

ANODE

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Editor's Comments

**Volume 8, Issue 8
April 2008**

Club Notes

Bulletin Readers

for the Months of March and April.

13-Apr-08 ZS6OUN - Stuart, Chairman

20-Apr-08 ZS6WWJ - Willem, SARL liaison

27-Apr-08 ZS6CRW - Craig, Treasurer

4-May-08 ZS6PVT - Philipp, Repeater Management

11-May-08 ZS6BZF - John, Secretary

15-May-08 ZR6RON - Ron, Vice Chairman

25-May-08 ZS6C - Joop, Contests

Web page moved to jbc's.

I have moved the club's web pages to the commercial site. This should allow the members to access the news and information quicker and more reliably.

http://www.jbc's.co.za/ham_radio/index.php

After a suggestion by Stuart (Our chairman), I also left the club database on a machine at my place. This has proved to be an interesting resolution to a small problem. The data

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Metzler's Laws of Signals

Many fine circuits have been abandoned or ignored because of 'components' that never appeared on the schematic.

1. Any conductor that carries alternating current is considered to be a transmission line. Any energy that fails to appear at the far end went elsewhere. Signals escape by way of capacitance, mutual inductance, common resistances (ground loops) or by radiating as RF. It's a bad idea to just hope the missing stuff turned into heat! This includes power supplies, which must be assumed to be carrying nasty stuff until proven clean.

2. Reciprocity: if stuff can leak out, stuff can also leak in!

3. If the conductor is $\ll 1/8$ wavelength (at the highest excitation frequency), time delays MAY be unimportant. In digital work, excitation frequencies (edge rates) are way higher than clock frequencies. In analog work, distortion products are way higher than signal frequency excitations. Is the line still short?

4. If there's a known resistance in range, try to match to it unless there's a very good reason not to. Even a simple series terminator at the source end can help. If you get lucky and

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Special points of interest:

- Contact details on back page (updated)
- Next Flea Market is on the 3rd of May at 12:00.

Metzler's Laws of Signals

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condition 5 is met, the line can be ignored... maybe.

5. ALL lines have return paths associated with them. If you don't control them, Murphy will. In which case return will likely be by way of another of your signal lines. Return is by way of the lowest impedance, NOT the lowest resistance path, even at 'audio' frequencies. The smallest area loop will carry the signal current. DC powered amplifiers of ALL kinds work by shunting current between 2 or more 'power rails', which become the actual return points. Have you tied them together? Where and with what? Only a perfect transformer can keep these current off of your lines. This includes logic gates.

6. Capacitors have inductance, lots of it. Resistance too. Know how much if you can. People who make capacitors don't like inductance and resistance and don't readily admit to having any!

7. Inductors have capacitance, lots of it. Resistance too. Know how much if you can. People who make inductors don't like capacitance and resistance and don't readily admit to having any!

8. Resistors have capacitance, lots of it. Inductance too. Know how much if you can. People who make resistors don't like capacitance and inductance and don't readily admit to having any!

9. Conductors are usually decent inductors. Their capacitance may be due to lousy dielectrics. Make sure yours is good enough. This includes ANY insulator between signal and return.

10. ALL mismatched lines (most lines in general) are resonant somewhere in the spectrum. If they're not resonant, they're matched, PERIOD! Sometimes one can get away with matching them only at high frequencies (snubbing).

Find or control Z and the frequency (length) rather than blindly trying out a slew of resistor and capacitor values. Never assume that where they're resonant isn't hurting your signal in some way.

11. If something isn't working right and the voltages don't tell you why, start looking at the currents.

David Robbins, K1TTT

Editor's comments - Rants & Raves

(Continued from page 1)

now is fed back to the main web site over the ADSL line to my place.

