

Rialto Amateur Radio Club

Amateur Radio Emergency Communications Course

Level I Part II





Amateur Radio Communications Course Level I

Part 2: LU-14 Through LU-23
Presented for
The Rialto Amateur Radio Club

By
Joe Martinez, NJ6OE

© 2003 American Radio Relay League, Incorporated. Information in this document, including Amateur Radio Emergency Services, ARES, ARECC, URL and other Internet Web Site references and logos, is subject to change without notice.



Amateur Radio Communications Course Level I

House Keeping Issues

Parking Rules

Rest Room Locations

Break/Lunch Room

Comments and Questions Etiquette



Amateur Radio Communications Course Level I

Course Book: ARECC Level I, 3rd Edition

PG, COL & PP Notes on Slides:

- PG – Page
- COL – Column of text on the page.
- PP- Paragraph – Number of complete paragraphs from the top of the column. Also, “Top” and “Final” or “Last” may be used.

Test Preparations Suggestions for Students:

- Read each chapter through completely.
- Answer each question and note where in the text that the answer is located.
- Hi-Lite the sections of the text that apply to each question.
- Review the Hi-Lited areas of the text and their associated questions to prepare for the ARECC Level I test.



Amateur Radio Communications Course Level I

Emergency Activation LU 14

How Will I Know?

- You must be registered in advance in order to be on the served agency's notification list.
- "Last Minute" volunteers are extremely difficult to integrate into an already confusing emergency response.
- A formal, written plan to activate emcomm members is necessary.



Amateur Radio Communications Course Level I

Emergency Activation LU 14

Initial Notification by the Served Agency

- Several members act as “activation liaisons” to the served agency.
- When emcomm volunteers are needed, it is one of these members who is called first.
- If that person is unavailable for any reason, the served agency should contact the next “activation liaison” member.
- Never rely on a single point of contact!



Amateur Radio Communications Course Level I

Emergency Activation LU 14

Group Alerting Systems

- **No one method should be relied upon, since emergency conditions may render it useless.**
- **Telephone Tree**
 - ❖ **The liaison calls two members, who each call two members and so on until the entire group has been notified.**
 - ❖ **If one or both persons can not be reached, the person calling must then call the members that that person would have called.**
 - ❖ **This method ensures that the “tree” is not broken.**



Amateur Radio Communications Course Level I

Emergency Activation LU 14

Group Alerting Systems (Continued)

- **Paging and Email Systems are also recommended. However, email activation systems may not reach emcomm members immediately.**
- **Self-Activation**
 - ❖ **If you become aware of an incident or situation that might require the activation of your emcomm group, you should take immediate steps to make yourself available.**
 - ❖ **Your group's activation plan might require that you monitor the assigned net frequency, or make contact with the served agency and/or emcomm group.**
 - ❖ **Do not contact a served agency if you are not specifically authorized to do so.**



Amateur Radio Communications Course Level I

Emergency Activation LU 14

I have been notified – Now What?

- In most cases, the first step should be to check in on a specific simplex or repeater frequency.
- If a repeater is used as the primary gathering point for members, a back up simplex frequency and/or another repeater, should be specified in the event that the primary repeater is no longer operating.
- Some members may have been assigned specific tasks in the event of activation and they should go and complete those tasks.
- The assigned NCS should activate the net when he or she arrives on frequency. The first emcomm member should assume temporary NCS until the assigned NCS arrives.



Amateur Radio Communications Course Level I

Emergency Activation LU 14

En Route

- While you are headed home to pick up your jump kit or other gear, or while on the way to your assigned location, there are several things you need to do:
 - ❖ Check into and continue to monitor the activation net for further instructions.
 - ❖ Fill your vehicle with fuel and pick up any supplies you may need, including alkaline batteries for radios and lights, food, water, and other supplies on your checklist.
 - ❖ Contact your spouse, children or other family members to let them know what is happening and where you will be.
 - ❖ Give them any instructions they will need to be safe.



Amateur Radio Communications Course Level I

LU 14-1 When the 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. (PG 87, COL 2, PP Last)
- 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 and “break” the tree.

LU 14-2 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 equipment
- D.** A member of an emcomm group who is alerted first by the agency. (PG 87, COL 2, PP 1)



Amateur Radio Communications Course Level I

LU 14-3 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. (PG 87, COL 2, PP 2)

LU 14-4 Which if 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 the messages will be reviewed quickly.
- C. E-mail is best used as a back up alerting system. (PG 88, COL 1, PP2)
- D. With email, the CTCSS tone assures that all members will be quickly alerted.



Amateur Radio Communications Course Level I

LU 14-5 Which of the following statements is true about 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. (PG 98, COL 2, PP 2)**
- D. The first member to sign on to a net is always the NCS for the duration of the incident.**



Amateur Radio Communications Course Level I

Setup, Initial Operations, and Shutdown LU 15

Responding After The Activation

- If you already have your assignment, confirm that it is being activated by monitoring and checking into the local activation net.
- If you do not have an assignment, you should check into an activation net and make yourself available for assignment.
- You may be asked to proceed to a “staging” or “volunteer intake” area to wait for an assignment.
- You should expect the situation to be fluid as each incident is unique and to respond accordingly.



