



# Remote HF after the Pandemic

~~“Super-Charged” or  
“Supply Chain Slow-down?”~~

## What works NOW?

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These slides, and more, are at my website [k6ufo.com](http://k6ufo.com)



K3/0 RemoteRig

FlexRadio Systems  
Software Defined Radio

Maestro

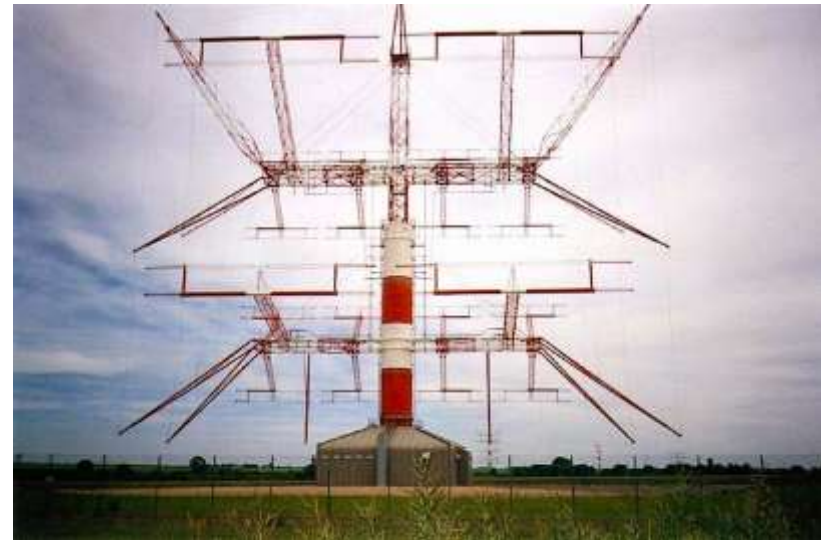
Win PC runs digitals

FlexRadio Systems MAESTRO è la nuova console di controllo per i ricetrasmittenti della serie 8000 che permette l'uso immediato dell'apparato senza bisogno del PC, tramite connessione alla rete LAN anche WiFi, oppure direttamente all'apparato.

***I already understand why\* I want a remote station...***

Operate when away from home, antenna restrictions, moving into assisted-living, no longer able to do antenna work, share a station with others, multi-op contesting, use a good hill-top location, use a low-noise location, operate from the office, hotel, living room...

***...but what is the current way to build a remote station?***



# Using other people's stations is one easy approach, a good learning experience, and a backup solution.

Receive-only sites on the internet: [websdr.org](http://websdr.org) [kiwisdr.com/public](http://kiwisdr.com/public) [rx.linkfanel.net](http://rx.linkfanel.net) and others.... Good for SWL, signal monitoring, ...

Receive AND Transmit: you may need to register, provide a copy of your license, join a club, pay dues or dollars. Look for:

- A friend or club station already setup for remote access, especially FlexRadio-based station. Many contest stations have remote operators.  
*In the Feb 2023 ARRL DX CW contest, 15% of Multi-op entries checked “Remote.”*
- [RemoteHams.com](http://RemoteHams.com) has many shared stations and club stations globally.
- [RemoteHamRadio.com](http://RemoteHamRadio.com) \$20/month or \$99/year, plus airtime billed at \$0.05 to \$1.25 per minute. Very capable stations in USA, Puerto Rico, Haiti and Croatia. Free stations for licensed youth age 25 and younger.
- [BeLoud.us](http://BeLoud.us) A newer commercial operation. USA, Bonaire and Spain.

Remote operators need to be properly licensed for the location of the transmitter. Always follow the rules of the regulatory authority. Must use callsign approp for transmitter location. Transmitter location is the location for LoTW, contest operation, and award chasing.

## But how to setup your own station for remote use?

There is no One Perfect Solution. It depends on what you want to do:

Modes: Voice, Digital, CW? CW by keyboard only, or key or paddle?

How much equipment will you haul around with you? Just a smartphone? or tablet? Or extra control head? extra displays?

Fast connect? On in seconds from a phone? Longer for extras.

