters, or as a quickly deployable hilltop repeater.

- True repeater operation is only possible if all other mobile and portable stations have true dual-band radios.

Topic 18: Equipment Choices for Emergency Communication

Transceivers: HF

- Operation from a generator equipped Emergency Operations Center can be done with an ac powered radio.

- Having both ac and dc capability ensures the ability to operate under all conditions. Most 12 Volt HF radios fall in either the 100-watt or QRP (less than 5 watts) categories.

- Unless power consumption is extremely important, 100-watt variable output radios should be used. This gives you the ability to overcome noise at the receiving station by using high power, or to turn it down to conserve battery power.

- Do not use dc to ac inverters to power HF radios. Most use a high-frequency conversion process that generates significant broad-spectrum RF noise at HF frequencies that is difficult to suppress. Direct dc powering is more efficient in any case.

Topic 18: Equipment Choices for Emergency Communication

Voltage Tolerance and Current Drain

- Some transceivers nominally powered using 12 volts DC actually have a rather narrow range of voltage (e.g., 13.0 to 13.8 volts) over which they will operate properly, a high-quality battery part way through its discharge cycle can easily fall below such a tolerable range.

- Transceivers with a wide acceptable input voltages range (e.g., 11.5 to 15 volts) are preferable in limited-power situations.

Topic 18: Equipment Choices for Emergency Communication

Radio Receiver Performance

- For radios on all bands, several aspects of a radio receiver's performance can affect its suitability for emcomm. These include sensitivity, ,selectivity ,and intermodulation rejection.

- When operating near public service and business radio transmitters, an FM receiver's "intermodulation rejection" is important. Mobile radios generally have better intermodulation rejection than handheld radios, but you should review each individual radio's specifications.

- External intermodulation (band pass) filters are available, but they add to the expense, complexity, size and weight of the equipment.

SECOND- AND THIRD-ORDER INTERMODULATION PRODUCTS

② = SECOND-ORDER IMD PRODUCTS
③ = THIRD-ORDER IMD PRODUCTS
NOTE: f_1 = 5MHz, f_2 = 6MHz

Radio Receiver Performance (continued)

- Band-Pass filters will also prevent you from using a broadband radio to monitor public service frequencies (but will substantially increase intermodulation rejection).

- Some older "ham bands only" FM mobile radios have better front-end filtering than newer radios with broadband receive capability, making them more immune to intermodulation and adjacent channel interference.

- Receiver filters are important for effective HF operation. Choose appropriate filters for the types of operations most likely to use, including CW, RTTY and phone.
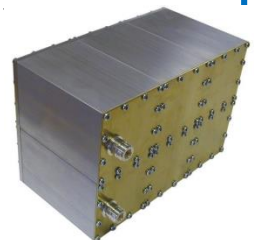
Topic 18: Equipment Choices for Emergency Communication

Digital Signal Processing (DSP)

- Digital Signal Processing (DSP) may be the single most important filtering feature available. Internal or external DSP circuits can allow clear reception of signals that might not otherwise be possible in situations with heavy interference.

"Noise blankers"

- "Noise blankers" are used to reduce impulse noise from arcing power lines, vehicle and generator ignition systems, and various other sources. While most all HF radios have some form of noise blanker, some work better than others.

Antennas

VHF/UHF:

- A good antenna, mounted as high as possible without incurring large feedline losses, is more important than high transmitter power. Not only does it provide gain to both the transmitter and receiver, but a higher gain antenna may also allow output power to be reduced, prolonging battery life.

- In relatively flat terrain, use a mast-mounted single or dual-band antenna with at least 3dBd gain.

- If you are operating in a valley, the low angle of radiation offered by a gain antenna may actually make it difficult to get a signal out of the valley.
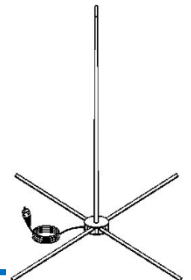
Topic 18: Equipment Choices for Emergency Communication

Antennas

VHF/UHF: (continued)

- Low or "unity" gain antennas have "fatter" radiation lobes and are better suited for Valley operation. Unity gain J-poles are rugged, inexpensive and easily built.

- For directional 2-meter coverage with about 7-dBd gain, a three or four element Yagi can be used. Collapsible and compact antennas of this type are readily available.

- For permanent base station installations, consider a more rugged commercial 2-way collinear antenna. Most 2-meter versions will also perform well on 70cm.

Antennas

VHF/UHF: (continued)

- A magnetic mount mobile antenna is useful for operating in someone else's vehicle. They can also be used indoors by sticking them to any steel surface, such as filing cabinets, beams or ductwork, even up-side down.

- Hand-held radio antennas, known as "rubber duckies," have negative gain. Use at least a 1/4 wave flexible antenna for most operations.

- "Roll-up J-pole" antennas made from 300 ohm television twin-lead wire can be tacked up on a wall or hoisted into a tree with heavy-duty string.

Topic 18: Equipment Choices for Emergency Communication

Antennas, HF

- There is no single perfect antenna for HF operation. Your choice depends on the size and terrain of the area you need to cover, and the conditions under which you must install it.

- For local operations (up to a few hundred miles), a simple random wire or dipole hung at a less than ¼ wavelength above the ground works well and is easy to deploy.

- This is known as a "Near Vertical Incidence Skywave" (NVIS) antenna. The signal is radiated almost straight up and then bounces off the ionosphere directly back downward. During periods of high solar activity, NVIS propagation works best on 40 meters during the day, switching to 80 meters at sunset.

The Near Vertical Incident Skywave (NVIS) antenna

Ionised region
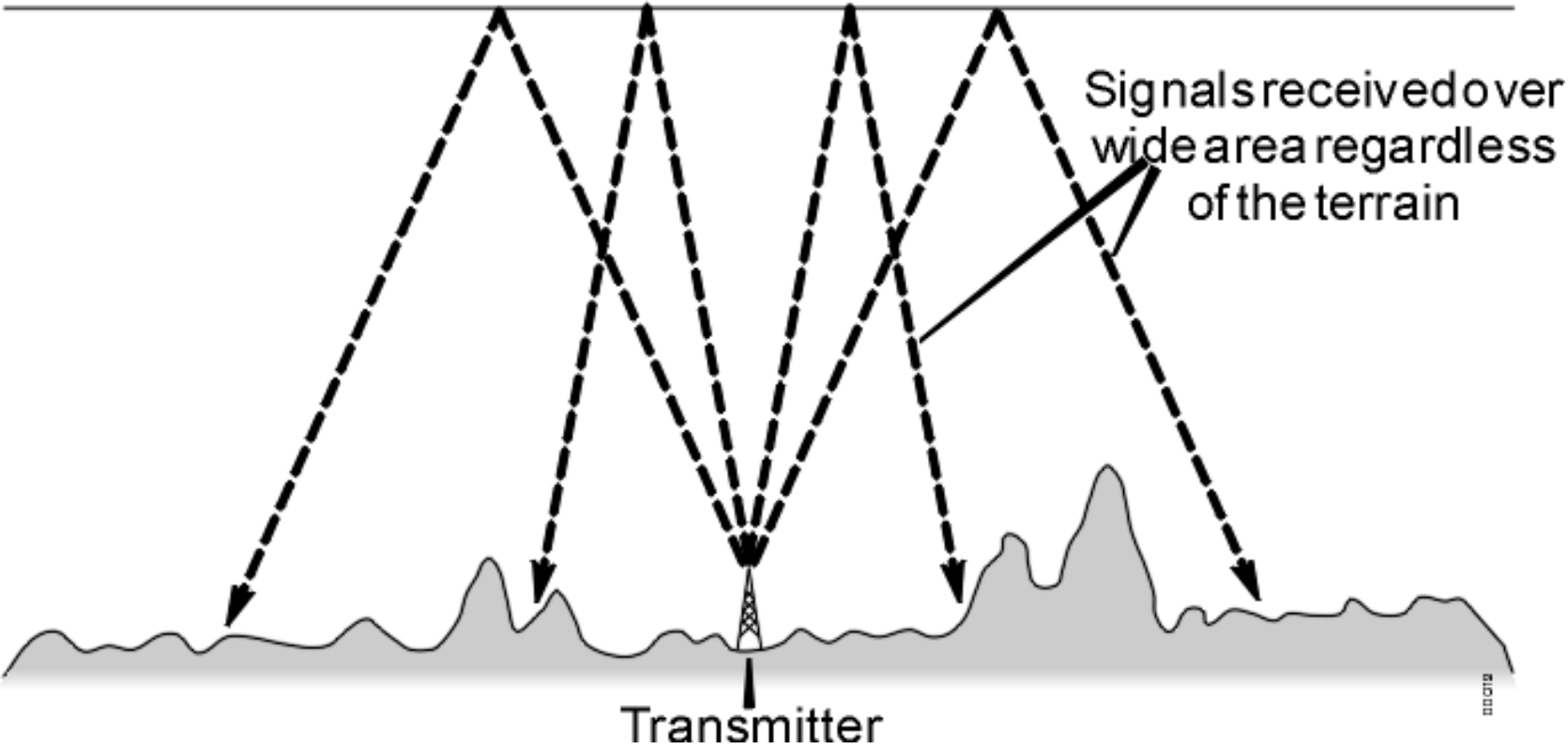
Signals received over
wide area regardless
of the terrain

Transmitter

Topic 18: Equipment Choices for Emergency Communication

Antennas, **HF** (Continued)

- During low parts of the sunspot cycle, 80 meters may be the most usable daytime NVIS band, and 160 meters may be needed at night. The new 60-meter band is also ideal for NVIS operation.

- An antenna tuner is necessary for most portable wire antennas, (especially for NVIS antennas), and is a good idea for any HF antenna. An automatic tuner is desirable, since it is faster and easier to use, and many modern radios have one built in. Include a ground rod, clamps and cable in your kit since almost all radios and tuners require a proper ground in order to work efficiently.

Topic 18: Equipment Choices for Emergency Communication

Antennas, HF (Continued)

- For communication beyond 200 miles, a commercial trapped vertical may work, but it has no ability to reject interfering signals from other directions.

- Mobile whip antennas will also work, but with greatly reduced efficiency.

- Directional (beam) antennas offer the best performance for very wide area nets on 10 to 20 meters, since they maximize desired signals and reduce interference from stations in other directions.

- Beam antennas are usually expensive, large, and difficult to store and transport.
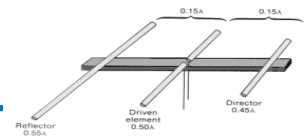
Feedlines:

- Feedlines used at VHF and UHF should be low-loss foam dielectric coax. For short runs of 30 feet or less, RG-58 may be suitable. For longer runs consider RG-8X or RG-213. RG-8X is an "in-between" size that offers less loss and greater power handling capability than RG-58 with far less bulk than RG-213. If carry only one type of cable, RG-8X is the best choice.

- On HF, the choice between coaxial cable and commercial "ladder" line will depend on your situation. Ladder line offers lower loss but more care must be taken in its routing, in proximity to metal objects, or where people might touch it. Coaxial cable is much less susceptible to routing near metal objects or other cables.

Topic 18: Equipment Choices for Emergency Communication

Operating Accessories

- Headphones are useful anywhere, and needed in many locations.

- Operators in an Emergency Operations Center or a Command Post where multiple radios are in use must use headsets.

- Headsets are also beneficial in shelters, to avoid disturbing residents and other volunteers trying to get some rest.

- Some radios and accessory headsets provide a VOX (voice operated transmit) capability. During emcomm operations use manual "push-to-talk" buttons used instead.

- As an alternative to VOX, consider using a desk or boom microphone and foot switch to key the transmitter.

Batteries

- Battery power is critical for emcomm operations.

- Batteries must be chosen to match the maximum load of the equipment, and the length of time that operation must continue before they can be recharged.

- NiCad, NiMH and Li-Ion are used for handheld transceivers, determined by the manufacturer. NiMH batteries store somewhat more energy than NiCad batteries for their size.

- Many smaller radios are using Lithium Ion (Li-Ion) batteries, which have much higher power densities, without the so-called "memory effect" of NiCads.
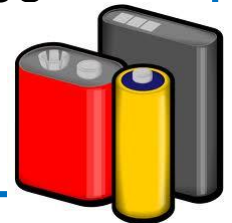
Batteries (continued)

- Many handhelds have optional AA alkaline battery cases. Common alkaline batteries are readily available in most stores and may be all you have if you cannot recharge your other batteries.

- Most handheld radios will accept an external 13.8Vdc power connection for cigarette lighter or external battery use.

- External batteries of any type can be used with a handheld, as long as the voltage and polarity are observed.

- Molex Power plugs work , but Anderson power poles can withstand repeated plugging and unplugging and have become the standard used by most ARES units.

Topic 18: Equipment Choices for Emergency Communication

Lead Acid Batteries

- There are three common types of lead-acid batteries: flooded (wet), VRLA (Valve Regulated Lead Acid), and SLA (Sealed Lead- Acid). Wet batteries can spill if tipped, but VRLA batteries use a gelled electrolyte or absorptive fiberglass mat (AGM technology) and cannot spill.

