

# Forester

sustainably manage your ham radio logs

RMHAM University Nerdfest

Chris Keller, K0SWE  
February 13, 2021

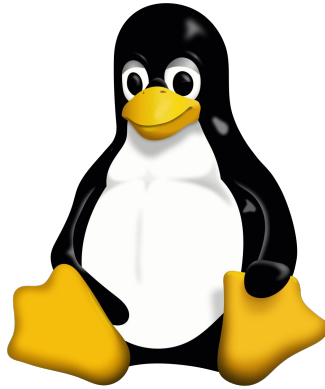


# Your Host



Chris Keller, K0SWE. Active in RMHAM and Colorado ARES R1D6, as well as software development for amateur radio. (That's where I got my vanity call: SoftWare Engineer, SWE)

# Linux



If you've heard me talk before, you probably know I'm a Linux nut and avoid Windows and Mac where I can. That makes it challenging sometimes to find quality software, especially for niches like ham radio.

# CQRLog

CQRLog for Linux

File View Filter QSL Sort Statistics Callbook Data Online log Help

QSO in log: 331 DXCC: 7 DXCC CFM: 7

gsdate	time_on	callsign	freq	mode	rst_s	rst_r	name	qth	state
2020-07-29	06:40	NXOR	7.0760	FT8	-12	-10	JAMES N TANIS	HAYS	KS
2020-07-29	06:35	K8EG	7.0760	FT8	-13	-18	KARL E GOETSCH	Defiance	MO
2020-07-26	20:50	N4GXX	14.0780	FT8	-13	-14	STEPHEN D STROM	CRESTVIEW	FL
2020-06-27	22:34	W7IL	14.0760	FT8	1B	1E	CHRISTOPHER J LA CLAIR	Surprise	AZ
2020-06-27	22:33	N8SBE	14.0760	FT8	1B	1D	DAVID E NEW	ANN ARBOR	MI
2020-06-27	22:32	AB9MZ	14.0760	FT8	1B	1D	Gregory D Rosenberg	Tinley Park	IL
2020-06-27	22:31	AG7EM	14.0760	FT8	1B	1D	MARK A MALEY	TUCSON	AZ
2020-06-27	22:29	K8TR	14.0760	FT8	1B	1B	RANDY L SILVERMAN	Livermore	CA
2020-06-27	22:19	W6TRW	14.0762	FT8	1B	1D	NGRC AMATEUR RADIO CLUB	REDONDO BEACH	CA
2020-06-27	22:18	AK6A	14.0762	FT8	1B	1D	CLYDE W VALENTINE	Lebanon	OR
2020-06-27	22:14	K8UJ	14.0759	FT8	1B	4A	DRAKE ARC CONTEST GROUP	Springboro	OH
2020-06-27	22:10	KU4VG	14.0759	FT8	1B	1E	Thomas E Lubrick	Louisville	KY
2020-06-27	22:06	W1SH	14.0760	FT8	1B	1A	WILLIAM L HYATT	Fayetteville	AR
2020-06-27	22:01	KN4DS	14.0760	FT8	1B	1D	David B Stewart	Perry	GA
2020-06-27	21:54	W7IEQ	14.0760	FT8	1B	1D	WILLIAM T KAUNE	Port Townsend	WA
2020-06-27	21:53	N6THN	14.0760	FT8	1B	1E	BRUCE G MCCASKIE	Vacaville	CA
2020-06-27	21:52	KN0R	14.0760	FT8	1B	1D	Ron M Nelson	Ames	IA
2020-06-27	21:46	W0UK	14.0758	FT8	1B	3D	DOUGLAS COUNTY AMATEUR RAD	Eudora	KS
2020-06-27	21:44	K1GNAZ	14.0758	FT8	1B	1D	Josh B Nass	Cerritos	CA
2020-06-27	21:41	K6RBS	14.0758	FT8	1B	1D	Richard B Saunders	Mission Viejo	CA
2020-06-27	21:39	K5TIP	14.0758	FT8	1B	1D	JOHN E MC FADDEN	MC KINNEY	TX
2020-06-27	21:34	W6F	14.0763	FT8	1B	5B	Route 66 On The Air Special Eve	Kingman	AZ
2020-06-27	21:27	K7NOL	14.0757	FT8	1B	1E	DANIEL A JACOBS	VANCOUVER	WA
2020-06-27	21:24	W0DDE	14.0758	FT8	1B	1E	Darrell E Karbiginaky	Salem	OR
2020-06-27	21:22	KC3QJ	14.0758	FT8	1B	1D	GEORGE H SABINO	NAPERVILLE	IL
2020-06-27	21:20	K9QJ5	14.0758	FT8	1B	1D	James K (Hoop) Hooper	San Juan Island	WA
2020-06-27	21:18	W4GRV	14.0758	FT8	1B	1E	AANTELOPE ACRES AMATEUR RAD	LANCASTER	CA
2020-06-27	21:15	K8SJM	14.0758	FT8	1B	1D	STEVE MILLER	Dayton	OH
2020-06-27	21:12	AE7QT	14.0758	FT8	1B	1E	RODNEY E SPENCER	Kelso	WA

