

May 2008

Volume 8, Issue 9

ANODE

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Editor's Comments

**May 2008
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In this issue we have a number of practical articles including a Ham-Comp HowTo article. If you have ever wanted to record an audio signal onto a hard disk, this is one for you.

Some Common Myths in Computing
"PDF's can't be changed"

Oh yes they can! Even before Adobe had produced their "distiller" and "reader" software, there were Open Source Postscript tools available for

the job. To produce the PDF for this newsletter, we use GhostScript with the viewer to produce compact PDF's.

Along similar lines, there are quite a few tools available to produce PDF's for web sites "on-the-fly". Also a PDF can be reduced to text and processed for keywords. As can the pictures be exported as bitmaps or jpeg files.

It is with these tools that I have produced text files of the Anode issues that can be "full text" searched.

How NOT to wire a mains plug!

Its sometimes amazing to me that in
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HOW TO: Record to your PC's hard disk

What you need to achieve this
(Requirements List)

1. Pentium 1 (Classic) PC with moderate sized hard disk. (Veteran PC)
2. PC Sound card. AC97 or later specification. (Draw a diagram of the sockets.)
3. A 3.5mm jack plug to jack plug cable of enough length to connect radio and PC.
4. Recording software. Audacity (Open Source)
5. Optional testing software. eg. QBASIC program to test hardware on sound card.

Getting the Audio from your radio (SIGNAL SOURCE)

[This allows you to use a general purpose cable]

Open the rig and find the volume control. Attach a screened cable (thin coax) across the volume control potentiometer. This really should be audio screened cable but you can use RG174 or r.f. coax cable if you wish. The earth or screen should be connected to the earthy or chassis end of the volume control. The live side or centre conductor should be connected to the top or maximum end of the volume control. You do not want the output to be affected by the

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Special points of interest:

- Contact details on back page (updated)

HOW TO: Record to your PC's hard disk

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position of the volume control. Also this allows you to monitor what is being received by the radio and to quiet it when necessary.

Preferably find a suitable hole or place for a 3.5mm jack socket (chassis mounted). Maybe there is a speaker socket already there or a suitable hole otherwise you will have to carefully drill the case to mount the socket. Try and find a stereo socket but if you can't find one, use a mono type and short left and right channels together later. Sound cards are stereo, ie. They have left and right channels for input and output. So its is best if you feed both left and right inputs.

Connect the cable inside the radio to the jack socket. Connect the screen (earth) to the chassis / earth connection on the jack socket. Connect both lives (left and right) to the centre conductor of the cable. Or if you had to use a mono type of socket, just connect the centre conductor to the output point.

Alternatively, if you don't mind a cable coming out of the non-mobile radio, connect a 3.5mm jack plug and stereo cable to the volume control directly. Connect both screens and both centre conductors together on the volume control pins.

Once you have completed the connections, you can replace covers etc and attach radio to aerial. Find a suitable station and connect the 3.5mm jack plug cable (you bought) to the radio. Connect the other end to the LINE IN of the sound card. A slight lowering of the volume may be observed. This is because the loading of the sound card will probably lower the signal level slightly. The input impedance of the LINE IN socket is around 100k Ohms and the volume control may be 10k. If the signal disappears, you have connected the socket round the wrong way or you connected to the slider of the volume control.

Whilst you are setting this up, it would be a

good idea to draw a large diagram of the sockets on the sound card. This will let you grope around in the rear of the PC in future with the knowledge that the plug goes into the right socket. eg. The one down from the top socket not the bottom socket or the green one etc.

As an 'add-on' to this, you might want to consider attaching to the squelch line another output socket. This could be used to start and stop recording. Most software does not detect audio and start recording when the level is large enough. So a way of recording only the sounds from your radio is desirable. Recording 18 hours of silence is not really a good use of disk space. [This requires obtaining the circuit diagram of the radio and probably the construction of a small circuit to drive a relay or opto-coupler which could then be connected to connection on the PC. Such as the Joystick port.] Another possibility is the use of the S meter reading to indicate and record received signal strength. Again this is not a simple project but could be constructed to feed an audio tone indication to the other input channel. So audio goes into the left channel and gets recorded. The S meter reading goes into the right channel as a tone pitch rising with input level and gets recorded.