- SLA batteries are similar to VRLA batteries, but can be operated in any position—even up-side down. All lead-acid batteries are quite heavy.

Topic 18: Equipment Choices for Emergency Communication

Lead Acid Batteries (continued)

- Lead acid batteries are designed for different applications.

- "Deep-cycle" batteries are a better choice than common automotive batteries, which are not designed to provide consistent power for prolonged periods, and will be damaged if allowed to drop below approximately 80% of their rated voltage.

- Deep cycle batteries are designed for specific applications and vary slightly in performance characteristics.

- For radio operation, the best choice would be one specified for UPS (uninterruptible power source) or recreational vehicle (RV) use.

Topic 18: Equipment Choices for Emergency Communication

Lead Acid Batteries (continued)

- Sealed lead acid (SLA) or "gel cells," such as those used in alarm or emergency lighting systems, are available in small sizes (2, 4, and 7Ah), but sizes up to 100Ah are available.

- SLA batteries should never be deeply discharged. A 12 volt SLA battery will be damaged if allowed to drop below 10.5 volts.

- Excessive heat or cold can damage SLA batteries. Storage and operating temperatures in excess of 75 degrees F. or below 32 degrees F. will reduce the battery's life by half.

- Storage temperatures between 40 and 60 degrees will provide maximum battery life.

Topic 18: Equipment Choices for Emergency Communication

Battery "Power Budgeting"

- The number of ampere/hours required, called a "power budget," can be roughly estimated by multiplying the radio's receive current by the number of hours of operation, and then adding the product of the transmit current multiplied by the estimated number of hours of transmission and by the duty cycle for that mode.

- For a busy net control station, the transmit current will be the determining factor because of the high transmit time.

- For low-activity stations, the receiver current will dominate.

- The value obtained from these calculations are only a rough estimate of the ampere/hours required. The AH rating of the actual battery or combination of batteries should be up to 50% higher, due to variations in battery capacity and age.

Topic 18: Equipment Choices for Emergency Communication

Battery "Power Budgeting" (continued)

- Don't confuse the percent of time transmitting with "duty cycle," which is mode-specific (e.g., 100% for FM and digital, 50% for CW and 30% for uncompressed SSB).

Estimated 24-hour power budget example:

Receive current: 1 amp x 24 hours = 24 AH

Transmit current: 8 amps x 6 hours = 48 AH (figuring 6 hours as the 25% transmit time)

Total AH: 72 AH estimated actual consumption

*Actual battery choice 72 x 1.5 = **108** AH figuring 50% higher due to variations*

Chargers, Generators and Solar Power

Battery Chargers:

- You should have two or more batteries so that one can be charging while another is in use.

- **NiCad and NiMH batteries**: The type of charger required depends on the battery—for instance; most NiCad chargers will also charge NiMH, but not Li-Ion batteries. Several aftermarket "universal" chargers are available that can charge almost any battery available. A rapid-rate charger can ensure that you always have a fresh battery without waiting, although rapid charging can shorten a battery's overall lifespan.

Battery Chargers: (continued)

- **Lead-acid batteries:** Always consult the battery's manufacturer for precise charging and maintenance instructions. It is best to slow-charge all batteries, since this helps avoid over-heating and extends their over-all life span.

- In general, automotive and deep cycle batteries can be charged with an automobile and jumper cables, an automotive battery charger, or any constant-voltage source. If a proper battery charger is not available, any dc power supply of suitable voltage can be used, **but a heavy-duty isolation diode must be connected between the power supply and the battery.**

Battery Chargers: (continued)

- An isolation diode is important, since some power supplies have a "crowbar" overvoltage circuit, which short-circuits the output if the voltage exceeds a certain limit. If a battery is connected, the crowbar could "short-circuit" the battery with disastrous results.) The output voltage of the supply must be increased to compensate for the diode's voltage drop.

- **Wet Batteries**: These should be charged at about 14.5 volts, and VRLA batteries at about 14.0 volts. The charging current should not exceed 20% of the battery's capacity. For example, a 20-amp charger is the largest that should be used for a battery rated at approximately 100 Ah.

Battery Chargers: (continued)

- Deep cycle batteries do not normally require special charging procedures. However, manufacturers do recommend that you use a charger designed specifically for deep cycle batteries to get the best results and ensure long life.

- **SLA or "gel- cell":** Gel-Cell batteries must be charged slowly and carefully to avoid damage. All batteries produce hydrogen gas while recharging. Non-sealed batteries vent it out. SLA batteries do what is called "gas recombination." This means that the gas generated is "recombined" into the cells. SLA batteries actually operate under pressure, about 3 psi. for most.

Battery Chargers: (continued)

- If SLA or "gel cell" batteries are charged too quickly, the battery generates gas faster than it can recombine it and the battery over-pressurizes. This causes it to overheat, swell up, and vent, and can be dangerous and damage the battery.

- The charging voltage must be kept between 13.8 and 14.5 volts. A good rule of thumb is to keep the charging current level to less than 1/3 its rated capacity. For example, if you have a 7Ah battery, you should charge it at 2 amps or less.

- The time it takes for a SLA battery to recharge will depend on the amount of charge remaining in the battery. If the battery is only 25% discharged then it may recharge in a few hours. If discharged 50% or more, 18-24 hours may be required.

Topic 18: Equipment Choices for Emergency Communication

Solar panels and charge controllers:

- These are readily available at increasingly lower costs. These provide yet another option for powering equipment in the field when weather and site conditions permit their use.

DC to AC inverters:

- While direct dc power is more efficient and should be used whenever possible, inverters can be used for equipment that cannot be directly powered with 12Vdc. Not all inverters are suitable for use with radios, computers or certain types of battery chargers. The best inverters are those with a "true sine-wave" output.

- Inverters with a "modified sine-wave" output may not operate certain small battery chargers, and other waveform-sensitive equipment.

Topic 18: Equipment Choices for Emergency Communication

DC to AC inverters (continued)

- Test your inverter with your radios, power supplies and accessories (even those operating nearby on dc) and at varying loads before relying upon it for emcomm use.

- Effective filtering for VHF and UHF can be added rather simply, but reducing HF noise is far more difficult.

- Inverters should be grounded when in operation for safety and to reduce radiated RF noise.

- As an alternative to an inverter, consider a mid- sized 12V computer UPS (uninterruptible power source). Most true sine-wave units use internal batteries, but with minor modifications can be used with external batteries. The larger commercial UPS units run on 24 or 48 volts, and require two or four external batteries in series.

Topic 18: Equipment Choices for Emergency Communication

Generators:

- Generators are usually required at command posts and shelters for lighting, food preparation and other equipment.

- Radio equipment can be operated from the same or a separate generator.

- Be sure that co-located multiple generators are bonded with a common ground system for safety.

- Not all generators have adequate voltage regulation, and shared generators can have widely varying loads to contend with.

- You should perform a test for regulation using a high-current power tool or similar rugged device before connecting sensitive equipment.

Topic 18: Equipment Choices for Emergency Communication

Generators:

- Acoustical noise levels can be a concern with generators. Some are excessively noisy and can make radio operations difficult and increase fatigue.

- A noisy generator at a shelter can make it difficult for occupants to rest, and can result in increased levels of stress for already stressed people.

- Unfortunately, quieter generators also tend to be considerably more expensive. Consider other options such as placing the generator at a greater distance and using heavier power cables to compensate.

- Placing a generator far from a building can also prevent fumes from entering the building and causing carbon monoxide poisoning, an all-too-common problem with emergency generators.

Topic 18: Equipment Choices for Emergency Communication

Generators: (continued)

- Several other devices may be helpful when dealing with generators or unstable ac power sources. High quality surge suppressors, line voltage regulators and power conditioners may help protect your equipment from defective generators.

- Variable voltage transformers ("Variacs") can be useful to compensate for varying power conditions.

- A voltmeter should be part of your equipment any time auxiliary power sources are used.

Topic 18: Equipment Choices for Emergency Communication

- **Equipment for Other Modes**

- If you plan to operate one of the digital modes (packet, APRS, AMTOR, PSK31, etc), then you will also need a computer and probably a TNC or computer sound card interface.

- Some newer radios have built-in TNCs. Be sure to identify all the accessories, including software and cables, needed for each mode.

- The internal battery in your laptop computer will probably not last long enough for you to complete your shift. Be prepared with an external dc power supply and cable, or a dc to ac inverter. If you need hard copy, then you will also need a printer, most of which are ac powered.

Scanners and Other Useful Equipment

In addition to your Amateur Radio equipment, you may find a few other items useful:

- Multi-band scanning radio(s) to monitor GMRS, FRS, MURS, public service and media channels.

- FRS, GMRS (separate license required) or MURS handhelds

- Cellular telephone (even an unregistered phone can be used to call 911)

- Portable cassette tape recorder with VOX (for logging, recording important events)

- AM/FM radio (to monitor media reports)

Scanners and Other Useful Equipment (continued)

- A 40 chanel CB Radio.

- Portable television (digital if analog is not available in your area) to monitor media reports.

- Weather Alert radio with "SAME" feature (to provide specific alerts without having to monitor the channel continuously).

- Laptop computer with logging or emcomm- specific packet software.

Testing the Complete Station

- After making your equipment selection (or beforehand if possible), field test it under simulated disaster conditions.

- This is the fundamental purpose of the annual ARRL Field Day exercise in June, but any time will do. Operations such as Field Day can add the element of multiple, simultaneous operations on several bands and modes over an extended period.

- Try to test all elements of your system together, from power sources to antennas, and try as many variations as possible. For instance, use the generator, and then switch to batteries.

Testing the Complete Station (continued)

- Try charging batteries from the solar panels and the generator. Use the NVIS antenna while operating from batteries and then generator. This procedure will help reveal any interactions or interference between equipment and allow you to deal with them now—before proper operation becomes a matter of life and death.

Topic 18: Equipment Choices for Emergency Communication

Review Questions:

1. In considering power sources for HF radios, which of the following is *true*?

    a. DC to AC inverters are often used to power HF radios.

    b. Standard automotive batteries last longer than deep cycle batteries.

    c. AC powered HF radios are suitable for all emcomm use.

    d. Whenever possible, use deep cycle batteries to power HF radios.

2. In considering antennas for VHF/UHF radios, which is the *best* rule?

   a. High transmitter power is more important than having a good antenna.

   b. Transmitter power and antenna selection are equally important.

   c. A good antenna is more important than high transmitter power.

   d. If properly used, "rubber ducky" antennas can compensate for low transmitter power.

3. Beam antennas have many advantages. Which of the following is the *best* reason for selecting a beam antenna?

   a. They are inexpensive and easy to transport.

   b. They are easy to erect and very stable in storm conditions.

   c. They are compact and easy to store.

   d. They maximize desired signals and reduce interference from other stations.

4. **Which of the following statements about ARES deployment clothing is true?**

   a. Three years (until 2013) are being given to "wear out" and replace older clothing.

   b. The standards increase recognition and acceptance of ARES units.

   c. The standards apply only to clothing worn on actual ARES deployments.

   d. **All of the above.**

5. **In comparing the 30 amp Anderson power pole connector with the 10 amp Molex connector, which of the following statements is *true*?**

   a. The Molex is better for high power applications.

   b. The Molex is better for heavy duty cycles.

   c. The Anderson handles only low power applications.

   d. **The Anderson is capable of being plugged and unplugged a greater number of times without deterioration.**

Topic 19: Emergency Activation

How Will I know?

- The actual method by which emcomm volunteers are notified of activation will be determined locally.

- Every emcomm group should have a formal, written plan with its served agency(s) to activate their members when needed.

- The plan should detail who will call whom, and the various methods that can be used to contact them.

- The checklist can also list the actual telephone numbers and other contact information for each individual listed in the order that it is to be used.

- This information should be verified and updated on a regular schedule.

Initial Notification by the Served Agency

- In most cases, three or more members serve as "activation liaisons" to the served agency. When the emcomm volunteers are needed, it is one of these members who is called first.

- **Never rely on a single point of contact**. If that person is unavailable for any reason, the served agency should have one or more alternatives to try.

- They may be called by phone at work or at home, but the most reliable primary method is commercial radio paging (beepers).

Group Alerting Systems

- Once a liaison has been notified, a number of group alerting methods may be used. Common ones are described below. No one method should be relied upon, since emergency conditions may render it useless.

- Commercial paging systems and ham repeaters might be off the air, phone lines down, and Internet service disrupted. Again, a written plan and checklist should be developed well in advance, and updated periodically.

Topic 19: Emergency Activation

Group Alerting Systems (Continued)

- **Telephone Tree**: The liaison calls two members, who each call two other members and so on until the entire group has been notified. If any one person cannot be reached, the person calling must then call the members that person would have called. Messages should be left on all answering machines and voice mailboxes.

- **Text Messaging**: Even when voice cell phone systems are overloaded, there may be text messaging capabilities. Keep in mind however that text messages sent over cellular phone systems can be delayed for several hours or more in times of heavy use.

Group Alerting Systems (Continued)

- **Paging**: If commercial digital pagers are used, the liaison or someone he designates calls each member's pager telephone number and sends a specific numeric emcomm activation code.

