



**HG3 QRO 80m-30m MLA**

**HG3-QRO 80-M-30M MLA OPTION**

The HG3 QRO 80m-30m is an add-on kit to the HG3-QRO MLA. It supplements the existing HG3-QRO 40m-10m system by adding a second turn to the radiator loop.

**Roger Stenbock W1RMS**

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When the HG3 QRO 80m-30m option kit is installed on a HG3 QRO Magnetic Loop Antenna (MLA), full power on 80m, 60m, 40m and 30m operation is implemented. The HG3 QRO allows selection and tuning on these bands. Operation from 20m to 10m is not possible with the option installed.

**What you get:**

- The LMR600 radiation loop
- Two each “L” SO239 connectors
- Six-inch SO239 extensions
- Two radiation loop spacers
- Two zip ties
- One Adel type clamp
- Arduino microprocessor with latest firmware

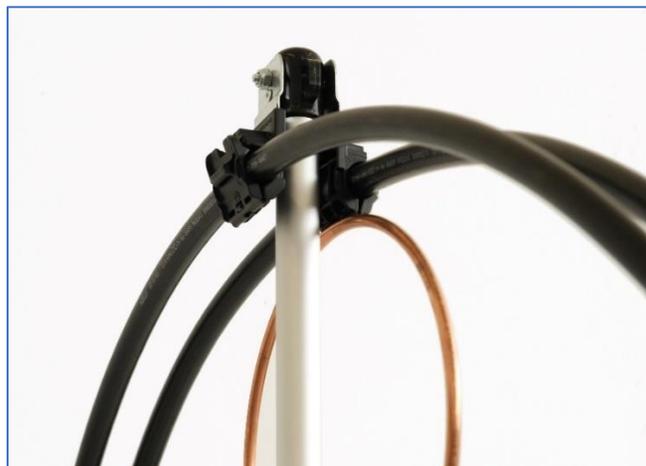


*Figure 1 80m -30m Kit*

**Assembly:**

The 80m-30m option adds an additional turn to the existing HG3 radiator loop by connecting it in series with it. The added inductive reactance allows tuning the entire 80m-30m bands (3MHz-10MHz). Follow these steps:

1. Secure loop to the back of the mast using the existing bracket. Do not tighten the bracket at this time. It will be tightened after all components are installed.



*Figure 2 The top mast loop clamps*

2. See the figure below. The add-on radiation loop is connected in series with the existing radiation loop. Connect one end of the existing radiation loop to the **left input** (looking at the front) on the tuner case. Connect the other end to the six-inch SO239 extensions. Secure it with the supplied Adel clamp to the back of the tuner case using the existing bolt. Connect the two “L” SO239 connectors back-to-back to form an offset. Connect one end of the add-on loop to the output of the two “L” connectors. Connect the other end to the **right input** (looking at the front) of the tuner case.



Figure 3 Routing the radiator

3. The radiation loop is made up of two turns. The loops are separated by two spacers. These spacers are placed at approximately the 90-degree and 270-degree positions on the loop. Use the supplied zip ties and affix them as shown below.

