

Amateur Radio License Class

Operating Station Equipment

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Operating Station Equipment

Modulation

- ◆ Modulation is the process of adding information to a radio signal
- ◆ The unmodulated signal is the *carrier*
- ◆ The carrier frequency is the frequency referred to when naming a frequency (e.g. 146.52 MHz)
- ◆ Modulation gives a frequency width

Operating Station Equipment

Modulation

- ◆ Amateur operators are allowed to select any available frequency, with a few limitations
- ◆ Amateur operators are also allowed to use several different modes for modulating a signal

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Modulation

- ◆ We can put different kinds of information in a signal
 - Voice (called phone)
 - Morse code (CW – Continuous wave)
 - Digital modes
 - ◆ FSK
 - ◆ Packet
 - ◆ SSTV
 - ◆ ATV

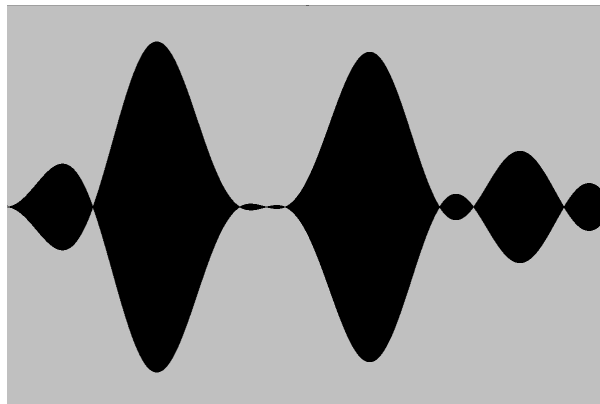
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Modulation

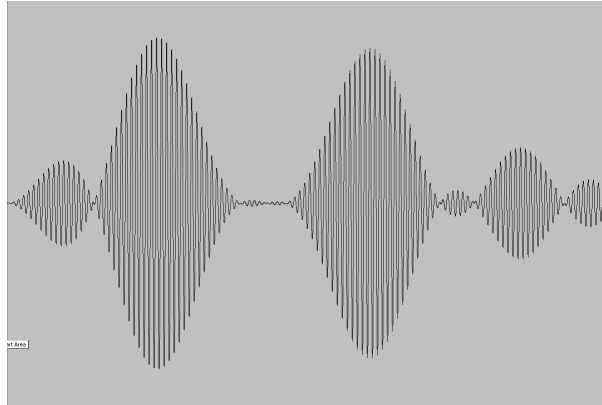
- ◆ We can use different methods to put information on a signal
 - AM – Amplitude modulation
 - FM – Frequency modulation
 - SSB – Single sideband

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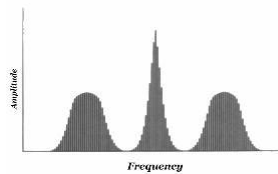
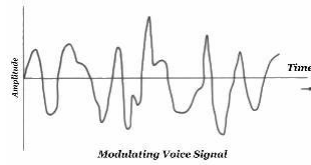
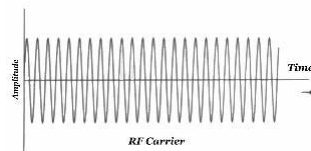
Modulation