I built my first HF station in March 2020 when the pandemic started. CQRLog was the first logging application I used seriously. I was disappointed by the lack of being able to import logs and have them de-duplicated, and the lack of sync between independent machines, but it was good enough. That is, until I got a HiDPI monitor...

# CQRLog HiDPI (Retina)

qso date	time on	call sign	freq	mode	rst s	rst r	name	gth	state	country	sl	sl	pwr	loc	qsl
2020-07-29	04:40	N4OK	7.0750	F1B	-12	-10	JAMES N JANIS	HAYS	KS	United States	50		80	EM46	E
2020-07-29	04:35	K0EG	7.0750	F1B	-13	-18	KARL E GOETSCH	Dehance	MO	United States	80		80	EM46	E
2020-07-26	20:50	N4GXX	14.0750	F1B	-13	-14	STEPHEN D STR	CRESTVIEW	FL	United States	80		80	EM66	LE
2020-06-27	22:34	V1TH	14.0750	F1B	-18	-1E	CHRISTOPHER I	Stromse	AZ	United States	80		80	M331	L
2020-06-27	22:33	N8SBE	14.0750	F1B	-1B	-1D	DAVID E NEW	ANN ARBOR	MI	United States	80		80	N82C	LE
2020-06-27	22:32	AB9MZ	14.0750	F1B	-1B	-1D	Gregory D Rosen	Univ Park	IL	United States	80		80	N61C	
2020-06-27	22:31	AG7EM	14.0750	F1B	-1B	-1D	MARK A MALEY	TUCSON	AZ	United States	80		80	M22C	LE
2020-06-27	22:29	K8TR	14.0750	F1B	-1B	-1B	RANDY L SILVERI	Livermore	CA	United States	80		80	M97C	L
2020-06-27	22:19	W6TRW	14.0750	F1B	-1B	-1D	NGRC AMATEUR	REDONDO BEACH	CA	United States	80		80	DM03	L
2020-06-27	22:18	K6GA	14.0750	F1B	-1B	-1D	CLOVE W VALENTI	Lebanon	OR	United States	80		80	V84N	LE
2020-06-27	22:14	K8UU	14.0750	F1B	-1B	-4A	DRAKE ARC CON	Springboro	OH	United States	80		80	V79U	
2020-06-27	22:10	KU4WG	14.0750	F1B	-1B	-1E	Thomas E Lubric	Louisville	KY	United States	80		80	M78E	
2020-06-27	22:05	W1SH	14.0750	F1B	-1B	-1A	WILLIAM L HYAT	Fayetteville	AR	United States	80		80	N9C	
2020-06-27	22:01	KN4DS	14.0750	F1B	-1B	-1D	David B Stewart	Perry	GA	United States	80		80	EM82	LE
2020-06-27	21:54	W7EQ	14.0750	F1B	-1B	-1D	WILLIAM T KAUN	Port Townsend	WA	United States	80		80	N18E	
2020-06-27	21:53	N6HTN	14.0750	F1B	-1B	-1E	BRUCE G MCCAS	Yacaville	CA	United States	80		80	N83	
2020-06-27	21:52	KN0R	14.0750	F1B	-1B	-1A	Ron M Nelson	Ames	IA	United States	80		80	N32Q	LE
2020-06-27	21:46	W0UX	14.0750	F1B	-1B	-1E	DOUGLAS COUN	Eudora	KS	United States	80		80	EM2E	
2020-06-27	21:44	K6NA	14.0750	F1B	-1B	-1E	Josh B Nass	Cerritos	CA	United States	80		80	M03	
2020-06-27	21:41	K8RBC	14.0750	F1B	-1B	-1E	Richard B Saunc	Mission Viejo	CA	United States	80		80	DM13	L
