

Technician License Class



Tulsa Amateur Radio Club

Slides by Tom White, K5EHX

Images from ARRL, Wikipedia, Other Sources

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Shoot for 2 hour and 30 minutes presentation time. Provide break every hour, for about ten minutes. Estimating 10 minutes at beginning to handle signins and introductions.

Chapter 4

Communicating with Other Hams

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Chapter 4

4.1 Contact Basics

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The Friendly Radio Service

- Always be ready to lend a helping hand, especially as you learn more.
- If you hear a newly licensed operator that is having trouble with their station, you should contact them and offer to help with the problem.

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T3C07 What should you do if you hear a newly licensed operator that is having trouble with their station? Contact them and offer to help with the problem

Basic Operation

- Amateurs are limited to 1500 watts in most bands and for most modes.
- An amateur must use the minimum transmitter power necessary to carry out the desired communication.
- When circumstances are not specifically covered by FCC rules, good engineering and amateur practices must be applied to amateur station operation.

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T3B07 Which of these statements is true about legal power levels on the amateur bands?

An amateur must use the minimum transmitter power necessary to carry out the desired communication

T3C10 When circumstances are not specifically covered by FCC rules, what general operating standard must be applied to amateur station operation? Good engineering and amateur practices

Prohibited and Unwise

- Indecent and obscene language **prohibited** in the Amateur Service:
 - It is offensive to some individuals.
 - Young children may intercept amateur communications with readily available receiving equipment.
 - Such language is specifically prohibited by FCC Rules.
- Amateur radio operators avoid the use of racial or ethnic slurs when talking to other stations. It is offensive to some people and reflects a poor public image on all amateur radio operators.

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T3C05 Why is indecent and obscene language prohibited in the Amateur Service? Because it is offensive to some individuals; Because young children may intercept amateur communications with readily available receiving equipment; Because such language is specifically prohibited by FCC Rules

T3C06 Why should amateur radio operators avoid the use of racial or ethnic slurs when talking to other stations? It is offensive to some people and reflects a poor public image on all amateur radio operators

Prohibited or not?

- There is no official list of prohibited obscene and indecent words.
- You may be mistakenly told that some subjects are not allowed, but the following are allowed:
 - Political discussions
 - Jokes and stories
 - Religious preferences

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T3C08 Where can an official list be found of prohibited obscene and indecent words that should not be used in amateur radio? There is no official list of prohibited obscene and indecent words

T3C09 What type of subjects are not prohibited communications while using amateur radio? Political discussions; Jokes and stories; Religious preferences

Q Codes

Code	Meaning	Sample use
QRL	Is this frequency busy?	Used almost exclusively with Morse code , usually before transmitting on a new frequency
QRM	Man-made interference	There's another QSO up 2 kHz that's causing a lot of QRM
QRN	Natural interference, e.g. static crashes	The band is noisy today; There's a lot of QRN
QRO	High- or full-power transmission (usually 100 W or more up to licence limit)	I need to QRO when propagation is poor.
QRP	Low-power transmission (usually 5 or 10 W, or less)	I'm using a QRP transmitter here, running only 3 watts
QRT	Stop sending	I've enjoyed talking to you, but I have to QRT for dinner now
QRV	I am ready	Will you be QRV in the upcoming contest?
QRX	Hang on a minute, I'll be right back	Please QRX one
QRZ	Who is calling me?	QRZ? You're very weak. (Only someone who has previously called should reply)
QSL	I Acknowledge receipt	QSL your last transmission. Please QSL via the bureau (i.e. please send me a card confirming this contact).
QSO	A conversation	Thanks very much for the QSO (Morse abbreviation: TNX QSO 73 SK)
QSX	I am listening on ... frequency	I QSX 14200 to 14210 kilohertz
QSY	Shift to transmit on ...	Let's QSY up 5 kilohertz
QTH	Location	My QTH is South Park, Colorado
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Source: Wikipedia



WSIAS

Q Code Questions

- What is the "Q" signal used to indicate that you are receiving interference from other stations?
 - QRM
- What is the "Q" signal used to indicate that you are changing frequency?
 - QSY