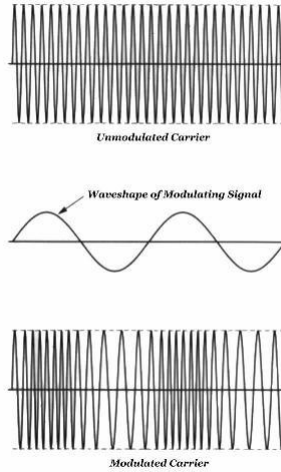
Operating Station Equipment Modulation



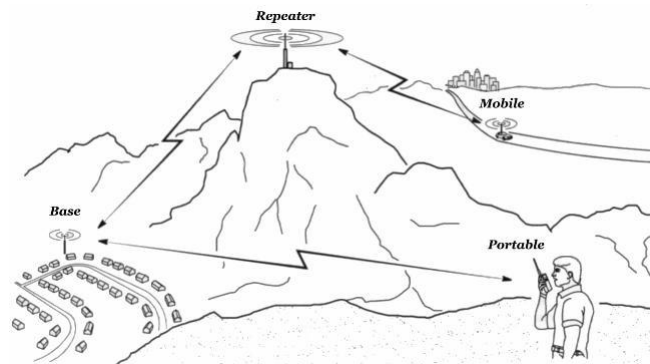
Operating Station Equipment Modulation



Operating Station Equipment Modulation



Operating Station Equipment Repeater operation



Amateur Radio License Class

Operating Station Equipment

Exam Questions

What does a microphone connect to in a basic amateur station?

- A. The receiver
- B. The transmitter*
- C. The SWR Bridge
- D. The Balun

T4A02

Which piece of station equipment converts electrical signals to sound waves?

- A. Frequency coordinator
- B. Frequency discriminator
- C. *Speaker*
- D. Microphone

T5A02

What is the term used to describe what happens when a microphone and speaker are too close to each other?

- A. Excessive wind noise
- B. *Audio feedback*
- C. Inverted signal patterns
- D. Poor electrical grounding

T5A03

What could you use in place of a regular speaker to help you copy signals in a noisy area?

- A. A video display
- B. A low pass filter
- C. A set of headphones*
- D. A boom microphone

T5A04

What is a good reason for using a regulated power supply for communications equipment?

- A. To protect equipment from voltage fluctuations*
- B. A regulated power supply has FCC approval
- C. A fuse or circuit breaker regulates the power
- D. Regulated supplies are less expensive

T5A05

Where must a station filter be installed to reduce spurious emissions?

- A. *At the transmitter*
- B. At the receiver
- C. At the station power supply
- D. At the microphone

T5A06

What type of filter should be connected to a TV receiver as the first step in trying to prevent RF overload from a nearby 2-meter transmitter?

- A. Low-pass filter
- B. High-pass filter
- C. Band pass filter
- D. *Notch filter*

T5A07

What is connected between the transceiver and computer terminal in a packet radio station?

- A. Transmatch
- B. Mixer
- C. Terminal Node Controller*
- D. Antenna

T5A08

Which of these items is not required for a packet radio station?

- A. Antenna
- B. Transceiver
- C. Power source
- D. Microphone*

T5A09

What can be used to connect a radio with a computer for data transmission?

- A. Balun
- B. *Sound card*
- C. Impedance matcher
- D. Autopatch

T5A10

What may happen if a transmitter is operated with the microphone gain set too high?

- A. The output power will be too high
- B. *It may cause the signal to become distorted and unreadable*
- C. The frequency will vary
- D. The SWR will increase

T5B01

What kind of information may a VHF/UHF transceiver be capable of storing in memory?

- A. Transmit and receive operating frequency
- B. CTCSS tone frequency
- C. Transmit power level
- D. All of these answers are correct*

T5B02

What is one way to select a frequency on which to operate?

- A. Use the keypad or VFO knob to enter the correct frequency*
- B. Turn on the CTCSS encoder
- C. Adjust the power supply ripple frequency
- D. All of these answers are correct

T5B03

What is the purpose of the squelch control on a transceiver?

- A. It is used to set the highest level of volume desired
- B. It is used to set the transmitter power level
- C. It is used to adjust the antenna polarization
- D. *It is used to quiet noise when no signal is being received*

T5B04

What is a way to enable quick access to a favorite frequency on your transceiver?

- A. Enable the CTCSS tones
- B. *Store the frequency in a memory channel*
- C. Disable the CTCSS tones
- D. Use the scan mode to select the desired frequency

T5B05

What might you do to improve the situation if the station you are listening to is hard to copy because of ignition noise interference?