2020-06-27	21:39	K5TIP	14.0750	F1B	-1B	-1E	JOHN E MC FADD	MC KINNEY	TX	United States	80		80	EM13	L
2020-06-27	21:34	W4FE	14.0750	F1B	-1B	-1E	Ronitied On the	Kingman	AZ	United States	80		80	DM13	L
2020-06-27	21:27	K2NO	14.0750	F1B	-1B	-1E	DANIEL A JACOB	VANCOUVER	WA	United States	80		80	N8E	F
2020-06-27	21:24	W7DD	14.0750	F1B	-1B	-1E	Darrel E Karbein	Salem	OR	United States	80		80	N841	LE
2020-06-27	21:22	K092	14.0750	F1B	-1B	-1E	GEORGE W CASPI	NAPERVILLE	IL	United States	80		80	E851	
2020-06-27	21:20	K092	14.0750	F1B	-1B	-1E	James K (Hoop)	San Juan Island	WA	United States	80		80	N8E	L
2020-06-27	21:18	WV6R	14.0750	F1B	-1B	-1E	ANNELOPE ACR	LANCASTER	CA	United States	80		80	DM07	
2020-06-27	21:15	K8JUN	14.0750	F1B	-1B	-1E	STEVE MILLER	Dayton	OH	United States	80		80	E793	L
2020-06-27	21:12	A70J	14.0750	F1B	-1B	-1E	RODNEY E SPEN	Kelso	WA	United States	80		80	N8E	LE
2020-06-27	21:06	K9BL	14.0750	F1B	-1B	-1E	Brian L Richwint	Bloomington	IN	United States	80		80	EM66	
2020-06-27	21:02	K4W	14.0750	F1B	-1B	-1E	RICHARD L RICH	CAYTON	OH	United States	80		80	E793	L
2020-06-27	20:58	KCSW	14.0750	F1B	-1B	-1E	Gene Ingram	Denison	TX	United States	80		80	EM13	
2020-06-27	20:55	K640	14.0750	F1B	-1B	-1E	Peter E Ekstrom	Sugar Hill	GA	United States	80		80	EM74	L
2020-06-27	20:50	K640	14.0750	F1B	-1B	-1E	Peter E Ekstrom	Sugar Hill	GA	United States	80		80	EM74	L
2020-06-27	20:45	W0HC	14.0750	F1B	-1B	-1E	HARVEY G IONE	Edmond	OK	United States	80		80	EM15	
2020-06-27	20:38	K6KOV	14.0750	F1B	-1B	-1E	WILLIAM R PHILI	CUPERTINO	CA	United States	80		80	EM87	L
2020-06-27	02:21	W1SL	14.0750	F1B	-1B	-1E	El Paso Contest	El Paso	TX	United States	100		80	DM61	LE
2020-06-23	02:15	N4EYA	14.0750	F1B	-13	-15	DANIEL HORVAT	WESLEY CHAPEL	FL	United States	80		80	EL88	L
2020-06-07	02:05	WD9DUJ	7.0800	JSB	-13	-15	GARY T LESNIEW	TORRANCE	CA	United States	100		80	M031	L
2020-06-07	00:49	N3WGM	14.0750	F1B	-19	-17	William	Rural Hill	VA	United States	80		80	E196	L
2020-06-07	00:33	KH6M	14.0750	F1B	-18	-21	Mitchell	NAPLES	FL	Hawaii	80		80	E196	L
2020-06-07	00:18	KN4CXC	14.0750	F1B	-11	-16	Michael	Brooksville	FL	United States	80		80	EL88	E
2020-06-06	22:34	W4LX	14.0750	F1B	-16	-10	Charles	SAVANA	NY	United States	80		80	E196	L

Yikes, that's awful! With a HiDPI (Retina-class) monitor, CQRLog is unusable. Without scaling, it's tiny; with scaling, the UI is completely distorted.

