Half-size G5RV Conversion for 80m

The Half-size G5RV also known as the G5RV Junior

http://www.rsars.org.uk/ELIBRARY/docsants.htm

RSARS

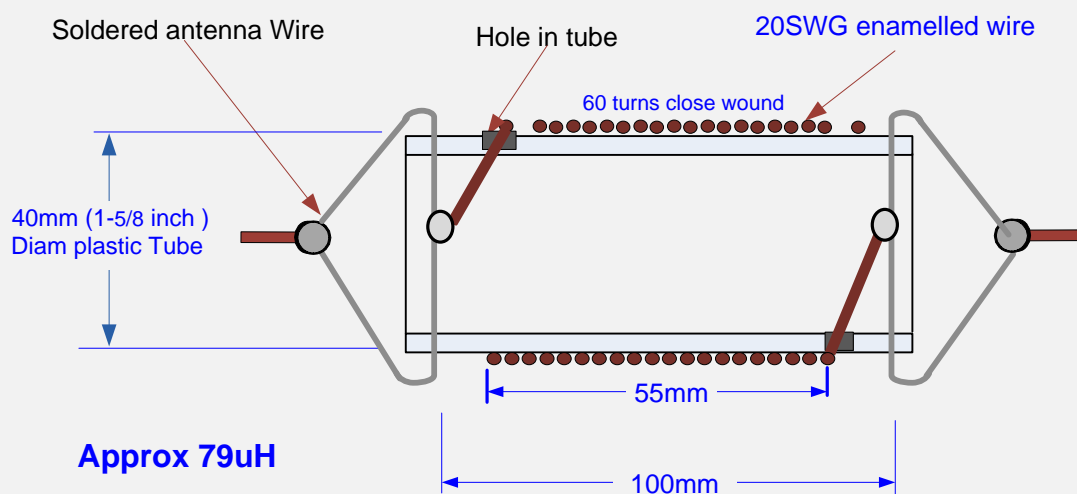15.55m (51 ft)

2.4-3.1m (8-10 ft)

4.6m (15ft)
approx
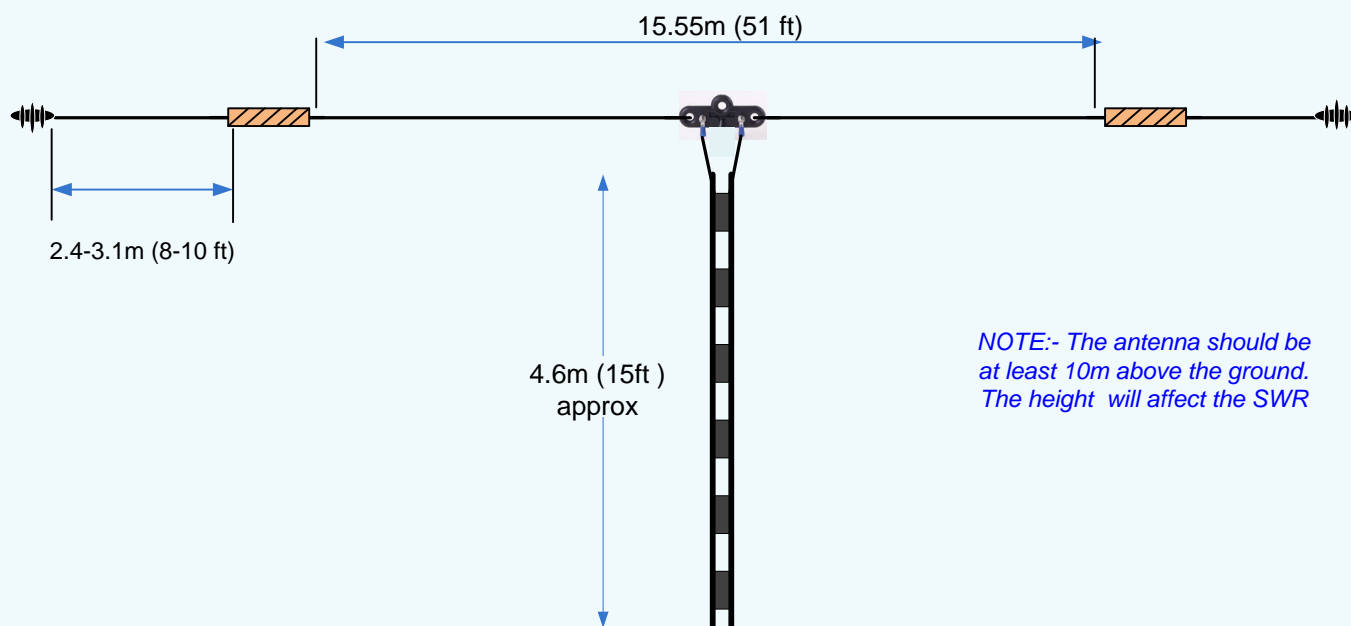
NOTE:- The antenna should be
at least 10m above the ground.
The height will affect the SWR

