

# *TRAINING MANUAL*



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# INTRODUCTION TO REACT

## **What Is REACT?**

REACT is an acronym for “Radio Emergency Associated Communications Teams.”

## **What is the purpose of REACT?**

- To develop the use of the Amateur Radio Service as a resource in time of emergency or disaster.
- To coordinate efforts with and provide communications to other disaster and emergency relief organizations.
- To promote the benefits of and the proper use of the Amateur Radio Service.
- To provide communications and safety in support of community service activities and events.

## **History of REACT International, Inc.**

- 1962: Pete Kreer founded REACT in Chicago with the sponsorship of the Hallicrafters Radio Company
- 1964: REACT Teams establish CB Channel 9 as their home channel.
- 1967: REACT petitions the FCC to establish CB Channel 9 as an official emergency channel.
- 1969: General Motors assumes sponsorship of REACT.
- 1970: On June 24th, three years after the petition was filed, the FCC designates Channel 9 an emergency channel.
- 1971: An agreement is signed between the American Red Cross and REACT. This same year, Canada also designates Channel 9 as an emergency channel.
- 1975: REACT International, Inc., is organized as a not-for-profit corporation.
- 1976: The first REACT national convention is held. REACT International is granted Federal IRS tax exempt status. The National Emergency Aid Radio (NEAR) program is developed by the National Highway Traffic Safety Administration with help from REACT.
- 1978: The first Field Directors are added to the REACT International Board of Directors.
- 1980: A number of forums and task groups are established by REACT International.
- 1982: REACT receives the President’s Volunteer Action Award.
- 1985: The “C” in REACT is changed from “Citizens” to “Communications.” The REACT forum is discontinued. The Task Groups now report directly to the Board of Directors.
- 1986: REACT International headquarters is moved from Chicago, IL to Wichita, KS.
- REACT International headquarters is currently located in Glendale, California.

The REACT International Corporate Officers consist of the President, Vice-President, Secretary and Treasurer, who also can be regional directors.

The REACT International Board of Directors consists of nine regional directors elected to 3-year terms by the teams in their region. Only the President and the elected Regional Directors have a vote on the Board of Directors. Regional Directors may, at their discretion appoint Assistant Directors to serve in their regions. Assistant Directors do not have a vote on the Board of Directors, but may attend sessions, as may any member.

## **REACT International dues and fees:**

Part of the dues you pay goes to International. For this, the member receives a REACT international membership card and newsletter. This also covers the member under the team liability insurance policy (\$1,000,000) when working team approved events.

## **REACT International website:**

The REACT International website address is <https://www.reactintl.org/>.

## **REACT Trademark:**

The REACT logo and the name REACT are registered trademarks owned by REACT International. Permission must be obtained to use either. The team has a number of camera-ready copy sheets of authorized forms of logos for use in advertising and public relations work.

## **Southwestern REACT of San Diego County, Inc.**

### **History:**

Southwestern REACT was founded in February of 1966 in Imperial Beach by a group of Citizen's Band radio operators who were interested in being of service to the public through the use of their radio skills. Soon after, the team was chartered by REACT International, Inc.

Three years later, on April 30, 1969, the team was incorporated as a not-for-profit educational and charity organization by the State of California. At this time, the team acquired the CB license KCO0783.

The current REACT Charter C475 was issued to the team on April 10, 1970 to replace the original charter which was lost.

At this time, the team holds Business Band License WQKR689, issued in 2009, and Amateur License KK6SLE, issued March 10, 2015.

### **Organization:**

The Board of Directors consists of five members elected annually by the team in December. Anyone who has completed all required training and have been voted full membership in the team can vote in this election. A full description of the duties of the members of the board can be found in the Policies and Procedures Manual.

The following is a brief description of those duties:

- The President acts as the leader of the team.
- The Vice-President/Communications Coordinator assists the President, is in charge of all committees and is the Operations Supervisor.
- The Secretary records and maintains the minutes of all board and general meetings and handles all team correspondence.
- The Treasurer accepts responsibility and custody of all funds belonging to the team.
- The Director-At-Large hears, discusses and assists the board in making recommendations to be brought to the team.

The team also has staff (appointed as necessary) to assist the board with the operation of the team. This staff consists of, but is not limited to the following:

Operations staff reporting to the Communications Coordinator:

- Assistant Communications Coordinator
- Area Coordinators and Fan-Out Assistants
- Business Band and Amateur License Trustees

Administrative Staff appointed by the President and reporting to the Vice-President:

- Appointed Officers
- Appointed committees.

### **Dues and Fees:**

The members at the annual team meeting in October set annual dues. For members coming into the team after the month of March, the dues are prorated by quarters and are paid in full for the remainder of the calendar year. There is an initiation fee of \$5.00 that covers the team photo membership card, team patch and a copy of the team Bylaws and Policies and Procedures manual.

### **Team Image:**

#### **Conduct:**

Team members should behave in a manner that shows your pride in being a member of the team and will not bring discredit on the team.

#### **Dress Code:**

The team colors are Red and Gold. REACT International colors are Orange and Black.

The recommended team uniform consists of the following:

- A red shirt with team patches on the shoulders. The team patch is worn on the left shoulder and the International patch on the right shoulder. A name tag may be worn on the right front of the shirt. The REACT International issued ID badge may be worn in lieu of a name tag.
- A red cap with a team patch, REACT logo or team name and unit number may be worn. Team members may wear a red jacket with team patches (same as the shirt) on the shoulders. Other optional items are covered in the Policies and Procedures manual.
- The uniform is to be clean, well fitting and in good repair.

#### **Vehicles:**

Do not operate your vehicle, even when part of a team operation, any differently than you would as a private citizen. Always obey the California Vehicle Code and all traffic laws. Use of amber lights is permitted when authorized by the board and operated in accordance with California law.

#### **Equipment:**

Team Owned equipment consists primarily of two portable “Go-Kits” used for field operations, a Yaesu System Fusion® repeater and a portable UHF repeater.

Individual team members have the responsibility to obtain, operate and maintain their own personal radio equipment. Other team members are available to assist in the setup and maintenance of radio equipment.

#### **Rosters, Manuals and Handbooks:**

The team roster with member contact information will be provided once full team membership is approved. This information is to be treated as *CONFIDENTIAL* and only for team use. Information from this roster *is not* to be given to non-team individuals. A copy of the Team Bylaws and the Policies and Procedures Manual will also be provided.

Two Emergency Operations Plans, DISASTER and NEAR EMERGENCY are contained in the Policies and Procedures Manual.

## SPECIAL EVENTS

The primary reason REACT provides communications for parades, running events, equestrian and other events is to obtain the necessary training for working together as a team. This experience is valuable in the event of a major emergency or disaster. REACT also takes pride in service to the community.

Southwestern REACT members are not required to work *every* event scheduled. However, it is expected that each member will participate in their share of events in the course of the year.