## Buy vs **Build**

Requirements:

- Merge on import with smart deduplication
- Sync between clients
- Sync with QSL services & other online logbooks (QRZ, LotW, eQSL, etc.)
- Award progress with maps
- Offline
- WSJT-X and rig control integration
- At least Linux, Windows and Mac
- Open source



# Make it a web app

I fretted over whether to make it a native app like [CQRLog](#) (or contribute to that in Pascal), a hybrid like [K4CPO Field Day logger](#) (or contribute to that in PHP), or a pure web app. Ultimately, I decided I didn't want to make a slightly better CQRLog or a slightly better K4CPO. Nor did I want to contribute to Pascal or PHP programs where their authors already had a vision.

I decided to play to my personal strengths as a software developer and build a web app, and rely on cutting-edge techniques to overcome traditional web limitations.


# Rig Control via Web Page

## WebUSB

- Direct device control, no need for any installed software
- But device (radio) firmware has to support it. **Not going to happen!**

## Agent program

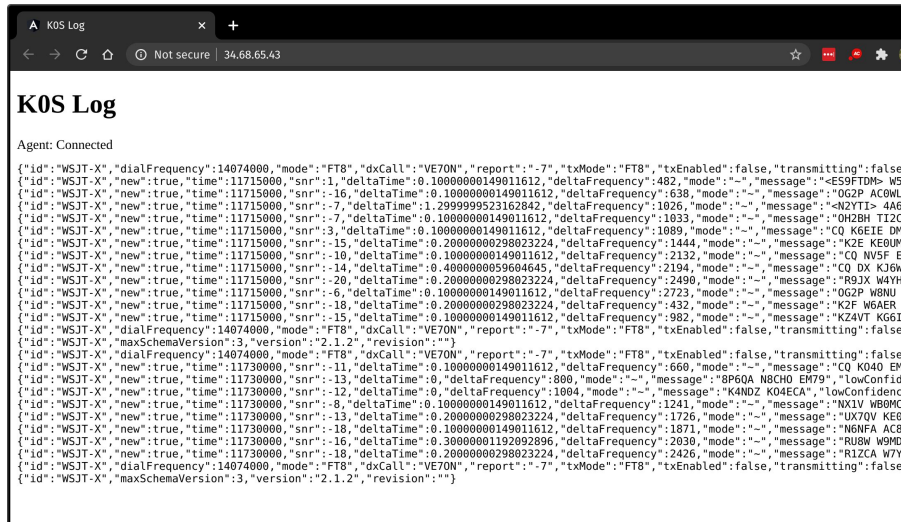
- Translate local program APIs (WSJT-X, rig control) to web sockets



I researched WebUSB first for rig control. I've used WebUSB for things like my Ergodox EZ mechanical keyboard; it can connect to the [web-based key-mapping tool](#) so the web UI can show you what the current key layout is. I imagined being able to transpile [hamlib](#) into Javascript with [WebAssembly](#); transpiling is ugly, but it does work. Unfortunately, I found that the USB device must specify its WebUSB domain name during enumeration. In other words, it has to come out of the factory knowing that it's WebUSB compatible and exactly which website is going to connect to it. Not an option for hundreds of ham radio transceivers from dozens of manufacturers connecting to arbitrary third-party web sites.

