Amateur Radio Technician License Training

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Mendocino Auxiliary Communications Service (MACS)
Office of Emergency Services

Mendocino County Amateur Radio Communications Service (McARCS)

Willits Amateur Radio Society (WARS)

Adventist Health

Public Health of Mendocino County

Long Valley Health Center

Topics on Exam

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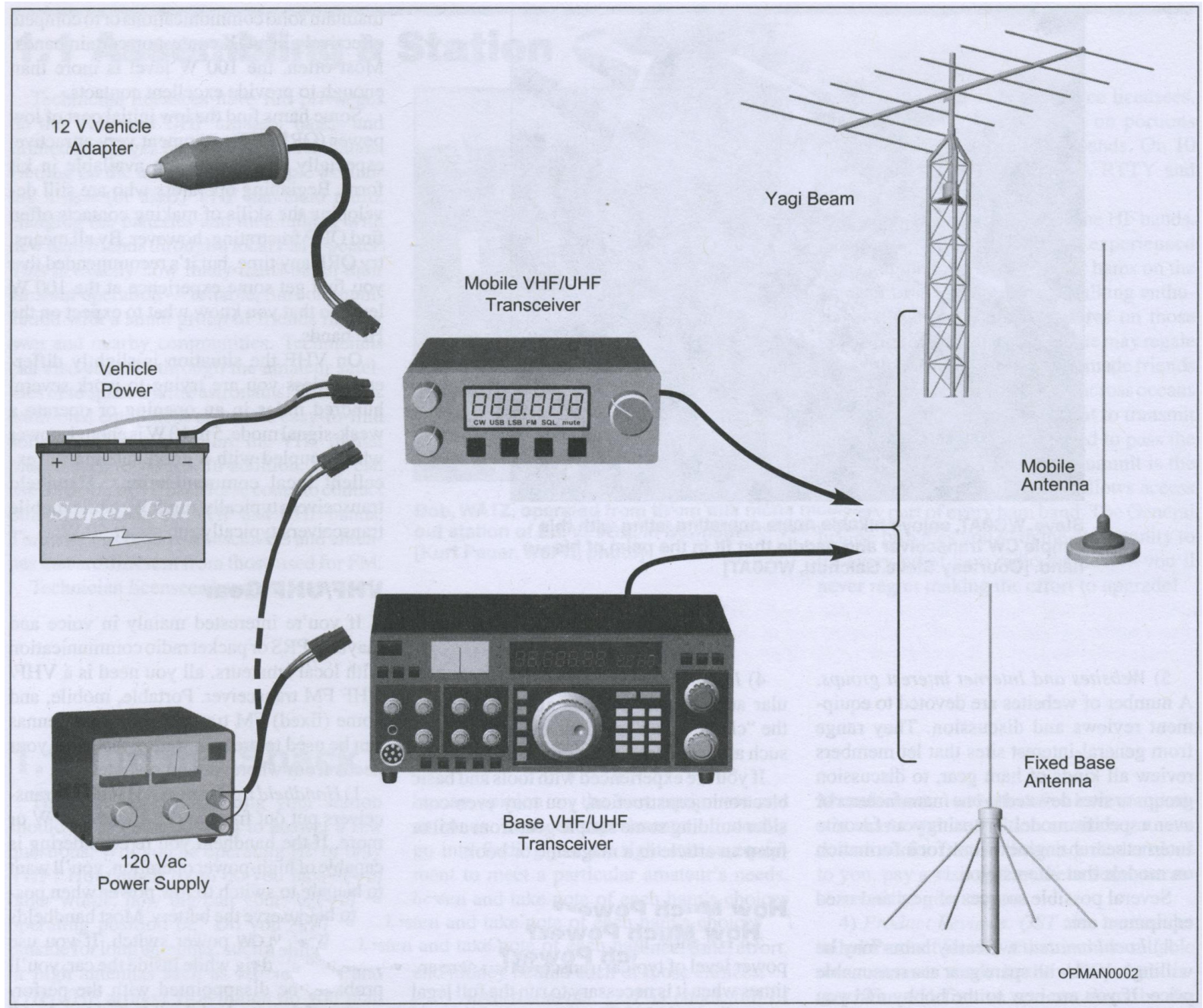
SUB-ELEMENT T4

Amateur Practices

Presented by
Michael Carroll KM6OTE


12 V Vehicle
Adapter
Vehicle
Power
Super Cell
Mobile VHF/UHF
Transceiver
888.888
CW USB LSB FM SQL mute
Yagi Beam
Mobile
Antenna
Base VHF/UHF
Transceiver
120 Vac
Power Supply
Fixed Base
Antenna
OPMAN0002

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T4A05

Where should an RF power meter be installed?

