W1ICP takes another look at an old friend, the G5RV antenna. It's been around for a long time, it's popular, and most of all, it still works.

Another Look at the G5RV Antenna

BY LEW McCOY*, W1ICP

Certainly one of the most popular wire antennas over the years has been the dipole described by R. L. Varney, G5RV. As I understand it, this antenna originally was designed by G5RV to cover the 20 meter band. It is a dipole, but an unusual dipole in that it consists of three half wave lengths on 20 meters fed at the center. G5RV originally fed this antenna with tuned, open-wire feeders. What we originally had, then, was a dipole 102 feet long and center fed.

Varney's idea was to make a good antenna for 20 meters, and he certainly succeeded. However, many amateurs were not happy with a single-band antenna. They wanted to know if the antenna would work on other bands. Not long after, Varney described his antenna in a British magazine, as I recall. It was later written up in the *RSGB* (Royal Society of Great Britain) *Handbook.*

In order to work on other bands, the antenna uses tuned feed lines, such as open-wire line or these days the popular ladder line. An antenna such as the G5RV, which is 102 feet long, easily works, and works well, on many other bands, including the 80 meter band. Without going into too many technical details, because it is long for the higher bands it also works well on 20 through 10 meters. Therefore, what we have using a Transmatch to tune the system is a reliable multiband antenna that will cover 80 through 10 meters. It also will work on 160 by tying the feeders together at the transmitter and using the system as a form of top-loaded wire. (I have used the antenna on 160 in this manner, and it has performed fairly well.)

Some stubborn amateurs did not want to use a tuner or Transmatch, so they tried other methods of feed. The first, or just tuned feeder, is shown in fig. 1 at (A), and the other method of using a combination of different impedance lines is shown at fig. 1(B). (This is as Varney describes the feed in the *RSGB Handbook.)*

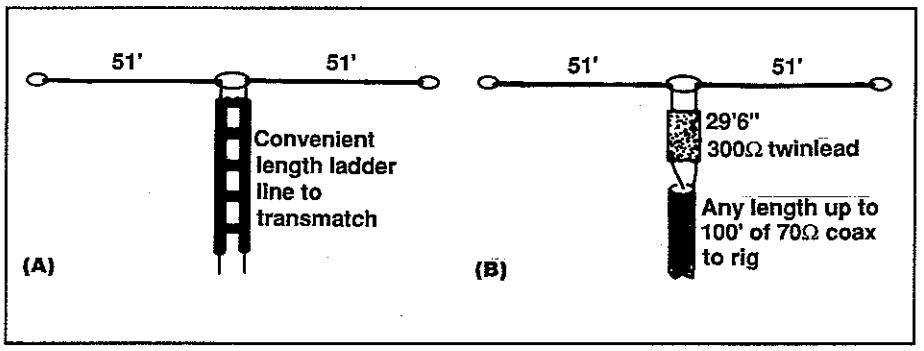

Fig. 1– At (A) is the standard G5RV configuration. At (B) we have a system that "might" match a 50 ohm load.

There are a couple of "egg on the face" problems with the method shown at (B). You must realize that the feed impedance of a dipole (or any antenna, for that matter) is influenced by many factors. The height above true earth is the main controlling factor, plus surrounding objects can also get into the act. What this really means is that if you use such a system, it may (??) work, but there is no guarantee. The ideal system is to use a Transmatch. Then you know you can match the system to your rig.

It is worth noting that *The W6SAI HF Antenna Handbook* by Bill Orr, W6SAI (available from *CQ*) has considerable information on various combinations of the G5RV method shown at fig. 1(B). As Bill points out in his excellent book, there are many controlling factors that can affect the SWR when trying to accomplish multiband operation. In many cases, some of these modifications put the SWR figure well over 3 to 1, making transceiver shutdown a problem. That's why I recommend a Transmatch. In this case, the excellent antenna can be used on all bands and all frequencies under a matched condition.

It is interesting to note that Varney designed this antenna back in the days before transmitters had built-in antenna tuners. Now you must have an antenna system that will *not* present an antenna impedance load of more than 3 to 1. If the system does, the transmitter will shut down. However, no matter what I write, some amateur will still want to try the no-tuner method. Good luck.

A note is in order here for those amateurs who have never used TV 300 ohm

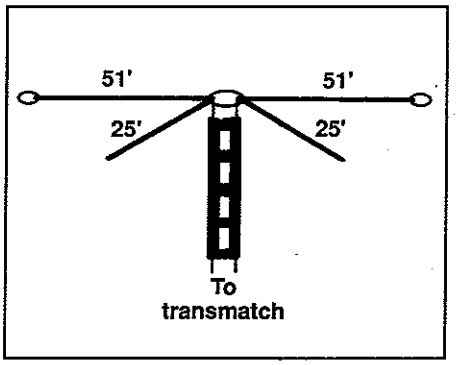

Fig. 2– If you use a 51 foot dipole in conjunction with the regular G5RV, the antenna will perform on 10 meters.

