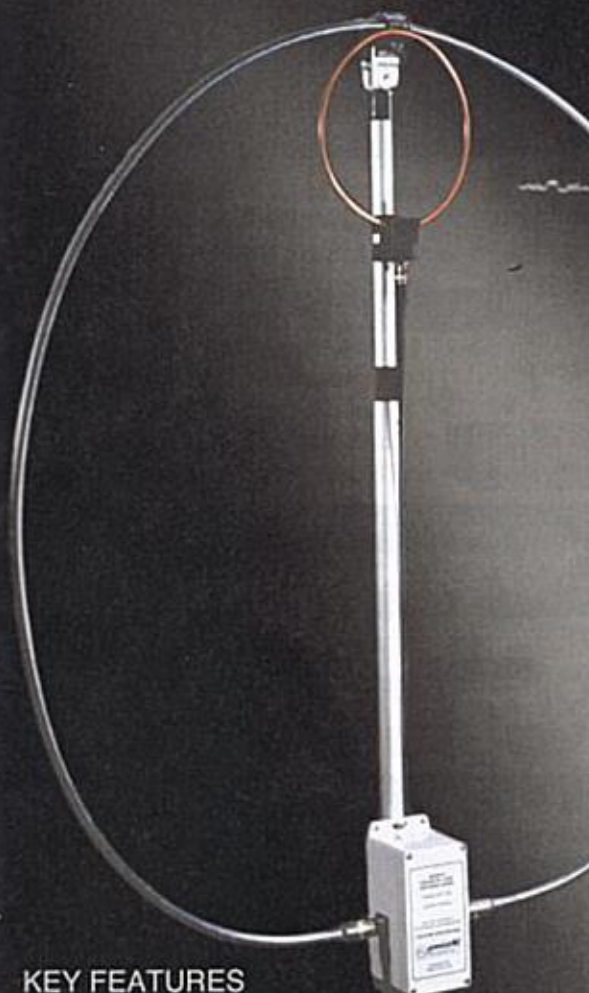


Step up to Top Performance with the HG3 Stepper Mag Loop!

NEW!

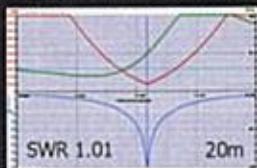


The new HG3 stepper tuned Mag Loop Antenna (MLA) sets a new standard delivering unprecedented capability in remote tuning, performance and convenience for an MLA. It employs a proven, accurate and repeatable stepper motor design. Band selection, remote tuning, including optional loop rotation, is controlled via a microcontroller driving a high resolution stepper motor.

A built-in digital SWR bridge provides auto-tuning based on an SWR scan. This ensures compatibility with most radios. Manual tuning uses a convenient rotary encoder knob - no more finicky push buttons. The four-line LCD displays band selected, SWR, ERP, Cap value and more. The bottom line - count on top-notch RX and TX performance!

KEY FEATURES

- STEPPER MOTOR ACCURACY
- CONVENIENT REMOTE TUNING
- DISPLAYS BAND, SWR, ERP & MORE
- QUICK BAND SELECTION
- AUTO-TUNING BASED ON SWR
- 80m - 10m COVERAGE AVAILABLE
- NO COMPROMISE SPOT-ON TUNING
- MAX POWER: 100 W PEP*



A precise LC match at the desired frequency ensures spot-on tuning (red SWR, blue RL, green Z) and minimizes mismatch losses within the MLA's specified frequency range.

* For EXPRESS & PRO models, see specifications for limitations



Patent pending

digital-mode operation, high-duty-cycle SO2R contesting, or situations in which the amplifier is located away from the operating position.

In standby mode, the PGXL fan is quiet after it cools down. In operational mode and receiving, the fan is only moderately noisy. As with other solid-state, legal-limit amplifiers, after a lengthy full-power transmission, it does get rather loud as it tracks the internal temperature and more cooling is needed. I did some informal testing with a sound pressure level meter and measured 40 dBA in standby mode (but perfectly quiet when the fans are not running), 70 dBA in operating mode with light transmissions, and 85 dBA under full power. My Emtron DX-3 tube amplifier is slightly quieter with the stage 1 fan operating at 66 dBA, although stage 2 is much more.

Summary

The FlexRadio Power Genius XL is a great solid-state, maximum-legal-limit amplifier for 160 through 6 meters. It integrates seamlessly with FLEX-6000 series radios, but it also works well with other transceivers with or without band data connections. It effortlessly produces 1,500 W output on any band with about 50 W drive, something that cannot be said about just any amplifier. MARS operation from 2 to 30 MHz is also available. Although not inexpensive, it has outstanding performance. The manual and other documentation is available from the FlexRadio website.

