Technician License Course
Chapter 6

Lesson Plan Module 14 –

Communicating with Other Hams – Part 2
Nets, Emergency Communications, Special Modes and Techniques

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Nets

- Net is short for “Network”
  - Evolved over the years to share and exchange information in an organized and efficient way
- Social nets
- Traffic nets
- Emergency and public service nets

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Traffic Nets

- *Traffic* refers to formal messages that are relayed via Amateur Radio
  - Radiogram structured to ensure accuracy
- National Traffic System (NTS)
  - Procedures
  - Accountability

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Emergency and Public Service Nets

- Public service nets – training for emergency nets
  - Training for ham operators as well as emergency groups and managers supported by Amateur Radio
- Emergency nets

Net Structure

- Net Control Station (NCS)
  - Traffic cop who controls the flow of information
- Check-in and check-out procedures
  - Priority/Emergency access to Net Control
- Communications discipline vital
  - Learn and follow procedures
  - Speak only when directed, and only to whom directed
  - Follow through with your commitments

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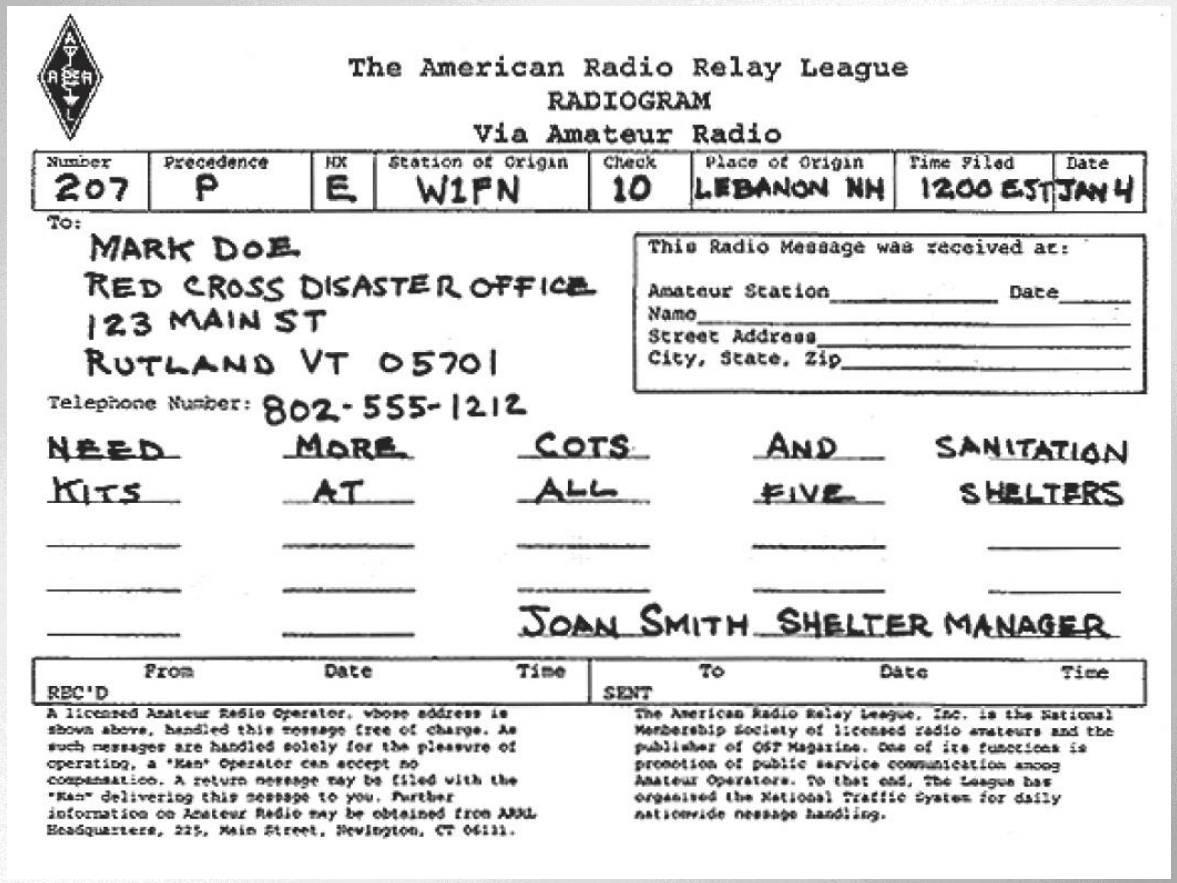
The Radiogram



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
REC'D		

To	Date	Time
SENT		

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.

