Ham 143 - Emcom hf station

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Mission: *Establish reliable, lowest technical common denominator communications, locally & regionally, in a HOA*.
Local HF for EmCom requires specific, unique equipment. For hobby apps, see article Ham 113 HF Equipment.

Radio fixed: *ICOM 7300*
The transceiver has great performance, is easy to use, and is price competitive.
Why not something else? (1) More Evergreen Hams use this than any other.
(2) TARC emergency response uses them. (3) It is most used emergency radio.
A tremendous advantage of using a common radio is support and trading skills.
This is a fixed base radio. Though usable portable, it is not preferred weight..
It transmits 160m – 6m on all modes, which is very important for local HF.
The touch-screen, software-defined radio (SDR) is incredibly flexible.
At 100 W, the power draw is 21 A on 13.2 Volts.

Power Supply: *Linear 35 Amp, not adjustable.*
For HF, low noise is critical. 1 to 2 S-units difference will mean no contact.
Inherent noise plagues switched-mode supply. It is technically impossible to eliminate.
A linear supply has smooth wave-forms, huge transformer, is heavy, is pricier,
but it is inherently quieter on RF. Ambient noise is quieter.
Adjustable voltage is not recommended, since mis-setting can destroy a radio.
The radio needs 21 A, so the supply needs 25A continuous.
My VHF/UHF radio draws 13A. Using a single power supply requires 35A continuous.
My supply is Astron RS-35M.

Lower end of voice		
MHz	λ-m	λ/4-ft
50 - 54	6	4.9
28.0 - 29.7	10	8.7
14.0 - 14.35	20	17.3
7.0 - 7.3	40	34.2
3.5 - 4.0	75	64.8

Local HF: *Bands* are 6m and 10m for close-in direct comms, while 40m and 80/75m depend on ionosphere reflection.
The antennas must be viable for any ham, regardless of where they live.
Environment is a major consideration, requiring use during inclement weather. Indoor requires a diminutive size.
Mount the feed-point at 15’ above earth or lower. This type radiation uses the earth as a major component.
Low gain with a circular pattern seems to work best, based on Marconi, Hertz, military practices, and modeling.
Many operators have demonstrated multi-band, EFHW does <u>not</u> work. Go ahead and try. The take-off angle is wrong.

Resonant antennas: The length corresponds to the wavelength. External tuners may be disruptive.
The build can use conventional long wires or a trade-off, Triad design.
The Triad system is smaller, indoor, environmentally superior, and may be the only viable way.

Antenna 1: *6m and 10m* preferably use vertical polarity.
A vertical dipole is simplest and is effective with a decent ground.
A vertical monopole with counterpoise takes more space.
A vertical Triad, which is a combination of the two, is very effective. The identical antenna was tested at 11-miles to vertical mobile, 14-miles to horizontal tower, and 1200-miles (~2000 km) to a Los Angeles horizontal beam.

Antenna 2: *40m and 80/75m* generally uses a near vertical incident sky wave (NVIS).
A horizontal dipole properly spaced above the earth is generally less preferred option.
An inverted-Vee is the more common used by military and hams, but requires height and a lot of space.
A Triad, although with trade-offs, is much smaller & indoor.

Coax: *RG-213/U vs RG-8X*
RG-213/U is a lower-loss, high-quality, relatively-stiff coax. RG-8X is small diameter, but high loss.
For 10 and 6 meter keep 8X about 25’. At lower frequencies, use to over 50’.
I run separate coax from each antenna to the radio, typically 25 - 50’ each.
A short 3’ RG-8X jumper with barrel connector aids connection from the stiff coax to the radio.
Coax switches are high-loss devices, as much as a couple dB. I do not switch antennas often, so I do not use.

Noise & Lightning Protection: *Important: Connect to an earth ground system.*

For outdoor antennas exposed to lightning see the appropriate instructions and take proper precautions.
For NM0D Triad, put 4 to 7 ferrite beads on the coax below the feed. These are critical to tuning.
Apply a lightning protection or similar shunt device below ferrite and before entering building.
Ground the device. If ground wire over 20’, run a second path (>AWG 6) to a different ground rod.
Place at least three 8-ft ground rods 17’ apart. Bond them together. Bond to utility ground.
For ground resistance > 5Ω, use concrete to backfill rods and around conductors. Bury more conductors.
The protection system helps lower the noise floor.
Life is good. Enjoy!