Manufacturer: FlexRadio Systems, 4616 W. Howard Lane, Suite 1-150, Austin, TX 78728; www.flexradio.com. Price: \$6,999.

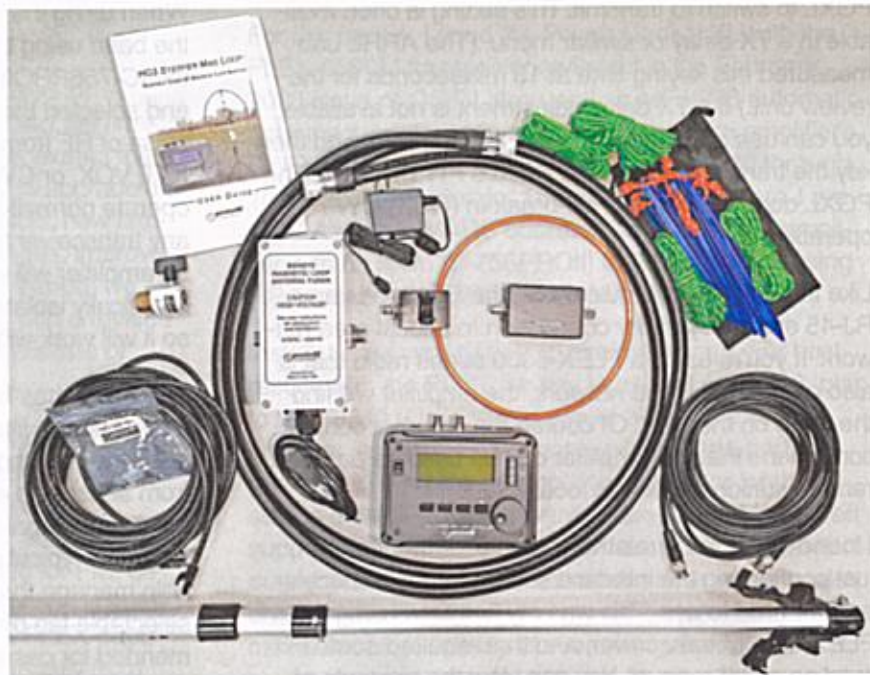
PreciseRF HG3 Stepper Magnetic Loop Antenna

Reviewed by Phil Salas, AD5X
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In the June 2019 issue of *QST*, I reviewed the PreciseRF HG-1, a small magnetic loop antenna that has the option of being tuned remotely. PreciseRF recently released the HG3, a stepper-controlled magnetic loop antenna that includes remote tuning only, as well as additional features. The stepper motor provides an accurate and repeatable tuning system.

Description

The HG3 covers 7 to 30 MHz. Maximum power ratings are between 25 W and 100 W depending on operating mode (duty cycle) and frequency (see Table 2). Optional 80-meter and 60-meter high-voltage/high-current resonating capacitors, or a new 60/80-meter tunable resonating capacitor may be purchased for operation on those bands. However, the maximum power rating on 80 and 60 meters is reduced to 10 W PEP.



Bottom Line

The HG3 is designed for both portable and fixed station operation. The remote-tuned stepper-controlled tuning results in precise, repeatable operation.

Table 2
PreciseRF HG3 Manufacturer's Specifications

Parameter	14 MHz at 10 W Input	29 MHz at 10 W Input
SWR/Return Loss	1.01:1/41.09 dB	1.14:1/23.40 dB
Bandwidth (2:1 SWR)	31.2 kHz	279 kHz
Quality factor (Q)	448	104
Rrad	0.074 W	1.36 W
Rloss	0.093 W	0.134 W
Power radiated	4.44 W	9.10 W
Efficiency	44% (-3.5 dB)	91% (-0.4 dB)
Max Power (with 25-foot RG-8 feed line)		
PEP SSB	55 W (75 W with CMB-300 balun)	
CW 50% duty cycle	35 W	
RTTY (digital) and AM	25 W	
Max Power (with 50-foot RG-8 feed line)		
PEP SSB		75 W (100 W with CMB-300 balun)
CW 50% duty cycle		50 W
RTTY (digital) and AM		35 W
Environmental: 0 – 35 °C, <80% relative humidity. Water resistant, not waterproof.		