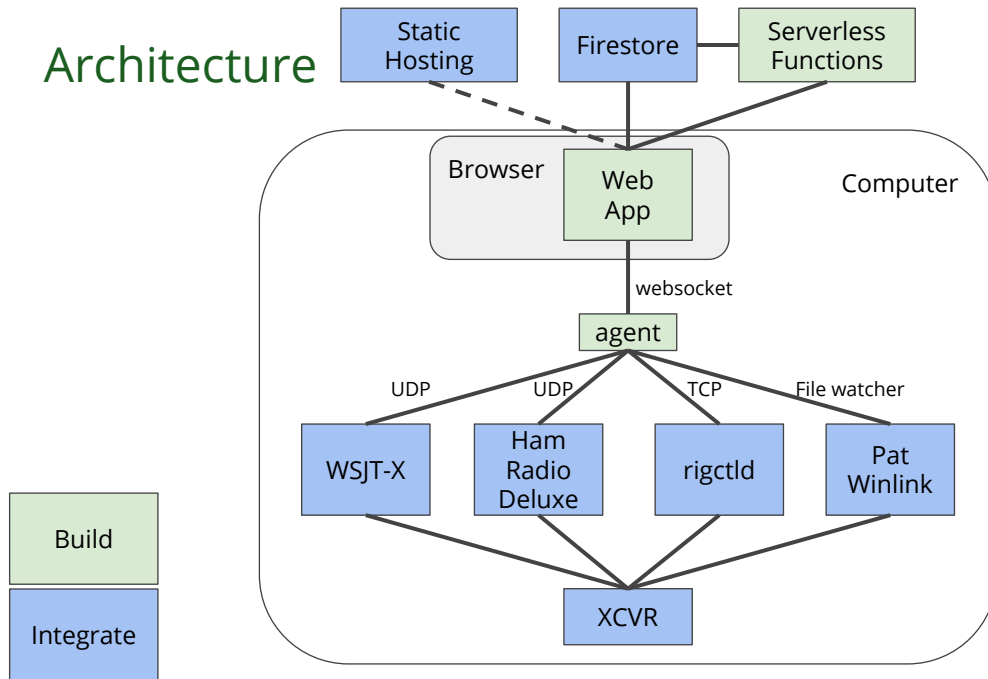
Instead, I looked at making an agent, a small installed program that mediates between the web page and the stuff on the computer. This technique is used by the [Arduino Create](#) web IDE. Create and compile your program in the web browser, then upload it to the Arduino board via the agent.

# Prototype



But does this really work? I deployed a prototype web app to an internet host and had it connect to a simple agent on my machine. I discovered (the hard way) a couple of browser security checks that had to be satisfied, but after some trial and error I got it to work! I got WSJT-X on my computer to stream information into a web application in my browser!

# Architecture

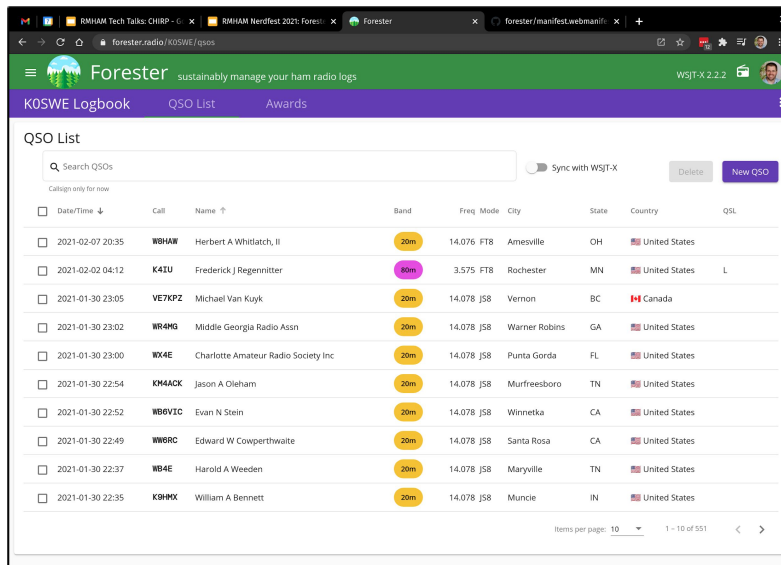




# Demo: The current state

Subsequent slides are for talking points

# Forester



The screenshot shows the Forester web application interface. At the top, there's a navigation bar with 'Forester' and 'sustainably manage your ham radio logs'. Below this, there's a 'K0SWE Logbook' section with tabs for 'QSO List' and 'Awards'. The 'QSO List' tab is active, displaying a table of QSOs. The table has columns for Date/Time, Call, Name, Band, Freq, Mode, City, State, Country, and QSL. The data is filtered for '2021-02-07 20:35' to '2021-01-30 22:35'. The table shows 10 items per page, with a total of 531 items. The interface also includes a search bar, a 'Sync with WSJT-X' button, and a 'New QSO' button.

