Maximize Your ARRL Field Day Performance

Expert advice from the W3AO team will help you get the most out of your station, regardless of the bands, modes, and antennas you may be using.

Frank Donovan, W3LPL, and Rol Anders, K3RA

If you are a Field Day enthusiast, perhaps you have worked W3AO (see Figure 1). Our group has entered Field Day for more than 20 years in categories with many transmitters on the air simultaneously, often exceeding 10,000 contacts. Groups often ask us for recommendations on how to improve their scores, given that we have transmitters on virtually all modes and bands whenever and wherever there is a chance that contacts can be made.

Bands and Modes

The most common question we are asked is: "What bands and modes should we concentrate on?" Because we are on all bands and modes simultaneously, W3AO has extensive data that will help you make decisions. The 20- and 40-meter bands are by far the most productive Field Day bands due to propagation. Forty meters is open around the clock, and 20 meters is open much longer than every band other than 40. Year after year, our highest contact totals have been on 20- and 40-meter SSB. But the Field Day scoring system always produces our highest point totals on 40- and 20-meter CW. If you have one or more operators with CW skills, those two CW bands should be their highest priority. As you can see in Table 1, our 40- and 20-meter CW, SSB, FT8, and Get on the Air (GOTA) stations have exceeded our point totals on every other band. If you do not have one or more experienced CW operators, excursions to FT8 on 40 and 20 meters could be among your most productive operating periods.

CW, SSB, FT8, and GOTA Stations

To capitalize on the enormous potential of 40 and 20 meters, it is obvious that you should spend as much time on both bands as possible. That means having the ability to operate at least two modes on these bands simultaneously. One hundred watts of RF and basic antennas provide the opportunity to simultaneously operate multiple transmitters on the same band with little to no mutual interference. W3AO operates as many as four stations simultaneously on both 40 and 20 meters — SSB, CW, FT8, and sometimes GOTA.

If you're considering the use of four simultaneous transmitters on the same band, the question remains: "How do you do that?" All W3AO antennas on the same band are horizontally polarized, are installed end to end with at least one-half wavelength of separation between them, and are oriented broadside to the highest concentrations of population. When operating an SSB GOTA station in the same band and at the same time as the main SSB station, their frequencies are separated as much as possible.

Cross-Polarization Does Not Adequately Reduce Inter-Station Interference

Years ago, we tried the "cross-polarization solution" by installing a quarter-wavelength vertical antenna as far

Figure 1 — The W3AO Field Day team in action. [Audrey Suhr photo]

Table 1 – W3AO Bands and Points Breakdown in 2024

	Contacts				Points			
Band (Meters)	CW	FT8	SSB	GOTA	CW	FT8	SSB	GOTA
80	466	204	387	57	932	408	387	57
40	1211	292	1709	160	2422	584	1709	160
20	1213	533	1423	216	2426	1066	1423	216
15	634	334	925	259	1268	668	925	259
10	8		235	3	16		235	3
6		83				166		
2		23				46		
Totals	**3532**	**1469**	**4679**	**695**	**7064**	**2938**	**4679**	**695**

as possible from the horizontally polarized antenna on the same band. We were never able to eliminate the interference between stations, even with substantial antenna spacing. Besides, verticals have drawbacks that make them undesirable for Field Day.

Simple Antennas

Because 40 and 20 meters are by far the most productive Field Day bands, they are also the most crowded, especially on SSB and FT8. As a result, it's critically important that you install simple but highly effective 40- and 20-meter antennas.

