



## Operating in a Tactical Radio Net, Procedures and Equipment

Adapted by Virginia RACES from original text by Dick Rawson, N6CMJ (SVECS Handbook) used with permission

**Emergency radio communications nearly always use formal nets, as do NTS traffic nets. Casual everyday ham operation mostly doesn't.** This article discusses how to operate as part of a formal radio net, probably one where most operators are using handy-talkies in unfamiliar locations. Net control's job is to keep the net under strict control to move traffic efficiently and prevent chaos! When net control requires stations to get permission before using the net; this is called a **directed net**.

**A directed net is essential if the channel is very busy:** Net Control can quickly pick among the several stations that have traffic to handle. It's also appropriate if stations on the net are not paying close attention to net activity. For example, if an operator was talking to the public, or was helping carry supplies, he may have lost track of net activity by the time he gets some traffic to originate. You can suspect this is the case if operators frequently transmit on top of one another!

**Use tactical and FCC call signs efficiently.** You will be called by your tactical call sign, not your FCC amateur radio call sign. You should use the tactical call sign to identify your transmissions and you should call another station by its tactical call sign. Of course you must identify properly every ten minutes and at the end of each transmission with your FCC call sign; see below.

**Listen for your tactical call sign.** That way, the net can be conducted without regard to what operator is at the radio of any particular place. Of course, Part 97 requires each amateur radio station to give its FCC identifier at the end of each communication and every ten minutes during transmission. To comply, simply add your FCC call sign to your last transmission in a series. For example:

NC "Wilson's Shadow, Net Control."  
WS "Wilson's Shadow."  
NC "Tell Chief Wilson that his driver has returned."  
WS "Wilson's Shadow copies; K6XYZ."  
NC "W6ZZZ"

**Answer promptly when called.** Unless you make other agreements, you are expected to listen continuously to the net and answer immediately when called. If you know you will be unable to participate for an interval, tell that to Net Control before you leave, and check in with Net Control when you return. Otherwise, the net can waste a lot of time attempting to call you when you are not there.

**Never leave a net without checking out.** Always **check out** of your net **before** leaving. If another operator has your assignment after you, don't check out before briefing him (see below). As a practical matter, we are volunteers and Net Control cannot compel someone to stay that wants to leave. But we owe it to the people and agencies we serve and to our reputations as individuals and as RACES organizations, to be reliable. Once we agree to support an agency's activity, we should do our best to deserve that agency's trust. During disaster operations RACES stations are part of the coordinated emergency response and are expected to continue with their assignment until released.

**Brief the operator who relieves you.** Write down all oral instructions given to you by Net Control Station or served agency officials update them as needed. Pass this sheet on to your relief operator and then tell the operator that takes your place everything he needs to know to do the job:

- Frequencies being used
- Essential radio, power, or antenna details
- All tactical call signs and where the stations are located
- If telephone is accessible, its location and number
- Officials /others being served; how to find /recognize
- The station's purpose
- What's going on? What changes are expected?
- Any pending activity: important messages sent and replies expected (who gets the reply?)
- Location of toilet, water, food

**Get to your assignment ahead of time.** Arrive at your assigned operating point before your shift starts so that you get set up and briefed by the start of your shift.

**Keep the channel available for interruptions.** There are several things we can do to minimize how much we delay someone

who must break in with urgent traffic:

1. **Keep all transmissions short.** Short transmissions allow other stations to interrupt if they get more urgent traffic.
2. **Stop transmitting if you stop talking.** Always release the push-to-talk button if you need to pause for some reason. While you are trying to think of a street name, or what the other thing was you wanted to report, unkey the mic to allow urgent traffic to break in.
3. **Avoid unnecessary transmissions.** Think before you speak.
4. **Don't call endlessly.** If you get no answer to your first two calls, wait a few minutes so others use the channel before trying again. (If urgent, disregard)
5. **Wait before keying, between transmissions.** Give others a chance to break in. It may be urgent!

**How to Interrupt the Net.** It is proper to interrupt the net and transmit when Net Control has not invited you to. That's the purpose for leaving gaps between transmissions.

If you interrupt, key very briefly, only enough to ID and briefly state the nature of the interruption: For example, "N6ABC," "emergency traffic," "autopatch," or "info." The station you want to interrupt may not have noticed you in time; so if you just transmit for 30 seconds, nobody will understand anything on the channel for 30 seconds.