Dual use? Station to be used at home AND remotely, or dedicated to remote? Do you need a human operator position at station?

How much re-configuration to go from local to remote use? Will you re-configure every day before leaving to work?

Is the station easily accessible (in the garage), or is it a trip to the hills?

Are you willing to keep a PC on-line at the remote station (useful), or does everything have to be extended across the internet (difficult)?

How much remote “reset” ability do you need? Is anyone on-site?

**Recommendation: Start simple, gain experience, then expand or change. Different solutions have different advantages/problems.**



VE3VEE





# Four Basic Needs for Remote Operation

**1. Audio In/Out to radio:** MIC/SPKR, Line In/Out, audio over USB, or over Ethernet. Just like being set up for digital modes (FT8).



**2. Radio Control:** Radio with a **serial port, CAT, CI-V, USB control**, or over Ethernet. To set Freq., Mode, PTT, CW keying... just like a contest logger keying your radio.



**3. Station Control:** AC power outlets, antenna switch, rotators, tuners, amplifiers, ... Equipment must be highly automatic, or have PC control, or over-the-web control. Automate and Simplify your station where possible.



**4. "Good" Internet service: ...**

# ... Basic Needs for Remote Operation

## 4. "Good" Internet service:

**Speed:** Download and Upload speeds over 1 Mbps for audio and radio control. (more for waterfalls, and even more for webcams).

**Low latency/delay.** High latency makes timing difficult for PTT and VOX control and pileup control.

+ Under 50ms is **good**,

- 100ms **okay** (USA W6 to W1),

- over 150ms **difficult** (USA W6 to Europe).

**Low packet loss, low jitter, low variation:** causes audio and control dropout. "Wired" internet usually good.

+ **DSL/cable/fiber = good**

- **Satellite internet = bad**

- Wireless internet provider, or WiFi connected can be good.

? Starlink has frequent dropouts "for a few seconds, every dozen minutes." Getting better as more satellites launched.

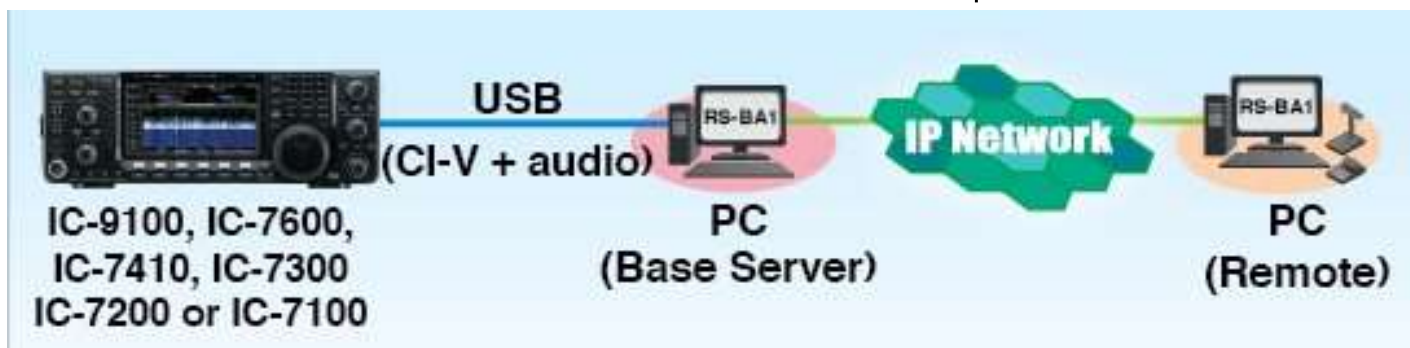
# Two “simple” ways to Implement Remote Access

1. Software Programs designed to control remote radios.
2. Remote Desktop Software designed to control a remote computer. (and VPNs)

# 1. Software Programs designed to control remote radios.

[RemoteHams.com](http://RemoteHams.com) is both a free software Program (RCForb) and a community of users & stations. You can use the server software to offer up your own station for remote use. See, QST Magazine, April 2017, p30: “DIY Remote Radio Now” by K5PA, and [k5pa.com](http://k5pa.com)

## ICOM’s RS-BA-1 IP Remote Control software. \$160.



For ICOM radios, see also: Win4Icom Suite (VA2FSQ), or [wfview.org](http://wfview.org)

See also: RemoteTX.net, N4PY Software, Win4K3Suite Server, Ham Radio Deluxe, Kenwood ARCP-590, TRX-Manager, DF3CB software, RigPi (MFJ-1234B)...

