

# ANODE

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## Editor's Comments

### Solar Eclipse! Couldn't you pick a better/sunnier day?

Well now you have time to prepare for the next eclipse. Its in 28 years! We include in this Anode the forms for reporting what results you got on Medium Wave. Of course if you were like me, I really didn't have time to prepare any spectacular results. So I set up a complete system for measuring the received signal strength and re-

coding it to a file on a networked hard disk. See the article at the end of this one.

Of course like last years one, the eclipse day was cloudy and wet. It also rained later in the day. Much to the relief of my garden which was looking more like winter grass than summer.

### Club Project

The LC Meter that OM Bob has put forward as a

project appears to have met with some favour. Please let the chairman know if you are interested in putting together an accurate and low cost LC meter. The cost will be somewhere between R200 and R300 for a meter that would normally cost thousands. Its design is novel and precise. It uses a pic and liquid crystal display for the readings. No programming knowledge required,  
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## The Great Eclipse Debacle

Well I hadn't thought of the eclipse having any impact on Amateur Radio for a while. So When Tony (OM ZS6CCD) gave a short talk on measuring Radio Today's Medium Wave signal strength I was intrigued to see if I could do it.

I first went round the house looking for a suitable MW receiver. I found several. On investigation, I found that most of the modern units which were FM VHF/MW portables or HiFi units, didn't have any agc pin/

connection that I could monitor. I finally found my old Sony HiFi radio that I bought in 1972. This has an 'S meter' which works both on FM and MW.

I put it aside for a bit and looked at what I could use to log the measurements with. I could have sworn I had a chart recorder somewhere. Having searched the garage, I worked out that I must have had it in a previous life. It wasn't there. Time to use the pc I thought. I bought an Analogue to Digital card from Peter Strauss many years ago from his shop in Brix-

ton. Peter has gone silent key since then and so I thought had his card when I tried it out on an old 486. I can remember paying a lot of money for this card - over R400 at the time. The badly printed documentation I had actually placed into a file marked "Interface Cards" now on one of the many shelves in the study.

The card is really an Intersil digital voltmeter chip with a digital output. See the Elektor article for another and bet-  
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**Special points of interest:**

- Contact details on back page

## The Great Eclipse Debacle

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ter design. This one is SLOW, but accurate with a 12 bit resolution. That means it can output  $2^{12}$  or 4096 levels. Its slow because it has a dual slope integration filter on the input which reduces the hum pickup. Its also slow because of the 16 way c.m.o.s switched input. This allows for 16 inputs to be measured one-by-one.

The interface on this card is an XT slot which plugs into an ISA slot. Thank goodness the pc had several. Modern motherboards don't even have one ISA slots, only PCI slots.

The screen on the pc created so much QRM that I despaired of making any realistic meas-

urements. It even drowned out 702, the local MW station. When switched off the signals came in quite cleanly and I could measure several stations. Unfortunately I am inside the local coverage area of Radio Today on 1,485kHz. So the night time level was almost exactly the same as during the day.

I did think off using a webcam to take pictures of the S-Meter every minute. The pics would then be stored on a network disk. I ruled this out earlier on because the meter had no scale whatsoever. So no readings. No, what I wanted was a small program that took readings every one minute and wrote the values

to a file. A file I could access over the LAN (Local area Network).

Having re-connected the 486 to the local area network in the study, I went back to the test program for the A2D card. I eventually found it stored away in a folder on my main pc. I copied to the 486 and ran it. Oh dear. It looks like the card is non-functional as there was no readings whatsoever.....

### RTFM

I shut the pc down and switched it off. I removed the card and stared hard at the dip-switch on the card. Had I

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## SOLAR ECLIPSE "D" LAYER EXPERIMENT

On the 4th December 2002 at 08:20, Southern Africa will experience an eclipse of the sun. Most of the country will experience a partial eclipse, however, a line about 70km wide extending from Mozambique through Limpopo Province crossing the Limpopo river into Zimbabwe and Botswana will present us with a total eclipse.

A number of observers consisting of staff of Wits University School of Physics, UNISA Dept of Astronomy and students from the American International School will conduct an experiment to study the effect of the eclipse on medium wavelength propagation.

For the experiment to be successful we have enlisted the help of the community radio station "Radio Today" who operate on the top end of medium wave. However we also need as many radio amateurs and SW listeners to monitor "Radio Today" on 1485kHz for about 24 hours starting on the 3rd December.

For those interested in participating in the experiment and feel that they may be far out of range of this low power station (1kW) it may be of interest to note that signals have been heard on a car radio 1000km from the transmitter at night.

### SOLAR ECLIPSE "D" LAYER IONOSPHERIC EXPERIMENT

It is important to note how the signal you are monitoring changes from day time conditions (if heard) to night time conditions and the at sunrise on the 4th December to the time of eclipse maximum, or totality, depending on where your receiving station is situated. This exercise will hopefully tell us of the effects of the sun on "D" layer propagation. The "D" layer being the lowest layer in the ionosphere at +/- 70 km above the earth and is very dependent on the sun for its existence. It is also part of the iono-

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## Editors Comments

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just assemble the components onto a pcb and place in a nice box and voila, Bob's your uncle!

### Only in SA

We in SA always go one better than elsewhere. SARS has recommended 128 byte encryption for emailed invoices. I believe the danger here is that the customer won't be able to decrypt the email and therefore won't pay. Ha!

Drivers in the holiday season of December usually go through phases of quality driving. Some around here (Gauteng) go through robots others stop-

streeps. Everybody gets quite tense and uptight. People please calm down. The guys at the robots are only trying to sell you something to make a little extra to augment their meager (R2000 per month) untaxed income. Please take extra care on your drive to the shops.

