



# SHACKNEWS

## HIGHVELD AMATEUR RADIO CLUB

### NOVEMBER 2010

### COMMUNICATION IS THE NAME OF THE GAME

**Meeting** Normal turnout of members who enjoyed a talk given by Yvonne ZR6TBL on a digital pen and a digital notepad. Most interesting and makes you think where technology is going. The end-of-year do will be held at the home of Rex and Ingrid on Sunday 12 December. It will take the form of a Bring and Braai. Time - 12:00 for 13:00. Don't forget that membership fees are due. If paying via EFT please supply your callsign. Frank ZS6TMV asked on this past Sunday bulletin if there any persons who would like to renew an interest in CW. Please contact him via contact list on the back page.

**SSC Meeting** No meeting this month

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#### Very useful tip

From Ton ZS6ANA

Recycling Idea - Plastic bottle cap.

Incision cut RIGHT AT the NECK.

Stick the plastic bag through the NECK of the bottle which you have just cut off.

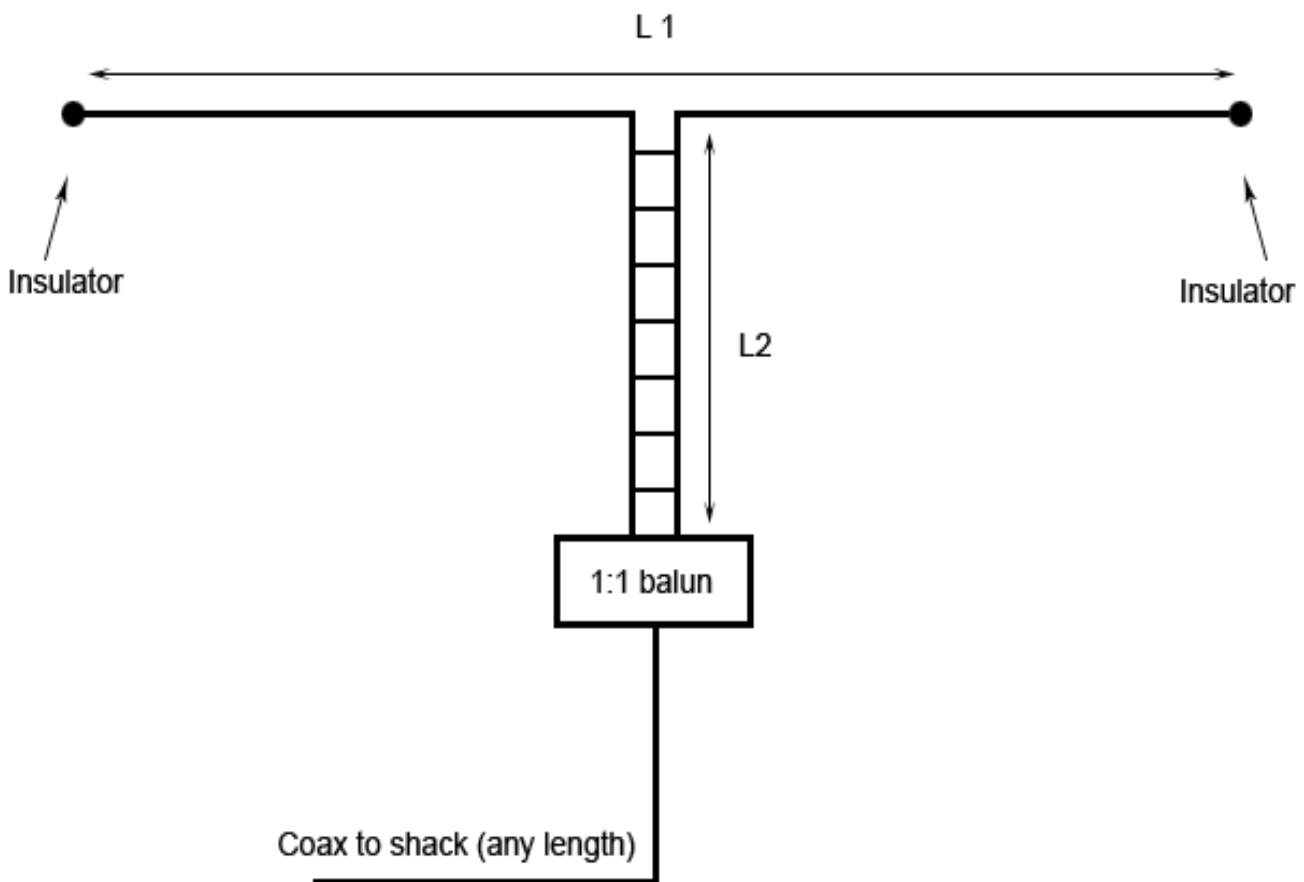
Better than the plastic clips that you have to buy.