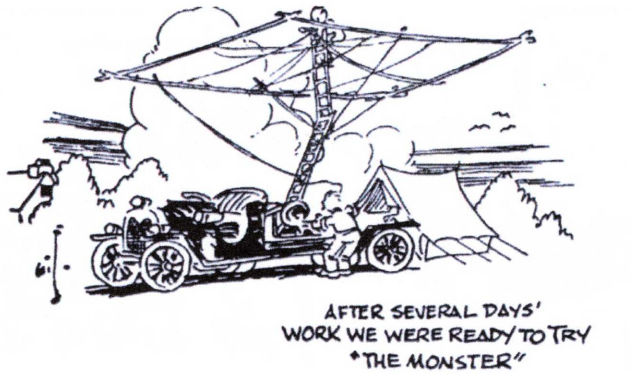
It is tempting to consider a quarter-wave vertical antenna given the ease of erection and omnidirectional radiation pattern. However, unless your Field Day site is on the oceanfront or in a salt marsh, horizontally polarized antennas at modest heights will consistently outperform vertically polarized and sloping antennas by as much as 8 dB at the same location. Furthermore, to the extent you can make a vertical antenna work, vertically polarized antennas have inadequate higher-angle radiation needed for the many Field Day contacts taking place within less than 1,000 miles. Vertically polarized antennas and low antennas such as NVIS horizontal dipoles, low horizontal loops, and magnetic loops are proven poor performers on these highly productive but crowded bands, and they will quickly discourage all but your most hard-boiled operators.

Beam Antennas

You may have heard stories of clubs that decided to build their "dream antenna" for Field Day — perhaps erecting a huge multi-element Yagi for 20 meters. Is it worth the extra effort? Definitely not.

Increased gain in one direction always results in unwanted loss in another, and you want a strong signal into all the large population centers without need for a rotator. A horizontally polarized Yagi with a maximum of three elements (a 3 dB beamwidth of nearly 70 degrees) is preferred. Eliminating a rotator means one less thing to break, as well as simplified setup and operating.

Near the center of the US, a 20-meter horizontal dipole broadside east/west at a 30- to 50-foot height will work quite well, perhaps supplementing with a small rotatable two- or three-element horizontal Yagi. Near the east and west coasts, a fixed two- or three-element 20-meter beam at a 30- to 50-foot height will cover almost all of the major population centers without the need for a rotator.



This cartoon from a 1949 issue of *QST* is as valid today as it was 76 years ago. "Monster" high-gain antennas are not the way to ensure high contact rates on Field Day.

Be sure you know where to accurately aim your antennas. Print a map of your Field Day site along with a Great Circle map centered on your location, such as those available at **https://ns6t.net/azimuth/azimuth.html**. Figure 2 shows a Great Circle map centered on W3AO. All of our HF antennas are fixed due west, which maximizes our coverage of high-population areas.

At W3AO, we've found that horizontally polarized, center-fed half-wavelength dipoles are effective on 40 meters, and small two- or three-element Yagis at 30- to 50-foot heights are effective on 20, 15, and 10 meters. In the past, we went to considerable effort to erect two-element 40-meter beams, but our half-wavelength horizontal dipoles have proven to be just as productive.

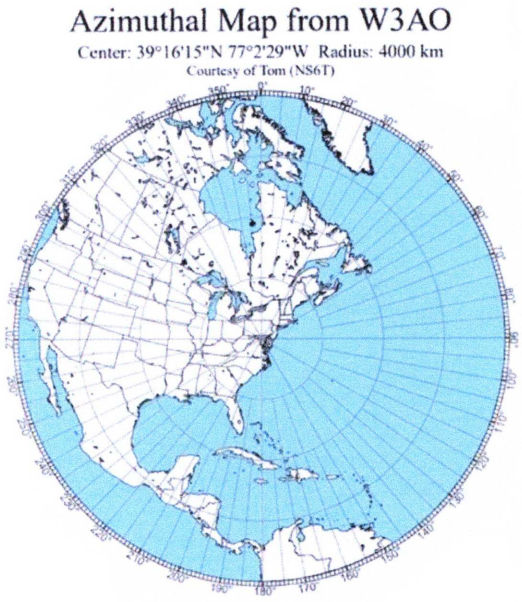


Figure 2 — A Great Circle map centered on W3AO.

