



BUILDING & OPERATING A MOBILE HF STATION

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Tonight's Presentation



- Mobile HF Antennas
- Mobile HF Radios and Accessories
- Bonding, Choking and Noise Control
- Stage 1 – A Basic 100W Station
- Stage 2 – A Multi-band 100W Setup
- Stage 3 – Amplifiers, Top Band, and Serious DX
- Mobile HF Station Installation in a Car
- Operating and DX'ing from a Mobile HF Station
- County Activations, Contests, and National Parks On The Air

Mobile HF Antennas – Theory and Practice

■ Efficiency – the “3 R’s”

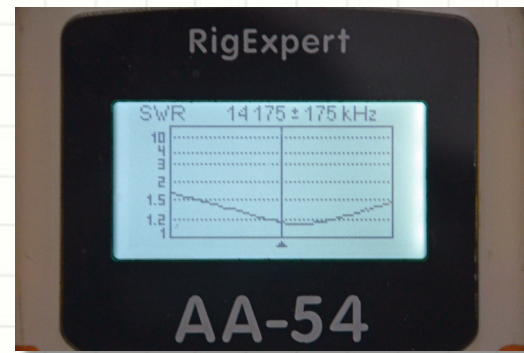
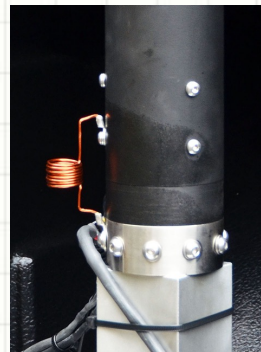
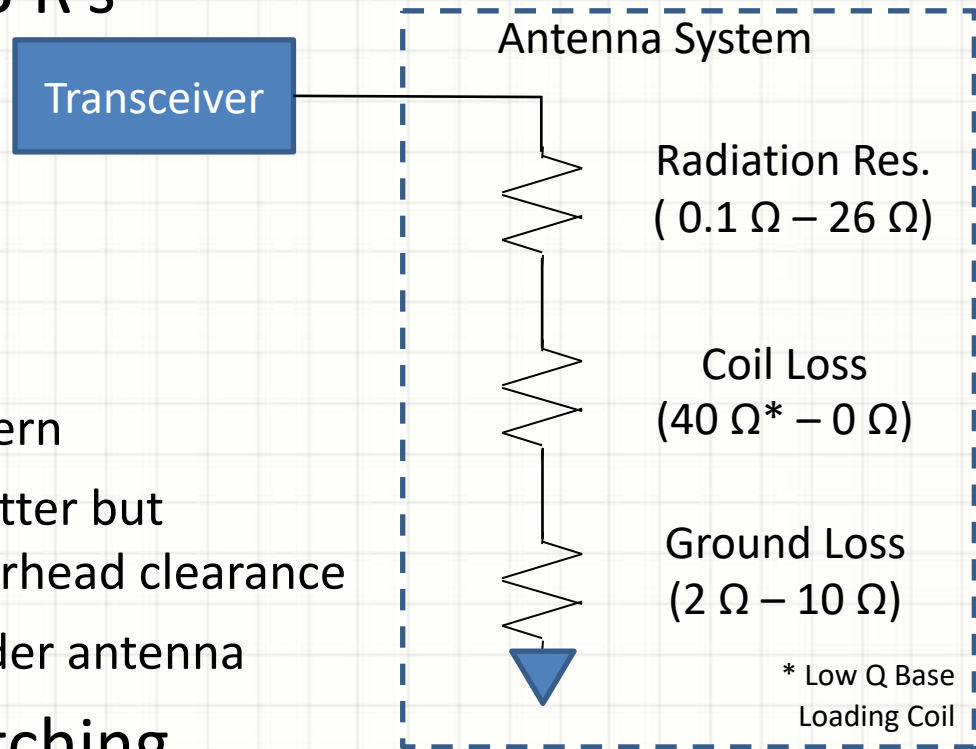
- High Q Coils
- Cap hats
- Vehicle size, and ...