- The code might indicate the six-digit frequency of a local repeater, followed by a three-digit "action" code (e.g.: 911 for an emergency, 000 for test).

- Some groups use a two- tone, POCSAG (digital), or similar paging signal on a local Amateur repeater with wide coverage, activating commercial voice or digital pagers that have been modified to monitor the repeater's frequency.

Group Alerting Systems (Continued)

- A low-cost method of "paging" a group using an Amateur repeater uses a specific Continuous Tone Coded Squelch System (CTCSS) tone.

- Members leave their radios turned on in the "CTCSS decode" mode when they are not actively listening to the repeater.

- When the correct CTCSS tone is turned on for emcomm activation, everyone can hear the transmissions.

- Since many newer radios include CTCSS decoding as a standard feature this method is generally simple to implement.

Group Alerting Systems (Continued)

- **E-mail:** While e-mail might not immediately reach members anywhere they happen to be, it is a good backup method as long as it continues to function.

- **Self-Activation:** If you become aware of an incident or situation that might require the activation of your group, you should take immediate steps to make yourself available. Monitor the assigned net or served agency frequencies, or making contact with one or more appropriate persons.

- It is important that an NCS or their backup start the emergency net as soon as possible to disseminate information on the event and to take check-ins.

I Have Been Notified—Now What?

- Your group's activation plan should tell each member what steps to take immediately after learning of emcomm activation. In most cases, the first step should be to check in on a specific frequency or repeater.

- If a repeater is used as the primary gathering point for members, a back-up simplex frequency (the repeater's output frequency works well) should be specified in the event that the repeater is no longer operating.

Topic 19: Emergency Activation

Review Questions

1. **When a telephone tree is activated, what should be done when a caller cannot reach one of their assigned contacts?**

   a. **Call all those assigned to the person who cannot be reached.**

   b. Call the liaison to report the difficulty.

   c. Ignore that person and go on to the next assigned contact.

   d. Stop calling at that point to "break" the tree.

2. What is an "emcomm activation liaison" for a served agency?

   a. A phone answering service employed by the agency.

   b. An automatic paging service employed by the agency.

   c. An agency employee who arrives early to turn on the equipment.

   d. A member of an emcomm group who is alerted first by the agency.

3. Regarding emcomm alerting systems, which of the following is true?

   a. All systems are equally useful.

   b. As an alerting system, commercial paging is clearly superior to all others.

   c. As an alerting system, the telephone tree is clearly superior to all others.

   d. It is best not to rely exclusively upon any single alerting system.

4. **Which of the following is true of e-mail as an alerting system?**

    a. With e-mail, emcomm members can be reached immediately anywhere they happen to be.

    b. With e-mail, high-speed Internet connections guarantee that messages will be received very quickly.

    c. **E-mail is best used as a backup alerting system.**

    d. With e-mail, the CTCSS tone assures that all members will be quickly alerted.

5. Which of the following statements is true about the NCS?

a. The NCS is so important that it should never be assigned on a temporary basis.

b. The NCS is so important that temporary assignment as NCS should be limited to only one member of the group.

c. **The NCS is so important that several members should be trained to take on the duties until the assigned NCS checks in.**

d. The first member to sign on to a net is always the NCS for the duration of the incident.

Who Is In Charge?

- At each station, the EC or other emcomm manager should appoint one member of the emcomm group to take a leadership role as "station manager," with full responsibility for all operations at that site.

- This person serves as a point of contact, information and decisions for the team with the incident commander and with other groups aiding in the response.

- When you accept a position as an emcomm volunteer Expect to work with others. Expect that there are times you are the follower. Expect that other times, you may be the leader.

Arriving at the Site

- If you are assigned to a facility operated by the served agency introduce yourself to the person in charge as an "emergency communicator" assigned to serve that location.

- Explain that you have been assigned to set up a communication station for that location, and by whom.

- Inform them that you would like to set up your equipment and get on the air. Ask if another communicator has already arrived. Explain your needs and ask sk if they have a preference for the station's location.

Arriving at the Site (continued)

- If you are the first communicator to arrive, be prepared to suggest an appropriate location—one that can serve as both an operating and message desk, has feed line access to a suitable antenna location, access to power and telephone, and is just isolated enough from the command center to avoid disturbing each other.

- If no building or other suitable shelter is available, you may need to set up your own tent, or work from your car. Choose a location that provides shelter from wind, precipitation and other hazards, and is close enough to the served agency's operations to be convenient but not in each other's way.

Topic 20: Setting Up, Initial Operations and Shutdown

Being a Good Guest

- In many cases, you will be occupying a space that is normally used by someone else for another purpose. Respect and protect their belongings and equipment in every way possible. For instance, if you are in a school and will be using a teacher's desk, find a way to remove all the items from its surface to a safe place for the duration of operations. A cardboard box, sealed and placed under the desk usually works well.

- When installing antennas, equipment and cables, take care not to damage anything. Avoid using "duct" tape to fasten cables to walls or ceilings, since its removal will usually damage the surface.

Initial Set Up and Information Gathering (continued)

- Once your basic station is on the air, you can begin to work on other needs:
  - Check for working telephones, faxes, Internet and other means of communications
  - Learn about the served agency's operations and immediate needs.
  - Install additional stations or support equipment
  - Make a list of stations within simplex range
  - Identify possible alternative message paths
  - Find sanitary facilities
  - Determine water and food sources, eating arrangements
  - Review conditions at the site, and how they affect your operations
  - Find a place to get some occasional rest

Initial Set Up and Information Gathering (continued)

- As soon as possible, ask a member of the served agency's staff to spend a few moments to discuss the agency's needs:
  - What are the most critical needs?
  - Whom do they need to communicate with?
  - What sort of information will need to be transmitted?
  - Will most messages be short and tactical in nature, or consist of long lists?
  - Will any messages be too confidential for radio?
  - Are phones and fax still working?
  - What will traffic needs be at different times of day?
  - How long is the site anticipated to be open? Will there be periodic changes in key agency staff?

Ending Operations

- Emcomm operations may end all at once, or be phased out over time. Factors affecting which operations end, and when:

  – Damaged communication systems are restored and returned to service

  – Traffic loads are reduced and can be handled with normal systems

  – Shelters and other locations are closed

- How you are notified to end operations will depend on the policies of your emcomm group and served agency, and the specific situation.

END

Ending Operations (continued)

- Even though a shelter manager has been told to shut down by the served agency. your orders may normally come from a different person who may not be aware of the shelter's closing. You might need to check with the appropriate emcomm manager before closing your station.

- Once the decision to close your station has been received and verified, be sure that the person in charge of the location is aware that you are doing so, and if necessary, why.

- File and package all messages, logs and other paperwork for travel.

- Return any borrowed equipment or materials.

Topic 20: Setting Up, Initial Operations and Shutdown

Departure

- Several actions may be necessary when leaving. First, be sure to leave the space you used in as good a condition as possible. Clean up any messes, remove trash and put any furniture or equipment back where it was when you arrived.

- If you sealed desktop items in a box for safekeeping, simply place the box on the cleaned desk. Do not unpack the items and attempt to replace them on the desk. This will provide proof to the desk's owner that you took steps to protect their belongings, and helps keep them secure until their owner takes possession again.

The Debriefing

- After each operation, your emcomm group, and perhaps even the served agency, will probably want to hold a meeting to review the effectiveness of the operation.

- Events may have occurred within the served agency that involved communications you handled. If you try to rely on your memory or logbooks, you will probably forget.

- To prevent this from happening, keep a separate "de-briefing" diary, specifically for use during this meeting.

- Some entries might only refer briefly to specific times dates in the station operating log, or they may contain of an issue that is not appropriate in the station log.

The Debriefing (continued)

- During the de-briefing, organize the session into
  (a) what worked well, and
  (b) what could be improved for the next operation.

- Change criticisms and judgment statements into a constructive manner by saying, "This method might have worked better if…" rather than "This method was stupid."

- Avoid personal attacks and finger pointing. In most cases, interpersonal issues are dealt with most effectively away from the group meeting

Review Questions:

1. **Suppose that you have been activated during an emergency and have been told to report to an agency that is different from your usual assignment. Which of the following is your best course of action upon arriving at the new agency?**

   a. Take charge and set up a communication center right away.

   b. Check around the site and find the best place to set up a communication center.

   c. Ask the receptionist about the best location for setting up a communication center.

   d. **Introduce yourself to the person in charge as the emergency communicator assigned to that location.**

2. **You are to brief the staff of a served agency about privacy on Amateur Radio. Which of the following is the most accurate statement you can make?**

   a. Speaking quietly into a microphone assures that no one will overhear private information.

   b. It is permissible to use code words to assure privacy on the air.

   c. There is no privacy with Amateur Radio voice communications.

   d. **There are <u>no methods</u> by which the security of any message can be assured on Amateur Radio.**

3. **Suppose that you have been assigned to a site and the emergency ends. If the site manager asks you to close your station, what is your best course of action?**

   a. Do as the site manager tells you and close down your station immediately.

   b. Ignore the site manager and await further instructions from higher authority.

   c. **Check in with the emcomm manager or NCS before closing down.**

   d. Have your emcomm manager or NCS speak directly with the site manager before you take any action.

4. **In preparing to leave a site after an emcomm event, which of the following actions is <u>not</u> <u>appropriate?</u>**

   a. Clean up any mess, discard trash, and move furniture back to its original position.

   b. **Unpack all desk items that you have placed in boxes and put them back in their original locations.**

   c. Thank all of those who worked with you.

   d. Repair any relationships that may have been strained during the event.

5. A debriefing should be scheduled after each emcomm event. What is the primary purpose of the debriefing?

   a. It provides an occasion to swap "war stories."

   b. It serves as a legitimate forum for complaints.

   c. It serves to improve future emcomm activities.

   d. It provides an occasion for resolving interpersonal issues.

Choosing Phone Net Frequencies

- Unlike commercial and public safety radio users, Amateurs have a vast amount of radio spectrum to use in meeting the needs of an emergency.

- Most local and regional emcomm communication takes place on 2 meter or 70 centimeter FM, or on 40, 60 or 80 meter SSB/ CW. The choice made is based on the locations to be covered, the availability of repeaters, distance, terrain, and band conditions.

- VHF and UHF FM are preferred for most local operations because the equipment is common, portable, has clear voice quality and the coverage is extended by repeater stations.

Choosing Phone Net Frequencies (continued)

- VHF and UHF communication range is determined by terrain, antenna height and the availability of repeaters.

- For larger areas or in areas without repeaters, use HF SSB.

- Most local emcomm operation is on the 40 or 80-meter bands using Near Vertical Incidence Skywave (NVIS) propagation.

- For long-haul communication needs and international operations, 15 or 20-meter nets may be the best option.

- Many emcomm groups will have pre-selected a number of frequencies for specific purposes. The complete list of these frequencies should be in your jump kit, and pre-programmed into your radios.

Know Your Resources In Advance

- Become familiar with the coverage and features of each permanent repeater and digital message system in your area, and pre-program your radios with the frequencies, offsets and CTCSS tones.

- Ask your EC or AEC which repeaters are used for emergency communication in your area.

- Will they be available for exclusive emcomm use, or must they be shared with other users? Information to find out includes:

- How does it identify itself?

- Are there any "dead spots" in critical areas?

Network Coverage Concerns

- Most emcomm managers rely on simplex operation when planning their VHF or UHF FM nets for one reason—repeaters often do not survive disasters or are overwhelmed with the amount of traffic.

- Repeaters that do survive and are usable are considered a bonus. Since simplex range is limited by terrain, output power, antenna gain and height, operation over a wide area can be a challenge.

- Almost any structure or hills can block signals to some degree. Don't overlook SSB on our VHF or UHF bands; it can support communication over surprising distances over rough terrain.

Network Coverage Concerns (continued)

- In a fast moving situation with poor simplex coverage and no repeater, it can be helpful to place a mobile station on a hilltop or office building where they can communicate with, and relay for, any station in the net.

- A mobile relay station can also allow communications to follow a moving event, such a wildfire or flash flood. That station becomes, in effect, a "human repeater."

Topic 21: Operations & Logistics

Network Coverage Concerns (continued)

- Although an expedient "work-around," the "human Repeater" is a slow and cumbersome process can reduce net efficiency by more than half.

- A modern aid to this kind of operation is the "simplex repeater." This device automatically records a transmission, and immediately re-transmits it on the same frequency. Remember that FCC rules do not allow unattended operation of simplex repeaters, and that you must manually identify it.

Network Coverage Concerns (continued)

- A better solution is a portable duplex repeater that can be quickly deployed at a high point in the desired coverage area.

- The coverage of this repeater does not have to be as good as a permanent repeater—it just has to reach and hear the stations in your net. Portable repeaters have been used successfully from the back seat of a car, using a mobile antenna, and parked on a ridge or even the top floor of a parking garage.

Topic 21: Operations & Logistics

Frequency and Net Resource Management

- While we may have a large amount of frequency resources, in actual practice our choices are limited to the available operators and their equipment.