Antenna Height Matters

All W3AO antennas are installed at 50 feet or less. To maximize coverage from your antennas, you do not want high antennas optimized for low-angle radiation at the expense of needed higher-angle radiation, nor should you use low antennas with inadequate low-angle radiation. A 40-meter half-wavelength dipole at 40 feet has the desirable radiation pattern shown in Figure 3. It provides excellent 78-degree broadside beamwidth and adequate higher-angle radiation at all azimuths. This is ideal for 40 meters during the day, and it provides sufficient low-angle radiation for making contacts late at night.

Band-Pass Filters

Inexpensive 100 W transmit/receive band-pass filters for each station provide valuable protection against crossband front-end overload, but band-pass filters won't help with in-band interference between stations. That can be controlled by simple end-to-end antenna placement.

Most harmonics between bands can be placed out of band by judicious choice of operating frequencies. For example, harmonics from a 40-meter SSB transceiver operating in the General portion of the band — say, at 7220 kHz — will appear at 14,440 kHz, well outside the 20-meter band. Even a 40-meter CW signal at 7060 kHz will have a second harmonic at 14,120 kHz, which is a relatively unused portion of the band during Field Day.

Other HF Bands

The 160-meter band will produce very few points and will complicate your antenna arrangements. After 40 and 20 meters, 15, 80, and 10 meters — in that order — are the most productive Field Day bands. When 20 meters slows during the day, especially on Sunday, 15 or even 10 meters might be more productive for several hours. Likewise, when 20 slows during Saturday nighttime hours, 80 meters might be quite productive.

While 40-meter dipoles might work well enough on 15 meters, a small two- or three-element Yagi at least 30 feet high will be far superior. Definitely install an 80-meter half-wavelength horizontal dipole at least 30 feet high if you can, but this is not essential for a successful Field Day.

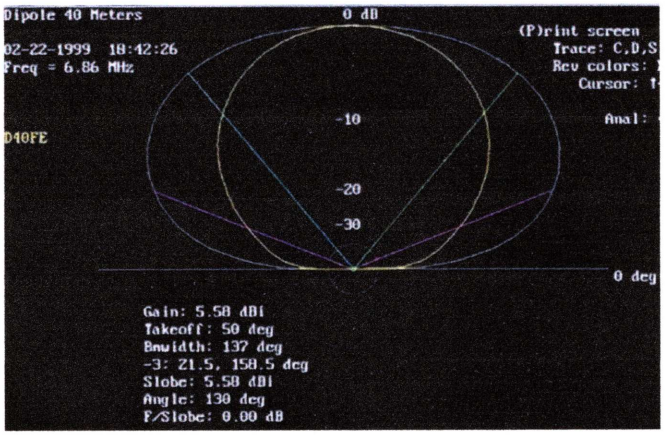


Figure 3 — The radiation pattern of a 40-meter horizontal dipole at 42 feet.

6-Meter FT8

A VHF station is a freebie from a transmitter count standpoint in nearly all Field Day entry categories, providing a valuable addition to your score. The vast majority of all Field Day VHF activity is on 6-meter FT8. A modest 6-meter beam (ideally with a small rotator or manually rotatable) at a 30- to 50-foot height is ideal.

Have Fun and Be Safe!

Finally, remember the Field Day "prime directive" (right after "Safety First") is to have fun. Simple but effective antennas — especially for 40 and 20 meters — will increase your team's fun factor. Here's wishing you a safe and fun Field Day 2025!

Frank Donovan, W3LPL, began his ham radio adventures at age 12 during the Providence Radio Association, W1OP/1, Field Day in 1959. His multioperator teams have made more than 1 million DX contacts in CQWW and ARRL DX contests. Frank contributed to the updated propagation section of the 100th edition of *The ARRL Handbook*. He retired 14 years ago as a chief engineer at General Dynamics Corporation. Frank can be reached at **donovanf@erols.com**.

Rol Anders, K3RA, was first licensed in 1958. Now retired as Chief Scientist for Space at Northrop Grumman Space Systems in Maryland, he is active in contests from home, W3LPL, and V26B, and he is an avid DXer. He is long-time chair of the National Conference of Volunteer Examiner Coordinators Question Pool Committee. Rol teaches free online licensing classes to hundreds of students each year, and he has been an organizer and 20-meter CW operator of the W3AO Field Day team since 1999.