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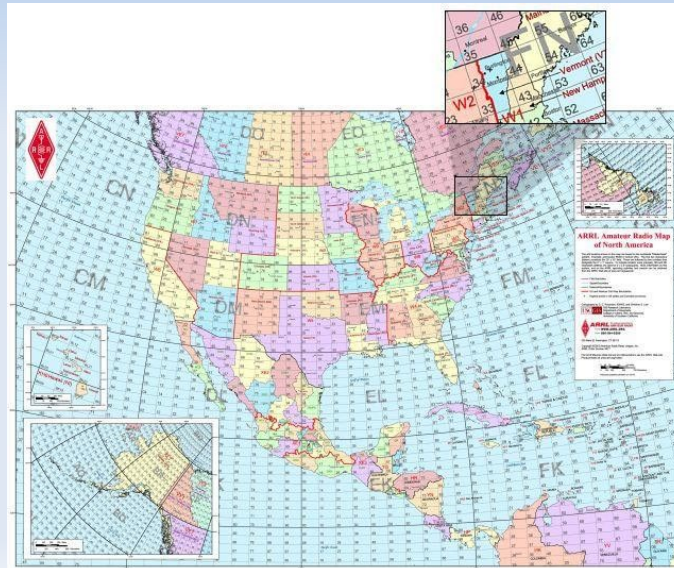


T6C10 What is the "Q" signal used to indicate that you are receiving interference from other stations? QRM

T6C11 What is the "Q" signal used to indicate that you are changing frequency? QSY

Grid Locators

- A grid locator is a letter-number designator assigned to a geographic location.



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T7A09 What is a grid locator? A letter-number designator assigned to a geographic location

Chapter 4

4.2 Band Plans

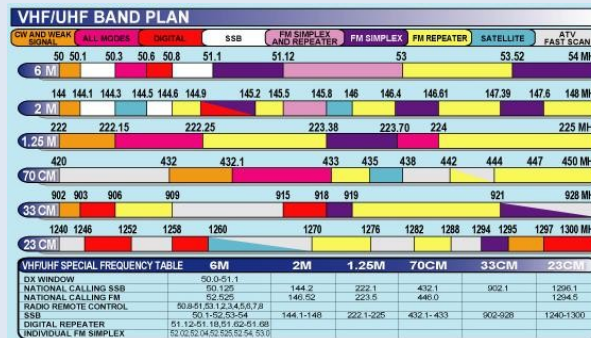
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Band Plans

- A band plan is a voluntary guideline, beyond the FCC rules to more efficiently use available radio spectrum.
- Band plans are developed by the Amateur Radio community.



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- T3B01 What is a band plan? A voluntary guideline, beyond the divisions established by the FCC for using different operating modes within an amateur band
- T3B02 Which of the following statements is true of band plans? They are voluntary guidelines for efficient use of the radio spectrum
- T3B03 Who developed the band plans used by amateur radio operators? The amateur community

Chapter 4

4.3 Making a contact

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Selecting a Frequency

- When selecting a frequency on which to transmit, always listen first to determine if the frequency is busy.
- What happens if two amateur stations want to use the same frequency? No frequency will be assigned for the exclusive use of any station and neither has priority.
- When the FCC has not declared a communication emergency, no station has exclusive use of any frequency.

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T3A01 Which of the following should you do when selecting a frequency on which to transmit? Listen to determine if the frequency is busy

T3C04 What rule applies if two amateur stations want to use the same frequency? No frequency will be assigned for the exclusive use of any station and neither has priority

T3D06 Who has exclusive use of a specific frequency when the FCC has not declared a communication emergency? No station has exclusive use of any frequency

Calling Another Station

- To call another station on a repeater if you know the station's call sign, just say the station's call sign then identify your own station.
- The proper way to break into a conversation between two stations that are using the frequency is to say your call sign between their transmissions.

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T3A02 How do you call another station on a repeater if you know the station's call sign? Say the station's call sign then identify your own station

T3C01 What is the proper way to break into a conversation between two stations that are using the frequency? Say your call sign between their transmissions

CQ

- CQ is short for “I seek you” or “Calling any station”.
- On a repeater, if nobody else is using it, you can just say your callsign.
- To call CQ, say CQ one or more times, then identify.
 - “CQ CQ CQ K5EHX”
- To answer CQ, say the other station's callsign, then your own.
 - “K5EHX AD5PE”

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T3A03 How do you indicate you are looking for any station with which to make contact? CQ followed by your callsign

T3A04 What should you transmit when responding to a call of CQ? The other station's callsign followed by your callsign

T3A08 What is the meaning of the procedural signal "CQ"? Calling any station

T3A10 What brief statement is often used in place of "CQ" to indicate that you are listening for calls on a repeater? Say your call sign

Answering a Station

- Before responding to another stations call, make sure you are operating on a permissible frequency for your license class.
- You can answer a call any way you like:
 - Just say your callsign
 - “This is <callsign>, go ahead.”

