THE WEST RAND AMATEUR RADIO CLUB

July 2006
Volume 6, Issue 12

ANODE

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Editor's Comments

Volume 6 Issue 12 - July 2006

The Club AGM

This was held last Saturday at the clubhouse. The committee was re-elected with the inclusion of myself. So now you really got the committee you deserve! Subscriptions are now due in full. Please pay your R75 membership as soon as possible.

Stories from the 'hood

Long ago my Elmer told me a story of a local ham who got the bright (pun intended) idea of putting a large neon bulb at the top of his vertical antenna. Not long afterward, his neighbour knocked on the door complaining of TVI. "How do you know it's me that's causing the interference?" the ham asked.

"Because," said the neighbour, "every

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Strictly for FM Deviates

Ever wonder how the modulation is on your FM rig? Try this simple deviation meter and find out.

Unlike AM-SSB, FM modulation monitoring on most rigs simply is not available. It's unusual to see audio-modulated transmitters without some indicator to monitor modulation. The opposite is true of FM transceivers. The only indication that your talk power is too high is distortion at the receiving end.

The FM deviation meter I built can be used for monitoring modulation, frequency offset between transmitters, etc. Its most attractive features pay off when in conjunction with an audio frequency generator; the transmitter is bench-checked for equal deviation on both sides of the carrier, maximum deviation, and audio distortion.

Amateur FM uses narrowband FM, ± 5 kHz (± 2.5kHz in SA) maximum deviation from the carrier. The instrument can measure ±10 kHz deviation at 146.52 MHz, the common direct 2-meter frequency. An audio output with 750-uSec de-emphasis is available for scope monitoring. Most parts are available from Radio Shack, coils and variable cap were purchased from Radio Kit, and the crystal from Sentry Manufacturing.

The heart of the deviation meter is a

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Special points of interest:

- Contact details on back page (updated)
- New email address for Anode and ZS6WR. See back page

Editors Comments & News

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time that light on the top of the antenna blinks, my TV goes crazy."

The next night the ham was seen in the back yard with a BB gun shooting out the neon bulb.

Roy Lewallen, W7EL

Andy writes:

Reminds me of the time in college when I worked at WRAL in Raleigh,. They had four big towers spread out over a quarter mile, and I had to record the base currents at the towers every night. Pain in the ass.

The chief engineer put up a fluorescent bulb at each tower base and I had to touch each one when I went there. The field would sustain the light, and the CE could see the four lights each morning when he came in before power changed, and he KNEW I had been there...

Well, I put about 3 feet of #32 on each lamp, and when power changed at night the lamps would glow by themselves... I didn't have to make the walk and could "estimate" the currents by the line currents in the station..... It worked fine until one night it snowed. The CE saw the lights glowing the next morning, but didn't see any footprints across the field..... You'd think a bright young college student would have better sense.... :>))))))

Andy W40AH in Eureka, Texas

As a not so bright college student, I can safely say that even the smartest people can fail to have common sense.

Case and point. I worked for a small tribe in Cordova Alaska installing communications for a sonar fish counter camp about 27 miles outside of town. While this location was on the road it was in the middle of the cooper river delta and should be considered quite remote for the purposes of this story. One of the smartest people I've ever met was responsible for specifying the sonar and doing most of the hard science behind the counter. He was happily standing on the bridge overlooking the river probably pondering some complex function of acoustics and leaned over and watched his keys tumble into the river.

Animals tend to have a bit more common sense than highly educated people; while people who live outside the norm know to keep the keys in the ignition in a situation like that.

Funny how life works out, KL1RL

Macaroni Cheese?

http://www.mhs.ox.ac.uk/marconi/exhibition/

Club Boot Sale

Hi.

This is a final reminder that the annual auction by the Waverley Amateur Radio Society will take place on the morning of this Saturday June 24th at the clubhouse in Rose Bay, Sydney. Doors open 08:30 and the sale begins at 10:30. It is open to all to buy or sell ham, commercial and vintage radio or electronic gear.

See the club web site http://www.vk2bv.org for full details of the event including an illustrated list of over 50 of the items to be sold.

Simon VK2UA

[Ed - it's a long way to go. But you can visit ours in September. This will be on the 2nd of September. Gates will open 10:30 for visitors, 11:30 for vendors and 12:00 the sale will commence.

Warning to vendors who sell outside the club

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Editors Comments & News

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area. SARS have recently prosecuted street vendors selling at the exterior areas of shopping malls without 'registration papers'. So be sure the person you sell to is a radio amateur.]