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Supporting Emergency Operations

- One of the most important reasons for the existence of Amateur Radio.
- Get involved and use what you have learned.
- Know where you fit in the overall emergency management team.

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Emergency Communications Organizations

- Radio Amateur Civil Emergency Service (RACES).
  - Supports civil emergencies
  - National in scope
- Amateur Radio Emergency Service ® (ARES®).
  - Local and regional in scope
  - Supports non-governmental agencies

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Emergency Communication Tips

- Don’t become part of the problem.
- You are a communicator, not a decision or policy maker.
- Don’t give out unauthorized information.
- Know your abilities and limitations — keep yourself safe.
- Follow radio discipline and net procedures.
- Protect personal information — Amateur Radio communications is public.

ARRL The national association for AMATEUR RADIO

Emergency Declarations

- FCC may declare a Temporary State of Communications Emergency.
  - Includes details of conditions and rules to be followed.
  - Specifics communicated through web sites and ARRL bulletins, the NTS, and on-the-air.
  - Avoid operating on restricted frequencies unless engaged in relief efforts.

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Making and Answering Distress Calls

- Rule number one – speak in plain language!
- Mayday (voice); SOS (Morse code)
- Identify
- Give location
- State the situation
- Describe assistance required
- Provide other important information

ARRL The national association for AMATEUR RADIO

Tactical Communications

- Tactical Identifiers
  - Facilitate communications
  - Location- or function-specific
  - Transcends operator changes
- FCC ID rules still apply
  - Give your FCC call sign every 10 minutes and when changing operators

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Emergency Equipment

- "Go-kits"
  - Portable Amateur Radio equipment
  - Emergency power sources
  - Personal survival supplies and equipment

Emergency Communications Training

- If you are going to participate, get training.
- Actively participate in training and drill activities.
  - Nets
  - Public service activities
  - Attend community meetings and get involved in your community.
- Take emergency communication courses.
  - ARRL courses
  - FEMA courses on NIMS and other topics
    - May be required for your participation

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Awards, DXing, Contests

- On-the-air activities provide incentive to get on the radio.
- Learn about propagation as you search for specific stations on various bands.
- Improve operating skills.
- Fun!

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Awards

- WAC
  - Contacting all six inhabited continents
- WAS
  - Contacting 50 states
- VUCC
  - Contacting 100 grid squares on VHF/UHF

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DXing

- Contacting stations far away – a tradition since the first days of radio.
- On HF, usually means contacting stations in other countries.
- On VHF/UHF, means contacting stations outside your normal coverage area.

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Contests

- ARRL Rookie Roundup
- North American QSO Parties (ncjweb.com)
- State QSO Parties
- VHF/UHF Contests
- CQ World Wide DX Contest (a big one!)
- Contest Calendars

ARRL The national association for AMATEUR RADIO

Field Day

- Emergency communications training with a competitive spirit.
- Set up portable station and antenna (in the field, mobile, anywhere!) and make as many contacts as possible.
- Get started with your local club or group – great way to get involved.

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Special Events

- Special Event stations are set up to commemorate some significant local event.
- Usually stations are demonstration stations set up for public display.
- Commemorative certificates are awarded for contacting the stations.

Radio Direction Finding

- Useful for locating interference or noise sources.
- Works best with a directional antenna.
- “Fox hunting” competitions offer a fun opportunity to learn and practice.
- Good training for search and rescue.