**Warning:** You can spend a lot of time on this path, that may not meet your goals.

**Warning:** Can be hard to also connect to your logging program since “serial port is already in use.” You may have to log manual/un-connected.



## 2. Remote Desktop Software designed to control a remote computer.

Set up the shack PC to control the station. Use any software - even if it doesn't have any "remote" ability: WSJT-X, N1MM+, DXLab, ...

Then, use remote desktop software to "connect-in" to the shack PC. You "see" the shack desktop, and control the station, just like being at the shack PC.

There are many good free "remote desktop" programs (also called VNC):

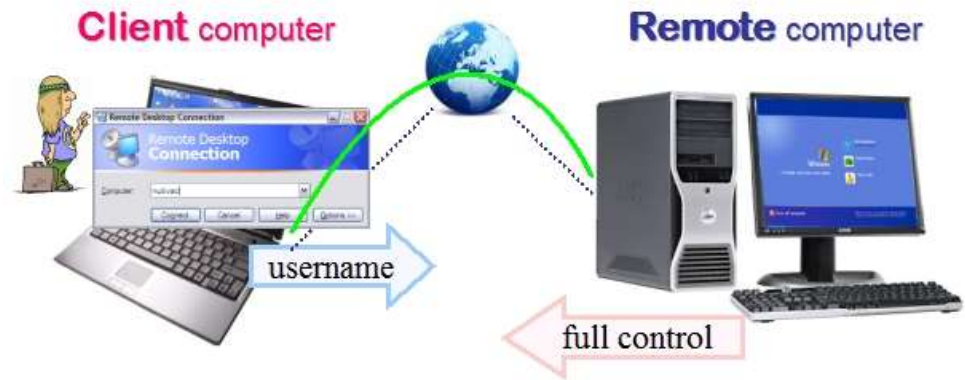
Chrome Remote Desktop,

AnyDesk, Windows Remote Desktop,

TeamViewer(license problems?),

Splashtop,, ...

- + Use any ham software on the shack PC.
- + Audio decoding for FT8 is best at the station.
- + CW generation is best at the station.
- Audio transfer to op may need special attention.
- Needs higher internet speed to duplicate the display.



\*make sure your VNC includes two-way audio, or you'll have to add SW like Skype, Mumble, RemAud, ... which adds complexity.

# Similar to Remote Desktop, is to install a VPN (Virtual Private Network) between the operator and the station.

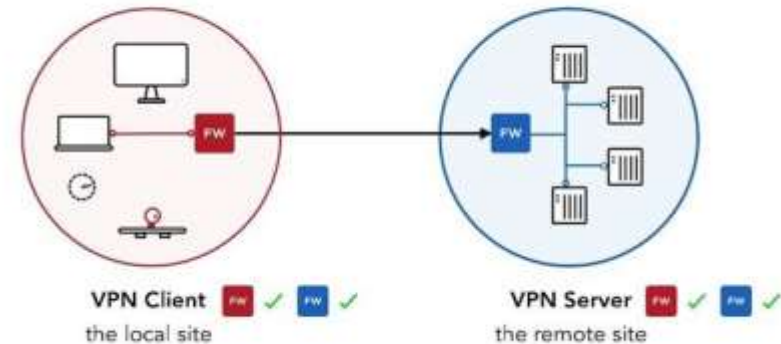
This makes it look like the operator computer and station computer are on the same LAN. Setup a VPN server on the station computer. Then use a VPN client to “connect in” to your station and use the radio and devices on the LAN or connected to the station computer.

You can use Windows “built-in” VPN, or install SoftEther software on both operator computer and station computer. (SoftEther recommended, it passes UDP broadcast packets. Hams also like OpenVPN, Tailscale and ZeroTier.)

