Amateur Radio Jump Kits

W5IFQ

3 SEP 2024

Presentation Goals

- Provide techniques for constructing portable HF and VHF/UHF stations.
- All but the last example use inexpensive music industry cases with 19” rack mounting hardware.
- References are provided for obtaining cases, 19” rack mount shelving and panels.
- Introduce a work-in-progress of a high performance QRP back pack station.

Portable Station Capabilities

- Self contained HF/VHF Amateur Radio station capable of being operated in the field.
- Can operate with a variety of DC and AC power sources.
- Includes Digital capability.
  - Mil Std. 188-M110A
  - Winlink Express
  - Fldigi
  - WSJT suite
  - JS8Call
- Includes a variety of HF and VHF antennas.

TxSG HF ICOM Kit
(HF MARS TICP Kit)
(Quantity – 14)
Date: 2016 - Present

Installed Software

- W10Pro
- MS Office
- Winlink Express
- MixW (similar to Fldigi)
- MARS Software removed during conversion to TxSG use.

Jump Kit – Front View

Radio/Modem Components

ICOM IC-7200

Heil ProSet 6

Heil AD1IC

Heil Hand Switch

SCS DR-7400

Signalink USB

PTCIIex/Signalink Summing Box

ICOM IC-208H

Kantronics KPC-3+

KPC-3 to IC-208

Power Supply Components

Astron SS30M

Rigrunner 4005
Note: 5V DC regulator
added to provide external DC
for USB Hub

SGC Coaxial
Line Isolators
(located inside SG-230
& Jump Kit)

TICP Jump Kit Housing

SKB 1SKB-R4UW Rolling Roto Rack Case
4U Roto-molded Rack Case with 17.6" Rackable Depth, Mil-Spec Butterfly Latches, Front and Rear Rack Rails, Retractable Pull Handle, and Inline Wheels - $299.99

19” rack mount threaded rails

Covers have O-ring gaskets

https://www.sweetwater.com/store/detail/SKBR4UW--skb-1skb-r4uw-rolling-roto-rack-case?mrkgadid=&mrkgcl=28&mrkg

19” Rack Mount Shelving

https://www.hammfg.com/dci/products/accessories/ras

19 Inch Mounting Shelves

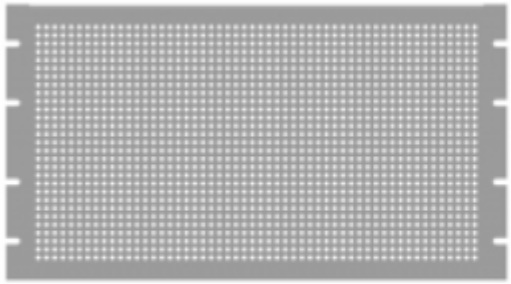
Units shown: **inch**. Switch units to: mm

Part No. Vented	Part No. Solid (Un-Vented)	Mounting Dimensions Height	Width	Depth	Rack Units	Stiffener Lip(s) Folded	Suggested Load Capacity*
RASV190107UBK1	RASU190107UBK1	1.75	19.30	7.00	1U	Up (Front & Back)	16ga 42 lbs (19 kg)
RASV190107DBK1	RASU190107DBK1	1.75	19.30	7.00	1U	Down (Front & Back)	16ga 42 lbs (19 kg)
RASV190110BK1	RASU190110BK1	1.75	19.30	10.00	1U	Up (Back Only)	16ga 42 lbs (19 kg)
RASV190112BK1	RASU190112BK1	1.75	19.30	12.00	1U	Up (Back Only)	16ga 42 lbs (19 kg)
RASV190115BK1	RASU190115BK1	1.75	19.30	15.00	1U	Up (Back Only)	16ga 42 lbs (19 kg)
RASV190120BK1	RASU190120BK1	1.75	19.30	20.00	1U	Up (Back Only)	16ga 42 lbs (19 kg)
RASV190312BK1	RASU190312BK1	3.50	19.30	12.00	2U	Up (Back Only)	14ga 100 lbs (45 kg)
RASV190315BK1	RASU190315BK1	3.50	19.30	15.00	2U	Up (Back Only)	14ga 100 lbs (45 kg)
RB-SHELFV	RB-SHELF	3.50	19.30	16.00	2U	Down (Front & Back)	16ga 50 lbs (22 kg)
RASV190318BK1	RASU190318BK1	3.50	19.30	18.00	2U	Up (Back Only)	14ga 100 lbs (45 kg)
RASV190320BK1	RASU190320BK1	3.50	19.30	20.00	2U	Up (Back Only)	14ga 100 lbs (45 kg)
RASV190515BK1	RASU190515BK1	5.25	19.30	15.00	3U	Up (Back Only)	14ga 200 lbs (91 kg)
-	RASU190516BK1	5.25	19.30	16.00	3U	Up (Back Only)	14ga 200 lbs (91 kg)
RASV190520BK1	RASU190520BK1	5.25	19.30	20.00	3U	Up (Back Only)	14ga 200 lbs (91 kg)
-	RASU190522BK1	5.25	19.30	22.00	3U	Up (Back Only)	14ga 200 lbs (91 kg)
-	RASU190524BK1	5.25	19.30	24.00	3U	Up (Back Only)	14ga 200 lbs (91 kg)
RASV190715BK1	RASU190715BK1	7.00	19.30	15.00	4U	Up (Back Only)	14ga 200 lbs (91 kg)
RASV190720BK1	RASU190720BK1	7.00	19.30	20.00	4U	Up (Back Only)	14ga 200 lbs (91 kg)

19” Blank Panels

https://www.newark.com/c/enclosures-racks-cabinets/enclosure-rack-cabinet-accessories/rack-panels

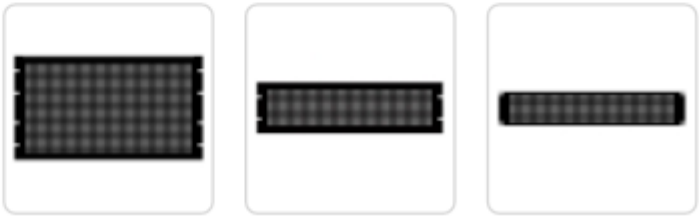
Perforated Steel Rack Panel *PPFS Series*



Features

- Constructed of 16-gauge steel.
- Fits standard EIA-310-D compliant rails.
- Allows 25% airflow through panel.
- Finished in smooth powder paint.
- RoHS Compliant.
- Manufactured in North America.