### **Event Volunteer:**

Prior to an event, the volunteer should:

1. Attend the general meetings and check the Southwestern REACTer for information about the upcoming events the team as approved for participation. If you are available and wish to work the event, contact the Event Coordinator to sign up for the event. If you are unable to attend the entire event, make your hours known to the Event Coordinator.
2. The Event Coordinator will contact you prior to the event to confirm your availability. You will be sent or given a copy of the Event Briefing Sheet (Appendix B) outlining when and where to report and the expected duration of the event.
3. Any volunteer who has not received instructions prior to the day before the event should contact the Event Coordinator as soon as possible for instructions.
4. It is the responsibility of the volunteer to ensure their equipment (radios, batteries, etc.) is fully operational several days prior to the event. This would include ensuring your radio(s) are programmed to the proper talk-in and operational frequencies.

The day of the event:

1. All volunteers should arrive at the designated assembly point at the time indicated on the briefing sheet.
2. The Event Coordinator will hold a briefing of the day's schedule and assignments. The briefing will also review the communications procedures to be used during the event, including primary and secondary frequencies.
3. When you arrive at your assigned station, find a shady spot, if possible. The weather may get hot during the day. If you must rely on your vehicle radio, park where you will have a good view of activities, but can remain near your radio. Locate near the checkpoint table, but be aware of excess noise that might interfere with communications.
4. The event Coordinator should have been made aware of lunches, drinks, etc that may be available for volunteers. However, on some events these may not be available. Bringing your own provisions for thirst or hunger should be part of normal event preparation. Remember, NO ALCOHOLIC BEVERAGES are to be consumed during the event under any circumstances.
5. Team members must remember that, during the event they are to communicate only on the assigned frequencies and only transmit information pertinent to the event.
6. Team members should always act in a courteous and professional manner and strive to uphold the high standards that Southwestern REACT has set in the past.

### **Radio Communications:**

1. Every event will have a net control station. The event coordinator, at their discretion, may assume this position themselves.
2. If the event is a parade, the team member may be assigned at or close to an announcer's stand. Earphones and/or hand microphones are recommended for noisy environments.
3. A notepad and writing implement should be part of the team member's equipment for the event. If there are two or more individuals at a location, one should operate the radio and the other handle writing down message traffic. No unlicensed individual may operate the radio.
4. All radio traffic must be directed to the net control station. If you desire to contact another unit directly, request permission from net control.

5. Do not switch from the primary frequency without permission from net control.
6. When using Simplex, be aware that net control may be unable to copy you or other stations. Be prepared to relay traffic from other stations to net control and vice versa.

### **Roving Units:**

These units should keep alert for any unforeseen emergency or unsafe condition. Any such information must be passed to net control, who will pass it to the event organizers. It may be advantageous for the rover to remain on the scene until assistance arrives.

### **Event Completion:**

1. It is the responsibility of the event organizers to make the final sweep of the course to ensure it is free of all participants.
2. A Southwestern REACT roving unit will usually follow the event organizers to note which checkpoints are closed and to ensure our members are secured in a timely manner. Team members manning checkpoints will fall into line and follow the sweep vehicles until it is safe for them to exit the course.
3. All units will advise net control upon securing. Net control will relay this information to the Event Coordinator and the event organizers.
4. If a critique/hotwash/after-action report is scheduled, make every effort to attend. These critiques are very helpful in correcting any mistakes made during the event.

### **Event Coordinator:**

#### **Assignment:**

If you have volunteered to act as an event coordinator, these instructions should be helpful in completing the assignment in the most efficient manner.

#### **Assistance:**

Every effort should be made to find an assistant coordinator for the event. The Assistant/Co-Coordinator should attend all meetings with the coordinator, but may act in their stead if the coordinator is unable to attend. The assistant coordinator should be prepared to take over as coordinator if the coordinator is unable to fulfill their duties.

### **Communications Planning:**

The Event Coordinator has several choices as to what radios will best suit the communication needs of an event. In an event covering a large area, more than one radio system may be needed.

Currently, the choices are, but not limited to:

- Citizens Band, simplex, 40 channels
- Amateur Radio Service (ham radio) simplex or repeaters
- Family Radio Service (FRS) simplex, 22 Channels

Currently, the emphasis is on the amateur radio service with its multitude of club and privately owned repeaters across the county. The FCC rules limit the content of amateur radio communications. The traffic must benefit the general public, such as safety or emergency communications.

When using amateur radio for an event, each team member will have a “tactical” call, usually their location or check point number. This call should be used when communication with net control, but the transmission should always be finished with the team member’s amateur radio call sign.

The Event Coordinator will be responsible for contacting the owner of the appropriate amateur radio repeater to request permission to utilize the repeater during an event.

### **Early Planning:**

With the help of your assistant or co-coordinator, contact the person in charge of the event as early as possible. Attend all organizational meetings. The following guidelines may be helpful:

1. Find out what is expected of the team. Keep in mind the purpose of our participation is radio communications. Our volunteers will be on hand to observe and report to the organizers potential hazards to the participants. We are not there to furnish traffic control or normal pre-planned medical aid.
2. Find out what is available for volunteers, such as lunches, drink, T-shirts, etc. Although our services are donated free, we expect to be treated the same as all volunteers.
3. If necessary, recommend to the event organizers that they should obtain other volunteers for first aid, messenger service, etc.
4. Suggest to the event organizers that, in their press releases to the media, they mention that Southwestern REACT is providing safety radio communications for the event.
5. During your first contact with the event organizers, request a map of the route(s) as soon as possible. *Note: Most events will have a website with lots of event information for the event participants. Many times the route maps are available on these web sites.* Before your first meeting with the organizers, go over the route of the event. If, for any reason of safety or communications, you feel a checkpoint should be changed, make this suggestion to the organizers. If the event is a new one, going over the route will also assist in determining which repeater(s) have the necessary coverage.
6. If the event is one the team has worked in the past, contact the previous event coordinator for any information they feel will assist you in coordinating the team's participation. The previous event's files should be available from the team communications coordinator.

### **Volunteers:**

1. Provide the communications coordinator with an estimate of the number of volunteers needed to properly staff the event. Request an e-mail to all team members seven to ten days prior to the event to fill any remaining vacancies. Your request should be for more than the minimum number of volunteers so you will be sure to have enough people.
2. Personally contact the volunteers at least 24 hours before the event to confirm their availability and remind them of the hours of the event. Advise them if you can use operators for periods less than the full event.
  - It may be possible for a team member to work the event, but due to other obligations, would be available only for certain hours.
  - Be sure to find a job for all volunteers, no matter how small. Less experienced or new volunteers can be placed with an experienced team member. This is a good opportunity for mentoring and training of the new volunteer.
  - Appoint an experienced operator to act as net control. Appoint another, if available, to do the recording of the log of the event at net control. This is another opportunity for training a less experienced volunteer in the operation of net control.