- A. Increase your transmitter power
- B. Decrease the squelch setting
- C. *Turn on the noise blanker*
- D. Use the RIT control

T5B06

What is the purpose of the buttons labeled “up” and “down” on many microphones?

- A. *To allow easy frequency or memory selection*
- B. To raise or lower the internal antenna
- C. To set the battery charge rate
- D. To upload or download messages

T5B07

What is the purpose of the “shift” control found on many VHF/UHF transceivers?

- A. Adjust transmitter power level
- B. Change bands
- C. *Adjust the offset between transmit and receive frequency*
- D. Change modes

T5B08

What does RIT mean?

- A. Receiver Input Tone
- B. *Receiver Incremental Tuning*
- C. Rectifier Inverter Test
- D. Remote Input Transmitter

T5B09

What is the purpose of the “step” menu function found on many transceivers?

- A. It adjusts the transmitter power output level
- B. It adjusts the modulation level
- C. It sets the earphone volume
- D. It sets the tuning rate when changing frequencies*

T5B10

What is the purpose of the “function” or “F” key found on many transceivers?

- A. It turns the power on and off
- B. It selects the autopatch access code
- C. It selects an alternate action for some control buttons*
- D. It controls access to the memory scrambler

T5B11

What is one purpose of a repeater?

- A. To cut your power bill by using someone else's higher power system
- B. *To extend the usable range of mobile and low-power stations*
- C. To transmit signals for observing propagation and reception
- D. To communicate with stations in services other than amateur

T5C01

What is a courtesy tone?

- A. A tone used to identify the repeater
- B. *A tone used to indicate when a transmission is complete*
- C. A tone used to indicate that a message is waiting for someone
- D. A tone used to activate a receiver in case of severe weather

T5C03

Why should you pause briefly between transmissions when using a repeater?

- A. To let your radio cool off
- B. To reach for pencil and paper so you can take notes
- C. *To listen for anyone wanting to break in*
- D. To dial up the repeater's autopatch

T5C04

What is the most common input/output frequency offset for repeaters in the 2-meter band?

- A. *0.6 MHz*
- B. 1.0 MHz
- C. 1.6 MHz
- D. 5.0 MHz

T5C05

What is the most common input/output frequency offset for repeaters in the 70-centimeter band?

- A. 600 kHz
- B. 1.0 MHz
- C. 1.6 MHz
- D. 5.0 MHz

T5C06

What is meant by the terms input and output frequency when referring to repeater operations?

- A. *The repeater receives on one frequency and transmits on another*
- B. The repeater offers a choice of operating frequencies
- C. One frequency is used to control the repeater and another is used to retransmit received signals
- D. The repeater must receive an access code on one frequency before it will begin transmitting

T5C07

What is the meaning of the term simplex operations?

- A. *Transmitting and receiving on the same frequency*
- B. Transmitting and receiving over a wide area
- C. Transmitting on one frequency and receiving on another
- D. Transmitting one-way communications

T5C08

What is meant by fundamental overload in reference to a receiver?

- A. Too much voltage from the power supply
- B. Too much current from the power supply
- C. *Interference caused by very strong signals from a nearby source*
- D. Interference caused by turning the volume up too high

T5D01

Which of the following is NOT a cause of radio frequency interference?

- A. Fundamental overload
- B. Doppler shift*
- C. Spurious emissions
- D. Harmonics

T5D02

What is the most likely cause of telephone interference from a nearby transmitter?

- A. Harmonics from the transmitter
- B. The transmitter's signals are causing the telephone to act like a radio receiver*
- C. Poor station grounding
- D. Improper transmitter adjustment

T5D03

What is a logical first step when attempting to cure a radio frequency interference problem in a nearby telephone?

- A. Install a low-pass filter at the transmitter
- B. Install a high-pass filter at the transmitter
- C. *Install an RF filter at the telephone*
- D. Improve station grounding

T5D04

What should you do first if someone tells you that your transmissions are interfering with their TV reception?