Voting for SARL resolutions

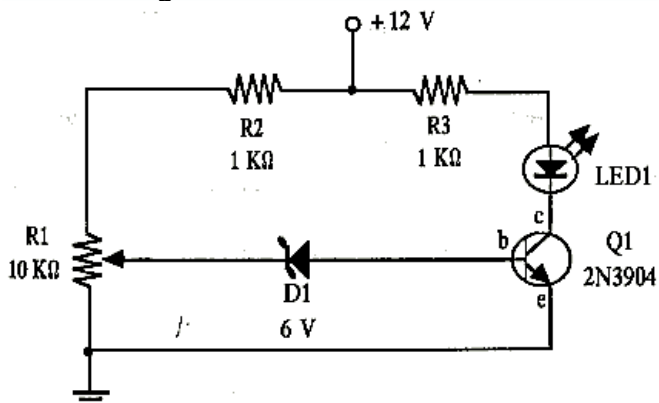
At Willem's request I sent out an email this week requesting those interested to vote yes or no to give our "proxy holder". A fair number replied and the votes were 10 to 2 in favour (YES).

Unfortunately the power was cut on Friday at 10:03+/- and only restored after 14:00 hours. So a final counting and response to Willem and our SARL representative could not be updated.

This leads me to suggest that we have a "voting page" on our club web site. You (the members) could only access it after logging in using your call sign. And only committee members could change the content on the page. What do you think?

Things that don't work

A recent amateur newsletter published a circuit for a "12 Volt battery monitor". Unfortunately I had seen this circuit before as an example of a non-working circuit.



If you carefully study the circuit, you will see that the zener diode (D1) is the critical part of the circuit. It is required to break-over at 6 Volts to conduct and turn on the transistor (Q1). Unfor-

tunately the voltage is dropping (going down) and so the transistor will turn off and the LED as well. It's a pity the newsletter didn't check the circuit. But it must work, its on the Internet!

The web site perpetrating this is :-

www.reconnsworld.com/power_12vbattmon.html

RIP Arthur C. Clarke

Clarke died in Sri Lanka on 19 March 2008 after suffering from breathing problems, according to Rohan de Silva.

Probably best known for his paper on geostationary satellite communications which was published as an insert in Wireless World early on in my career. He never patented the principle which would have probably made him very rich. He preferred to write Science Fiction and produced a great many well written stories.

JB 2008-04-13



SLIM JIM ANTENNA PROJECT

Several designs rolled into one
Edited and condensed from various designs
Page updated with new information

The Slim Jim Antenna

The Slim Jim is a vertically polarized omni directional end-fed antenna having considerable "gain" and this is concentrated almost parallel to ground toward the horizon rather than skyward making it more efficient than a ground plane type antenna by about 50 percent better. It can be built for almost any frequency! (Below 10 meters it gets VERY tall) Due to it's SLIM design, there is very little wind loading. It is fed with 50 ohm coax.

It uses a 'J' type matching stub (J Integrated Matching = JIM), hence the name SLIM JIM. Credit for the original design goes to F.C. Judd, G2BCX. Since the vertical angle of radiation is so narrow, about 8 degrees toward the horizon, it usually out performs 5/8 wave or ground plane type construction due to their much higher angle of radiation. It is estimated that the Slim Jim appears to have about 6dB gain over a 5/8 wave antenna due to the extreme low angle of radiation.

(Most of the radiation is directed toward the horizon making the "gain" appear much greater than other vertical type antennas it has been compared to with A/B testing)

Editor's note: There are many gain figures quoted for this antenna and also various descriptions of the actual type of antenna on various websites.

Some have even stated that, "In fact I found it outperformed a 1/2wave over 1/2wave colinear!"