Recording Software

This is an area where I have found a lot of problems. Most Windows software for use with the sound card is written for non-amateur users. Also nowadays there are no level indicators on the software or any display of input waveforms. In the old days, we would make a mixing desk with VU (Volume Unit) meters connected to every input socket. One of the nicest things about Audacity, is the indicators that go from left to right across the main window, indicating audio level. Certain Windows 3.0 applications had a graphical VU meter on the window but that has been discontinued lately in "modern" software.

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HOW TO: Record to your PC's hard disk

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Audacity is open source software. That is free for use and you may not resell it as yours. It also allows you to examine the source code of the program. To allow you to modify it to your requirements and to fix any bugs that might lurk in the code.

Oscope for Linux. Both display the input waveform on screen that is sampled from the inputs. To run any graphical software like this, you will need a processor better than a Pentium 1 as the program and sampling is very cpu intensive.

JB 2008

Audacity is available for both Windows and Linux and can be downloaded from Sourceforge:

<http://audacity.sourceforge.net/>

It outputs the recordings as WAVE (.wav) files, MP3 (using LAME) and quite a few other sorts as well. Audacity also allows editing of the sound file as well as removing clicks, changing the frequency response and labelling the sections of sounds.

LAME can be found at:

<http://lame.sourceforge.net/index.php>

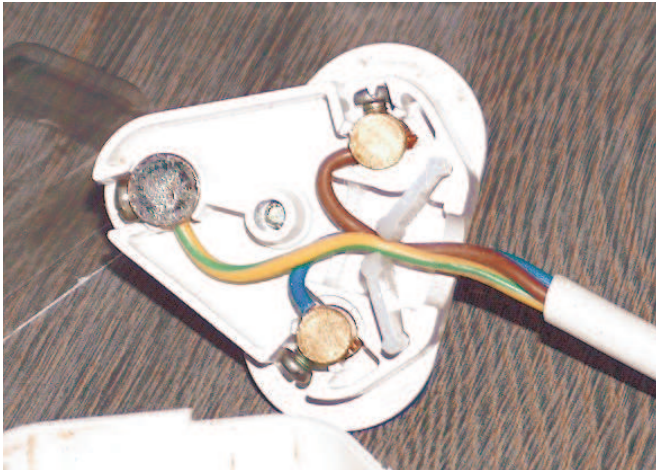
Testing the hardware with software

It is possible to test the sound card hardware and check that everything is working. You can check in Windows' Device Manager for any yellow exclamation marks that indicate there is a problem with the sound card. But to test the hardware thoroughly, you actually need DOS and a program. To do this you will have to provide a boot disk with DOS on it or to reboot the PC into DOS from Windows 98 etc. You will not be able to do this with Windows XP or 2000.

The Sound Blaster 16 came with a DOS program called 'Test-SBC.exe' which will test the card reasonably for sound outputs. But to check the mic and line inputs there has been very little written. One program that checks inputs is written in Qbasic and can be provided on request. Alternatively you can fire up the Windows oscilloscope (winscope) or the

Editor's Comments

this day and age, people still don't know how to put a mains plug on a cable. I was taught at around age 11 to put a mains plug on a wire by my father. Not long after, I taught my father how to connect the newly colour coded wires



into a 13 Amp plug with a fuse. South Africa still uses 15 Amp round pin plugs with a good strain relief system. As you can see from the above picture, the wires should NOT form the strain relief as they are not held by the plug. It is possible that with a suitable amount of force the wires could be "stripped" by the strain relief, exposing the mains voltage to shorting or touch by a person.

[Two year olds seem fascinated by the wall sockets at convenient height and try to poke fingers inside at every sighting.]



After rewiring the plug, I ran through the notes I made years ago. The earth wire (green and yellow striped), should be longer than the others. So that if the wire is pulled out of the plug, the equipment remains earthed and does not become "live". The mains cable casing sleeve forms the strain relief with the wedges. Usually this means that if the cable is yanked or pulled violently, the plug should unplug from the socket. (Watch out if it does, the flying plug will hit, usually some sensitive part of your body with some force!)

Do I have to remind you about the other colours? Blue is Neutral, usually marked with an embossed 'N' on the plug. Brown is Live, usually marked with a 'L' on the plug.

In SA the Ultra-Violet radiation from the sun makes the plugs go brittle after a few years. So after inspecting the 'plug top' and strain relief wedges, if you find it brittle, throw the plug away. The cost of a new plug is still under R10, much cheaper than a life!

