

ANODE

Inside this issue:

Editor's Comments	1
Phase-locked loop detector circuit	1
Build A 10 Amp 13.8 Volt Power Supply	4
The January Birthday list	7
Event Calendar for January 2007	8

Editor's Comments

Volume 7 Issue 6 January 2007

With the New Year behind us, the committee took some resolutions on the 28th which affect the Anode.

We shall now be publishing the News Reader list and event calendar in every issue. See page 8 for details. Both lists are also going to be available on our website. Whenever that happens...

So the Adobe Reader has a 'backdoor'. Now they want you to upgrade to version 93, which of course doesn't run on Windows 98...

increase. Its just getting smarter and past all the spam filters on the servers...

Linux Slackware 11 is out as well as a new version of Ubuntu. Ubuntu is very good and appears to be making headway in the home / small office market as it comes with Open Office V2. Open Office is also available for Windows.

Open the December Elektor and you will find WiFi antennas with gain. I was amused to see a 'bi-quad' (hi John!). As usual a great read with 50+ circuits in a pull-out magazine this year.

Spam apparently is not really on the

(continued on page 6)

Phase-Locked loop detector circuit

The objective

I was after a simple and "non-tweakable" frequency modulation demodulator. It was to be a deviation detector for use in a simple 2m/70cm receiver. It must use easily obtained components and cost virtually nothing. Component mining and recycling is probably the only way to find this sort of component these days (2006-7).

Research

I didn't go looking on the Internet but went looking through my collection of circuits and data sheets. Why? Well whilst I would probably

have found what I wanted, none of it would be any great use here in SA. We just don't have the component and hobby shops that the USA and UK have. Scrounging of medium to old components is now firmly embedded in our Amateur Radio creed. Whilst new chips and components do exist, sometimes for free, they are minute in size and are beyond our capabilities when it comes to soldering. The electronics industry has become a mass market supplier with machine assembly the order of production. So if you want just one or two of anything you will have to buy a 'minimum order' quantity. That is if you can source the component locally.

(continued on page 2)

Special points of interest:

- Contact details on back page (updated)
- Event Calendar on page 8.

Phase-Locked loop detector circuit

(continued from page 1)

After reading through my 20+ year old notes, I came across a paging receiver that fitted the bill. This was a single conversion receiver with an I.F. of 23.455MHz. Why 23.455MHz? I don't know. Maybe it was because the design company (Phillips) had lots of the if filters.

The circuit for the demodulator caught my eye. What is a TCA520B? After a quick search on the Internet, I found that it was an early version of the 741 operational amplifier. So where were the diodes etc for the phase detector? Reading the circuit description again, I worked out that the designer was using the input transistors of the integrated circuit as the switching device for the phase detector. Did it work? Well I set out to build a version that I could test.

My circuit is not very different from the original. I used some readily available devices and moved the frequency of operation to 10.7MHz. That was my first mistake.