The 300 Ohm line is a matching section to the 50
ohm coax going back to the shack. Adjust length of
300 ohm Ladder-line VF=0.82 to equalise the
variations of SWR across all the bands

Loading Coil Construction

Soldered antenna Wire

Hole in tube

20SWG enamelled wire

60 turns close wound

40mm (1-5/8 inch)
Diam plastic Tube

Approx 79uH

55mm

100mm

The loading coils and the end wires extend the operation of the half-size G5RV antenna to the 80m band.
The end wires should be trimmed for resonance on the required part of the 80m band.

Trimming of the extra wires is critical so start long and trim about 1cm (0.5ins) approx. at a time.

The Half-size G5RV or G5RV-Jnr does not perform in the same way as Louis Varney's full size G5RV. The GAL-ANA software model of this antenna at a height of about 13m above average ground shows that the antenna only work on 80,40,20,and 12m bands where the SWR is between 1.82:1 and 8.3:1 .

On the 17m and 15m bands the SWR is very high. The antenna is very useful none the less.

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*** NEC - 2 ***
F = 18.120 MHz
Ga = 9.60 dBi (Outer ring)
Elev.angl = 29.0 deg.
Z = 27.80 + j246.96 Ohm
SWR = 46.20 (50.0 Ohm)
Ground: MININEC Die = 13.0  Cond = 5.0(mS/m)
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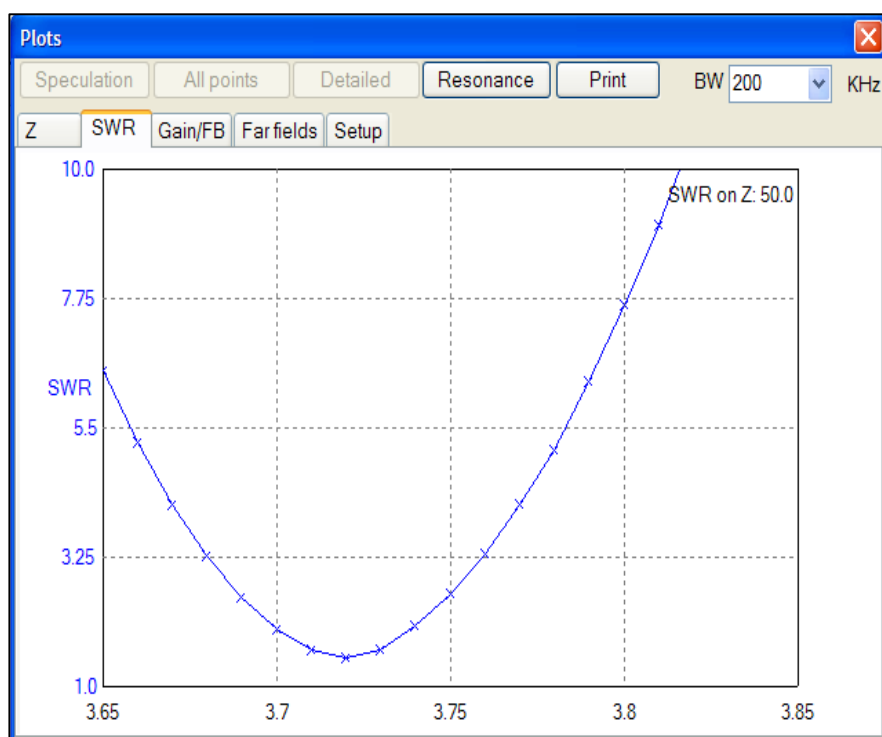
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*** NEC - 2 ***
F = 21.225 MHz
Ga = 10.25 dBi (Outer ring)
Elev.angl = 25.0 deg.
Z = 881.92 + j1615.91 Ohm
SWR = 76.90 (50.0 Ohm)
Ground: MININEC Die = 13.0  Cond = 5.0(mS/m)
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Plots

| Speculation | All points | Detailed | Resonance | Print | BW 200 ⌄ KHz |

| Z | SWR | Gain/FB | Far fields | Setup |

SWR on Z: 50.0

SWR

10.0 — 7.75 — 5.5 — 3.25 — 1.0

3.65   3.7   3.75   3.8   3.85

Effect of the 80m loading coils on bandwidth and other bands

The 79uH loading coil and extra wires are not without a down side. These only enable the antenna to be use on a much narrower portion of the 80 m band compared to that of an 80m resonant dipole.