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A Redhead calls her boyfriend and says, "Please come over here and help me. I have a killer jigsaw puzzle, and I can't figure out how to get started."

Her boyfriend asks, "What is it supposed to be when it's finished?"

The Redhead says, "According to the picture on the box, it's a rooster."

Her boyfriend decides to go over and help with the puzzle.

She lets him in and shows him where she has the puzzle spread all over the table.

He studies the pieces for a moment, then looks at the box, then turns to her and says, "First of all, no matter what we do, we're not going to be able to assemble these pieces into anything resembling a rooster."

He takes her hand and says, "Second, I want you to relax. Let's have a nice cup of tea, and then .." he said with a deep sigh, "Let's put all these Corn Flakes back in the box."

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"Do not meddle in the affairs of cats, for they are cunning, and you sleep with your mouth open"

{—}

I was reading the local newspaper yesterday...The Miles City Star (Montana) and they have a column called Stardust, about what happened 25, 50 and 100 years ago here in Miles City. In the 100 years ago section there was a little tidbit that I found highly interesting. I'll quote it exactly as it was printed in the paper. Keep in mind that what was said here was printed 100 years ago...1906...in the Miles City Star:

"R. B. Sigafoos, northwestern manager of the American DeForest Wireless Telegraph Co., gave a talk at the court house Friday night on the system. Wireless telephones, yea, even pocket telephones no larger than a man's watch, are promised by Mr. Sigafoos as the system develops." Like I said...this was 100 years ago. This guy had a firm grip on what was to come didn't he ??? Just thought I'd share this.

Ben

{—}

Outside of a dog, a book is man's best friend.

Inside of a dog, it's too dark to read.

- Groucho Marx 1890-1977

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From: "CA" <no@mail.com>

Subject:

Return Loss Bridge Accuracy Questions

Date: 18 March 2006 21:28

My homebrew RLB uses a current balun. Some turns of thin 50 Ohm coax on a ferrite core. The core is from a scrapped Siemens inductor. I have achieved good performance between 0,1 to 200 MHz with this technique. I first tried the twisted pair winding approach but the current balun was far better.

Chris SM6PXJ

skavanagh72nospam@yahoo.ca wrote:

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I have just built an HF return loss bridge according to the info in "Solid State design for the Radio Amateur". While it works ok, I was hoping for a bit better performance. Clearly the "balun" doesn't have enough inductance to operate well below 10 MHz or so (10 turns bifilar #30 AWG enamelled wire on Amidon T23-43, as specified in the book - twisted pair, which isn't specified one way or the other in the book). This can probably be largely fixed by using a larger ferrite core (T37-43's available in junkbox). I am interested primarily in the 1.8-50 MHz range, though I wouldn't complain if it worked on 2m too.

But even at 30 MHz a reasonably good microwave 50 ohm load gives only about 28 dB apparent return loss...Not bad, but I might have expected a bit more.

And an open and short give about 2 dB different signal levels at 30 MHz. That is with big pads (20 dB attenuation) on both the signal generator and detector. The detector is an HF receiver with a step attenuator used to maintain a constant S-meter reading.

The circuit is built on a small PC board using construction techniques typical for the UHF or low microwave range (except that the test port connector is an SO-239), and is enclosed in a shielded box. Each of the three 50 ohm resistors is made of two 100 ohm 1206 chip resistors in parallel and measures between 50.0 and 50.3 ohms at DC.

Has anyone with experience with this circuit any suggestions for how to tweak it for best performance ? What accuracy level have you achieved ? Do you know where I might find an error analysis for this circuit ? Or if I am to think about errors myself, does anyone know how to model the balun in SPICE ?

73, Steve VE3SMA

Chris:

Thanks....I have been wondering about this option. At least you know that the differential-mode impedance is 50 ohms. I am not sure my box has room for the much larger core needed to wind coax on, though.

I don't have the book and haven't used the design. However, the minute you say "SO-239", all bets are off. You must have used an adapter to connect your "reasonably good microwave load" to the SO-239. You measure 28 dB RL, that sounds optimistic to me, other things considered.

I have a link to a must read paper at:

http://www.k6mhe.com/n7ws/

Note No. 11.

Make particular note of the part, "The Curse of Adapters."

Wes Stewart wrote:

the minute you say "SO-239", all bets are off.

