

CRCRST Field Day 2024

By Avery Davis, WB4RTP

Old slides by David Holman,
AC7DS





Joint Field Day Effort for 2024

Catalina Radio Club

<https://www.w7sa.org/>

Radio Society of Tucson

<https://www.rstclub.org/>

What is Field Day

- ▶ It's a contest!!
 - ▶ *Not Really, but it is*
- ▶ It's a social event!!
- ▶ It's a radio event



Field Day Is FUN!!!

Field Day is a Practice Deployment Emergency Communications Exercise



When Is Field Day?

June 22-23, 2024

Beginning 1800 UTC (1100 MST) Saturday

Ending 1800 UTC (1100 MST) Sunday



Objective

To contact as many stations as possible on the 160-, 80-, 40-, 20-, 15- and 10-Meter HF bands, as well as all bands 50 MHz and above, and to learn to operate in abnormal situations in less than optimal conditions.

Field Day is open to all amateurs in the areas covered by the ARRL/RAC Field Organizations and countries within IARU Region 2. DX stations residing in other regions may be contacted for credit, but are not eligible to submit entries.

Each claimed contact must include contemporaneous direct initiation by the operator on both sides of the contact. Initiation of a contact may be either locally or by remote.

Rules

- ▶ For Official Rules:
 - ▶ <https://www.arrl.org/field-day>
- ▶ **NEW FOR 2023: There is no limit to the number of contacts made by the GOTA station.** QSOs made by this station may be claimed for credit by its primary field day operation. In addition, bonus points may be earned by this station under rule 7.3.13.
- ▶ **New for 2024: 7.3.13 GOTA Bonus (Updated for 2024).**
- ▶ **7.3.18. Site Responsibilities Bonus (new for 2024):** A 50-point bonus may be earned by having a person ensure that the Field Day site is free of hazards, and that safety precautions have been taken throughout the entire event, as well as providing a point of contact to the visiting public or served agency officials. A signed copy of the Site Responsibilities Check List must be included in the supporting documentation sent to ARRL HQ in order to claim this bonus.
Available to Class B, C, D, E, or F entries.
- ▶ Entries must be postmarked or submitted by Tuesday July 23, 2024. Late entries cannot be accepted.

Operating

- ▶ Club Call:
 - ▶ K7RST on Mt. Bigelow
 - ▶ W7SA at CRC plant site station
 - ▶ WN7BSA for GOTA
- ▶ Exchange:
 - ▶ *Stations in ARRL / RAC sections will exchange their Field Day operating Class and ARRL / RAC section.*
 - ▶ *Example: a three transmitter Class A station in Arizona which also has a GOTA station and the extra VHF station:*
 - ▶ *Send "3A AZ" on CW or "3 Alpha Alpha Zulu" on Phone.*
- ▶ DX stations send operating class and the term DX (i.e. 2A DX).
- ▶ Only operate on bands and modes authorized by your band captain!



Example Contact

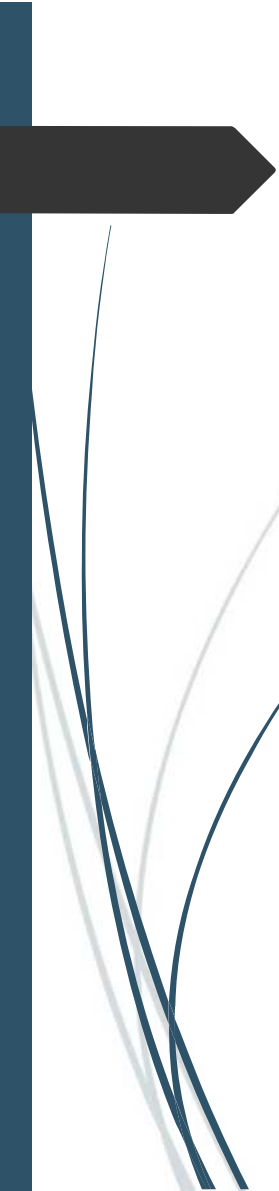
- ▶ “Running”: Find a clear frequency and call...
 - ▶ *(us)* CQ Field Day (CW: FD), CQ Field Day, this is K7RST, kilo 7 romeo sierra tango
 - ▶ *(them)* K7RST from N3TN, November 3 tango november
 - ▶ *(us)* N3TN from K7RST
 - ▶ *(them)* copy 5 Alpha West PA, 5 Alpha West PA
 - ▶ *(us)* QSL your 5 Alpha West PA, we are 3 Alpha Arizona, 3 Alpha Alpha Zulu, good luck (CW: GL) in the contest
 - ▶ *(another caller may follow immediately, if not call CQ again)*
- ▶ Or Hunt and Pounce:
 - ▶ Find someone calling CQ field day, such as N3TN
 - ▶ Check for duplicate before transmitting!
 - ▶ *(us)* N3TN from K7RST kilo 7 romeo sierra tango
 - ▶ *(them)* K7RST from N3TN
 - ▶ *(us)* N3TN copy 3 Alpha Arizona, 3 Alpha Alpha Zulu
 - ▶ *(them)* copy 5 Alpha West PA, 5 Alpha West PA
 - ▶ *(us)* QSL 5 Alpha West PA, thank you (CW: TU) and good luck (CW: GL) in the contest
- ▶ Ask for clarifications as needed