Amateur Satellites

- OSCAR
  - **O**rbiting **S**atellites **C**arrying **A**mateur **R**adio
- Modes
  - FM
  - Analog (SSB and CW)
  - Digital
- International Space Station

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Satellite Terms

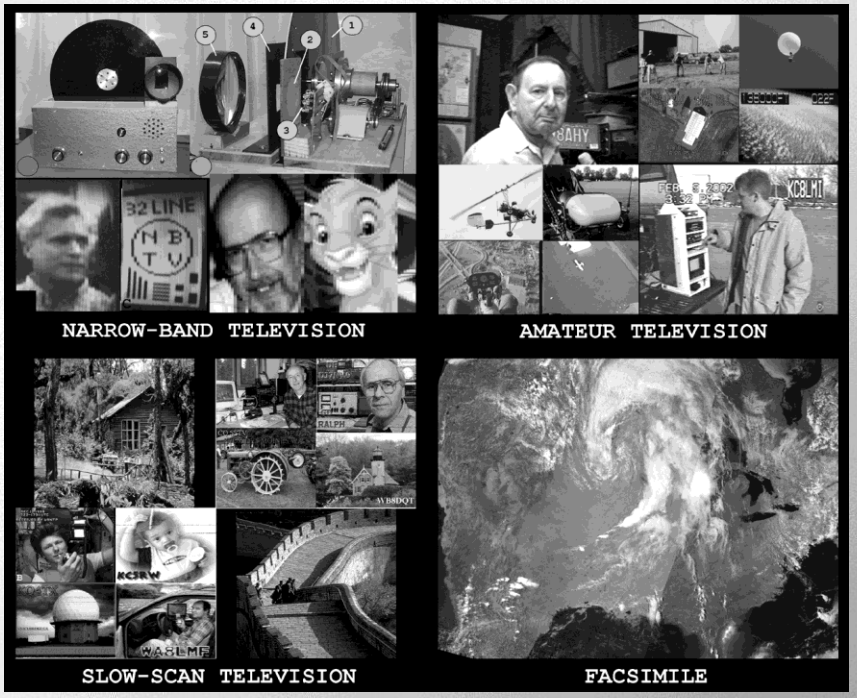
- Uplink – Earth stations transmit to satellite
- Downlink – Satellite transmits to stations on Earth
- Beacon – Signal from satellite with information about satellite operating conditions
- Doppler Shift – Shift in frequency due to relative motion between satellite and Earth station
- LEO – Low Earth Orbit

Satellite Terms

- Spin fading – caused by rotation of satellite
- Pacsat – packet radio satellite
- Tracking software – gives beam heading and times when satellite is in view
- Mode – bands satellite is using for uplink and downlink (eg Mode U/V = 70 cm uplink, 2 meters downlink)

Other Special Modes

- Slow Scan TV (SSTV)
  - Sending snap-shot pictures
  - One frame every few seconds
- Amateur TV (ATV)
  - Similar to commercial TV imagery
  - Uses analog TV format (NTSC)



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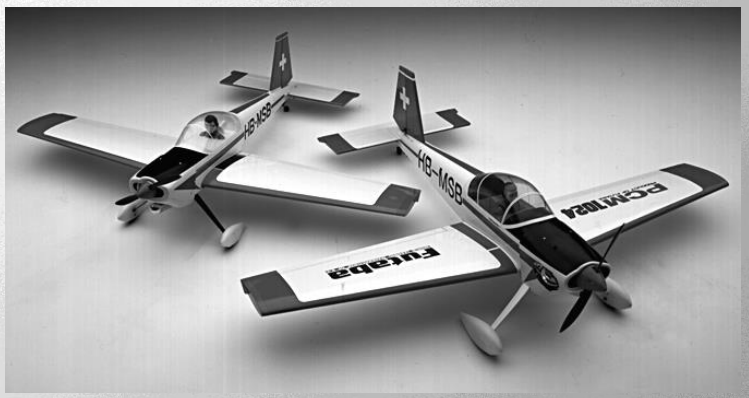
Other Special Modes

- Radio Control (RC)
  - Telecommand
  - 50 MHz band



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Practice Questions

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What is the FCC Part 97 definition of telemetry?

