

Amateur Radio License Class

Communicating with Other Hams

Presented by Steve Gallafent

October 17, 2007

Communicating with Other Hams

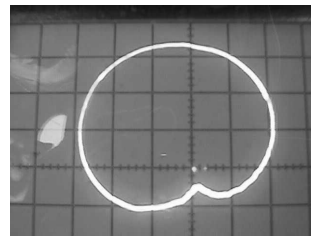
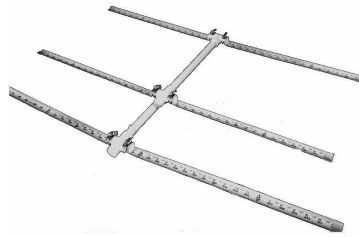
Radio Direction Finding

- ◆ Radio direction finding is the process of locating the source of an unknown signal
- ◆ Radio direction finding is often used to locate sources of interference or jamming
- ◆ Fox hunts are a radio direction finding exercise where you locate a hidden transmitter

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Radio Direction Finding

- ◆ Use a directional antenna for radio direction finding



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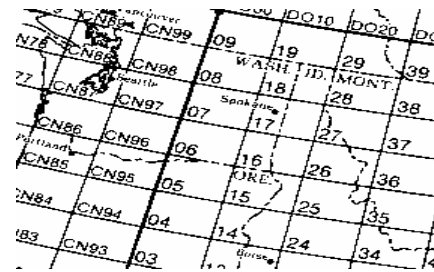
Contesting

- ◆ Contesting is contacting as many stations as possible during a defined period
- ◆ One of the biggest contests is the ARRL Field Day held on the fourth full weekend in June

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Grid Squares

- ◆ Grid squares are letter number designators for a geographic location
- ◆ We are in grid square DN17



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Special Event Stations

- ◆ A special event station is a temporary station that operates in conjunction with an activity of special significance.
- ◆ Special event call signs are 1x1 call signs. (Example: K7A)
- ◆ A special event call sign can be issued for an event which is "publicly significant."

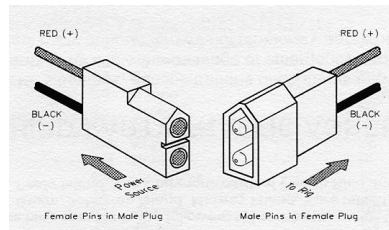
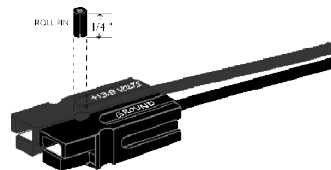
Communicating with Other Hams Operating in the Field

- ◆ Extensive handheld operation requires one or more fully charged spare battery packs.
- ◆ Many radios have a battery case that accepts AA batteries.



Communicating with Other Hams Operating in the Field

- ◆ Some other helpful items:
 - A cable and clips for connecting to an external power source
 - External antenna and cable
 - Repeater and net frequencies
 - Radio reference instructions
- ◆ Something you probably don't need:
 - 1500 Watt output linear amplifier



Communicating with Other Hams Operating in the Field

Some accessories can make your life easier:

- ◆ You can make the signal from a handheld radio stronger by using an external antenna instead of the rubber-duck antenna
- ◆ A combination headset and microphone can make it easier to communicate in an area with a lot of crowd noise



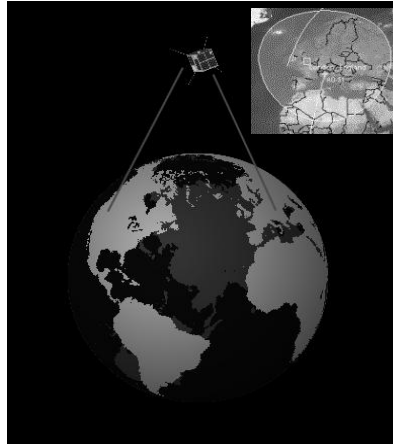
Communicating with Other Hams Radio Control

- ◆ Radio control transmissions are limited to 1 Watt maximum power.
- ◆ Transmitters must be identified with a label indicating the licensee's call sign and address.