Many VPNs focus on privacy and encryption – but our use is for “remote access”.

- + Operator can use any logging software.
- Audio transfer to op may need special attention.
- Needs higher internet speed to handle all LAN traffic.
- Can lead down complex IT/network rabbit holes.

Remote Access VPN



# Two ways to Implement Remote Access with Knobs and Buttons!

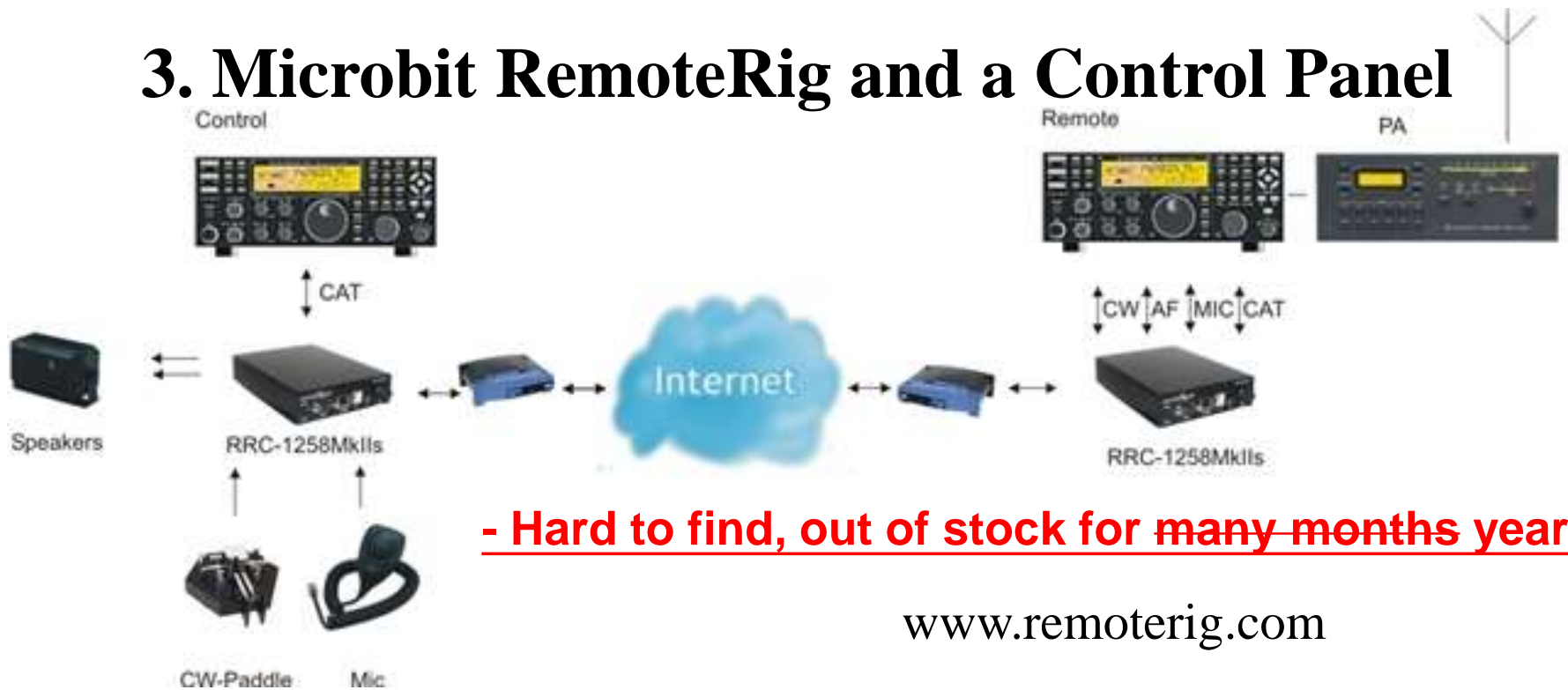
**3. Microbit RemoteRig boxes + 2<sup>nd</sup> front panel.**

**4. FlexRadio SmartLink software + Maestro front panel.**

These cost more in time and money, but can have real knobs!