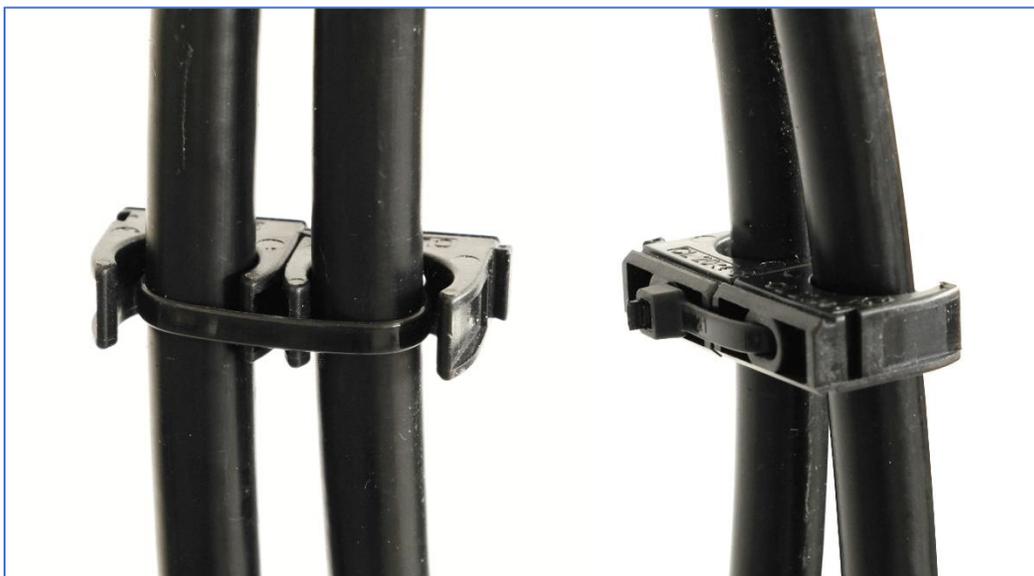


Figure 4 Radiator loop spacers

4. See below. After all the components are installed, dress the loops for a symmetrical appearance. Now tighten the loop hanging brackets.



*Figure 5 Loop centering*

5. Install the latest firmware Arduino (supplied). The 80m-30m option requires firmware version vP2.30 or later. If your firmware is already vP2.30 or later you can skip this step. Record your user band settings before updating your firmware so you can input these values using the SET command once you have installed the Arduino with the new firmware. You may need to open the controller case and replace the Arduino (it is in a socket no soldering required.)
6. See below. Select the 80m-30m MODE. Press the MODE button on the controller. Note the TOGGLE command. Press it to select the 211.5-inch loop. Press the MODE key to return to the home page. You are now able to tune 80m-30m.



Figure 6 HG3 Controller 80m-30m setting

## Tuning Considerations

Tuning the 80m-30m option is different from the 40m-10m option. While the band positions are factory preset, they may not be correct for your particular environment. The vacuum tuning capacitor is very high Q. One could easily miss the sharp dip in VSWR, especially on a wide band such as 80m. A good starting point is:

Band	Recommended Step	Your Final Step Value
80m	6360	
60m	16635	
40m	23742	
30m	27939	

*Figure 7 suggested starting step values*

By carefully and patiently scanning for the lowest SWR for each band, using an antenna analyzer, and then using the band pre-set feature, your bands can be set to your specific environment. This provides repeatable band settings. Once set, you can auto tune as in 40m-10m bands. We recommend you use an antenna analyzer or a VNA, such as a *Rig Expert AA-55 Zoom* or equivalent, to set your user band preferences.

## Two-turns versus one turn radiator

You might wonder why two turns rather than a single turn radiator loop? The 80m-30m option was tested as a single turn radiator. A single turn radiator is somewhat unwieldy. Also, to achieve resonance on the lower portion of 80m requires a considerably longer loop than simply stretching out the two-turn radiator. That is because the inductive reactance of a one-turn radiator is considerably lower than that of two-turn radiators.

Ham radio operators are at their core very resourceful. For those who enjoy home-brewing, here is a possible idea. It is conceivable to construct a more rigid loop from copper tubing of the longer length (in the order of 250"). The actual length needs to be calculated and tested with a VNA. This loop could be connected to the existing HG3 QRO tuner via a suitable SO239 connector adaptor. The 43K step vacuum capacitor would certainly work well. The controller is very flexible and could be made to work well with this arrangement. The mast would need changing to support the heavier loop. We encourage hams to take full advantage of the HG3 QRO system with such experiments.

Our performance tests (below) bear out that the two-turn design and implementation is an excellent compromise in mechanical and performance attributes which provided an easy upgrade path to the HG3 QRO MLA system for an 80m-30m operator.

## Typical Performance

Below are typical performance data obtained in our lab. The upper trace is return loss and lower trace is VSWR. Note the narrow bandwidth and excellent VSWR. While requiring more careful tuning, it does provide significant noise reduction.