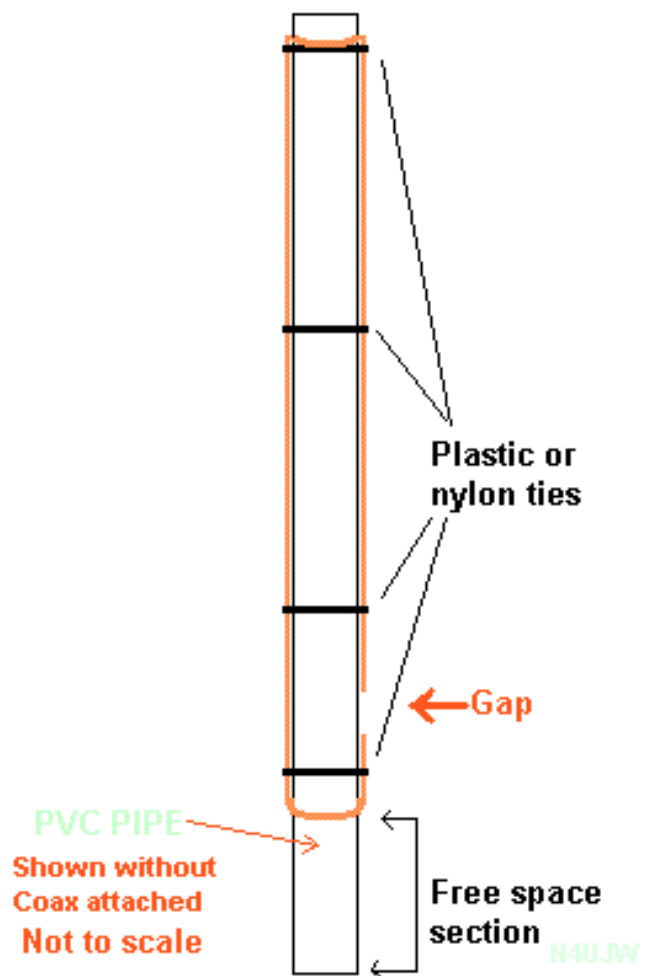
No matter what you call it, it seems to do an excellent job according to most reports. What have you got to lose?

Please let us know your results.....email us!
n4ujw AT hamuniverse.com

Using heavy duty construction would make this a good omni repeater antenna. When correctly matched for lowest swr, it has wide bandwidth.

Drawing on right shown with antenna mounted on PVC pipe

Slim Jim Mounted on PVC Pipe



Construction details:

NOTE: NO PART OF THIS ANTENNA SHOULD BE GROUNDED!

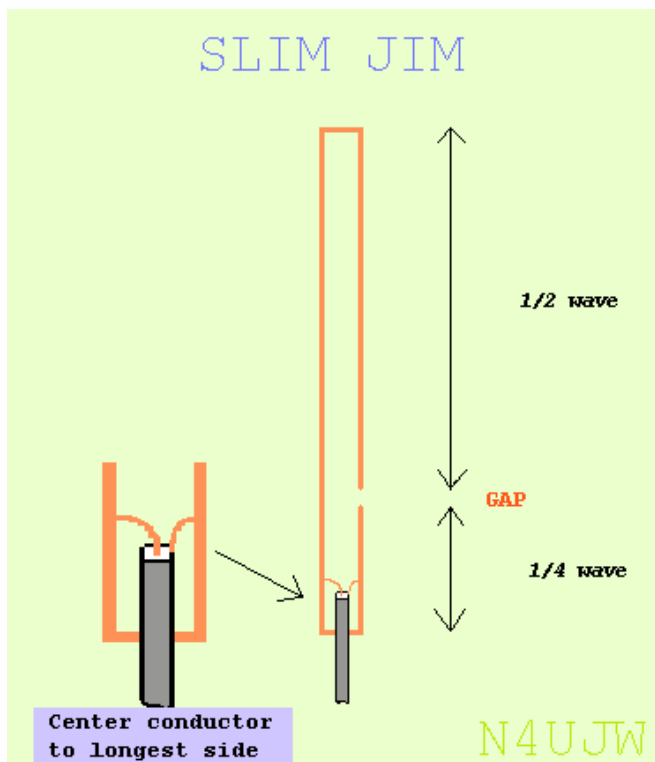
It should be totally insulated from it's mount, mast, tower, etc with at least 1/4 wavelength of "free space" distance. Formulas are provided below for all the measurements including the free space distance.

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SLIM JIM ANTENNA PROJECT

(Continued from page 4)

The Slim Jim should be constructed from 1/2" copper pipe. Also old tv antenna elements or aluminium tubing could be used with some ingenuity and would be lighter. Experimentation with heavy gauge wire supported inside PVC tubing or attached to insulated material such as wood could also be tried and would probably be successful with some ingenuity. 300 ohm twin lead versions also work great!



Using copper pipe, bends are made with soldered 90 degree copper elbows. An adjustable slip sleeve made from copper can be added to the element on top above the gap for tuning purposes or possibly some sort of nut, bolt arrangement soldered into the upper end to adjust spacing if needed. (See the 2 meter SSB loop project on this site for better details and pictures of the nut, bolt arrangement.)