PreciseRF offers three configurations of the HG3. Most users will purchase either the EXPRESS or PRO configuration. The EXPRESS and PRO configurations include:

- a 38-inch-diameter radiator loop made from LMR 600 coaxial cable;
- a copper tube induction loop at the feed point;
- a tuning capacitor adjusted by a high-resolution, remotely tuned 2,000-position stepper motor;
- a loop tuning controller;
- a three-section PVC mast;
- and a 9 V dc power supply, universal tripod adapter, 25 feet of RG-58 feed line, 25 feet of CAT6 controller cable, and a comprehensive, illustrated user guide.

The PRO version includes a USB key that adds functions to the HG3 controller, with auto-assisted tuning, an integrated SWR bridge, an equivalent radiated power (ERP) display, and the ability to control the optional PreciseRF AR-1 remote 12 V dc antenna rotator.

There is also a LAB version intended for experimental use. It is available in kit form, requiring some assembly and soldering. It supports a NEMA 17 ultra-resolution, 8,000-position stepper motor, as well as the features of the PRO version.

Finally, the manual and website mention a future high-power (QRO) version of the HG3 that is currently in

development. No information was available at the time of this review, other than it supports a NEMA 21 ultra-resolution, 8,000-position stepper motor, as well as all PRO version features.

Installing the HG3

If you wish to operate on 80 or 60 meters with the optional resonators, you must open the tuning unit's case and bridge two solder pads to connect the tuning capacitor to the external 60/80-meter banana jacks. This impacts 10-meter tuning, however. The 60/80-meter resonators plug into the top of the tuning unit.

The HG3 is designed to be installed in portable or permanent locations. The included tripod adapter permits the HG3 to be easily mounted on a camera tripod. As with other magnetic loop antennas, if there is any breeze the tripod can fall over. The tripod legs need to be well secured, or the antenna guyed using anchors and cord included in the HG3 package.

As mentioned earlier, the PRO version of the HG3 provides control for the optional AR-1 12 V dc rotator through the HG3 controller. However, the AR-1 rotator is designed for temporary, portable deployment only. Also, the optional aluminum mast is required when the AR-1 is used.

For a more permanent mount, the three-section PVC mast should be replaced with the optional aluminum mast, which can be attached to a more secure mount using U-bolts (not included). For this review, I mounted the HG3 at about the 15-foot level to a mast attached to the side of my house and rotated it with my U105 TV antenna rotator, as shown in Figure 3. Because the HG3 is bidirectional, only a 90-degree rotation capability is required.

The CAT6 stepper control cable and AR-1 rotator control cable are weatherproof. Although 25-foot cables are provided, cable lengths up to 50 feet have been tested by PreciseRF. All RF connections on the HG3 controller and antenna interface are BNC female. The included 25-foot RG-58 cable is terminated with BNC male connectors.

Finally, like all small transmitting loops, the HG3 maximum radiation occurs in the plane of the loop, with deep nulls perpendicular to the loop when vertically mounted. Keep this in mind, and always position yourself perpendicular to the HG3, especially when in close proximity to the antenna when transmitting. PreciseRF recommends that the antenna be placed so that there is at least a 15-foot clearance around it,



Figure 3 — The HG3 mounted on a pole attached to the author's house and turned with a U105 TV antenna rotator.

and that the operator should be at least 20 to 25 feet from the antenna.

Operating the HG3

The HG3 controller is powered by 9 to 13.8 V dc applied through a standard 2.1 × 5.5 millimeter power connector. If you do not use the included 9 V dc power adapter, you will need to provide your own dc cable. This is what I did, because it was convenient for me to power the controller from my 13.8 V dc station power supply.



Figure 4 — The HG3 PRO controller with the startup screen shown. The buttons below the screen change function, depending on the screen selected.

Operation of the HG3 is quite straightforward. When the controller is powered on, it briefly displays the firmware version and configuration as determined by the absence or presence of the USB key. Next, it defaults to the basic operating screen and sets the band to 40 meters. There are four soft keys labeled F1 through F4. The display indicates the function of these keys, and changes when keys are pressed to indicate the functions associated with the current display. The basic startup screen is shown in Figure 4.