Amateur Radio Communications Course Level I

Setup, Initial Operations, and Shutdown LU 15

Who is in Charge?

- The “station manager” has full responsibility for the site.
- This person serves as a point of contact, provides information and makes decisions for the team along with the incident commander and with other groups aiding in the response.
- When you accept a position as an emcomm volunteer, you do so knowing that you will often need to follow the directions of another person.
- Cooperation and good teamwork are key elements that result in an efficient and effective emcomm operation.



Amateur Radio Communications Course Level I

Setup, Initial Operations, and Shutdown LU 15

Arriving at the Site

- If you are assigned to a facility operated by the served agency, such as a shelter, introduce yourself to the person in charge as an “emergency communicator” assigned to serve that location.
- Inform them that you would like to set up your equipment and get on the air. And ask if they have a preference for the location for that station.
- If no building or other suitable shelter is available, you may need to set up your own tent, or work from your car.



Amateur Radio Communications Course Level I

Setup, Initial Operations, and Shutdown LU 15

Being a Good Guest

- You may be assigned to occupy a space that is normally used by someone else for another purpose. Respect and protect their belongings and equipment in every way possible.
- For example, if you are in a school and using a teacher's desk, find a way to remove all items from the surface for the duration of the operation. A cardboard box, sealed and placed under the desk usually works well.
- Avoid using duct tape to fasten cables to walls or ceilings. These surfaces may be damaged when you remove the duct tape.
- Make a log entry in you log identifying any damage in the area caused during the operation.



Amateur Radio Communications Course Level I

Setup, Initial Operations, and Shutdown LU 15

Initial Set Up and Information Gathering

- Your first priority will be to set up a basic station to establish contact with the net.
- Use the lowest power setting that produces reliable communication, especially if you are operating with battery or generator power, to conserve power for extended operations.
- Check out the telephone, faxes, Internet and other means of communication that are operating and available.
- Find out what are the immediate needs of the site.
- Make a list of repeaters and other stations that can be contacted by simplex operations in the area.
- Determine, food, water, sanitary, etc arrangements in the area.



Amateur Radio Communications Course Level I

Setup, Initial Operations, and Shutdown LU 15

Initial Set Up and Information Gathering (Continued)

- As soon as possible, ask a member of the served agency's staff to spend a few minutes with you and explain their needs and communication concerns.
- Determine what type of messages can you expect, long, short, detailed, formal informal, etc.
- What message forms will be used? Do you or they need training in how to use the forms.
- Let them know that their communications will not be private and "secure" if sent by Amateur Radio, and discuss possible alternatives.



Amateur Radio Communications Course Level I

Setup, Initial Operations, and Shutdown LU 15

Ending Operations

- Emcomm operations may end all at once and shelters may be closed.
- You should check in with the emcomm commander before closing your station even though the shelter manager has told you to do so.
- Clean up the area you were operating in and return any borrowed equipment or materials.



Amateur Radio Communications Course Level I

Setup, Initial Operations, and Shutdown LU 15

Departure

- First, leave the space you used in as good a condition as possible.
- If you sealed desk top items in a box for safekeeping simply place the box on the top of the desk. DO not attempt to replace the items on the desk. This procedure will provide proof to the desk's owner that you took steps to protect their belongings, and helps keep them secure until the owner takes possession again.
- Thank all those who worked with you. Make apologies if necessary and do your best to repair any damaged relationships before you leave.



Amateur Radio Communications Course Level I

Setup, Initial Operations, and Shutdown LU 15

The Debriefing

- After each operation, your emcomm group will probably want to hold a meeting to review the effectiveness of the operation.
- Events may have occurred within the served agency that involve communications you handled. If you try to rely on your memory or logbooks, you will probably forget key details or even forget certain events altogether.
- To prevent this, keep a “de-briefing” diary, specifically for use during this meeting especially if you will be required to turn over your station logs immediately at the end of the operation.



Amateur Radio Communications Course Level I

LU 15-1 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 agency?

- D** Introduce yourself to the person in charge as the emergency communicator assigned to that location. (PG 92, COL 2, PP 2)

LU 15-2 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 no methods by which the security of any message can be assured on Amateur Radio. (PG93, COL 1, PP 2)**



Amateur Radio Communications Course Level I

LU 15-3 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 the 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. (PG 93, COL 1, PP 4)**
- D. Have your emcomm manager or NCS speak directly with the site manager before you take any action.

LU 15-4 In preparing to leave a site after an emcomm event, which of the following actions is NOT appropriate?

- 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. (PG 93, COL 2, PP2)**
- C. Thank all of those who worked with you.
- D. Repair any relationships that may have been strained during the event.



Amateur Radio Communications Course Level I

LU 15-5 A debriefing should be scheduled after each emcomm event. What is the primary purpose of this 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. (PG 94, COL 1, PP 1)**
- D. It provides an occasion for resolving interpersonal issues.**



Amateur Radio Communications Course Level I

Operations & Logistics LU 16

Choosing Phone Net Frequencies

- Most local and regional emcomm communication takes place on 2 meter or 70 centimeter FM, or on 40, 60 or 80 meters SSB/CW.
- VHF and UHF FM are preferred for most local operations because the equipment is common, portable, has a clear voice quality and the coverage is extended by repeater stations.
- Most local emcomm HF operation is on 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.
- The complete list of these frequencies should be in your jump kit, and pre-programmed into your radios.

