

Field Day on 2 Meters

Opportunities for Technicians and Above

By Fred Seitel AE6SF

If you are a Technician class ham and have a 2-meter (or VHF/UHF dual-band) radio, **you can have fun on ARRL Field Day during this pandemic** by making and logging contacts (QSOs) on 2-meters and higher. You will earn points which will be added to the club's score when you submit your results to the ARRL. Together, but operating separately, we can enjoy the pleasure of performing as a coordinated group.

Here are pointers for success.

What if I don't have a radio, or external antenna, or cable?

Our club has radios, antennas, cables, and accoutrements to lend. Contact fdlender@fredee.com to borrow. If you have items to loan out, please also contact us, same address.

Field Day Rules

Get the official rules here. Click on "Field Day Rules". They should clarify any ambiguities:

<http://www.arrrl.org/field-day>

What mode should I use?

Unless you have a multimode radio (which does weak-signal AM, SSB, CW), your mode will be analog FM voice. The following comments apply to both sets of modes except the antenna polarization changes.

How do I make a contact?

Either you "Run" by finding an open frequency within your privilege range and using your radio call "CQ Field Day, this is [callsign]" repetitively and listen in-between for someone to respond, or you "Pounce" by scanning frequencies until you hear someone calling CQ and you respond with your callsign "[callsign]". Both stations then exchange pre-defined information (see EXCHANGE below) and then log results [see LOGGING below]. If you have Internet access, your results can be uploaded in real time for comparison with other club members. It's fun to make multiple contacts, to find out where they are located, and to use your own equipment and technical savvy to make it happen.

QSOs through repeaters do not count but repeaters may be used for spotting. The idea is to have two radios communicate directly via RF with no intermediaries.

Can I use an HT (hand-held transceiver)?

Yes. A 5W hand-held transceiver (HT) is a viable radio. Antenna type, height above terrain, elevation, and location can increase coverage more than raw power. There's a score multiplier if all your QSOs are limited to 5 watts maximum. You may also use a mobile rig and/or amplifier for higher power.

Antenna Type

The antenna type has a significant influence on range through foliage since a better antenna produces a stronger signal. Antenna types are listed here in order of increasing effectiveness. See Figures 1 through 12 for specific comments. There is a big jump between the following groups: Figures 1-4 (attached whips), Figures 5-9 (elevated omnidirectional antennas), Figures 10-12 (gain antennas). The greater the range, the more contacts that are likely:



Figure 1



Figure 2

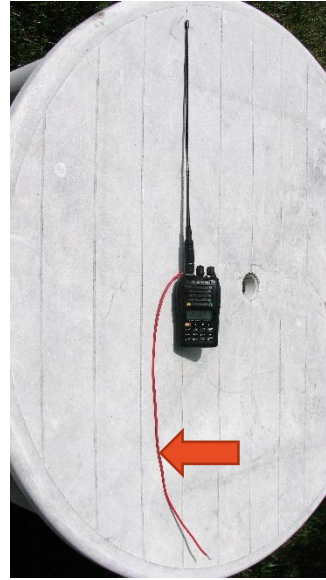


Figure 3

Figure 1: Original rubber-duck antenna. These perform poorly.

Figure 2: 15" whip, greatly improves handheld transmissions.

Figure 3: 19" length of wire added to base of antenna forms a better dipole than does one's arm.



Figure 4

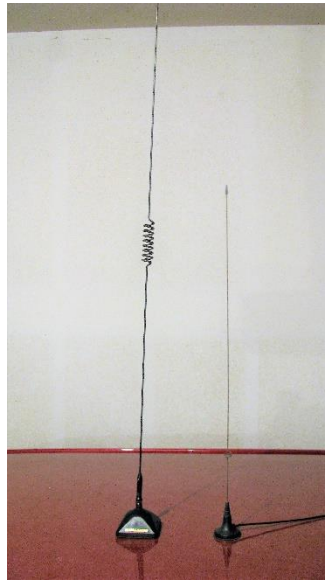


Figure 5



Figure 6

Figure 4: Radio on top of car (or refrigerator) for a ground plane. Optional speaker-mic eases operation.

Figure 5: Two mag-mount antennas on car roof (only one is needed). Aluminum roofs (e.g. F150) also make good ground planes but the magnetic bases will not be attracted.