How to wind a coil (carefully)

Recently I had occasion to show some of the members the coil construction method I recommend to be used on the Direct Conversion receiver.

Overseas and in Europe it's a simple matter to go to the local electronic component shop and pick up a pre-wound coil assembly. Here in SA, we are exploring new ways to construct with what we have to hand.

The coil form I used for the project was an empty ball-point pen tube. It has several advantages; one, it is very cheap; two, it is 7 mm in diameter, complying with the authors coil dimensions; three, it fits perfectly into a box spanner head from a very cheap spanner set.

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The wire I got from a battery-eliminator transformer that I popped with overheating. Having de-constructed the transformer, I used the plas-



tic former to hold the wire. I then put my hand drill into a small table vice and put the box spanner with its piece into the chuck. The picture shows the overall view of the set up. I quite quickly wound 90 turns consistently onto the former. I had tried my cordless screwdriver as the driving/winding method but quickly botched the coils and threw these attempts away. The hand drill at moderate to slow speed, produced a neat winding without slippages. To hold the coil wire in place I used a small piece of "Prestik".



Dead Horse theory

Dakota Native American tribal wisdom, passed on from generation to generation, says:

"When you discover that you are riding a dead horse, the best strategy is to dismount and get a different horse."

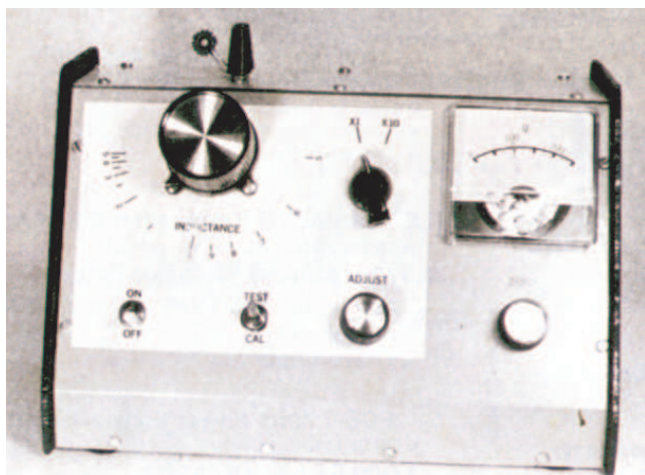
However, in educative, corporate and governmental South Africa, more advanced strategies are often employed, such as:

1. Buying a stronger whip.
2. Changing riders.
3. Appointing a committee to study the horse.
4. Arranging to visit other countries to see how other cultures ride dead horses.
5. Lowering the standards so that the dead horse can be included.
6. Reclassifying the dead horse as 'living impaired'.
7. Hiring outside contractors to ride the dead horse.
8. Harnessing several dead horses together to increase speed.
9. Providing additional funding and / or training to increase dead horse's performance.
10. Doing a productivity study to see if lighter riders would improve the dead horse's performance.
11. Declaring that as the dead horse does not have to be fed, it is less costly, carries lower overheads and therefore contributes substantially more to the bottom line of the economy than do some other horses.

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Around and Around and Around

There's got to be a better way to wind your coils to specification. Build the Q-meter and get the exact inductance you need.



Front view of completed Q-meter.

Winding coils for a new seems to be one of the more frightening aspects of the job. One reason may be the fear that we may not be able to duplicate the author's model. If we have a way

to check each coil before it's installed, much of the apprehension is removed. A "Q"-meter will do this by measuring the coil's inductance and Q. The unit pictured is such a Q-meter that will measure inductances from 0.5 μH to 50 μH and Q's to 200. It's easy to build, easy to operate, and is powered by an internal 9-volt battery or wall-plug power supply.

There are four basic parts to this Q-meter: a dual-frequency r.f oscillator, an FET voltmeter, a power supply, and the tank circuit that indicates the inductor of unknown value (LX).