I did some SPICE modelling of an ideal bridge (with resistive detector) and came to the same conclusions....that the higher-than-50 ohm-impedance UHF connector and adapter may be a limiting factor in the performance on a good SMA- or N- connected load. It has virtually no effect on the difference in level between open and short terminations though.

Thanks...the original Wiltron app note has been a favourite of mine for many years, but have never seen the updated version.

73, Steve VE3SMA

Directivity plays a large part in the accuracy of return-loss measurements. Do some research

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on how to determine the directivity of the bridge. If the directivity is less than 30 dB, the return-loss accuracy will be impacted substantially.

Bob, w6nbi

If you could give more details of how to build your circuit, or a photo of it, I'd appreciate that.

Chris

My first guess is leakage around the test fixture. Incidental radiation and coupling around the bridge can be a source of errors. the test for that is to use a well shielded RF source and minimal RF and run the tests with less detector (RX) gain.

For a lot of tests getting better than 20db return loss is adequate accuracy.

Allison

{—}

Can't find Pringles chips cans to make WiFi antennas?

Try:

http://www.drivebywifiguide.com/TetraBrikHowTo.htm

Strictly for FM Deviates

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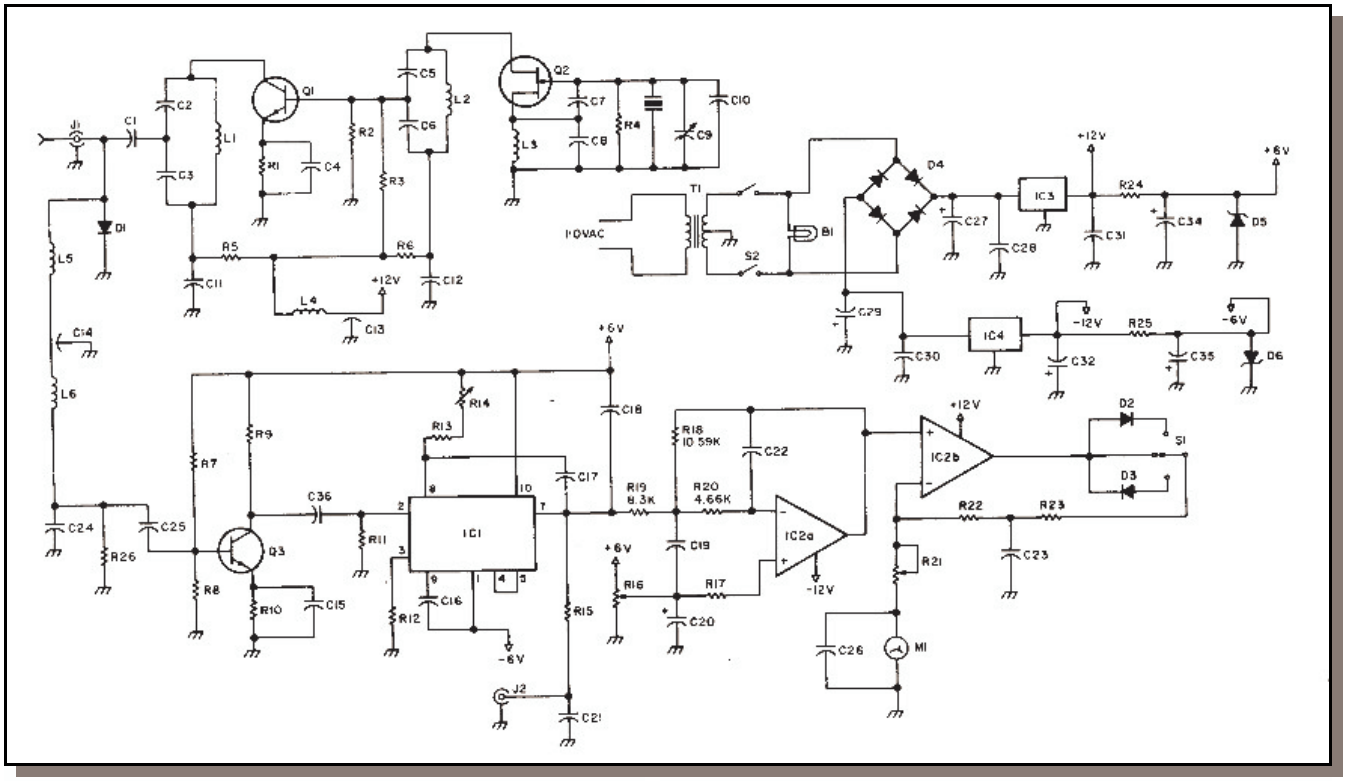
565 PLL FM demodulator listed as having a high linearity of demodulated output (0.2%). Calibration proved this out, better than 1% at the meter. The circuit uses the heterodyne method. A crystal-controlled local oscillator beats with the incoming signal and the resulting lower frequency FM is demodulated by the phase-locked loop. After filtering, a peak detector displays the maximum positive or negative frequency excursion of the incoming signal.