Schedule

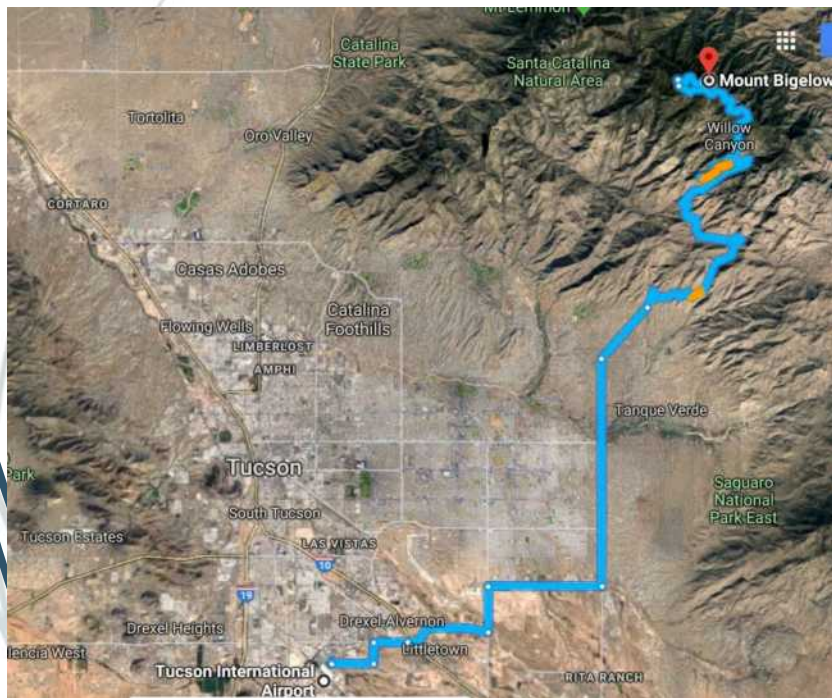
- ▶ Wednesday/Thursday Early Arrival
 - Save the spot
- ▶ Friday, Everyone else arrives
 - Start putting up antennas, after 11:00 am MST
- ▶ Field Day Officially Begins 11:00 on Saturday, 24 June
- ▶ Boy Scouts will prepare meals
 - What meals not certain at this time.
 - No Pot Luck dinner
 - You will likely be on your own for some meals
- ▶ Generators Go Quiet at 22:00 Each Night – Park Service Rules
- ▶ Field Day Officially Ends, Sunday, 25 June, 11:00
- ▶ Monday – BACK TO WORK (YES, THIS INCLUDES THE RETIREES)!!!!

Detailed Schedule
TBD



Where is Field Day for CRCRST?

- Mt. Bigelow in the St. Catalina Mountains



Turn On To Mt. Bigelow Rd

- For those of you who use GPS to get you where you're going, the Field Day Site is:
- Latitude N 32 degrees, 25.053' (+32.416913 degrees)
- Longitude W 110 degrees, 44.102' (-110. 110.734203 degrees)
- Directions:
- 1. Take Catalina Hwy/Mt Lemon Hwy to Whitetail Rd which is 1 mile past the Palisade Ranger Station and Visitor Center and turn right.
- 2. Approximately ¼ mile you'll come to a "T" in the road at the Observatory.
- 3. Turn left at the Observatory (Mt Bigelow Rd) and Travel ¼ mile to the RST/CRC Field Day Site on the left.





What Do We Need?

➡ OPERATORS

What Do We Need?

➔ OPERATORS



What Do We Need?

➔ OPERATORS



What Do We Need?

OPERATORS

- ▶ Band Captains
- ▶ Radios
- ▶ Antennas
- ▶ Power
- ▶ Network/MESH
- ▶ N1MM



Safety

→ Fires

Don't want this....



Safety



To Become THIS!!!!

Important Safety Tips

Fires

- ▶ *Fires are badder than Bears*
 - ▶ *Fire danger today: Moderate*
 - ▶ *We have had restrictions in prior years:*
 - ▶ https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd915424.pdf
- ▶ Bears (and other critters)
 - ▶ *They call it Bear Wallow for a reason*
 - ▶ *Pretty little black and white kitties*
- ▶ We hang antennas, not people
 - ▶ But Exceptions can be made
 - ▶ *Beware of low hanging ropes for antennas*
- ▶ Watch your step
 - ▶ *Power Cables on the ground*
 - ▶ *Antenna coax cables on the ground*