A. An information bulletin issued by the FCC

B. A one-way transmission to initiate, modify or terminate functions of a device at a distance

C. A one-way transmission of measurements at a distance from the measuring instrument

D. An information bulletin from a VEC

FCC Rule: [97.3(a)(46)] T1A07 HRLM (6-33)

ARRL The national association for AMATEUR RADIO

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FCC Rule: [97.3(a)(45)] T1A13 HRLM (6-33)

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FCC Rule: [97.3(a)(45)] T1A13 HRLM (6-33)

When do the FCC rules NOT apply to the operation of an amateur station?

A. When operating a RACES station

B. When operating under special FEMA rules

C. When operating under special ARES rules

D. Never, FCC rules always apply

FCC Rule: [97.103(a)] T2C01 HRLM (6-25)

ARRL The national association for AMATEUR RADIO

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FCC Rule: [97.103(a)] T2C01 HRLM (6-25)

ARRL The national association for AMATEUR RADIO

What do RACES and ARES have in common?

A. They represent the two largest ham clubs in the United States

B. Both organizations broadcast road and weather traffic information

C. Neither may handle emergency traffic supporting public service agencies

D. Both organizations may provide communications during emergencies

T2C04 HRLM (6-24)

ARRL The national association for AMATEUR RADIO

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T2C04 HRLM (6-24)

ARRL The national association for AMATEUR RADIO

Which of the following describes the Radio Amateur Civil Emergency Service (RACES)?

A. A radio service using amateur frequencies for emergency management or civil defense communications

B. A radio service using amateur stations for emergency management or civil defense communications

C. An emergency service using amateur operators certified by a civil defense organization as being enrolled in that organization

D. All of these choices are correct

FCC Rule: [97.3(a)(38), 97.407] T2C05 HRLM (6-24)

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FCC Rule: [97.3(a)(38), 97.407] T2C05 HRLM (6-24)

ARRL The national association for AMATEUR RADIO

Which of the following is an accepted practice to get the immediate attention of a net control station when reporting an emergency?

A. Repeat the words SOS three times followed by the call sign of the reporting station

B. Press the push-to-talk button three times

C. Begin your transmission with “Priority” or “Emergency” followed by your call sign

D. Play a pre-recorded emergency alert tone followed by your call sign

T2C06 HRLM (6-21)

ARRL The national association for AMATEUR RADIO

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T2C06 HRLM (6-21)

ARRL The national association for AMATEUR RADIO

Which of the following is an accepted practice for an amateur operator who has checked into an emergency traffic net?

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. Remain on frequency without transmitting until asked to do so by the net control station

D. All of the choices are correct

T2C07 HRLM (6-21)

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T2C07 HRLM (6-21)

ARRL The national association for AMATEUR RADIO

Which of the following is a characteristic of good emergency traffic handling?

A. Passing messages exactly as received

B. Making decisions as to whether or not messages should be relayed or delivered

C. Communicating messages to the news media for broadcast outside the disaster area

D. All of these choices are correct

T2C08 HRLM (6-22)

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T2C08 HRLM (6-22)

ARRL The national association for AMATEUR RADIO

Are amateur station control operators ever permitted to operate outside the frequency privileges of their license class?

A. No

B. Yes, but only when part of a FEMA emergency plan

C. Yes, but only when part of a RACES emergency plan

D. Yes, but only if necessary in situations involving the immediate safety of human life or protection of property

FCC Rule: [97.403(b)] T2C09 HRLM (6-25)

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FCC Rule: [97.403(b)] T2C09 HRLM (6-25)

ARRL The national association for AMATEUR RADIO

What is the preamble in a formal traffic 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

T2C10 HRLM (6-22)

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T2C10 HRLM (6-22)

ARRL The national association for AMATEUR RADIO

What is meant by the term "check" in reference to a formal traffic message?

A. The check is a count of the number of words or word equivalents in the text portion of 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

T2C11 HRLM (6-22)

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D. The check is a box on the message form that tells you the message was received

T2C11 HRLM (6-22)

ARRL The national association for AMATEUR RADIO

What is the Amateur Radio Emergency Service (ARES)?