Fig. 1 is the schematic. A 2N2222 transistor serves as the r.f oscillator, followed by an MPF-102 JFET buffer. The range of measurement is controlled by the oscillator frequency and the tank variable capacitor. With the capacitor specified, the range is .5 to 5 μH at a frequency of 20.05 MHz, and 5 to 50 μH at 6.34 MHz. The two toroid coils resonate with C1 and C2 to produce these frequencies, and S1 determines the range in use. The buffer stage provides the nec-

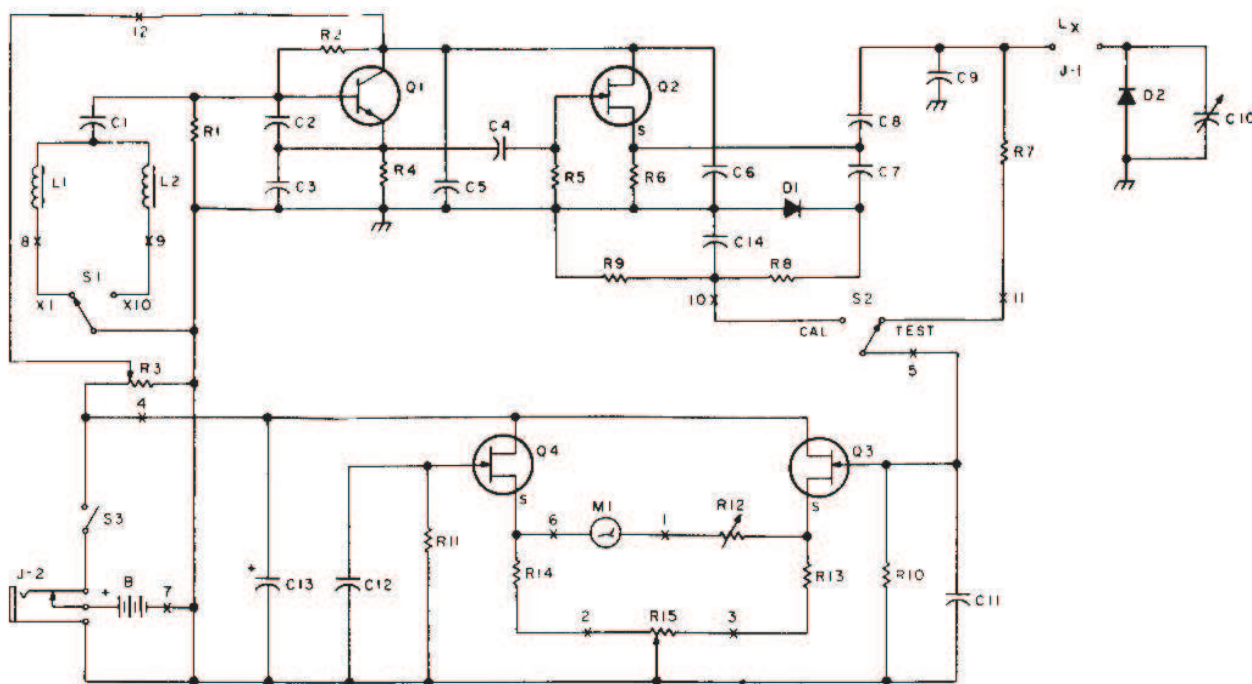


Fig. 1. Circuit schematic.

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Around and Around and Around

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essary low impedance excitation for the tank circuit through C8. A 1N270 germanium diode (D1) rectifies the r.f. output of the buffer and is used to calibrate the meter before taking a measurement. A hot-carrier diode (D2) is placed across the variable capacitor and rectifies the tank circuit current to provide a dc voltage that is proportional to the Q of L, at resonance. It is this voltage that is measured in the TEST position 1 of S2.

The JFET voltmeter uses two MPF-102 JFET's, zeroed by R15. Full scale on the meter should be 250 micro Amps or less. The critical components have been selected so that the Q reading will be quite accurate if 100 is used as the calibration reference. The meter I used is calibrated from zero to 250 and is a 200-uA movement. A more sensitive meter will require using a higher resistance setting of R12, but will not affect the units accuracy. Q's of 250 or more are seldom required and are difficult to obtain, so there is not much need to have a higher scale.

As for construction, there is really only one critical portion—the mounting of the tank components (C9, C10, and the terminals for L). At 50uH an inch or two of extra wire will not have much effect on accuracy, but at 0.5 uH, the leads must be kept as short as possible. This is one reason for the miniature variable capacitor and small unit for C9. The terminals for L, consist of 4-40 bolts mounted directly to the Formica (TM) top, using solder lugs to connect to the circuit board components and 4-40 hex nuts fastened by epoxy to small wire nuts for holding the unknown inductor leads. Small 5-way connectors should also work fine. Although I used an import vernier dial mechanism and attached a plastic pointer, a non-reduction knob will work quite well it's just a little harder to get right on resonance. The shaft of C10 is too short to reach the panel. It can be lengthened by attaching a one-quarter-inch round metal spacer with a bolt into the capacitor's threaded shaft. An alternative would be a small flexible coupler and a piece of 1/4 -inch shaft.