■ Mounting

- Safety – the #1 concern
- Height – higher is better but consider trees & overhead clearance
- Location – metal under antenna

■ Bandwidth & Matching

- Important on 40m & lower bands
- Antenna BW limitations, adjustability
- Matching via shunt coils



Source: Tarheel Antennas

20m Hamstick
Typical SWR

Mobile HF Radios and Accessories

■ Transceivers

- 100W Typical
- Effective noise blanker, DSP noise reduction
- Display readability, control ergonomics (remote control head is highly desirable)
- Safety (in-use, in case of crash)



■ Popular Choices

- Icom – IC-7000, IC-7100
- Yaesu – FT-891

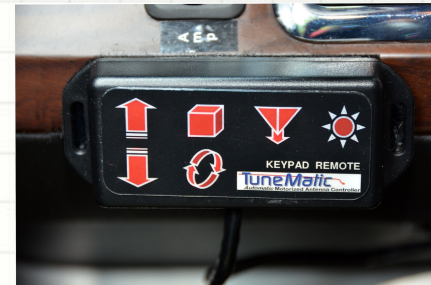


Courtesy Icom

DATE	TIME	FREQ	MODE	POWER	TIME	REPORT	TIME OFF	OTHER
11/28/15	21:22	14.285	SBC	80W	WD4MRT	S7	57	Don
"	21:23	"	"	"	K5SEA	S9	57	"
"	21:24	"	"	"	W4K6/M	S6	57	"
"	21:31	"	"	"	M4K6/P	S7	56	"
"	21:34	"	"	"	H4SEA	S6	56	"
"	21:37	"	"	"	W4H40	"	"	"
"	21:38	"	"	"	W4H40	"	"	"
"	21:39	"	"	"	W4H40	"	"	"
"	21:40	"	"	"	W4H40	"	"	"
"	21:41	"	"	"	W4H40	"	"	"
"	21:42	"	"	"	W4H40	"	"	"
"	21:43	"	"	"	W4H40	"	"	"
"	21:44	"	"	"	W4H40	"	"	"
"	21:45	"	"	"	W4H40	"	"	"
"	21:46	"	"	"	W4H40	"	"	"
"	21:47	"	"	"	W4H40	"	"	"
"	21:48	"	"	"	W4H40	"	"	"
"	21:49	"	"	"	W4H40	"	"	"
"	21:50	"	"	"	W4H40	"	"	"
"	21:51	"	"	"	W4H40	"	"	"
"	21:52	"	"	"	W4H40	"	"	"
"	21:53	"	"	"	W4H40	"	"	"
"	21:54	"	"	"	W4H40	"	"	"
"	21:55	"	"	"	W4H40	"	"	"
"	21:56	"	"	"	W4H40	"	"	"
"	21:57	"	"	"	W4H40	"	"	"
"	21:58	"	"	"	W4H40	"	"	"
"	21:59	"	"	"	W4H40	"	"	"
"	22:00	"	"	"	W4H40	"	"	"

■ Accessories

- Connection to audio system or external speaker
- Voice recorder – key safety item
- Microphone upgrades
- Screwdriver antenna controller
- Voltage monitor



Noise Control, Bonding & Choking

■ Noise Control

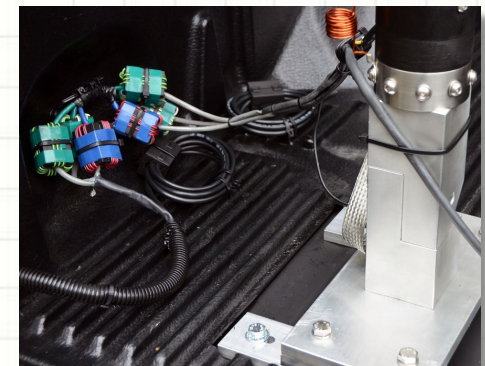
- #1 item that makes or breaks the installation
- Noise from motor electronic (Coil on plug, injectors, alternator, ...)
- Exhaust bonding
- Engine grounding

■ Body Section Bonding

- Antenna mounting surface
- Flat surfaces
- Vertical surfaces (ex. doors, especially on older vehicles)