### **Event Day:**

1. The event briefing form calls for a "talk-in" frequency in addition to the primary and secondary operational frequencies. The event coordinator should be monitoring this frequency once they arrive at the briefing location, if not before. This is essential as some members may not be able to arrive at the briefing location at the designated time due to traffic, etc.
2. All team volunteers should be briefed on the day's events and proper communications procedures. At this time the event coordinator will make assignments to the various stations and net control. Provide maps and assignments sheets to all operators. The briefing should be conducted at least 45 minutes prior to the start of the event to allow operators to reach their assigned locations in a timely manner.
3. Remind all volunteers that all communications must be directed to net control. If a station wishes to talk directly to another station, permission must be granted by net control.
4. A sign-in sheet should be maintained and should reflect the following information:

Volunteer Name  
Unit Number  
Assignment  
Amateur Radio or other call sign  
Cell phone number  
Sign-in time

5. The sign-in sheet should be turned in to the communications coordinator to be kept with all other paperwork pertinent to the event.
6. The event coordinator should be available to net control at all times. The use of the radio is not to be surrendered to anyone other than a team member or recognized relief. Event officials should not be allowed to operate any of your radios. ***An event official who is a licensed amateur radio operator may operate your radio if the situation warrants and only with permission of the event coordinator. The individual's license should be verified, if possible.***
7. To assist in maintaining a clear frequency, the following announcement should be made periodically on the operational frequency:

**Event Conclusion:**

1. At the completion of the event be sure to announce, on the radio, the closing of the event and clear the channel for regular communications. Again, thank the radio public for sharing the frequency for the event. This announcement should be made only after all REACT units have been accounted for and the event coordinator has checked with the event organizers.
2. It is recommended that a critique is held after the event is over. This should be done as soon as possible after the event while all information is fresh in everyone's mind. If necessary, this can be done by e-mail or at a general team meeting.
3. Be sure to thank all the volunteers who helped with the event.

## RADIO OPERATIONS

### **Introduction:**

Possibly the most critical aspect of REACT operations is knowing your radio(s) and how to operate them in all situations one might encounter. Knowing how to set up, program (if necessary) and operate a radio, along with observing correct radio procedure is critical in ensuring communications are understood and acted upon promptly. This section will deal primarily with amateur radios, but will touch on other radio services.

### **Radio Services:**

There are a number of different radio services set aside by the Federal Communications Commission (FCC) for different purposes. Each of the services has its own set of regulations that must be adhered to. Some of the services that Southwestern REACT could use (or has used in the past) are Citizen's Band (CB), the Land Mobile Radio Service, sometimes called the Business Band or "Part 90" (after the section of the regulations dealing with it), General Mobile Radio Service (GMRS), Family Radio Service (FRS), Multi-Use Radio Service (MURS) and the Amateur Radio Service. CB, FRS and MURS are all part of the FCC's "Personal Radio Services." Other radio services that Southwestern REACT would not use as a matter of course are the Marine VHF Service and the Aviation Service. Each service has its own frequencies and/or bands allocated to it.

The Citizen's Band was created by the FCC to provide a simple, inexpensive method of personal and business communication. It was popularized in the 1970's by the entertainment media and the trucking industry. The service originally required a license, obtained simply by paying a small fee, but this is no longer the case. It is now "licensed by rule" meaning as long as the individual abides by the service rules, they may operate without an actual physical "license." Radios used in the CB service must be type certified by the FCC.

The Land Mobile Radio Service is a licensed service primarily for businesses, such as taxi services, trucking companies and others that need radio communications. The railroads operate within the Land Mobile Radio Service. Licenses may be obtained through application to the FCC and payment of the appropriate fee. Radios must be type certified.

The General Mobile Radio Service is a licensed service, intended for short-range communication. There is no examination required for the license, but a fee is required. Immediate family members of the licensee are allowed to use the service, but employees of the licensee that are not family members may not. Some GMRS channels are shared with the family Radio Service, but different type certification and transmit power requirements exist for each service.

The Family Radio Service is a low-power service, envisioned as an alternative to the Citizen's Band service that is less susceptible to interference. Although it is used by businesses for short-range communications, the largest use is by families keeping track of each other at venues such as theme parks. Southwestern REACT has used the service for short-range communications that do not conflict with an event net. Transmit power and type certification requirements apply to FRS radios. The service is "licensed by rule."

The FCC defines the Multi-Use Radio Service "a private, two-way, short-distance voice or data communications service for personal or business activities of the general public." MURS is licensed by rule and type certification applies.

The Amateur Radio Service is unique in that an examination is required to obtain a license, but there is no fee paid to the FCC for the license. Examinations are conducted by other licensed amateur radio operators that are certified as Volunteer Examiners (VE.) VEs may collect up to \$15 per exam to cover expenses only. There are three classes of license within the amateur service, Technician (entry level) General (an intermediate level) and Amateur Extra (the highest class.) Each class has greater privileges and a separate examination is required for each level. Because of the amateur radio service's lengthy history of experimentation and home building of radios, type certification is not required of radios used within the service. Radios designed for other services, may be reconfigured and used in the amateur service, but radios designed strictly for the amateur service may not be used in the other services because they lack the required type certification.

### **Types of radios:**

Radios can vary widely, both by their physical characteristics and by their frequency allocations. We'll start with

frequencies. Within the amateur service there are a number of bands, each with allocations for different classes of license. Because entry-level Technician license holders are restricted to frequencies above about 30MHz, the most common radios are VHF/UHF radios. General and Amateur Extra license holders have more available frequencies and may use radios in the HF spectrum.

Radios also vary by their physical characteristics. Most common are handheld radios, commonly called Handi-Talkies (HT,) usually with a transmit power no higher than 5 watts. Next in popularity are mobile VHF/UHF radios designed to be installed in a vehicle and with a maximum transmit power of around 50 watts. Finally, HF radios are usually large, heavy radios intended for a more permanent installation and having a transmit power of 100-200 watts. There are lower power HF radios designed for vehicle or portable use. Because of the nature of REACT operations, we will deal primarily with VHF/UHF handheld and mobile radios in this manual.

### **Simplex Vs. Repeater Operation:**

Simplex is defined as direct communication between two radios without the benefit of a repeater. Simplex communication is used when there is nothing obscuring two operators, such as buildings or mountains. Both radios will be using the same frequency and an operator must wait until others on the same frequency are finished before transmitting. Simplex operation is advantageous for close-in short-range communication such as a parade or an event held over flat, open ground.

A repeater does just what the name implies. It is a stand-alone, usually automatically controlled radio that “repeats” a communication by simultaneously retransmitting it. Because VHF/UHF communications are essentially line-of-sight, repeaters are used when obstacles—buildings or mountains—exist between two individuals wishing to communicate. Repeaters are usually located at high elevations, such as mountain tops. Repeaters are advantageous when an event is spread out over a large area or has substantial changes in elevation.

