Setting up for Field Day

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Q: How do we find a good Field Day site?

A: This is usually a two-step process. The first is locating suitable sites for publicity and propagation. The next is obtaining permission to use the property. Usually, locations with plenty of publicity potential are the easiest in terms of getting permission to operate (local parks are quite popular). A side benefit to obtaining permission in advance is discovering potential problems—such as the inconvenience of being thrown out of the place at sunset!

Q: Is it advisable to get a location on top of a big hill?

A: Not necessarily. W1NY seems to do very well in the January VHF Sweepstakes and W1AW certainly has a decent HF signal. Neither are on big hills. The surrounding hills that exist at such locations are not high enough to pose serious problems. If you decide to operate from a hilltop, make sure you dress appropriately for the weather. This is especially true for mountaintop sites. (Few operators can run up big contact totals while freezing.) High-altitude sites also tend to have more trouble with thunderstorms than lower locations.

Q: How can I figure out whether a nearby hill is going to block our signals?

A: A topographical map is a useful tool. If you're mathematically inclined, you can calculate your signal *takeoff angle* and determine if it is likely to be obstructed. All you need is an electronic calculator that has an **ATAN** function. Look at the map and determine the height of the nearest hill (in feet) as well as the distance from your site to the hill (in feet). Use the following formula:
Takeoff angle = atan(hill height/distance to hill).

At VHF and above, you want to avoid obstacles at low takeoff angles. At HF, obstructed low angles of a few degrees are rarely a problem for stations using low horizontal antennas.

Q: The park has no problem with us staying all night, but they won't let us attach anything to the trees. Will nearby trees prevent our ground-mounted verticals from working effectively?

A: At HF frequencies the attenuation from trees is usually insignificant. Getting an HF groundwave signal through a couple of miles of dense growth is difficult, but I wouldn't be too concerned. After all, who really wants stations a few miles away to be as loud as possible on HF?

At UHF and above, trees can be a problem, particularly if you have only a few dB to spare. It's sometimes possible to work through trees at frequencies up to 2.3 GHz—if the trees are a good distance away. At higher frequencies, people start thinking about chain saws (just kidding!).

Q: Does it make any sense to set up a 10-meter SSB station for Novices and Technicians if the sunspot activity is so low?

A: Even if there is little chance of F2 skip, there is always the possibility of E_s (sporadic-E) activity. Sporadic-E propagation is difficult to predict, but when it's hot, it's *hot*! A good E_s opening will span several hundred miles or more and the signals you'll hear will often be quite strong. Novices and Technicians can also have great fun working locals while they're searching for E_s openings. Don't rule out 10 meters on Field Day!

Q: I'd like to try 6-meter operation. Where can I get an inexpensive radio for this band?

A: Used radios (such as the Drake TR-6) can occasionally be found, but the demand seems to far exceed the supply. The most inexpensive single-band radio seems to be the Yaesu FT-690 Mk II. The MF/HF radios that include 6 meters may be an option for some people. Another option is to get a transverter that can be used with HF radios. For more information about 6-meter gear (and operating techniques) read the article by Ken Neubeck, WB2AMU, "Getting Started on the Magic Band" in the March 1994 *QST*.

Q: The operators of our Novice station want to run 200 W peak-envelope-power (PEP) on 10-meter SSB. Is the 150-W limit for the Field Day power multiplier based on average power or PEP?

A: The limit is based on PEP, so 200 W PEP would result in a multiplier of 1.

Q: Doesn't this mean that Field Day QRP stations can run only half the QRP ARCI standard of 10 W PEP on SSB?

A: Yes.

Q: Is there a conversion factor between PEP and what my average-power wattmeter indicates?

A: There is no standard conversion factor—it all depends on modulation characteristics and meter damping. Some meters are so heavily damped that a 1-kW signal will read only 70 W! The February 1991 *QST* has a comparison review of peak-reading wattmeters.

Q: We want to run SSB QRP, but we own 100-W radios that lack the means to reduce power to the 5-W level. Any suggestions?

A: One method of reducing power is to apply a negative voltage to the rig's ALC connector (assuming it has one) using a battery and a potentiometer. The disadvantage of this technique is the ease of putting out full power if this negative voltage is accidentally upset.

Q: We'd like to demonstrate an EME (moonbounce) station, but we would need considerably more power than our 5-W QRP classification allows. Is there some way we could make the contacts without hurting our score?

A: Well, you could compensate for your low output by building a parabolic dish antenna the size of two football fields. The easier solution is to use another call sign and run two separate operations for scoring purposes. One operation can then run up the big score with QRP multipliers while the other can concentrate on having fun and showing off favorite activities.

Q: Won't that result in a lot of interference? Even though we ran QRP last year, we had a considerable amount of interference between stations. How can we prevent this?

A: There are a variety of techniques to reduce interference. The first is to space the antennas as far apart as possible, while keeping everything within the 300-meter circle required by Field Day rules. Cross polarization also helps to reduce pickup between antennas. For example, a vertically polarized antenna might be used on 15-meter CW and a horizontally polarized antenna on 15-meter SSB. Another technique is to use separate power systems—perhaps a separate battery for each radio. A supply of toroids might also be helpful—cables often act as antennas that pick up common-mode interference. Wrapping cables through toroids will often choke off the interference.

In some cases you have to filter the transmitters to reduce broadband noise and spurious signals. Filtering the receivers

may also be necessary to reduce the level of out-of-band signals. See the article by Lew Gordon ("Band-Pass Filters for HF Transceivers") in the September 1988 *QST* and the article by Alan Bloom, N1AL, ("Field Day Interference Filters") in this issue.

Q: We'd like all of our radios to use the same 12-V power connector. That way, we can swap rigs in an instant if necessary. Can you suggest a standard plug?