Gallery



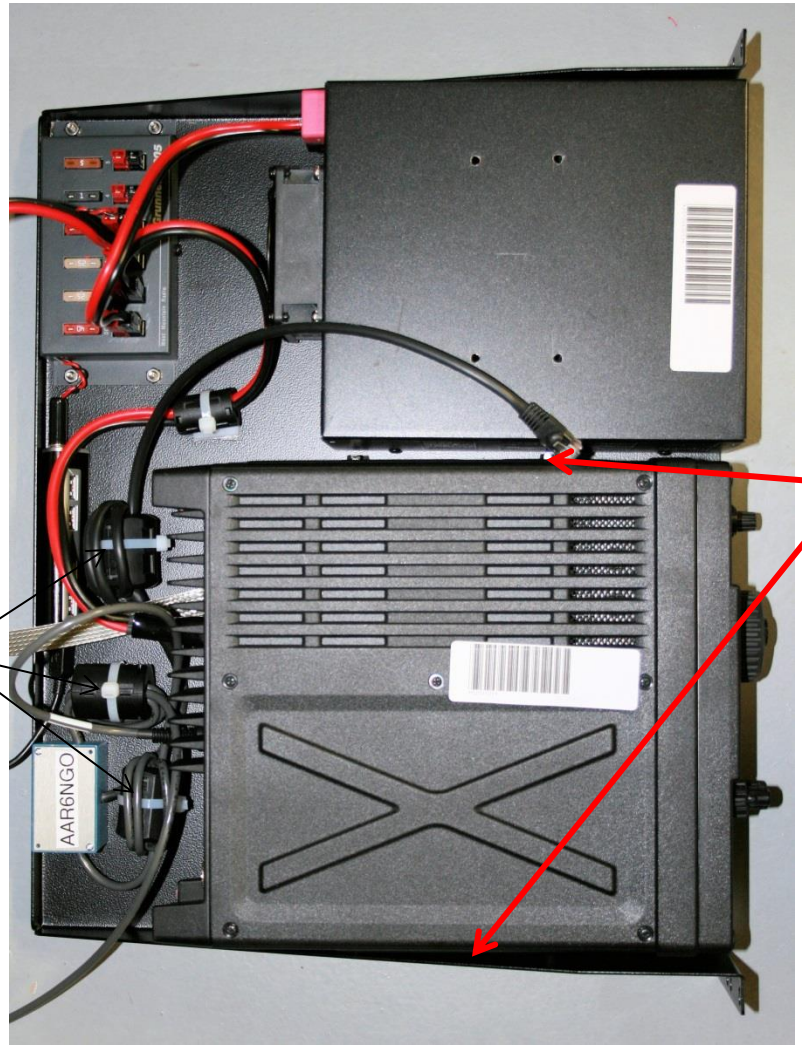
BOTTOM SHELF

RIGrunner

USB Hub

Ferrite Cores

Summing Box

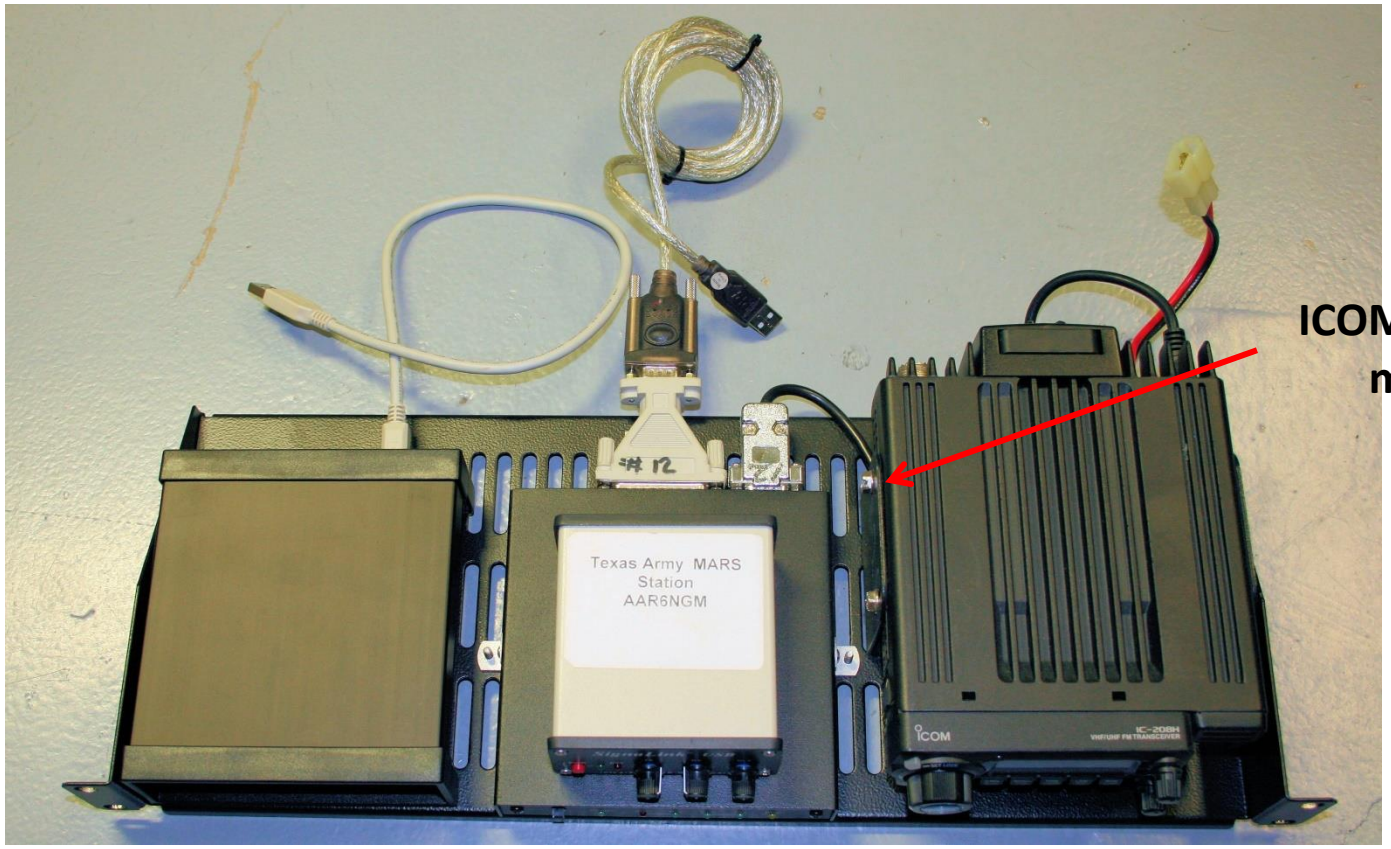


Astron SS-30M

ICOM mobile mount

ICOM IC-7200
HF Radio

TOP SHELF



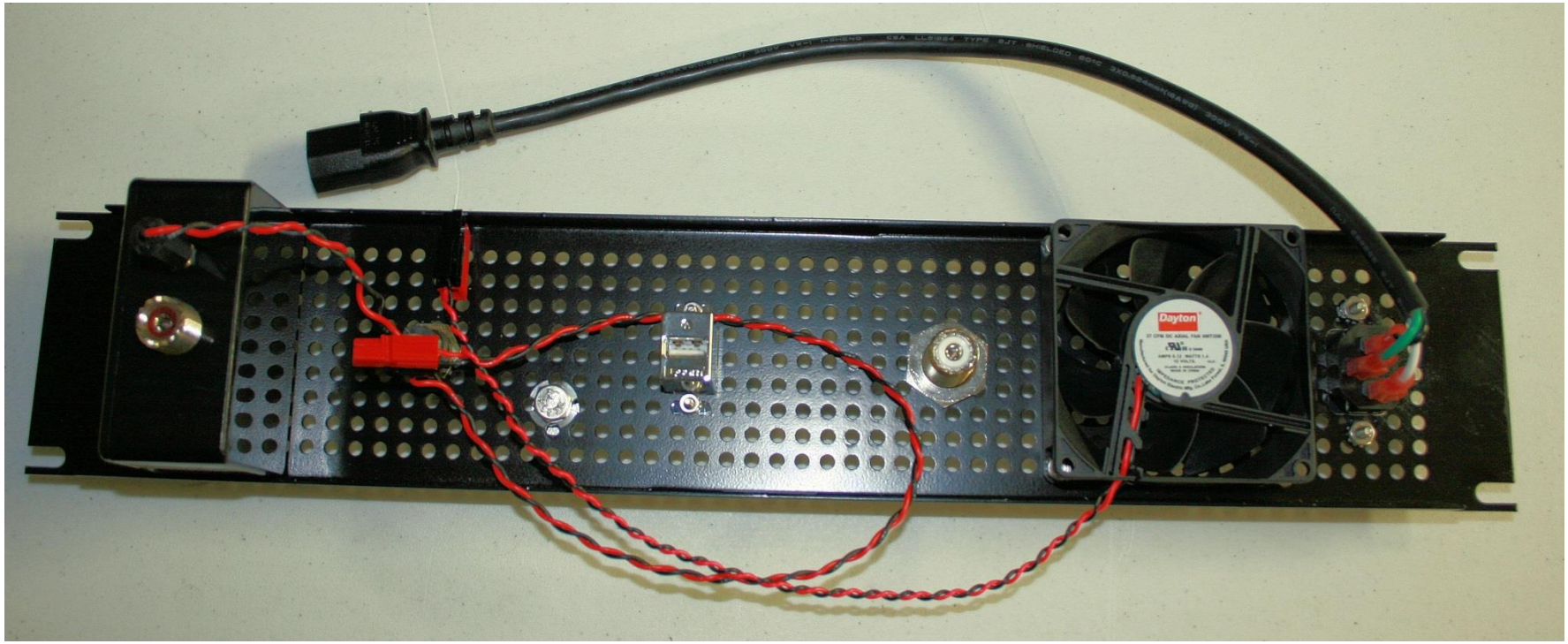
ICOM mobile mount

Pactor Modem

Packet Modem Signalink USB

IC-208H VHF/UHF Radio

BACK PANEL



SGG Coaxial Line Isolator HF Output

GND Lug

USB A/B

UHF

Muffin Fan 12 VDC

AC in

Computer Components

Dell Latitude E6540
With Windows 10

USB to Serial for
KPC-3+ (Prolific)

9 to 25 Pin Adapter
For KPC-3

Travel Scan Pro

Canon iP100

4-Port USB Hub
Gear Head
(Required 5VDC)

USB A/B cable

Antenna Components-1

1. Digital VOM
2. Additional fuses
3. *Adapters:
    1. N-UHF (2)
    2. UHF-N (2)
    3. UHF Barrel
4. Tie-wraps
5. Mast halyard assembly tool

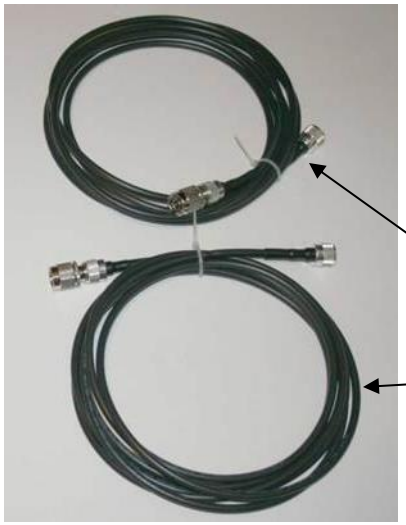
5

1 2 3 4

Antenna Components-2

SG-230 & HF Antenna

Diamond X-30 VHF Antenna (stored in one of the mast sections)



HF & VHF Jumper Cables

Antenna Components - 3
(32 ft. Portable Mast)

Aluminum mast sections – Quant. 7

Top Hat with guy ropes and halyard pulley

Halyard rope

Guy rope stakes - 3

Bottom mast section with halyard pulley and cleat.

Antenna Components - 4 (Portable Antenna)

Hinged mounting base with mounting spikes

Coaxial cable 2 X 100 ft. RG-213

Stake tools

Mast bag for all components

Jump Kit – Rear View

Storage for:

1. Heil Proset 6
2. Heil hand switch
3. Spare microphones
4. AC power cord
5. USB A/B cable

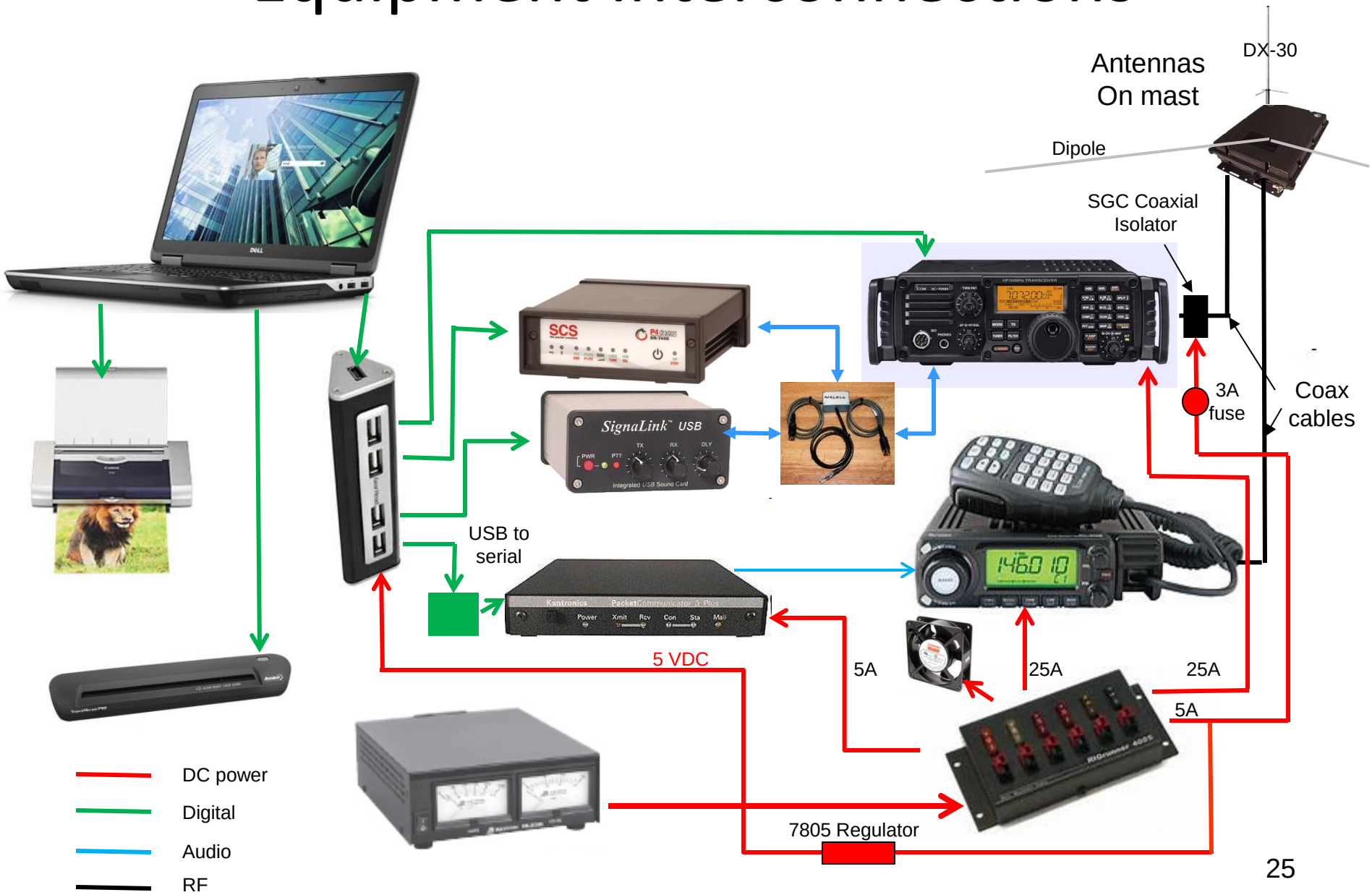
STORAGE COMPARTMENT IN USE

Antenna Tuner Case

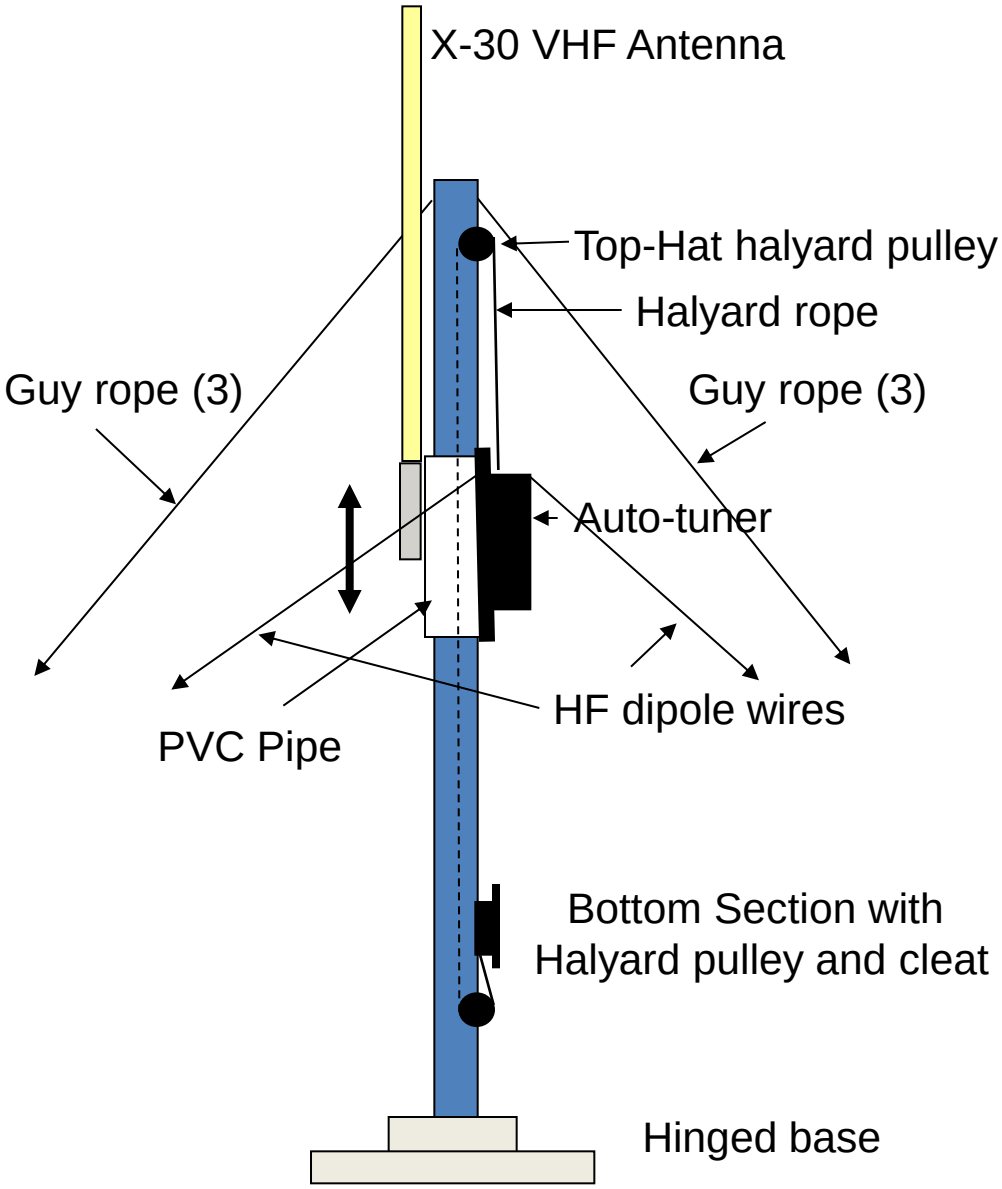
Laptop Case – Bottom layer

Laptop Case – Top Layer

Equipment Interconnections

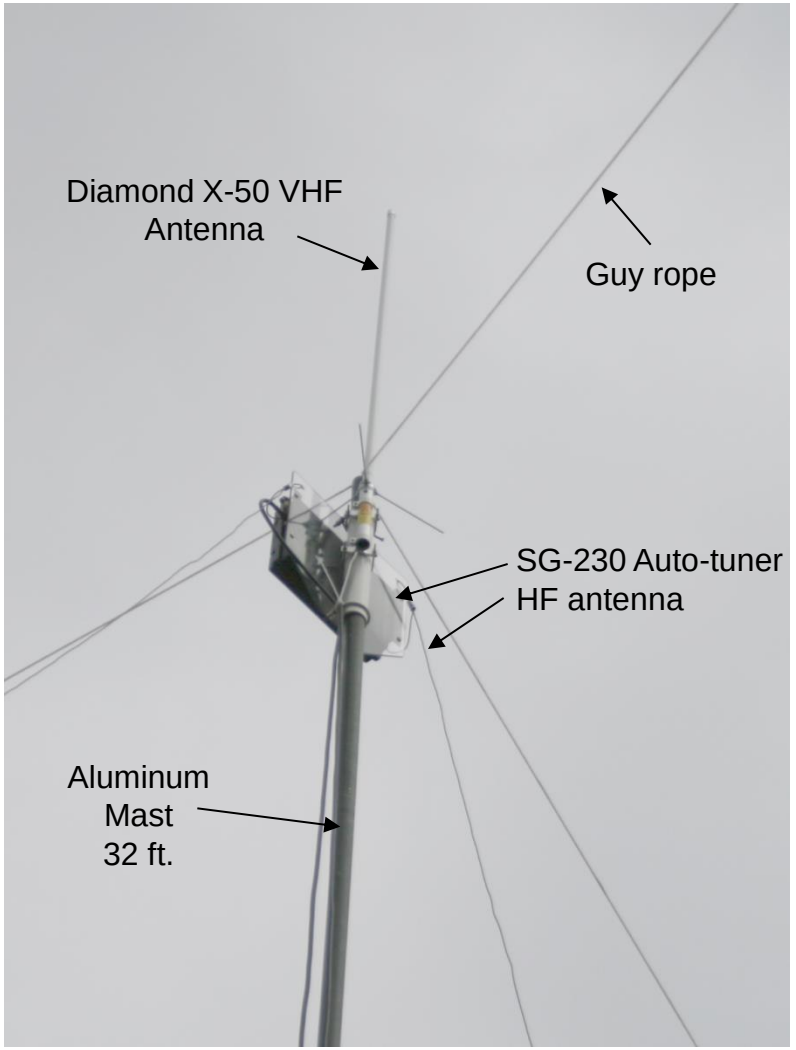


Internal Halyard Assembly



Portable Antenna

- A portable antenna mast assembly is available in the event that the TICP pneumatic mast is not available or is inoperative.
- This mast uses ground stakes, so can only be mounted on ground that supports stakes, i.e. no provisions for paved parking lots or sand beaches.
- The mast and antennas can be erected by two personnel. One person can erect if guy rope stakes are pre-positioned and two guy ropes attached.



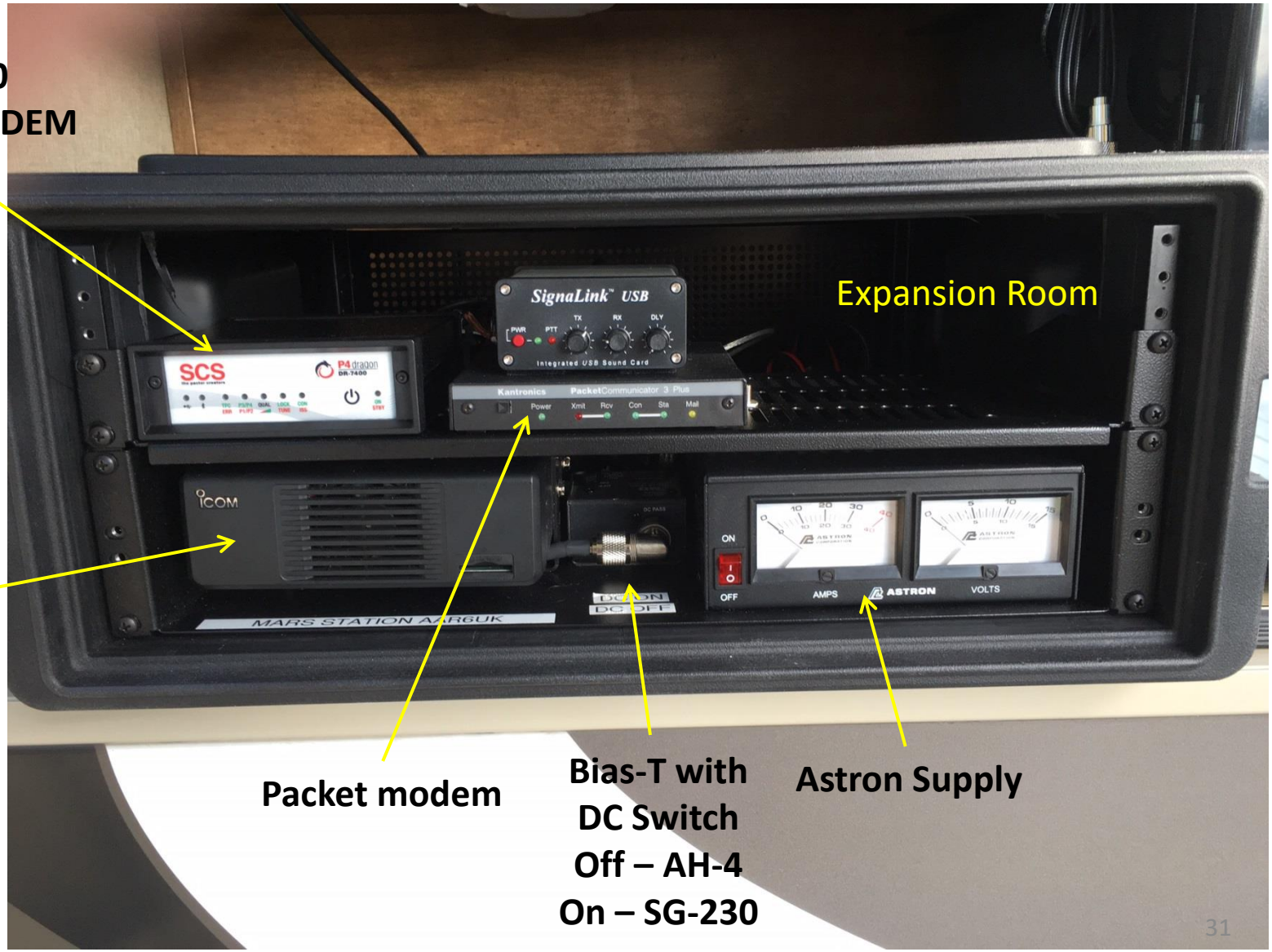
TICP Trailer Deployment (Hurricane Harvey)

RV Jump Kits
(Next Generation for Personal Use)

Installed Software

- W10Pro
- Firefox
- Microsoft Edge
- Open Office
- Winlink Express
- VARA HF
- VARA FM
- Fldigi
- Flrig
- WSJT (FT-8, FT-4, etc.)
- VSPE
- Mil Std. 188-110A (MARS suite)