For updates to this article, see the *QST* Feedback page at www.arrl.org/feedback.

Frequently Asked Questions

Here are some of the most common questions that we receive about ARRL Field Day. If you have a question that's not covered here, visit the Field Day FAQ pages in the "Rules, Entry Forms and Information Packets" section at **www.arrl.org/field-day#rules** or email **fdinfo@arrl.org**.

Q What is our Field Day class?
A Field Day entries (such as 21A, 3B, etc.) are classified according to the maximum number of simultaneously transmitted signals, followed by a designator indicating the nature of their individual or group participation. The transmitter number is not the number of physical transmitters onsite, but the maximum number of transmitters on the air at any point during the event. See the Field Day rules for more information on each class.

Q What is the Field Day exchange?
A Stations located in the United States, Canada, and US possessions exchange their Field Day operating class and ARRL/RAC Section. For example, a three-transmitter Class A station in Connecticut would send "3A CT" on CW and digital, or "3 Alpha, Connecticut" on phone. Stations located outside of the US and Canada send their operating class and "DX."

Q How do I determine my ARRL Section?
A A complete list of ARRL Sections is available at **https://contests.arrl.org/contestmultipliers.php?a=wve**. While some Sections are an entire US state or Canadian province, there are several states (Florida and California, for example) that have multiple Sections within them. See **www.arrl.org/section-boundaries** to determine which Section you are located in.

Q Our club would like to run a 40-meter CW station and a 40-meter SSB station at the same time. Is that permitted under the Field Day rules?
A Yes, that is permitted. You're allowed to have three signals on the air on the same band at the same time — one CW, one phone, and one digital.

Q I will be participating with my club Saturday during the day. Can I get on the air from home and make some Field Day contacts using my own call sign afterwards?
A Yes, the only limitation is that you cannot make contacts for points with any group or station from which you participate during Field Day. For example, you can't call the club's 2-meter Field Day station while driving to the site for QSO point credit.

Q What bands are we allowed to use on Field Day?
A Field Day operation is permitted on the 160-, 80-, 40-, 20-, 15-, and 10-meter HF bands, as well as all bands 50 MHz and above. Use of the 2200-, 630-, 60-, 30-, 17-, and 12-meter bands is prohibited.

Q Our group is planning to operate at our usual Field Day site, but some members will be operating from their home stations or from other locations. If we submit an entry using the club call sign, can members who operated using their own call signs contribute to the club's aggregate score?
A Yes. If your club is hosting a group Field Day effort, it will submit an entry as usual, using the club call sign. Club members operating at other locations will submit separate entries with their own call signs and will enter the club name on the entry form for club aggregate scoring.

Q The trustee of our club call sign is an Extra. Does this mean our station can operate on any frequency?
A No. A club call sign carries no operating privileges. A station may only operate according to the privileges of the control operator at the control point for that station. For example, if a control operator is a General, that transmitter may only be operated using General-class privileges.

Q We have a small group of area hams. I have a large, deep property, and we will be setting up in my backyard. What class will we be?
A Class A and Class B stations are designated as portable stations, with the difference being the number of participants. Class B stations are limited to 1 or 2 participants, which includes anyone assisting in setup/breakdown, as well as operating. If you're not using your normal station, or using any facilities installed for permanent station use, then you'd qualify as Class B. If you're operating from your permanent station location, then you'd be a Class D or E home station.

Q How do I know if my Field Day entry has been accepted?
A The web app will display a confirmation number and email a confirmation of your Field Day entry to the email address entered via the app. If accepted, the entry will appear on the "Field Day Entries Received" page at **https://field-day.arrl.org/fdentriesrcvd.php**. If you have difficulty submitting an entry, contact **fieldday@arrl.org**.

BONUS POINTS ADD UP!