A repeater operates by receiving a communication on one frequency and transmitting it on another, usually widely separated. Because there are only a finite number of frequencies available for repeater use and to prevent interference between repeaters, they are “coordinated.” In other words, frequencies are assigned to repeaters by organizations set up expressly for that task. Also, to prevent interference, many repeaters require the transmission of a sub-audible tone to activate or “open” the repeater. This tone is commonly called a “PL” tone, but that term is proprietary to Motorola. The proper term is Continuous Tone Coded Squelch System or CTCSS. Most radios are capable of transmitting these tones.

Some mobile VHF/UHF radios are equipped with a feature entitled “Cross-Band Repeat.” This allows the radio to serve the same function as a regular repeater without the need for all of the necessary infrastructure. When set in the “Cross-Band Repeat” mode, the radio will receive transmissions on either the VHF or UHF band and retransmit them on the other band.

### **Digital vs. Analog:**

The hottest new “thing” in VHF/UHF communications is digital voice. Three protocols currently exist, D-Star, System Fusion and Digital Mobile Radio or DMR. D-Star was developed by the Japan Amateur Radio League in the 1990s. For many years, D-Star could only be found on radios marketed by iCom. Now other manufacturers are beginning to produce D-Star radios.

System Fusion is a protocol proprietary to Yaesu that first appeared on the market in \_\_\_\_\_. Yaesu upped the game by offering repeaters capable of either analog FM or System Fusion to clubs and organizations at a very reduced price. The only requirement was the repeater be immediately placed on the air and kept there for at least one year. System Fusion is only available on radios manufactured by Yaesu.

The third, and possibly most popular, digital voice protocol is Digital Mobile Radio or DMR. DMR was originally developed for the business community by Motorola under the name MotoTurbo. It has been modified for use by the amateur community and the number of users is growing rapidly. This growth has been fueled by the availability of relatively inexpensive DMR radios, mostly from China.

Most digital voice capable radios, whether D-Star, System Fusion or DMR are also capable of analog FM operation

and most are also dual-band (VHF/UHF) capable.

### **Communications Plans:**

Every organization that regularly uses radio communications must have a plan of frequencies they use for different purposes and at different times. These are usually called Communications Plans, abbreviated Comm Plan (but other terms are used.)

A “Fleet Map” is also a comm plan, but the term is more appropriate to trunked radio systems and not to REACT operations. However, the term is still hangs on in some organizations.

Comm plans can be as simple as just a list of frequencies to be used when operating or as complicated as a diagram indicating who will use what frequency under which circumstance.

See Appendix A for the Southwestern REACT Team Comm Plan.

### **Programming and Code Plugs:**

Modern VHF/UHF radios have the capability of storing frequencies, whether simplex or repeaters, in memory channels. This enables the user to call up frequently or commonly used frequencies without the need to enter them manually each time. (These frequencies are usually reflected in the organization’s comm plan.) Entering information into the radio’s memory is know as “programming.” Programming can be accomplished either by hand from the radio’s keypad or by the use of computer software. A “Code Plug” is nothing more than another name for a radio’s programming, but it’s used mostly in reference to DMR radio programming.

Programming of a radio is usually accomplished in one of two ways; either by manually entering the channel information, then writing the information to a memory channel in the radio, or by using a computer and appropriate software to write the information to the radio. Computer programming software is available from a number of sources. Most radio manufacturers have programming software available for their radios, usually free. There are also commercially available software packages and free software available on the internet.

### **Know Your Radio:**

Every team member must have all their radios set up with the team communications plan prior to working any event. In addition, they should be prepared to add a frequency to their radio on short notice, even if the use of the frequency will be short term. Different models of radio, even within a specific manufacturer, will have different steps to add (or remove) a frequency. Sometimes it’s difficult to remember all these steps for a number of different radios. With the profusion of smart phones, and tablet computers, a copy of the radio’s operating manual can be stored in a phone or tablet where it is available for easy reading when needed. For those that do not possess smart phones or tablets, pocket-size printed guides are available for most commonly used radios.

In addition to knowing how to program frequencies, team members should know how to change the transmit power level, squelch setting, and volume setting on their radios. (Not all radios have external knobs for this purpose.)

### **Useful accessories:**

While a radio can be useful just as it comes out of the box, there are a number of accessories that can make the radio even easier to use.

An earphone or headset (earphone and microphone together) is good for high noise environments, situations where communications should be kept private, or where the radio would disturb others. There are any number of quality earphones or headsets available. Some headsets are capable of voice-controlled operation (vox) but are impractical in high noise environments.

A speaker/microphone is a convenient accessory for a hand-held radio as it eliminates removing the radio from the operator’s belt every time a call is received. It can be clipped to the operator’s clothing close to the ear, allowing the volume level to be lowered. Most speaker/mics have a jack for an earphone, allowing even more private communications.

Another good accessory for a handheld radio is a longer antenna specially tuned for the radio’s particular bands.

These antennas can improve the coverage of the radio and could mean the difference between good and bad communications at an event.

Probably the most important accessory for a hand-held radio is one or more spare batteries. By having spare, fully-charged batteries on hand during an event will eliminate the loss of communications in the event of a dead battery. The operator should know how to quickly swap out batteries on their radio.

### **Basic Operations:**

Standard voice operation procedure is first listen to ensure the frequency is not in use, then press the Push-To-Talk (PTT) button on the radio. Pause for an instant before talking. This gives the radio a chance to start transmitting. Talking too soon will clip off the first part of the transmission. If the operator is initiating the call, they begin with the call sign of the unit they are calling, followed by their own call sign. At most events the operator will be given a “tactical” call sign, usually their assigned location. This will be their primary call sign for the event but doesn’t relieve the operator of the responsibility of identifying with their FCC-assigned call sign.

A typical exchange between operators might go thus:

**Operator:** “Net control, this Water Stop 4.”

**Net Control:** “Water Stop 4, go ahead.”

**Operator:** “Net Control, Water Stop 4, we need five more cases of water at this location.”

**Net Control:** “Water Stop 4, understand you need five more cases of water?”

**Operator:** “Water Stop 4, affirmative.”

**Net Control:** “Copy. Net Control Out, KX6XXX”

**Operator:** Water Stop 4 out, W6XXX”

All operators should always identify with their FCC-assigned call signs at the end of an exchange.