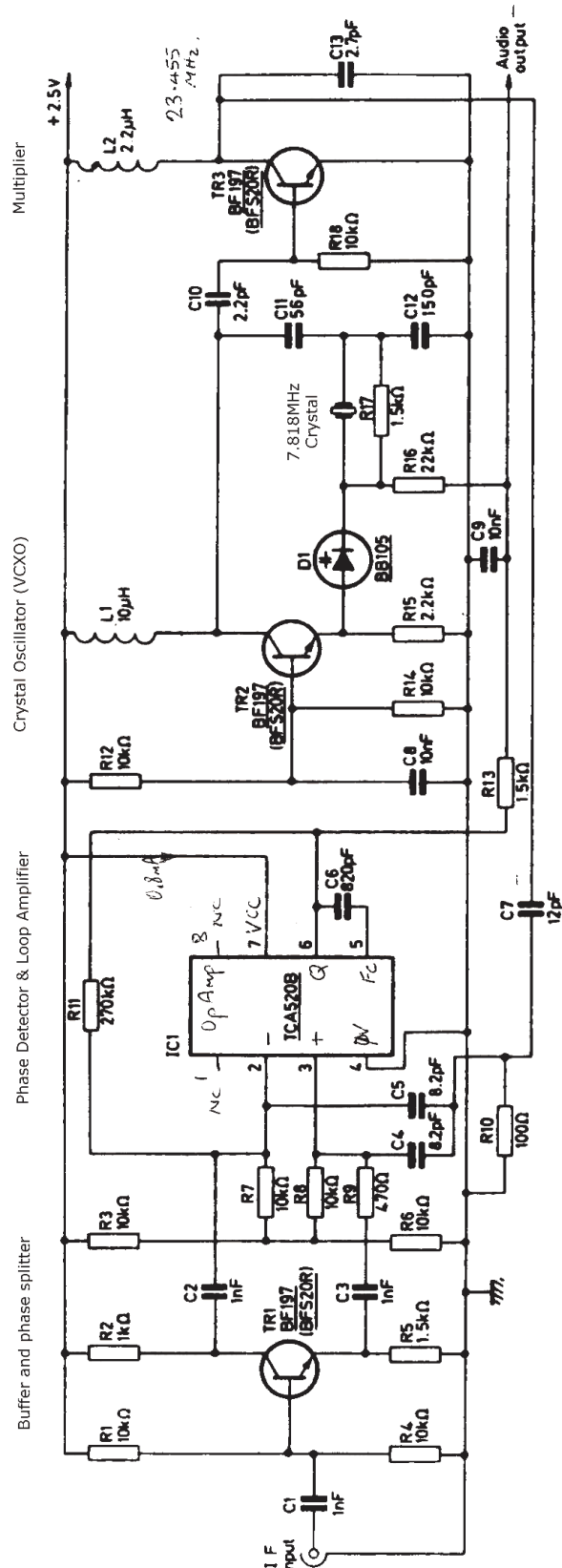
Conclusions

It was only after I had tested the modified circuit at 10.7MHz, that it dawned on me that the original circuit worked quite differently. The new modified circuit was exhibiting "injection locking" with the phase-lock loop broken for testing. This arrangement sort of worked as a discriminator but gave out-of-lock beat frequencies, which ruined any reliable operation.

The original circuit uses a crystal oscillator and tripler to phase detect the I.F. at 23.455MHz. This of course cannot be "injection locked" by the I.F. feeding past the phase detector.

The phase detector is a novel way of using an operational amplifier to provide both phase

(Continued on page 3)

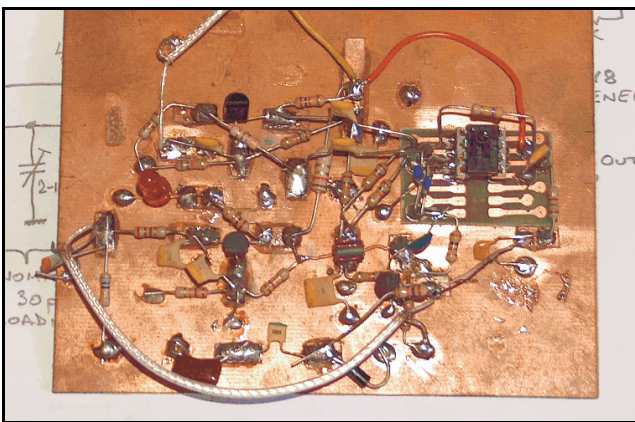
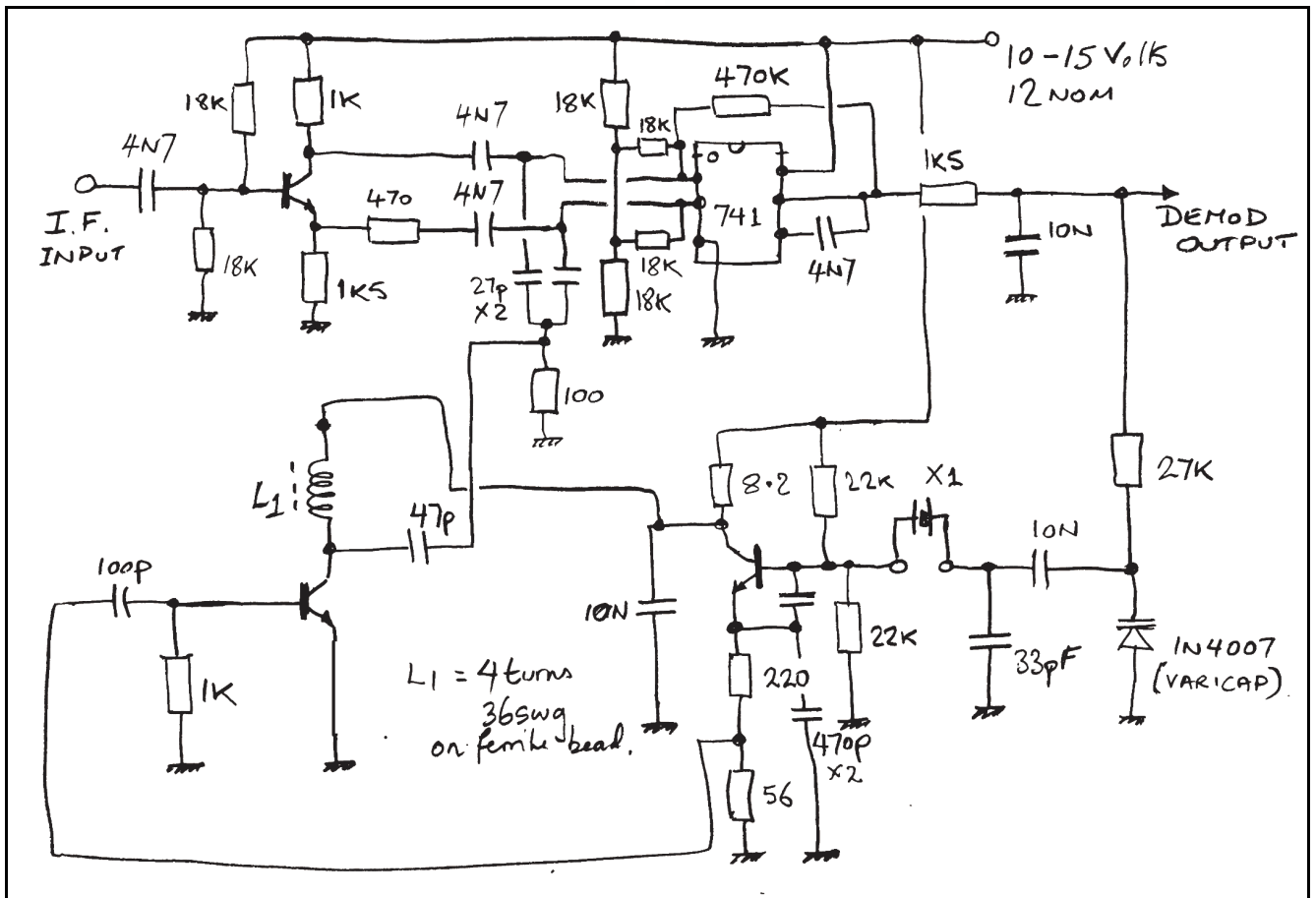