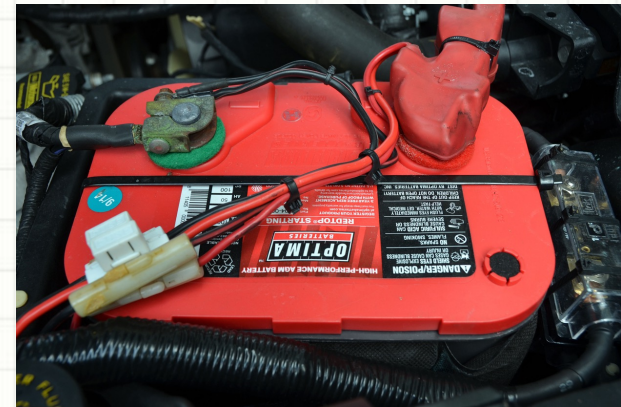
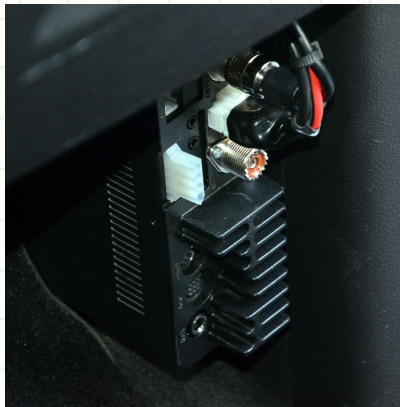
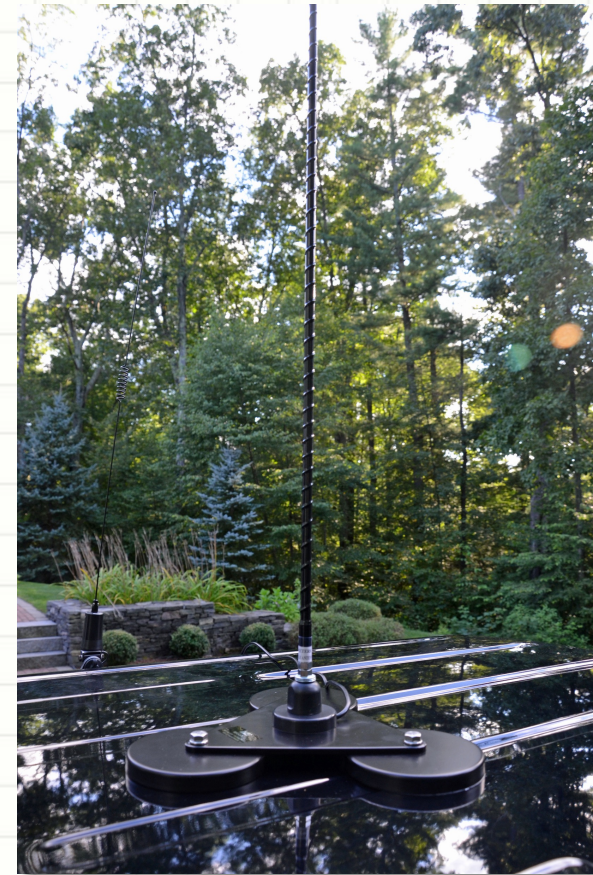
■ Coax and Control Lead Choking

- Keep RF out of the vehicle
- Feedline and control leads (screwdriver antenna)
- Two places – at the antenna and again at interior penetration point (inside)
- DON'T stagger chokes