Operations & Logistics LU 16

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 frequencies, and offsets and CTCSS tones.**
- **Know your repeaters**
 - ❖ **How does it ID itself?**
 - ❖ **Are there dead spots in critical areas?**
 - ❖ **How much power is necessary to key the repeater?**
 - ❖ **Does it have a courtesy tone?**
 - ❖ **How long is the “time out timer”?**
 - ❖ **Is it part of a linked system of repeaters?**



Amateur Radio Communications Course Level I

Operations & Logistics LU 16

Network Coverage Concerns

- If the area repeaters do not survive a disaster, does the emcomm manager have a simplex communication plan? If so, how does it affect you at your assigned station?
- Simplex operation can be improved by using a higher gain antenna, moving the antenna away from obstructions, increasing antenna height. Increase transmit power as a last resort.
- A “simplex repeater” may be used. This device retransmits received simplex messages.
- Some Dual band radios can operate as a “cross band repeater.” receive on one band and retransmit on another.
- FCC rules do not allow for unattended operation of simplex and cross band repeaters.

Operations & Logistics LU 16

Frequency and Net Resource Management

- Net managers may have 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.
- There should be one or more “back up” frequencies for use in the event of interference, and one or two frequencies to pass traffic “off net.”

Message Relays

- When one station cannot hear another, a third station may have to “relay” the messages. Best to move the station involved off the main net frequency to avoid tying up channel for an extended period.



Amateur Radio Communications Course Level I

Operations & Logistics LU 16

Radio Room Security

- It is best to allow only operators who are on duty to be in the room.
- Avoid leaving the radio room and equipment unattended and accessible.
- It is never a good idea to allow members of the press to be in the room without specific permission from the served agency.

Record Keeping

- Station records will certainly include original copies of any messages sent, station logs, memos, and official correspondence.
- You may be required to turn these records over to the served agency. These may be permanent legal documents! Use permanent ink and numbered pages.



Amateur Radio Communications Course Level I

Operations & Logistics LU 16

Dealing With Stress and Egos

- Any unusual situation can create personal stress – disasters create incredible amounts of it.
- Especially in the early hours of a disaster, the tendency is to regard every situation or need as an “emergency,” requiring an immediate response.
- To reduce and control stress:
 - ❖ Delegate
 - ❖ Prioritize your actions
 - ❖ Do not take comments personally.
 - ❖ Help other team members control stress.
 - ❖ If you need help – request it – Don’t let things get out of control.

Operations & Logistics LU 16

Long Term Operations

- **As soon as you see that the situation is not going to return to normal for a while, start making plans for extended emcomm operations.**
 - ❖ **Assign additional operators to allow for regular shift changes.**
 - ❖ **Arrange for replacement equipment as necessary.**
 - ❖ **Establish food and water requirements.**
 - ❖ **Fresh batteries.**
 - ❖ **Alternate NCS operators.**
 - ❖ **And, anything else that you can anticipate – plan for it.**



Amateur Radio Communications Course Level I

Operations & Logistics LU 16

Battery Management

- If you are operating on battery power only, you will need to recharge your batteries. Remember, some batteries take longer to charge than others.

Generator and Power Safety

- Internal combustion engines are still the number one cause of carbon monoxide poisoning. Propane powered engines produce as much or more carbon monoxide as gasoline or diesel engines.
- Earth grounding of portable or vehicle mounted AC generators is not required as long as only plug and cord connected equipment is used.
- AC generators connected to a building's permanent electrical system will require an earth ground.



Amateur Radio Communications Course Level I

Operations & Logistics LU 16

Ground Fault Interrupters (GFIs)

- GFIs add a further degree of safety when working with portable power systems. They detect any difference between the hot and neutral conductors, and open the circuit.
- Always test GFIs!

AC Extension Cords

- Most extension cords are only rated for their actual lengths, and cannot be strung together to make a longer cord without “de-rating” the cord’s capacity, i.e., two 50 ft, 16-gage, 10 amp rated cords strung together have to be “de-rated” to 7 amps.
- Romex – solid copper core cables – should never be used for long extension cords as repeated bending, rolling and abrasion can cause the insulation to break down.
- Use only flexible insulated extension cords that are UL rated for temporary portable use.



Amateur Radio Communications Course Level I

Operations & Logistics LU 16

Equipment – Leaving Yours 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. However, remember, you still have the ultimate responsibility for its operation and safety.
- Mark every piece with your name and Amateur call.

Accepting Specialized Assignments

- 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 include SKYWARN weather spotting, Red Cross damage assessment and many logistics jobs



Amateur Radio Communications Course Level I

LU 16-1 Which of the following will NOT limit VHF simplex range?

- A. Terrain.
- B. Output Power.
- C. Antenna Gain.
- D. **Digipeaters. (PG 98, COL 2, PP Top)**

LU 16-2 Which of the following actions will NOT improve simplex receptions?

- A. Increase the antenna height.
- B. **Switch to a non-directional antenna. (PG 98, COL 1, PP 2)**
- C. Increase transmitter output power at both stations.
- D. Move the antenna away from obstructions.