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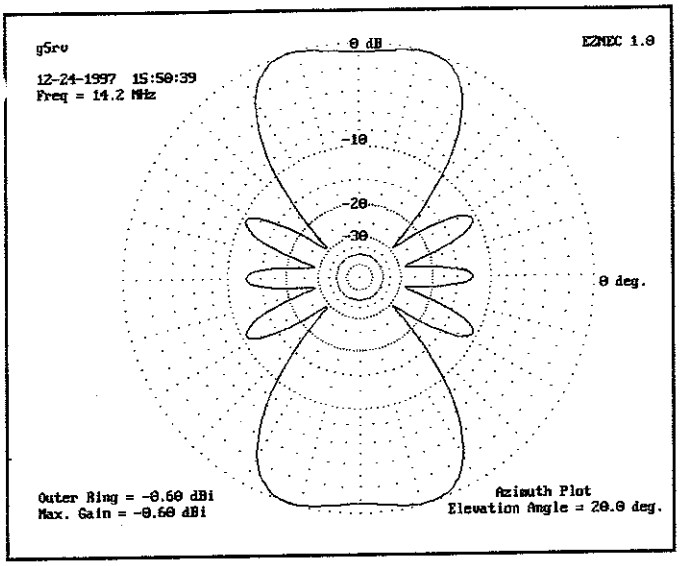

Fig. 3– An azimuth pattern for the G5RV antenna on 20 meters.

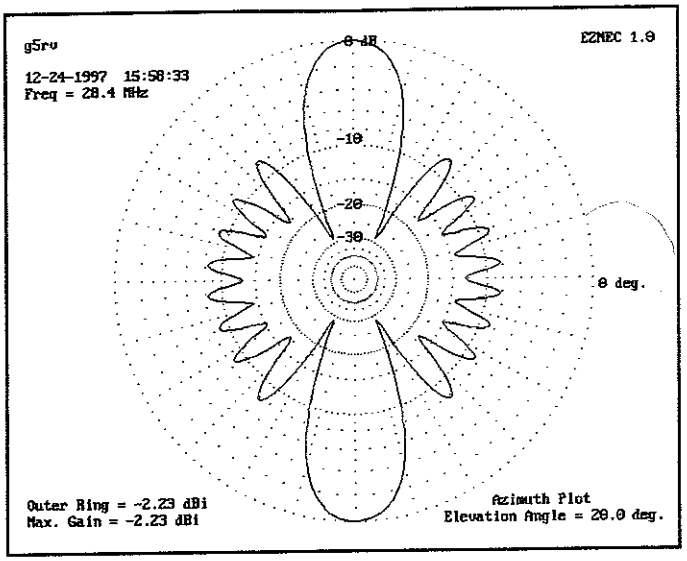

Fig. 4– This is an azimuth plot for 28.4 MHz, at a radiation angle of 20 degrees. Note the two distinctive lobes.

twinlead for feeders. This is usually an inexpensive feed line and is fairly low loss on 80 through 10 meters. As a tuned line, the twin lead can handle power fairly well. I have used the line at kilowatt inputs. However, when it rains, the impedance of the line can vary a great deal. Therefore, be aware of that problem. Your tuning is likely to change.

How about using the G5RV as an inverted V? Many amateurs have done so, but keep in mind that as a rule a horizontal dipole will always work better than an inverted V. Also, with the matching line section shown in fig. 1(B), it is difficult to predict what will happen. The only rule I would throw in here is McCoy's rule: If the darn thing works, leave it alone. Remember, there is a very old rule I learned in amateur radio many, many years ago. The rule is don't be afraid to experiment.

I have heard that some amateurs have experienced problems with the G5RV on 10 meters. We are approaching a time of good conditions on 10 meters. It would be a simple matter to arrange another dipole in parallel with the 102 feet, but make this three half waves on 10 meters—or 51 feet. (I have tried this, and it works.) I have shown in fig 2. While it works, I have never been very happy with common feed to multiple dipoles. With more than one dipole tied to a common feed line, coax for example, you never know exactly what kind of impedance or radiation pattern you will encounter.

To that end, I have taken an average height of 30 feet for a horizontal G5RV (over average ground conditions) and run some typical patterns you can expect from the antenna. I did this using EZNEC, an antenna computer program.

In any event, this will provide you with a relative idea of the radiation pattern of the G5RV at a very common height. Keep in mind when you look at antenna advertising for the G5RV that the G5RV is specifically a 102 foot dipole. Any other configuration is simply another dipole that is tuned or matched. A simple question often asked is if the G5RV is a better performer than a half wave dipole cut for the 80 meter band—say, 130 feet. Nearly always, a larger or longer antenna will outperform a shorter antenna. The difference between a G5RV and a half wave 80 meter dipole is really slight, so there isn't much room for argument as to which is better. ■