Depending on the frequency or band, the average length of the gap and spacing between the elements is 3" at 72MHz and 1" at 220MHz. (See

updates below) For 2 meter work this would be around 1 1/2 to 2 inches.

Some experimenters report about 1 inch or less works well. Experiment with the adjustment for best results. The recommended mount is the use of PVC pipe and PVC pipe "T's."

Testing and tuneup:

Support the antenna as high as possible from the ground and other nearby objects especially metal, and fit the coaxial cable to the antenna with some crocodile (alligator) clips. It is suggested that the centre conductor be attached to the longest element, shield to the shortest. See diagram above. Attach about 2 to 4 inches up from the bottom and check the VSWR at the design frequency.

USE LOW POWER!

Adjust the clips up or down to get the best match, mark where they are to be finally installed, remove the clips, and solder the coax directly or use clamps, screws, etc. Waterproof or seal all connections and the end of the coax. Use the copper sleeve or nut bolt arrangement, if added, for any necessary tuning.

FORMULAS

(For results in inches)

NOTE: Air gap and element spacing may have to be determined by some experimentation for various frequencies.

See new info about gap spacing below.

(Divide results by 12 for feet)

3/4 wave (longest section) = $8415 / f\text{MHz} =$ inches

1/2 wave section = $5610 / f\text{MHz} =$ inches

1/4 wave section = $2805 / f\text{MHz} =$ inches

* 1/4 wave free space = $2953 / f\text{MHz} =$ inches

* This is the distance that antenna should be from mounting boom, mast or tower.

Note: These formulas are believed to be accurate. Some trimming or tweaking of lengths may

(continued on page 6)

SLIM JIM ANTENNA PROJECT

(continued from page 5)

be needed with YOUR construction!

Slim Jim Metric Formulas:

(For results in meters) Updated June, 2006 (For results in Centimetres, multiply results by 100)

$213.74 / \text{fmhz} = 3/4$ wave overall length

$142.496 / \text{fmhz} = 1/2$ wave length

$71.248 / \text{fmhz} = 1/4$ wave length

Feed point = About 10 to 20% of $1/4$ wave-length (+ - tuning)

$75 / \text{fmhz} = 1/4$ wave "free space" in metres

Note: These formulas are believed to be accurate. Some trimming or tweaking of lengths may be needed with YOUR construction!

Some Examples

2 Meters 146.00mhz

$3/4$ wave section 8415 divided by $146 = 57.63$ inches

$1/2$ wave section 5610 divided by $146.00 = 38.42$ inches

$1/4$ wave section 2805 divided by $146.00 = 19.21$ inches

$1/4$ wave freespace 2953 divided by $146.00 = 20.22$ inches

Feed point about 10 to 20% of $1/4$ wave = 1.9 to 3.84 inches (+ - tuning) The gap would be a guesstimate at about $1\ 1/2$ to 2 inches (+ - tuning) Remember, the $1/4$ wave freespace is the distance from the mount as a minimum.

6 Meters 50.150mhz

$8415 / 50.150\text{mhz} = 167.79$ inches

$5610 / 50.150\text{mhz} = 111.8$ inches

$2805 / 50.150 = 55.93$ inches

Gap spacing 10 to 20% of $1/4$ wave = 8 inches (15%) Freespace mounting distance 58.8 inches

10 Meters 28.400mhz

$8415 / 28.4\text{mhz} = 296.30$ inches (24.69 feet)

$5610 / 28.4 = 197.5$ inches (16.45 feet)

$2805 / 28.4 = 98.76$ inches (8.23 feet)

Freespace mounting distance 103.97 inches (8.66 feet)

17 Meters!

A 52 foot vertical including minimum distance from ground!

Hay don't laugh! It might be worth a try for about 6 db more!

Please send us your input if you have suggestions for any band using this antenna!

The lengths will have to be adjusted slightly for the addition of the top and bottom connection points.

See Construction and Testing tips below.

CONSTRUCTION and TESTING TIPS

CONSTRUCTION:

The Slim Jim should be constructed from $1/2$ " copper pipe OR near this size of any conductive material but this is not an absolute! The bends are made with soldered 90 degree copper elbows if your using copper tubing.