- Net managers may need to "shift" resources to meet changing needs. In the early stages of an emergency, the tactical nets may require more operators, but in later stages, the health and welfare traffic might increase.

- In addition to the main net frequency, each net should have several alternate frequencies available. These should include one or more "back up" frequencies for use in the event of interference, and one or two frequencies to be used to pass traffic "off net."

Message Relays

- When one station cannot hear another, a third station may have to "relay" the messages.

- Although this is a slow and cumbersome process, it is often the only way to reach certain stations.

- If relays must be used, move the stations involved off the main net frequency to avoid tying up the channel for an extended period.

Record Keeping

- Most served agencies will expect you to keep records of your operations.

- Your station operating logs should probably contain the following information:
  - Your arrival and departure times.
  - Times you check in and out of specific nets.
  - Each message, by number, sender, addressee and relay stations.
  - Critical events—damage, power loss, injuries, earth tremors, other emergencies.
  - Staff changes—both emcomm and site management, if known
  - Equipment problems and issues.

Tips to help manage stressful situations:

- Delegate some of your responsibilities to others.

- Only take on those tasks that you can handle.

- Prioritize your actions—the most important and time-sensitive ones come first.

- Do not take comments personally—mentally translate "personal attacks" into "constructive criticism" and a signal that there may be an important need that is being overlooked.

1. First things first
2. Second things second
3. Third things third

Dealing With Egos

- Some within the emergency response community have "big egos," and still others with a need to be in full control at all times.

- Both personality types can be problematic anytime but far worse under stress. Take time now to consider how you will respond to the challenges they present.

- If your automatic response to certain behaviors is anger, make a conscious decision to come up with a different and more positive response strategy.

Long Term Operations

- As soon as it becomes clear that the situation is not going to return to normal for a while, you and your group should make plans for extended emcomm operations.

- Your emcomm group and served agency should have prepared contingency plans for this, and all you will have to do is put them into action.

Battery Management

- If you are operating on battery power, you will eventually need to recharge your batteries.

- Some batteries need more time to recharge than others, and this time needs to be taken into account in your planning.

  – Deep cycle marine batteries, for instance, can require a full day or longer to fully recharge.

  – Sealed lead-acid (SLA) batteries, also known as "gel-cells," require up to 18 hours to recharge depending on the size of the battery.

  – NiCad, Li-Ion and similar batteries can be recharged quite quickly, although repeated rapid charge cycles can reduce overall battery life.

Battery Management (continued)

- If you are using slow-charging batteries, you may need to have enough on-hand to last the entire length of the operation.

- If your batteries can be charged quickly, some means must be provided for doing so. Some chargers can be powered from a vehicle's 12-volt system, and are a good choice for emcomm.

- If no local means of charging is available, your logistics team may need to shuttle batteries back and forth between your position and a location with power and chargers.

Generator and Power Safety

- Take some care in the placement of generators so that they will not be a problem for others.

- Engine noise can make it difficult for shelter residents and volunteers to get much needed rest.

- Exhaust fumes should not be allowed to enter the building or nearby tents or vehicles. Carbon monoxide tends to settle, so exhaust components should be carefully located so that fumes cannot settle into inhabited areas below the generator.

- A position "down- wind" of any occupied location is best.

DANGER
Using a generator indoors
CAN KILL YOU IN MINUTES.
Generator exhaust contains cabon monoxide.
This is a poison you cannot see or smell.

NEVER use inside a home or garage. **EVEN IF** doors and windows are open.

Only use **OUTSIDE** and far away from windows, doors and vents.

Topic 21: Operations & Logistics

Equipment—Leaving Yours Behind?

- You are exhausted, and ready to head for home, but the emcomm operation is far from over. You brought along a complete station, and when you leave, the next operator is not nearly as well equipped. Should you leave your equipment behind for the next operator?

- You have several options here. They are all yours to choose from. No one can, or should, tell you to leave your equipment behind. If you feel comfortable that someone you know and trust will look after your gear, you may choose to leave some or all of it behind.

Accepting Specialized Assignments

- In the world of modern emcomm, you may be asked to handle other assignments for the served agency that may or may not include communicating.

- At one time, most emcomm groups had strict policies against doing other tasks, and this is still true of some groups.

- In the days when radios were difficult to operate under field conditions and required constant attention, this was important.

- The other common reason given is that you have volunteered to be a communicator, not a "bed pan changer."

Accepting Specialized Assignments (continued)

- Some agency's staff will abuse the situation when they are short of help. If the agency's staff and emcomm group are clear about limits beforehand, the problem should not arise.

- Today, most emcomm groups will permit their members to be cross-trained for, and perform, a variety of served-agency skills that also include communicating. Examples are:

  - SKYWARN weather spotting

  - Red Cross damage assessment and many logistics jobs.

- If your group still has a "communication only" policy, are you really meeting your agency's needs?

Review Questions

1. **Which of the following will *NOT* limit VHF simplex range?**

   a. Terrain.

   b. Output Power.

   c. Antenna Gain.

   d. Digipeaters.

2. Which of the following actions will *NOT* improve simplex reception?

    a. Increase the antenna height.

    b. Switch to a non-directional antenna.

    c. Increase transmitter output power at both stations.

    d. Move the antenna away from obstructions.

3. Which of the following is true about a simplex repeater?

   a. The FCC rules do not permit unattended operation of simplex repeaters.

   b. They work best in the "cross band repeater" mode.

   c. They require the use of two radios.

   d. Is the same as a "human repeater."

Topic 21: Operations & Logistics

4. Which of the following is a good means of dealing with stress during an emcomm event?

   a. Take every comment personally.

   b. Pay no attention to other team members; let them handle their own problems.

   c. To reduce personal stress, insist on working more than your own shift.

   d. Prioritize your actions - the most important and time sensitive ones come first.

Introduction

- Disaster relief volunteers may become so involved with others that they forget to take care of their families and themselves.

- The needs of disaster victims seem so large compared with their own that volunteers can feel guilty taking even a moment for their own basic personal needs.

- If you continue to assist others, you need to keep yourself in good condition so you are not part of the problem.

- If your family is not safe and all their needs are not taken care of, worrying about them may prevent you from concentrating on your job.

Topic 22: Safety & Survival

Home and Family First

- Before leaving on an assignment, be sure you have made all necessary arrangements for the security, safety and general well being of your home and family.

- Family members, and perhaps friends or neighbors, should know where you are going, when you plan to return, and a way to get a message to you in an emergency.

- If you live in the disaster area or in the potential path of a storm, consider moving your family to a safe location before beginning your volunteer duties.

- Take whatever steps you can to protect your own property from damage or looting.

Home and Family First

- In addition to your emcomm deployment checklists, you might want to create a home and family checklist. It should cover all their needs while you are gone.

Should You Leave At All?

- There are times when your family may need you as much or more than your emcomm group. Obviously, this is a decision that only you and your family can make.

- If a family member is ill, your spouse is unsure of their ability to cope without you, if evacuation will be difficult, or any similar concern arises, staying with them may be a better choice.

Should You Leave At All? (continued)

- If there is any doubt, your decision is stay with your family.

- This is also something you should discuss, and come to an agreement with your spouse about well before any disaster, in order to avoid any last minute problems.

You First—the Mission Second

- Once you are working with your emcomm group, you will need to continue to take care of yourself. If you become over-tired, ill or weak, you cannot do your job properly.

- If you do not take care of personal cleanliness, you could become unpleasant to be around. Whenever possible, each station should have at least two operators on duty.

Food

- Most people need at least 2000 calories a day to function well. In a stressful situation, or one with a great deal of physical activity you may need even more.

- If you are at a regular shelter, at least some of your food needs may be taken care of. In other situations, you may be on your own, at least for a while.

- High calorie and high protein snacks will help keep you going, but you will also need food that is more substantial. You may need to bring along some freeze-dried camping food, a small pot, and a camp stove with fuel, or some self-heating military-style "Meal, Ready to Eat" (MRE) packages.

Topic 22: Safety & Survival

Water

- Safe water can be difficult to find during and after many disasters.

- Most disaster preparedness checklists suggest at least one gallon per person, per day.

- Many camping supply stores offer a range of water filters and purification tablets.

- Filters may or may not remove all potentially harmful organisms or discoloration, depending on the type.

- Iodine- saturated filters will kill or remove most harmful germs and bacteria.

Water (continued)

- Purification tablets, such as Halazone, have a limited shelf life that varies with the type, and give the water an unpleasant taste. The tablets will do nothing for particulate (dirt) or discoloration in the water.

- The CDC says you can use unscented household chlorine bleach. After filtering out any particulates put 1/8 teaspoon of bleach in a gallon of water, mix well, and allow it to sit for thirty minutes.

- If you have no other means, boiling for at least five minutes will kill any bacteria and other organisms. Boiling will leave water with a "flat" taste.

Sleep

- Try to get at least six continuous hours of sleep in every twenty-four hour period, or four continuous hours and several shorter naps.

Personal Hygiene

- If you pack only a few personal items, be sure they include toothpaste and toothbrush, a comb, and deodorant.

- If possible, bring a bar of soap or waterless hand cleaner, a small towel and washcloth, and a few extra shirts.

- Waterless shampoo is available from many camping stores. After two or three days without bathing, you can become rather unpleasant to be around—think of others and make an attempt to stay as clean and well-groomed as you can under the circumstances.

Safety in an Unsafe Situation

- Many disaster assignments are in unsafe places.

- While you may focus on the job assigned you, never lose "situational awareness." You should always be aware of your surroundings and the dangers they hold.

- Never place yourself in a position where you might be trapped, injured or killed.

- Try to anticipate what might happen and plan ahead. Always have an escape plan ready in the event that conditions suddenly become dangerous

Safety in an Unsafe Situation (continued)

- . Do not allow yourself to become "cornered"— have ***more than one*** escape route from buildings and hazardous areas.

- Wear appropriate clothing.

- Always bring several pairs of <u>non</u>-cotton socks and change them often to keep your feet clean and dry.

- Create seasonal clothing lists suitable for your climate and the types of disasters you might encounter.

- Avoid potentially dangerous areas. Industrial buildings or facilities may contain toxic chemicals which can be released in a disaster.
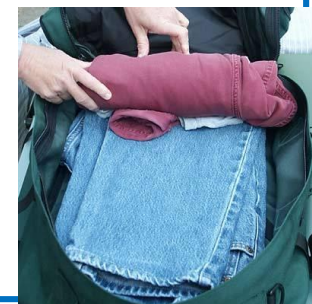
Safety in an Unsafe Situation (continued)

- Be prepared to help others find or rescue you should you become trapped or isolated.

- Carry a police or signal whistle and a chemical light stick or small flashlight in your pocket. Let others know where you are going if you must travel anywhere, even within a "safe" building.

- Try not to travel alone in dangerous conditions—bring a "buddy."

Protect Your Eyes and Sight

- If you wear eyeglasses or contact lenses, bring at least one spare pair. Keep spare eyeglasses or safety glasses in a hard shell, felt-lined storage case.

- If you use disposable contact lenses, bring more than enough changes to avoid running out.

- Bringing a copy of your lens prescription along may also be a good idea, especially if you are likely to be some distance from home for a while.

- Sunglasses may be a necessity in some situations and should always be carried in sunny climates.

Topic 22: Safety & Survival

Sample Personal Survival and Comfort Needs Checklist (Modify according to your own situation)

- Suitable size backpack or duffel bag for clothing and personal gear

- Plastic storage tub for food, cooking gear

- Toilet kit—soap, comb, deodorant, shampoo, toothbrush, toothpaste

- Toilet paper in zipper-lock freezer bag

- Small towel and washcloth

- Lip balm

- Facial tissues

Review Questions:

1. Which of the following statements concerning water purification is FALSE?

    a. Boiling water for a full 5 minutes will kill most harmful bacteria.

    b. Boiling water to purify it can leave it with a flat taste.

    c. Filters may or may not remove harmful bacteria.

    d. Purification tablets will remove bacteria and particulate matter (dirt).

2. Which of the following is TRUE about using unscented household chlorine bleach to purify water?

a. It is best to use 8 tablespoons of chlorine bleach per gallon of water.

b. Adding the proper amount of chlorine bleach to water will improve the taste.

c. After adding bleach, water must sit for 3 hours before drinking.

d. **It is best to use 1/8 teaspoon of plain chlorine bleach per gallon of water.**

3. Which of the following is TRUE about the personal gear you bring to a long-term incident?

   a. Include several pairs of warm cotton socks.

   b. Lightweight summer clothing is all you will ever need.

   c. Keep spare eyeglasses or safety glasses/goggles in a hard-shell, felt-lined storage case.

   d. As a volunteer communicator, you will need to bring specialized protective clothing.

4. **Many disaster assignments are in unsafe places. Which of the following is TRUE about such locations?**

    a. Always plan an escape route from buildings and hazardous areas.

    b. **Always plan more than one escape route from buildings and hazardous areas.**

    c. The only dangers that you need be concerned with in any location are fire, flood, and falling debris.

    d. Dams, bridges and buildings can generally be thought of as "safe zones."