Date/Time	Call	Name	Band	Freq	Mode	City	State	Country	QSL
2021-02-07 20:35	WB4HW	Herbert A Whitlatch, II	20m	14.076	FT8	Amesville	OH	United States	
2021-02-02 04:12	K4IU	Frederick J Regennitter	80m	3.575	FT8	Rochester	MN	United States	L
2021-01-30 23:05	VE7KPZ	Michael Van Kuyk	20m	14.078	J58	Vernon	BC	Canada	
2021-01-30 23:02	WR4MG	Middle Georgia Radio Assn	20m	14.078	J58	Warner Robins	GA	United States	
2021-01-30 23:00	WX4E	Charlotte Amateur Radio Society Inc	20m	14.078	J58	Punta Gorda	FL	United States	
2021-01-30 22:54	KH4ACK	Jason A Oleham	20m	14.078	J58	Murfreesboro	TN	United States	
2021-01-30 22:52	WB0VIC	Evan N Stein	20m	14.078	J58	Winnetka	CA	United States	
2021-01-30 22:49	WB0RC	Edward W Cowperthwaite	20m	14.078	J58	Santa Rosa	CA	United States	
2021-01-30 22:37	WB4E	Harold A Weeden	20m	14.078	J58	Maryville	TN	United States	
2021-01-30 22:35	K0HMX	William A Bennett	20m	14.078	J58	Muncie	IN	United States	

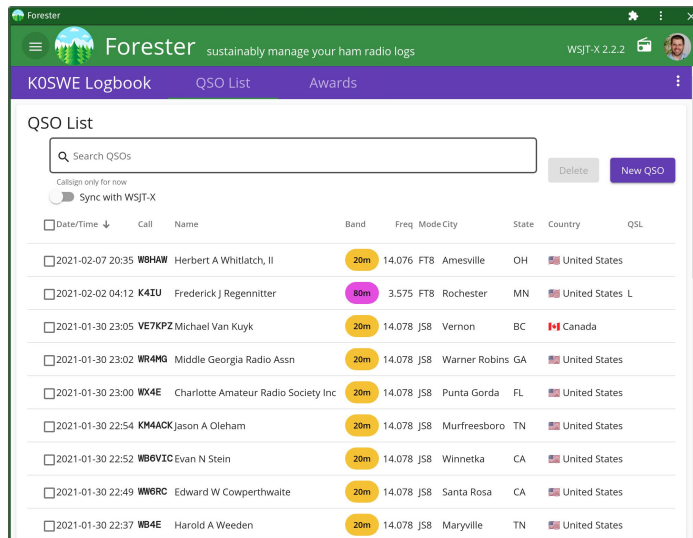
Forester is a [hosted web application](#) written in the Angular framework in the Typescript language. It uses Google Firestore as an underlying database which gives it fast real-time sync between devices as well as being robust to going offline for a short while. The offline capability is probably not appropriate for a DXpedition, but perfect for field day or a POTA/SOTA activation.

To connect to installed ham programs, it uses [kel-agent](#), written in golang. Installers are available for Windows, Mac, Linux and Raspberry Pi, and will soon be available in the Debian/Ubuntu APT repositories. Right now, kel-agent can connect to WSJT-X as a backend, with planned support for rigctld, Ham Radio Deluxe, JS8Call, and whatever else people ask for. Eventually, kel-agent will be a tray-icon program, but right now it's just a command-line utility.

For certain tasks like syncing with other internet services (QRZ.com, LotW, etc), Forester uses Serverless Functions. This is faster and uses less client bandwidth than running these tasks in the browser. However, I've been careful to build anything functionality that's needed offline into the web app.

All three facets of Forester are [open source](#), and kel-agent is written to be used by other applications. (I hesitate to say "free" because I pay for the cloud services; if I get enough users, I'll probably have to charge or show ads to break even.)

# Progressive Web App



PWA enables offline support, “add to home screen” and “installed” experience. It adds an icon to the application menu on desktops, phones and tablets in all major operating systems. The app will run and most things will function even when offline. (Support for PWAs in web browsers is [not universal yet](#); a Chromium-based browser like Chrome or Edge is your best bet.)