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T3C03 What should you do before responding to another stations call? Make sure you are operating on a permissible frequency for your license class

Using a Repeater

- Use a repeater to extend the usable range of mobile and low-power stations.
- Always pause briefly between transmissions to listen for anyone wanting to (or needing to) break in.
- Use simplex when possible to free up the repeater. To find out if you could communicate with a station using simplex instead of a repeater, check the repeater input frequency to see if you can hear the other station
 - Many radios have a button to quickly switch to the input frequency of a repeater, often called “Reverse”.

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T5C01 What is one purpose of a repeater? To extend the usable range of mobile and low-power stations

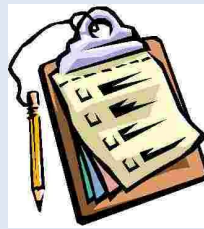
T5C04 Why should you pause briefly between transmissions when using a repeater? To listen for anyone wanting to break in

T5C09 What is a reason to use simplex instead of a repeater? To avoid tying up the repeater when direct contact is possible

T5C10 How might you find out if you could communicate with a station using simplex instead of a repeater? Check the repeater input frequency to see if you can hear the other station

Repeater Coordination

- Repeater frequencies are coordinated by a local frequency coordination group, usually at the state level.
- The frequency coordinator is responsible for the repeater band plan in each area, and cooperating with neighboring coordinators.
- Coordination minimizes interference between repeaters and makes the most efficient use of available frequencies.



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T3B04 Who is in charge of the repeater frequency band plan in your local area? The recognized frequency coordination body

T3B05 What is the main purpose of repeater coordination? To reduce interference and promote proper use of spectrum

T5C12 What is the main reason repeaters should be approved by the local frequency coordinator before being installed? Coordination minimizes interference between repeaters and makes the most efficient use of available frequencies

Staying Legal on the Repeater

- When using a repeater:
 - Monitor before transmitting and keep transmissions short
 - Identify legally
 - Use the minimum amount of transmitter power necessary
- The transmitting station is accountable if a repeater station retransmits communications that violate FCC rules.

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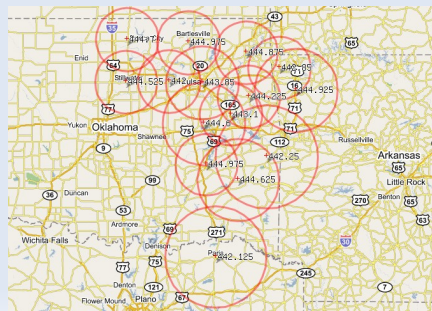


T3B06 Who is accountable if a repeater station inadvertently retransmits communications that violate FCC rules? The transmitting station

T3C02 What is considered to be proper repeater operating practice? Monitor before transmitting and keep transmissions short; Identify legally; Use the minimum amount of transmitter power necessary

Club Repeaters

- Access to any repeater may be limited by the repeater owner.
- A closed repeater is a repeater when use is restricted to the members of a club or group.
- A Linked repeater system is a series of repeaters that can be connected to one another to provide users with a wider coverage.



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T5C13 Which of the following statements regarding use of repeaters is true? Access to any repeater may be limited by the repeater owner

T5C14 What term is used to describe a repeater when use is restricted to the members of a club or group? A closed repeater

T5C11 What is the term for a series of repeaters that can be connected to one another to provide users with a wider coverage? Linked repeater system

Repeater Signal Reports

- When asked for a signal report through a repeater, your S-meter is useless because that's the signal strength of the repeater. Instead, report the quality of the audio signal itself:
 - Dropping: the repeater is losing carrier while the transmitting station is talking.
 - Noisy or scratchy: there is a lot of noise in the signal.
 - Full Quieting: there is no noise in the signal.
- What might be the problem if you receive a report that your signal through the repeater is distorted or weak?
 - Your transmitter may be slightly off frequency
 - Your batteries may be running low
 - You could be in a bad location

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T5D12 What might be the problem if you receive a report that your signal through the repeater is distorted or weak? Your transmitter may be slightly off frequency; Your batteries may be running low; You could be in a bad location

Internet Linked Repeaters (VOIP)

- Repeaters can be linked across the internet using Voice over IP (VOIP). Two examples of this technology are:
 - Echolink
 - IRLP
- To find a list of active nodes using VoIP, try a repeater directory or the Internet website for each protocol.
- If you hear a brief tone and then a station from Russia calling CQ on a 2-meter repeater, you are hearing an Internet linked DX station.