Communicating with Other Hams
Satellite Operation

- ◆ Satellite operation is like working a repeater in the sky.
- ◆ Satellites allow VHF and UHF communication with amateur radio operators in other countries.



Communicating with Other Hams
Satellite Operation

- AO-51
- ◆ Launched in 2004
 - ◆ 25cm cube
 - ◆ FM voice repeater
 - 145.920 uplink
 - 435.300 downlink



Communicating with Other Hams Satellite Operation



Communicating with Other Hams Satellite Operation

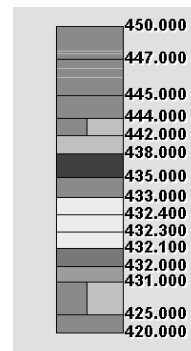
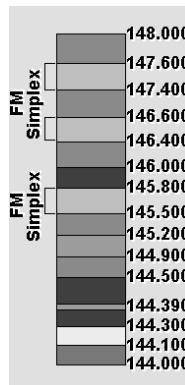
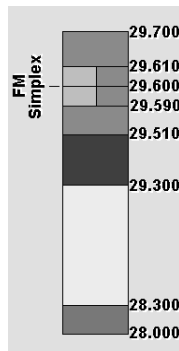
- ◆ Any amateur whose license allows them to transmit on the satellite uplink frequency can use an amateur satellite.
- ◆ Satellite operation is possible with an HT, although you may need a better antenna.
- ◆ As with other modes, you should use the minimum amount of power needed to complete the contact.
- ◆ A beacon transmits information about a satellite.

Communicating with Other Hams
Satellite Sub-bands

- ◆ Band plans provide a way to coordinate different communication methods that share an amateur radio band.
- ◆ A satellite sub-band is a portion of a band where satellite operations are permitted.

Communicating with Other Hams
Satellite Sub-bands

- ◆ The satellite sub-band in the 70cm band is 435 to 438 MHz.



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Satellite Orbits

- ◆ Amateur satellites are typically LEO (Low Earth Orbit) satellites.
- ◆ LEO satellites typically orbit the earth about once every 90 minutes.
- ◆ A satellite tracking program can help you determine when a satellite will pass over.
- ◆ There are several web sites with tracking information:
 - <http://www.amsat.org/>
 - <http://www.heavens-above.com/>

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Doppler Shift

- ◆ Doppler shift is a change in signal frequency caused by motion through space.
- ◆ Doppler shift is not a form of RF interference.
- ◆ We can hear Doppler shift at voice frequencies – sirens and train whistles, for example.
- ◆ Doppler shift is about 10KHz at 70cm and about 3KHz at 2m.

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Split Frequency / Operating Protocols

- ◆ Satellite repeaters are typically cross-band repeaters.
 - AO-51 – FM Tx on 2m, Rx on 70cm
 - SO-50 – FM Tx on 2m, Rx on 70cm
 - VO-52 – SSB Tx on 70cm, Rx on 2m
- ◆ Satellites can be congested, so contacts should be brief – generally call signs, signal reports, grid squares, and names.

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AMSAT

- ◆ AMSAT is *The Radio Amateur Satellite Corporation*.
- ◆ AMSAT is responsible for the largest number of amateur radio satellites.
- ◆ Formed in 1969 to “foster Amateur Radio’s participation in space research and communication.”
- ◆ <http://www.amsat.org/>



Communicating with Other Hams

ISS Communications

- ◆ Any amateur with a Technician class or higher license class can communicate with the International Space Station.
- ◆ ARISS coordinates amateur radio on the ISS.
- ◆ <http://www.rac.ca/ariss/>



Communicating with Other Hams

Emergency Communications

- ◆ An FCC declaration of a communication emergency sets special conditions for operation in the amateur service
 - Special conditions or rules
 - Frequencies restricted to emergency communication
- ◆ You must avoid frequencies restricted to emergency use

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Emergency Communications

- ◆ An emergency is defined as a situation where there is immediate threat to human life or property
- ◆ You can use any means of communication available to you in an actual emergency
 - Other services
 - Non-amateur frequencies
- ◆ Emergency traffic always has priority over any other traffic