**Use short simple phrases.** There many ways to word an idea; pick one of the shorter ways. When you "keep all transmissions short," it helps the listener, because the fewer words you say, the fewer he has to understand. (The listener doesn't know whether missed words are important to understanding the meaning until he hears them clearly.)

**Establish contact before saying messages longer than 2-3 words.** That may mean to call the other station, and hear it tell you to proceed. Or it may mean to hear the other station reply to Net Control's call. Net procedures vary. But don't spend air time with a long message until you are sure that you have the other operator's attention.

**Acknowledge transmissions to you.** Acknowledge transmissions promptly, this avoids repeating the message. Once you acknowledge, the net can assume you will continue with your assignment, and the channel can be used for other traffic.

**Answer questions as directly as possible; do not explain.** It is basic to efficient operation to avoid unnecessary transmissions. If asked a question, just answer it; do not volunteer additional detail or an explanation of why something is so. If you think that amplifying information is vital in order for your traffic to be understood, be brief; let the questioner ask for more detail if he chooses to.

**Always ask who a message is for, if you don't know.**

**DO let third parties speak over your radios,** this is both expedient and necessary for complex medical, engineering or other technical information. It's just as legal as passing third-party messages. However, don't expect to reserve a channel for several minutes while one of the operators gets someone to come to the microphone. The calling party may need to be coached ahead of time to ensure clear, concise, and brief transmissions.

**Remember your primary duty.** Your duty is "comm." so keep idle chatter to a minimum. Don't spread rumors. Refer members of the press or media to those in charge.

## PREPARING A MESSAGE- GETTING / ORGANIZING THE INFORMATION

**Get the subject's (victims, runners) name, but keep it off the air.** When asked to send a message about some one, try to get a specific name if it seems appropriate. However, avoid saying names over the air unless you are specifically told that it is permitted. For example, someone needs first aid, someone wishes an additional box lunch, or someone has been lost. It may not seem important while someone is standing next to you, asking you to send the message ... but he may wander off before you get a reply, or request for more information. Knowing names helps match up lost and found persons, and helps eliminate duplicate reports of the same injury (or lunch request, or transportation request).

**Do not pass victim or patient names over the radio.** Generally the only personal names that belong in traffic are the names of agency officials, if they choose to put them into messages. Anyone can monitor ham radio channels. There may be exceptions to this policy at certain events, such as for matching up lost children, but make sure that Net Control approves of all exceptions.

**Try to get fully worded and signed messages, not paraphrases.** When someone asks you to send a message of any substantial length, agree with that person on the exact wording that constitutes the message. That is as contrasted with someone asking you to "tell Captain Smith that ....", so that you have to paraphrase the meaning. If you reword the message, you can introduce errors, omit details, or change the emphasis or urgency.

**A best way to handle a message that you receive verbally** in the "tell them that ..." format is to write down what you think is the entire intended message, then read it back verbatim to the author for approval. Pass the message just as you read it back to the sending party. Substantial messages should be signed with name / title of originator. Use your judgment as to whether this much care is needed with tactical traffic. If the officer you are shadowing says to you, "Tell Wilson that his driver came back," you may reasonably not worry about transmitting exactly his words.

**Address traffic to a specific station.** If you are asked to get help for a problem, work with the person who asked to understand who should handle the problem, and then send the message asking for help. If you explain the problem to Net Control and he isn't the one who can handle it, it takes more time to explain it again to someone else. The person bringing the request may well know better than Net Control does who should get the message.

## PREPARING AND USING YOUR EQUIPMENT

**Bring charged spare batteries.** Get a AA battery case for your HT so that you can continue operating even if you can't recharge your nicads. Get a cigarette lighter power cord for your HT and brick amp, plus separate sealed lead-acid (gel cell) batteries of a total capacity equal to at least an amp-hour per watt of your transmitter's output.  
*Don't forget battery chargers for your both your HT NiCds and gel cells!*

**Bring a higher-gain HT antenna.** Several HT antennas work much better than the factory supplied "rubber duck." A quarter wave provides unity gain on a ground plane or when used with a "tiger tail" or counterpoise, held at face level. A half-wave provides the same unity gain without a ground plane that a quarter waves does with a ground plane. Adding a ground plane to a half-wave antenna provides 2 db of gain. Best choices for portable gain antennas to attach directly to an HT are a flexible or telescoping quarter wave, or a telescoping half-wave.