5. Which of the following statements about safety and survival is TRUE?

a. The mission takes priority over everything else.

b. A person requires at least four gallons of water per day just for drinking.

c. If caffeine keeps you awake, stop drinking caffeinated beverages at least ten minutes before going to bed.

d. Your personal safety and well-being are a higher priority than the mission.

Section 5: Considerations
Topic 23: ARES PIO: The Right Stuff

- More and more sections are appointing ARES-specific Public Information Officers (PIOs). These PIOs are specialists in covering media relations when ARES units are deployed in an emergency or community service operation.

- **The goal of a PIO in an emergency is**: "Providing the Right information to the Right people at the Right time so they can make the Right decisions."

- In addition to the regular PIO duties and tasks of establishing media relationships, informing the public and attracting new members, the ARES PIO has the opportunity to become an integral part of the Incident Command System (ICS).

- The public needs to know what is happening. Silence or errors on in reporting breed rumors.

- The ICS has standardized ways to coordinate this information in a unified voice.

- One component of forming the Unified Command is that of a group of Public Information Officers (PIOs) representing the responding agencies will come together to form a Joint Information Center (JIC).

- It is the duty of the JIC to establish a unified message and become the voice of the event. .

- A trained ARES PIO is very likely to be invited to represent Amateur Radio within the JIC.

- As an ARES PIO, your job is to be the "expert" on Amateur Radio efforts involved (number of ARES personnel involved, locations of ARES stations, etc.)

- You may be assigned multiple additional duties within the JIC to assist the Lead PIO. You will be expected to perform these additional duties as well as your ARES PIO duties simultaneously.

- Should the media inquire about ARES or Amateur Radio involvement, the Lead PIO will call on you to provide the facts and figures. Your job will be to answer any (and only) questions regarding Amateur Radio and ARES.

- **UNDER NO CIRCUMSTANCES SHOULD YOU EVER SPECULATE AS TO THE OUTCOME OF THE SITUATION, OR PROVIDE ANY INFORMATION AS TO VICTIM NAMES, CONDITION OF INDIVIDUALS OR GRAVITY OF THE SITUATION TO THE MEDIA**!

- This is the job of others, not an ARES operator nor an ARES PIO. The PIO may be asked to speak to the media about Amateur Radio involvement, number of ARES personnel involved and the kinds of communications being supported by ARES.

- The PIO can only talk about ARES' own work and must refer other topics to more appropriate personnel.

Some Rules You Need to Know

- Amateur Radio must NOT be used to assist news media in gathering information **when telephones or other normal means of communication are available**.

- Amateur Radio operators may assist news media representatives in their efforts to gather information for relay to the public **from areas where normal communications have been disrupted**.

- Amateurs may ask questions of, or relay media questions to, other amateurs in the emergency area and their responses be recorded by media representatives.
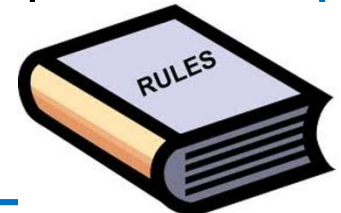
Some Rules You Need to Know (continued)

Who Can Record and Transmit What:

- One constant area of confusion is in the recording and re-transmission of Amateur Radio messages.

- Amateur Radio operators can NOT record and re-transmit commercial radio and TV broadcasts.

- Commercial radio and TV reporters CAN record and then broadcast Amateur Radio messages.

Topic 23: ARES PIO: The Right Stuff

Review Questions

1. A Joint Information Center is established to:

    a. Formulate a unified voice and message.

    b Dispel rumors.

    c. Provide a central location for media questions.

    d. All of the above.

2. As an ARES PIO you will be expected to:

   a. Get coffee for the Lead PIO.

   b. Provide relevant information to media regarding Amateur Radio involvement.

   c. Give timely updates regarding the overall emergency effort and participants.

   d. Provide a victim list including names and conditions.

3. **You are involved in an ARES deployment but not as a PIO and a reporter shows up at your location and starts to ask you questions. What should you do?**

   a. **If possible, refer them to the JIC, designated Lead PIO or ARES PIO.**

   b. If possible, refer them to the EC and DEC.

   c. Refer them to the Unified Commander.

   d. Be friendly, tell them what you are doing and how the operation is going.

4. There's a flood in progress. A reporter for the local TV station comes to your location and asks you to get on the radio and talk to someone at the levees to find out if they think the sandbags will hold. What things need to be considered in this request?

a. Are other means of communication still available.

b. Amateurs can ask questions of other amateurs – not just "someone".

c. The question is speculating about things not specific to the Amateur Radio operation.

d. All of the above.

Topic 24: Alternative Communication Methods

Introduction

- Amateur Radio may not always be the only or best radio service for the job.

- Sometimes it is better to hand an official a radio he can use to stay in contact with the ARES team on site, and not saddle him or her with a ham radio "shadow." This is particularly true for officials who must regularly deal with sensitive issues.

- Other voluntary agencies may use these radio services in their own operations.

- The radio services discussed in this chapter are commonly available at low cost and are in general use.

- Other volunteers may already own radio equipment in these services, and amateur emergency communication groups should be equipped to communicate with them.

Topic 24: Alternative Communication Methods

Legal Considerations

- Some radio services require licenses, and others do not. In a true emergency this may not be a problem. FCC rules permit the use of "any means necessary" to communicate in order to protect life and property— **but only when no other normal means of communication is possible.**

- Be prepared to defend yourself in court if necessary to justify the "emergency" and be prepared to lose.

- Other services, such as GMRS, require a license that is relatively easy to obtain, although not free. If your group is planning to use licensed radios, obtain your license well before any emergency and keep it current.
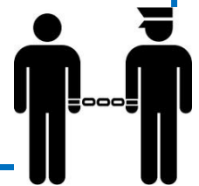
Using Modified Ham Radios

- While it is easy to modify many VHF and UHF Amateur radios for operation in nearby public service and business bands, it is not legal to do so for regular "emergency" use.

- Radios used in those bands must be "Type Accepted" by the FCC for the purpose, and Amateur radios are not.

Topic 24: Alternative Communication Methods

Permissible Modes on the Other Radio Services

- In most of the radio services listed below only voice communication is permitted. Packet and other forms of data or image transmission are illegal.

Citizens' Band (CB) Radio

- In remote areas with little or no telephone service, families rely on CB radios for basic day-to-day communications.

- Many rural police and sheriff's organizations still monitor CB traffic. REACT groups in the area may still be monitoring.

- In disaster situations, emphasis is placed on the timely movement and distribution of supplies by truck. By far, the largest group of CB users is the trucking community.

Topic 24: Alternative Communication Methods

Citizens' Band (CB) Radio (continued)

- Channel 19 has been the unofficial "trucker" channel since the late 1960s, and in some areas <u>is as good as channel 9 when calling for assistance.</u>

- Channel 9 is reserved for emergency and motorist assistance traffic only.

Multi-Use Radio Service (MURS)

- With little fanfare, the FCC added a new, unlicensed "citizen's" radio service in 2000 with both personal and business operation permitted, with a maximum power of two watts.

- The MURS frequencies are 151.820, 151.880, 151.940, 154.570 and 154.600.

- Base operation is not specifically prohibited, the service is primarily intended for mobile and portable operation.

- For about 20 years, certain businesses have been able to obtain licenses for operation on what the FCC calls "itinerant" frequencies. These channels became commonly referred to as the "color dot" channels

Topic 24: Alternative Communication Methods

Multi-Use Radio Service (MURS) (continued)

- One of the former itinerant channels, 154.570 MHz, (blue dot), is now a MURS channel. This means that a number of these low-cost one or two-watt output "itinerant" radios (which are usually user programmable for itinerant channels only) could be utilized for MURS.

- MURS allows you to equip unlicensed volunteers with a VHF portable having much the same simplex capability as a 2-meter handheld.

Topic 24: Alternative Communication Methods

Family Radio Service (FRS)

- Almost anywhere, in most every situation, you can find FRS radios in use. Family Radio Service portables are useful, effective and inexpensive.

- Like CB, the Family Radio Service is designed for short-range personal communications. Campers, hikers, vacationers and families on weekend outings use FRS units to keep in touch.

- There are 14 available UHF channels, and 38 different CTCSS codes to limit background chatter and noise. Output power is from 100 to 500 mw, depending on the model.

Topic 24: Alternative Communication Methods

Family Radio Service (FRS) (continued)

- In an effort to standardize the ability to call for help using FRS, REACT recommends the use of FRS channel 1 (462.5625 MHz) with no CTCSS tone as an emergency calling channel.

- Monitoring channel 1 is recommended to all persons in outdoor areas whenever possible.

- The first seven FRS channels are shared with the General Mobile Radio Service (GMRS). Although the original rules seem to prohibit it, a later FCC Report and Order explicitly permit communication between the two services.

- The chance of a distress call being heard on either service is greatly increased on these seven common channels.

Family Radio Service (FRS) (continued)

- Most FRS radios are available with 2 or 14 channels, although single channel radios can be found.

- It is important to note that the channel numbers on each radio are not always interchangeable between these units.

- Single channel radios are usually on channel 1, which corresponds to channel 1 in the 14-channel units.

Topic 24: Alternative Communication Methods

General Mobile Radio Service (GMRS)

- The GMRS consists of fifteen UHF frequencies between 462.5625 and 462.7250 MHz. Eight are paired with matching repeater inputs five MHz higher, as with Amateur and commercial systems.

- Seven "interstitial" channels are shared with FRS

- operation there is restricted to simplex with a maximum of 5 watts. Power on the other channels is limited to 50 watts.

- GMRS stations have the option of working only simplex modes if desired, even on paired channels.

- There is no frequency coordination, and users must cooperate locally to effectively use channels.

General Mobile Radio Service (GMRS) (continued)

- CTCSS codes are the same as for FRS, and the first 7 channels are common to both services.

- FM voice operation is permitted, but digital modes and phone patches are not.

- Operating a GMRS station will requires a system license from the FCC. You can apply using FCC Form 574, or apply online.

- System licenses are currently granted only to individuals for 5 years an the license fee is $70.

- A system includes any and all radios operated by family members, and may include fixed, mobile, and repeater equipment.

Topic 24: Alternative Communication Methods

General Mobile Radio Service (GMRS) (continued)

- Use under the license is restricted to members of the licensee's immediate family. Licenses to entities other than individuals are no longer issued.

- The frequency of 462.675 MHz is recognized for emergency and travel information use, and is monitored by many REACT teams nationwide.

- Many teams operate repeaters on this and other frequencies.

- One or more members might wish to become licensed if use of GMRS is likely, especially for liaison with locally active REACT teams.

Topic 24: Alternative Communication Methods

Public Safety Radio

- There are instances where the use of police and fire radio frequencies is possible.

- The agency itself might allow and train you for such use, or an individual officer may ask you to use his radio to call for help when he cannot.

- Keep your transmissions short and to the point.

- Do not tie up the channel with long explanations, and cease transmitting if they tell you to.

Topic 24: Alternative Communication Methods

Cellular and PCS Phones

- In a widespread disaster situation, these phone systems can quickly become overloaded. In smaller emergencies, they may still be usable.

- If a message is too sensitive to send via any two-way radio, try your cell phone.

- Cellular and PCS phone transmissions, especially digital, are considerably more secure.

- In addition, it is possible to send low-speed data or fax transmissions over the cellular network.

Topic 24: Alternative Communication Methods

Cellular and PCS Phones (continued)

- An important consideration is that most cellular phone systems can send text messages. These digital messages are "fit in between" the systems' voice communications.

- It has often been found that even when a cellular system is overloaded by people trying to make normal calls, the text messaging still can get through.

- Text message delivery can be delayed several hours or more when the voice channels are in heavy use.

Topic 24: Alternative Communication Methods

Marine Radio

- FM marine radios operate on internationally allocated channels in the 160 MHz band.

- HF SSB marine radios operate on a variety of channels between 2 and 30 MHz.

- Operation of FM stations for vessels in US waters does not require a license, but operation on the HF channels does.

- In coastal areas, along major rivers or the Great Lakes, it may be a good idea to have a FM marine radio in your group's inventory.

Topic 24: Alternative Communication Methods

Marine Radio (continued)

- During major storms, you can monitor channel 16, the distress channel.

- If you hear a vessel in distress whose calls are going unanswered by the Coast Guard, you may legally answer them from an unlicensed land-based station under the FCC's "emergency communications" rules.

- If the Coast Guard is in communication with the vessel, do not transmit.

- Most other land-based operation is illegal, except where authorized by a FCC coast station license.

Aviation Radio

- AM radios operating in the 108-136 MHz band are used in aircraft (108 to 118 for navigation aids and 118 to 136 for voice) and in certain limited vehicles and ground stations.

- FCC licenses are required for all stations.

- Emergency locator transmitters (ELTs) are automatic devices that transmit a distress signal on 121.5 and 406 MHz.

- Marine Emergency Position Indicating Radio Beacons (EPIRB) transmit digital ID codes on 406 MHz and a low-powered homing signal on 121.5 MHz.

- The new land-based Personal Radio Beacons (PRB) transmit on 121.5 MHz.