It is therefore important to cut the end wires to match the desired portion of the of the band that operation is required.

Since the inductor acts as a choke to the RF current on other bands, the antenna thus behaves like an unmodified half-size G5RV

The Antenna can also be constructed with homebrew open wire feeder that has a 2cm spacing using 3mm diameter wire 5.55m long. The model's feeder is shorter because it employed a 300Ω feeder with a VF =0.82.

The GAL_ANA program model of the G5RV-Jnr + 80m coils over a real ground, used the NEC-2 engine and the Sommerfeld-Norton ground model. This helps to account for the effect of the radio wave being reflected by the ground directly underneath the antenna, which becomes more significant as the antenna gets closer to the ground.

The Sommerfeld-Norton ground is accurate for wire segments down to about 0.02 λ above ground. The GAL-ANA antenna model's ground separation is 8m additional height and a 4.55m feeder i.e. 12.44 3/80 = 0.157 λ. Using the Sommerfeld-Norton ground helps to reduce these errors for the antenna gain and impedance as the antenna drops below about 0.2 wavelength and helping to improve the far field radiation plots.
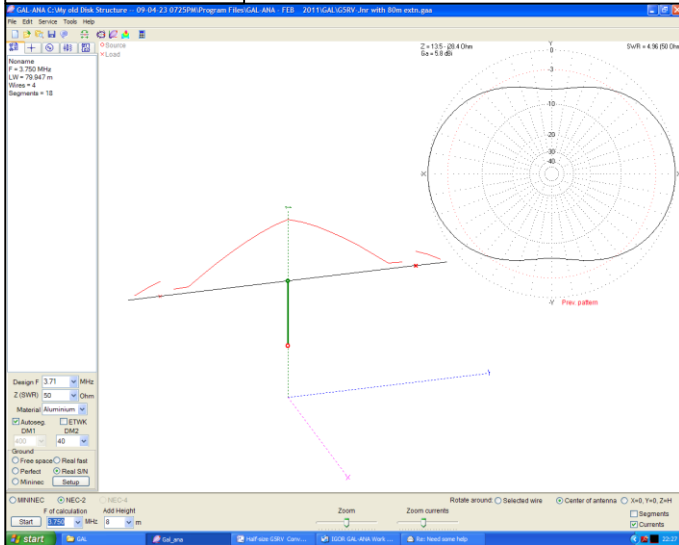
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RSARS

Model Provided by DI2KQ

3.75 MHz Plots

7.05 MHz Plots

*** NEC - 2 ***
F = 3.710 MHz
Ga = 3.81 dBi (Outer ring)
Elev.angl = 90.0 deg.
Z = 27.60 - j2.50 Ohm
SWR = 1.82 (50.0 Ohm)
Ground: MININEC Die = 13.0 Cond = 5.0(mS/m)

Az. plot: Elev. angle = 45.0 deg, Elev. plot: Az. angle = 0.0 deg, max Gain = 3.81 dBi

*** NEC - 2 ***
F = 7.050 MHz
Ga = 5.32 dBi (Outer ring)
Elev.angl = 90.0 deg.
Z = 12.57 - j23.09 Ohm
SWR = 4.87 (50.0 Ohm)
Ground: MININEC Die = 13.0 Cond = 5.0(mS/m)

Az. plot: Elev. angle = 45.0 deg, Elev. plot: Az. angle = 0.0 deg, max Gain = 5.32 dBi

Graphics by G8ODE   Mar 2011 iss 1.3
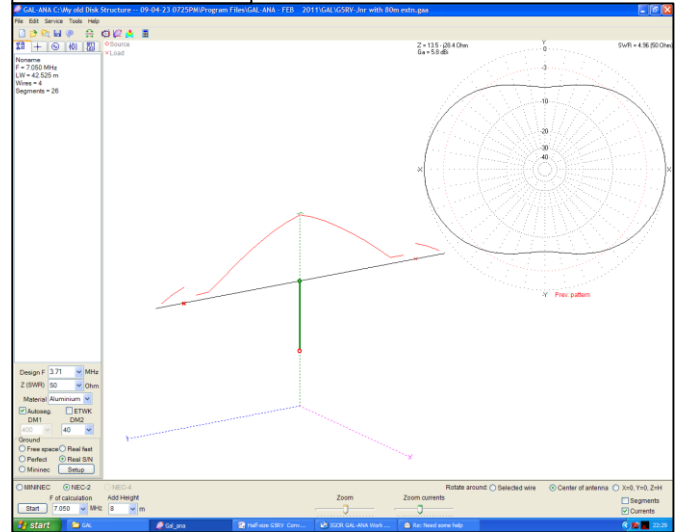
The GAL-ANA model parameters :-