In cases where the content of a message might be confusing the use of a phonetic alphabet is warranted. REACT uses the standard NATO/ICAO Phonetic Alphabet:

<b>A: Alpha</b>	<b>N: November</b>
<b>B: Bravo</b>	<b>O: Oscar</b>
<b>C: Charlie</b>	<b>P: Papa</b>
<b>D: Delta</b>	<b>Q: Quebec</b>
<b>E: Echo</b>	<b>R: Romeo</b>
<b>F: Foxtrot</b>	<b>S: Sierra</b>
<b>G: Golf</b>	<b>T: Tango</b>
<b>H: Hotel</b>	<b>U: Uniform</b>
<b>I: India</b>	<b>V: Victor</b>
<b>J: Juliet</b>	<b>W: Whiskey</b>
<b>K: Kilo</b>	<b>X: X-Ray</b>
<b>L: Lima</b>	<b>Y: Yankee</b>
<b>M: Mike</b>	<b>Z: Zulu</b>

All communications will be conducted in plain language. The use of 10 Codes, “Q” codes and any other abbreviations is not permitted. The only proper response to a request for a “radio check” request is “loud and clear.” The use of other acknowledgements could be potentially confusing and is not permitted.

### **Net Procedures:**

Event radio operations are conducted via a net. One operator will be designated the Net Control Operator (NCO) and will be responsible for conducting and controlling all radio operations during the event. The NCO will make periodic announcements during the event indicating the frequency is in use for the event. (See Appendix B for the recommended net control script.)

All communications must go through the NCO. This is called a “Directed Net.” If a unit wishes to converse directly with another unit, permission must be obtained from Net Control. If the frequency is particularly busy, then the use of an alternate frequency is indicated.

The NCO is responsible for releasing the frequency at the end of the event and returning the frequency to normal use.

**Go-Kits:**

A Go-Kit, sometimes called a Go-Box or Go-Bag is a ready-made kit containing a radio that can be deployed quickly and on short notice. Every operator should have a Go-Kit ready, even if it's only a bag containing a couple of hand-held radios, batteries and accessories.

A handy Go-Kit can be built in an ammo can, a tool box or a waterproof case. The kit usually consists of a dual-band mobile radio, a power supply and/or battery, an antenna of some kind and coaxial cable to connect the antenna to the radio.

Southwestern REACT has such a kit than can be deployed at events if needed. This kit is capable of Cross-Band Repeat if required. See Appendix C for proper deployment and operation of the team go-kit.

## **MONITORING**

**Introduction:**

REACT was originally created to monitor the CB channels, particularly Channel 9, for motorists in distress and provide assistance to them. With the proliferation of cell phones, and to a lesser extent, highway call boxes, and the increased use of ham radio by REACT teams, this function has become obsolete.

Southwestern REACT has opted to make monitoring an optional function of the team. Team members may monitor communications and render assistance, if needed, at their own discretion.

**Appendix A**  
**Southwestern React Team Communications Plan**



**SOUTHWESTERN REACT TEAM FREQUENCY PLAN**

Team Channel	Your Channel	RX Freq	TX Freq	Offset Freq	Offset Direction	Operating Mode	Team Name	Tone Mode	CTCSS	UPDATED 07/02/2023 Comment
1		449.440	444.440	5.00 MHz	Minus	FM	SWR10TAY	Tone/Enc	107.2	SWR REACT 1—Net Alternate/Monitoring
2		449.260	444.260	5.00 MHz	Minus	FM	SWR2RR	Tone/ENC	107.2	SW REACT2—REACT Repeater (Palomar)
3		147.060	147.660	600 KHz	Plus	FM	SWR3RR	Tone/ENC	107.2	SW REACT3—Repeater (Downtown)
4										
5		145.555	145.555		Simplex	FM	SWR5SH			SWR REACT 5—VHF Private Simplex
6		446.500	446.500		Simplex	FM	SWR6X			SW REACT 6—UHF Pvt Simplex(X Band to VHF)
7		147.765	147.165	600 KHz	Minus	FM	SWR7RS	Tone/ENC	79.7	SW REACT 7—Rattlesnake
8		448.940	443.940	5.00 MHz	Minus	FM/FUSION	SWR8RS	Tone/ENC	141.3	SWR REACT 8—Rattlesnake-Analog/Digital
9		145.320	144.720	600 KHz	Minus	FM	SWR9MH	Tone/Enc	107.2	SW REACT 9—Mission Hills
10		147.195	147.795	600 KHz	Plus	FM	SWR10ACS	Tone Sq//ENC-DEC	114.8	SW REACT 10—RACES Red 1
11		147.195	147.195		Simplex	FM	SWR11ACS			SW REACT 11—Simplex on RACES Red 1
12		146.085	146.685	600 KHz	Plus	FM/FUSION	SWR12SBAY	Tone Sq//ENC-DEC	100.0	SW REACT 12—South Bay-Analog/Digital
13		448.340	443.340	5.00 MHz	Minus	FM/FUSION	SWR13SBAY	Tone Sq//ENC-DEC	100.0	SW REACT 13—South Bay-Analog/Digital
14		146.520	146.520		Simplex	FM	SWR14NCC			SW REACT14—National Calling Channel
15		147.180	147.780	600 KHz	Plus	FM/FUSION	SWR15LF	Tone/Enc	110.9	SW REACT15—Las Flores (Coronado)
16		146.235	146.835	600KHz	Plus	FM	SWR16VC	Tone/Enc	118.8	SW REACT16—Valley Center

## Appendix B

### Suggested Event Net Control Script

#### **Make this announcement once per hour:**

(End conversations with **KK6SLE**)

This is (*First name*) **KK6SLE**, Net Control for this Southwestern REACT Communications Team Net. Southwestern REACT has coordinated for the use of this repeater in support of (*event*) until approximately (*time expected to be clear*). We appreciate all operators' assistance in keeping the frequency clear. Stations with emergency traffic may interrupt this net at any time. This is **KK6SLE** standing by.

#### **Use this announcement to close the net:**

This is (*first name*) **KK6SLE**, Net Control for this Southwestern REACT Communications Team Net. Southwestern REACT would like to thank this repeater owner for the use of this repeater in support of (*event*) and all operators' for assistance in keeping the frequency clear. Southwestern REACT provides communications support for many events in the community. For information about joining our team, or for communications support of your event, please visit our website at [www.SWReact.com](http://www.SWReact.com). This is **KK6SLE** and this net is now closed.

## **Appendix C**

### **Operation Of The Southwestern React Team Go-Kit**

#### ***Introduction:***

The Southwestern REACT Team Go-Kit is a portable, battery-operated kit containing a dual band (2 meters and 70 CM) FM transceiver. It is constructed on a three-tier wheeled Ridgid® tool box system from Home Depot. (Figure 1)

The bottom, wheeled portion contains a 30Ah Lithium Iron Phosphate (LiFePo) battery and charger module from Bioenno Power. Power from the battery is distributed by a West Mountain Radio RigRunner 4008. (Figure 2) On the front of the box, there are a gauge measuring battery voltage and current draw, an on-off switch and two 5v USB charging ports. (Figure 3) On the back of the box is an Anderson PowerPole® connection for battery voltage out and a Powerpole connection for connecting solar panels for battery charging. (Figure 4)

The next larger box contains the radio, a Yaesu FT-8800R dual band radio. The main portion of the radio is in the bottom of the box and the control head is in the upper tray. (Figures 5 and 6) There is provision for an external speaker (in the box also). (Figure 7) There are external connections on the box for power from the battery box and coaxial cable to the antenna.