Non-Radio Communication

- Do not forget the most obvious means of communication—the land-line telephones.

- If they are still functioning, use the telephone and fax whenever the message might be too sensitive for radio.

- Fax is also useful for sending long lists, and where accuracy is critical.

- Do not tie up a radio frequency sending a long list of supplies if a working fax or phone is available.

Topic 24: Alternative Communication Methods

Couriers

- Since pre-history, runners have carried messages from place to place.

- When we are asked to deliver a sensitive or very lengthy message, and fax and phone lines are out of service, hand delivery might be the best choice if travel is possible.

- Acting as a courier does not eliminate the use of radio, since couriers need to be dispatched from place to place.

- Courier service is actually an excellent marriage of old and new technologies.

Topic 24: Alternative Communication Methods

Review Questions:

1. **Which can you <u>not use </u>to identify your transmissions on Citizens' Band radio?**

   a. **Your Amateur call.**

   b. Your "handle".

   c. A self-assigned identifier.

   d. A tactical callsign.

2. Which is the best course of action for summoning help via CB?

   a. Use channel 1, since the lowest frequency has the longest ground-wave signal.

   b. Call at regular intervals on Channels 9 and 19 for a response.

   c. Call only on channel 9, since it is designated for assistance and emergencies.

   d. Say "Break-Break" or "MAYDAY" on any channel.

3. Which is NOT an advantage of using Family Radio Service (FRS) systems?

  a. They are readily available at low cost.

  b. Operation of FRS radios is simple and requires little training.

  c. There is no requirement for licensing to use FRS.

  d. Low transmitter power.

4. Who may currently license a GMRS system with the FCC?

   a. A privately owned business, for routine communications.

   b. An individual, for family and personal use.

   c A charitable institution, for benevolent purposes.

   c. A local repeater club.

5. **Which is *NOT true* of the MURS?**

a. **A station license is required.**

b. Power output is limited to 2 watts.

c. Radios operate in the VHF band.

d. Data emissions are permitted.

What happens in the first 72 hours?

- In the early hours of an emergency turning into a major disaster, it takes precious time to overcome the obstacles to placing fully activated mutual aid resources into operation.

- Communication is one of those vital resources.

- The greatest concentration of relief efforts is generally found in the incorporated cities served by agencies with paid professionals.

- Suburbs and isolated areas of a county suffer from remoteness from fire departments, public works, law enforcement and the services of all other agencies.

What happens in the first 72 hours? (continued)

- As the event unfolds all organizations scramble to respond to an unprecedented demand for service .

- There may be indecision and conflicts between community leaders.

- In these circumstances the public is often isolated, unable to call for help or determine the nature and extent of the disaster so that they can make plans to:

  - "Wait it out."

  - Prepare to evacuate.

  - Actually, evacuate with some possessions to a safe place.

  - Obtain physical aid for an impending catastrophe.

-

What happens in the first 72 hours? (continued)

- Lack of information results in further attempted use of the telephone when the system is already saturated, if indeed it is still operating at all.

- An unexpected event in Katrina was that calls can often be received from out-of-town but not made across town.

- The opportunity to even call for help is often unavailable to most citizens during the first 72 hours.

- Occasionally, a passing public safety vehicle or one equipped with an operational commercial, utility, amateur or CB radio can be "flagged down" to make a call—assuming it can contact a person who can help.

Topic 25: What to Expect in Large Scale Disasters

What happens in the first 72 hours? (continued)

- Too little information is gathered about the public's immediate needs, and ways to meet them.

- Distorted public perceptions develop through misinformation.

- At the same time, essential damage-assessment report data is needed by state and federal agencies to initiate relief aid from outside the disaster area.

Following the event:

- Word circulates about shelter locations.

- Some displaced persons stay at homes of friends, relatives or strangers.

- Others are housed at public shelters for days, still searching for family members elsewhere, and without communication.

- The opportunity to notify concerned distant relatives is rarely available except via the American Red Cross' "Safe and Well" program which is computer & internet based.

- Later, often too late, information trickles in about problem areas or cases that have been overlooked or mishandled to the lack of communication.

SHELTERS

Topic 25: What to Expect in Large Scale Disasters

Following the event: (continued)

- Once the immediate threat to life has passed, survival instincts prevail.

- People operate essentially on their own for an indefinite period while public agencies seek to organize and respond to the most urgent problems of which their communications make them aware.

- After-shocks, flare-up of fires, weakening or breaking of dams and new flood crests, build-up of winds, broken levees, etc., result in some relief work being undone and the posing of new threats.

Section 5: Considerations
Topic 25: What to Expect in Large Scale Disasters

Following the event: (continued)

- Following Katrina, there were great strides made to achieve inter-agency communications, but there is still has a long way to go. Inter-agency communication capabilities remain poor.

- At the end of 72 hours, the disaster area remains in virtual isolation.

- Little centralized information is available. Amateur Radio operators from neighboring counties and states offer to help but are often unable to cross the roadblocks established to limit access by sightseers and potential looters.

- Little overall assessment emerges in the first 72 hours about available emergency resources and relief supplies.

Topic 25: What to Expect in Large Scale Disasters

Following the event: (continued)

- Restaurants remaining open are unable to cook without gas or to serve the masses that flood them.

- Food and water shortages have become critical. Gasoline is unavailable Eventually, essential functional communication networks evolve as priorities are asserted and clusters of traffic emerge.

- Relief efforts are mounted when someone takes charge, makes a decision and directs the efforts of others.

- The command and control process requires communication— the ingredient in short supply in all disasters.

Topic 25: What to Expect in Large Scale Disasters

Review Questions

1. **What is the first thing that happens after a disaster has occurred?**

    a. The Federal Emergency Management Agency arrives on the scene.

    b. The Red Cross and Salvation Army arrive with food and bedding for victims.

    c. **Massive increase in the volume of traffic on public-safety radio channels.**

    d. The press provides up to date and accurate information to the public.

2. **Which of the following statements is <u>not true</u> of interagency communication?**

a. **Many agencies use incompatible radio systems.**

b. Many agencies are reluctant to use each other's radio system.

c. Agencies all use the same radio systems and frequencies.

d. Amateur Radio can be used to link agencies.

Topic 25: What to Expect in Large Scale Disasters

3. In the first 72 hours of a disaster situation, where is the greatest concentration of relief effort to be found?

a. **Urban areas.**

b. Suburban areas.

c. Rural areas.

d. Outside the affected area.

Topic 25: What to Expect in Large Scale Disasters

4. **Which organization handles health and welfare messages on behalf of the victims?**

   a. Department of Homeland Security.

   b. Hurricane Watch Net.

   c. National Weather Service.

   d. **American Red Cross.**

5. What is the usual situation in a disaster after the initial 72 hours?

a. **The disaster area remains in virtual isolation.**

b. The disaster is over and everybody can go home.

c. A few victims still need assistance.

d. Communication systems are back to normal.

Topic 26: Hazardous Materials Awareness

Introduction

- Amateur Radio operators may encounter HazMat incidents during their travels, or they may be asked to assist with emergency communications in such incidents.

- Proper training is required for your own safety.

- A wrong move by you during a HazMat operation can endanger not only your own safety, but also the safety of other responders as well as the entire local community.

- The term "hazardous materials" (HazMat) refers to any substances or materials, which if released in an uncontrolled manner (e.g., spilled), can be harmful to people, animals, crops, water systems, or other elements of the environment.

Introduction (continued)

- The HazMat list is long and includes:
  - explosives
  - gases
  - flammable and combustible liquids
  - flammable solids or substances
  - poisonous and infectious substances
  - radioactive materials
  - Corrosives

- One of the major problems faced by emergency responders is determining which chemicals are involved and determining the potential hazards.

Topic 26: Hazardous Materials Awareness

Hazardous Chemicals On The Move

- As the primary regulatory agency concerned with the safe transportation of such materials in interstate commerce, the US Department of Transportation (DOT) has established several systems to manage HazMat materials.

- The DOT requires that all freight containers, trucks and rail cars transporting these materials display placards identifying the hazard class or classes of the materials they are carrying.
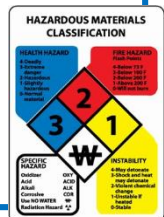
Hazardous Chemicals On The Move

- Color-coded and show an icon or graphic symbol depicting the hazard class (flammable, caustic, acid, radioactive, etc).

HAZARDOUS MATERIALS CLASSIFICATION

HEALTH HAZARD
4-Deadly
3-Extreme danger
2-Hazardous
1-Slightly hazardous
0-Normal material

FIRE HAZARD
Flash Points
4-Below 73 F
3-Below 100 F
2-Below 200 F
1-Above 200 F
0-Will not burn

INSTABILITY
4-May detonate
3-Shock and heat may detonate
2-Violent chemical change
1-Unstable if heated
0-Stable

SPECIFIC HAZARD
Oxidizer — OXY
Acid — ACID
Alkali — ALK
Corrosive — COR
Use NO WATER — ₩
Radiation Hazard — ☢

Hazardous Chemicals On The Move (continued)

- They are displayed on the ends and sides of transport vehicles.

- A four-digit identification number may also be displayed on some placards or on an adjacent rectangular orange panel.

- You have undoubtedly seen these placards or panels displayed on trucks and railroad tank cars. You may recognize some of the more common ones, such as 1993, which covers a multitude of chemicals including road tar, cosmetics, diesel fuel and home heating oil.

Placards or Orange Panels

1090

and

Appropriate Placard must be used

1072
2

1203
3

1993
3

Hazardous Chemicals On The Move (continued)

- You may have also seen placards with the number "1203" (gasoline) on tankers filling the tanks at the local gas station.

- In addition to truck and rail car placards, warning labels must be displayed on packages containing hazardous materials. The labels are smaller versions of the same placards.

- In some cases, more than one label must be displayed, in which case the labels must be placed next to each other.

- In addition to labels for each DOT hazard class, other labels with specific warning messages may be required.
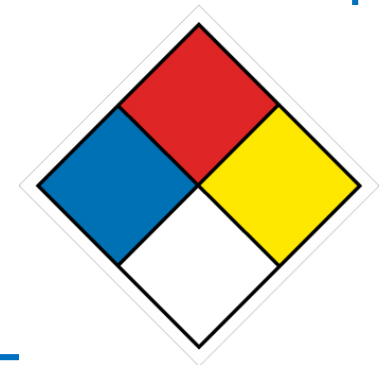
Hazardous Chemicals in Buildings

- The National Fire Protection Association (NFPA) has devised a marking system to alert firefighters to the characteristics of hazardous materials stored in stationary tanks and facilities.

- This system, known as NFPA 704M, can also assist citizens visiting a site in identifying the hazard presented by the stored substance. Use of the system is voluntary, unless specified by local codes.

Hazardous Chemicals in Buildings (continued)

- The NFPA 704M label is diamond-shaped, and is divided into four parts, or quadrants.

Hazardous Chemicals in Buildings (continued)

- The top quadrant of the NFPA symbol contains the substance's fire hazard rating. As you might expect, this quadrant is red. Again, number codes in this quadrant range from 0 to 4, with 4 representing the most serious hazard.

- The NFPA label's right quadrant, colored yellow, indicates the substance's likelihood to explode or react. Quadrant ratings from 0 to 4 are used to indicate the degree of danger. If a 4 appears in this section, the chemical is extremely unstable, and even under normal conditions may explode or react violently. A zero in this quadrant indicates the material is considered stable.

Topic 26: Hazardous Materials Awareness

Hazardous Chemicals in Buildings (continued)

- The bottom quadrant is white, and contains information about any special hazards that may apply. There are three possible codes for the bottom quarter of the NFPA symbol:

  – OXY means this material is an oxidizer. It can easily release oxygen to create or worsen a fire or explosion hazard.

  – The symbol W indicates a material that reacts with water to release a gas that is either flammable or hazardous to health.

  – If the material is radioactive, the usual tri- blade "propeller" symbol for radioactivity will appear.

Guidelines for Handling HazMat Incidents

- Once you are in a safe position up-hill and up-wind, try to identify the material. However, it cannot be over-emphasized that you MUST stay well away from the site.

- Do NOT be tempted to get just a little closer so that you can read placards or other items. If you cannot read these items using a spotting scope or binoculars, simply report what you can see from a safe position.

Guidelines for Handling HazMat Incidents (continued)

- Do not attempt to personally take any action beyond your report and preventing others from approaching.

- include the following when reporting a HazMat incident,

  - Identify yourself.

  - Give your current location and the location of the incident.

  - Briefly describe what you see (from a distance), i.e. liquid spill, gaseous cloud, etc, and any placard numbers or other information you can safely see.

  - If a gaseous cloud or liquid spill exists, give the direction the contaminant is flowing or moving. Give any pertinent weather or other information you can observe from a safe distance.

Review Questions:

1. **Which of the following BEST describes where you should be located when in the vicinity of a HazMat incident?**

   a. **Far away enough to ensure your safety.**

   b. Downhill and downwind.

   c. Close enough to read the numbers on any placards with your naked eyes.

   d. Alongside emergency responders wearing exposure suits.