RF Exposure Calculations for FD

Power	Mode DC	TX DC	Ant Gain	Freq	Gnd Refl	Controlled Environment		Uncontrolled Environment		Description
						Max PD	Min Safe	Max PD	Min Safe	
Watts	%	TX,RX min	dBi	MHz	y/n	mw/cm2	feet	mw/cm2	feet	
100	50	1,1	2.15	4	y	56.25	0.3999	11.25	0.8941	80m SSB & CW dipole
100	50	1,1	2.15	7	y	18.3673	0.6998	3.6735	1.5647	40m SSB & CW dipole
100	50	1,1	2.15	14	y	4.5918	1.3995	0.9184	3.1294	20m SSB & CW dipole
100	50	1,1	2.15	21	y	2.0408	2.0993	0.4082	4.6941	15m SSB & CW dipole
100	50	1,1	2.15	28	y	1.148	2.799	0.2296	6.2588	10m SSB & CW dipole
100	50	1,1	10	54	y	1	7.4041	0.2	16.556	6m SSB & CW yagi
50	100	1,1	6	146	y	1	4.6716	0.2	10.4461	2m FM 5/8 vertical
50	100	1,1	9	450	y	1.5	5.388	0.3	12.0478	450 MHz FM colinear vertical

From Amateur Radio RF Exposure Calculator at:

<https://www.arrl.org/rf-exposure>

DC is Duty Cycle

TX is transmit, RX is receive

TX DC is TX time and RX time in minutes

PD is Power Density and $1\text{mW}/\text{cm}^2 = 10\text{ W}/\text{m}^2$

Min Safe is minimum safe distance for personnel

Details in backup slides

Camping

- ▶ Dry Camping!!
- ▶ No fee for camping in undeveloped areas
- ▶ No Power
- ▶ No Dump Station
- ▶ No Water



- ▶ It's Arizona, but sometimes it really does rain
 - ▶ *Come prepared for the weather*
- ▶ 20-30 degrees cooler than Tucson
- ▶ Sometimes it is actually cold (Yes, it's rare)



What To Bring To Field Day

- Bring your own **HEADPHONES** or Headset if you want to operate
- Antenna you want to try
- Radio you want to use
- Friends interested in Ham Radio
- Family
- Pets, keep them on a leash and be prepared to clean up after them
- Food for yourself for some meals
- Water and beverages
- Camera
- Bug spray
- Sunscreen
- MOST OF ALL JUST AN ENJOYABLE SPIRIT!
 - Its all about having FUN!

Some meals provided (preliminary menu)

- ▶ Some meals provided by Boy Scout Troop 157 as a **fund raiser**
 - ▶ **When you contribute, you are paying for the food plus a little more to pay for the scout's year-long camping program, so please plan appropriately when contributing for food costs.**
 - ▶ Contact Joe, K3TYE, if you plan on partaking so the proper food quantity may be obtained
- ▶ Friday Evening Around 6 PM.
 - ▶ Subway type sandwiches. Cold drinks to include popular sodas, water, and seltzer. Cake, cookies, or brownies for desert.
- ▶ Saturday Breakfast:
 - ▶ Ham and scrambled eggs with cheese, plus pancakes. Cold cereal. Maybe some donuts. Coffee, tea, chocolate milk, plain milk, and orange juice.
- ▶ Saturday Lunch:
 - ▶ Our traditional chicken spiedies, Polish sausage sandwich, or cheeseburgers with chips, potato salad, and baked beans.
- ▶ Saturday Supper:
 - ▶ Prepared beef taco with chips, and potato salad. Also left overs from lunch.
- ▶ Saturday evening:
 - ▶ Possible wine tasting hosted by an RST member.
- ▶ Sunday Morning:
 - ▶ Fast Continental Breakfast with some donuts. Coffee, tea, chocolate milk, plain milk, and orange juice.

Power – IF NO GENERATORS

- ▶ Solar
 - ▶ *The trees make this difficult*
- ▶ Use your car battery or other battery
 - ▶ *Run the car when needed to recharge*
 - ▶ *Electric Vehicle has a large battery*
 - ▶ *If charged on home solar before FD, this does count for the alternate power bonus!*
 - ▶ *Use inverters for AC power distribution from batteries*
- ▶ Bicycle Generator
- ▶ Treadmill
- ▶ Other ideas??





Current Status of CRCRST Field Day

- ▶ Mountain is currently open
 - ▶ *But a lot can happen between now and Field Day*
 - ▶ *We need rain – Do a rain dance a day!!!*
 - ▶ *Rain Keeps the Mountain OPEN!!*

If The Mountain Closes – CRC Plan B

- ▶ Use the CRC Shack
 - ▶ *Develop an operator schedule*
 - ▶ *Raytheon employees welcome as visitors*
 - ▶ *Can't have everyone in the shack at one time*
 - ▶ *Need Instructors to show folks how to use the radios/N1MM*





Benefits of using CRC Shack

- ▶ Band captains not needed
- ▶ Equipment is already set up and ready to go
- ▶ Operators will only have to be there for 2-4 hour time slots



Disadvantages of using the CRC Shack

- In the heat!!!
- No extra points for public access, official visits, GOTA station, etc.
- Can't use EOC designator without formal agreements in place
- Getting the retirees on the plantsite
- Limited access to facilities
- No Pictures