**A mag-mount is highly recommended for operators who may need to accompany officials in a vehicle.** You also need a male BNC to female UHF adapter to fit the mag mount coax to your HT. Half-wave mobile antennas are less common, but work without a ground plane on ambulances with fiberglass cabs, bicycles, motorcycles, etc. Other good choices are dual-band antennas which are half-wave on VHF and collinear UHF, or flexible dual-band quarter-waves which can be used on a window clip.

**Wait after keying, before speaking.** Wait a fraction of a second after pressing the mic button before speaking, to make sure you don't clip off the first syllable. Your radio may take a moment to change over to transmit, and the repeater may introduce its own delay. When the "battery save" is on your transceiver goes into a reduced power mode after several minutes of standby and needs a signal to be present for a second before it "wakes up" to pass any audio. This is very important for a one-syllable reply, because if that one syllable doesn't make it, you haven't communicated and will have to repeat the transmission.

**Don't talk louder in noisy environment.** It's natural to talk louder when it is noisy around you, but don't do that on the radio: it generally makes you less understandable, not more. You should always be speaking loudly enough into your microphone to achieve full modulation. If you speak louder, the radio clips your voice to avoid over modulating the transmitter, distorting the audio, reducing voice intelligibility. This works to overcome a limited amount of ambient noise, but the only way to overcome loud noise is to reduce it somehow, or wait until it passes.

**Shield your microphone from the wind.** Wind blowing across the microphone can makes it impossible to understand you.

**NEVER use voice operated transmission (VOX) or a locking PTT switch.** These often cause problems by keying your transceiver when you don't intend to transmit. PTT (push-to-talk) operation is better than VOX on a tactical net. You

control explicitly when to transmit.

Make sure that the PTT switch cannot be activated accidentally. **DISABLE locking PTT switches**, because they have led to jammed channels. (Rewire the control box so that it cannot lock the PTT on.)

***Your HT won't work well on your belt!*** Its proximity to your body results in -40 db attenuation compared to a quarter wave held at face level! Either raise the antenna on a [hat clip] or hold the HT at face height, unless you are very close to the repeater or to another station on simplex. Otherwise, marginal reception may cause you to miss important calls directed to you.

## WHAT DO I BRING?

This list is not all inclusive, but it provides good ideas. RACES could be activated for hours or days, so adapt this list to suit your situation and develop a "Ready Kit" which is always accessible!

### EQUIPMENT:

- Transceiver(s) (Identified with your call sign)
- Headphones or earphone
- Extra battery packs or external gel cell battery
- Cigarette lighter power adapter
- AC power supply and cord
- 50' coax with connectors (including adapters)
- Portable ground plane antenna
- Flashlight and batteries
- Small tool bag (tools, soldering iron, wire)
- State & Local RACES operations manual or plan
- Virginia RACES 50 Word Message Forms
- 50' 1/8" nylon cord
- Spare fuses
- Repeater directory
- Duct/electrical tape
- RACES ID Badge
- FCC license copy
- Credit cards/cash/coins/calling card
- Pens/pencils/steno pad
- 7-1/2 minute series USGS area topo maps
- RACES Frequency Reference Card

### PERSONAL ITEMS:

Aspirin, deodorant, toothbrush, toothpaste, antacids, sunscreen, comb, razor, shave cream, soap, "cold water" laundry soap, towel and washcloth, travel alarm, pocket knife, roll of toilet paper in a Ziploc bag, first aid kit and ear plugs (noisy shelters).

**CLOTHING:** *(no nylon or polyester on fire assignments, use cotton or wool)* Boots, jacket, sweatshirt, underwear (2), pair socks (2), hat, extra long sleeve shirt (plus the one on your back), rain wear, long pants, handkerchiefs.

**FOOD /SHELTER:** Canned stew, dry soup, instant coffee/tea/cocoa, 1 gallon water per man/day, salt/pepper packets, sugar subs, creamer packets, instant oatmeal, granola bars, throat lozenges, knife/fork/spoon, cup, sleeping bag, cot, tent, Sterno stove, small pot, bucket for laundry. ☺