Use this Bonus Points Calculator to keep track of your Field Day Bonus Points (see Rule 7.3 for details). Some bonus points require submission of proof and will be verified before being added to your score. Maximum bonus points are listed unless otherwise noted.

POINTS	ACTIVITY	AVAILABLE CLASSES
	100% Emergency Power. *100 bonus points* per transmitter; max. 20 transmitters, max. 2,000 points. Bonus stations (such as the GOTA station and satellite station) do not count toward determining the number of transmitters for the class and do not qualify for transmitter bonus points.	A, B, C, E, and F
	Media Publicity. *100 bonus points.* Bonus points may be earned for obtaining publicity from the local media. A copy of the media publicity received (newspaper article, news website post, etc.) must be submitted to claim the points.	All
	Set Up in Public Place. *100 bonus points.*	A, B, and F
	Public Information Table. *100 bonus points.* Bonus points may be earned for making information about amateur radio available to the public at your Field Day site.	A, B, and F
	W1AW Field Day Bulletin. *100 bonus points.* Copy, via amateur radio, the special Field Day bulletin transmitted by W1AW or K6KPH. An accurate copy of the message must be included with your Field Day entry to claim the bonus.	All
	Message Handling NTS/ICS-213. *0 to 100 points max., calculated by taking the Number of Messages (max. 10 messages): _____ × 10 bonus points for each formal message originated, relayed, or received and delivered during the Field Day period.* Copies of each message must be included with the Field Day entry. The message under Rule 7.3.5 does not count. All messages claimed for bonus points must leave or enter the Field Day operation via amateur radio RF.	All
	Message to ARRL Section Manager or Section Emergency Coordinator. *100 bonus points.* See Rule 7.3.5 for message format. This message is separate from the messages handled in Rule 7.3.6 and may not be claimed for bonus points under that rule. A copy of the message must be included with the Field Day entry.	All
	A Satellite QSO. *100 bonus points.* Satellite QSOs also count for regular QSO credit. List these contacts separately on the summary sheet as a separate "band." The QSO must be between two Earth stations through a satellite. Stations are limited to one (1) completed QSO on any single-channel FM satellite.	A, B, and F
	Alternate Power QSOs. *100 bonus points.* Complete at least five QSOs without using power from commercial mains or a petroleum-driven generator. A separate list of alternate power QSOs must be submitted with your entry.	A, B, E, and F
	Site Visit by Invited Elected Official. *100 bonus points.*	All
	Site Visit by Invited Served Agency Official. *100 bonus points.* Visits from ARRL officials (SM, SEC, DEC, EC, etc.) do not qualify for this bonus.	All
	Educational Activity. *100 bonus points.*	A, D, E, and F
	Youth Participation. ☐ For Class A, C, D, E, or F groups: *20 bonus points per participant age 18 or younger who completes at least one QSO; max. 100 points.* ☐ For a one-person Class B station: *20 bonus points if the operator is age 18 or younger; max. 20 points.* ☐ For a two-person Class B station: *20 bonus points for each operator age 18 or younger; max. 40 points.*	All (see specific points per class)
	GOTA. See Rule 7.3.13 for the bonus point breakdown.	A and F
	Use the Field Day Entry Web App. *50 bonus points.* Submit your entry using the web app at **https://field-day.arrl.org/fdentry.php.**	All
	Safety Officer. *100 bonus points.* Include a statement with the supporting documentation for your entry, verifying that a designated Safety Officer completed the ARRL Field Day Safety Check List.	A
	Social Media. *100 bonus points.* Promote your Field Day activation to the general public via social media (Facebook, X, Instagram, etc.). Individual participants do not qualify for this bonus. Club websites do not qualify as social media. Available to all classes who welcome visitors to their operation.	All
	Field Day Site Responsibilities. *50 bonus points.* Include a statement with the supporting documentation for your entry, verifying that a designated individual completed the Field Day Site Responsibilities Check List.	B, C, D, E, and F
	TOTAL BONUS POINTS CLAIMED	