40 / 20 / 17 / 12 / 10 / 6 m. without a tuner or traps

The famous G5RV antenna is often touted as an all-band antenna. However, it's not. Yes, a good antenna tuner can match it to your radio, but then a good tuner can match your radio with anything, including door knobs and toasters. Without an antenna tuner, you get an acceptable match only on 20 and 12m, while on all other bands the SWR is always greater (usually MUCH greater!) than 3:1. When OM Louis Varney designed his famous antenna in the 1950's, this was fine: the G5RV performed excellently with the equipment of that day and age, when valve radio's and balanced feed lines were the only game in town. However, when the G5RV is used with modern radio's (read: 50 ohms coaxial connectors, and transistorized finals that are not happy with an SWR of more than 3:1) it is a whole different picture.

This led OM Brian Austin, ex ZS6BKW (now G0GSF) to redesign the G5RV, using modern (1985) antenna modeling software - something that was not available when the G5RV was designed. OM Brian (otherwise known as Prof. Austin, formerly of the Faculty of Electrical Engineering at the University of Witwatersrand) discovered that shortening the two legs of the G5RV dipole and lengthening the matching stub (the balanced feed line) a bit, resulted in an antenna that provides a good match to the 50 ohms transistorized radio's of today, which allows the antenna to be used on five bands without an antenna tuner! And as an added bonus, it was later discovered that the ZS6BKW variety covers not five but six bands, as it does 6m, too, something that the original G5RV did not cover at all!



In the original G5RV design, the dipole length (L1) is 31.1m, while the matching section (L2) is 10,37m of open wire line. In the optimized design by ZS6BKW the dipole itself is slightly shortened to a length (L1) of 28.4m, while the matching section (L2) is longer, and depends on the velocity factor (VF) of the feed line used. For 300 ohm tape with a VF of 0.85, L2 is 11.1m. For 450 ohm window line L2 becomes 12.2m, while for open line (a.k.a. ladder line) L2 is 13.08m.

However, there is some bad news, too. On 80m and 15m the ZS6BKW design performs less well than the original G5RV, while on 15m it is just as bad. Also, the antenna's performance appears to be rather dependent on how well it is installed. If it is not high enough above ground or does not keep sufficiently clear of trees, buildings or conductive objects, performance can be affected rather seriously. However in this it does not differ markedly from the original G5RV. This seems to be the case with my ZS6BKW antenna, too.

While various literature claims that a 1:1 (or almost 1:1 match) without a tuner on various frequencies can be achieved, this appears more due to the lossy coax used by the ham doing the measurements than the antenna's performance! (Note that because lossy coax also dampens the reflected wave, coax loss will result in a better SWR measurement at the transmitter!)

With my own ZS6BKW antenna I have not been able to obtain anything better than 1.7:1 to 2:1. In OM Brian's own publication in 1985 publication he merely speaks of "an acceptable match", better than 2:1 match on five bands, which seems much more realistic. And that is fine - better than 2:1 is more than sufficient - a 1:1 match is not required, contrary to what many hams these days believe!

In the table below are a few SWR figures that compare theoretical (calculated) values found the literature to the measured values of my own ZS6BKW antenna, as well as to the G5RV. (Only theoretical values for the latter, but from past measurements when I did have a G5RV, I can testify that these match the actual performance fairly well.)

Band	80	40	30	20	17	15	12	10	6
ZS6BKW, literature	8.3	1.1	87	1.2	1.4	80	1.2	1.5	1.5
ZS6BKW, measured	high	1.7	high	2.2	1.4	high	2	2	1.7
G5RV	3.2	4.8	high	2.5	high	6.8	3.6	high	high

(Note: these are the "best" SWR figures; they will of course vary while tuning across the band. An SWR value of "high" means >10:1 and should be interpreted as "probably tunable but hardly usable" unless you have a *really* low-loss tuner and coax feed.)