Amateur Radio Communications Course Level I

LU 16-3 Which of the following is true about a simplex repeater?

- A. The FCC rules do not permit unattended operation of simplex repeaters. (PG 98, COL 2, PP Top)**
- 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.”**

LU 16-4 Which of the following is NOT an appropriate served agency assignment for an emcomm volunteer?

- A. Field damage assessment and reporting.**
- B. Driving a supply delivery vehicle.**
- C. Typing inventory lists and filing memos. (PG 102, COL 1, PP 1)**
- D. Gathering weather data and reporting conditions.**



Amateur Radio Communications Course Level I

LU 16-5 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.**
- C. To reduce personal stress, insist on working more than your own shirt.**
- D. Prioritize your actions – the most important and time sensitive ones come first. (PG 100, COL 1, PP Top)**



Amateur Radio Communications Course Level I

Personal Safety, Survival, and Health Considerations

LU 17

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.**
- **Take whatever steps you can to protect your own property from damage or looting, and let a neighbor or even local police know where you are going, when you plan to return, and how to reach you or your family members in an emergency.**
- **There are times when your family may need you as much or more than your emcomm group. If there is any doubt, your decision must be to stay with your family.**



Amateur Radio Communications Course Level I

Personal Safety, Survival, and Health Considerations LU 17

Food – Most people need 2000 calories a day.

- High calorie and high protein snacks will help keep you going.
- 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.

Water – You will need four gallons of water per day.

- Purification tablets, such as Halazone, give the water an unpleasant taste, and will do nothing for particulate (dirt) or discoloration.
- The FDA says the 2-4 drops of plain Clorox brand laundry bleach will purify one gallon of water. DO NOT use the scented or perfumed types.

Sleep – Try to get six hours of continuous sleep.

- Stop drinking coffee, tea, or other beverages containing caffeine at least four hours before going to bed.
- Bring a good sleeping bag and your favorite pillow.



Amateur Radio Communications Course Level I

Personal Safety, Survival, and Health Considerations

LU 17

Personal Hygiene

- 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.
- You also might want to include, several rolls of toilet paper, hand towels and any brand of flushable moist towelettes.
- If you do not take care of personal cleanliness, you could become unpleasant to be around.



Amateur Radio Communications Course Level I

Personal Safety, Survival, and Health Considerations

LU 17

Safety in an Unsafe Situation

- Natural disasters can bring flying or falling debris, high or fast moving water, fire, explosions, building collapse, polluted water, disease, toxic chemicals, and a variety of other dangers.
- Always have an escape plan.
- Do not allow yourself to be cornered. Identify at least two escape routes from the station.
- Carry a police or signal whistle, a chemical light stick or small flashlight in your pocket.
- Always let others know where you are going.



Amateur Radio Communications Course Level I

Personal Safety, Survival, and Health Considerations

LU 17

Shelter

- In most cases you will not need your own shelter for operating or sleeping.
- Tents should be rated for high winds, and should be designed to be waterproof in heavy weather.
- Your tent should have a full coverage rain fly rather than a single waterproof fabric.
- The tents bottom should be waterproof, extending up the sidewalls at least six inches in a “bath-tub” design, but bring an extra sheet of plastic to line the inside of your tent.



Amateur Radio Communications Course Level I

Personal Safety, Survival, and Health Considerations

LU 17

Medical Considerations

- If you are a diabetic, you will need to avoid going for long periods without proper food and medication, and stress may affect your blood sugar level.
- Persons with heart problems may need to avoid stressful situations.
- Even if your doctor says you can participate safely, be sure you have an adequate supply of appropriate medications on hand, and a copy of any prescriptions.
- Wear any medical ID jewelry you have and keep a copy of any special medical information and emergency phone numbers in your wallet at all times.



Amateur Radio Communications Course Level I

Personal Safety, Survival, and Health Considerations

LU 17

Protect Your Eyes and Sight

- **If you wear eyeglasses or contact lenses, bring at least one spare pair. Bring a copy of your lens prescription.**
- **Sunglasses may also be necessary in some situations. Working without them in bright sun can cause fatigue and possibly eye damage.**
- **If you do not normally wear eyeglasses, consider a pair or industrial safety glasses or goggles to protect your eyes from wind blown water, dust and debris.**



Amateur Radio Communications Course Level I

LU 17-1 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). (PG 106, COL 2, PP Last)**

LU 17-2 Which of the following is true about using chlorine to purify water?

- A. It is best to use four to six drops of chlorine per gallon of water.
- B. Adding the proper amount of chlorine water will improve the taste.
- C. Adding the proper amount of chlorine to water will kill cysts like Giardia.
- D. It is best to use two to four drops of plain chlorine per gallon of water. (PG 107, COL 1, PP 1)**



Amateur Radio Communications Course Level I

LU 17-3 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. (PG 108, COL 2, PP 3)**
- D. As a volunteer communicator, you will need to bring specialized protective clothing.**

LU 17-4 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. (PG 107, COL 2, PP 1)**
- 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.”**



Amateur Radio Communications Course Level I

LU 17-5 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. (PG 106, COL 2, PP2)
- 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.