A. In the feed line, between the transmitter and antenna

B. At the power supply output

C. In parallel with the push-to-talk line and the antenna

D. In the power supply cable, as close as possible to the radio

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T4A02
Which of the following should be considered when selecting an accessory SWR meter?
A. The frequency and power level at which the measurements will be made
B. The distance that the meter will be located from the antenna
C. The types of modulation being used at the station
D. All these choices are correct

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Power Supply Unit

- Minimum Current Requirement (Amperage)
  - Efficiency of the transmitter at full power output
  - Receiver and control circuit power
  - Power supply regulation and heat dissipation
- Switching – Smaller form factor, but could create RFI
- Linear – Large, heavy, and warm, but quiet!
- Use heavy-gauge wire with short runs (length) – Voltage Drop
  - Ground with flat strap – lowest impedance to RF

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T4A01
Which of the following is an appropriate power supply rating for a typical 50 watt output mobile FM transceiver?
A. 24.0 volts at 4 amperes
B. 13.8 volts at 4 amperes
C. 24.0 volts at 12 amperes
D. 13.8 volts at 12 amperes

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T4A09
How can you determine the length of time that equipment can be powered from a battery?
A. Divide the watt-hour rating of the battery by the peak power consumption of the equipment
B. Divide the battery ampere-hour rating by the average current draw of the equipment
C. Multiply the watts per hour consumed by the equipment by the battery power rating
D. Multiply the square of the current rating of the battery by the input resistance of the equipment

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T4A03

Why are short, heavy-gauge wires used for a transceiver’s DC power connection?

A. To minimize voltage drop when transmitting

B. To provide a good counterpoise for the antenna

C. To avoid RF interference

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T4A08
Which of the following conductors is preferred for bonding at RF?
A. Copper braid removed from coaxial cable
B. Steel wire
C. Twisted-pair cable
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T4A11
Where should the negative power return of a mobile transceiver be connected in a vehicle?
A. At the 12 volt battery chassis ground
B. At the antenna mount
C. To any metal part of the vehicle
D. Through the transceiver’s mounting bracket

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T4A12

What is an electronic keyer?

A. A device for switching antennas from transmit to receive

B. A device for voice activated switching from receive to transmit

C. A device that assists in manual sending of Morse code

D. An interlock to prevent unauthorized use of a radio

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What is an electronic keyer?