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Emergency Communications

- ◆ RACES is the Radio Amateur Civil Emergency Service
- ◆ RACES requires registration with the responsible civil defense agency
- ◆ RACES organizations are restricted to serving government emergency communication organizations

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Emergency Communications

- ◆ ARES is the Amateur Radio Emergency Service
- ◆ ARES organizations serve public service organizations
 - Red Cross
 - Salvation Army
 - National Weather Service

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Emergency Communications

- ◆ Be prepared for emergencies
 - Regularly check equipment
 - Practice field operation
 - Backup power sources
 - ◆ Car battery
 - ◆ Bicycle generator
 - ◆ Solar panel

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Emergency Communications

- ◆ Mayday – Any station come in please
- ◆ Penalties for false declaration of emergency can be severe

- ◆ Do not transmit personal information of victims without consent
- ◆ Digital modes reduce the possibility of casual listeners

Communicating with Other Hams


Emergency Communications

- ◆ Tactical call signs can help simplify emergency and public service communication
- ◆ You must still legally identify every ten minutes

Communicating with Other Hams Directed Nets

- ◆ Directed nets create a formal structure to keep communication happening
- ◆ Do not transmit until acknowledged by the net control station
- ◆ Avoid idle chatter that ties up the frequency
- ◆ Net control stations should have a strong clear signal

Communicating with Other Hams Traffic Handling



**The American Radio Relay League
RADIOGRAM
Via Amateur Radio**

Number 32	Precedence R	HX	Station of Origin KD1SM	Check 6	Place of Origin LUNENBURG MA	Time Filed	Date MAR 23
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To:

This Radio Message was received at:
 Amateur Station _____ Date _____
 Name _____
 Street Address _____
 City, State, Zip _____

Telephone Number:

<u>CLASS</u>	<u>WILL</u>	<u>BEGIN</u>	<u>AT</u>	<u>TEN</u>
<u>AM</u>				

RALPH KD1SM

REC'D	From	Date	Time	SENT	To	Date	Time
-------	------	------	------	------	----	------	------

A licensed Amateur Radio Operator, whose address is shown above, handled this message free of charge. As such messages are handled solely for the pleasure of operating, a "Ham" Operator can accept no compensation. 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 of licensed radio amateurs and the publisher of QST Magazine. One of its 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.

Amateur Radio License Class

Communicating with Other Hams

Exam Questions

What is a good thing to have when operating a hand-held transceiver away from home?

- A. A selection of spare parts
- B. A programming cable to load new channels
- C. One or more fully charged spare battery packs
- D. A dummy load

T7A01

Which of these items would probably not be very useful to include in an emergency response kit?

- A. An external antenna and several feet of connecting cable
- B. A 1500 watt output linear amplifier
- C. A cable and clips for connecting your transceiver to an external battery
- D. A listing of repeater frequencies and nets in your area

T7A02

How can you make the signal from a hand-held radio stronger when operating in the field?

- A. Switch to VFO mode
- B. Use an external antenna instead of the rubber-duck antenna
- C. Stand so there is a metal building between you and other stations
- D. Speak as loudly as you can

T7A03

What would be a good thing to have when operating from a location that includes lots of crowd noise?

- A. A portable bullhorn
- B. An encrypted radio
- C. A combination headset and microphone
- D. A pulse noise blanker

T7A04

What is a method used to locate sources of noise interference or jamming?

- A. Echolocation
- B. Doppler radar
- C. Radio direction finding
- D. Phase locking

T7A05

Which of these items would be the most useful for a hidden transmitter hunt?

- A. Binoculars and a compass
- B. A directional antenna
- C. A calibrated noise bridge
- D. Calibrated SWR meter

T7A06

What is a popular activity that involves contacting as many stations as possible during a specified period of time?

- A. Contesting
- B. Net operations
- C. Public service events
- D. Simulated emergency exercises

T7A07

What is a grid locator?