A slip sleeve or other arrangement can be added to the upper or lower part of the gap made from copper, brass or aluminium for adjustment of the gap measurement for swr tuning, although the average length of the gap and spacing between the elements is 3" at 72MHz and 1" at 220MHz. Some experimentation may be needed for gap distance.

For 2 meters, this would be about $1\ 1/2$ to 2 inches. Here again, this measurement is not extremely critical and the gap, element spacing and element length all interact.

The total distance from the top of the gap around the entire length and back to the bottom of the gap should equal about 1.5 wavelengths or in the case of the 2 meter example above about 115.26 inches.

No part of the antenna should be grounded to the tower or mast. The recommended mount is the use of PVC pipe and PVC pipe "T's." Make sure the space between the tower or mast and

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SLIM JIM ANTENNA PROJECT

(Continued from page 6)

the antenna is one "free space" 1/4 wavelength.

were very feeble , with GP now are very strong ,
and even 0.5 W is enough for me .
(we have no repeater)

TESTING:

Stand upright (on a railing or non-conductive object, clear of metal surfaces, drain pipes, etc.) and fit the coaxial cable to the antenna with some crocodile (alligator) clips. Attach about 2 to 4 inches up from the bottom (at 2 meters). It is suggested that the center conductor be attached to the longest element, shield to the shortest and using just enough power to get an swr reading, check the VSWR. Adjust the clips up or down to get the best match, mark where they are attached, remove the clips, and solder the coax directly. Seal connections and end of coax! Use the copper sleeve, or other spacing adjustment if added, for any necessary tuning. You may not get that perfect 1:1! The air gap, total length and element spacing all interact.

I have No SWR meter, and simply depended on your design.

So many thanks to u for the support to ham community.

The following hams (brewed along with me) conveyed their thanks to u VU2DFB, VU3KVF, VU2NDJ .

73es

(RAMU)

VU2RMU.

03.12.06

RECENT INPUT FROM SOME BUILDERS:

12 - 03 - 06

Dear Om

Recently I returned back to this City of Visakhapatnam, AP,INDIA.

I was looking for a simple omni-directional antenna. Then happend to see ur slimjim design and tech details.

Immediately brewed one as follows:

Freq: 145 Mhz (being our center freq. in VHF)

PVC Pipe support: 32 MM Dia.

Ant. Element : 15 SWG Copper Enamilled.

Gaps and spacings used : 152, 98.3 , 49.2 CM

Gaps: 1.1/2" Feed Point: 2"

Gr . Clearance: 50 CM.

Performance: Excellent (The stations which

Updates by F4DYT, Dimitri of France
(EDITORS COMMENTS IN RED TYPE---HIS
COMMENTS IN BLACK)

Just to report that yesterday I built the Slim Jim for 2m using the instructions I found in your site. Without any changes to your design, it made an increase of 4 S points (measured in my FT-857D screen) the reception of a repeater 60 km away.

4 S points in an FT-857D is to be taken with caution. It only shows a *qualitative* increase in reception. I am afraid, S points in my transceiver cannot be related to quantitative measures. (Note: Normal calibrated S meters yield about 6db per S unit.....there is NO way this antenna has 24db gain. Dimitri compared the Slim Jim to a 1/4 wave ground plane.) (See below for more).

It does seem to be a very good antenna for 2 meters or any other band where the physical size would not be a mounting problem.

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SLIM JIM ANTENNA PROJECT

(continued from page 7)

I agree!

What were you using before the Slim Jim to compare it to and how high was the old antenna and how high is the new Slim Jim?

I used a home-built 1/4 lambda ground plane, built using the ARRL Antenna Handbook instructions. Photos can be seen in <http://f4dyt.free.fr>

Height is of relative value, since the Ground Plane had a... ground. And Slim Jim is very insensitive to height. Both antennas were installed as indoor VHF antennas at the attic of my house, both at around 3 meters above ground. It was an A/B test.

I did a QRP test with 5 watts using a repeater 24 km East from home. I don't have a clear view, so some diffraction may affect results (if I am in a reinforcement zone, for example). My correspondent gave me a 57 with very little noise, and a very good signal strength for a QRP station.