Phase-Locked loop detector circuit

(Continued from page 2)

detection and d.c. gain for the phase-locked loop.

cap later did not provide any advantage.



In the original circuit a BB105 varicap diode is used. I did not have one of those, so I used a 1N4007 rectifier diode recovered from a blown energy saving lamp. Testing with a B0580 vari-

The oscillator I used is a "typical" H.F. type of Colpitts/Clapp and used a 2N3904 transistor. I was hoping to keep any "hard to get" devices out of the design. The operational amplifier used was a standard 8 pin 741.

When I finally reproduced the circuit accurately, operating an I.F. of 10.7MHz, the other comment in the article stood out. The reference oscillator needs a "rubber" crystal. Not that it is made of rubber but it should be elastic in frequency. The 3.5MHz crystal I used would move from 180 to 260Hz at 3.5MHz or 540 to 780Hz at 10.7MHz. This would demodulate the 1kHz deviation alright but would distort any larger deviation. Not good enough for my application in

(continued on page 4)

Phase-Locked loop detector circuit

(continued from page 3)
narrow band frequency modulation with a deviation of around 2.5kHz.

$21.4 / 3 = 7.133$ MHz. I might even have one of those.

JB 2007

Considering we (the club) acquired a lot of 21.4MHz crystal filters recently. Maybe I should try the circuit out at 21.4MHz. This will require a "rubber" / "pullable" crystal of

Build A 10 Amp 13.8 Volt Power Supply

By N1HFX

Sometimes amateurs like to home-brew their power supplies instead of purchasing one off the shelf at any of the major ham radio retail dealers. The advantage to rolling your own power supply is that it teaches us how they work and makes it easier to troubleshoot and repair other power supply units in the shack. It

should be noted that there is no real cost advantage to building your own power supply unless you can get a large power transformer and heat sink for a super low price. Of course rolling our own gives us the ability to customize the circuit units. The circuit in Figure 1 will give us 10 amps (12 amps surge) with performance that equals or exceeds any commercial unit. The circuit even