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T6B04 What technology do Echolink and IRLP have in common? Voice over Internet protocol

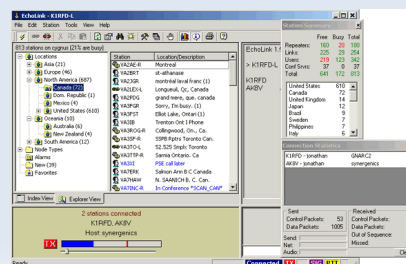
T6B05 What method is used to transfer data by IRLP? Voice over Internet protocol

T6B10 Where might you find a list of active nodes using VoIP? A repeater directory or the Internet

T6B08 What are you listening to if you hear a brief tone and then a station from Russia calling CQ on a 2-meter repeater? An Internet linked DX station

Echolink

- Echolink transmits information between stations using the Internet.
- Any licensed amateur radio operator may use the Echolink system.
- Echolink allows computer-to-radio linking for voice transmission (as opposed to IRLP, which does not).
- For more information, go to <http://www.echolink.org>



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T6B01 How is information transmitted between stations using Echolink? Internet

T6B03 Who may operate on the Echolink system? Any licensed amateur radio operator

T6B07 Which one of the following allows computer-to-radio linking for voice transmission? EchoLink

IRLP

- IRLP stands for Internet Radio Linking Project.
- IRLP is a method of linking two or more amateur stations using the Internet.
- When using a portable transceiver use the keypad to transmit the IRLP node numbers to select a specific IRLP node.
- For more information, go to <http://www.irlp.net>



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T6B02 What does the abbreviation IRLP mean?
Internet Radio Linking Project

T6B06 What does the term IRLP describe? A
method of linking between two or more
amateur stations using the Internet

T6B11 When using a portable transceiver how
do you select a specific IRLP node? Use the
keypad to transmit the IRLP node numbers

Morse Code

- One practical reason for being able to copy CW when using repeaters is to recognize a repeater ID sent in Morse code.
- When sending morse code, only use a speed at which you can reliably receive.



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T6C08 What sending speed is recommended when using Morse code? Any speed at which you can reliably receive

T6C09 What is a practical reason for being able to copy CW when using repeaters? To recognize a repeater ID sent in Morse code

Chapter 4

4.4 Nets

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Net Control

- One of the most important attributes for a net control station is a strong and clear signal.
- The Net Control Station must be alert for emergency traffic (messages). He or she must immediately stop all net activity until the emergency (or emergencies!) has been handled.
- If a large scale emergency has just occurred and no net control station is available, open the emergency net immediately and ask for check-ins. You can pass control to someone else later.

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T8C06 What is of primary importance for a net control station? A strong and clear signal

T8C07 What should the net control station do if someone breaks in with emergency traffic? Stop all net activity until the emergency has been handled

T8C08 What should you do if a large scale emergency has just occurred and no net control station is available? Open the emergency net immediately and ask for check-ins

Emergency Nets

- Traffic nets rate traffic by priority:
 - Emergency
 - Priority
 - Regular
 - Health and Welfare
- Once you have checked in to an emergency traffic net, do not transmit on the net frequency until asked to do so by the net control station to minimize disruptions.
- The name of the person originating the message must always be included when passing emergency messages.



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T8C01 Which type of traffic has the highest priority? Emergency traffic

T8C03 What should you do to minimize disruptions to an emergency traffic net once you have checked in? Do not transmit on the net frequency until asked to do so by the net control station

T8C04 What is one thing that must be included when passing emergency messages? The name of the person originating the message

Chapter 4

4.5 Emergency Operating

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Nets

- Amateur Radio nets are a way for many amateurs to use the same frequency for some purpose.
- The net is under the absolute control of one station, called the “Net Control Station”.
- The NCS has many responsibilities:
 - Ensure that messages are handled in a timely manner.
 - Ensure that important messages get handled first.
 - Coordinate many other radio operators in an efficient way.