LU 17-6 Which of the following best defines an MRE package?

- A. Mainly Radio Equipment.
- B. Mostly Random Equipment.
- C. Meals, Ready to Eat. (PG 106, COL 2, PP 1)
- D. Meals, Rarely Eaten.

Alternative Communication Methods LU 18

- **Some radio services require licenses, others do not. However, in a true emergency, FCC rules gives everyone special permission to use “any means necessary” to communicate in order to protect life and property – but only if no other normal means of communication is possible.**
- **Law enforcement agencies are not bound by FCC rules. Hams who have called for “help” on police frequencies have been convicted of “interfering with a police agency.”**
- **It is not legal to modify VHF and UHF Amateur radios for operation in nearby public service and business bands. Doing so might indicate to a judge that you had “premeditated to interfere” in those bands.**

Alternative Communication Methods LU 18

Citizens' Band (CB) Radio

- **No licensing is required. They operate on forty designated channels from 26.965 to 27.405 MHz, with a maximum power of four watts. Operating modes are FM and SSB.**
- **DO not use your Amateur Radio Call sign on CB Radio!**
- **Channel 9 is reserved for emergency and motorist assistance traffic only. Channel 19 has been unofficially designated as the “trucker” channel. REACT teams monitor these channels.**



Amateur Radio Communications Course Level I

Alternative Communication Methods LU 18

Multi-Use Radio Service (MURS)

- No license required for either business or personal use. The MURS frequencies are 151.820, 151.880, 151.940, 154.570 and 154.600. Two watts output maximum power. Portable operation only. Base operation and data transmissions are not authorized.

Family Radio Service (FRS)

- No license required. There are 14 UHF channels and 38 different CTCSS codes to limit background chatter and noise. Maximum output power is 500mw.
- REACT recommends FRS channel 1 (462.5625 MHz) with no CTCSS tone as an emergency channel.
- The first seven FRS channels are shared with the General Mobile Radio Service (GMRS). GMRS operation on these channels is limited to 5 watts.



Amateur Radio Communications Course Level I

Alternative Communication Methods LU 18

General Mobile Radio Service (GMRS)

- An FCC system license is required and granted only to individuals. A system includes any and all radios operated by family members, and may include fixed, mobile, and repeater equipment.
- There are fifteen UHF frequencies. Seven are common to the FRS and eight are paired with matching repeater inputs. Simplex only modes of operation are also authorized.
- Maximum output power is limited on the first seven channels shared with the FRS to 5 watts. The maximum power output on all other channels is 50 watts.
- 462.675 MHz is recognized for emergency and travel information use and is monitored by REACT.



Amateur Radio Communications Course Level I

Alternative Communication Methods LU 18

Public Safety Radio

- Fire, police and other government services. These organizations may train you to use their equipment or an individual officer may ask you to operate his unit to call for help when he cannot do so.

Marine Radio

- FM marine radios operate on internationally allocated channels in the 160 MHz band. HF SSB radios operate on a variety of ITU channels between 2 and 30 MHz. Most land base operation is illegal.
- No license required for FM operation in U. S. waters. Operation on HF channels requires one.
- Channel 16 is the international calling and distress channel. Stay off of channel 22 – it is for Coast Guard use only unless invited to communicate on the channel by them.



Amateur Radio Communications Course Level I

Alternative Communication Methods LU 18

Aviation Radio

- **FCC licenses are required for all stations. AM radios operate in the 108 – 136 MHz band and are used in aircraft and in certain limited ground vehicle and ground stations.**
- **Emergency Locator Transmitters (ELTs) are automatic devices that transmit a distress signal on 121.5 MHz (civilian) and 243.0 MHz (military.)**
- **These frequencies are also used for marine Emergency Position Indicating Radio Beacons (EPIRB) and the new land based Personal Radio Beacons (PRB.)**



Amateur Radio Communications Course Level I

LU 18-1 Which can you NOT use to identify your transmissions on Citizens' Band radio?

- A. Your Amateur call, if you were licensed when 11-meters was an Amateur allocation. (PG 112, COL 1, PP2)**
- B. With your old Class D call sign, if you had one.**
- C. A self-assigned identifier.**
- D. A tactical call sign.**

LU 18-2 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. (PG 112, COL 2, PP 1&2)**
- C. Call only on channel 9, since it is designated for assistance and emergencies.**
- D. Say "Break – Break" or "MAYDAY" on any channel.**



Amateur Radio Communications Course Level I

LU 18-3 Which is NOT an advantage of using Family Radio Service (FRS) systems?

- A. They are readily available at low cost.
- B. Operation on FRS radios is simple and requires little training.
- C. There is no requirement for licensing to use FRS.
- D. **Low transmitter power. (PG 113, COL 1, PP 2)**

LU 18-4 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. (PG 113, COL 2, PP 1)**
- C. A charitable institution, for benevolent purposes.
- D. A local repeater club.



Amateur Radio Communications Course Level I

LU 18-5 Which is NOT true of the MURS?