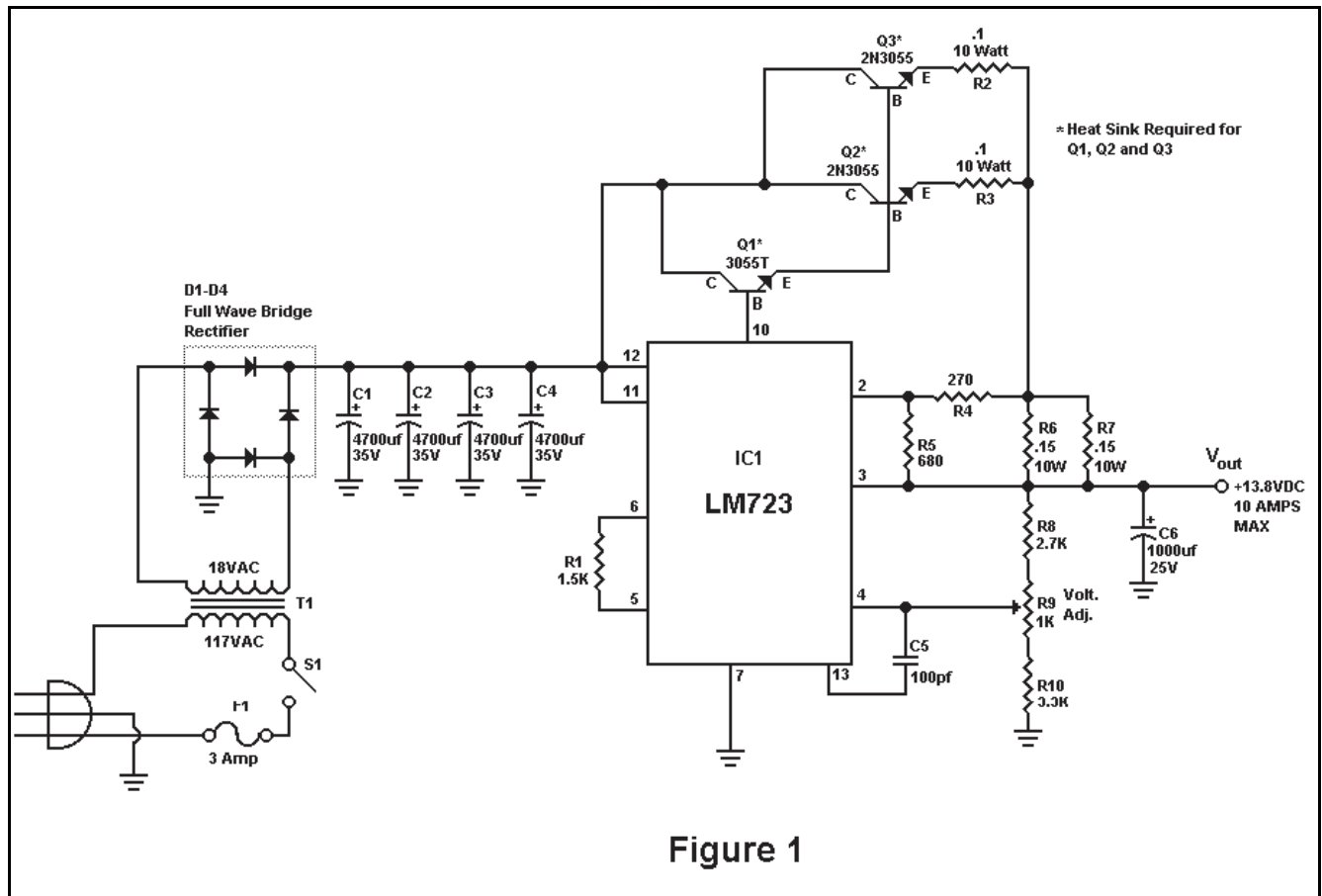


Figure 1

(continued on page 5)

Build A 10 Amp 13.8 Volt Power Supply

(Continued from page 4)

has a current limiting feature which is a more reliable system than most commercial units have.

Just like other commercial units, this circuit uses the LM723 IC which gives us excellent voltage regulation. The circuit uses 3 pass transistors which must be heat sinked. Resistor R9 allows the fine tuning of the voltage to exactly 13.8 volts and the resistor network formed by resistors R4 through R7 controls the current limiting. The LM723 limits the current when the voltage drop across R5 approaches .7 volts. To reduce costs, most commercial units rely on the HFE of the pass transistors to determine the current limiting. The fault in that system is that the HFE of the pass transistors actually increases when the transistors heat up and risks a thermal runaway condition causing a possible failure of the pass transistors. Because this circuit samples the collector current of the pass transistors, thermal runaway is not a problem in this circuit making it a much more reliable power supply.