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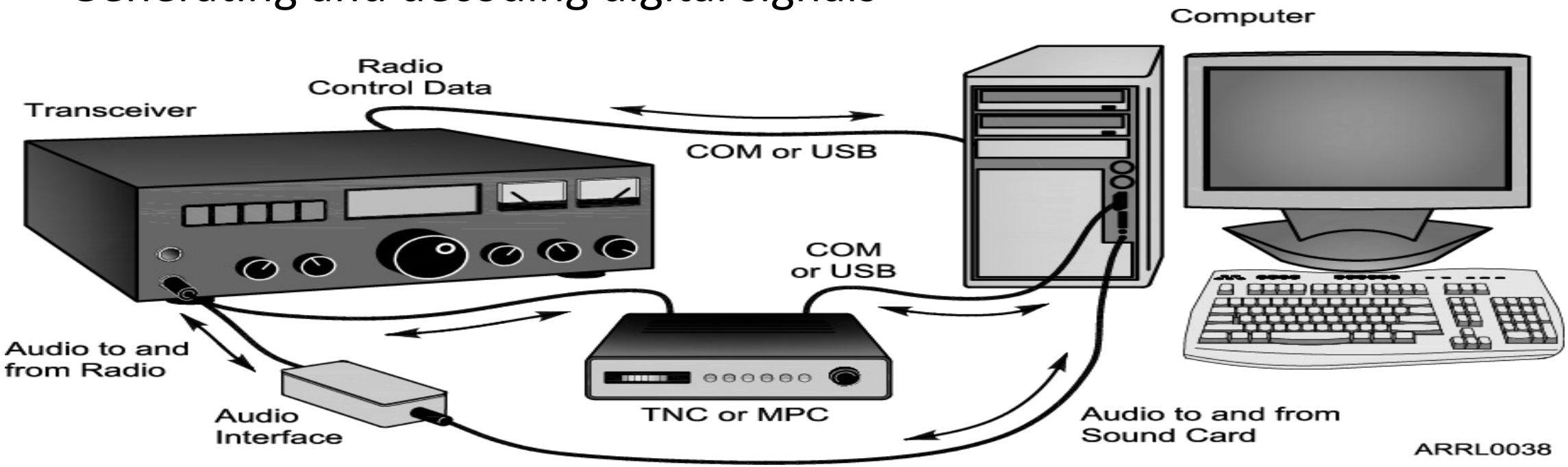
Computer and Digital Operations

- Logging contacts and information
- Sending and/or receiving CW
- Generating and decoding digital signals



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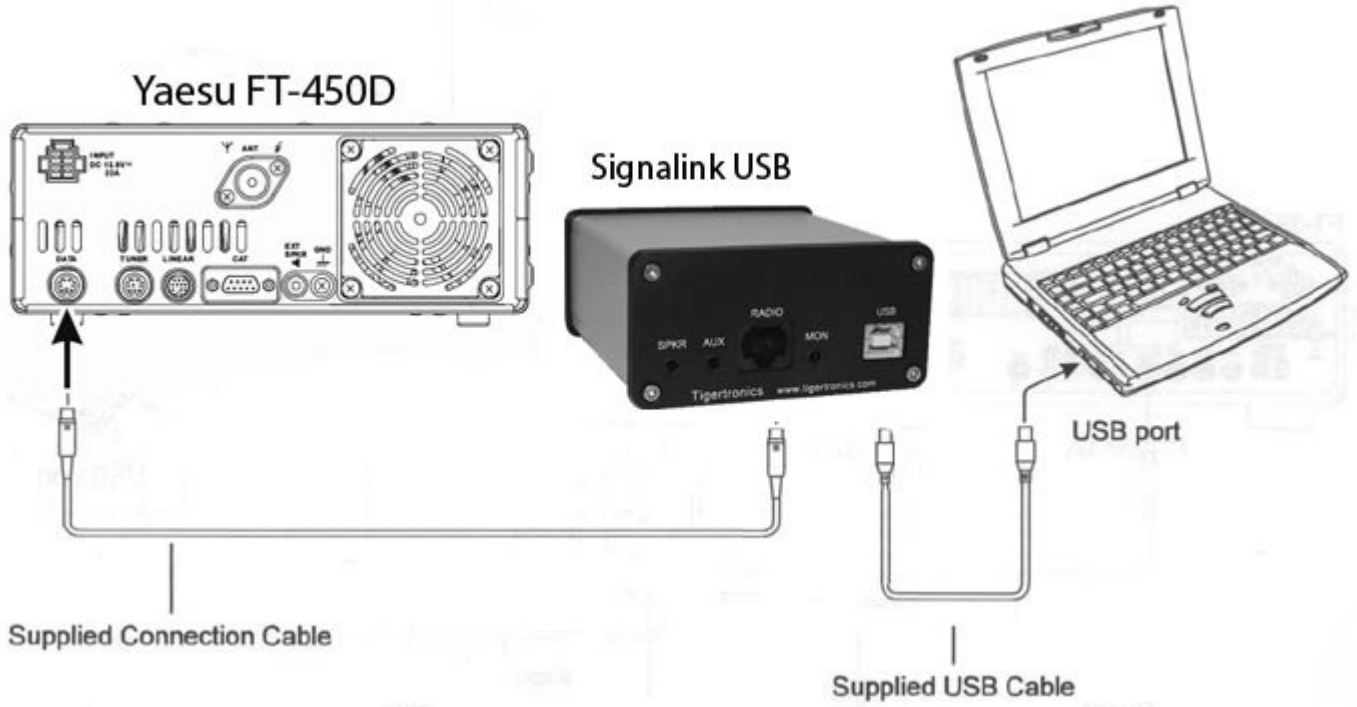
Digital Operations