- A. A station license is required.**
- B. Power output is limited to two watts.**
- C. Radios operate in the VHF band.**
- D. Data emissions are permitted.
(PG 112, COL 1, PP 1)**



Amateur Radio Communications Course Level I

What To Expect in Large Scale Disasters LU 19

Onset: Critical Communication Requirements in a Disaster

- First, there is a huge increase in the volume of traffic on public-safety radio channels, accompanied by prolonged waiting periods to gain access.
- As the disaster widens, equipment outages occur at key locations. Messages are not handled in order of priority, and urgent messages are often lost.
- As agencies respond, the need arises for them to communicate with each other. However, they have incompatible radio systems and are reluctant to use another agency's radio system.
- In a large-scale situation, a need arises to contact locations at distances beyond the range of a given radio system (50 to 350 miles or more.)

What To Expect in Large Scale Disasters LU 19

What Happens in the first 72 Hours?

- The greatest concentration of relief efforts is generally found in the incorporated cities served by agencies with paid professionals – assuming their equipment, facilities and personnel remain operable.
- Suburbs and isolated areas of a county suffer from remoteness from fire departments, public works, law enforcement and the services of all other agencies.
- The opportunity to call for help is often unavailable to most citizens during the first 72 hours.
- The opportunity to notify concerned distant relatives is not afforded except via Amateur Radio and the American Red Cross.



Amateur Radio Communications Course Level I

What To Expect in Large Scale Disasters LU 19

What Happens in the first 72 Hours (Continued)?

- Once the immediate threat to life has passed, survival instincts prevail, printed “What to Do” instructions are located and followed, and people operate essentially on their own for an indefinite period while the public agencies respond to the most urgent problems of which their communications make them aware.
- Inter-agency communication is poor to non-existent. AT the end of 72 hours, the disaster area remains in virtual isolation except for helicopter service for known critical cases and official use.
- Amateur Radio operators from neighboring counties and states offer to help but are often unable to cross roadblocks.
- The command and control process of directing requires communication – the ingredient in short supply in all disasters.



Amateur Radio Communications Course Level I

LU 19-1 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. (PG 117, COL 1, PP 2)**
- D. The press provides up to date and accurate information to the public.

LU 19-2 Which of the following statements is NOT true of interagency communications?

- 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. (PG 117, COL 1, PP 3)**
- D. Amateur Radio can be used to link agencies.



Amateur Radio Communications Course Level I

LU 19-3 In the first 72 hours of a disaster situation, where is the greatest concentration of relief effort to be found?

- A. Urban areas. (PG 118, COL 1, PP 6)**
- B. Suburban areas.
- C. Rural areas.
- D. Outside the affected area.

LU 19-4 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. (PG 118, COL 2, PP5)**



Amateur Radio Communications Course Level I

LU 19-5 What is the usual situation in a disaster area after the initial 72 hours?

- A. The disaster area remains in virtual isolation. (PG 119, COL 1, PP 3)**
- B. The disaster is over and everybody can go home.**
- C. A few victims still need assistance.**
- D. Communication systems are back to normal.**



Amateur Radio Communications Course Level I

Hazardous Materials Awareness LU 20

Hazardous Materials (HazMat)

- HazMat refers to any substances or materials, which if released in an uncontrolled manner can be harmful to people, animals, crops, water systems, or other elements of the environment.
- These materials include explosives, gases, flammable and combustible liquids, flammable solids or substances, poisonous and infectious substances, radioactive materials, and corrosives.



Amateur Radio Communications Course Level I

Hazardous Materials Awareness LU 20

Hazardous Chemicals On The Move

- The US Department of Transportation (DOT) has established several systems to manage HazMat materials. These include definitions of various classes of hazardous materials, placards and other marking requirements for vehicles, containers and packages to aid in rapid identification of cargoes and an international cargo commodity numbering system.
- All freight cars, trucks and freight containers display a diamond shaped placard, 10 inches on a side, color-coded and show a graphic symbol of the hazard class and include a four digit identification number. Warning labels are also displayed on most packages containing hazardous materials.
- Common four digit numbers you might see are 1993 (road tar, diesel fuel, etc.), and 1203 (gasoline).



Amateur Radio Communications Course Level I

Hazardous Materials Awareness LU 20

Hazards 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.
- The NFPA label is diamond shaped, divided into four quadrants:
 - ❖ The left quadrant, colored blue, contains a 0 to 4 (highest) numerical rating of the substance health hazard.
 - ❖ The top quadrant, red in color, contains the substances fire hazard rating, 0 to 4 (highest.)
 - ❖ The right quadrant, colored yellow, indicates the substances likelihood to explode or react rating, 0 to 4 (highest.)
 - ❖ The bottom quadrant is white, contains information regards three special hazards, OXY – oxidizer, W – reacts with water, and the Radioactive symbol.



Amateur Radio Communications Course Level I

Hazardous Materials Awareness LU 20

Guidelines to Handling HazMat Incidents

- Once you are in a safe position, up-wind and up-hill, try and identify the material.
- If you cannot read the items on the placard using a spotting scope or binoculars, simply report what you can see from a safe position.
- If you can see from a safe position look for the four-digit number preceded by the initials “UN/NA” and the name of the material on a shipping paper, package or drum.
- When reporting a HazMat incident, identify yourself, give your current location and the location of the incident, briefly describe what you see and if a gaseous cloud or liquid spill exists, give the direction that the contaminant is flowing.