- A. A letter-number designator assigned to a geographic location
- B. Your azimuth and elevation
- C. Your UTC location
- D. The 4 digits that follow your ZIP code

T7A09

What is a special event station?

- A. A station that sends out birthday greetings
- B. A station that operates only on holidays
- C. A temporary station that operates in conjunction with an activity of special significance
- D. A station that broadcasts special events

T7A10

What is the maximum power allowed when transmitting telecommand signals to radio controlled models?

- A. 500 milliwatts
- B. 1 watt
- C. 25 watts
- D. 1500 watts

T7A11

What is the station identification requirement when sending commands to a radio control model using amateur frequencies?

- A. Voice identification must be transmitted every 10 minutes
- B. Morse code ID must be sent once per hour
- C. A label indicating the licensee's call sign and address must be affixed to the transmitter
- D. There is no station identification requirement for this service

T7A12

What class of license is required to use amateur satellites?

- A. Only Extra class licensees can use amateur radio satellites
- B. General or higher class licensees who have a satellite operator certification
- C. Only persons who are AMSAT members and who have paid their dues
- D. Any amateur whose license allows them to transmit on the satellite uplink frequency

T7B01

How much power should you use to transmit when using an amateur satellite?

- A. The maximum power of your transmitter
- B. The minimum amount of power needed to complete the contact
- C. No more than half the rating of your linear amplifier
- D. Never more than 1 watt

T7B02

What is something you can do when using an amateur radio satellite?

- A. Listen to the Space Shuttle
- B. Get global positioning information
- C. Make autopatch calls
- D. Talk to amateur radio operators in other countries

T7B03

Who may make contact with an astronaut on the International Space Station using amateur radio frequencies?

- A. Only members of amateur radio clubs at NASA facilities
- B. Any amateur with a Technician or higher class license
- C. Only the astronaut's family members who are hams
- D. You cannot talk to the ISS on amateur radio frequencies

T7B04

What is a satellite beacon?

- A. The primary transmit antenna on the satellite
- B. An indicator light that shows where to point your antenna
- C. A reflective surface on the satellite
- D. A signal that contains information about a satellite

T7B05

What should you use to determine when you can access an amateur satellite?

- A. A GPS receiver
- B. A field strength meter
- C. A telescope
- D. A satellite tracking program

T7B06

What is Doppler shift?

- A. A change in the satellite orbit
- B. A mode where the satellite receives signals on one band and transmits on another
- C. A change in signal frequency caused by motion through space
- D. A special digital communications mode for some satellites

T7B07

What is the name of the group that coordinates the building and/or launch of the largest number of amateur radio satellites?

- A. NSA
- B. USOC
- C. AMSAT
- D. FCC

T7B08

What is a satellite sub-band?

- A. A special frequency for talking to submarines
- B. A frequency range limited to Extra Class licensees
- C. A portion of a band where satellite operations are permitted
- D. An obsolete term that has no meaning

T7B09

What is the satellite sub-band on 70 cm?

- A. 420 to 450 MHz
- B. 435 to 438 MHz
- C. 440 to 450 MHz
- D. 432 to 433 MHz

T7B10

What do the initials LEO tell you about an amateur satellite?

- A. The satellite battery is in Low Energy Operation mode
- B. The satellite is performing a Lunar Ejection Orbit maneuver
- C. The satellite is in a Low Earth Orbit
- D. The satellite uses Light Emitting Optics

T7B11

What information is included in an FCC declaration of a temporary state of communication emergency?

- A. A list of organizations authorized to use radio communications in the affected area
- B. A list of amateur frequency bands to be used in the affected areas
- C. Any special conditions and rules to be observed during the emergency
- D. An operating schedule for authorized amateur emergency stations

T8A01

Under what conditions are amateur stations allowed to communicate with stations operating in other radio services?

- A. When communicating with the space shuttle
- B. When specially authorized by the FCC, or in an actual emergency
- C. When communicated with stations in the Citizens Radio Service
- D. When a commercial broadcast station is reporting news during a natural disaster

T8A02

What should you do if you are in contact with another station and an emergency call is heard?