- Computer Mic to Radio Speaker
- Radio Mic (PTT manually) to Computer Speaker

-OR-



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T4A06
What signals are used in a computer-radio interface for digital mode operation?
A. Receive and transmit mode, status, and location
B. Antenna and RF power
C. Receive audio, transmit audio, and transmitter keying
D. NMEA GPS location and DC power

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T4A04

How are the transceiver audio input and output connected in a station configured to operate using FT8?

A. To a computer running a terminal program and connected to a terminal node controller unit

B. To the audio input and output of a computer running WSJT-X software

C. To an FT8 conversion unit, a keyboard, and a computer monitor

D. To a computer connected to the FT8converter.com website

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T4A07
Which of the following connections is made between a computer and a transceiver to use computer software when operating digital modes?
A. Computer “line out” to transceiver push-to-talk
B. Computer “line in” to transceiver push-to-talk
C. Computer “line in” to transceiver speaker connector
D. Computer “line out” to transceiver speaker connector

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Digital hot Spot

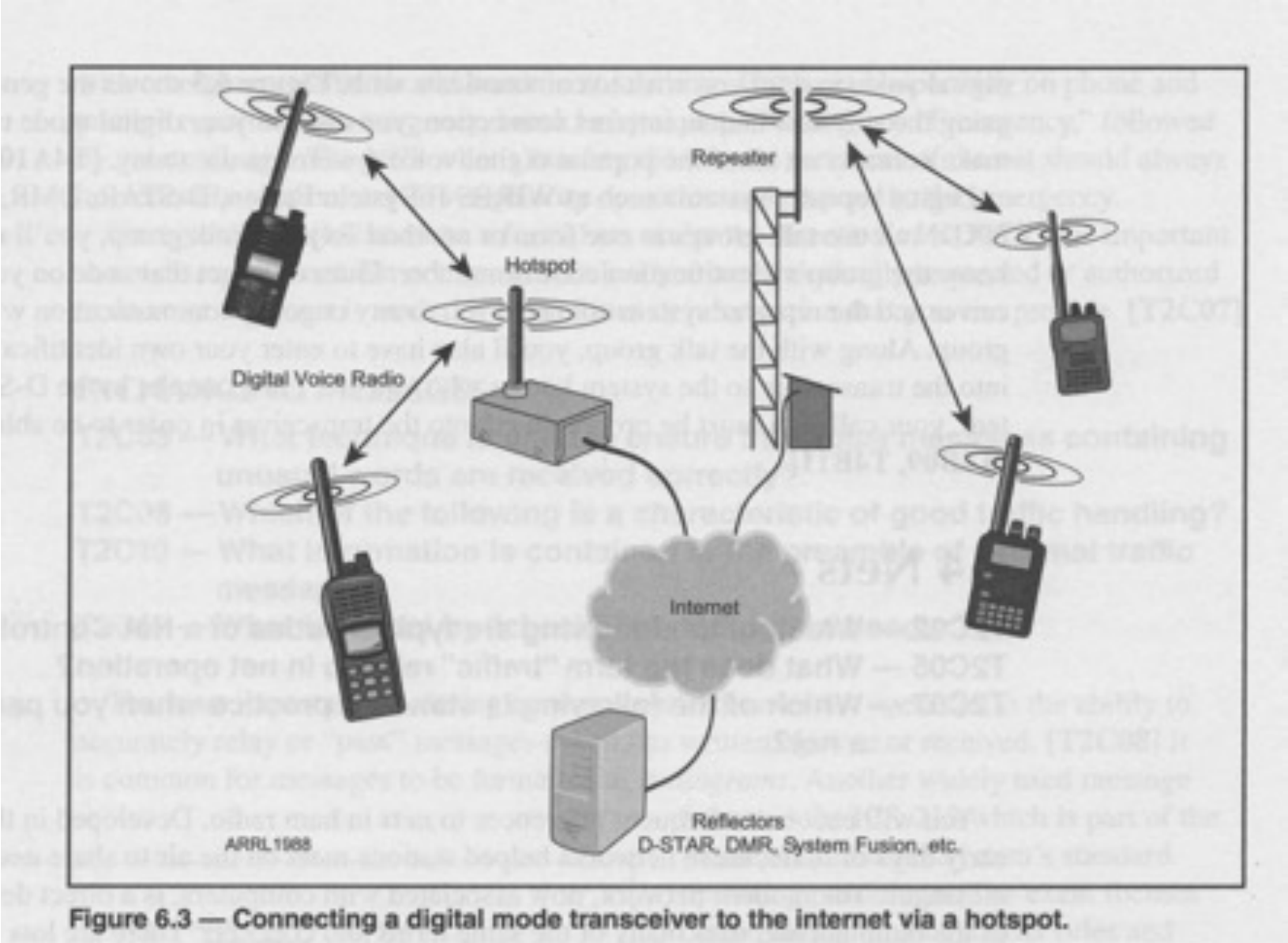

Figure 6.3 — Connecting a digital mode transceiver to the internet via a hotspot.

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T4A10
What function is performed with a transceiver and a digital mode hot spot?
A. Communication using digital voice or data systems via the internet
B. FT8 digital communications via AFSK
C. RTTY encoding and decoding without a computer
D. High-speed digital communications for meteor scatter

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T4B08
What is the advantage of having multiple receive bandwidth choices on a multimode transceiver?
A. Permits monitoring several modes at once by selecting a separate filter for each mode
B. Permits noise or interference reduction by selecting a bandwidth matching the mode