Using 300 ohm tape for the matching stub is probably the most convenient solution. This cable is available in South Africa (while 450 ohm window line is hard to find) and relatively inexpensive. However it has the disadvantage of being sensitive to rain (i.e. when it's wet the velocity factor and therefore the matching impedance changes dramatically) and for outdoor use you absolutely need the black variety - white 300 ohm tape is not UV resistant and won't last more than a few months at best. The performance of 450 ohm window line is much better - if you can obtain any in South Africa at an affordable price! Alternatively, open line (a "chicken ladder") performs better than both 300 ohm tape and 450 ohm window line and is much cheaper, but you will have to make it yourself and the exact velocity factor and impedance will depend a bit on the wire used and the distance between the wires, so you will need to cut and tune it to obtain an optimal match. The length of 13.08 meters is an average, based on a theoretical VF of 0.97, but in practice this may (and probably will) vary slightly so a bit of tinkering is indicated. Note that the matching section (be it tape, window line or ladder line) must always "hang freely" and be kept well away from poles, roof gutters and other conductive objects! (So whatever you do, *do not* tape it to your antenna mast!!)

A lot of "religious debate" on whether or not to use a balun between the coax and the matching section has taken place over the years. Most of it is based upon OM Varney's own remarks on the subject, and the experiments by other hams. However, Varney's statement that he did not notice any difference with or without a balun, and his conclusion that one is therefore better off without one, date from the 1960's and apply to the equipment of that era. Many hams, meanwhile, have experimented with 4:1 voltage baluns, which introduce a mismatch (and huge losses).

The fact of the matter is that any way you look at it, it is never a good idea to attaching an unbalanced coax directly to a balanced load (which this antenna is). It introduces unbalanced currents in a balanced antenna arrangement causing it to perform wildly different from what theory predicts, and it causes shield currents in the coax... which in turn often result in burnt fingers in the shack, TV interference in the lounge, and QRM in the XYL. (HI) A proper 1:1 current balun (i.e. a choke) between the coax and the balanced antenna feed point is therefore to be recommended.

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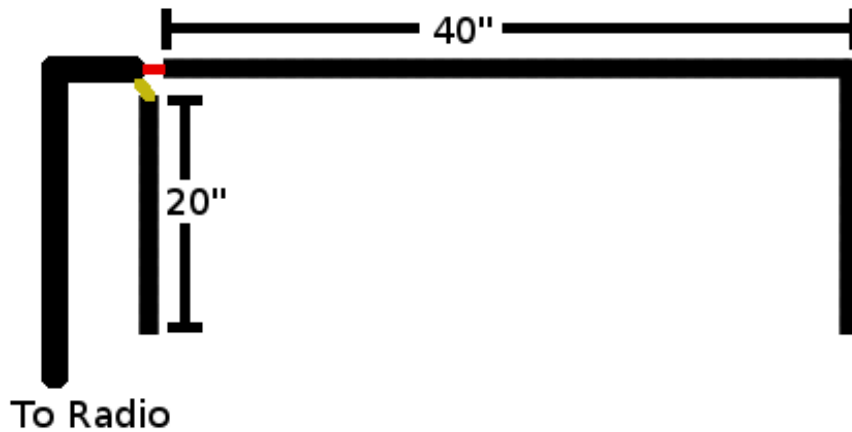
### A Half square antenna for 144Mhz / 2M

The theory behind it is simple. Two vertical pieces that are 1/4 wavelength and the top portion is a 1/2 wavelength. The top portion is connected to one vertical piece and is where the centre conductor is connected to it and the braid/shield is connected to the other vertical portion.

The for 2m is 20"(50.8cm) for the vertical pieces and 40 inches(101.6cm) for the top. The perfect antenna to have hidden behind drapes or a blind in case you need to go stealth in your operations.

Notes: Leave the longest piece 2-3 inches longer than described and cut back the end until you have a low swr. It's easier to cut off than add.

Diagram on the next page



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**Puns for those with a higher IQ**

- Those who jump off a bridge in Paris are in Seine.
- A man's home is his castle, in a manor of speaking.
- Practice safe eating - always use condiments.
- A hangover is the wrath of the grapes.

**CLUB INFORMATION**

**Postal address** PO Box 19937 Sunward Park 1470

**Website** <http://www.qsl.net/zs6hvb/>

**Back Issues of Shacknews available on the club website**

**e-mail** [zs6hvb@gmail.com](mailto:zs6hvb@gmail.com)

**Repeater** 145.1875 MHz input - 145.7875 MHz output

**Linked** to 70 cm - 438.850 Mhz (Sunday bulletins)

**Bulletins** Sunday morning - 145.7875 MHz & 7062 KHz @ 08h45.  
Relay - 80M - 3662KHz

**Monthly meeting venue**  
Germiston Methodist Church  
Hall  
Lady Duncan Rd  
Germiston  
*3rd Saturday of the month at 14:30*

**Committee**

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**Club bank details**

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