The smallest box is a repository for miscellaneous items such as a binder of documentation (including a copy of these instructions,) a radio manual, a manual for the solar controller (in the bottom box), guying cord, tent stakes, programming software disc and tools.

Antenna parts are located in either the radio box or are transported separately. They are:

1. An antenna mast (A painter's pole capable of extending from 8 feet to 23 feet) (Figures 12 and 13)
2. A tripod
3. A Diamond X-50A two meter, 70 CM dual band vertical antenna
4. PVC antenna transportation tube (Figure 15)
5. 50 foot RG213 coaxial cable with PL-259 connectors on each end.
6. Antenna mount holder (Figure 14)

#### ***Radio Deployment:***

The three boxes may be stacked in any convenient order just by releasing the handles on the sides of the boxes.

Setup is as follows:

1. Remove the fused power cord from the battery box and plug the fused end into the power socket on the back of the radio box. (Use the top pair of connectors.) (Figure 8)
2. Plug the other end of the power cable into the Power out connector on the back of the battery box. (Figure 9)  
Note: There are additional cables in the battery and radio boxes if the power cord is not long enough.
3. Connect one end of the coaxial cable to the SO-239 connector on the back of the radio box. (Figure 10)
4. Connect the external speaker to the audio connector in the upper tray in the radio box (Figure 7). Note: The tray may be removed from the box and placed in a convenient location, such as a table. (Figure 22)

#### ***Antenna Deployment:***

The procedure for setting up the antenna is as follows:

1. Set up the tripod. Always extend the legs to their widest possible stance with the supports parallel to the ground. (Figure 11)
2. Screw the antenna mount holder onto the top of the painter's pole. (Figure 14)
3. Remove the antenna from the transportation tube and slide the tube into the rings on the mount. Snug down the two Phillips screws, but don't overtighten them. (Figure 16)
4. The three antenna radials are strapped to the body of the antenna. Remove them and screw them into the sockets on the base of the antenna. Snug down the nuts on the radials. (Figure 17)
5. Connect the other end of the coaxial cable to the SO-239 pigtail on the bottom of the antenna. (Figure 18)

6. Slide the painter's pole into the center tube of the tripod until it bottoms out. The center tube on the tripod may be raised and the pin inserted to give more height to the antenna if needed. If the antenna is being erected in windy conditions, it may be necessary to guy the antenna. Attach the guying cords to the ring on the antenna prior to sliding the painter's pole into the tripod. (Figures 19, 20, 21)
7. Once the antenna is erected, the power can be turned on using the switch on the battery box. (Figure 24)

**Battery Charging:**

Once the event is over, the battery should be charged in anticipation of the next event.

1. The battery charger is located next to the battery in the bottom box.
2. Remove it from the bag, connect the coaxial plug to the pigtail on the battery and plug the power cord into a convenient 120V outlet. (Figures 25, 26)

**Solar Charging:**

Southwestern REACT owns a Harbor Freight three-panel solar charging system (Figure 27) This system may be used to charge the battery by connecting the Powerpole adapter cable (Figure 28) to the panel output cables and plugging it directly into the "SOLAR IN" jack on the rear of the battery box. **DO NOT** use the solar controller supplied with the solar panel kit. The battery box has its own internal solar controller. The charge may be monitored with the internal solar controller.



Figure 1. The three-tier Ridgid tool box system.

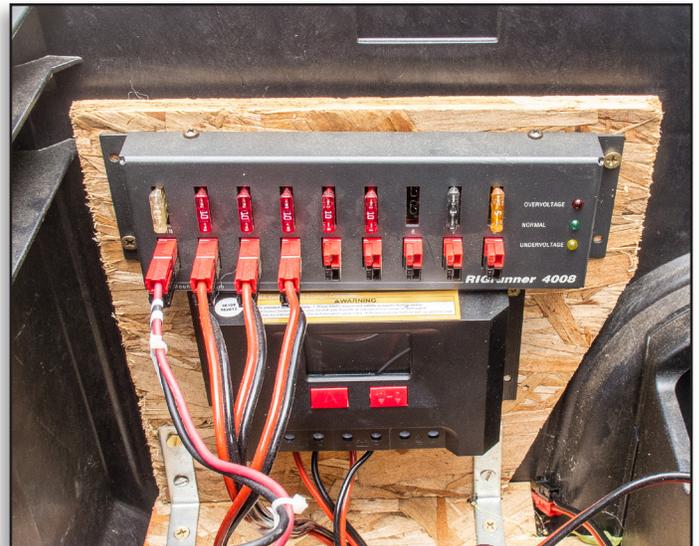


Figure 2. West Mountain Radio RigRunner 4008 and Harbor Freight solar charge controller.



Figure 3. Battery box front controls



Figure 4. Battery box rear connections.

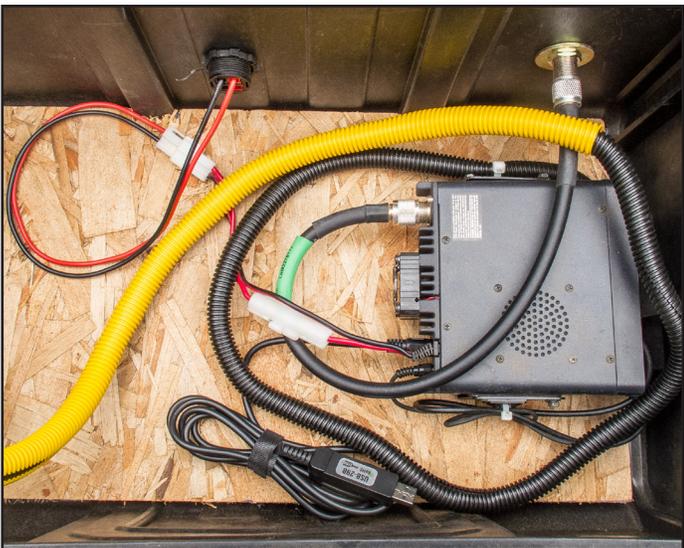


Figure 5. Radio box showing body of the FT-8800R.



Figure 6. Radio control head in upper tray.



Figure 7. External radio speaker.



Figure 8. Power connection on the back of the radio box.