2. **Which federal agency is responsible for warning the public about hazardous materials containers and shippers?**

   a. Federal Emergency Management Agency.

   b. Federal Response Plan.

   c. National Communications System.

   d. **Department of Transportation.**

3. **Before transmitting in the area of a HazMat incident what should you always do?**

   a. First identify the agents by reading the placard or container labels.

   b. **Be far enough away so that no vapors or fumes are present.**

   c. Wait to report the incident until police or fire officials have arrived.

   d. Take action to stop or contain any agents that might be leaking.

4. **On the sides of transporting vehicles how are different classes of hazardous materials identified?**

    a. Placards.

    b. Four-digit numbers.

    c. Warning labels and/or icons.

    d. **All of the answers are correct.**

5. **Gasoline tankers filling the neighborhood gas station's underground tanks are identified with a placard bearing which of the following?**

    a. **1203.**

    b. 1993.

    c. 2003.

    d. 2706.

Introduction

- The most common marine radio mode is VHF- FM, (156 to 162 MHz), with an effective range from ship to ship of 10 to 15 miles, and ship to shore of 20-30 miles.

- Vessels that routinely travel outside this distance generally have MF/HF-SSB, satellite communications or both.

- CW communication on MF/HF is no longer used.

- No license is currently required for pleasure boats operating on the FM channels in US territorial waters.

- The FCC limits VHF-FM marine radios to a maximum of 25 watts. Radios are also required to be capable of 1-watt operation for short range and in-harbor use.

Introduction (continued)

- For more regulatory information visit: http://wireless.fcc.gov/.

- The use of VHF and MF/HF marine radios is restricted to vessels on the water.

- The use of portables or mobiles to communicate with crew on shore is not allowed.

- Certain commercial users, such as marinas, marine towing services and fish canneries may be licensed for limited base operations on certain channels.

- In an emergency, however, the FCC rules are suspended, and you may use whatever means of communication are necessary to protect life and property.

Topic 27: Marine Communications

Channel Selection

- Marine FM frequencies have been assigned channel numbers, and all are designated for specific uses.

- Channel 16 has been designated worldwide as a distress and calling frequency.

- All vessels are required to maintain a listening "watch" on FM 16 while underway.

- With the growth of boating and the elimination of mandatory radio licenses for certain vessels operating in domestic waters, FM 16 has suffered from abuse and overuse.

- To maintain the integrity of FM 16 as a distress frequency, FM 9 has been designated as an alternate calling frequency.

Channel Selection (Continued)

- While FM 16 can be used for routine calling, most calls should be made on FM 9. This would apply to owners of newer marine radios, which are capable of simultaneously monitoring both FM9 and FM16 using either a "scan" or "dual watch" function.

- The designated use for every marine channel is contained in the manual that comes with all VHF-FM radios. For example, FM 13 is designated for navigational purposes, and a number of channels are used for inter-ship communication.

Channel Selection (Continued)

- FM 83 is reserved for use by the Coast Guard Auxiliary.

- FM 22 is for public communication with the Coast Guard, but may not be used by boaters unless specifically instructed to do so by the Coast Guard radio operator on FM 16.

- FM 22 is also used by the Coast Guard to broadcast "Notice To Mariners" messages, after announcing them on FM 16.

- FM 6 is an Inter-Ship Safety channel, and is often used for search and rescue operations.

- A list of all marine channels and assigned uses can be seen at http://wireless.fcc.gov/services/index.htm?job=service_band plan&id=ship_stations

Spoken Emergency Signals

- To simplify identification of marine radio traffic, certain pro-words are used. When you hear one of these, you should listen carefully, write down any information and refrain from transmitting on the frequency until necessary. The pro-words are listed below with an explanation of each.

- "MAYDAY MAYDAY"—the highest priority urgency call. The vessel calling is threatened by grave or immediate danger and requires immediate assistance. If you hear this call, copy the information on paper, resist the urge to contact the party calling and listen first for a reply from a Coast Guard unit.

Incident Reporting

- There are two types of incidents that hams should report directly to the Coast Guard:
  - vessels in distress
  - oil or chemical spills into public waters.

- The first should be reported directly to the nearest Coast Guard station.

- Oil and chemical spills should be reported to the Coast Guard's National Response Center at 1-800-424-8802.

- The secondary reporting method is via the NRC Internet Web site http://www.nrc.uscg.mil/. If neither is available, try contacting the nearest Coast Guard facility.

Distress Information

- If you hear a distress call, listen first to see if the Coast Guard responds within a minute or two. If not, attempt to gather the following information:
  - Position of the vessel involved, number of persons on board, nature of the distress.
  - Name of the vessel.
  - Call sign (if any).
  - Vessel Specifics
  - Weather conditions on scene.
  - Frequency being used to communicate with the vessel.
  - On board emergency equipment: Life raft, Emergency Position Indicating Radio. Beacon (EPIRB) and class of EPIRB if possible.

Distress Information (continued)

- Identify yourself as an Amateur Radio operator relaying an emergency message.

- Pass on all the information that you have gathered and assist as requested.

- Provide your name and phone number or other means of contact so that responding local public safety agencies or the Coast Guard may reach you if needed.

- It is possible that you are the only station that can communicate with the distressed vessel.

Routine Communication

- Calling a vessel on a marine channel is very similar to 2 meters. If using channel 9, transmit the name of the vessel you want to talk with twice, followed by your station's name twice, and the channel designation. For example: "Fishy Business, Fishy Business, this is Dream Boat, Dream Boat, Channel 9."

- In order to avoid confusion on congested channels, FCC rules require you to identify your vessel on each transmission, although some stations shift to a shortened call after the initial contact is established.

MF/HF SSB Communications

- Vessels that operate further offshore may operate a MF/HF-SSB unit on designated channelized international frequencies.

- Vessels using a MF/HF radio <u>must also have a VHF-FM radio aboard.</u>

- The US Coast Guard maintains "guard" on (they monitor) 2182 kHz, the calling and distress frequency, as well as other designated frequencies in this band.

- A complete list of MF and HF maritime frequencies and assignments can be seen at
  http://www.navcen.uscg.gov/?pageName=mtHighFrequency

MF/HF SSB Communications (continued)

- Many boaters traveling on the high seas carry HF Amateur Radio aboard.

- A listing of Amateur Radio Maritime Nets is contained on the ARRL Web site http://www.arrl.org/arrl-net-directory.

- These nets may also be used to pass emergency traffic. Distress traffic received over MF/HF-SSB should be handled in the same way as on VHF- FM.

Review Questions:

1. **When is it permissible to utilize channel FM 22?**

   a. At any time after making an initial call on FM 16.

   b. Whenever channel FM 9 or FM 16 are busy.

   c. **Only when directed by the Coast Guard.**

   d. At no time, it is for Coast Guard use only.

2. **What should you do if you hear an unanswered marine distress call?**

   a. Contact the nearest Coast Guard facility and advise them of the call.

   b. Answer the caller immediately and ask what the emergency is.

   c. Get in your own boat and attempt a rescue.

   d. **Listen for a response. If none, respond and gather all information possible and then contact the nearest Coast Guard facility.**

3. **When must you identify yourself on VHF-FM marine radio?**

   a. Only on the initial call.

   b. Only on the initial call and the final call.

   c. Only on the original call and then every ten minutes.

   d. **On all transmissions.**

4. Which vessels operate MF/HF SSB radios?

    a. Any vessel that wants to.

    b. Only sea-going vessels that operate outside the range of VHF-FM radios.

    c. Only those vessels that operate offshore and have a VHF-FM marine radio.

    d. Only those vessels that have an Amateur Radio operator aboard.

5. Which channel(s) may be used for calling another vessel?

   a. FM 83.

   b. FM 9.

   c. FM 16.

   d. Both FM9 and FM 16.

Introduction

- Your purpose as emergency communicators is to provide accurate and rapid transfer of information from one place to another.

- To do that job well, you must understand the strengths and weaknesses of each mode of communication.

- In addition, you must be thoroughly familiar with the needs and priorities of the agencies you are serving.

- Some messages must be delivered quickly, and others are urgent.

- Some are detailed, and some are simple.

- Sometimes you should not even use radio.

Communication modes fall into several categories:

- Point to point – Telephone, fax, some digital radio modes

- Multi-point – Voice and CW radio, some digital modes

- High precision – Fax, e-mail, digital modes

- Low precision – Voice, CW, telephone

- High priority – Voice, telephone

- Low priority – Fax, e-mail, digital modes, CW

Messages fall into similar categories:

- Point to point – Messages intended for one party

- Point to multi-point – Messages intended for a group

Messages fall into similar categories: (continued)

- Multi-point to point – Messages from members of a group directed to one station

- High precision – Lists of items, medical or technical terminology, specialized or

- detailed information

- Low precision – Traffic reports, damage estimates, simple situation reports

- High priority – Fast delivery is critical

Topic 28: Modes, Methods and Applications

Messages   (continued)

- Low priority – Messages can be delivered in a more relaxed time frame

- Each type of message should be sent using the most appropriate mode, taking into consideration the message's contents, and its destination(s).

- An example might serve to illustrate these concepts.

Mode Example:

A localized flash flood hit a north Florida county a few years ago, prompting the evacuation of a low-lying neighborhood. The Red Cross opened a shelter in a church several miles away from the affected area. ARES was mobilized to provide communication support. In spite of the weather, the shelter still had electricity and phone service.

- When the county Emergency Coordinator (EC) stopped by the site, the ARES operator on duty was using his battery-operated 2-meter hand-held radio and the wide-area repeater to talk to Red Cross HQ across town.

Mode Example: (continued)

- The ham was reading a three-page list of names and addresses of evacuees who had checked into the shelter.

- To ensure proper transcription, he was spelling each name phonetically, pausing after each name to see if the headquarters station needed fills. The operator had been reading for almost 15 minutes and was still on the second page of the list.

- Less than 10 feet away from his operating position sat a fax machine. The EC turned on the machine, dialed the Red Cross fax number, and fed in the remaining page of the list. The third page was faxed in less than 20 seconds.

Mode Example: (continued)

- Neither the operator at the shelter nor the one at headquarters had considered using the telephone or fax machine, even though these communication options were available and functioning.

- In all fairness to the hams in this situation, their training and practice had led them to concentrate on 2-meter voice to the exclusion of other modes of communication.

- So, instead of an efficient, point-to-point communication channel (telephone line), they had used a busy multi-point channel (the wide-area repeater).

Mode Example: (continued)

- Instead of using a mode that generated automatic hard copy, they used one that required handwritten transcription. Instead of a high- precision transfer (fax), they had used a low-precision one (voice) requiring spelling and phonetics.

- The situation was especially poignant because the repeater had been needed at the time for a different type of communication – the transfer of mobile operator's reports, which could not be done over the telephone. Further, it was later discovered that the "broadcast" of evacuee's names and addresses over non-secure communication channels was a violation of Red Cross policy.

Tactical Messages:

- Tactical messages are usually low-precision and time-critical, and can be passed most efficiently using voice.

- Depending on the nature of the message, it may take the form of formal written traffic, or at the other extreme, it may mean that the microphone is handed to a person from the served agency. This is frequently the quickest way to get the job done.

Lists and Detailed Messages:

- Some messages contain long lists of supplies, or details where accuracy is important. Voice transmission can introduce errors, and long messages can waste valuable net resources.

- The various digital modes (including land-line fax and email) offer the best means of handling these messages, since they are both fast and accurate.

- Digital messages also have the benefit of repeatable accuracy. When a message is passed through several stations, it remains unchanged since no operator intervention occurs.

Sensitive Information:

- Some messages contain information that should be kept private.

- Names and addresses of evacuees should never be transmitted over voice channels.

- Learn in advance your served agency's privacy policy regarding certain types of information.

- Some groups have switched to digital modes, such as packet, in an attempt to offer more privacy.

- Although digital transmissions require more than a simple scanner to intercept, they cannot be relied upon for absolute privacy.

Sensitive Information: (continued)

- The equipment needed to receive most digital modes is available, and is even built into some newer receivers. Anyone wishing to monitor digital transmissions can certainly do so.

- Remember - any means of assuring meaningful message security on Amateur Radio would be in violation of the Part 97 prohibition against the use of codes and ciphers.

- If absolute privacy is required, the message should not be transmitted by Amateur Radio.

- In some cases, the most appropriate method might be hand delivery by a radio-dispatched courier.

Digital Modes

- Traffic nets handling large volumes of written or high precision traffic should consider using one of the digital modes.

- Digital modes can be used to transmit long lists such as health and welfare traffic, and logistics messages involving lists of people or supplies.

- Some digital modes provide virtually error-free transmission and relays can be accomplished by retransmitting the received digital message without having to retype it.
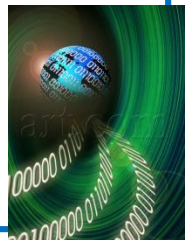
Digital Modes (continued)

- Digital modes that do not provide automatic error correction should only be used when clean and interference-free signals can be guaranteed. These modes include RTTY, AMTOR mode A, and <u>PSK31 in BPSK mode</u>.