Pandemic “supply-chain problems” have made Microbit hardware and Flex Maestro front panel **out-of-stock** for many months. If you want these, start looking for the hardware.

### 3. Microbit RemoteRig and a Control Panel



**- Hard to find, out of stock for many months years.**

[www.remoterig.com](http://www.remoterig.com)

Use a pair of RemoteRig “modems” to send audio and control signals across internet. Use with any radio for audio/keying/CAT control. Can also support detached front panels (TS-480), “control heads” (Elecraft K3/0-Mini), “twin” radios, a PC program or an Android App. Provides a serial port for your logging SW. These have been a “gold standard” for years with K3 radios, but K3 and K3/0 are discontinued. Boxes hard to find.

- + No shack or remote PC needed. Very reliable once working. Real knobs.
- + Good CW keying from computer or paddle or straight key. Widely used for good CW.
- + Good PTT support, including hand switch or foot switch.
- Expensive? (\$500 a pair, plus a \$700 control head or 2<sup>nd</sup> radio)
- May be hard to configure the 1<sup>st</sup> time. Get help from a current user/expert.

# 4. FlexRadio and a Maestro control panel



All FlexRadios are controlled from a software program (SmartSDR) locally or remotely. A “Maestro” control panel can also be used locally or remotely. (WiFi or wired) There are also tablet and smartphone Apps. Provides “virtual serial ports” for your logging SW.

- + Good support, one vendor.
- + No shack PC required.
- + Real Knobs.
- + CW keying from computer XOR paddle or key. Some latency issues.
- + Widely used.
- + Nice Spectrum Display.
- Expensive? \$2k radio and \$1k Maestro
- **Maestro out of stock until “spring.”** Interim knob solution FlexControl knob.



È la nuova console di controllo per i ricetrasmittitori della serie 8000 che permette l'uso immediato dell'apparato. Le connessioni: alla rete LAN anche WIFI, oppure direttamente all'apparato.

È un moderno e funzionale pannello radio dotato di schermo touch, pulsanti e manopole, connessioni per microfono e l'apparato senza rinunciare alla operatività tradizionale di una qualsiasi apparecchiatura radio, oltre che a permetterne punto coperto dalla vostra rete LAN.

# Operating CW to a remote transmitter has some unique issues.

+ Generating CW at the transmitter generates good CW.

1. Use transmitter's internal keyer.
2. Use a shack PC at the transmitter to generate keying.
3. Use a Winkeyer at the transmitter to generate keying.

- Sending CW keying across the internet can have delayed or lost data, which can cause poor CW.

1. Microbit RemoteRig box has settings to adjust to prevent problems, and has a local sidetone for operator.
2. Flexradio Maestro is able to send CW across internet, and has local sidetone, but cannot do both computer keying and paddle keying at same time.

3. Local sidetone is needed to allow paddle keying by an operator.

A remote sidetone returned from a remote transmitter is okay for TX monitoring, but is too delayed for an operator to perform paddle keying.

You can use “linked winkeyers” called Wkremote, one at operator and one at transmitter.

RemoteKeyerInterface@groups.io also offers a solution for getting an operator paddle signal safely across the internet to a Flexradio.



# What are the REAL problems?



Station Control: **The control of “everything else”**: AC power outlets, antenna switching, rotators, tuners, amplifiers, RX-only antennas, watt meters, ...

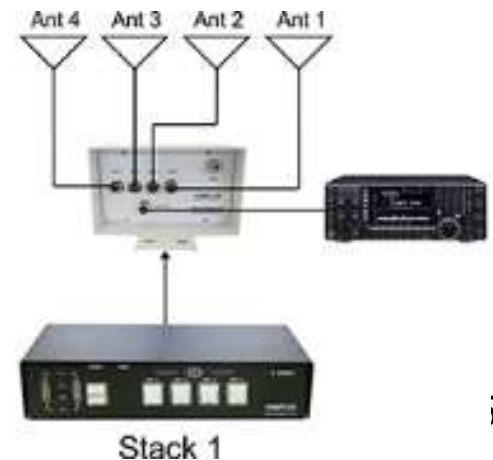
**Simplify** your station, make your station as **automatic** as possible, then solve remaining issues. Look for devices that are “**automatic**” or “**computer-controlled**”(needs a PC in shack). (Trust, but verify...)