NEC2 engine and Sommerfeld-Norton Ground factors.
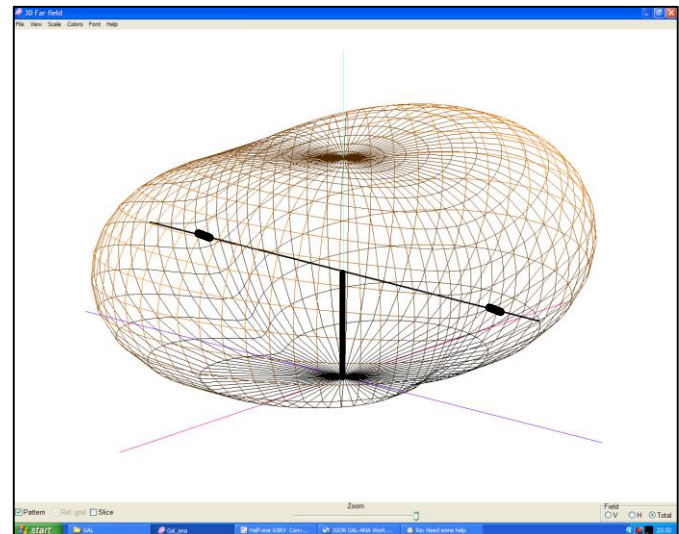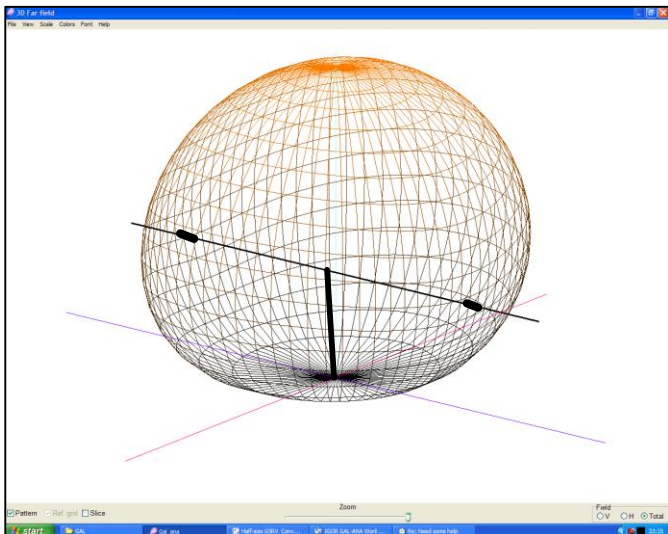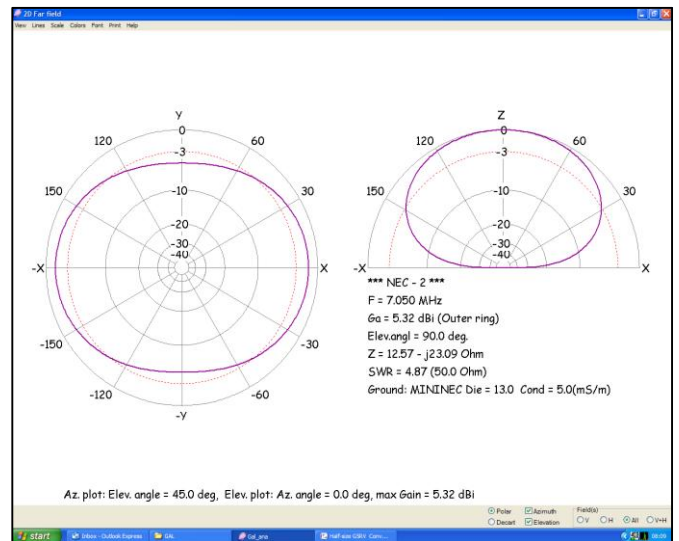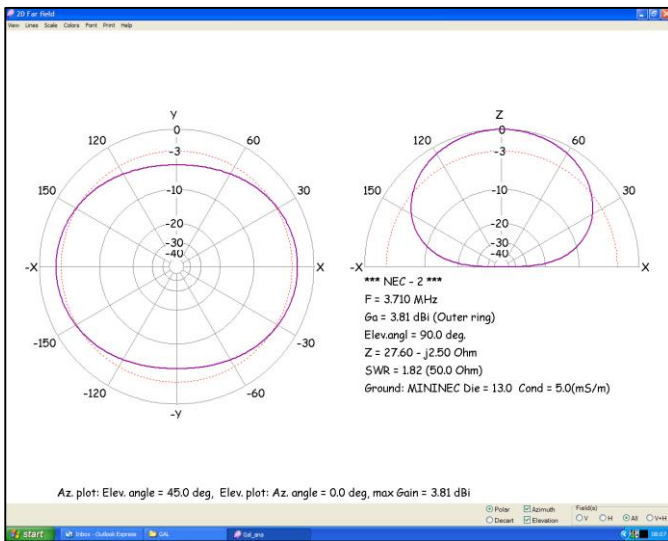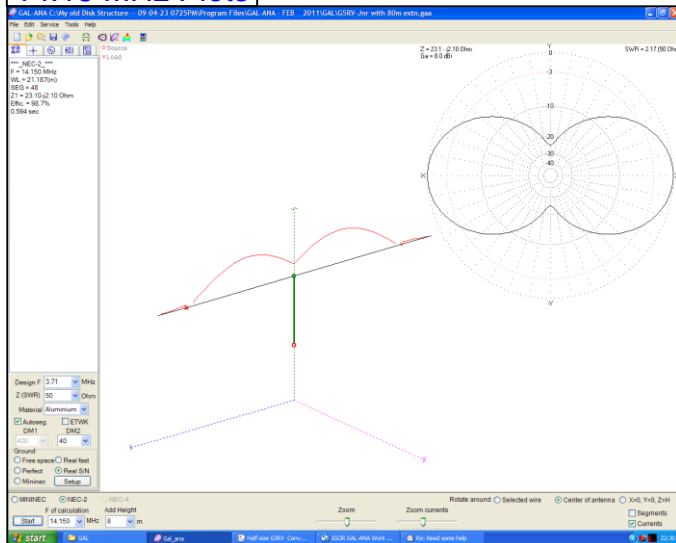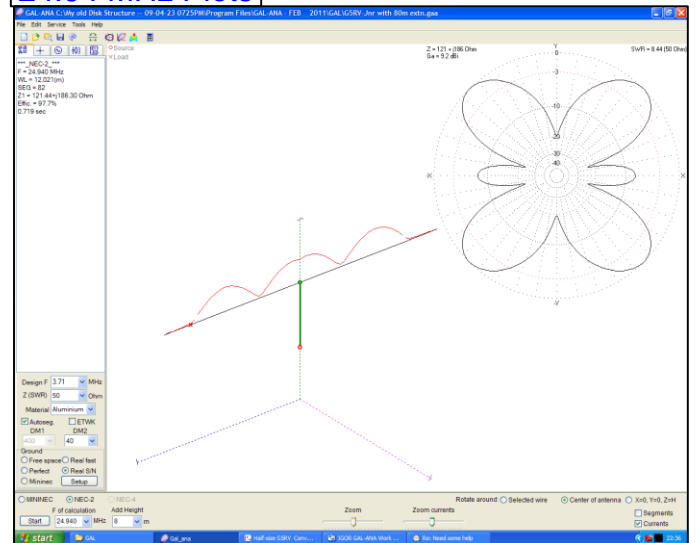Real Ground   = (5mS and 13 Dielectric), 300 ohm 4.55m feeder (VF=0.8s)
Antenna height = 12.55m i.e (4.55m feeder + 8m extra height)

Model Provided by DI2KQ

14.15 MHz Plots

24.94 MHz Plots

*** NEC - 2 ***
F = 14.150 MHz
Ga = 7.11 dBi (Outer ring)
Elev.angl = 37.0 deg.
Z = 25.54 - j4.42 Ohm
SWR = 1.98 (50.0 Ohm)
Ground: MININEC Die = 13.0 Cond = 5.0(mS/m)

Az. plot: Elev. angle = 37.0 deg, Elev. plot: Az. angle = 0.0 deg, max Gain = 7.11 dBi

*** NEC - 2 ***
F = 24.940 MHz
Ga = 8.77 dBi (Outer ring)
Elev.angl = 21.0 deg.
Z = 114.64 + j180.70 Ohm
SWR = 8.30 (50.0 Ohm)
Ground: MININEC Die = 13.0 Cond = 5.0(mS/m)

Az. plot: Elev. angle = 21.0 deg, Elev. plot: Az. angle = 0.0 deg, max Gain = 8.77 dBi

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