Front View of 6UK RV Jump Kit

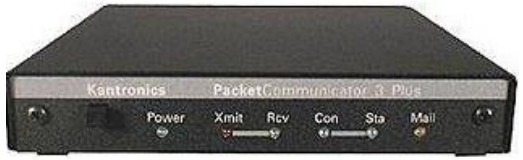


Back View of RV Jump Kit

Major Hardware Components

ICOM IC-7100

4-Port USB Hub
Gear Head



Kantronics KPC-3+

SCS DR-7400

DR-7400/Signalink
Summing Box

Astron SS30M

MFJ-4117
Bias-T

RigRunner 4005
(modified)

Signalink USB

Carrying Case

(https://www.caseclub.com/product/ccr4u1sk-case/)

CCR4U1SK Case

$159.99

4U Roto Rack

Roto-molded for strength and durability
Front and rear gasketed covers
Interlocking stacking ribs
New size bar cover design
Recessed latches
Heavy-duty flushmount handles
Rackmount hardware included for secure mounting front or rear
Roto molded uni-body construction
Threaded steel rails
Rear rails included
Interlocking X pattern for solid stackability
Front and rear full size lids
Recessed latches
Molded-in handles
Shock absorbing feet
Case has a Lifetime Warranty

- 1 + Add to cart

Categories: 17.6" Deep Rack Cases, 4U, Case Club Cases, Rack Cases

Equipment Interconnections

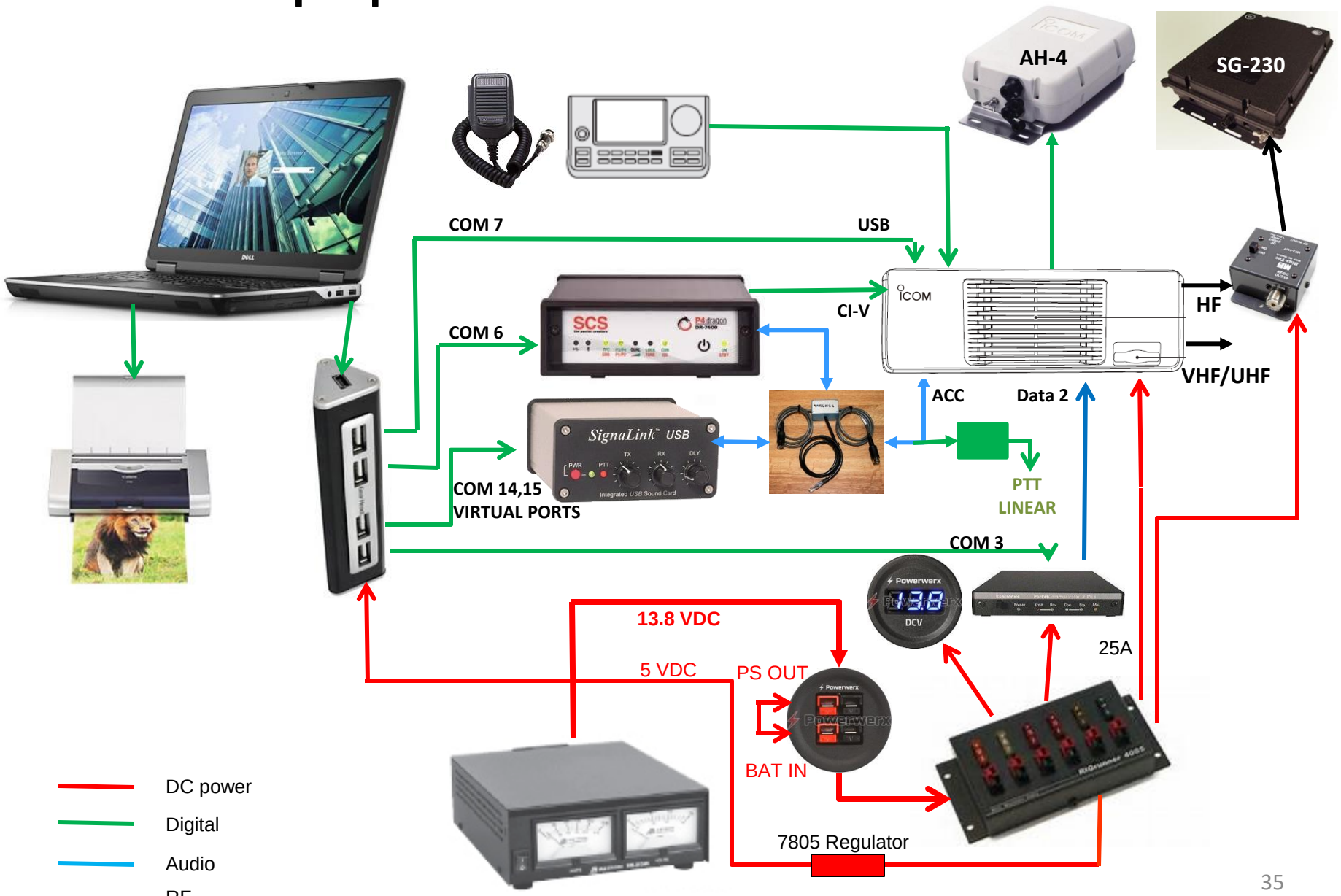
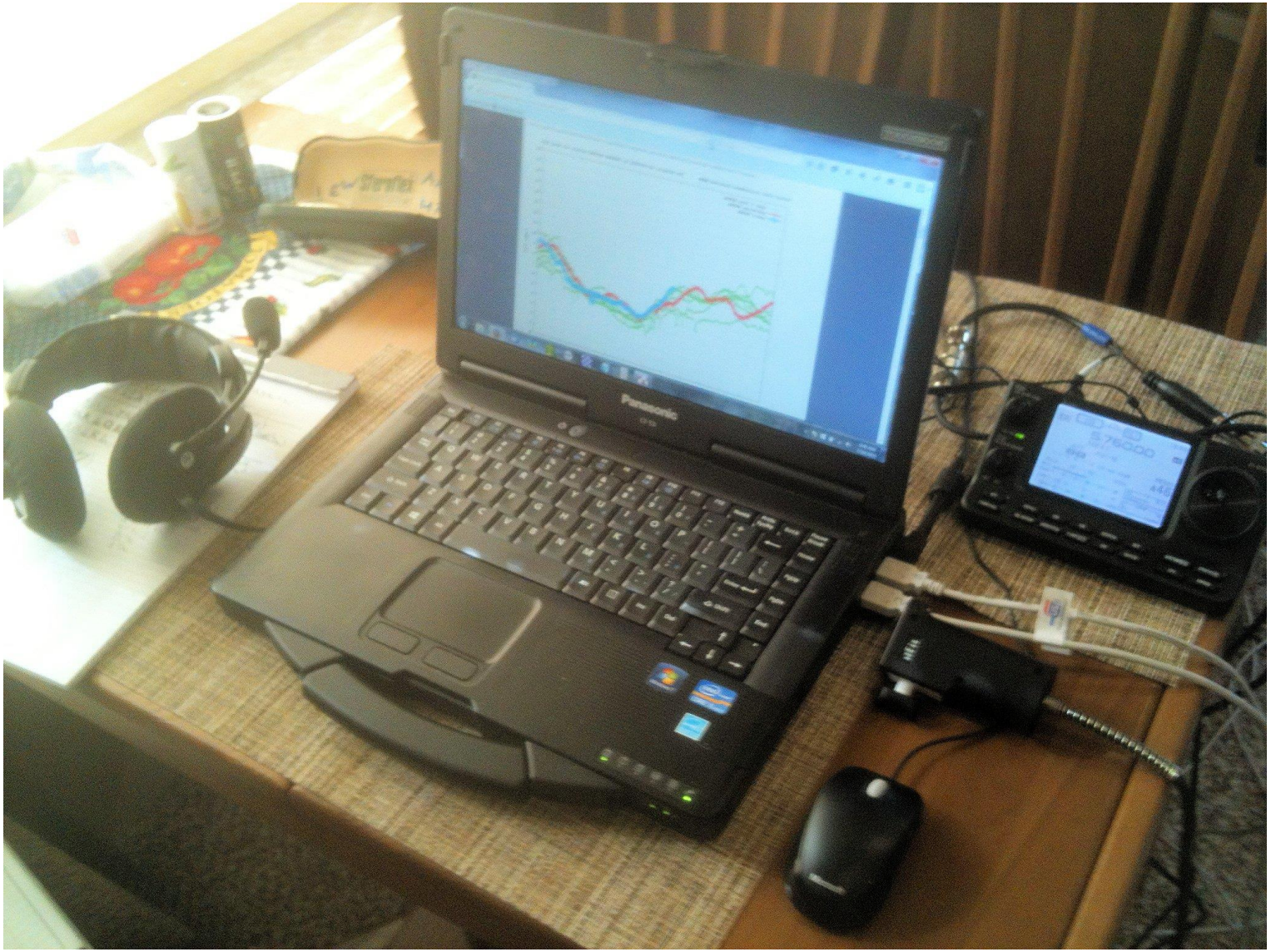


Table Top Operation In RV



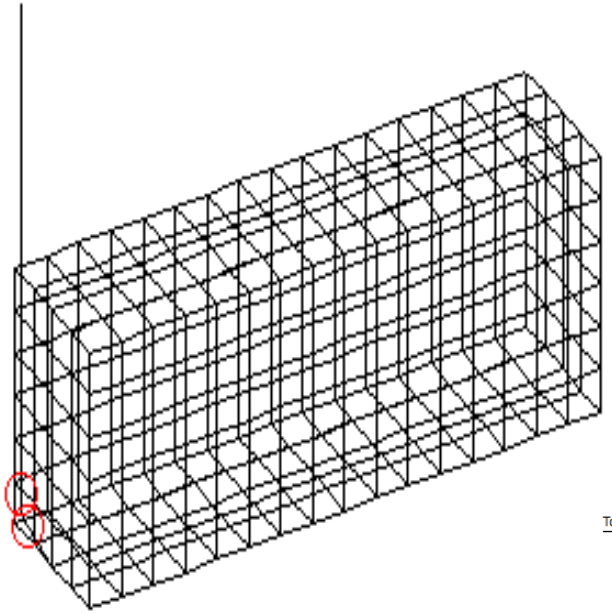
Remote Location of Radio Case

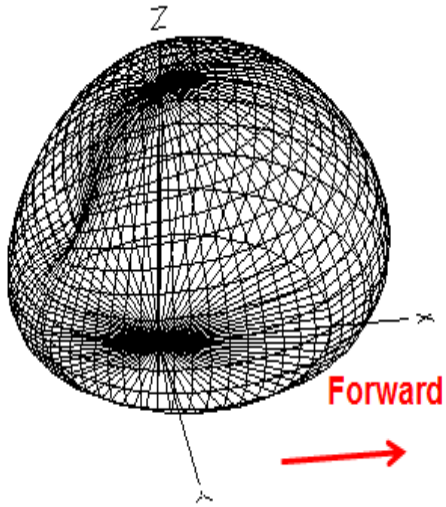
Tilted Vertical on RV

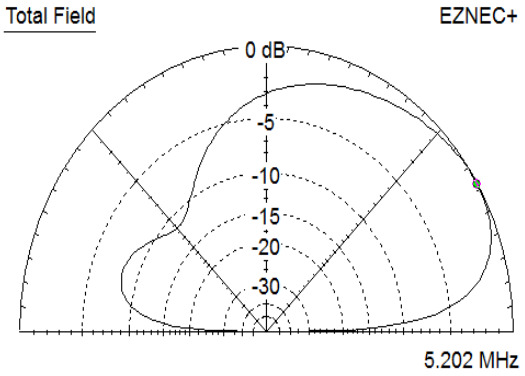
RV Portable Vertical

Marine Whip:
- 24 ft. whip
- AH-4 at base

RV Dimensions:
- Height – 12 ft.
- Width – 8 ft.
- Length – 32 ft.
- Gnd. height – 2 ft.