Amateur Radio Communications Course Level I

LU 20-1 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. (PG 122, COL 2, PP 4)**
- 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.**

LU 20-2 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. (PG 121, COL 1 , PP Last)**



Amateur Radio Communications Course Level I

LU 20-3 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. (PG 122, COL 2, PP 4, 5 & 6)**
- 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.**

LU 20-4 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 above answers are correct. (PG 121, COL 2, PP 2)**



Amateur Radio Communications Course Level I

LU 20-5 Gasoline tankers filling the neighborhood gas station's underground tanks are identified with a placard bearing which of the following?

- A. 1203. (PG 121, COL 2, PP 2)**
- B. 1993.**
- C. 2003.**
- D. 2706.**



Amateur Radio Communications Course Level I

Marine Communications LU 21

Marine Communications

- 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 to 30 miles.
- Vessels that routinely travel outside this distance generally have MW/HF – SSB, satellite communications or both. Note: CW communication is no longer used on MW/HF.
- The use of VHF and MW/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.



Amateur Radio Communications Course Level I

Marine Communications LU 21

Channel Selection

- Marine FM frequencies have been assigned channel numbers, and all are designated for specific uses.
- Channel 16 has been designated as the worldwide distress and calling frequency. All vessels are required to maintain a listening “watch” on FM 16 while underway.
- FM 9 has been designated as an alternate calling frequency.
- 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 (NOTAMS), after announcing them on FM 16.



Amateur Radio Communications Course Level I

Marine Communications LU 21

Spoken Emergency Signals

- **“MAYDAY MAYDAY”** – The highest priority urgency call. The vessel calling is threatened by grave or immediate danger and requires immediate assistance.
- **“PAN PAN”** – Known as an “urgency” call – the vessel calling has an urgent message concerning the safety of a vessel or person.
- **“SECURITE”** – The safety signal – used for official messages about the safety of navigation or important weather warnings.
- **“SILENCE”** – The Coast Guard may declare silence on a specific channel. Only those units actively involved in the incident may transmit on that frequency.



Amateur Radio Communications Course Level I

Marine Communications LU 21

Incident Reporting

- There are two types of incidents that hams should report directly to the Coast Guard: vessels in distress, and oil or chemical spills into public waters.
 - ❖ The first, 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 or via NRC Internet Web site www.nrc.uscg.mil.



Amateur Radio Communications Course Level I

Marine Communications LU 21

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 get 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)
 - ❖ Length and type of vessel.
 - ❖ Color.
 - ❖ Any descriptive features.
 - ❖ On board emergency equipment.



Amateur Radio Communications Course Level I

Marine Communications LU 21

Distress Information (Continued)

- Once you have the information, advise all persons on board to don life jackets, and contact either 911 dispatch or the closest Coast Guard facility by phone.
- Identify yourself as an Amateur Radio operator relaying an emergency message. Pass on the information and assist as requested

Routine Communications

- If calling on FM 9, transmit the name of the vessel you want to talk with twice, followed by your station's name twice.
- FCC rules require that you identify your vessel on each transmission.
- The use of "Q" signals and "10 codes" is not permitted on marine VHF-FM.



Amateur Radio Communications Course Level I

LU 21-1 When is it permissible to utilize channel FM 22?

- A. At anytime after making an initial call on FM 16.
- B. Whenever channel FM 9 and FM 16 are busy.
- C. Only when directed by the Coast Guard. (PG 125/126, COL2/1, Last/First)**
- D. At no time, it is for Coast Guard use only.

LU 21-2 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. (PG 126, COL 2, PP 4)**



Amateur Radio Communications Course Level I

LU 21-3 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. (PG 123, COL 1, PP 3)**

LU 21-4 Which vessels operate MW/HF SSB radios?

- A. Any vessel that wants to.
- B. **Only sea-going vessels that operate outside the range of VHF-FM radios. (PG 125, COL 1, PP 1)**
- 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.



Amateur Radio Communications Course Level I

LU 21-5 Which channel(s) may be used for calling another vessel?

- A. FM 83**
- B. FM 9**
- C. FM 16**
- D. Both FM 9 and FM 16. (PG 125, COL 2, PP 1)**



Amateur Radio Communications Course Level I

Other Learning Opportunities LU 22

Other Learning Opportunities

- If you want your performance in the next big disaster to be flawless, practice is essential.
- Regularly Scheduled Nets – Well-designed nets will vary the format and goals frequently in order to keep them interesting.
- Local Classroom and On-Air Training Sessions – Local agencies may offer job specific training, such as the American Red Cross' Introduction to Disasters and Disaster Damage Assessment courses.
- Public Service Events – Some of the best practice for tactical disaster communication is any local, walkathon, marathon, bike-athon, etc.



Amateur Radio Communications Course Level I

Other Learning Opportunities LU 22

Other Learning Opportunities (Continued)

- Learning Resources on the Internet –
 - ❖ ARRL - Down load the ARRL Public Service Manual and the ARES Field Resources Manual.
 - ❖ The FEMA Institute - online courses are available for many areas involving emergency events.
- Books – The ARRL has a wide selection of books that can be ordered from them directly at www.arrl.org.
- Software – There are many specialized software packages available for Packet Radio.