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Emergency Operating Pre-planning Equipment

- One or more fully charged spare battery packs is a good thing to have when operating a hand-held transceiver away from home.
- A combination headset and microphone would be a good thing to have when operating from a location that includes lots of crowd noise.
- Which of these items would be useful in an emergency response kit?
 - An external antenna and several feet of connecting cable
 - A 1500 watt output linear amplifier
 - A cable and clips for connecting your transceiver to an external battery

21/08/06 A listing of repeater frequencies and nets in your area



More Emergency Equipment

- The following can be used as an alternate source of power to operate radio equipment during emergencies:
 - The battery in a car or truck
 - A bicycle generator
 - A portable solar panel
- One way to recharge a 12-volt battery if the commercial power is out is to connect the battery to a car's battery and run the engine.

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T8B07 What could be used as an alternate source of power to operate radio equipment during emergencies? The battery in a car or truck; A bicycle generator; A portable solar panel

T0A09 What is one way to recharge a 12-volt battery if the commercial power is out? Connect the battery to a car's battery and run the engine

Be prepared!

- Be prepared for an emergency situation!
 - Check at least twice a year to make sure you have all of your emergency response equipment and know where it is
 - Make sure you have a way to run your equipment if there is a power failure in your area
 - Participate in drills that test your ability to set up and operate in the field

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T8B01 What can you do to be prepared for an emergency situation where your assistance might be needed? Check at least twice a year to make sure you have all of your emergency response equipment and know where it is; Make sure you have a way to run your equipment if there is a power failure in your area; Participate in drills that test your ability to set up and operate in the field

Making an Emergency Call

- Use cell phones or telephones first.
- An emergency is an immediate threat to human life or to property.
- To make an emergency call say "Mayday, Mayday, Mayday" followed by "any station come in please" and identify your station .
- In a genuine emergency you can use non-amateur frequencies or equipment to call for help - if you have no other means of communication available.
- Another way to call for help is to transmit "SOS" in morse code.

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T8B08 When can you use non-amateur frequencies or equipment to call for help in a situation involving immediate danger to life or property? In a genuine emergency you may use any means at your disposal to call for help on any frequency

T8B02 When may you use your amateur station to transmit a "SOS" or "MAYDAY" signal? When there is immediate threat to human life or property

T8A09 What is an appropriate way to initiate an emergency call on amateur radio? Say "Mayday, Mayday, Mayday" followed by "any station come in please" and identify your station

Emergency means Emergency

- The penalties for making a false emergency call can include any or all of the following:
 - You could have your license revoked.
 - You could be fined a large sum of money.
 - You could be sent to prison.

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T8A10 What are the penalties for making a false emergency call? You could have your license revoked; You could be fined a large sum of money; You could be sent to prison

Communicating with Other Services

- Amateur stations may only communicate with stations operating in other radio services when specially authorized by the FCC, or in an actual emergency.
- For example, when could you use a modified amateur radio transceiver to transmit on the local fire department frequency?
 - In a genuine emergency you may use any means at your disposal to call for help on any frequency

T8A02 Under what conditions are amateur stations allowed to communicate with stations operating in other radio services? When specially authorized by the FCC, or in an actual emergency

T8B11 When can you use a modified amateur radio transceiver to transmit on the local fire department frequency? In a genuine emergency you may use any means at your disposal to call for help on any frequency

Receiving an Emergency Call

- If you are in contact with another station and an emergency call is heard Stop your contact immediately and take the emergency call
- If you hear someone reporting an emergency on the air, always assume the emergency is real and act accordingly.
- Emergency communications has priority at all times in the Amateur Radio Service.
- Priority must be given to stations providing emergency communications at all times and on all frequencies.

T8A03 What should you do if you are in contact with another station and an emergency call is heard? Stop your contact immediately and take the emergency call

T8A08 What should you do if you hear someone reporting an emergency? Assume the emergency is real and act accordingly

T8A11 What type of communications has priority at all times in the Amateur Radio Service? Emergency communications

T8A12 When must priority be given to stations providing emergency communications? At all times and on all frequencies

FCC Declared Communication Emergency

- An FCC declared of a temporary state of communication emergency will include any special conditions and rules to be observed during the emergency.
- If the FCC has declares restrictions on amateur radio communications , amateurs must avoid those frequencies dedicated to supporting the emergency unless you are participating in the relief effort.
- An FCC declaration of a communications emergency is legally required to restrict a frequency to emergency-only communication.
- No station has exclusive use of a frequency if the FCC has not declared a communication emergency.