How It Works

The internal frequency generator starts with FET local oscillator Q2 at 14.655 MHz. The output tank circuit is tuned to the 5th harmonic; it drives doubler circuit Q1. The output is thus 146.55 MHz. The incoming signal with a carrier of 146.52 MHz and the local oscillator are lightly coupled into the mixing diode, D1 , resulting in a beat frequency of 30 kHz. This signal has the modulation of the incoming signal. To minimize capacitive loading of the diode, the signal first goes through high-frequency choke L5 and then low-pass filter L6-C24. Amplifier Q3 boosts the signal approximately 10 times.

The 565 PLL has a voltage controlled oscillator centre tuned to 30 kHz with C16-R13-R14. Basically, the incoming signal is compared with this oscillator and a dc voltage is generated which is directly proportional to the frequency of the input signal. As the input frequency shifts, it is this output signal which causes the vco to shift its frequency to match that of the input. The peak voltage occurs at peak frequency deviation.

This demodulated audio signal is available at pin 7 of IC1 and is connected to the low-pass filter and to the audio output jack through de-emphasis network R15-C21. Low-pass filter IC2a filters some 30 M.A noise generated within the PLL. The peak detecting circuit, IC2 charges C23 to either the positive or negative peak, selectable with switch S1. M1 essentially shows the peak voltage across C23.

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The null mode of S1 is used for adjusting the difference between the unmodulated carrier and local oscillator to 30 kHz. The output voltage from the PLL at pin 7 is a dc voltage since there is no modulation. Amplifiers 1C2a and 1C2b works as straightforward dc amplifiers and M1 is calibrated at 30 kHz for zero reading with R1 6, an offset potentiometer. During use, zero adjust is made by changing the local oscillator frequency with C9, the null control.

Construction

A 7" X 5" X 3" aluminium box is used for the enclosure. The oscillator is mounted on a separate board and is shielded from the rest of the circuitry. Feed through capacitors for power to the oscillator and the PLL input signal are used to prevent r.f. leakage. The shielding extends wall to wall of the enclosure; slits were filed in the box lip to let the shields slide through. Both oscillator coils were close-wound with #22 enamel wire. The top of the coil connects to the collector and the bottom end to the power supply. Tuned-circuit caps should be temperature-stable NPO discs or silver micas and are mounted at the coil with the shortest leads possible. The rest of the parts are mounted thorough the perf board, bent over and soldered. The complete oscillator mounts on a 1.5" x 1.75" surface with 3 /4" long spacers.

The mixing diode, D1, is mounted right behind the BNC connector. C1 reaches from the oscillator board, and L5 leads the signal to the PLL circuitry. D1 works best with a minimum of parallel capacitance. The PLL and meter circuitry together with the power supply also are mounted on perfboard. The parts are soldered to flea clips and are wired at the rear with a Vector wire pencil. All variable pots face the back for easy adjustment when the instrument is out of the enclosure. The meter is shielded from all the circuitry since r.f. could enter through its face.

The calculated value of the resistors used in the low pass filter are shown on the schematic. The nearest standard value is listed in the parts list. I used a borrowed LCR bridge to select C19-C22-R18-1R19-R20 to within 1 % of the calculated value. If this is not possible, use standard values and check the low-pass filter for flat response with an audio generator. With 1 % parts, the response curve is flat to 2 kHz and drops to approximately 94% at 3 kHz, and 70% at 5 kHz. For accurate measurements of deviation, tone of less than 2 kHz should be used. I used a 1.8 kHz, "Sonalert" piezo buzzer right into the microphone. These units output a clean sine wave tone easy for a quick test.

The power supply transformer is mounted in the back of the box, oscillator section and is connected with a 3 pin Molex connector. The centre tap is grounded to the box at the transformer. The connecting cable is constructed from 26" of RG 58/U cable. As shown in Fig. 1, a UHF connector is soldered to one end. This will connect to the T installed at the dummy load. The instrument end has a BNC with the centre pin cut short; it does not connect to the mixing diode directly but is capacitively coupled. Mounting different connectors prevents incorrect installation. The cable should be 1/2 wavelength since, as a stub, it affects the swr. Never connect a regular feed through cable as it will blow the diode.