The total current drain is under 15 mA, so a 9-volt battery will last a long time with intermittent use. For a.c. operation, any rectified and filtered wall-plug supply that is rated at 4.5 to 9 volts fills the bill.

To put the Q-meter to work, set S2. to TEST, turn on the power switch, and adjust the meter to zero reading with R15. Switch S2 to CAL and set the r.f. level to 100 on the meter by adjusting R3.

Connect the coil you want to measure, using the shortest possible leads. Reset S2 to TEST; tune C10 for maximum deflection of the meter. The reading is the approximate Q of the unknown inductor. If you can not get any upward deflection of the meter, try the other position of S1. If you still cannot get a reading and you are quite sure the unknown inductance falls within the range of the meter, recheck the Lx connections. A good connection is a must for reliable operation of the Q-meter.

A test coil can be made by winding about 15 turns of #24 enamel-covered wire in a T-37-2 or T-37-6 toroid. You should measure it somewhere around 1 uH with a Q of about 100. If you are satisfied with the results, you may want to mark the measured information on a tag and attach it to the inductor. It can be used later to check the performance of the meter if you should question a reading on some unknown coil.

This relatively simple project can take a lot of the fear out of coil-winding, as well as sort out unmarked small inductors and provide the identification you need.

Parts List

- C1 620-pF ceramic disc
- C2, C3 68-pF NPO ceramic
- C4 56-pF NPO ceramic
- C5, C6, C11, C12 0.01 ceramic disc
- C7 100-PF ceramic
- C8 22-PF NPO ceramic

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Around and Around and Around

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C9 1500-pF poly
C10 138-pF variable (RS A1-234)
C13 10-uF 25-V electrolytic
D1 1N270 germanium diode
D2 MBD-101 hot carrier diode
R1 47k, 1/4-Watt carbon
R2 100k, 1/4-Watt carbon
R3 10k linear pot
R4 1.5 k, 1/4-Watt carbon
R5, R9 1-meg Ohm, 1/4-Watt carbon
R6 390-Ohm, 1/4-Watt carbon
R7, R10, R11 2.2-meg Ohm, 1/4-Watt carbon
R8 100k, 1/4-Watt carbon
R12 100k trimmer
R13, R14 150-Ohm, 1/4-Watt carbon
R15 2k linear standard pot
L1 1.97 uH (21 turns #24 enamel on T-37-2 toroid)
L2 19.7 uH (70 turns #32 enamel on T-37-2 toroid)
S1 SPIDT rotary
S2 SPIDT mini-toggle
S3 SPST mini-toggle -
M1 200-uA meter (see text)
J1 Connectors for Lx (see text)
J2 Mini phone jack (normally-closed circuit)

Edwin C. Miller N7APE 306 W. Court Street
Weiser ID 83672

Taken from: 73 Magazine January, 1984

Editors Comments

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12. Rewriting the expected performance requirements for all horses.

And of course last but not least ...

13. Promoting the dead horse to a supervisory position!

If you understand the above, then you are obviously a South African.

Political Correctness is a doctrine, fostered by a delusional, illogical, liberal minority and rabidly promoted by an unscrupulous mainstream media, which holds forth the proposition that it is entirely possible to pick up a politician by the clean end.

The AGM is coming soon!

Be advised that the AGM is probably going to be held in early July. Start thinking about who you want to run your club now!

John Brock 2008 (formerly ZS6BZF)

The West Rand Amateur Radio Club
26.14122 South - 27.91870 East

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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!

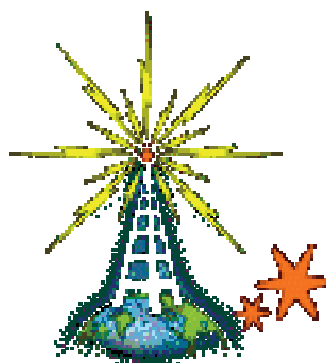
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West Rand members - we need your input!

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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