# QRZ.com Logbook 3 beta

Logbook by QRZ.COM

KOSWE Logbook List Incoming Awards Leaderboard Help Logout Refresh Settings

Beta Version - Do Not Report Problems to Support Center, Discuss issues in our forums • Click here to leave the beta.

Enter Call... Add QSO QSO's: 553 Confirmed: 437 Countries: 12 Book # 230915

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 of 28 Search... Filter: All QSOs

#	Date	Time	Call	Band	Freq	Mode	Grid	Country	Operator Name	Comments	Star	Flag
1	2021-02-07	20:35	WBHAW	20m	14.076	FT8	EN99	United States	Herbert A Whitlatch, II	Ryan Park QRP	☆	
2	2021-02-02	04:12	K4IU	20m	3.575	FT8	EN34	United States	Frederick J Regennitter		☆	
3	2021-01-30	23:05	VE7KPZ	20m	14.078	JS8	D0801g	Canada	Michael Van Kuyk	Winter Field Day - 1...	☆	
4	2021-01-30	23:02	WR4MG	20m	14.078	JS8	EM82eo	United States	Middle Georgia Radi...	Winter Field Day - 6...	☆	
5	2021-01-30	23:00	WX4E	20m	14.078	JS8	EL86xw	United States	Charlotte Amateur R...	Winter Field Day - 2...	☆	
6	2021-01-30	22:54	KM4ACK	20m	14.078	JS8	EM65tv	United States	Jason A Oleham	Winter Field Day - 11...	☆	
7	2021-01-30	22:52	WB6VIC	20m	14.078	JS8	DM04rf	United States	Evan N Stein	Winter Field Day - 1...	☆	
8	2021-01-30	22:49	WV6RC	20m	14.078	JS8	CM88pk	United States	Edward W Cowperth...	Winter Field Day - 11...	☆	
9	2021-01-30	22:37	WB4E	20m	14.078	JS8	EM85as	United States	Harold A Weeden	Winter Field Day - 21...	☆	
10	2021-01-30	22:35	K9HMX	20m	14.078	JS8	EN70ge	United States	William A Bennett	Winter Field Day - 21...	☆	
11	2021-01-30	22:22	K9HMX	20m	14.078	JS8	EN70ge	United States	William A Bennett	Winter Field Day - 21 IN	☆	
12	2021-01-30	22:19	KU4WW	20m	14.078	JS8	EM64as	United States	Jeffrey K Dover	Winter Field Day - 1...	☆	
13	2021-01-30	22:17	K06TH	20m	14.078	JS8	CM98kx	United States	Gregory D Dolkas	Winter Field Day - 1...	☆	
14	2021-01-30	21:55	N8ET	20m	14.187	USB	EN80ex	United States	William M Kelsey	Winter Field Day - 1...	☆	
15	2021-01-30	21:35	N4EE	20m	14.328	USB	EM93va	United States	Trident Amateur Radi...	Winter Field Day - 2...	☆	
16	2021-01-30	21:30	K9GLH	20m	14.287	USB	EN51wq	United States	Gregory L Morley	Winter Field Day - 1...	☆	
17	2021-01-30	21:08	WA3JAT	20m	14.223	USB	EN91fd	United States	James F Berry	Winter Field Day - 1...	☆	
18	2021-01-30	20:40	NA8LP	20m	14.290	USB		United States		Winter Field Day - 11 MI	☆	
19	2021-01-30	20:38	W9ROG	20m	14.284	USB	EN62cs	United States	Roger G Callewaert, Jr	Winter Field Day - 1...	☆	

Legend: request seen requested rejected confirmed used for award flagged

QSOs: 553 Confirmed: 437 Countries: 12 0 confirmations in queue, Processing QSOs entered after 2021-02-08 00:39:30

The next generation QRZ.com logbook (currently in beta) is also being built as a PWA and will have offline support.

# Under Construction

Current state of Forester is “alpha”

- Works well enough for some tasks
- Plenty of missing features and sharp edges

<https://forester.radio/>

I'm eager to hear feedback!



# Contact Me

[k0swe@arri.net](mailto:k0swe@arri.net)