Special attention was paid to shielding. The instrument can be used with a small antenna and held within a few feet of the transmitter. The r.f. noise pickup, however, is a problem and can cause unpredictable meter readings. The best way is to use a tapped an audio dummy load with coax connections and good shielding practices.

The micro ammeter is a 100-0-100 movement liberated from a local surplus store for $3.50. It is an accurate 1" movement and originally came

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from a General Radio instrument. An off-centre scale movement can be used but extra contacts will be needed on S1 to reverse the meter.

The parts are readily available. D1 is a UHF mixer diode purchased from a local Radio-TV supply firm. The negative voltage regulator and 10-turn pots are available from mail-order electronic parts suppliers. Coils, chokes, and caps are available from Radio Kit. They have a small catalogue listing radio parts which are almost impossible to obtain elsewhere. Radio Shack fills out the remainder of the parts list.

Calibration and Use

The PLL was calibrated with an audio generator monitored by a frequency counter. A 30-kHz audio tone of approximately 40-mV p-p output is fed into amplifier Q3 at R26. L6-C24 is disconnected. Pin 7, IC1 is monitored with a dc voltmeter and R14 is adjusted to a point where there is no change in voltage between the audio tone connected and disconnected. This establishes the PLL at 30 kHz. Switch S1 turned to centre position, or null, and R21 is adjusted at approximately the mid point of its resistance range. M1 is now adjusted for zero, or null, with R16.

Vary the audio generator above and below 30 kHz and note the meter movement. An increase in frequency should show an increase in meter movement, a frequency decrease, a decrease in meter movement. If it is the reverse interchange D2-D3 wires to S1.

Set the audio generator at 35 kHz and adjust the meter reading to 5 kHz with R21. Turning S1 to + deviation should not have any effect on the meter reading. Conversely, adjust for 25 kHz and note a negative meter reading of 5 kHz in null, or -, deviation. Slowly decrease the frequency to 20 kHz. The meter should come close to 10-kHz deviation and then suddenly return to zero. The PLL has lost control at that point.

Set the audio generator 1 kHz below the point the PLL loses control and now slowly decrease the input voltage. Again at some input level the PLL will lose control. Carefully note this voltage; it is the minimum voltage required to give full scale indication. It could be as low as 5-mV p-p. For reliable operation, the voltage from the mixing diode, D1, should be at least four times this minimum level. I checked the meter in 1-kHz steps and found the calibration better than 1%.

Reconnect the L6-C24 filter to R26 when the calibration is completed. The local oscillator is tuned up by first turning the tuning slugs all the way in. R26 is tuned monitored with an Ac voltmeter, and L2, L1 is tuned for a peak reading of approximately 1/4 volts dc. Make sure the output is the 10th harmonic or 146.55 MHz, with a wave meter or such, and not the 11th or 9th harmonic.

The transceiver is now connected to the dummy load with a T connector. Attach the special cable and tune the transceiver to 146.52 MHz direct. Set C9 the null control, at half capacitance. Attach a SCOPE to resistor R26. The scope, during transmit, should display a sine wave of approximately 40-mV p-p amplitude and a frequency above 30kHz. A value of 5 pF for C10, installed across C9, should bring the frequency to about 30 kHz. The idea is to have C9 in the middle of its operating range.

At this point, we are ready to try measuring deviation. I tested a 10-Watt unit and a 2-Watt hand-held in high and low power. With the deviation meter switched to null, push to transmit and zero the meter with the null control. Turn to + deviation and hum loudly into the microphone. The meter will show maximum positive deviation. Turn to - and re peat for -negative deviation. The reading should be the same and at 5 kHz.

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Strictly for FM Deviates

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BUD AC-429 SP-3T miniature rotary switch
DPDT miniature toggle switch
BNC connector, chassis mount, female
miniature phone jack

100-0-100-uA dc meter
Fair Radio lists several 0-50-uA or 0-100-uA movements needed. Switch S1, Radio Shack 275-1386, can be used.