Eliminate things that require you to **manually** switch, plug, adjust or reset.

**No!**



**Yes!**



# There are solutions to the REAL problems:

AC Power switching: Smart Plug \$25, or DLI Web Power Switch \$190



Antenna switching: The radio's ANT 1/2 button, or a band decoder & coax switches like microHam Station Master, HamPlus, Hamation, KK1L, Amplitec, homebrew, ...

Rotators: Control box has serial or USB port, then use logging SW's rotator control, or YO3DMU's PstRotatorAz, or Green Heron software.

Tuners and amplifiers: If manual tune, use on one band switched-in by antenna switch. If auto-tune: use anywhere. Use in Automatic-mode or with control SW on shack PC, or over internet if remote-capable. Acom, Flexradio Power Genius, Elecraft KPA-1500, ...

Other devices can be controlled by the shack PC or a RaspberryPi and relay boards (Denkovi, Sainsmart or KMtronic) or controlled across the internet with a serial port extender or “web relay” or a smart plug switch. Flexihub software, virtual serial ports, .16

# Example: Operator Screen for a Remote Station, using separate apps on a remote desktop.

**\* TOWER TWO**  
4 Element SteppIR @ 75 feet under 40m Moxon @ 85'.  
Same rotor, "CoRotating"

*Note -- the actual heading for antennas is 15 degrees Clockwise from the indicated heading.*

**\* TOWER ONE**  
10/15/20 Meter Monobanders on 1 Mast. @ 90 - 105 feet. "CoRotating"  
Fixed 20m Monobander @ Europe  
For EU STACK rotate to 65 degrees and select M2 BOTH

**T2: SteppIR, 40m SteppIR Controller**  
Setup Calibrate Radio View  
To SteppIR: 21.175  
From SteppIR: 14.075  
Bands: 80 40 20 17 15 12 10 6  
Auto Home  
Manual Recall 180 Auto

**T2: SteppIR, 40m Polytotonic - Begin...**  
Communication Setup Tracker Map View Help  
Mode: Manual Tracking  
Az: 66 92  
BD: 0 90 ANT: 1 STOP

**T2: 10/15/20 M2 Polytotonic - Begin...**  
Communication Setup Tracker Map View Help  
Mode: Manual Tracking  
Az: 124 53  
BD: 0 90 ANT: 1 STOP

**ShackLab-4 Control Center V4.4**  
Setup Window View Help  
160 80 75 60 40 30  
20 17 15 12 10 6  
Radio 1 Auto Band Radio 2  
Multi Presets RX Master  
Main Antennas Shared Apex Loop  
WRT RT FLIP

**Before selecting or QSYing SteppIR make sure no one is using it!**

**IMPORTANT OPERATING PROCEDURES**  
1. For 160M there is an autotuner in place which will allow operation from 1800-1900. Before your first TX and if you QSY more than 15kc from your last TX freq you need to let autotuner adjust. **Put AMP in STBY, TX low power CW or FSK signal for 2-3 seconds**, then can put AMP in OPER and switch radio mode if needed.

WPX SSB IP-Addresses  
KT7E-MASTER 10.0.26.7  
KT7E-RUN1 10.0.26.2  
KT7E-RUN2 10.0.26.3  
K7RF-JON 10.0.26.10  
K7ZO-SCOTT 10.0.26.6  
KR7X-HANK 10.0.26.8  
K7MK-JIM 10.0.26.5  
NK7U2-JOE 10.0.26.4 (Note the "NK7U2" part)