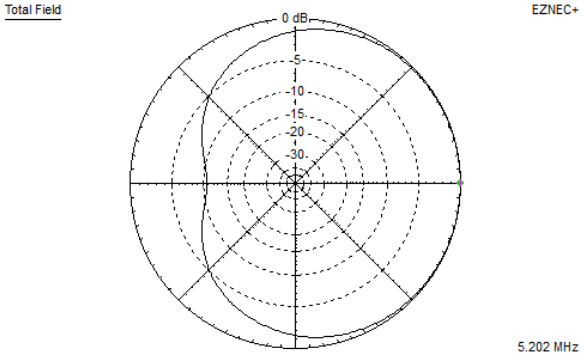




Elevation Plot
Azimuth Angle 0.0 deg.
Outer Ring -1.21 dBi

Cursor Elev 31.0 deg.
Gain -1.21 dBi
0.0 dBmax

Slice Max Gain -1.21 dBi @ Elev Angle = 31.0 deg.
Beamwidth 79.2 deg.; -3dB @ 9.7, 88.9 deg.
Sidelobe Gain -9.41 dBi @ Elev Angle = 160.0 deg.
Front/Sidelobe 8.2 dB



Azimuth Plot
Elevation Angle 50.0 deg.
Outer Ring -1.78 dBi

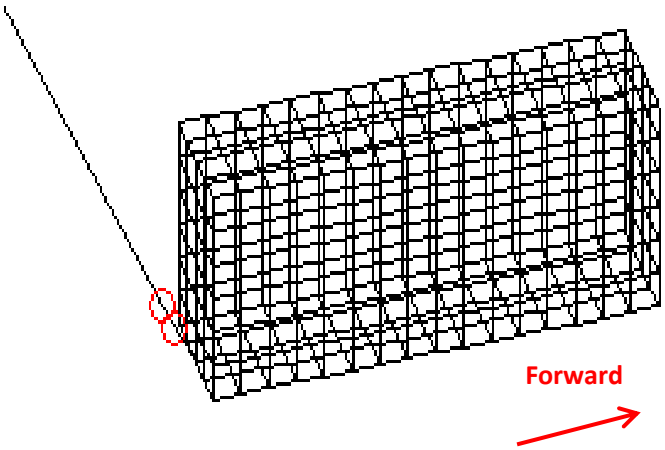
Cursor Az 0.0 deg.
Gain -1.78 dBi
0.0 dBmax

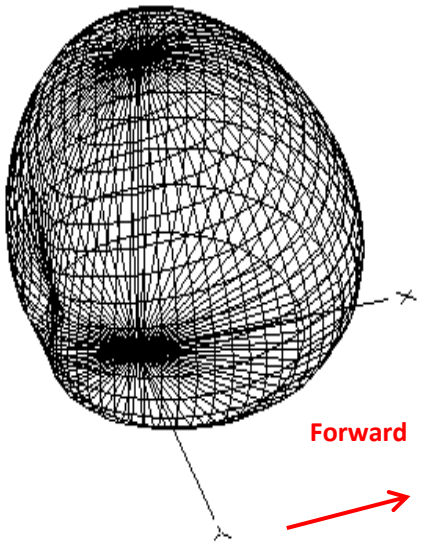
Slice Max Gain -1.78 dBi @ Az Angle = 0.0 deg.
Front/Back 10.73 dB
Beamwidth 228.4 deg.; -3dB @ 245.8, 114.2 deg.
Sidelobe Gain < -100 dBi
Front/Sidelobe > 100 dB

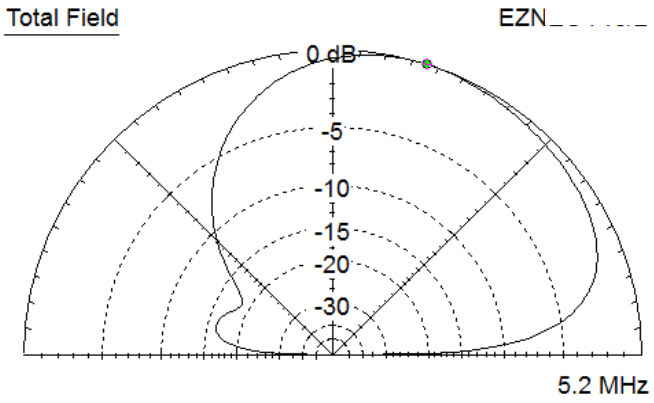
RV Portable Tilted Vertical

Marine Whip:
- 24 ft. whip
- AH-4 at base
- Tilt – 30 deg.

RV Dimensions:
- Height – 12 ft.
- Width – 8 ft.
- Length – 32 ft.
- Gnd. height – 2 ft



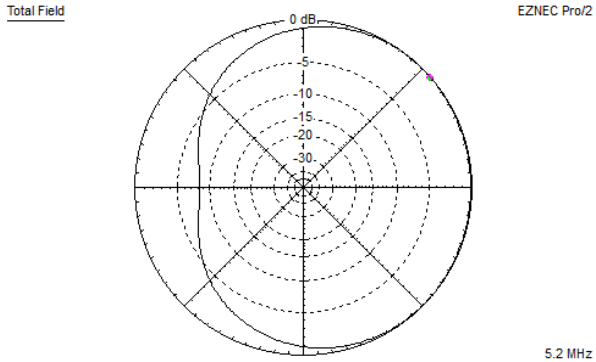




Elevation Plot
Azimuth Angle 0.0 deg.
Outer Ring -1.3 dBi

Cursor Elev 72.0 deg.
Gain -1.3 dBi
0.0 dBmax

Slice Max Gain -1.3 dBi @ Elev Angle = 72.0 deg.
Beamwidth 98.1 deg.; -3dB @ 12.8, 110.9 deg.
Sidelobe Gain -17.5 dBi @ Elev Angle = 165.0 deg.
Front/Sidelobe 16.2 dB



Azimuth Plot
Elevation Angle 50.0 deg.
Outer Ring -1.55 dBi

Cursor Az 41.0 deg.
Gain -1.55 dBi
0.0 dBmax

Slice Max Gain -1.55 dBi @ Az Angle = 41.0 deg.
Front/Back 4.62 dB
Beamwidth 246.0 deg.; -3dB @ 237.0, 123.0 deg.
Sidelobe Gain -1.55 dBi @ Az Angle = 319.0 deg.
Front/Sidelobe 0.0 dB

Low Profile Version
RV Jump Kit
(Built for MARS Member)

Front View

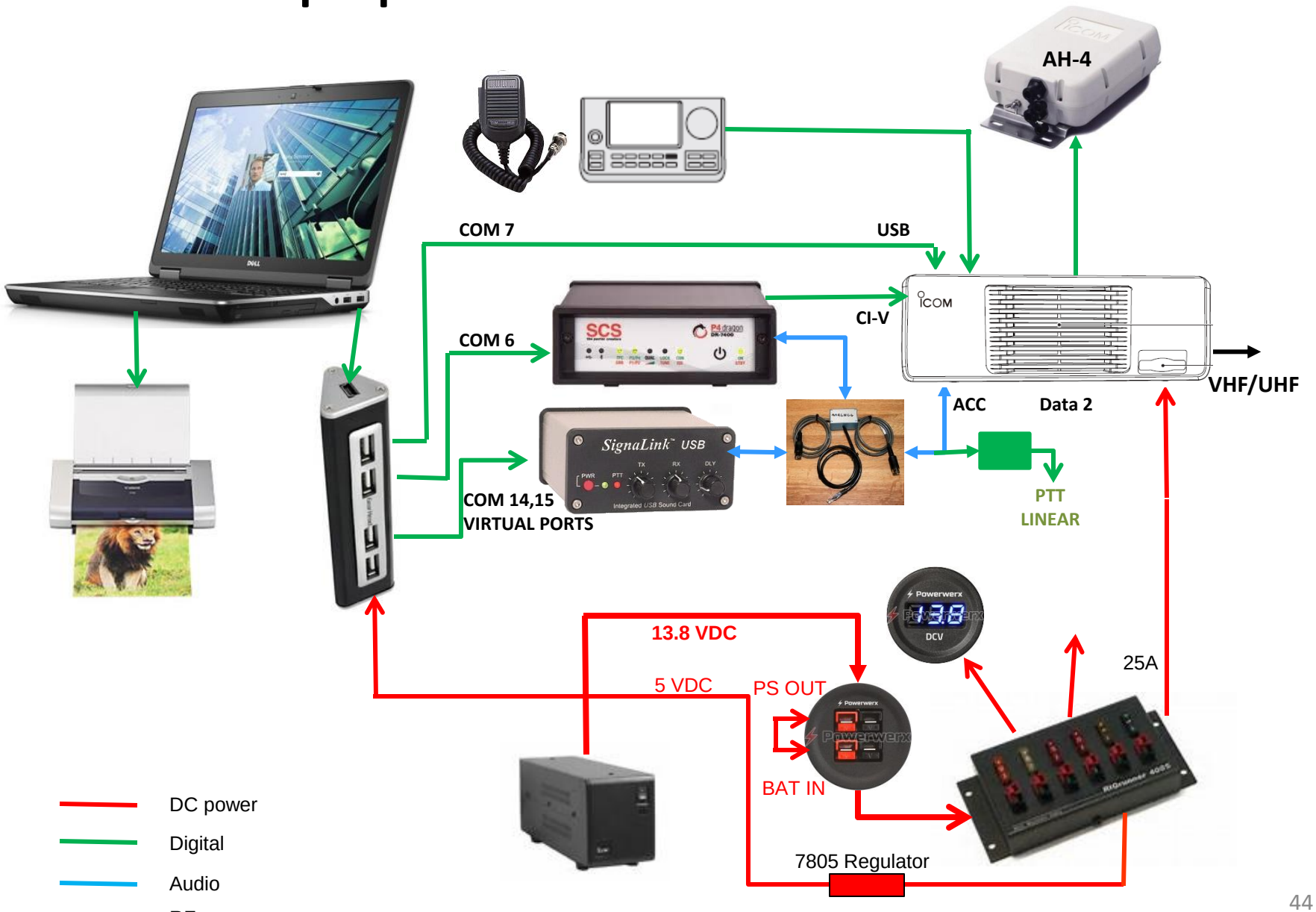
IC-7100 Chassis **Signalink USB DR-7400** **PS-126**

Total Weight with covers, but not control head – 36 lbs.