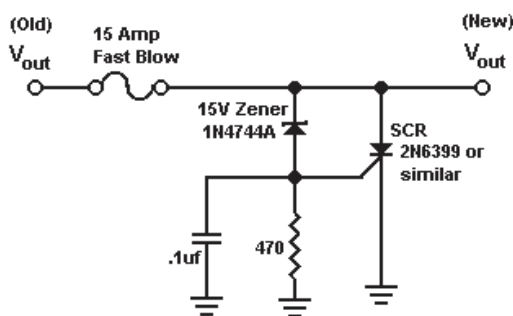


Figure 2

The only adjustment required is setting R9 to the desired output voltage of anywhere between 10 and 14 volts. You may use a front panel mounted 1K potentiometer for this purpose if desired. Resistor R1 only enhances temperature stability and can be eliminated if desired by connecting pins 5 and 6 of IC-1 to-

gether. Although it really isn't needed due to the type of current limiting circuit used, over voltage protection can be added to the circuit by connecting the circuit of Figure 2 to V_{out} . The only way over voltage could occur is if transistors Q2 or Q3 were to fail with a collector to emitter short. Although collector to emitter shorts do happen, it is more much more likely that the transistors will open up when they fail. I actually tested this and purposely destroyed several 2N3055's by shorting the emitters to ground. In all cases the transistors opened up and no collector to emitter short occurred in any transistor. In any event, the optional circuit in Figure 2 will give you that extra peace of mind when a very expensive radio is used with the power supply.

The circuit in Figure 2 senses when the voltage exceeds 15 volts and causes the zener diode to conduct. When the zener diode conducts, the gate of the SCR is turned on and causes the SCR to short which blows the 15 amp fuse and shuts off the output voltage. A 2N6399 (Tech America) was used for the SCR in the prototype but any suitable SCR can be used. While over voltage protection is a good idea, it should not be considered a substitute for large heat sinks. I personally feel the best protection from over voltage is the use of large heat sinks and a reliable current limiting circuit. Be sure to use large heat sinks along with heat sink grease for the 2N3055 transistors.

I have used this power supply in my shack for several months on all kinds of transceivers from HF, VHF to UHF with excellent results and absolutely no hum. This power supply will be a welcome addition to your shack and will greatly enhance your knowledge of power supplies.

DE N1HFX

Parts List

R1 1.5K $\frac{1}{4}$ Watt Resistor (optional, tie pins 6 & 5 of IC1 together if not used.)

(continued on page 6)

Build A 10 Amp 13.8 Volt Power Supply

(Continued from page 5)

R2,R3 0.1 Ohm 10 Watt Resistor (Tech America 900-1002)

R4 270 Ohm ¼ Watt Resistor

R5 680 Ohm ¼ Watt Resistor

R6,R7 0.15 Ohm 10 Watt Resistor (Tech America 900-1006)

R8 2.7K ¼ Watt Resistor

R9 1K Trimmer Potentiometer (RS271-280)

R10 3.3K ¼ Watt Resistor

C1,C2,C3,C4 4700 Microfarad Electrolytic Capacitor 35 Volt (observe polarity)

C5 100 Picofarad Ceramic Disk Capacitor

C6 1000 Microfarad Electrolytic Capacitor 25

Volt (observe polarity)

IC1 LM723 (RS276-1740) Voltage Regulator IC. Socket is recommended.

Q1 TIP3055T (RS276-2020) NPN Transistor (TO-220 Heat Sink Required)

Q2,Q3 2N3055 (RS276-2041) NPN Transistor (Large TO-3 Heat Sink Required)

S1 Any SPST Toggle Switch

F1 3 Amp Fast Blow Fuse

D1-D4 Full Wave Bridge Rectifier (RS276-1185)

T1 18 Volt, 10 Amp Transformer Hammond #165S18 (Tech America 900-5825)

Editor's Comments

(Continued from page 1)

NEW YORK - A public school teacher was arrested today at John F.Kennedy International Airport he attempted to board a flight while in possession of a ruler, a protractor, a set square, a slide rule, and a calculator.

At a morning press conference, Attorney General Alberto Gonzalez said he believes the man is a member of the notorious Al-gebra movement. He did not identify the man, who has been charged by the FBI with carrying weapons of math instruction.