HF:

- While there are many "favorites" with promoters for specific modes, over the years it appears that the most commonly used digital modes for emergency HF operation are packet, AMTOR mode B, and <u>PSK31 in QPSK</u> mode.

- But this is changing with new options to interface with the Internet. In general, antenna and radio considerations are similar to voice or CW operation, although certain digital signals require less power than voice modes to achieve the same effect.
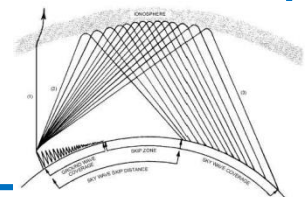
VHF/UHF:

- The TNC2 (Terminal Node Controller, Version 2) FM packet is the most common mode used on VHF and UHF frequencies.

- Packet**:** Packet communication is error-free in point to point "automated repeat request" (ARQ) or "forward error correction" (FEC) broadcast modes.

- The most effective way to send messages via packet radio is to use a "bulletin board". The sending station "posts" his messages on the bulletin board and other stations can then retrieve their messages at will.

- Urgent messages can also be sent directly to the receiving station if needed.

VHF/UHF: (continued)

- If your group is using FM packet you will need to know which frequencies and modes are used and for what purpose, what their call signs or aliases are, and how various parts of the system interconnect.

- A consideration is that multipath propagation may distort digital signals enough to cause failure when a voice might still be understandable.

- The solution is the same as in voice mode – move the antenna a few inches or feet until you get a clear signal.

AMTOR Mode B:

AMTOR mode B (also known as "FEC" mode) is an advanced teletype mode with forward error correction, making it ideal for high precision messages over long distances.

PSK31:

- The ability of PSK31 to be usable in very poor conditions makes it ideal for HF emergency communication. In addition, the efficiency resulting from the very narrow bandwidth of the PSK31 signal means that even a low power transmitter will work quite well.

PSK31: (continued)

- The ability of PSK31 to be usable in very poor conditions makes it ideal for HF emergency communication.

- In addition, the efficiency resulting from the very narrow bandwidth of the PSK31 signal means that even a low power transmitter will work quite well.

- There are two PSK31 modes: BPSK, which has no error correction, and QPSK, which has forward error- correction.

- BPSK should be used unless the received copy is poor, since QPSK is 3dB less efficient and requires more careful tuning. Under all but the worst conditions, BPSK will provide perfect transmissions.

PACTOR

- Packet Teleprinting Over Radio (PACTOR):   This is a combination of packet and AMTOR. It is designed for HF use only, and combines the best features of both.

- PACTOR uses FEC and ARQ modes, and a standard keyboard. PACTOR is quite robust (more so than AMTOR and RTTY), but can be slowed by poor band conditions.

TCP/IP Packet:

- TCP/IP Internet protocols and network services are useable on packet radio. TCP/IP systems have advantages over conventional packet protocols that could be important in amateur emcomm operations.

APRS:

- While not a message handling mode, APRS is a digital information mode with applications in emcomm.

- Originally called "Automatic Position Reporting System", this mode is now sometimes called "Automatic Packet Reporting System", owing to new applications of the technology.

- The newest application of APRS is the automated reporting of data from digital weather stations. The original application for APRS, developed by Bob Bruninga, WB4APR, is to track a station's location.

APRS:

- A GPS receiver is connected to a computer, and its position information is transmitted to other stations using APRS packet software, displaying the location of the sending station on a map. APRS also has a messaging mode similar to Internet "Instant Messaging" where quick one-line messages can be exchanged.

- APRS has two obvious applications for emcomm –

  – First, the locations of various emergency vehicles can be tracked visually in real time in an automated and unattended fashion.

  – Second, weather and other environmental data can be reported automatically in near real-time. Both applications can both speed data acquisition and reduce the work load on critical emergency nets.

Amateur Television (ATV)

- **Fast-scan ATV** is live, full motion TV similar to what you see on commercial TV, but usually at reduced quality.

- **Slow-scan ATV** uses a voice-grade channel to send a still picture line by line. It can take more than a minute for a color picture to be transmitted.

    – ATV has a number of emcomm applications, but all involve letting emergency managers see what is going on in the field.

    – ATV crews usually take a passive "observer" approach, and avoid interaction with bystanders to ensure that a situation is accurately represented. No emcomm ATV transmission should ever be "staged" for the camera.

Review Questions:

1. **Which of the following best describes your purpose as an emergency communicator?**

    a. To operate the radio.

    b. To coordinate communications for the EOC.

    c. **To provide accurate and rapid transfer of information from one place to another.**

    d. To provide internal communication support to one (and only one) responding agency.

2. **Which of the following best describes tactical messages?**

    a. They are high precision and time critical.

    b. **They are low precision and time critical.**

    c. They are point-to-point and NOT time critical.

    d. They are point-to-multipoint and low precision.

3. **Long lists and detailed messages are best handled by which of the following modes?**

    a. Voice or CW.

    b. **Fax or digital.**

    c. CW or digital.

    d. Phone or fax.

4. **During an emergency, you are using voice transmissions to pass messages. Which of the following "guidelines" should govern your action if you were asked to transmit the names and addresses of victims?**

   a. Transmit the information exactly as presented to you.

   b. Use a pre-established code to transmit the information.

   c. **If absolute privacy is required; do not transmit the information by Amateur Radio.**

   d. Switch to a digital mode and be assured of complete privacy.

5. Which of the following PSK31 modes has an error correction feature?

    a. BPSK.

    b. QPSK.

    c. RPSK.

    d. SPSK.

Other Learning Opportunities

Introduction

- If you want your performance in the next big disaster to be flawless, practice is essential. Fortunately, there are plenty of opportunities to do so if you take the time to seek them out.

Regularly Scheduled Nets

- Many local ARES and RACES groups hold regularly scheduled training nets. Well-designed nets will vary the format and goals frequently in order to keep them interesting.

- One month may be devoted to learning about the county's new damage report form, and another with moving welfare messages to and from the National Traffic System (NTS).

TOPIC 29:
Other Learning Opportunities

Local Classroom and On-Air Training Sessions

- Your emcomm organization and/or served agency may offer a variety of educational opportunities.

- Agencies may offer job specific training, such as the American Red Cross' Introduction to Disasters, Mass Care Overview, Shelter Operations and Disaster Damage Assessment courses.

- Smaller training sessions may deal with the use of certain forms or procedures.

- In addition to regular nets, special on-air training sessions may be held on a repeater or simplex frequency as an alternative to classroom sessions when the subject is simple or utilizes a net environment.

TOPIC 29:
Other Learning Opportunities

Public Service Events

- Some of the best practice for tactical disaster communication is your local "athon". It does not matter if it is a bike-athon, walk-athon or crawl- athon, but the larger the event, the better the experience.

- A large, fast moving event closely simulates the conditions experienced in disaster communication situations.

- Even a smaller or slower event will allow you to practice tactical net operating skills or experiment with various modes under field conditions.

TOPIC 29:
Other Learning Opportunities

Learning Resources on the Internet

- We strongly recommend downloading and printing copies of the ARRL Public Service Manual and ARES Field Resources Manual. Put them in a three ring binder and make them part of your jump kit for easy reference at home or in the field. Check out the following:
  - ARRL Section Manager List: http://www.arrl.org/sections
  - ARRL Net Directory: http://www.arrl.org/arrl-net-directory
  - ARRL Public Service Manual:
  - http://www.arrl.org/public-service-communications-manual
  - ARRL Digital Mode Information: http://www.arrl.org/digital-modes
  - FEMA Emergency Management Institute: http://training.fema.gov/is/crslist.asp - see "ISP Course List" and "NIMS" Courses"

Other Learning Opportunities

Learning Resources on the Internet (continued)

- FEMA Virtual Library http://www.fema.gov/library/index.jsp
- FCC Rules and Regulations http://www.arrl.org/part-97-amateur-radio
- National SKYWARN: http://skywarn.org/
- NOAA Watch – NOAA's All Hazard Monitor: http://www.noaawatch.gov/
- Ham Radio at the NWS Hurricane Center: http://www2.fiu.edu/orgs/w4ehw/
- NWS Doppler Radar Sites: http://www.weather.gov/radar_tab.php
- FEMA Community Emergency Response Teams (CERT): http://www.citizencorps.gov/cert/

Other ARRL Courses

- PR-101: The ARRL course for dealing with media and public relations. Available on CD. http://www.arrl.org/shop/PR-101-Course-on-CD-ROM

- Public Service and Emergency Communications Management for Radio Amateurs (EC-016): This AREC course is designed for those in leadership positions who wish to further develop management skills. If you are an AEC, EC, DEC, or SEC, or are serving in another leadership or training capacity this is the course for you. Available online. http://www.arrl.org/ec-016-course

TOPIC 29:
Other Learning Opportunities

Other ARRL Courses (Continued)

- The ARRL Digital Technology for Emergency Communications Course will introduce you to all the ways Amateur Radio operators are using digital technology as a valuable emergency communications tool. Available on CD. http://www.arrl.org/shop/ARRL-Digital-Technology-for-Emergency-Communications-Course/

TOPIC 29:
Other Learning Opportunities

Books

- *The ARES Field Resources Manual* **(ARRL)** is a handy and rugged spiral bound field guide packed with essential emcomm information.

- **The ARRL** *Operating Manual* covers all the basics of Amateur Radio operation & more.

- **The ARRL** *FCC Rules and Regulations for the Amateur Radio Service* includes the complete Part 97 rules from Title 47 of the Code of Federal Regulations.

- **ARRL's** *HF Digital Handbook* covers PSK31, MFSK16 and other popular digital modes.

- *VHF Digital Handbook by Steve Ford WB8IMY* includes discussion of digital applications of packet radio, APRS and Winlink 2000 in public service and emergency communications.

Books (continued)

- *Transmitter Hunting: Radio Direction Simplified* by Joseph Moell, K0OV, and Thomas Curlee, WB6UZZ (ARRL) is the "bible" of radio direction finding.

- *The ARRL RFI Handbook* will help you locate and resolve all sorts of radio interference.

- *The ARRL Antenna Book* covers portable & emergency antennas for 40 and 80 meters.

- *The ARRL Repeater Directory* lists all VHF and UHF repeaters in the USA, Canada and many other countries. This directory is updated annually.

- *Storm Spotting and Amateur Radio* by Michael Corey W5MPC and Victor Morris AH6WX is a resource for the Amateur Radio operator who volunteers as a storm spotter.

Books (continued)

- ***Emergency Power for Radio Communications*** discusses methods of alternative power generation for a variety of situations.

- ***The ARRL Emergency Communication Library v. 1.0*** provides informative documents and presentations on many aspects of emergency communication operating.

- All of the above are available from ARRL at: http://www.arrl.org/arrl-store

Other Learning Opportunities

Software

- **Tucson Amateur Packet Radio: (**TAPR) has a variety of packet software available. http://www.tapr.org/

- **FNpack:** A free Windows ® based packet messaging software package. FNpack lets you automate much of the process of handling ARRL format messages, as well as to create your own forms. FNpack also has a novel unproto "net" mode. It can be downloaded at http://www.w1fn.org/. Also available on the same site is FNpsk, which offers much of the same functionality for PSK31 users.

Software (continued)

- **Narrow Band Emergency Messaging System (NBEMS):** A suite of programs for emergency applications. See http://www.w1hkj.com/download.html for software download.

- **PSKMail:** A bare bones program that uses very limited bandwidth for passing messages. For Linux operating systems. http://pskmail.wikispaces.com/

- **WXSpots Network A:** useful tool on the Internet devoted to severe weather spotting as a means to enhance SKYWARN and similar operations. http://www.wxspots.com/

- **Winlink 2000**: http://www.winlink.org/

Other Learning Opportunities

Review Questions:

1. **Which of the following was NOT recommended as a means of practicing actual emcomm skills?**

    a. Regularly scheduled nets.

    b. On-air training sessions.

    c. Discussion groups.

    d. Public service events.

2. **What is the purpose of ARRL's *Public Service and Emergency Communications Management for Radio Amateurs* course?**

    a. To review the skills and knowledge presented in this course.

    b. To provide training for prospective Emergency Operation Center Managers.

    c. To prepare individuals for the jobs of NCS and Net Manager.

    d. **To prepare individuals for management level jobs such as EC, DEC or SEC or other leadership or training roles.**

TOPIC 29:
Other Learning Opportunities

To complete this course and receive your course completion certificate from ARRL you must:

1. Complete ICS-100 (IS-100.b) - Introduction to the Incident Command System.

2. Complete ICS-700 – National Incident Management System.

3. Take the 35 question exam (the question pool for the exam is the questions at the end of each topic) and pass with a score of at least 80%.   The exam is administered by Emcomm Volunteer examiners.   A $15 exam fee will be charged.
   If you do not know where you can take the exam go to the ARRL website at www.arl.org/emergency-communications-training

TOPIC 29:
Other Learning Opportunities

Recommended but not required courses are:

- IS-250 Emergency Support Function 15 (ESF-15), External Affairs.

- IS-288 Role of Voluntary Agencies in Emergency Management