A: The August 1993 *QST*, page 50, describes a recommendation useful for supplying up to 12 A. It uses a 2-pin Molex connector available at Radio Shack and other electronic suppliers.

Q: We blew up a Heathkit HW-9 by assuming it followed that standard! Are there circuits that would protect the radio from batteries being hooked up backward?

A: The July 1993 *QST* has an article by Michael Covington, N4TMI, titled "Reverse Polarity Protection for your Gear." It includes circuits for protecting low-power rigs. The January 1994 *QST* has more suggestions (by Lee Hart, N8DUA), including the use of a relay for high-current applications.

Q: Is there a way to protect radios from a generator that goes berserk?

A: A useful circuit appeared in the August 1993 *QST* ("A Dual-Range AC Voltage, Current and Frequency Monitor" by Ed Oscarson, WA1TWX). The article by Jerry Paquette, WB8IOW ("Overvoltage Protection for AC Generators"), in this issue provides not only protection, but also for operator safety. It's a simple circuit that you can build in time for this year's Field Day—so get busy! Beware of the old technique of using a clock to determine the line frequency. Many modern clocks rely on an internal quartz standard, rather than the 60-Hz line frequency.

Q: We want to charge car batteries with solar cells. Do we need a sophisticated setup?

A: No—unless you want to use a big, expensive solar panel to charge the battery quickly. I'd recommend you use a small panel, rated at less than 3 A, and charge the battery over several days or a week. Not only is this cheaper, it's also safer. Slow charging doesn't generate as much dangerous hydrogen gas. An unwanted spark can easily cause a battery to explode, spraying the area with nasty sulfuric acid. It makes a lot of sense to charge a car battery outside your home. Keep in mind that car batteries aren't designed to be deeply discharged—a new battery could be killed with a few complete discharges. But, it will do an excellent job of powering a radio that draws only a few amps for several hours.

Q: Sounds like car batteries aren't the best choices. Are there better batteries?

A: Sealed lead-acid batteries are probably the best choice for powering radios. They aren't messy and perform well electrically. Their only flaw is you can kill them by overcharging. While their voltage varies during discharge, the voltage during charging is pretty constant. Thus, the danger of exposing your radio to too much voltage is reduced if you wish to operate the radio while charging. Conversely, the voltage of a NiCd pack is pretty constant while discharging, but can soar to high voltages while charging. As a result, a low-current receiver could be damaged if operated off a NiCd while it's being charged.

Q: I noticed that an old tube-type radio changed frequency whenever someone entered the tent after the weather got chilly. What caused this?

A: What you're noticing is temperature-induced frequency drift. Free-running oscillators are often susceptible to changes in temperature. Opening the tent changed the temperature.

Q: I once heard of a Field Day group that ran into below-freezing weather on a mountaintop site. At one point some of their radios stopped working. What caused this?

A: Semiconductor junctions are actually quite temperature sensitive. (You can use them to make thermometers! The National Semiconductor LM335 is an optimized version.) Most likely, the transistors stop-ped conducting enough current to operate properly. A technique known as active biasing will greatly reduce this problem, but requires more complex circuitry.

Q: Last year we broke an expensive fiberglass support boom for our satellite array and can't get anyone to bring a replacement this year. Is there some way of using a metal boom without upsetting the circularly polarized Yagi antennas?

A: Yes. The proceedings of the 1993 AMSAT-NA Space Symposium feature a paper by Kent Britain, WA5VJB, titled "Using Metal Booms to Support AMSAT Antennas." By avoiding half-wave multiple distances between the driven element and the boom, and by keeping the tips of the elements away from the boom, Kent found that the interaction between a Yagi and a metal boom is minimal.

Q: We'd like to put up a rhombic antenna, but can't seem to agree on where to point it. How should we decide?

A: There are at least two opposing philosophies on this issue. One is to point it toward a population center that is already favored by your location. The rationale is to have an outstanding signal that will attract attention. On the other hand, you could orient your rhombic to help you reach an area where you're usually marginal. I prefer the former for Field Day—there is usually no shortage of stations to work.

Q: How about feeding several Yagi antennas simultaneously to get an outstanding signal in all directions?

A: Since power is divided between each Yagi, the gain of each Yagi is reduced by the power-divider loss. If two signals are phased properly at the receiver, you can double the magnitude of the signal, which gives a 6 dB gain (or as much as a 3 dB net gain). Unfortunately, this rarely happens if the antennas are pointing in different directions.

We welcome your suggestions for topics to be discussed in *Lab Notes*, but we are unable to answer individual questions. Please send your comments or suggestions to: Lab Notes, ARRL, 225 Main St, Newington, CT 06111. QST

Strays

HOSPITAL ALARM QRM?

◊ John Marthens, NU6A, of Whittier, California, mentions another source of potential interference from amateur transmitters that hams should be careful to avoid: interference to hospital smoke-detector alarm systems. John says that the National Fire Protection Association has learned of numerous reported cases of interference to hospital smoke alarms caused by cellular telephones, and that some hospitals have already banned the use of cellular telephone and hand-held transceivers in their buildings.

John explains that with the technology used five or more years ago, false alarms can be readily triggered by a combination of internal dust accumulations and rectification of VHF or UHF signals. Newer systems aren't as susceptible, but can still be triggered by RF.

We might start seeing signs reminiscent of the saloons of the old Wild West: ***CHECK YOUR HAM RIGS AND CELL PHONES AT THE SNACK BAR.***

I would like to get in touch with...

◊ any regimental or battalion radio operators who were with the 14th Infantry Regiment of the 71st Infantry Division in the ETO during WW II. Jules Blitz, W3YZE, 7934 Winterset Ave, Baltimore, MD 21208.