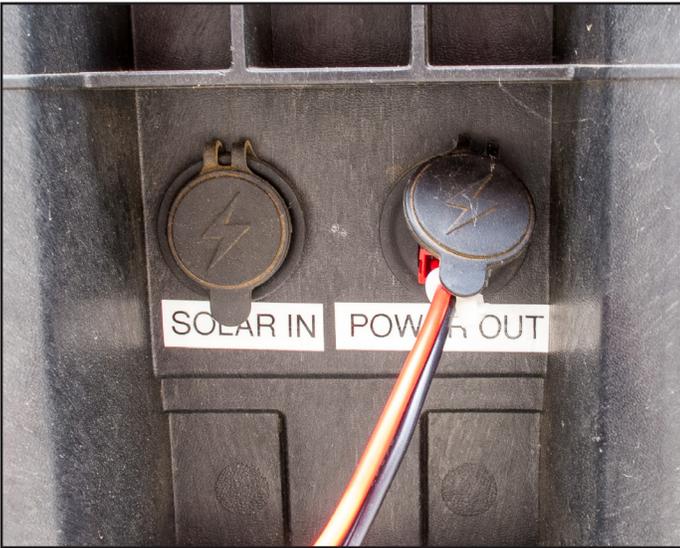


Figure 9. Power connections on the back of the battery box.



Figure 10. Coaxial cable connector on the rear of the radio box.



Figure 11. Antenna mast support tripod.



Figure 12. Top of painter's pole mast with guying ring.



Figure 13. Painter's pole mast extension instructions.



Figure 14. PVC painter's pole extension and antenna mounting bracket.



Figure 15. PVC antenna transportation tube.

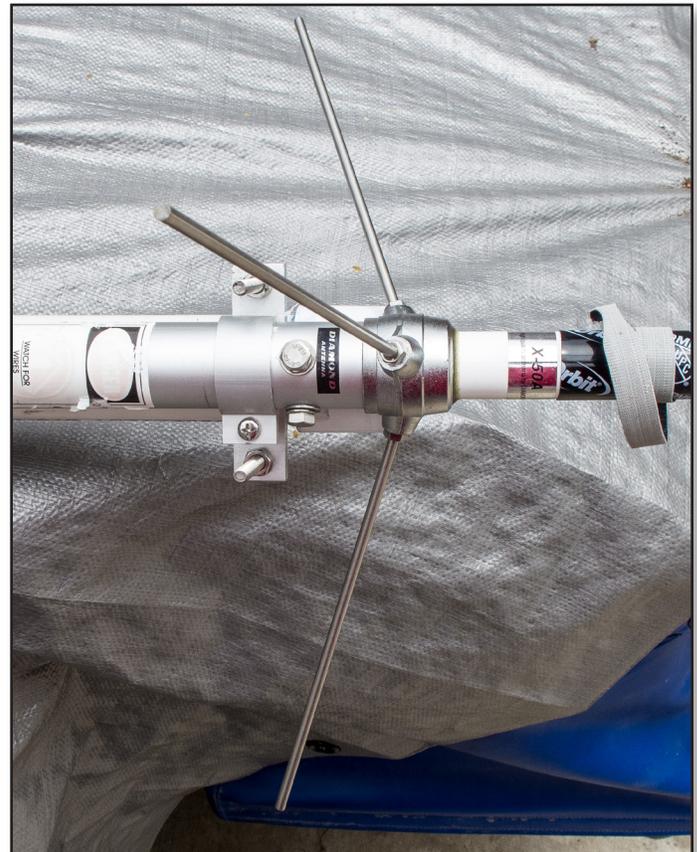


Figure 17. Antenna radials screwed into their sockets.

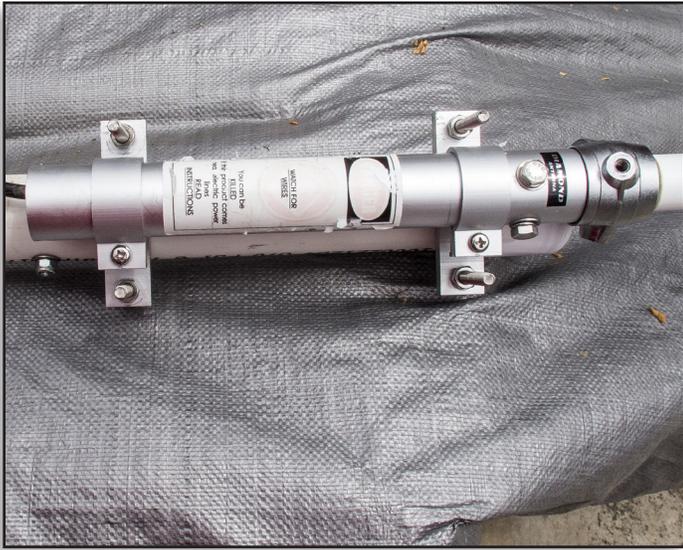


Figure 16. Antenna base inserted into mounting brackets.



Figure 18. Coaxial cable connected to antenna pigtail.

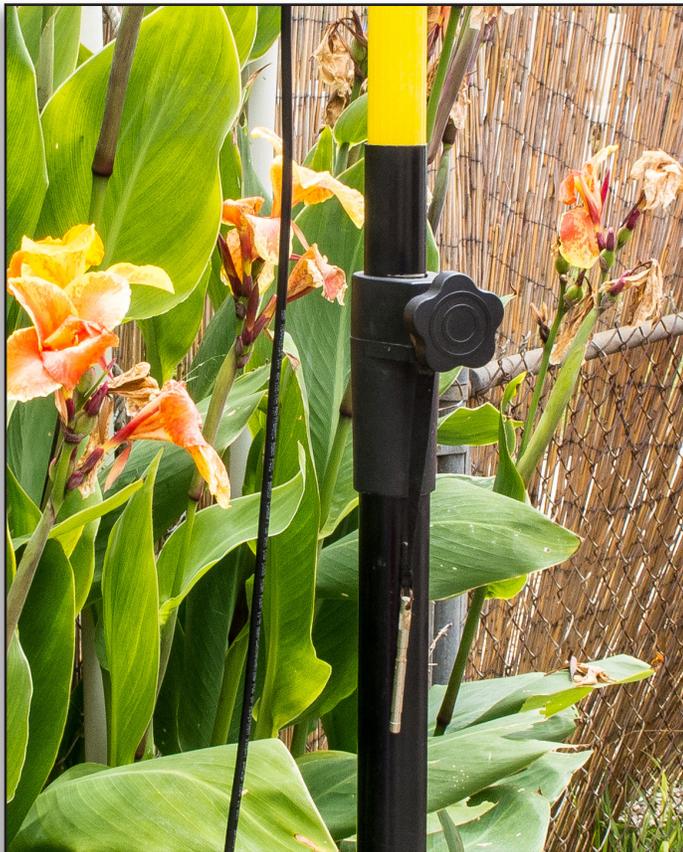


Figure 19. Top of the tripod showing the painter's pole inserted in the center tube.