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T8A01 What information is included in an FCC declaration of a temporary state of communication emergency? Any special conditions and rules to be observed during the emergency

T8A04 What are the restrictions on amateur radio communications after the FCC has declared a communications emergency? You must avoid those frequencies dedicated to supporting the emergency unless you are participating in the relief effort

T8A06 What is legally required to restrict a frequency to emergency-only communication? An FCC declaration of a communications emergency

T8A07 Who has the exclusive use of a frequency if the FCC has not declared a communication emergency? No station has exclusive use in this circumstance

Public Service Events and Emergency Operation

- Casual conversation between stations during a public service event should be avoided because idle chatter may interfere with important traffic.
- The FCC prohibits using your amateur radio transceiver to make a news report.
- Using tactical call signs such as "command post" or "weather center" helps coordinate public-service communications and is more efficient during an emergency.
- FCC rules always apply to your station when using amateur radio at the request of public service officials or at the scene of an emergency.

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T8B09 Why should casual conversation between stations during a public service event be avoided? Idle chatter may interfere with important traffic

T8B10 What should you do if a reporter asks to use your amateur radio transceiver to make a news report? Advise them that the FCC prohibits such use

T8A05 What is one reason for using tactical call signs such as "command post" or "weather center" during an emergency? They are more efficient and help coordinate public-service communications

T3D09 What rules apply to your station when using amateur radio at the request of public service officials or at the scene of an emergency? FCC

ARES and RACES

- ARES
 - Amateur Radio Emergency Service.
 - Is an organization of amateur radio operators.
- RACES
 - Radio Amateur Civil Emergency Service.
 - Is coordinated and managed by civil emergency authorities.
- Both organizations provide communications during emergencies.

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T3D10 What do RACES and ARES have in common? Both organizations provide communications during emergencies

ARES

- You must have an amateur radio license before you can join an ARES group.
- The primary function of ARES in relation to emergency activities is to support agencies like:
 - The Red Cross
 - Salvation Army
 - National Weather Service
 - Others



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T8B04 What is the primary function of ARES in relation to emergency activities? ARES supports agencies like the Red Cross, Salvation Army, and National Weather Service

T8B06 What is necessary before you can join an ARES group? You must have an amateur radio license

RACES

- You register with the responsible civil defense organization before you can participate in RACES activities.
- RACES organizations are restricted to serving local, state, and federal government emergency management agencies

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T8B05 What organization must you register with before you can participate in RACES activities? The responsible civil defense organization

T8B03 What is the primary function of RACES in relation to emergency activities? RACES organizations are restricted to serving local, state, and federal government emergency management agencies

Sensitive Traffic

- Personal information concerning victims should not be transmitted over amateur radio frequencies during emergencies.
- One way to reduce the chances of casual listeners overhearing sensitive emergency traffic is to pass messages using a non-voice mode such as packet radio or Morse code.

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T8C02 What type of messages should not be transmitted over amateur radio frequencies during emergencies? Personal information concerning victims

T8C05 What is one way to reduce the chances of casual listeners overhearing sensitive emergency traffic? Pass messages using a non-voice mode such as packet radio or Morse code

Chapter 4

4.6 Special Modes and Techniques

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Digital Communications

- Many digital systems can automatically correct errors caused by noise and interference.
- Packet Radio is a digital communications method that works similar to a phone modem.
- PSK31 (Phase Shift Keying) is a low-rate data transmission mode that works well in noisy conditions.

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T5D13 What is one of the reasons to use digital signals instead of analog signals to communicate with another station? Many digital systems can automatically correct errors caused by noise and interference

T6C01 Which of the following is an example of a digital communications method? Packet radio

T6C06 What does the abbreviation PSK mean? Phase Shift Keying

T6C07 What is PSK31? A low-rate data transmission mode that works well in noisy conditions

Amateur Television

- There are two types of “television” used in amateur radio:
 - SSTV - Slow Scan Television takes several minutes to send one frame.
 - ATV - Amateur television, also known as fast-scan TV or NTSC. ATV takes about 6 Mhz of bandwidth for combined audio and video signals.