Back View

FAN

Equipment Interconnections



https://www.caseclub.com/product/ccr2u1sk-case/
$139.99

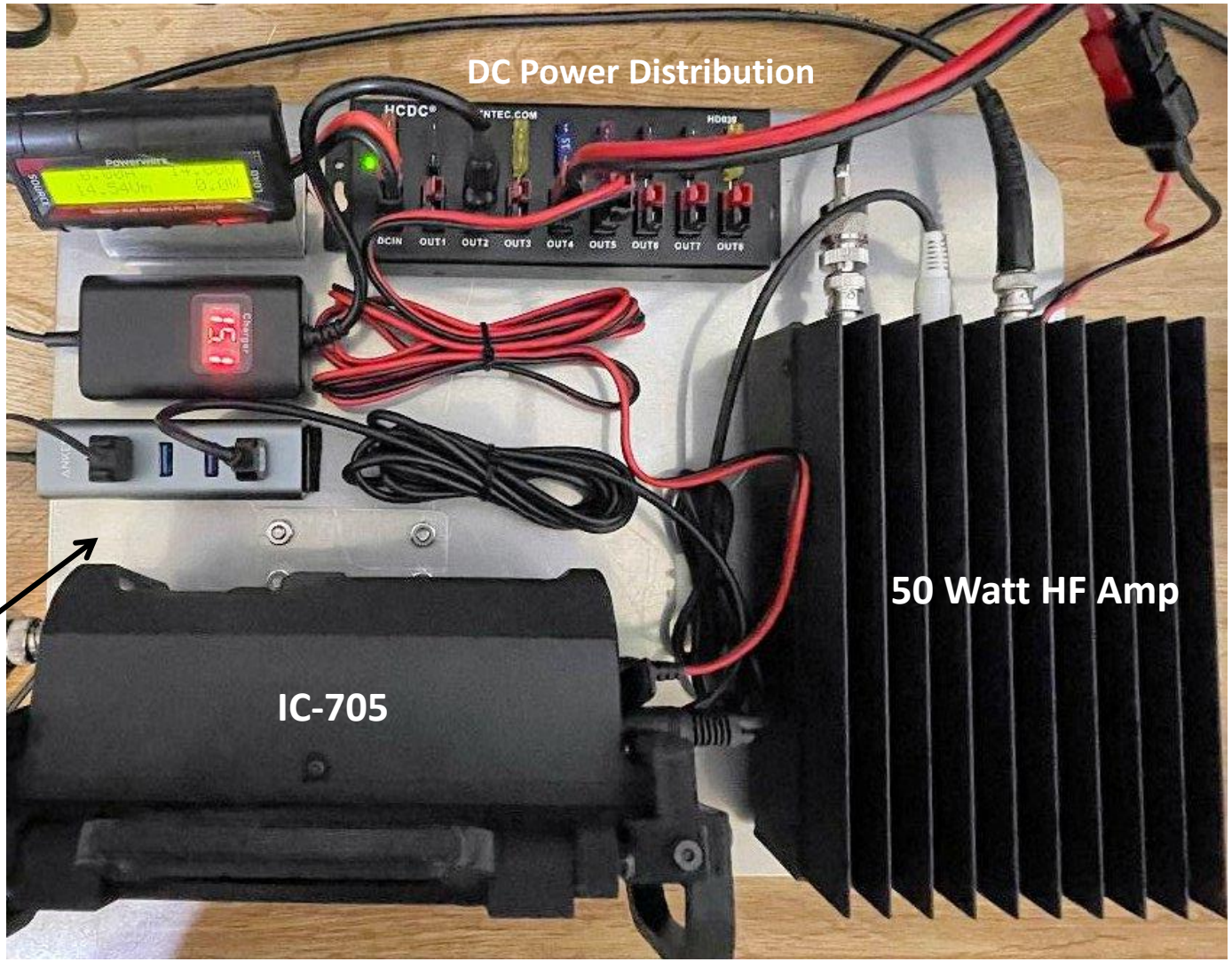
High Performance QRP Rig
(Work in Progress)
OH8STN – Julian (Finland)

Development Goals

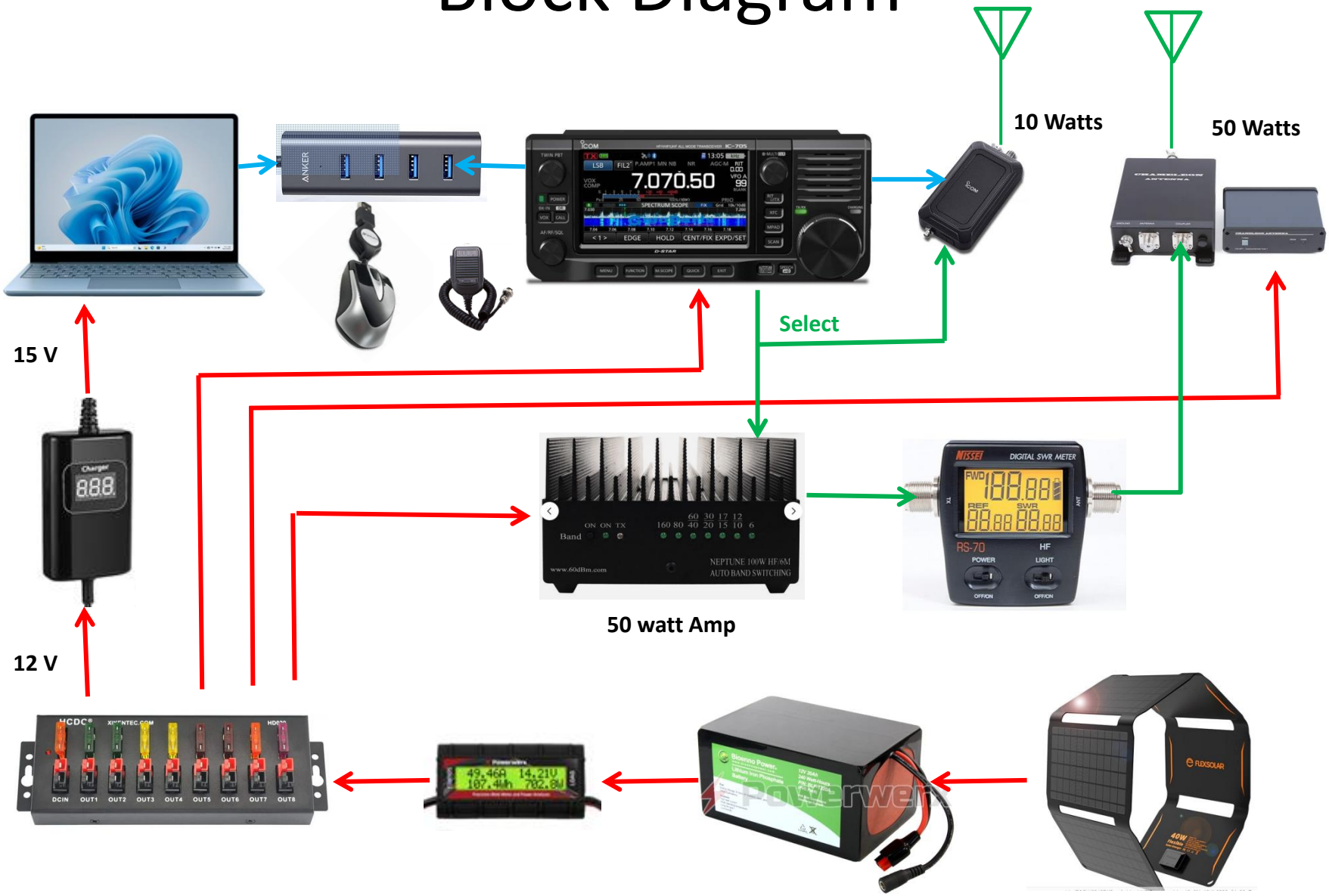
- Portable QRP multi-mode rig:
  - SSB
  - CW
  - WSJT modes
  - JS8CALL
  - Winlink HF and VHF (VARA)
  - Fldigi
  - (MARS digital mode Mil Std 188-110A)
- Low power.
- Solar charging of all Lithium batteries
- Light weight and back-packable. (2 people)
- Include 50 watt HF amplifier.
- Evaluate a variety of HF antennas.

Rig and Computer

Top View of Rig Only



Block Diagram



Radio: ICOM – IC-705

Screen Protection (hamgear3D.etsy.com)

Custom mount

IC-705 Radio Components

- **MARS Mod IC-705**
- **IC-705 AC/DC PS (AC power supply for initial testing)**
- **RT-Systems WCS-705-USB (memory programming)**
- **Heil AD-1-IHT Pro 7 head set adapter**

Antenna Tuners (Latching Relays)

ICOM IC-AH705
10 watt auto tuner
Latching relays
Internal AA batteries or external DC (13.5 VDC)

Chameleon
CHA-URT-1
125 watt auto-tuner
Latching relays

Digital SWR Meter

Amazon

Youmei RS-70 Digital SWR/Watt Meter HF 1.6-60MHz 200W for Two-Way Radio

- Forward/Reflected/VSWR ration in one push button
- LCD backlight display for easy reading
- Convenient control layout for easy operation
- Powered by two AAA batteries/rechargeable batteries or external USB port
- Low insertion loss(0.3dB or lower) structure allows it to be connected permanently

Neptune 50 watt HF Amplifier

Typical input drive – 1.5 – 3 watts for 50 watts output
Maximum current – 12A
Idle current – 0.8 A when turned on

Computer Components

Microsoft Surface Go 2 LTE
Intel Core m3. W10
8GB Memory
128 GB SSD Disk
GPS

Microsoft Surface Signature Type Cover

Travel optical mouse

Anker 4 port USB HUB

Installed Software

- Microsoft 365
- Microsoft Edge
- Winlink Express
- VARA HF
- VARA FM
- Fldigi
- Flrig
- WSJT suite (FT-8, FT-4, etc.)
- JS8CAll
- GPS Gate Splitter (Digital River – My Commerce)
  - Used to get GPS information from Computer for JS8Call

DC Handling Components

Anderson Power Poles on all DC wiring

Powerwerx Watt Meter, DC Inline Power Analyzer, 45A Continuous, 12 Gauge, Powerpole Connectors

HCDC 1 in 8 Out 40 Amp Connector Power Splitter Distributor Source Strip Module Xikentec.com
Fuses values were selected for each device

DC Power Inverter for Computer

Amazon

65W Surface Car Charger for Microsoft Surface Pro 9, 8, 7+, 7, 6, 5, 4, 3, X, Windows Surface Laptop 5, 4, 3, 2, 1 Studio, Surface Go Tablet, Surface Book 3, 2, 1, Support 44W, 36W

Brand: DHMXDC

Substituted Power poles

This 12 VDC to 15.1 VDC switching supply did not produce objectionable RF switching noise.
This allowed the single USB port to be used for digital coms with computer

Batteries & AC Charger

Bioenno BLF-1220A 12V, 20Ah Lithium Iron Phosphate (LiFePO4) Battery, PVC

Bioenno Power BPC-1504DC 14.6V, 4A, AC-to-DC Charger with DC Plug for 12V LiFePO4 Batteries

Solar Panel
(40 W, 1.2 Amps at 13 VDC)

Amazon:

FlexSolar 40W Foldable Solar Panel Charger with USB-C and USB-A Outputs for Phones, Power Banks, Tablets - Waterproof for Camping, Hiking, Backpacking

【Solar Panels Chargers】Built-in 1* QC3.0 USB-A max 18W , 1*PD 2.0 USB-C max 18w(5v-3A/9V-2A/12V-1.5A) and 19V DC (5.5*2.1mm) max 40W outputs to directly connect and charge phones((Android and Apple) , iPads, power banks, small power stations and other daily electronic devices. USB-A and USB-C allow you to charge both electronic devices at once. But don't recommend that DC and USB ports use toghter in case of the charging is a little slowly. Note: Solar Panels cann't store the power.