C. Increases the number of frequencies that can be stored in memory
D. Increases the amount of offset between receive and transmit frequencies

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Microphone Controls

- Gain – Controls transmitter sensitivity to your voice
- Speech Compressor or Speech Processor
  - Increases microphone gain at lower sound levels to increase overall signal strength or “punch”
- Too much gain or compression can cause problems
  - Splatter
  - Over-deviation
  - Over-modulation

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Receive Incremental Tuning (RIT)

- “Fine tuning” by ear (Signal seems too high or too low)
- Adjusts receive frequency independent of main VFO
- Doesn’t vary the transmitted frequency
- Transmitters have a similar function (XIT)

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T4B06
Which of the following controls could be used if the voice pitch of a single-sideband signal returning to your CQ call seems too high or low?
A. The AGC or limiter
B. The bandwidth selection
C. The tone squelch
D. The RIT or Clarifier

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T4B01

What is the effect of excessive microphone gain on SSB transmissions?

A. Frequency instability

B. Distorted transmitted audio

C. Increased SWR

D. All these choices are correct

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Band and Frequency Selection

- Set by VFO (variable frequency oscillator) or keypad entry
- Automatic Frequency Control (Matches incoming signal)
  - Scanning function to scan for activity on range of frequencies
- CTCSS or DTMF encoder (sub-audible tone frequency)
- Memories can generally store frequency, mode (AM/FM/SSB/CW/Data), filter and similar settings, and alphanumeric labels

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T4B04

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

A. Enable the frequency offset

B. Store it in a memory channel

C. Enable the VOX

D. Use the scan mode to select the desired frequency

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T4B05

What does the scanning function of an FM transceiver do?