- A. *Make sure that your station is operating properly and that it does not cause interference to your own television*
- B. Immediately turn off your transmitter and contact the nearest FCC office for assistance
- C. Tell them that your license gives you the right to transmit and nothing can be done to reduce the interference
- D. Continue operating normally because your equipment cannot possibly cause any interference

T5D05

Which of the following may be useful in correcting a radio frequency interference problem?

- A. Snap-on ferrite chokes
- B. Low-pass and high-pass filters
- C. Notch and band-pass filters
- D. All of these answers are correct*

T5D07

What is the proper course of action to take when a neighbor reports that your radio signals are interfering with something in his home?

- A. You are not required to do anything
- B. Contact the FCC to see if other interference reports have been filed
- C. Check your station and make sure it meets the standards of good amateur practice*
- D. Change your antenna polarization from horizontal to vertical

T5D08

What should you do if a “Part 15” device in your neighbor’s home is causing harmful interference to your amateur station?

- A. Work with your neighbor to identify the offending device
- B. Politely inform your neighbor about the rules that require him to stop using the device if it causes interference
- C. Check your station and make sure it meets the standards of good amateur practice
- D. *All of these answers are correct*

T5D09

What could be happening if another operator tells you he is hearing a variable high-pitched whine on the signals from your mobile transmitter?

- A. Your microphone is picking up noise from an open window
- B. You have the volume on your receiver set too high
- C. You need to adjust your squelch control
- D. *The power wiring for your radio is picking up noise from the vehicle’s electrical system*

T5D10

What may be the problem if another operator reports that your SSB signal is very garbled and breaks up?

- A. You have the noise limiter turned on
- B. The transmitter is too hot and needs to cool off
- C. *RF energy may be getting into the microphone circuit and causing feedback*
- D. You are operating on lower sideband

T5D11

What are phone transmissions?

- A. The use of telephones to set up an amateur radio contact
- B. A phone patch between amateur radio and the telephone system
- C. *Voice transmissions by radio*
- D. Placing the telephone handset near a radio transceiver's microphone and speaker to relay a telephone call

T6A01

Which of the following is a form of amplitude modulation?

- A. Frequency modulation
- B. Phase modulation
- C. *Single sideband*
- D. Phase shift keying

T6A02

What is the name of an amateur radio station that is used to connect other amateur stations to the Internet?

- A. *A gateway*
- B. A repeater
- C. A digipeater
- D. A beacon station

T6A03

What type of voice modulation is most often used for long distance and weak signal contacts on the VHF and UHF bands?

- A. FM
- B. AM
- C. *SSB*
- D. PM

T6A04

What type of modulation is most often used for VHF and UHF voice repeaters?

- A. AM
- B. SSB
- C. PSK
- D. *FM*

T6A05

Which emission type has the narrowest bandwidth?

- A. FM voice
- B. SSB voice
- C. *CW*
- D. Slow-scan TV

T6A06

Which sideband is most often used for VHF and UHF SSB communications?

- A. *Upper sideband*
- B. Lower sideband
- C. Suppressed sideband
- D. Inverted sideband

T6A07

What is the primary advantage of single sideband over FM for voice transmissions?

- A. SSB signals are easier to tune in than FM signals
- B. SSB signals are less likely to be bothered by noise interference than FM signals
- C. *SSB signals use much less bandwidth than FM signals*
- D. SSB signals have no advantages at all in comparison to other modes

T6A08

What is the approximate bandwidth of a single-sideband voice signal?

- A. 1 kHz
- B. 2 kHz
- C. Between 3 and 6 kHz
- D. *Between 2 and 3 kHz*

T6A09

What is the approximate bandwidth of a frequency-modulated voice signal?

- A. Less than 500 Hz
- B. About 150 kHz
- C. *Between 5 and 15 kHz*
- D. More than 30 kHz

T6A10