Summary

- CRC will join with RST for a combined FD
- Planning for Field Day started in March.
- Primary plan is to go to Mt. Bigelow for Field Day
- CRC Plan B – Use the CRC Shack
 - Schedule of operators to use the CRC Shack
- RST will have separate Plan B (TBD)
- Field Day this year is 22-23 June 2024



Please be considerate of others

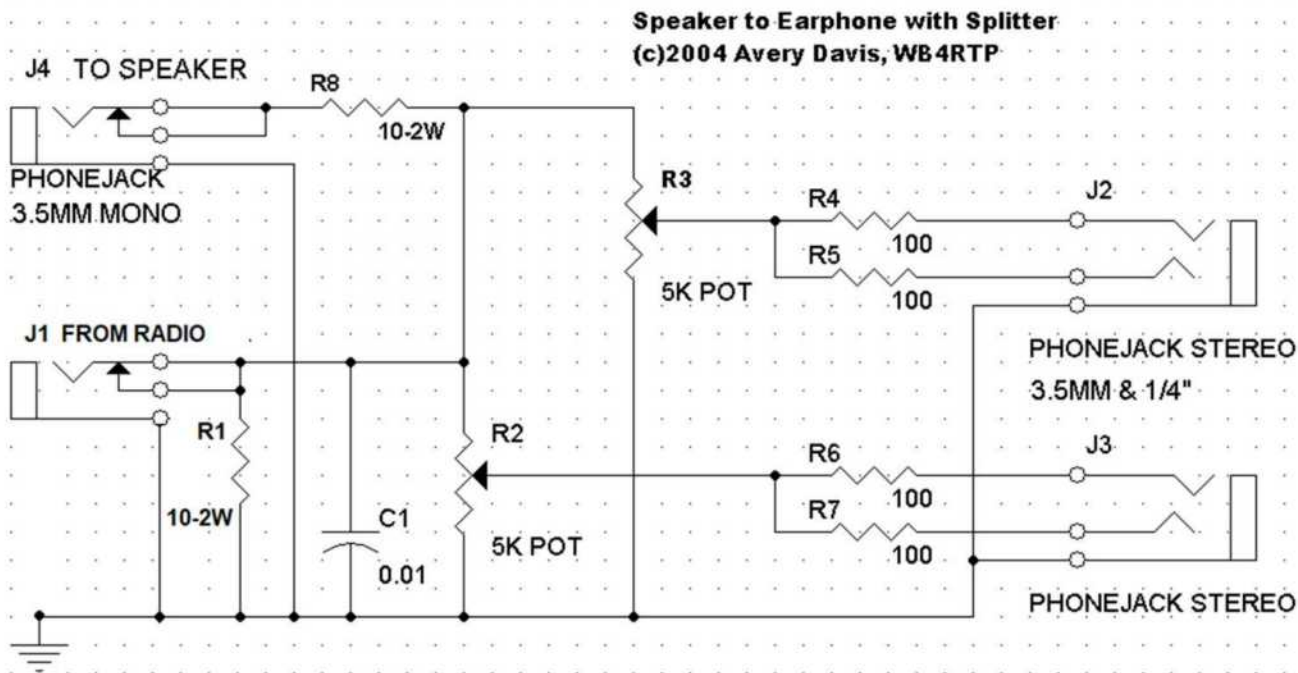
- ▶ It is requested that everyone participating be vaccinated, and to consider wearing masks.
- ▶ It is requested that smoking or vaping be kept well away from other participants.
 - ▶ As a guideline, the Smoke-Free Arizona Act has a 20 foot rule
- ▶ Let's all try to help each other enjoy Field Day!
- ▶



Things to do better for Field Day 2024

- ▶ Take more pictures
- ▶ Get everyone to use the same logging software.
 - ▶ Merging logs from different logging software or manual logs was a real pain in the neck.
 - ▶ Maybe designate someone whose main task is to provide logging software support for all stations
- ▶ Designate someone to take a role or make a roster of participants and visitors
- ▶ Get everyone to use Field Day filters
- ▶ Bring your own **HEADPHONES** or Headset if you want to operate
 - ▶ Get everyone to use headphone splitters for logger

