

Programming Simple Amateur HandHeld To Allow EOC to Broadcast on Weather Frequencies

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INTRODUCTION

At the 2018 Emergency Symposium hosted by Alachua ARES and the Santa Fe Amateur Radio Society, a short full scale exercise was held in which volunteer teams were challenged to complete a number of tasks in (simulated) support of local Emergency Management. The setting of the Exercise was a confusing and poorly-understood emergency in which local broadcast as well as public service communications had been severely damaged. These tasks as listed in the Table below and touch on a wide variety of radio skills and assets. The purpose of this article is to explain how to carry out Task #8 --- creating the ability for emergency authorities to broadcast on one of the National Weather Service frequencies, to reach members of the public who still have working weather-radio receivers.

No.	Task	Usefulness
1	Establish and maintain a Command Net	Allows tactical communication between teams.
2	Monitor frequencies for reports from fire / police / utilities / hospitals	Scanning or other techniques to “pick up” volunteers and others desiring radio connections to local emergency efforts. Also – <i>always hunt for amateurs who are on some other frequency and haven't found your operation yet.</i>
3	Create broadcasting ability at bottom end of 160 m band, or top end of AM Broadcast band, for the EOC	Allows public safety officials to have a means of reaching the general population in the absence of working broadcasting stations.
4	Digital email to State EOC	Notification and connection to state emergency authorities who need situational awareness and may be able to give you the wider picture also.
5	Create a repeater for Interoperability Channel NC1	An example of assisting to create repeater facilities where requested for interoperability between different emergency services.
6	Survey/test all known amateur communication assets	Develop situational awareness of available assets which can be leveraged to serve the community.
7	Establish contact with any ARES or other amateur emergency net	Establish connections.

8	Creating broadcasting ability over local NWS (“weather radio”) frequencies for the EOC	Allows public safety officials to have a means of reaching the general population in the absence of working broadcasting stations.
9	Utilize Message Pick Up stations to create digital connections in the absence of Internet functionality	Allows digital email connections between WINLINK-enabled communicators even without regional, national, or even international Internet functionality.
10	Maintain Activity Log and Communications Log for all actions	Keep a record of actions for both practical and legal purposes.

BACKGROUND

There are multiple possible causes of widespread multi-system communications failures. Hurricane with power loss and flooding are one. During Hurricane Katrina, 37 of 41 broadcast stations in the New Orleans area were knocked off the air, for example. There are other possible causes. It can be extremely valuable for public safety and emergency officials to have broadcast stations available to give our life-saving and reassuring updates during an emergency. In some kinds of emergencies, not only may electrical power be lost, but broadcast equipment itself may be badly damaged – and amateur radio operators' abilities to repair systems or come up with alternatives (“jerry-rig”) may be requested by emergency authorities.

Emergency authorities need the ability to convey information to the public to quell rumors, give directions, calm nerves and keep the peace. Life-saving warnings, instructions and commands may need to be urgently conveyed.

The key to restore lost broadcasting function is to be able to *transmit to receivers already in the hands of large numbers of the public*. Households generally own TV and AM/FM radio receivers as well as cell phones. It can be difficult for hams to transmit on TV, FM or cell phone frequencies or modes, as these are often complicated digital modes and far from ham radio bands. However, many families may also own a **national weather service receiver**, and these receive analog FM broadcasts on 7 frequencies in the 162 MHz band. Many amateur radio VHF transceivers can be programmed to transmit on these frequencies and thus utilized in an emergency by local authorities.

NWS Channel	Frequency
1	162.400 MHz
2	162.425 MHz
3	162.450 MHz
4	162.475 MHz
5	162.500 MHz
6	162.525 MHz

7	162.550 MHz
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Antennas for such emergency broadcasts can be easily made using the half-wave dipole formula of $468/F\text{mhz}$. A dipole for the 162 MHz band would be approximately 35 inches long, 17" on each side. One can be made easily with any metallic tubing or stiff wire. Vertical polarization is probably the best, and HEIGHT is the key to getting a wide service area --- so position on the tops of available buildings or structures. Ham radio coax will work fine – or even lampcord “emergency balanced line” can be pressed into service, albeit with losses equal to or exceeding RG-58 on VHF/UHF frequencies... Existing VHF business antennas are often quite broadband and if available, may be tested and utilized. Your VHF SWR meter will allow you to test their SWR. Expect N connectors on business band systems. Available antennas may even include an un-needed amateur repeater antenna. If 40 watts of RF power is available from a mobile transceiver or an amplifier connected to a handheld, a range of up to the radio horizon is possible, roughly in miles = $1.2 \times (\text{square foot of antenna height in feet})$. An antenna positioned 200 feet up over flat ground might reach a radius of 16 miles, covering more than 800 square miles, and a very significant population.

PROGRAMMING AMATEUR TRANSCEIVER

Its important to know how to program typical amateur radio transceivers for such emergency usage-- but you may not even need to! Putting many amateur transceivers into “VFO” mode may just allow you to tune to the desired frequency, then LOCK the controls to stay on the frequency. Be sure offset is set to 0 so transmission is on the same as received frequency.

You may wish to store the national weather service frequency in a channel. If you have CHIRP installed and have the proper programming cable, this is an easy task, but even manual programming can easily be accomplished. On the popular Baofeng-style systems, here is one sequence for manual programming: (more complete directions can be found at: <http://wc5c.org/wp-content/uploads/2017/08/Manually-Programming-BaoFeng-HT-Radio-Channels.pdf>)

Step	Action
1	Choose an existing channel to be overwritten (e.g., channel 87) that is already programmed for the desired band (that is, VHF or UHF), thus power and band settings are already correct.
2	Choose the A (top) display and move to this channel. (Some radios require that programming occur from the A display.)
3	Enter VFO Mode (using VFO/MR key) Key in the desired frequency.
4	Delete the current programming of the channel to be overwritten: Press MENU Using arrow keys, advance to “DEL-CH” (delete channel) (item 28), press MENU again to access selections, then arrow up or down to reach the desired channel to overwrite. Press MENU again to confirm, then EXIT to complete
5	Force transmit to occur on same frequency as receive:

	<p>Press MENU</p> <p>Using arrow keys, advance to “SFT-D” (shift-direction) (Item 25), press MENU again to access options, arrow key to reach OFF; then MENU again to save, EXIT to complete.</p>
6	<p>Memorize the settings and the new frequency from the VFO:</p> <p>Press MENU</p> <p>Using arrow keys, advance to “MEM-CH” (item 27), press MENU again to access options, arrow key to reach the desired channel to memorize, then MENU again to save, EXIT to complete.</p>

(Do not test except into a dummy load unless in a real emergency.)