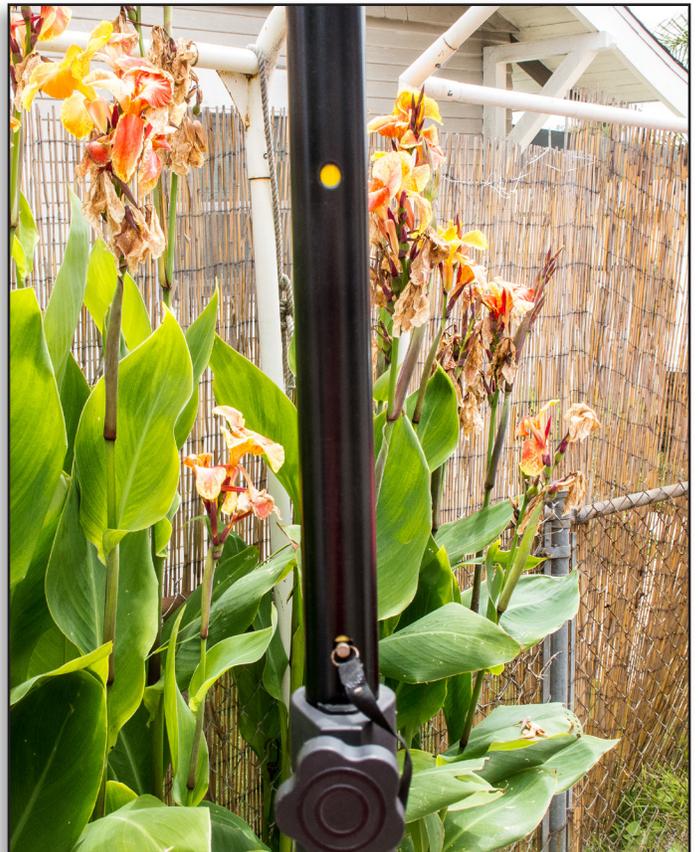


Figure 20. The center tube of the tripod may be extended to give the antenna more height.



Figure 21. The securing knob on the tripod showing the pin inserted to extend the mast height.



Figure 22. The top tray holding the radio head and speaker may be removed from the box for convenience.



Figure 23. The antenna fully installed and raised to a convenient operating height.



Figure 24. Main power switch on the battery box.



Figure 25. Bioenno charger connected to the battery.



Figure 26. Close up of the Bioenno charger connected to the battery.



Figure 27. Harbor Freight three-panel solar charging system.



Figure 28. Solar charging adapter cable.

# Configuring The Headset In The Team Go-Kit

## Introduction

At many of our events, it is necessary for net control to be located close to a high-noise environment. This includes start-finish lines, vehicle horns and sirens and musical performances. The noise creates difficulty in net control hearing calls from other events units and the background noise is transmitted along with necessary traffic, making it difficult for event units to hear net control. Efforts to relocate net control aren't always successful as event organizers desire reasonable access to communications and don't always have the personnel available to provide runners.

For these reasons, all the hardware to connect a headset to the go-kit radio has been purchased. It is hoped this will alleviate some of the issues with high noise environments.

## Hardware

The following items have been purchased from Heil Sound: (FIGURE 1)

- Pro-Micro double earphone headset
- Single Circuit foot switch
- AD-1-Y adapter for Yaesu
- AD-100 adapter for Yaesu

There is also a piece of vinyl plank flooring for the foot switch for uneven terrain. (More on this later.)

## Configuration

1. Connect the AD-1Y and the AD-100 together with the eight pin plug and receptacle. (FIGURE 2)
2. CAREFULLY remove the hand microphone connector from the right side of the radio control head (FIGURE 3) NOTE: Modular connectors are somewhat delicate and it's possible to accidentally break off the locking tab. **USE CARE WHEN REMOVING AND REPLACING!**
3. Plug the modular connector on the AD-100 into the microphone port on the radio control head. NOTE: The control head is held down by Velcro and can be lifted up for better access to the mic port. (FIGURE 4)
4. Make the connections shown according to the color code; red to red, white to white, etc. There is a Y cable attached to the audio output cable from the radio. The yellow and green connections should remain in place. As configured, the speaker will remain active, but be aware there is only one volume control and increasing volume to hear the speaker will result in too high a volume in the headphones. If the speaker isn't needed, the green connection may be unplugged. (FIGURE 5)
5. The final connection is the foot switch. The ¼ inch plug and jack (blue) should be connected together. The foot switch itself has Velcro on the bottom to adhere it to the vinyl plank. (FIGURE 6.)
6. Breaking down at the end of the event is just the reverse of configuring the headset. The AD-1Y and AD-100 may be left connected to each other and placed in the tray. Return the headset and foot switch to their original boxes.w

## Conclusion

This change will result in better communications and has the added advantage of the operator's hands being free to keep a log and other notes as necessary.

As always, use due care in handling team property, particularly the modular connectors.



FIGURE 1



FIGURE 2

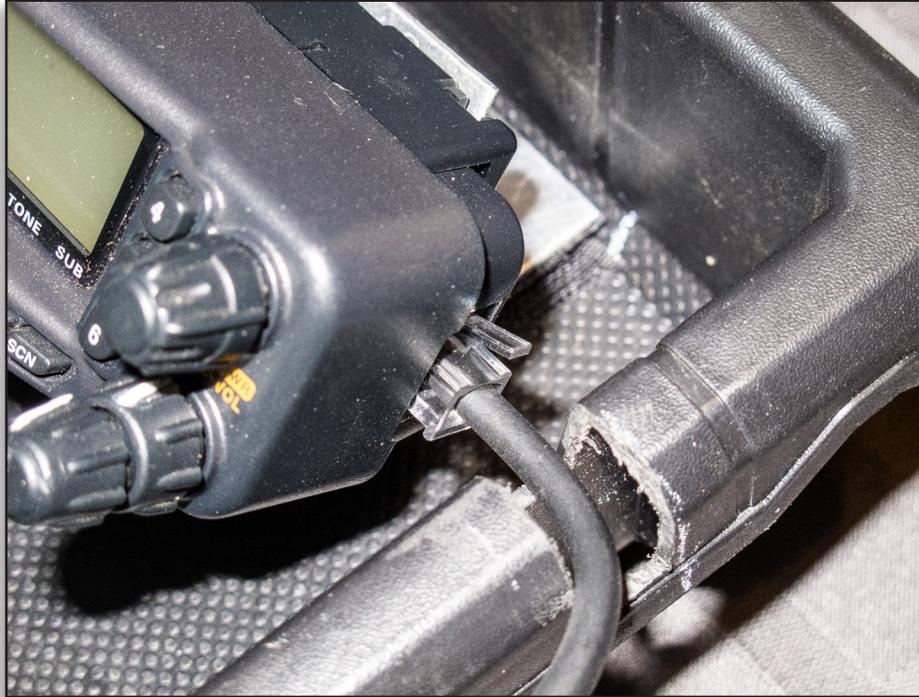


FIGURE 3



FIGURE 4



FIGURE 5



FIGURE 6

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