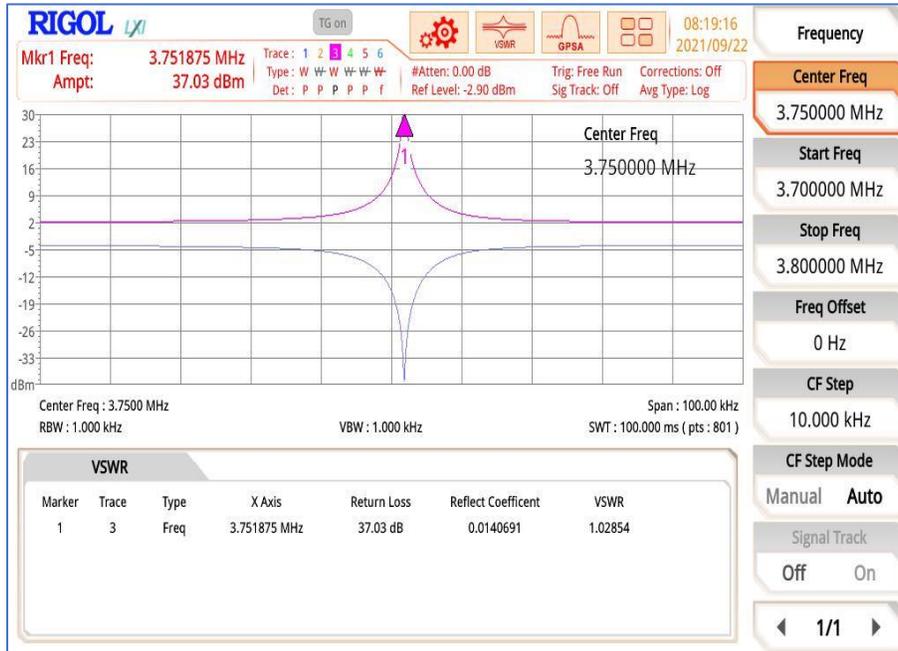


Figure 8- 80 Meter Scan

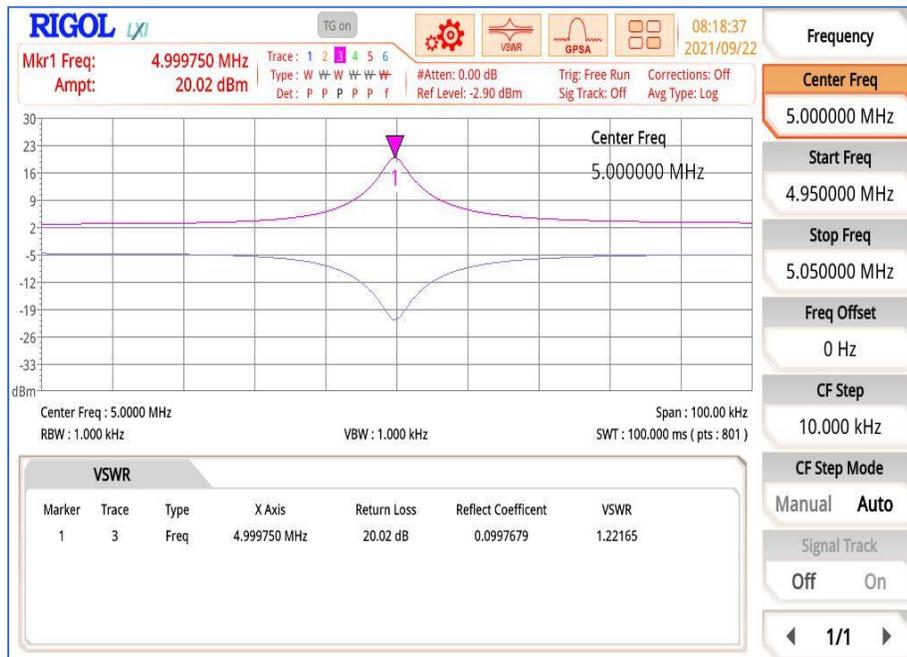


Figure 9 - 60 Meter Scan

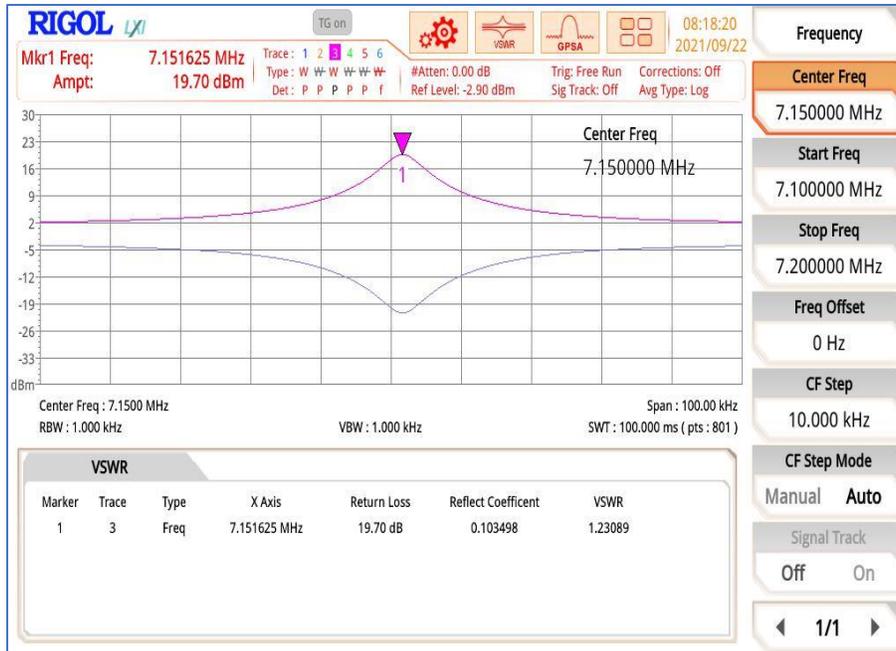