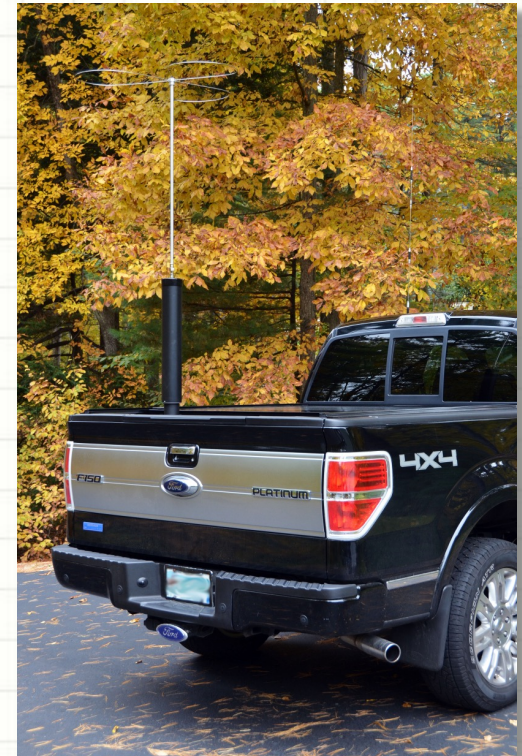
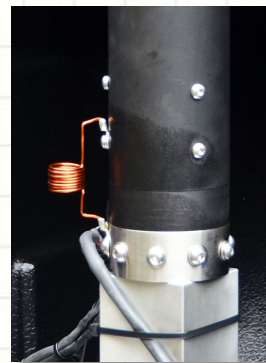
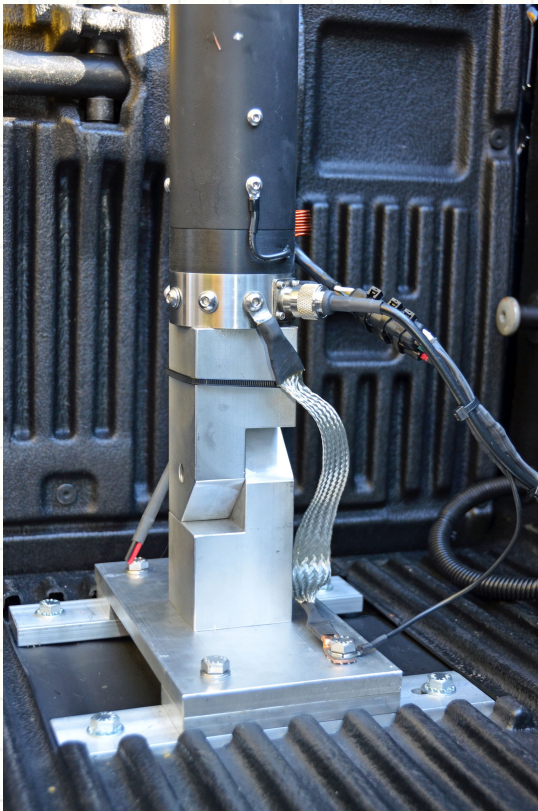
Mobile HF - Building In Stages

- Stage 1 – Basic Mobile HF (20m – 10m)
 - 100W HF Transceiver
 - QRV 20m – 10m
 - US contacts and decent DX (Europe, Caribbean)
 - Simple, inexpensive antennas (ex Hamsticks), one band (20m – 10m) at a time
 - Offset antenna towards driver's side of vehicle
 - Direct battery connection (power and ground), proper fusing and protection of power leads
 - Safety inside and outside the vehicle
 - Focus on noise control and bonding



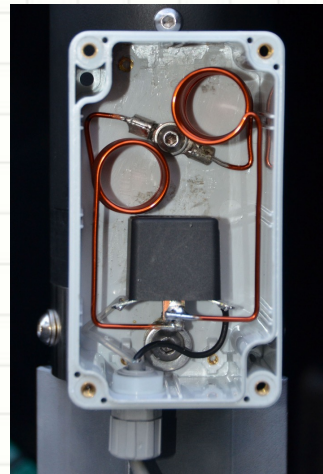
Mobile HF - Building In Stages

- Stage 2 – Multi-band Mobile HF (QRV 80m – 10m)
 - Add screwdriver antenna and possibly a cap hat
 - Improved DX, easy to change bands
 - Screwdriver antenna controller a wise investment
 - Careful attention to solid mounting for safety and reliability (inspect components regularly)
 - Proper matching on 40m and 80m



Mobile HF - Building In Stages

- Stage 3 – Amplifiers, Top Band Setup
 - “500W” Mobile Amplifier
 - Antenna System for 160m (additional loading, switchable matching network, cap hat becomes essential)
 - Serious Low-Band operation and “Work the World” DX
 - Heavy duty power system (100A+, 13.8V supply)
 - H-D alternator, secondary battery, proper fusing and cabling
 - Careful attention to electrical safety issues
 - Wattmeter, amp bypass & automatic band switching



Mobile HF Installation In A Car

- The steps and techniques are mostly the same
- Antenna mount on left-rear of vehicle is usually best
 - Requires a sturdy, post mount to be fabricated
- Unibody construction saves work w.r.t. bonding body panels
 - Exhaust, engine, and hood/trunk bonding are all still very important – use same techniques
- Fold-down rear seat, if available, can make an excellent mounting location for electronics
 - Mounting under seats can also work well