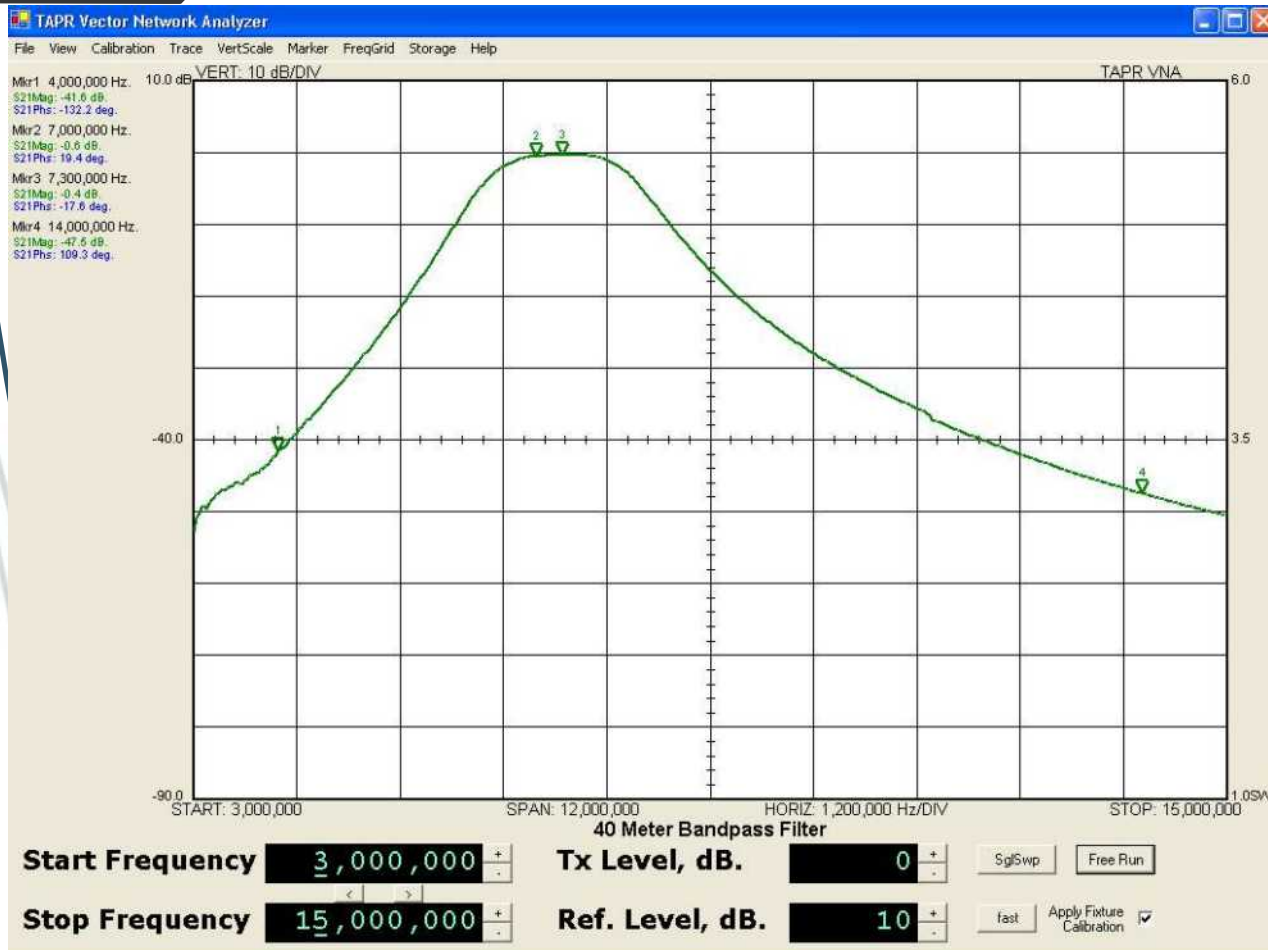
Headphone Splitter



- Allows a second operator/logger to plug in headphones
 - Provides separate volume control for both operators
 - Splits mono output of radio into both left and right channels
 - Has output for lower volume speaker for monitoring by visitors
 - Optional: both 3.5mm and 1/4" stereo jacks for headphones

- Currently, CRC has 4 of these
 - WB4RTP has a fifth provided for 20m PH
 - 3 more of these have been built by Lloyd, K7NX

Field Day (Contest) Filters



- ▶ Band pass transmitting filter for reducing the interference between HF transceivers operated in close proximity
 - ▶ NVARC “Ugly” Filter
 - ▶ <https://n1nc.org/Filters/>
 - ▶ Easy and inexpensive to build
 - ▶ Great performance
 - ▶ Currently, CRC only has 2: 40m and 20m
 - ▶ WB4RTP brings a second 20m filter
 - ▶ More are being built



BACK UP SLIDES

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Old slides by David Holman,
AC7DS



2023 Field Day Entry - Confirmation

Submitted by: **Avery Davis, WB4RTP** E-mail: wb4rtp@mindspring.com

Call Used: **K7RST** GOTA Station Call: **WN7BSA** ARRL/RAC Section: **AZ** Class: **6A**

Participants: **20** Club/Group Name: **Catalina Radio Club and Radio Society of Tucson**

Power Source(s): **Generator, Battery, Solar**

Power Multiplier: **2X**

Preliminary Total Score: 2,454

Bonus Points:

Bonus	Points	Status
100% emergency power	600	
Natural power QSOs completed	100	Documented by K7RST-NATURAL-POWER.txt
Youth participation (6 x 20, max of 100)	100	
Social media	100	
Entry submitted via web	50	
Total bonus points	950	