Figure 10 - 40 Meter Scan

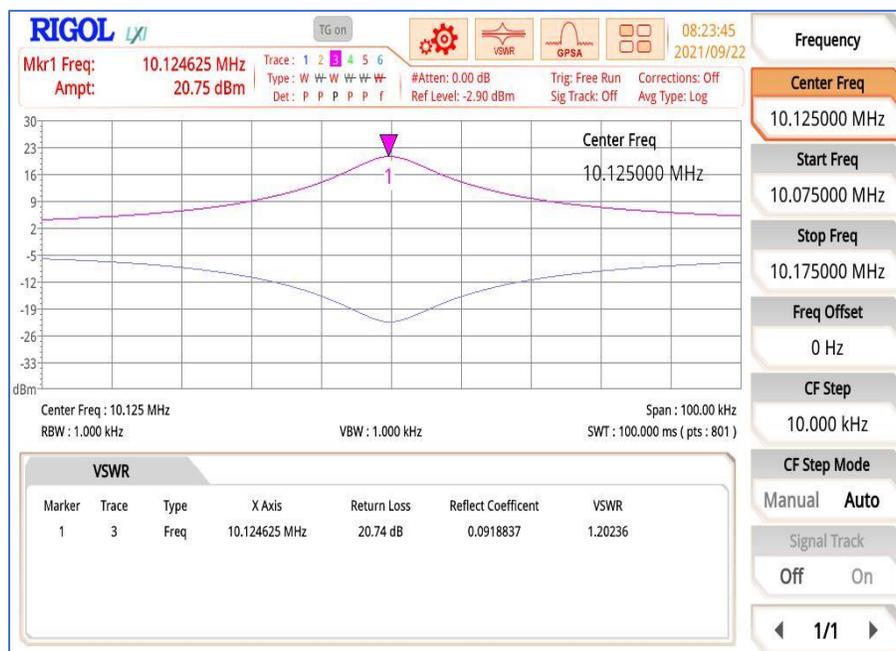


Figure 11 - 30 Meter Scan

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