**Alpha 9500 Remote - Amp Firmware Version: 3.03**  
File View Options  
BAND: 1.8 3.5 7 14 18 21 24 28  
SEGMENT: 1 2 3 4 5  
MEMORY: SAVE RCL DEF 1 2 AUTO  
TUNE: 47 54  
LOAD: 54  
ANTENNA SELECT: 1 2 3 4  
EF Power LW: 0 0.1 0.3 0.8 1.0 1.5 2.5  
SWR: 1 1.5 2 3 +10  
Grid Current mA: 0 50 100 150  
Plate Current Aneps: 0 1.0 1.5  
Plate Voltage kV: 0 1 2 3 4  
Gain: 10 30 50  
ALPHA 9500 MICROPROCESSOR CONTROLLED HF LINEAR AMPLIFIER  
OPER STBY ON ON/OFF  
AMP ANT SEL  
Line Voltage: 231.8V +5V: 5.06V -12V: -12.2V Connection Status: ■  
Tap: +12V: 0V +40V: 0V Fault:  
Temperature: 61.70F +24V: 0V

## Example 2: Operator Screen for a Remote Station, using Node Red software.





# Example 3: Operator Screen for a Remote Station, on RHR using web browser

W1/EastportMult

Daylight 10:07 to 22:56 UTC \$0.99/min REMOTE/ERG STATION IN USE BY KL9A 24s

1.8.2.15 (M6) 3  
Maine Grid: FMS 150' ASL ADRS: ME Washington County ITU: CQZ: 3

Power W1: K3

GXP 3 Element Yagi @ 120' (40m) 59° 40m



Go Anywhere GO STOP LP

AF EU JA PAC SA

General - as KL9A

CW 7,030.9 RUN BETA

CALLSIGN SENT RCVD NOTES Save

CALLSIGN	SENT	RCVD	NOTES
	599	599	

Elecraft K3 VICE RX

RR 7.030.917 40m CW  
TK  
LL 7.130.500 40m CW  
TX  
← → ±1 kHz ← → ±1 kHz

S7  
A → B A ← B SPLIT AGC-F NOTCH NB NR

Real-time CW (ESC to cancel) Edit Macros

KL9A/w1 R 5m 1u - - -



PTT (CTRL) PRE ATT SUB

Expert 1.3K-FA Amplifier 40m 66° F

0 W OPERATE  
1.0 MD

Remember our Question: ...

***...but what is the current way to build a remote station?***

Q1: Can the station be fully operated by the shack PC?

A1: Use either “Simple” method: Software Programs or Remote Desktop.

Q2: Is an Icom radio already in place?

A2: Try the Icom RS-BA-1 software, but you may be frustrated/disappointed. Try Win4Icom Suite software (VA2FSQ) or [wfview.org](http://wfview.org) software.

Q3: Is an Elecraft K3 already in place?

A3: Search for RemoteRig boxes, and borrow/use a second K3 or K3/0 as the control head. Alternative, look at Win4K3Suite (VA2FSQ) software.

Q4: Is a Flexradio already in place?

A4: Flexradio software already supports remote operation. Just configure and operate. It may be hard to find a Maestro control head. FlexControl knob available.

You may find some limits on changing antennas, retuning amp, paddle CW, etc...

You may be able to work around some with checklist/procedures or an on-site assistant. Solving every last problem may not be cost-effective for your initial testing. Gain experience, then decide what to change or improve.



continued... ***what is the current technology to build a remote station?***

“Internet Extender” solutions like Remote Desktop and VPN are available, powerful, and use “mainstream” internet technology.

BUT, they can be complicated, have quirks, and often need additional software for acceptable audio delay and CW keying.

Putting together in an efficient, reliable and affordable remote solution is the challenge - just like putting together any effective Amateur Radio station.

The goal of “remote” setups is to get more operators and stations on the air, for more hours of operating, contesting and DXing, - which leads to more fun for the operators, and for the stations on the other end of the contacts. Win-win!

*Thank you!*

***Questions?***

# Remote Elecraft K4

Elecraft has demonstrated a “Virtual K4” software program on a tablet controlling a K4.

They also plan a K4/0 control head to have a K4 “front panel” control a remote K4. Probably late in 2023.

Elecraft has released the software specification to stream the waterfall to other programs, like N1MM+, DXLabs, Win4K4Suite, N4PY, ...



## Other Resources

Excellent YouTube videos by:

VE6WZ - e.g., “The control setup at VE6WZ”

FlexRadioSystems VA3MW - e.g., “Setting up my First HF Remote Station”