Figure 6: AE6SF Rabbit Ears antenna. Home-brewed simple dipole, see April 2020 Short Skip.



Figure 7



Figure 8



Figure 9

Figure 7: N9TAX Slim Jim 2M/440 J-Pole antenna. Shown on a horizontal rope. Hang high.

Figure 8: WB6IQN Ed Fong DB-1 dual-band antenna. DB-1 mast mount, DB-2 hang mount.

Figure 9: WB6FRZ ground-plane antenna. Fits on painter pole or PVC pipe or hangs from tree or rope. Portably compact. Available to club members on loan for Field Day (or anytime) or for purchase.

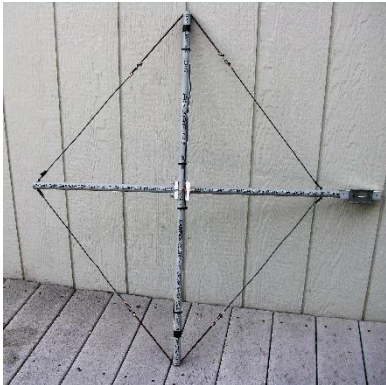


Figure 10



Figure 11



Figure 12

Figure 10: N6IY 2M 3-element portable beam. Mast mount at end. Constructed at Field Day 2014.

Figure 11: Classic home-brew Tape Measure Antenna, constructed by KI6MSP at Field Day 2018.

Figure 12: ELK 2M/440L5 log-periodic antenna. 2M gain 6.6 dBd, 440 gain 7 dBd. Handheld or mast.

The external beam (directional) antennas shown in Figures 10-12 concentrate energy in a desired direction, such as directly toward the receiving station, or up over a mountain ridge using knife-edge diffraction, or as a bank shot off of (or direct reflection from) the broad side of a mountain, thereby increasing range.

Cable Adapters

To connect to an external antenna, a cable adapter (see Figure 13) for the HT is required. There is no standardization on HT antenna connectors. Obtain an adapter specific to your radio. Club members might have one to loan.



Figure 13 (at right): Center adapter converts the HT connector to BNC which enables fast antenna swaps. Cable shown adapts from BNC to UHF (SO-239) although some cables end with a PL-259 instead.

Antenna Polarization

Vertical for analog FM Simplex. Horizontal for SSB, digital, and weak-signal modes.

Height and Elevation

Since 2M frequencies tend to be visible line-of-sight (LOS) plus 15%, height above terrain and elevation play a far greater role than does power level. Coverage will be greatest by raising the antenna up high and/or by operating from a mountain top or mountainside that has long-distance visibility.



Figure 14 (at right): WB6FRZ ground-plane antenna elevated 15 feet using a painter pole, umbrella stand, and table. Use guys if windy. Hanging it higher from the tree in the background would improve coverage.

Of course, a long LOS will not help if it is over an area sparse with hams, such as the ocean but over the Bay Area would be great. For reference, shown in the table below are LOS+15% distances for various antenna heights over level terrain. Double these distances if the opposite station has a similar height, otherwise add the two station results together:

Height	5.5'	10'	15'	20'	30'	100'	500'	1000'	2000'
LOS+15%	3.3 miles	4.5	5.4	6.3	7.7	14.1	31.5	44.5	63.0

Feedline (typically Coax)

Feedlines (e.g. coaxial cables) dissipate signal, so minimize the length or use a low-loss cable. Cable loss values are published as dB loss per 100 feet. Prorate by length. A 3dB loss dissipates half the power.

Frequencies

The following table lists suggested analog FM simplex frequencies and the suggested order in which to select them (when “running”). For example, on 2M, 146.535 MHz is the first suggested frequency.

Order	VHF – 2M	UHF - 70cm	COMMENT
10	146.445		
9	146.460		
8	146.475	445.925	
7	146.490	445.950	
6	146.505	445.975	
QST ONLY	146.520	446.000	NAT'L CALLING FREQ.
1	146.535	446.025	
2	146.550	446.050	
3	146.565	446.075	
4	146.580	446.100	
5	-	446.125	
QST ONLY	147.315 + 88.5		SCRA repeater, no QSOs.

The ARRL band plan allows simplex operation anywhere in the ranges of 146.40-146.58MHz, 147.42-147.57MHz, and 445.000-447.000MHz, with 2M steps of 0.005 MHz and 70cm steps of .0125 MHz, but the values in the table are more commonly used. If they are all in use, expand into the full ranges.