Power Consumption

- Both internal batteries charged, Amplifier disconnected:
  - FT-8 Receive: 0.6 A
  - FT-8 Tune: 1.2 A
- Amplifier Connected:
  - Standby: 1.5 to 1.66 A
  - VARA HF call at 50 watts 12A

Antennas Options

- NVIS – Doublets (Dipoles) driven by ladder line and a 4:1 balun.
- HF Skip – light weight verticals about ¼ λ high with a few ground radials.
- VHF/UHF – Coaxial J-pole
- Chameleon CHA LEFS 4010
  - End Feed Long-Wire
  - Dipole terminals

Chameleon Antenna System (Sloper or Dipole)

CHA LEFS 4010 (Lightweight End Fed Sloper) EFHW

$175.00

Low SWR – 40m, 20m, 15m, 10m (?)

End Feed Terminal

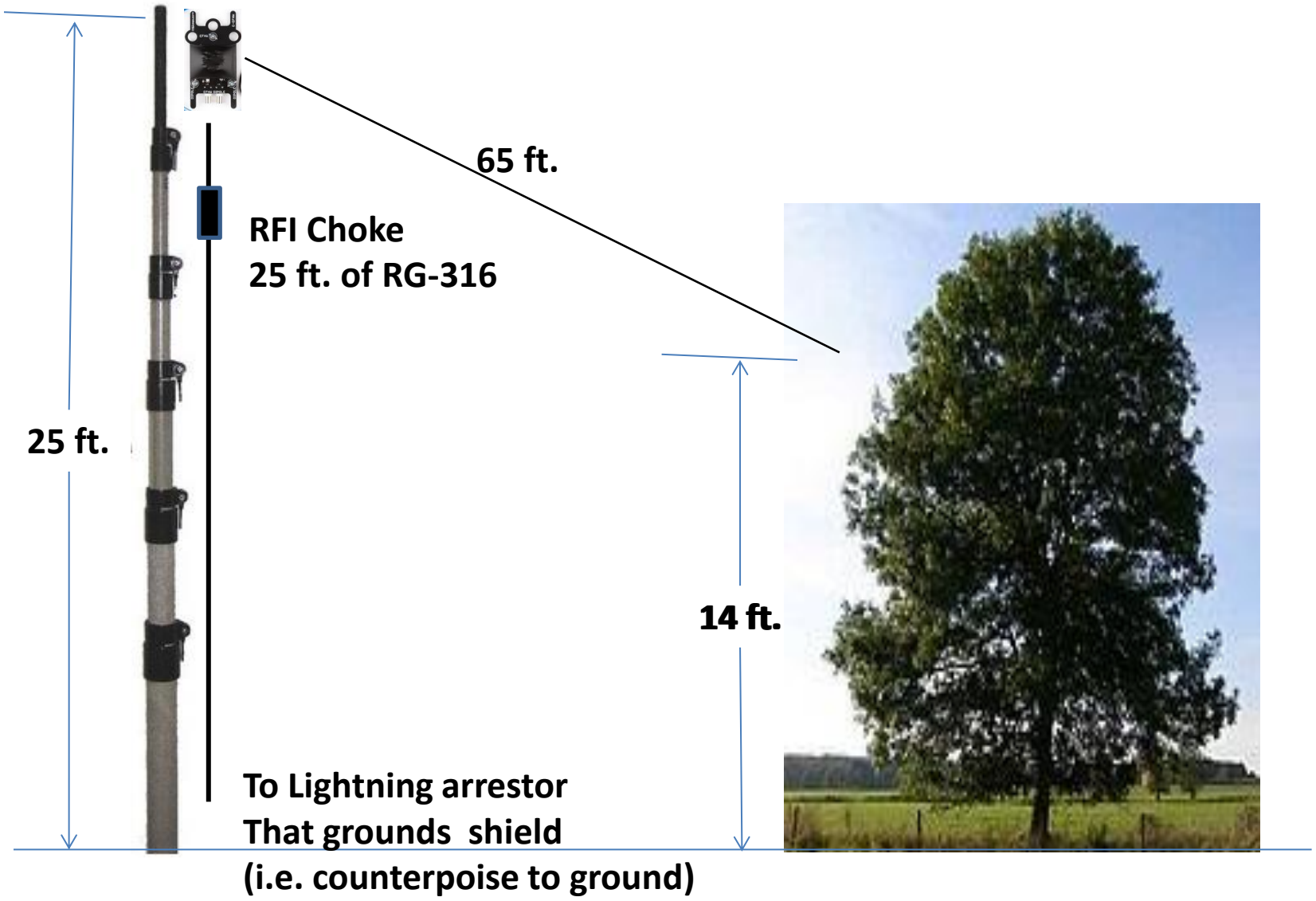
End fed wire – 65 ft.

49:1 Balun

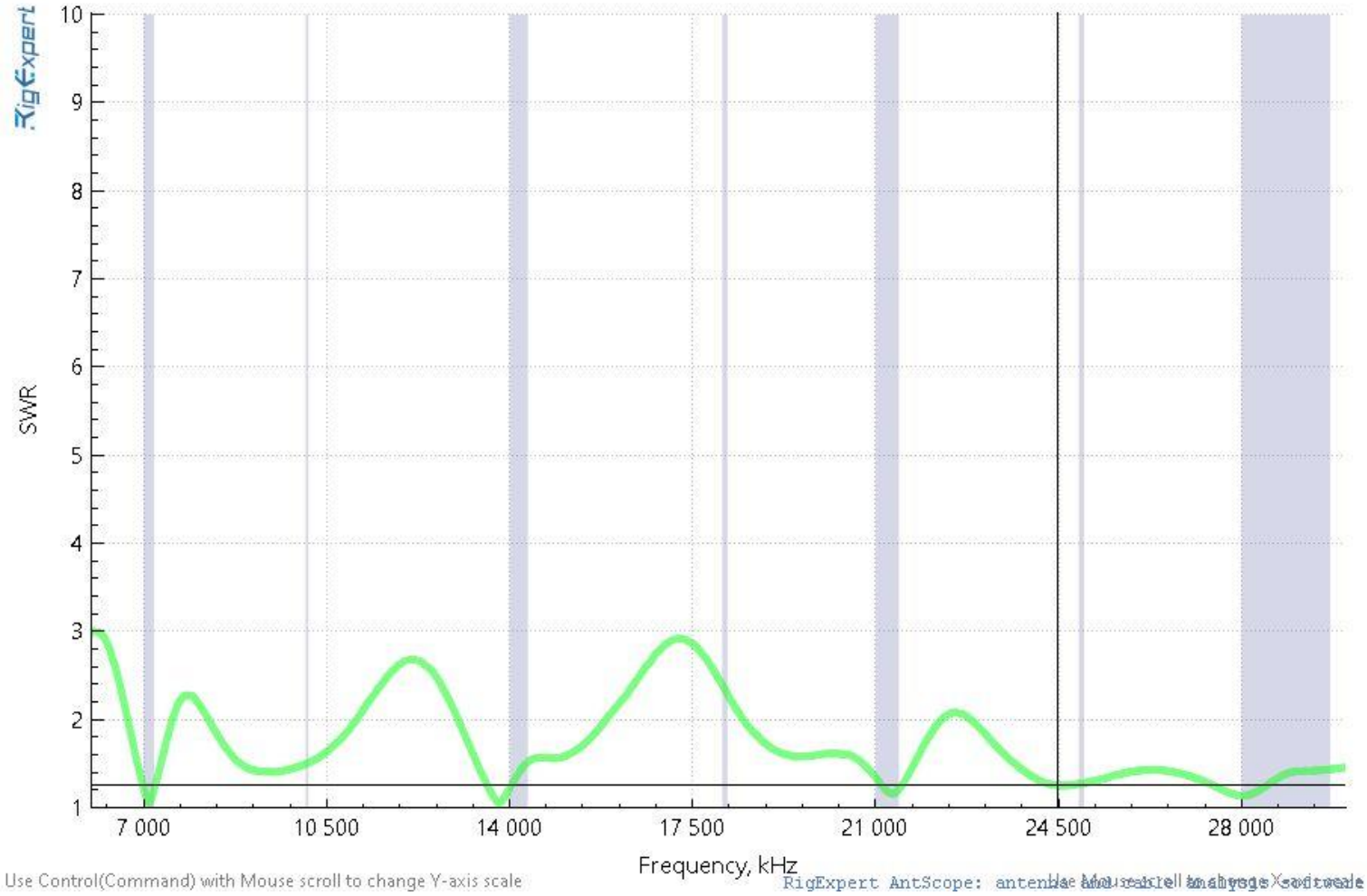
Dipole Terminals

Separate antenna inputs

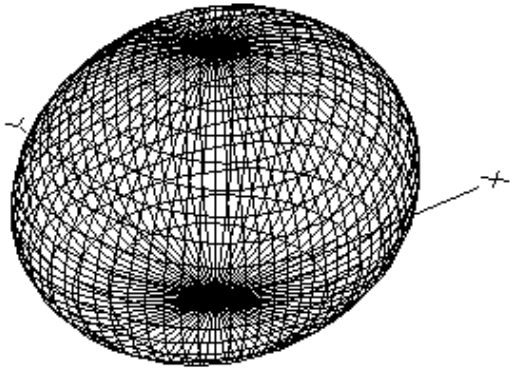
Test Geometry

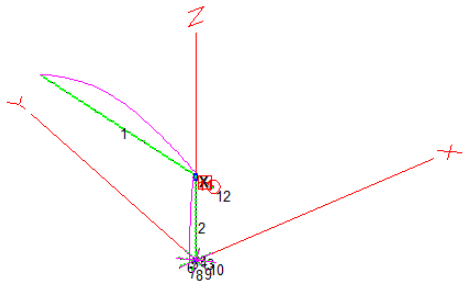


SWR Sweep

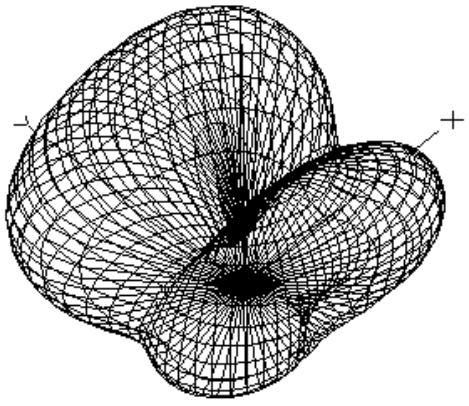

RigExpert
SWR
10
9
8
7
6
5
4
3
2
1
7 000
10 500
14 000
17 500
21 000
24 500
28 000
Frequency, kHz
Use Control(Command) with Mouse scroll to change Y-axis scale