A. Licensed amateurs who have voluntarily registered their qualifications and equipment for communications duty in the public service

B. Licensed amateurs who are members of the military and who voluntarily agreed to provide message handling services in the case of an emergency

C. A training program that provides licensing courses for those interested in obtaining an amateur license to use during emergencies

D. A training program that certifies amateur operators for membership in the Radio Amateur Civil Emergency Service

T2C12 HRLM (6-24)

ARRL The national association for AMATEUR RADIO

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D. A training program that certifies amateur operators for membership in the Radio Amateur Civil Emergency Service

T2C12 HRLM (6-24)

ARRL The national association for AMATEUR RADIO

Who may be the control operator of a station communicating through an amateur satellite or space station?

A. Only an Amateur Extra Class operator

B. A General Class licensee or higher licensee who has a satellite operator certification

C. Only an Amateur Extra Class operator who is also an AMSAT member

D. Any amateur whose license privileges allow them to transmit on the satellite uplink frequency

FCC Rule: [97.301, 97.207(c)] T8B01 HRLM (6-30)

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FCC Rule: [97.301, 97.207(c)] T8B01 HRLM (6-30)

ARRL The national association for AMATEUR RADIO

How much transmitter power should be used on the uplink frequency of an amateur satellite or space station?

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

FCC Rule: [97.313] T8B02 HRLM (6-31)

ARRL The national association for AMATEUR RADIO

How much transmitter power should be used on the uplink frequency of an amateur satellite or space station?

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FCC Rule: [97.313] T8B02 HRLM (6-31)

ARRL The national association for AMATEUR RADIO

Which of the following are provided by satellite tracking programs?

A. Maps showing the real-time position of the satellite track over the earth

B. The time, azimuth, and elevation of the start, maximum altitude, and end of a pass

C. The apparent frequency of the satellite transmission, including effects of Doppler shift

D. All of these answers are correct

T8B03 HRLM (6-31)

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Which of the following are provided by satellite tracking programs?

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D. All of these answers are correct

T8B03 HRLM (6-31)

Which amateur stations may make contact with an amateur station on the International Space Station using 2 meter and 70 cm band amateur radio frequencies?

A. Only members of amateur radio clubs at NASA facilities

B. Any amateur holding 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

FCC Rule: [97.301, 97.207(c)] T8B04 HRLM (6-30)

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FCC Rule: [97.301, 97.207(c)] T8B04 HRLM (6-30)

ARRL The national association for AMATEUR RADIO

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 transmission from a space station that contains information about a satellite

T8B05 HRLM (6-30)

What is a satellite beacon?

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B. An indicator light that shows where to point your antenna

C. A reflective surface on the satellite

D. A transmission from a space station that contains information about a satellite

T8B05 HRLM (6-30)

Which of the following are inputs to a satellite tracking program?

A. The weight of the satellite

B. The Keplerian elements

C. The last observed time of zero Doppler shift

D. All of these answers are correct

T8B06 HRLM (6-31)

ARRL The national association for AMATEUR RADIO

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B. The Keplerian elements

C. The last observed time of zero Doppler shift

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T8B06 HRLM (6-31)

ARRL The national association for AMATEUR RADIO

With regard to satellite communications, 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. An observed change in signal frequency caused by relative motion between the satellite and the earth station

D. A special digital communications mode for some satellites

T8B07 HRLM (6-30)

ARRL The national association for AMATEUR RADIO

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C. An observed change in signal frequency caused by relative motion between the satellite and the earth station

D. A special digital communications mode for some satellites

T8B07 HRLM (6-30)

ARRL The national association for AMATEUR RADIO

What is meant by the statement that a satellite is operating in mode U/V?

A. The satellite uplink is in the 15 meter band and the downlink is in the 10 meter band

B. The satellite uplink is in the 70 cm band and the downlink is in the 2 meter band

C. The satellite operates using ultraviolet frequencies

D. The satellite frequencies are usually variable

T8B08 HRLM (6-31)

ARRL The national association for AMATEUR RADIO

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D. The satellite frequencies are usually variable

T8B08 HRLM (6-31)

ARRL The national association for AMATEUR RADIO

What causes spin fading when referring to satellite signals?

A. Circular polarized noise interference radiated from the sun

B. Rotation of the satellite and its antennas

C. Doppler shift of the received signal

D. Interfering signals within the satellite uplink band

T8B09 HRLM (6-31)

ARRL The national association for AMATEUR RADIO

What causes spin fading when referring to satellite signals?