If you aren't having any CQ's answered, announce your operating frequency on the National Calling Frequency (start by saying "QST"), but don't park there. Shift to a suggested frequency. You may also announce your operating frequency (called spotting) on the club repeater but shift back to simplex to conduct the QSO. **Club members operating HF are encouraged to monitor 147.315 MHz for QSTs.**

Exchange

The information exchanged during the QSO is three items from each party, namely Call, Class and Section. In my case, these will be:

- Call: AE6SF
- Class: 1E
- Section: SF

Where Call is your callsign (AE6SF in my case). The number 1 is the number of transmitters that I will key up simultaneously. The Class letter (E) is determined as follows:

- Class E: At home using off-grid (emergency) power for transmit, receive, and on digital modes, the computer running the digital software. Lights, heat, A/C, logging computers may run on-grid. 2021 transmit 150W PEP max.
- Class D: At home using grid power for transmit and receive. 2021 transmit 150W PEP max.
- Class C: Mobil using station that normally is in the vehicle. Car battery or alternator counts as emergency power but not the multiplier of 5 since alternator is engine driven.
- Class B: One or two persons, portable, located away from home, not at a regular station location.

- Class B – Battery: Same as Class B except 5W max transmit power, and power source other than grid or motor-driven generator.
- Class A & Class A - Battery: Club or non-club operation, three or more persons, see Field Day rules for details.

The designation SF is my ARRL / RAC section (San Francisco). Your section can be found here:

<http://www.arrl.org/section-abbreviations>

If I were exchanging with N6IYY, I would say “N6IYY, please copy One Echo, Sierra Foxtrot”.

Logging

To fully participate and earn points, you must submit a log of your QSOs to the ARRL. It is possible to do this by hand, but the club recommends using the computer program *ARRL Field Day Contest Log*, latest version, by Scott N3FJP to log QSOs in real time. The program is easy to use, timestamps entries as you go, generates submittal files after the event, and optionally can contribute real-time data to the SCRA score totalization page. Be sure to use the most current version. The first 30 entries are free. Any additional QSOs require a lifetime license for \$8.99 which includes unlimited version updates.

Unfortunately, the club license may not be used where stations are located outside of the ARRL-mandated 1000' radius for Field Day. If interested, purchase the license directly from Scott N3FJP here:

<https://www.n3fjp.com/fieldday.html>

If you have Internet access while logging, please set up your computer to upload your progress in real time so that we all may follow club members' progress. Directions for setup (as of this writing) are here:

<https://www.fredee.com/scra/fdlogger.pdf> . If in doubt, contact me (Fred) at ae6sf@fredee.com .

Figure 15 shows a sample screenshot (using fake data) of the program once it is set up. It is easy to enter the other party's Call, Class and Section in the three boxes and hit the Enter key (or equivalent).

Figure 15: Example screen from ARRL Field Day Contest Log. (Later versions should look similar.)

Scoring and Bonus Points

Each QSO counts for points as follows: Voice: 1 point; CW and digital: 2 points.

The total QSO points are then multiplied by a power multiplier.

- x5 for 5W or less if not on commercial power and not using a motor-driven generator
- x2 for 5W or less if using commercial power or generator
- x2 for 150W maximum
- x1 for greater than 150W

You may apply only one multiplier, and it is the same one for all QSOs. No prorating is allowed.

After multiplying QSO total by the power multiplier, then Bonus points are added. There are 16 ways to earn bonus points. They are cumulative. Here are three of the more common ways:

- 7.3.1 100% Emergency Power: 100 bonus points per transmitter if all contacts are made using emergency power.
- 7.3.8 Alternate Power: 100 bonus points for making 5 QSOs minimum using off-grid power and not from a petroleum driven generator. (Propane counts as petroleum.)

- 7.3.9 W1A1 Bulletin: 100 bonus points for copying the special Field Day bulletin transmitted by W1AW or K6KPH. Sent in CW (Morse code), digital, and phone (voice) modes. For the schedule, go to <http://www.arrl.org/field-day> and search for “W1AW Bulletin Schedule”. It may not be available until Field Day nears.

Stay tuned to the club weekly blog, Tuesday-night SCRA service net, and SCRA website for updates.
<http://sonomacountyradioamateurs.com/wp/>

Conclusion

Have fun and good luck! May the QSOs be with you!