- A. Tell the calling station that the frequency is in use
- B. Direct the calling station to the nearest emergency net frequency
- C. Disregard the call and continue with your contact
- D. Stop your contact immediately and take the emergency call

T8A03

What are the restrictions on amateur radio communications after the FCC has declared a communications emergency?

- A. The emergency declaration prohibits all communications
- B. There are no restrictions if you have special emergency certification
- C. You must avoid those frequencies dedicated to supporting the emergency unless you are participating in the relief effort
- D. Only military stations are allowed to use the amateur radio frequencies during an emergency

T8A04

What is one reason for using tactical call signs such as “command post” or “weather center” during an emergency?

- A. They help to keep the general public informed
- B. They are more efficient and help coordinate public-service communications
- C. They are required by the FCC
- D. They increase goodwill and sound professional

T8A05

What is legally required to restrict a frequency to emergency-only communication?

- A. An FCC declaration of a communications emergency
- B. Determination by the designated net managed for an emergency net
- C. Authorization by an ARES/RACES emergency coordinator
- D. A Congressional declaration of intent

T8A06

Who has the exclusive use of a frequency if the FCC has not declared a communication emergency?

- A. Any net station that has traffic
- B. The station first occupying the frequency
- C. Individuals passing health and welfare communications
- D. No station has exclusive use in this circumstance

T8A07

What should you do if you hear someone reporting an emergency?

- A. Report the station to the FCC immediately
- B. Assume the emergency is real and act accordingly
- C. Ask the other station to move to a different frequency
- D. Tell the station to call the police on the telephone

T8A08

What is an appropriate way to initiate an emergency call on amateur radio?

- A. Yell as loudly as you can into the microphone
- B. Ask if the frequency is in use and wait for someone to give you permission to go ahead before proceeding
- C. Declare a communications emergency
- D. Say "Mayday, Mayday, Mayday" followed by "any station come in please" and identify your station

T8A09

What are the penalties for making a false emergency call?

- A. You could have your license revoked
- B. You could be fined a large sum of money
- C. You could be sent to prison
- D. All of these answers are correct

T8A10

What type of communications has priority at all times in the Amateur Radio Service?

- A. Repeater communications
- B. Emergency communications
- C. Simplex communications
- D. Third-party communications

T8A11

When must priority be given to stations providing emergency communications?

- A. Only when operating under RACES
- B. Only when an emergency has been declared
- C. Any time a net control station is on the air
- D. At all times and on all frequencies

T8A12

What can you do to be prepared for an emergency situation where your assistance might be needed?

- A. Check at least twice a year to make sure you have all of your emergency response equipment and know where it is
- B. Make sure you have a way to run your equipment if there is a power failure in your area
- C. Participate in drills that test your ability to set up and operate in the field
- D. All of these answers are correct

T8B01

When may you use your amateur station to transmit a “SOS” or “MAYDAY” signal?

- A. Only when you are transmitting from a ship at sea
- B. Only at 15 and 30 minutes after the hour
- C. When there is immediate threat to human life or property
- D. When the National Weather Service has announced a weather warning

T8B02

What is the primary function of RACES in relation to emergency activities?

- A. RACES organizations are restricted to serving local, state, and federal government emergency management agencies
- B. RACES supports agencies like the Red Cross, Salvation Army, and National Weather Service
- C. RACES supports the National Traffic System
- D. RACES is part of the National Emergency Warning System

T8B03

What is the primary function of ARES in relation to emergency activities?

- A. ARES organizations are restricted to serving local, state, and federal government emergency management agencies
- B. ARES supports agencies like the Red Cross, Salvation Army, and National Weather Service
- C. ARES groups work only with local school districts
- D. ARES supports local National Guard units

T8B04

What organization must you register with before you can participate in RACES activities?

- A. A local amateur radio club
- B. A local racing organization
- C. The responsible civil defense organization
- D. The Federal Communications Commission

T8B05

What is necessary before you can join an ARES group?

- A. You are required to join the ARRL
- B. You must have an amateur radio license
- C. You must have an amateur radio license and have Red Cross CPR training
- D. You must register with a civil defense organization

T8B06

What could be used as an alternate source of power to operate radio equipment during emergencies?