"Al-gebra is a problem for us," Gonzalez said. "They desire solutions by means and extremes, and sometimes go off on tangents in a search of absolute value. They use secret code names like 'x' and 'y' and refer to themselves as 'unknowns,' but we have determined they belong to a common denominator of the axis of medieval with coordinates in every country. As the Greek philanderer Isosceles used to say, 'There are 3 sides to every triangle.'

"When asked to comment on the arrest, President Bush said, "If God had wanted us to have better Weapons of Math Instruction, He would have given us more fingers and toes." White House aides told reporters they could not re-

call a more intelligent or profound statement by the president .

Logger32

<http://www.logger32.net/index.html>

Unfortunately not available for Linux.

All the best for 2007.

JB

January Birthday list from our database

ForeName	Surname	CallSign	Birth-date_This_Month	SpouseName	Spouse_DOB	Child1	Child1_DOB	Child2	Child2_DOB	Child3	Child3_DOB
Richard	Sequeira	ZR6KDX	1-Jan	Adele	27-Oct	Chezanne	22-Nov	Charlise	30-Apr	Chevonne	31-Mar
Hennie	Cilliers	ZS6BSF	3-Jan	Venetia	8-Jan						
Peter	Bosman	ZS6BIA	5-Jan	Pat	1-Jan						
Anton	Oosthuysen	ZR6OST	5-Jan	Sanra	26-Sep	Francois	21-Jan	Elomie	13-Jul		
Chris	Botham	ZS6CJB	8-Jan	Lindsay	4-Jul	Kim	21-Dec	Trevor	1-Jul	Nicole	12-Jan
Hubertus	Paquay	ZS6EO	9-Jan	Marie	11-Jan						
Chris	Gryffenberg	ZS6COG	13-Jan	Elsabe	27-Oct	Christiaan	25-Jan				
Sanra	Oosthuysen	ZR6SAN	26-Jan	Anton	5-Aug	Francois	21-Jan	Elomie	13-Jul		
Clive	Bean	ZS6AVP	29-Jan	Mouri	14-Feb						
Gavin	Penkin	ZR6GJP	31-Jan	Tertia	23-Jan	Lauren	30-Oct	Daniel	2-Sep		

January 2007 - ZS6WR

Sun	Mon	Tue	Wed	Thu	Fri	Sat
Bulletin Reader: ZS6AGF	1 <i>No Meeting</i>	2	3	4	5	6
7 Bulletin Reader: ZR6AOC	8 Bring & Fix Meeting (Moved up 1 week)	9	10	11	12	13 Lions Contest to the 14th.
14 Bulletin Reader: ZS6RON	15 Main Meeting (Moved up 1 week)	16	17	18	19	20
21 Bulletin Reader: ZS6CRW	22	23	24	25 19:00 Commit- tee Meeting	26	27 10:00 Club clean up. 13:00 Ham- Comp Meeting
28 Bulletin Reader: ZS6PVT	29	30	31	1	2	3 East Rand Flea Market. Pam Brink



The West Rand Amateur Radio Club
26.14122 South - 27.91870 East

P.O. Box 562
Roodepoort
1725

Phone: +27 11 475 0566

Email: zs6wrmail@mweb.co.za

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!

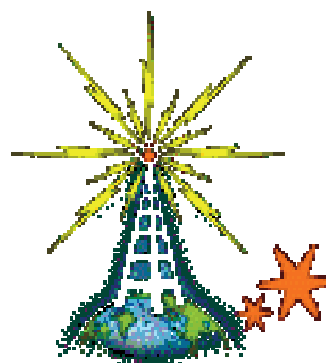
Chairman/Treasurer	Dave	ZR6AOC	475 0566 (H)	zr6aoc@mweb.co.za
Vice Chairman	Ron	ZR6RON		zr6ron@webmail.co.za
Member	Keith	ZS6AGF	675 1604 (H)	zs6agf@polka.co.za
Secretary	John	ZS6FJ	672 4359 (A/H)	
Digital Communications	Stuart	ZS6OUN	082 573 3359	sbaynes@iafrica.com
Technical	Phillip	ZS6PVT	083 267 3835	phillipvt@sse.co.za
Member (Anode)	John	'PieRat'	011 768 1626(H)	brockjk@gmail.com
Member	Craig	ZS6CRW	795 1550 (H)	craig.woods@absamail.co.za
Member	Willem	ZR6WWJ	082 890 5776	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.
john_brock@telkomsa.net