Mobile Operating & DX'ing

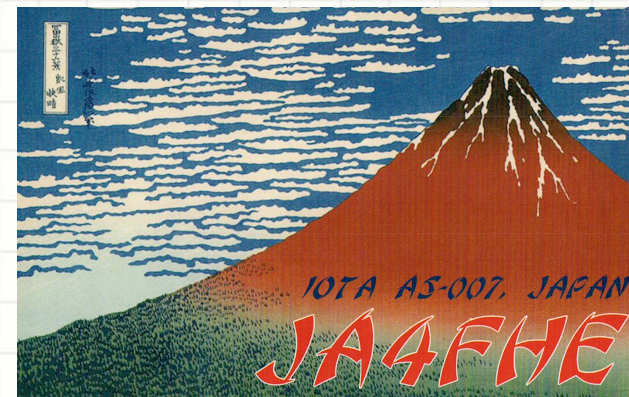
■ Safety First

- Check your equipment regularly and correct any issues immediately
- Keep eyes on road and hands on wheel
- Automated controls and a voice recorder help
- Logging via a paper log/voice recorder or a partner with a laptop

■ Working a DXCC Mobile HF is possible from New England

■ Operating tips

- Know areas where best propagation and fades lie along your route
- Utilize local hilltops, quiet spots, good grounds areas for that rare DX
- Speak slowly and clearly, don't use the speech compressor
- Pileup timing, use "stroke mobile" when calling
- Safely pull over when you need to focus on an important contact
- Try calling CQ, you will be surprised
- Other things to try - County activations, operation in contests, busting pileups, ...



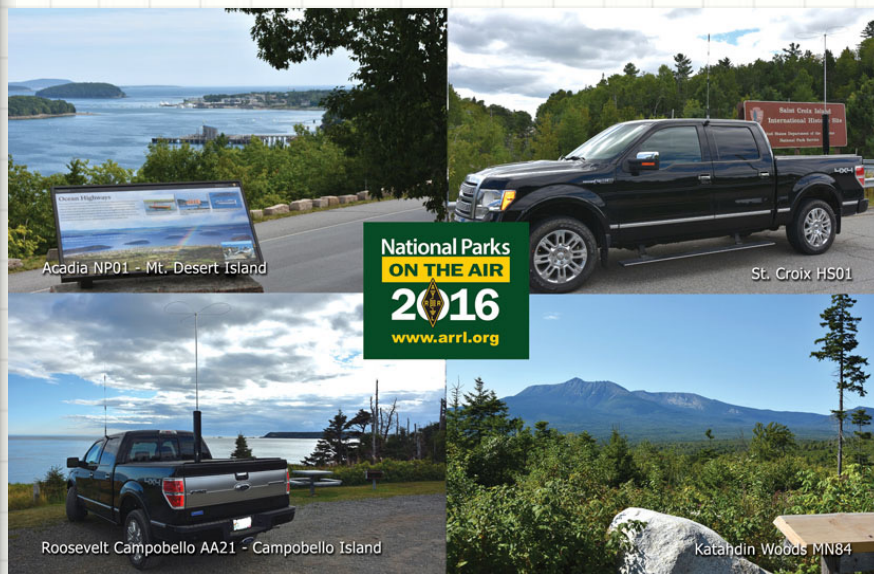
75m SSB from Japan with AB10C/M



40m SSB - Ulleung Island, South Korea with AB10C/M



Mobile HF – National Parks On The Air (NPOTA)