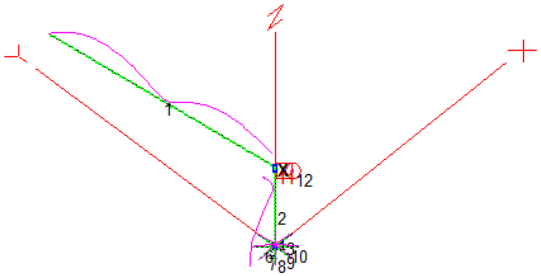
Directivity Patterns - 1



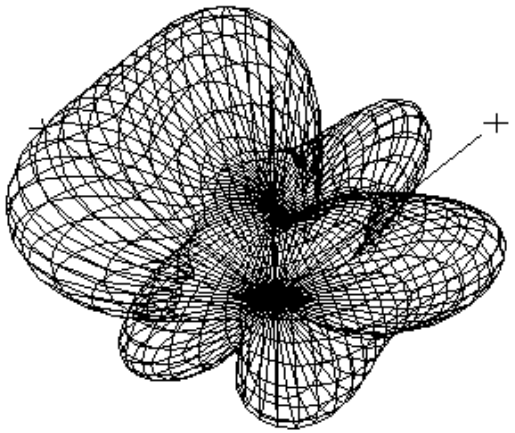


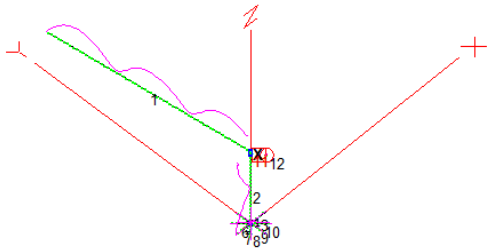
7 MHz
NVIS





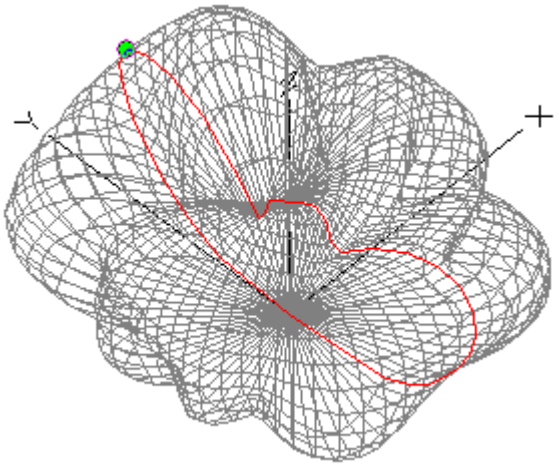
14 MHz
End-Fire

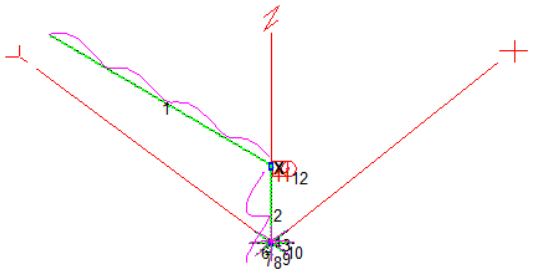




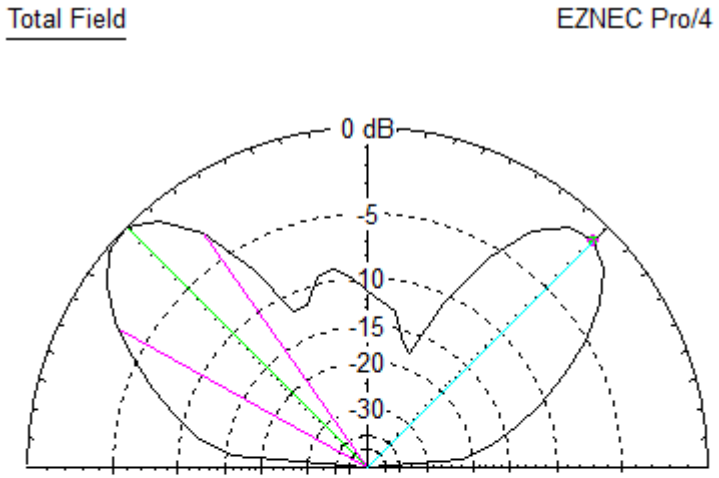
21 MHz

Directivity Patterns - 2





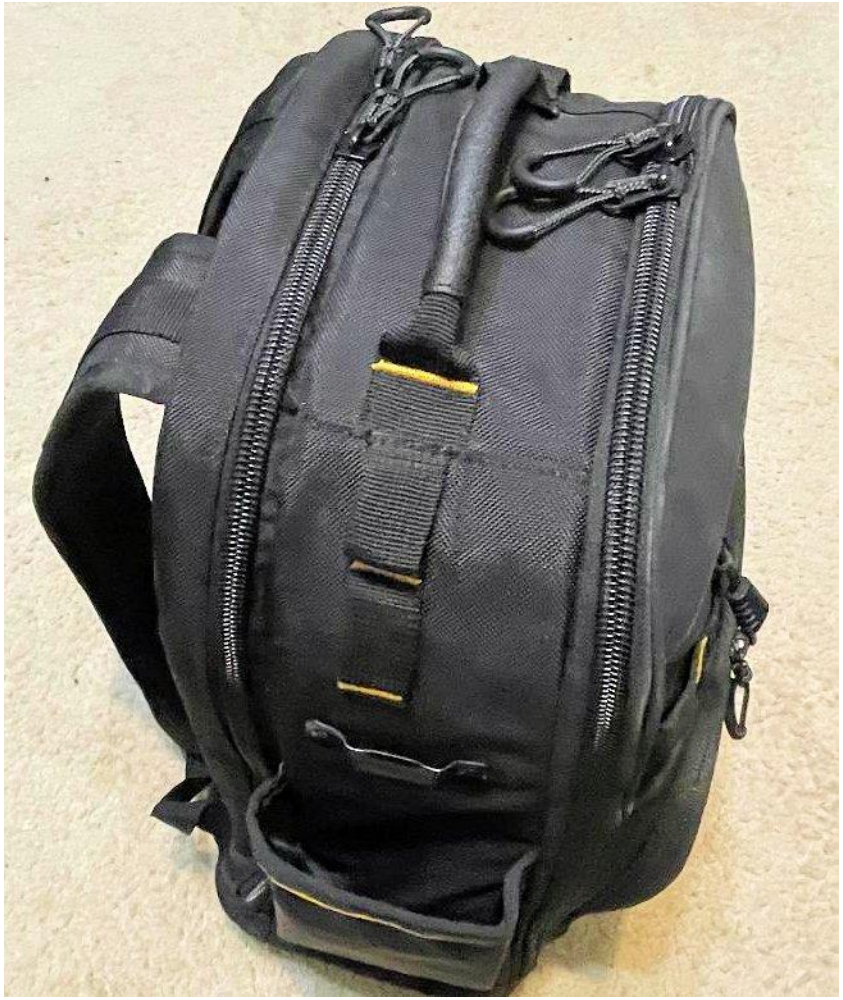
28.3 MHz
End-Fire



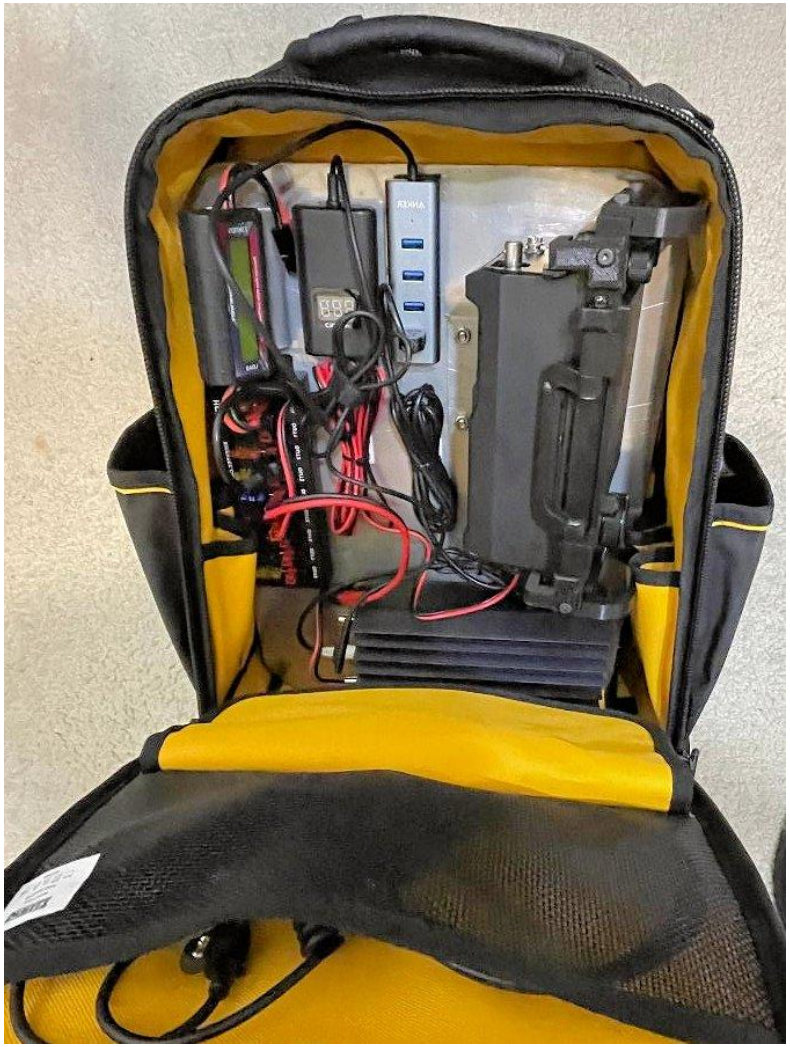
28.3 MHz

Elevation Plot		Cursor Elev	45.0 deg.
Azimuth Angle	90.0 deg.	Gain	5.31 dBi
Outer Ring	6.35 dBi		-1.04 dBmax
			-1.04 dBmax3D
3D Max Gain	6.35 dBi		
Slice Max Gain	6.35 dBi @ Elev Angle = 135.0 deg.		
Beamwidth	25.8 deg.; -3dB @ 125.0, 150.8 deg.		
Sidelobe Gain	5.31 dBi @ Elev Angle = 45.0 deg.		
Front/Sidelobe	1.04 dB		

Back Packs
(Home Depo)



Rig and Computer in Back Pack 1



QRP Rig with all cabling

Microsoft Surface Computer

Battery, Solar Panel, Antenna and 10W auto-tuner - Back Pack 2

Battery

Solar Array (folded)

Status of QRP Rig

- Bench testing of all modes with base station antenna with good results.
- Successful battery charging with solar panel done earlier this year.
- Received Chameleon antenna last week and have began testing in back yard after temporary mast installation.
- Made Winlink HF, FT-8, Fldigi and HF SSB contacts at 10 watts.
- When weather cools will move into the field (POTA, etc.).

Conclusions

- Cost effective, rugged, weather proof “jump-kits” can be constructed using music industry portable cases and 19” standard rack mount shelves and panels.
- An experimental back packable QRP rig was introduced that has all radio components mounted to a light-weight aluminum plate.
- A small light-weight computer has been tested that will run all windows digital programs.