Radio Shack
#275-1386 Radio Shack
#275-626 Radio Shack
#278-105 Radio Shack
#274-251 Radio Shack 0-50-uA meter

Taken from 73 Magazine - February, 1984
by
Rudolf E. Six
KA80BL
30725 Tennessee
Roseville M1 48066

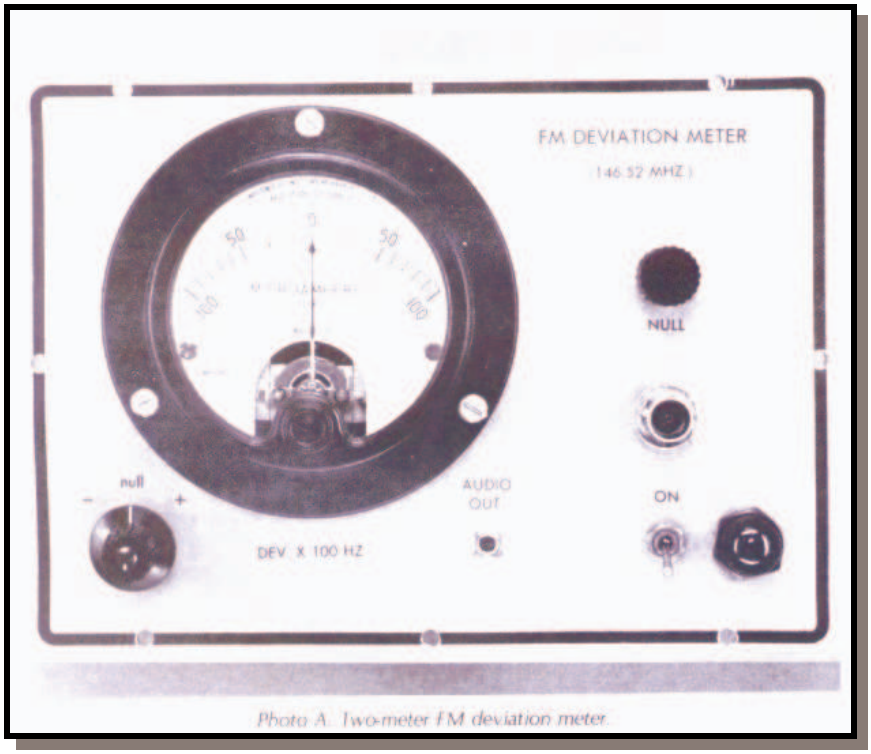

Photo A. Two-meter FM deviation meter.

Ham-Comp

In the past year we have seen numerous visitors to the Ham-Comp meetings. The next is on the 15th (next Saturday) at 13:00.

Early on I said we should find or build a Linux distribution that suited our needs as Radio Amateurs. I was quite pleased when I found one that would fit on a 200MB hard disk. But that pleasure didn't last as the operating system wouldn't even boot on a Pentium 1!

Unfortunately, just like the M$ world, the Linux operating system has improved itself to utilise the latest hardware. This has meant that the 'veteran' hardware cannot even run satisfactorily the latest distributions. The search continues…

The existing hardware in the majority of machines (sold here) use a motherboard display adapter. Which lowers the cost considerably. However this probably won't be sufficient to run M$ 'Vista'. Which will be released to corporates later this year. So you can expect an influx of redundant machines soon. These will be Windows 98 pc's that no longer have any support from the system supplier and cannot hope to run the newest offering from M$.

Whilst there is no shortage of applications for Amateur Radio running on either Windows or Linux, there is a shortage of testers. If you would like to contribute to this cause, please contact me for details.

In my explorations I came across a solution for wireless networking for Linux. Either the very latest kernel must be used or a "wrapper" utility using the windows driver.

Recycling of 'veteran' hardware is going to be an essential part of our techno-society in future. Start preparing yourself by visiting one of our meetings.

See you at the meeting…

JB 2006

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[NEW EMAIL ADDRESS]

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

Frequencies
439.000MHz 7.6MHz split
(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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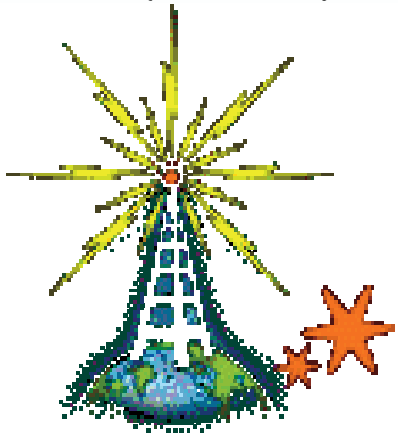
West Rand members - we need your input!

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.
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