Amateur Radio Communications Course Level I

Other Learning Opportunities LU 22

Other Learning Opportunities (Continued)

- **ARECC Levels II and III**

- ❖ **ARECC Level II is designed for those who wish to further develop net management skills. The course is designed to prepare you for the jobs of NCS and Net Manager.**
- ❖ **ARECC Level III is designed for emergency communication managers at all levels. If you plan to be an AEC, EC, DEC or SEC, this is the course for you.**



Amateur Radio Communications Course Level I

LU 22-1 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. (PG 129, COL 1&2, PP All)**
- D. Public service events.

LU 22-2 What is the purpose of the next course in this series?

- A. To reinforce the skills and knowledge presented in ARECC Level 1.
- B. To provide training for prospective Emergency Operation Center Managers.
- C. To prepare individuals for jobs of NCS and Net Manager. (PG 130, COL 2, PP Last)**
- D. To prepare individuals for the jobs of DEC or SEC.



Amateur Radio Communications Course Level I

LU 22-3 What is the purpose of the third course in this series?

- A. To reinforce the skills and knowledge presented in ARECC Level II.**
- B. To provide training for prospective Emergency Operations Center Managers.**
- C. To prepare individuals for the jobs of NCS and Net Manager.**
- D. To prepare individuals for management level emcomm positions. (PG 131, COL 1, PP 1)**



Amateur Radio Communications Course Level I

Modes, Methods and Applications LU 23

Your Purpose

- **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 communications.**
- **Each type of message should be sent using the most appropriate mode, taking into consideration the message's contents, and its destination(s).**



Amateur Radio Communications Course Level I

Modes, Methods and Applications LU 23

Some Concepts to Consider

- **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.**



Amateur Radio Communications Course Level I

Modes, Methods and Applications LU 23

Some Concepts to Consider (Continued)

- Messages fall into similar categories:
 - ❖ Point to point – Messages intended for one party.
 - ❖ Point to multi-point – Messages intended for a group.
 - ❖ 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.
 - ❖ Low priority – Messages can be delivered in a more relaxed time frame.



Amateur Radio Communications Course Level I

Modes, Methods and Applications LU 23

Tactical Messages

- Tactical messages are usually low-precision and time critical, and can be passed, most efficiently using voice.

Lists and Detailed Messages

- 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.

Sensitive Information

- Names and addresses of evacuees should never be transmitted over voice channels, since thieves with scanners can use the information to loot unattended homes.
- If absolute privacy is required, the message should not be transmitted by Amateur Radio.



Amateur Radio Communications Course Level I

Modes, Methods and Applications LU 23

Digital Modes

- Digital modes that do not provide automatic error checking should only be used when clean and interference-free signals can be guaranteed.
- HF – The best digital modes for HF operation are packet, AMTOR mode B, and PSK31 in QPSK mode.
- VHF/UHF – The TNC2 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.



Amateur Radio Communications Course Level I

Modes, Methods and Applications LU 23

Digital Modes (Continued)

- **AMTOR mode B** – It is an advanced teletype mode with forward error correction, making it ideal for high precision messages over long distances.
- **PSK31** – Usable in very poor conditions. This makes it ideal for HF emergency communications. There are two PSK31 modes:
 - ❖ **BPSK** – Has no error correction.
 - ❖ **QPSK** – Has forward error correction.
 - ❖ Under all but the worst conditions, the BPSK mode, should be used, as it will provide almost perfect transmissions.



Amateur Radio Communications Course Level I

Modes, Methods and Applications LU 23

Digital Modes (Continued)

- **Packet Teleprinting Over Radio (PACTOR) – A combination of packet and AMTOR. PACTOR uses ARQ and FEC modes, and a standard keyboard.**
- **TCP/IP Packet – Internet protocols and network services are useable on packet radio.**
- **APRS – APRS is a digital information handling mode with applications in emcomm. One use is the automated reporting of data from digital weather stations.**
- **Amateur Television (ATV) – There are two modes, slow-scan and fast-scan. Fast scan is live. Slow-scan ATV uses a voice-grade channel to send a still picture line by line.**



Amateur Radio Communications Course Level I

LU 23-1 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. (PG 133, COL 1, PP 1)**
- D. To provide internal communication support to one (and only one) responding agency.

LU 23-2 Which of the following best describes tactical messages?

- A. They are high precision and time critical.
- B. They are low precision and time critical. (PG 134, COL 2, PP 1)**
- C. They are point-to-point and NOT time critical.
- D. They are point-to-multipoint and low precision.



Amateur Radio Communications Course Level I

LU 23-3 Long lists and detailed messages are best handled by which of the following modes?

- A. Voice or CW.
- B. Fax or digital. (PG 134, COL 2, PP 7)
- C. CW OR DIGITAL.
- D. Phone or fax.

LU 23-4 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. (PG 135, COL 1, PP Top)
- D. Switch to a digital mode and be assured of complete privacy.



Amateur Radio Communications Course Level I

**LU 23-5 Which of the following
PSK31 modes has an error
correction feature?**

- A. BPSK**
- B. QPSK (PG 135, COL 2, PP 4)**
- C. RPSK**
- D. SPSK**