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T6A11 What is the normal bandwidth required for a conventional fast-scan TV transmission using combined video and audio on the 70-centimeter band? About 6 MHz

T6C04 What type of transmission is indicated by the term NTSC? A standard fast scan color television signal

Fox Hunting

- Fox hunting practices the skill of finding a hidden transmitter.
- Directional antennas are very useful for radio direction finding (RDF)
- You can often do direction finding using your own body as a shield.

T7A06 Which of these items would be the most useful for a hidden transmitter hunt? A directional antenna

Special Event Callsigns

- A special event station is a temporary station that operates in conjunction with an activity of special significance
- Example W6F
 - TARC Route 66 On the Air Event, September 2006
 - California State Fair, August 2006

T7A10 What is a special event station? A temporary station that operates in conjunction with an activity of special significance

Telecommand

- Telecommand is using Amateur Radio frequencies to control model craft or space stations.
- The maximum power allowed when transmitting telecommand signals to radio controlled models is 1 watt.
- A label indicating the licensee's call sign and address must be affixed to the transmitter when sending commands to a radio control model using amateur frequencies.



T7A11 What is the maximum power allowed when transmitting telecommand signals to radio controlled models? 1 watt

T7A12 What is the station identification requirement when sending commands to a radio control model using amateur frequencies? A label indicating the licensee's call sign and address must be affixed to the transmitter

Satellite Basics

- Using amateur satellites you can talk to amateur radio operators in other countries.
- Any amateur whose license allows them to transmit on the satellite uplink frequency can use a satellite.
- Don't forget to always use the minimum amount of power needed to complete the contact to a satellite.
- AMSAT is the group that coordinates the building and/or launch of most amateur radio satellites (amsat.org).



T7B01 What class of license is required to use amateur satellites? Any amateur whose license allows them to transmit on the satellite uplink frequency

T7B02 How much power should you use to transmit when using an amateur satellite? The minimum amount of power needed to complete the contact

T7B03 What is something you can do when using an amateur radio satellite? Talk to amateur radio operators in other countries

T7B08 What is the name of the group that coordinates the building and/or launch of the largest number of amateur radio satellites? AMSAT

Satellite Details

- A satellite tracking program can help you to determine when you can access an amateur satellite.
- Doppler shift is change in signal frequency caused by motion through space. You have to change frequencies during the pass!
- Satellite beacons are signals that contain information about satellites.
- Satellite communications are permitted in a portion of a band called a satellite “sub band”.
 - The satellite sub-band on 70-CM is 435 to 438 MHz.
- “LEO” means the satellite is in a Low Earth Orbit.

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T7B07 What is Doppler shift? A change in signal frequency caused by motion through space

T7B05 What is a satellite beacon? A signal that contains information about a satellite

T7B06 What should you use to determine when you can access an amateur satellite? A satellite tracking program

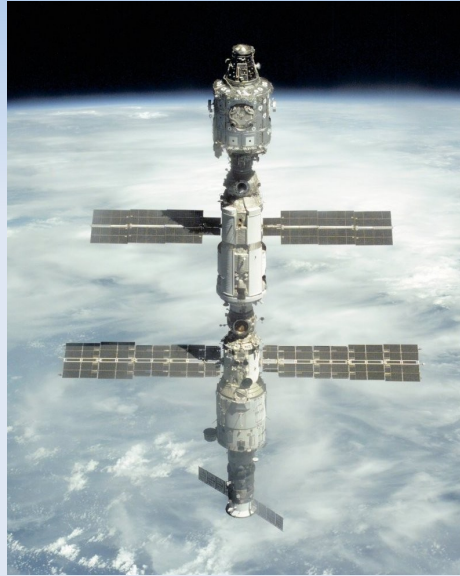
T7B09 What is a satellite sub-band? A portion of a band where satellite operations are permitted

T7B10 What is the satellite sub-band on 70-CM? 435 to 438 MHz

T7B11 What do the initials LEO tell you about an amateur satellite? The satellite is in a Low Earth Orbit

Talking to the Space Station

- Many astronauts are also hams, and there is an amateur radio station on the International Space Station.
- Any amateur with a Technician or higher class license may make contact with an astronaut on the International Space Station using amateur radio frequencies.



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T7B04 Who may make contact with an astronaut on the International Space Station using amateur radio frequencies? Any amateur with a Technician or higher class license

Chapter 4

The End