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C. Doppler shift of the received signal

D. Interfering signals within the satellite uplink band

T8B09 HRLM (6-31)

ARRL The national association for AMATEUR RADIO

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

T8B10 HRLM (6-30)

ARRL The national association for AMATEUR RADIO

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T8B10 HRLM (6-30)

ARRL The national association for AMATEUR RADIO

What is a commonly used method of sending signals to and from a digital satellite?

A. USB AFSK

B. PSK31

C. FM Packet

D. WSJT

T8B11 HRLM (6-31)

ARRL The national association for AMATEUR RADIO

What is a commonly used method of sending signals to and from a digital satellite?

A. USB AFSK

B. PSK31

C. FM Packet

D. WSJT

T8B11 HRLM (6-31)

ARRL The national association for AMATEUR RADIO

Which of the following methods is used to locate sources of noise interference or jamming?

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

T8C01 HRLM (6-29)

ARRL The national association for AMATEUR RADIO

Which of the following methods is used to locate sources of noise interference or jamming?

A. Echolocation

B. Doppler radar

C. Radio direction finding

D. Phase locking

T8C01 HRLM (6-29)

ARRL The national association for AMATEUR RADIO

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

A. Calibrated SWR meter

B. A directional antenna

C. A calibrated noise bridge

D. All of these choices are correct

T8C02 HRLM (6-29)

ARRL The national association for AMATEUR RADIO

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

A. Calibrated SWR meter

B. A directional antenna

C. A calibrated noise bridge

D. All of these choices are correct

T8C02 HRLM (6-29)

ARRL The national association for AMATEUR RADIO

What popular operating activity 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

T8C03 HRLM (6-28)

ARRL The national association for AMATEUR RADIO

What popular operating activity 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

T8C03 HRLM (6-28)

ARRL The national association for AMATEUR RADIO

Which of the following is good procedure when contacting another station in a radio contest?

A. Be sure to sign only the last two letters of your call if there is a pileup calling the station

B. Work the station twice to be sure that you are in his log

C. Send only the minimum information needed for proper identification and the contest exchange

D. All of these choices are correct

T8C04 HRLM (6-28)

ARRL The national association for AMATEUR RADIO

Which of the following is good procedure when contacting another station in a radio contest?

A. Be sure to sign only the last two letters of your call if there is a pileup calling the station

B. Work the station twice to be sure that you are in his log

C. Send only the minimum information needed for proper identification and the contest exchange

D. All of these choices are correct

T8C04 HRLM (6-28)

ARRL The national association for AMATEUR RADIO

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

FCC Rule: [97.215(c)] T8C07 HRLM (6-33)

ARRL The national association for AMATEUR RADIO

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

FCC Rule: [97.215(c)] T8C07 HRLM (6-33)

ARRL The national association for AMATEUR RADIO

What is required in place of on-air station identification when sending signals 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 name, call sign and address must be affixed to the transmitter

D. A flag must be affixed to the transmitter antenna with the station call sign in 1 inch high letters or larger

FCC Rule: [97.215(a)] T8C08 HRLM (6-33)

ARRL The national association for AMATEUR RADIO

What is required in place of on-air station identification when sending signals 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 name, call sign and address must be affixed to the transmitter

D. A flag must be affixed to the transmitter antenna with the station call sign in 1 inch high letters or larger

FCC Rule: [97.215(a)] T8C08 HRLM (6-33)

ARRL The national association for AMATEUR RADIO

What type of transmission is indicated by the term NTSC?

A. A Normal Transmission mode in Static Circuit

B. A special mode for earth satellite uplink

C. An analog fast scan color TV signal

D. A frame compression scheme for TV signals

T8D04 HRLM (6-32)

ARRL The national association for AMATEUR RADIO

What type of transmission is indicated by the term NTSC?

A. A Normal Transmission mode in Static Circuit

B. A special mode for earth satellite uplink

C. An analog fast scan color TV signal

D. A frame compression scheme for TV signals

T8D04 HRLM (6-32)

ARRL The national association for AMATEUR RADIO