A. Checks incoming signal deviation

B. Prevents interference to nearby repeaters

C. Tunes through a range of frequencies to check for activity

D. Checks for messages left on a digital bulletin board

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T4B02 (A)
Which of the following can be used to enter a transceiver’s operating frequency?
A. The keypad or VFO knob
B. The CTCSS or DTMF encoder
C. The Automatic Frequency Control
D. All these choices are correct

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B. The CTCSS or DTMF encoder

C. The Automatic Frequency Control

D. All these choices are correct

Automatic Gain Control (AGC)

- Automatically limits the incoming signals during signal (voice) peaks to maintain even volume
- Keeps strong signals from blasting the listener
- Different time response settings
  - Fast setting for CW
  - Slow settings for SSB and AM
  - Not used for FM because amplitude is constant

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Squelch

- Mutes audio to speaker when signal is not present
- Used in FM primarily
  - Open – allows very weak signals to pass through (plus noise)
  - Tight – allows only the strongest signals to pass
- Advance the squelch control until the noise just disappears
  - Also opened by MON (Monitor) control on handhelds

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T4B03

How is squelch adjusted so that a weak FM signal can be heard?

A. Set the squelch threshold so that receiver output audio is on all the time

B. Turn up the audio level until it overcomes the squelch threshold

C. Turn on the anti-squelch function

D. Enable squelch enhancement

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Filters

- Filters attenuate (reduce) signals
- High-pass – reduce low-frequency signals
- Low-pass – reduce high-frequency signals
- Band-pass – only pass a range of signals (500Hz for CW)
- Notch – reduces a narrow range of signals
- Selecting correct filter requires understanding the sources of the interference

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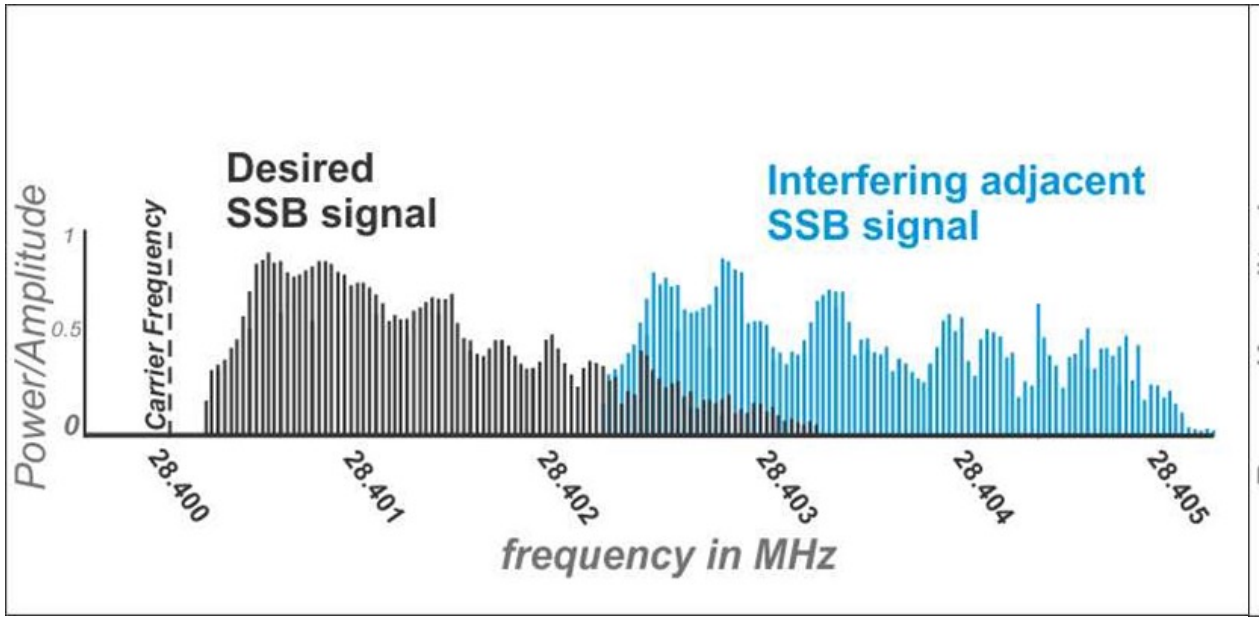
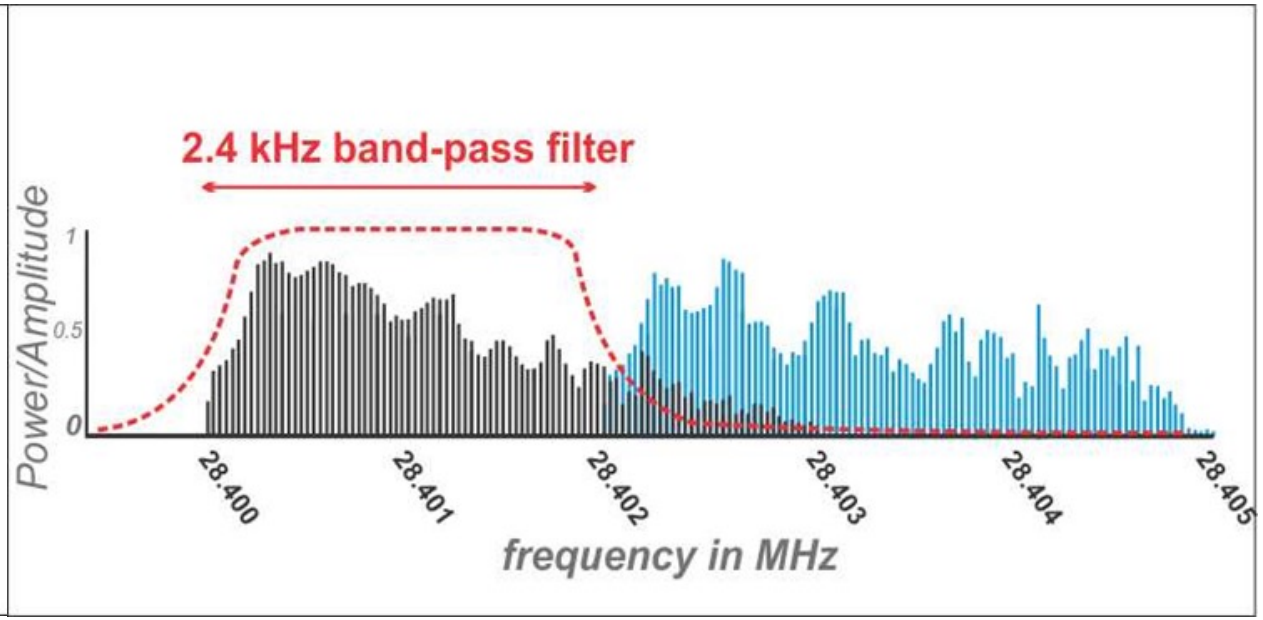
2400Hz band-pass filter for SSB reception