I would like to report that I modeled the antenna on MMANA (I also had to convert all units into metric ones). My simulations suggest that the theoretical height would have been 1.73 m, and that at 1.47 m the antenna should NOT work. Of course, reality won ;-)

I also want to report that the firing angle is very low. For example, before;

I was able to listen to airplanes going to the Charles de Gaulle airport at 121.500 MHz (AM) which are flying over our heads (we are below an aerial corridor). Now I listen to them much weaker, while the airport tower enters at S9++ (again, FT-857D measures not to be trusted at all). The MMANA simulations also suggest a maximum gain between 3 and 4 degrees, with a secondary lobe at 60 degrees. (Dimitri's MMANA simulations confirm the very low angle of radiation that this antenna is noted for.

Several months testing at the N4UJW QTH using this antenna to listen to 2 meter transmissions from the station aboard the International Space Station also confirms the extreme low angle of the pattern. It has been noted that on all passes over this QTH, the 2 meter signals were MUCH stronger at and below 8 degrees above the horizon with the signal strength decreasing as the ISS approached overhead!.....N4UJW)

73

Dimitri F4DYT

--

Dimitri Aguero - daguero@free.fr
F4DYT - Locator JN18bv
Saint-Germain-en-Laye, France

These comparisons will help others evaluate the antenna.....73 N4UJW

NEW Additional gap spacing information:

These air gap spacing measurements are believed to be accurate for the frequencies mentioned.

(Some experimentation may be needed for your particular frequency)

72mhz = 7.6cm

144mhz = 3.8cm (1.49 inches)

220mhz = 2.5cm (.98 inches)

440mhz = 1.25cm (.49 inches)

Gregory Harris <wdx9khy@sbcglobal.net> wrote:

August 2006

Howdy OM

I perused your webpage - I'm a condo ham and can't have any outdoor antennas. Also don't like the thought of a G.P. (with it's radials) hanging from the ceiling. Went to the local hardware emporium and got some wire and a legnth of PVC double-wall pipe, and 1 bar stool "foot" for each end. Drilled a hole at the top....used number 16 wire for the elements , held it all together with electrical tape. Put it in the corner

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Build Your Own Direct Conversion Receiver

(Continued from page 8)

of the "shack" (a bedroom) fired 5W from my ancient IC228H rig....and it works like a champ. Getting good reports from 5W and an indoor slim jim. It is a great apartment antenna. Take care thanks
73

Greg WB9MII

Illinois

MORE SLIM JIM ANTENNA PROJECTS:

2Meter 300 Ohm Twinlead Slim Jim Version.

Convert a J Pole to a Slim Jim!

2m Copper Tubing Slim Jim by KE5FXU

6 Meter 300 Ohm Slim Jim (From VK land)

MW3RUH SLIM JIM SPACER TIPS

POWERED BY HAM RADIO!

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Hamuniverse.com or article author

Taken from :-

<http://www.hamuniverse.com/slimjim.html>

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26.14122 South - 27.91870 East

P.O. Box 562
Roodepoort
1725

Phone: 082 573 3359 (Chairman)
Email: zs6wr@gmail.com

Bulletins (Sundays at ...)
11h15 Start of call in of stations
11h30 Main bulletin start

Frequencies
439.000MHz 7.6MHz split
Input: 431.4MHz (West Rand Repeater)
145,625 MHz (West Rand Repeater)
10,135 MHz (HF Relay)

Radio Amateurs do it with more frequency!

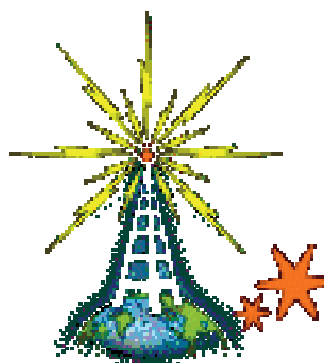
| | | | | |
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| SARL liaison | Willem | ZS6WWJ | | marie.w@absamail.co.za |

West Rand members - we need your input!

To make this the best ham radio magazine in South Africa we need your input. Please submit articles, comments, suggestions etc.

Please send plain text with no formatting to the email address below.

In July 2003, we re-published an Anode Compendium on CD. It has the issues from July 2000 until June 2005. This included the new Adobe reader. It has been updated, check with the chairman for details.



We need your input! Email us articles, comments and suggestions please.
zs6wr@gmail.com