Pressing the **BAND** (F1 key) on the controller changes the display to permit you to decrement (F1) or increment (F2) the bands (see Figure 5). Once in the desired band, press **OK** (F4). When changing bands, the HG3 controller always sets the tuned frequency to just below the lower band edge. So when changing bands, you will always rotate the **TUNE** control clock-

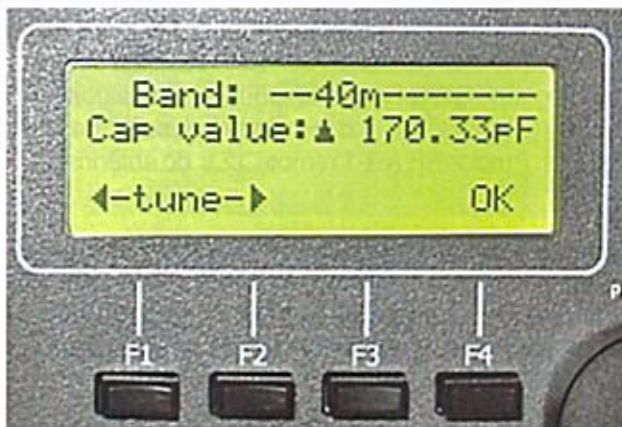


Figure 5 — Pressing **BAND** on the startup screen brings up this screen for changing to a different frequency band by using the arrow buttons (F1 and F2).

wise to find the maximum noise level. I found tuning particularly easy by observing the noise level on my Xiegu G90 transceiver's spectrum display.

I almost always wound up with close to a 1:1 SWR using this tuning method. Whether you look at a transceiver spectrum display or listen to the noise level, once noise is peaked, you can transmit a low-power signal and then fine-tune the HG3 for lowest SWR. Tapping the **TUNE** button changes the stepper tuning increments from coarse to fine, making it easy to tweak the SWR performance. Also, the HG3 controller displays the tuning capacitor value, so I found it easy to return to a favorite frequency by tuning to a previous capacitor setting.

With the PRO version, there is an auto-assisted tuning feature. The controller automatically scans for a low SWR, starting at slightly below the maximum-noise-tuned frequency. To enable autotune, tune the controller for maximum noise on your transceiver. Then press **AUTO (F2)**. The controller will display "Connect Radio" and "Transmit 1 – 3 Watt CW." Transmit a low-power carrier, and press **OK (F3)**. If the power is not correct, you will be prompted to increase the power level. The HG3 is automatically tuned in small steps while the controller continuously updates the capacitance value, SWR, ERP, and bar graph displays. Automatic tuning stops when the lowest SWR point is found, and the process can be canceled at any time by pressing **CANCEL (F4)**.

This entire process takes only a few seconds and works very well. I wound up with a 1:1 SWR on 40 through 12 meters, and a 1.5:1 SWR on 10 meters when using this method. This worked great on 20 through 10 meters with my Xiegu G90 portable transceiver. I had to use my Elecraft K3 transceiver to verify auto-tuning on 40 and 30 meters, as the G90 automatically cuts back power for an SWR of 3.6:1 (maximum protection setting) even when transmitting a low-level signal. Because the HG3 controller starts below the maximum noise tuned frequency, the starting SWR is usually greater than the G90's 3.6:1 SWR-protection point on 40 and 30 meters.

The **MODE (F3)** button enables the optional AR-1 rotator control (with the PRO version only), and also displays external 80/60-meter resonator information if it is used. I did not try these optional features. The **HELP (F4)** button provides instructions on tuning.

I operated on 40, 30, and 20 meters due to band conditions during the review period. The 17- through 10-meter bands were completely inactive. Transmit power was 20 W with my Xiegu G90. I operated CW (my preferred mode) on 30 meters, but focused on SSB on 40 and 20 meters. I could pretty much work anyone I could hear.

I also made many comparisons between the HG3 and my 43-foot vertical. On average, I found the HG3 to be about two S-units below the 43-foot vertical. This was not unexpected — after all I'm comparing a 3-foot diameter antenna to a 43-foot vertical. However, I did experience a surprising number of occasions where the HG3 actually outperformed the 43-foot vertical on 20 meters. I was also pleasantly surprised by the significantly improved signal-to-noise ratio of the HG3 when compared to the 43-foot vertical. On the 43-foot vertical, all sorts of spurious signals from neighborhood electronics equipment are present, but they were not heard on the HG3.

Conclusion

The PreciseRF HG3 is an effective antenna worth considering for restricted antenna locations and portable operation at power levels up to about 50 W PEP. Because it is remotely tuned, the high-intensity RF field can always be kept well away from the operator. Finally, you can view the HG3 operation manual, the HG3 installation guide, and an informative video on the PreciseRF website.

Manufacturer: PreciseRF, 960 S. Gribble Rd., Canby, OR 97013; www.preciserf.com. Price: HG3 EXPRESS, \$935; HG3 PRO, \$1,195; AR-1 antenna rotator, \$275; aluminum antenna mast, \$119; 60M-1 resonator, \$65; 80M-1 resonator, \$65; variable 60 – 80 meter resonator, \$75; LAB 8K tuner kit, \$275.