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T4B10
Which of the following receiver filter bandwidths provides the best signal-to-noise ratio for SSB reception?
A. 500 Hz
B. 1000 Hz
C. 2400 Hz
D. 5000 Hz

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A. 500 Hz

B. 1000 Hz

C. **2400 Hz**

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T4B12

What is the result of tuning an FM receiver above or below a signal's frequency?

A. Change in audio pitch

B. Sideband inversion

C. Generation of a heterodyne tone

D. Distortion of the signal's audio

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T4B12

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A. Change in audio pitch

B. Sideband inversion

C. Generation of a heterodyne tone

D. **Distortion of the signal's audio**

Noise

- Noise blanker (NB)
  - Removes signal pulses that are frequently associate with random naturally generated noise (ignition interference and power lines)
- Noise reduction (NR)
  - DSP function to remove noise from signal
- Noise limiter (NL)
  - Simply limits maximum volume of a noise pulse

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Noise

- RF current on shield of microphone cable distorting audio?
  - Employ a ferrite choke – impedance
- High pitched whine varying with engine speed (alternator)?
  - Wire directly from the battery to the transceiver with a choke
    - Negative return can go to battery or engine block grounding straps

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T4B07

What does a DMR “code plug” contain?

A. Your call sign in CW for automatic identification

B. Access information for repeaters and talkgroups

C. The codec for digitizing audio

D. The DMR software version

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T4B09

How is a specific group of stations selected on a digital voice transceiver?

A. By retrieving the frequencies from transceiver memory

B. By enabling the group’s CTCSS tone

C. By entering the group’s identification code

D. By activating automatic identification

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T4B11

Which of the following must be programmed into a D-STAR digital transceiver before transmitting?

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B. Your output power

C. The codec type being used

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END OF SUB ELEMENT 4
AMATEUR PRACTICES