Score Summary - Cabrillo log/dupe sheet file: K7RST-FD-2023.log

	CW	Digital	Phone	Total
Total QSOs	198	53	250	
Total Points	396	106	250	752

Claimed Score = (QSO points x power mult) = 1,504

Band/Mode QSO Breakdown:

Band	CW		Digital		Phone	
	QSOs	Pwr(W)	QSOs	Pwr(W)	QSOs	Pwr(W)
160m						
80m						
40m	71	100			85	100
20m	103	5	5	100	99	100
15m	24	100	45	100	61	100
10m			3	100		
6m					3	50
2m					2	50
222						
432						
Other						
Satellite						
GOTA						
Total	198		53		250	

GOTA Station: No GOTA Coach

Name	Call	QSOs	Bonus Points
No GOTA ops entered			

2023 Field Day – Organizers and Some Participants
Thank You!

LAST NAME	FIRST NAME	CALL	ROLL
?	Ray	NH6NS	Operator
?	Mike	KH7X	Operator
Bennett	Bill	N7DZ	Operator
Burcham	Randy	KE7KDQ	Band Capt VHF
Burcham	Marcia	KD7DYW	Social Media
Davis	Avery	WB4RTP	Band Capt 20m PH
Dorough	Mike	KB7TMV	Band Capt 40m 15m 10m CW
Fish	James	KD7HZQ	Band Capt 40m PH
Harman	Jeff	AD6T	Band Capt 20m CW
Holt	Brendon	KC5VCW	Band Capt Dig
Ninneman	Jason	KL3PD	Band Capt 10m PH
Statkevics	Joe	K3TYE	FD Chair & more
Vollin	Jeff	KC6WFU	Operator
Wevers	Jerry	WN7DX	Band Capt 15m PH

We Had 40m SSB:



Jim KD7HZQ and Ray NH6NS operating 40m SSB using power from two golf car batteries.



We Had 20m SSB:



Avery, WB4RTP, operating 20m SSB, using power from a Subaru Solterra electric car that was charged from solar power.



We Had 20m CW:



Jeff AD6T operating 20m CW using power from solar panels and batteries.

We Had 15m CW:

Mike KB7TMV operating the 15m CW station. Watching are Joe K3TYE and Huxley, Scout, Troop 157, Radio Merit Badge.



We Had VHF:



Randy KE7KDQ and Richard K7NSW setting up the VHF station.
Gotta-Go station in the background.

We Had Digital Modes:

Jeff KC6WFU and Brendon KC5VCW setting up the digital modes station.



We Had A GOTA Station:



Joe, K3TYE, coached the GOTA station



We Had Scouts Providing Food:



Tanya, one of the Scout's
Moms, was Awesome!



Rules

- For Official Rules:
 - <http://www.arrl.org/field-day-rules>
 - <https://contests.arrl.org/ContestRules/Field-Day-Rules.pdf>
- **NEW for 2023:** Power output for classes A, B and C cannot exceed **500 watts** Peak Envelope Power (PEP) transmitter output. Power output for classes D, E and F cannot exceed 100 watts Peak Envelope Power (PEP) transmitter output.
- **NEW FOR 2023: There is no limit to the number of contacts made by the GOTA station.** All GOTA station contacts are worth five (5) points, regardless of mode. In addition, bonus points may be earned by this station under rule 7.3.13.
- **New for 2023:** Each contact must include contemporaneous direct initiation by both operators making a contact. Initiation of a contact may be by either local or remote control. **Fully automated contacts are prohibited.**
- Entries must be postmarked or submitted by Tuesday July 25, 2023. Late entries cannot be accepted.



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How Did We Do? 2022:

We had a lot of fun!

Not a lot of contacts...

CallSign Used : W7SA

Operator Category : MULTI-OP

Assisted Category : ASSISTED

Band : ALL

Power : LOW

Mode : MIXED+DIG

Default Exchange : 4AAZ

Software : N1MM Logger+ 1.0.9579.0Score

Summary:

Phone QSOs: 148

Score Claimed: 148

Our CW station had equipment failure.



Other stations contributing to score:

WN7BSA GOTA station on the mountain
K2VNT at the CRC club station
W0PZD at home

We strung up antennas in trees



We had a GOTA station and a Gotta Go station:



We had Boy Scouts serving food:



We had an alternate fuel vehicle providing station power:



We had radios and rain:





What Went Well for FD at CRC Shack

- ▶ Everyone seemed to have a good time
- ▶ The two operating positions are set up well
- ▶ The Shack has two very capable stations
- ▶ Raytheon has a network connection in the shack, and the computers are networked together
- ▶ Having Field Day in the valley allowed participation from members who can't get up on the mountain (for medical or other reasons)
- ▶ The air conditioner in the shack worked well with no audible or RF noise
- ▶ Proved CRC shack can operate for extended, continuous periods
- ▶ With the south and north station computers linked with the LAN, we didn't have any problems using N1MM
- ▶ The CRC shack doesn't have a power problem