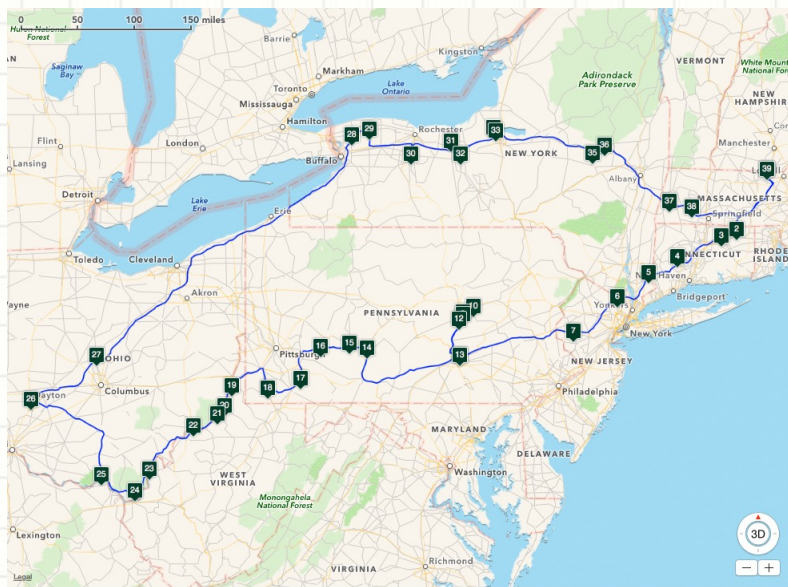


- ARRL National Parks On The Air program was tailor made for Mobile HF!
- We activated a total of 6 parks in New Hampshire, Vermont, Maine, and Canada
- Response was tremendous – we have made a total of 2,165 contacts from our Mobile as part of a single NPOTA Tour
- QSO rates averaged as high as 120 Qs per hour!
- We were first to activate Katahdin Woods and Waters, MN84 in Maine. The pileups were large enough to require split operation!
- DXLab Suite and N1MM+ loggers were used on a PC connected to our transceiver for logging and real-time uploads to ClubLog



ARRL Grid Chase Activations, POTAs, SOTAs

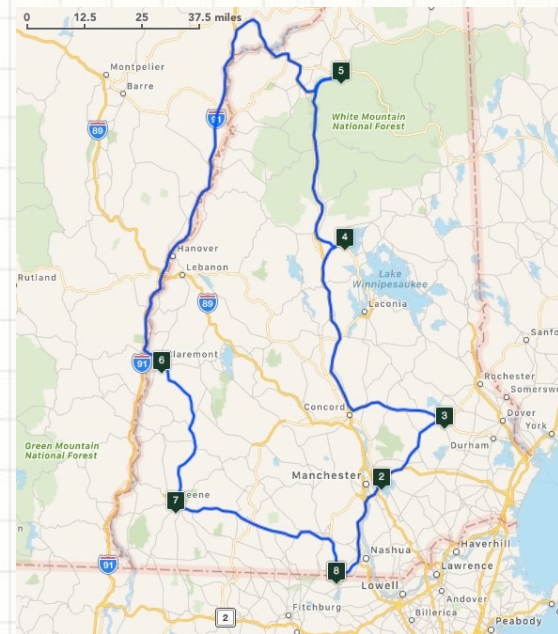
Mobile HF - County Activation Tour



- CQ's US-CA Award for confirming 3,077 U.S. Counties (500 Counties reqd. for base award)
- Mobile HF Operators activate most needed counties on trips
- Anita and I operated as N1FD/M on our trip to the 2015 Dayton Hamvention. We activated a total of 90 counties.
- Also operated an APRS Station – tracking via AB1QB-15 on aprs.fi
- iPhone Apps was used to determine County and position on APRS in real-time
- DXLab Suite running on a PC connected to our transceiver was used for logging and real-time uploads to ClubLog



Mobile HF Contesting



- CQ Worldwide DX SSB Contest from our Mobile station in 2014 ~ 85 DX contacts
- New England and State QSO parties - great opportunities to operate mobile HF
 - 11 Counties activated in 2016 NEQP
 - Advertise your planned route in advance
- County line activations and rare grid squares will generate pileups
- Suggest separate driver and operator or parked operating formats for safety
- Use N1MM+ or other contest logger connected to radio
- A headset/boom mic and a footswitch are a good idea for full on “contest mode”



Equipment, Info. & Resources



Type	Elements	Link
Antennas	Scorpion SA-680 and Accessories Tarheel Antennas MFJ Hamsticks and Mounts	www.scorpionantennas.com www.tarheelantennas.com/mobile_antennas www.mfjenterprises.com
Antenna Mounts	Breedlove Antenna Mounts	breedlovemounts.com
Screwdriver Antenna Controller	TuneMatic Antenna Controller	www.tunematic.us
Mobile HF Radios	Icom IC-7000, IC-7100 Yaesu FT-897D, FT-992	www.icomamerica.com/en/amateur/ www.yaesu.com
Microphone Upgrades	AB5N Microphone Upgrades	www.7000mic.com
Mobile HF Amplifier	Ameritron ALS-500M and Accessories	www.ameritron.com
Wattmeter	Elecraft W2 Wattmeter	https://elecraft.com/products/w2-wattmeter-assembled
Bonding and Choking	DX Engineering Ultrabond bonding strap material	www.dxengineering.com https://www.hubbell.com
Good Sources for Mobile HF Information	Alan Applegate's Mobile Amateur Radio Website Our Blog	k0bg.com http://stationproject.blog

Thank You!

Sources for more on Mobile HF:

Our Blog – stationproject.blog
Search on “Mobile HF”

Allen Applegate’s site – k0bg.com