FIELD DAY 2025

ARRL/RAC Section Checklist

UNITED STATES

- [ ] ALABAMA · AL
- [ ] ALASKA · AK
- [ ] ARIZONA · AZ
- [ ] ARKANSAS · AR

CALIFORNIA

- [ ] EAST BAY · EB
- [ ] LOS ANGELES · LAX
- [ ] ORANGE · ORG
- [ ] SACRAMENTO VALLEY · SV
- [ ] SAN DIEGO · SDG
- [ ] SAN FRANCISCO · SF
- [ ] SAN JOAQUIN VALLEY · SJV
- [ ] SANTA BARBARA · SB
- [ ] SANTA CLARA VALLEY · SCV

- [ ] COLORADO · CO
- [ ] CONNECTICUT · CT
- [ ] DELAWARE · DE

FLORIDA

- [ ] NORTHERN FL · NFL
- [ ] SOUTHERN FL · SFL
- [ ] WEST CENTRAL FL · WCF

- [ ] GEORGIA · GA
- [ ] HAWAII/PACIFIC · PAC
- [ ] IDAHO · ID
- [ ] ILLINOIS · IL
- [ ] INDIANA · IN
- [ ] IOWA · IA
- [ ] KANSAS · KS
- [ ] KENTUCKY · KY
- [ ] LOUISIANA · LA
- [ ] MAINE · ME
- [ ] MARYLAND/DC · MDC

MASSACHUSETTS

- [ ] EASTERN MA · EMA
- [ ] WESTERN MA · WMA

- [ ] MICHIGAN · MI
- [ ] MINNESOTA · MN
- [ ] MISSISSIPPI · MS
- [ ] MISSOURI · MO
- [ ] MONTANA · MT
- [ ] NEBRASKA · NE
- [ ] NEVADA · NV
- [ ] NEW HAMPSHIRE · NH

NEW JERSEY

- [ ] NORTHERN NJ · NNJ
- [ ] SOUTHERN NJ · SNJ

- [ ] NEW MEXICO · NM

NEW YORK

- [ ] EASTERN NY · ENY
- [ ] NORTHERN NY · NNY
- [ ] WESTERN NY · WNY
- [ ] NYC/LONG ISLAND · NLI

- [ ] NORTH CAROLINA · NC
- [ ] NORTH DAKOTA · ND
- [ ] OHIO · OH
- [ ] OKLAHOMA · OK
- [ ] OREGON · OR

PENNSYLVANIA

- [ ] EASTERN PA · EPA
- [ ] WESTERN PA · WPA

- [ ] PUERTO RICO · PR
- [ ] RHODE ISLAND · RI
- [ ] SOUTH CAROLINA · SC
- [ ] SOUTH DAKOTA · SD
- [ ] TENNESSEE · TN

TEXAS

- [ ] NORTH TX · NTX
- [ ] SOUTH TX · STX
- [ ] WEST TX · WTX

- [ ] US VIRGIN ISLANDS · VI
- [ ] UTAH · UT
- [ ] VERMONT · VT
- [ ] VIRGINIA · VA

WASHINGTON

- [ ] EASTERN WA · EWA
- [ ] WESTERN WA · WWA

- [ ] WEST VIRGINIA · WV
- [ ] WISCONSIN · WI
- [ ] WYOMING · WY

CANADA

- [ ] ALBERTA · AB
- [ ] BRITISH COLUMBIA · BC
- [ ] GOLDEN HORSESHOE · GH
- [ ] MANITOBA · MB
- [ ] NEW BRUNSWICK · NB
- [ ] NEWFOUNDLAND/LABRADOR · NL
- [ ] NOVA SCOTIA · NS
- [ ] ONTARIO EAST · ONE
- [ ] ONTARIO NORTH · ONN
- [ ] ONTARIO SOUTH · ONS
- [ ] PRINCE EDWARD ISLAND · PE
- [ ] QUEBEC · QC
- [ ] SASKATCHEWAN · SK
- [ ] TERRITORIES · TER