- A. The battery in a car or truck
- B. A bicycle generator
- C. A portable solar panel
- D. All of these answers are correct

T8B07

When can you use non-amateur frequencies or equipment to call for help in a situation involving immediate danger to life or property?

- A. Never; your license only allows you to use the frequencies authorized to your class of license
- B. In a genuine emergency you may use any means at your disposal to call for help on any frequency
- C. When you have permission from the owner of the set
- D. When you have permission from a police officer on the scene

T8B08

Why should casual conversation between stations during a public service event be avoided?

- A. Such chatter is often interesting to bystanders
- B. Other listeners might overhear personal information
- C. Idle chatter may interfere with important traffic
- D. You might have to change batteries more often

T8B09

What should you do if a reporter asks to use your amateur radio transceiver to make a news report?

- A. Allow the use but give your call sign every 10 minutes
- B. Advise them that the FCC prohibits such use
- C. Tell them it is OK as long as you do not receive compensation
- D. Tell the reporter that you must approve the material beforehand

T8B10

When can you use a modified amateur radio transceiver to transmit on the local fire department frequency?

- A. When you are helping the Fire Department raise money
- B. Only when the Fire Department is short of regular equipment
- C. In a genuine emergency you may use any means at your disposal to call for help on any frequency
- D. Only when the local Fire Chief has given written permission

T8B11

Which type of traffic has the highest priority?

- A. Emergency traffic
- B. Priority traffic
- C. Health and welfare traffic
- D. Routine traffic

T8C01

What type of messages should not be transmitted over amateur radio frequencies during emergencies?

- A. Requests for supplies
- B. Personal information concerning victims
- C. A schedule of relief operators
- D. Answer D

T8C02

What should you do to minimize disruptions to an emergency traffic net once you have checked in?

- A. Whenever the net frequency is quiet, announce your call sign and location
- B. Move 5 kHz away from the net's frequency and use high power to ask other hams to keep clear of the net frequency
- C. Do not transmit on the net frequency until asked to do so by the net control station
- D. Wait until the net frequency is quiet, then ask for any emergency traffic for your area

T8C03

What is one thing that must be included when passing emergency messages?

- A. The call signs of all the stations passing the message
- B. The name of the person originating the message
- C. A status report
- D. The message title

T8C04

What is one way to reduce the chances of casual listeners overhearing sensitive emergency traffic?

- A. Pass messages using a non-voice mode such as packet radio or Morse code
- B. Speak as rapidly as possible to reduce your on-air time
- C. Spell out every word using phonetics
- D. Restrict transmission of messages to the hours between midnight and 4:00 AM

T6C10

What is of primary importance for a net control station?

- A. A dual-band transceiver
- B. A network card
- C. A strong and clear signal
- D. The ability to speak several languages

T8C06

What should the net control station do if someone breaks in with emergency traffic?

- A. Ask them to wait until the roll has been completed
- B. Stop all net activity until the emergency has been handled
- C. Ask the station to call the local police and then resume normal net activities
- D. Ask them to move off your net frequency immediately

T8C07

What should you do if a large scale emergency has just occurred and no net control station is available?

- A. Wait until the assigned net control station comes on the air and pass your traffic when called
- B. Transmit a call for help and hope someone will hear you
- C. Open the emergency net immediately and ask for check-ins
- D. Listen to the local NOAA weather broadcast to find out how long the emergency will last

T8C08

What is the preamble of a message?

- A. The first paragraph of the message text
- B. The message number
- C. The priority handling indicator for the message
- D. The information needed to track the message as it passes through the amateur radio traffic handling system

T8C09

What is meant by the term “check” in reference to a message?

- A. The check is a count of the number of words in the message
- B. The check is the value of a money order attached to the message
- C. The check is a list of stations that have relayed the message
- D. The check is a box on the message form that tells you the message was received

T8C10

What is the recommended guideline for the maximum number of words to be included in the text of an emergency message?

- A. 10 words
- B. 25 words
- C. 50 words
- D. 75 words

T8C11