Things that need to be improved

- The radios were not properly set up to start Field Day
 - *PACKET filter was on, 600 HZ to about 1800 HZ as I recall. Which was cutting off the intelligible part of SSB on the TS-2000*
- Very few of the operators were familiar with the Kenwood radios
- Very few of the operators really understood how to use N1MM
 - *Operating Ham Radio Deluxe or FLDIGI at the same time*
- A few (small) folding chairs would be nice to have
- Lack of toilet facilities for the retirees
- The shack computers don't have internet access because they are not Raytheon owned assets
- Getting the retirees on the plant site
- Couldn't use the EOC designator since we don't have an agreement with PCOEM
- Power other than having generators if not at CRC shack
 - *The generator restriction on the mountain caused problems*
 - *The shade up there makes using solar difficult*
 - *Batteries are big and heavy*
 - *Need more than one*
 - *An Electric Vehicle with inverters has been used to power multiple stations*



Possible Solutions

- ▶ Verify that the radios are set up before the event
- ▶ Better operator training on the radios
 - ▶ *Tried to hold classes – no volunteers for teachers*
- ▶ Operators use the radios regularly during the year
 - ▶ *Use CRC equipment more than once a year.*
- ▶ Better operator training on using N1MM
 - ▶ *Tried to hold classes – no volunteers for teachers*
- ▶ Get some “Nifty Manuals” for the shack radios
- ▶ Rent a port-a-potty for the event
 - ▶ *Getting it on the plantsite has to approved through Raytheon*
 - ▶ *Not a last minute planning decision*
- ▶ Permanent solution to getting retirees on plantsite
 - ▶ *Working with security*
- ▶ Figure out how to get internet into the shack.
 - ▶ *Working with IT*
- ▶ Some folding chairs in the shack would accommodate more people in the shack at one time.
- ▶ Better organize shack antennas
- ▶ Make accommodation to better work with temporary antennas

How Did We Do Previously?

2020:

Bonus Points:

Description	Points
W1AW Field Day Message	100
Satellite QSO completed	100
Submitted via the Web	50
Social media	100
Total Bonus Points	350

Score Summary:

	CW	Digital	Phone	Total	
Total QSOs	112	12	209		
Total Points	224	24	209	457	Claimed Score = 914



Good Job Everyone!!!!!!



Questions?



Survey Monkey Results

TBD





Field Day Calculations: 80m SSB & CW

RF Exposure Calculator

Parameters:

- Power at Antenna: 100 (watts)
- Mode duty cycle: Conversational SSB, heavy speech processing (duty cycle=50%)
 - The calculator lists "Conversationsl CW (duty cycle = 40%)", so using 50% for contest CW is conservative
- Transmit duty cycle: (time transmitting)
- You transmit for 1 minutes then receive for 1 minutes (and repeat).
- Antenna Gain (dBi): 2.15 (dipole)
- Operating Frequency (MHz): 4
- Include Effects of Ground Reflections

Results for a controlled environment:

- Maximum Allowed Power Density (mw/cm²): 56.2500
- Minimum Safe Distance (feet): 0.3999
- Minimum Safe Distance (meters): 0.1219

For an uncontrolled environment:

- Maximum Allowed Power Density (mw/cm²): 11.2500
- Minimum Safe Distance (feet): 0.8941
- Minimum Safe Distance (meters): 0.2725

Field Day Calculations: 40m SSB & CW

RF Exposure Calculator

Parameters:

- Power at Antenna: 100 (watts)
- Mode duty cycle: Conversational SSB, heavy speech processing (duty cycle=50%)
 - The calculator lists "Conversationsl CW (duty cycle = 40%)", so using 50% for contest CW is conservative
- Transmit duty cycle: (time transmitting)
- You transmit for 1 minutes then receive for 1 minutes (and repeat).
- Antenna Gain (dBi): 2.15 (dipole)
- Operating Frequency (MHz): 7
- Include Effects of Ground Reflections

Results for a controlled environment:

- Maximum Allowed Power Density (mw/cm2): 18.3673
- Minimum Safe Distance (feet): 0.6998
- Minimum Safe Distance (meters): 0.2133

For an uncontrolled environment:

- Maximum Allowed Power Density (mw/cm2): 3.6735
- Minimum Safe Distance (feet): 1.5647
- Minimum Safe Distance (meters): 0.4769

Field Day Calculations: 20m SSB & CW

RF Exposure Calculator

Parameters:

- Power at Antenna: 100 (watts)
- Mode duty cycle: Conversational SSB, heavy speech processing (duty cycle=50%)
 - The calculator lists "Conversationsl CW (duty cycle = 40%)", so using 50% for contest CW is conservative
- Transmit duty cycle: (time transmitting)
- You transmit for 1 minutes then receive for 1 minutes (and repeat).
- Antenna Gain (dBi): 2.15 (dipole)
- Operating Frequency (MHz): 14
- Include Effects of Ground Reflections

Results for a controlled environment:

- Maximum Allowed Power Density (mw/cm²): 4.5918
- Minimum Safe Distance (feet): 1.3995
- Minimum Safe Distance (meters): 0.4266

For an uncontrolled environment:

- Maximum Allowed Power Density (mw/cm²): 0.9184
- Minimum Safe Distance (feet): 3.1294
- Minimum Safe Distance (meters): 0.9538

Field Day Calculations: 15m SSB & CW

RF Exposure Calculator

Parameters:

- Power at Antenna: 100 (watts)
- Mode duty cycle: Conversational SSB, heavy speech processing (duty cycle=50%)
 - The calculator lists "Conversationsl CW (duty cycle = 40%)", so using 50% for contest CW is conservative
- Transmit duty cycle: (time transmitting)
- You transmit for 1 minutes then receive for 1 minutes (and repeat).
- Antenna Gain (dBi): 2.15 (dipole)
- Operating Frequency (MHz): 21
- Include Effects of Ground Reflections

Results for a controlled environment:

- Maximum Allowed Power Density (mw/cm²): 2.0408
- Minimum Safe Distance (feet): 2.0993
- Minimum Safe Distance (meters): 0.6399

For an uncontrolled environment:

- Maximum Allowed Power Density (mw/cm²): 0.4082
- Minimum Safe Distance (feet): 4.6941
- Minimum Safe Distance (meters): 1.4308

Field Day Calculations: 10m SSB & CW

RF Exposure Calculator

Parameters:

- Power at Antenna: 100 (watts)
- Mode duty cycle: Conversational SSB, heavy speech processing (duty cycle=50%)
 - The calculator lists "Conversationsl CW (duty cycle = 40%)", so using 50% for contest CW is conservative
- Transmit duty cycle: (time transmitting)
- You transmit for 1 minutes then receive for 1 minutes (and repeat).
- Antenna Gain (dBi): 2.15 (dipole)
- Operating Frequency (MHz): 28
- Include Effects of Ground Reflections

Results for a controlled environment:

- Maximum Allowed Power Density (mw/cm²): 1.1480
- Minimum Safe Distance (feet): 2.7990
- Minimum Safe Distance (meters): 0.8531

For an uncontrolled environment:

- Maximum Allowed Power Density (mw/cm²): 0.2296
- Minimum Safe Distance (feet): 6.2588
- Minimum Safe Distance (meters): 1.9077

Field Day Calculations: 6m SSB & CW

RF Exposure Calculator

Parameters:

- Power at Antenna: 100 (watts)
- Mode duty cycle: Conversational SSB, heavy speech processing (duty cycle=50%)
 - The calculator lists "Conversationsl CW (duty cycle = 40%)", so using 50% for contest CW is conservative
- Transmit duty cycle: (time transmitting)
- You transmit for 1 minutes then receive for 1 minutes (and repeat).
- Antenna Gain (dBi): 10 (yagi)
- Operating Frequency (MHz): 54
- Include Effects of Ground Reflections

Results for a controlled environment:

- Maximum Allowed Power Density (mw/cm2): 1.0000
- Minimum Safe Distance (feet): 7.4041
- Minimum Safe Distance (meters): 2.2568

For an uncontrolled environment:

- Maximum Allowed Power Density (mw/cm2): 0.2000
- Minimum Safe Distance (feet): 16.5560
- Minimum Safe Distance (meters): 5.0463

Field Day Calculations: 2m FM

RF Exposure Calculator

Parameters:

- Power at Antenna: 50 (watts)
- Mode duty cycle: FM (duty cycle=100%)
- Transmit duty cycle: (time transmitting)
- You transmit for 1 minutes then receive for 1 minutes (and repeat).
- Antenna Gain (dBi): 6 (5/8 vertical)
- Operating Frequency (MHz): 146
- Include Effects of Ground Reflections

Results for a controlled environment:

- Maximum Allowed Power Density (mw/cm²): 1.0000
- Minimum Safe Distance (feet): 4.6716
- Minimum Safe Distance (meters): 1.4239

For an uncontrolled environment:

- Maximum Allowed Power Density (mw/cm²): 0.2000
- Minimum Safe Distance (feet): 10.4461
- Minimum Safe Distance (meters): 3.1840

Field Day Calculations: 450MHz FM

RF Exposure Calculator

Parameters:

- Power at Antenna: 50 (watts)
- Mode duty cycle: FM (duty cycle=100%)
- Transmit duty cycle: (time transmitting)
- You transmit for 1 minutes then receive for 1 minutes (and repeat).
- Antenna Gain (dBi): 9 (colinear vertical)
- Operating Frequency (MHz): 146
- Include Effects of Ground Reflections

Results for a controlled environment:

- Maximum Allowed Power Density (mw/cm²): 1.5000
- Minimum Safe Distance (feet): 5.3880
- Minimum Safe Distance (meters): 1.6423

For an uncontrolled environment:

- Maximum Allowed Power Density (mw/cm²): 0.3000
- Minimum Safe Distance (feet): 12.0478
- Minimum Safe Distance (meters): 3.6722