### Holidays, bah humbug!

The shops have long queues, so you can't buy any food. The malls are full of people, so you can't buy anything. The banks are closed on the holidays so you can't get any money to buy anything anyway. So the best thing is to sit at home and starve. Or play with your ra-

dios/computers etc. Get that project out of the cupboard, blow the dust off it and lets see it at the next Bring & Fix meeting on January the 6th.

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## SOLAR ECLIPSE "D" LAYER EXPERIMENT

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sphere that affects the propagation of long and medium wave frequencies 20kHz => 2MHz.

All reports are important so please do not think that because you are situated out of the main eclipse area (area of totality) your signal report will be of no value. The more reports we have the more accurate our results.

In these times of high tech off the shelf radio equipment, it may seem that there is little that the average radio amateur and short-wave listener can do to further scientific knowledge in radio communication science.

Nothing is further from the truth as will be demonstrated with this project, so please feel free to take part.

The only equipment that you will need will be a reasonably good radio receiver, a wire antenna +/- 20 meters long thrown into a tree or suchlike. A fairly accurate clock, this be set on the short wave time service WWV on 10MHz or 15MHz.

At about sunset on the 3rd December tune your radio receiver into "Radio Today" on 1.485MHz (1485KHz). You may need to listen very carefully for the station as it may be very weak in your area. As the eve-

ning progresses the signal should get stronger. However during the summer months you will have QRN from lightning and this could make things a little difficult.

The "Radio Today" transmitter is situated in Marks Park in Johannesburg Latitude 26 09 37S Longitude 28 00 11E and consists of a Nautel F.E.T 1KW transmitter loaded into 1/10th wave length vertical antenna with capacity hat and ground radials.

What makes this station ideal is that it broadcasts up at the top end of the MW scale 1.485MHz. That it is on the air

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## The Great Eclipse Debacle

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changed the port address settings? I found the file on the shelves and looked in the documentation. As you can see, I am favour of when all else fails, read the manual. Yes, I had changed the port address from the default 300Hex to 280Hex. This was probably to stop a port address clash between the card and the network card in that pc. Network cards of the ISA variety usually default to 300Hex. The A2D card doesn't use an interrupt as it was a SLOW card. The pc could probably do 10 million other things before the A2D had a reading ready.

Ok, so back to the Qbasic program. I changed the constant port value to 280Hex and lo and behold, it worked. The program was quickly copied and

'hacked' to produce a program that would read the A2D every minute and write the file. I had tuned the tuner into an African station that was fading slightly. The file is a simple CSV text file (Comma Separated Variable) having only three values in it. The Date, time and the value from the A2D. I went to the main pc and checked I could read the file. I could, so I set up a link to it on the desktop. Well that was easy wasn't it. I left the pc on, switched the screen off and went to bed. It had got dark quite a while ago.

About the seventh thing I did next morning was to check the file. It was Monday before the eclipse and I wanted to build up some readings to see what the night-time to day-time ratio would be. The read-

ings had stopped at 23:59. I went to the pc and found the program still running but looping in the one minute delay routine. This routine is a standard delay routine that uses the system timer tick. This tick occurs every 18.2 times a second and the system, DOS or Windows accumulates the ticks in a counter. These counted ticks are reset at midnight. Oops! The routine had never been written for use by the computer but for a person (operator) who would have probably gone home at five. Rather like the bug in Windows 95 that crashes the system 49.7 days after booting. A pc that is switched on or that lasts that long, without a reboot is exceptional. So the bug, sorry issue, usually didn't surface. MS don't use the word 'bug' anymore. [Bug - invented  
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## SOLAR ECLIPSE "D" LAYER EXPERIMENT

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for 24 hours and that it uses a low power transmitter. This last point making it very sensitive to ionospheric propagation conditions.

An HF station is to be set up at the West Rand Amateur Radio Club and at the research site in Limpopo and will be standing by for reports on the 4th December from about 07:00 SAST. Report in frequencies will be 7,080kHz and 14,280kHz.

All written reports may be sent to:

**Solar Eclipse Experiment  
West Rand Amateur Radio  
Club  
P.O. Box 562  
Roodepoort  
1725**

FORM ON NEXT PAGE

# Editors Comments

## SOLAR ECLIPSE "D" LAYER IONOSPHERIC EXPERIMENT

Name: \_\_\_\_\_

Call sign: \_\_\_\_\_

Physical address of receiving station:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Nearest Town to receiving station: \_\_\_\_\_

Latitude and Longitude of receiving station (where known):

\_\_\_\_\_  
\_\_\_\_\_

Radio receiver type (Domestic radio, Communications receiver etc).

\_\_\_\_\_

Antenna used: \_\_\_\_\_

Frequency monitored: \_\_\_\_\_

Name of radio station monitored (where known): \_\_\_\_\_

Times when signal heard (this is important so please quote times accurately. Use UT or GMT) (SAST is GMT + 2):

\_\_\_\_\_

Signal Strength: \_\_\_\_\_

If your receiver has no S-meter make use of the SWL SINPO scale. Else a general description of the signal conditions will do.

## The Great Eclipse Debacle

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by Ada Hopper in the 1940's]

Okay, this was a problem then the delay routine which basically sat around and did nothing while waiting for a minute to go by, was faulty. The fix is below :-

The link looks like this :-

```
C:\WINDOWS\COMMAND
\QBASIC.EXE /RUN
WriteD~1.BAS and the start up
folder is the folder where the
Basic program lives.
WriteD~1.bas is the name of
the Qbasic program in the
```

reading was around 300mV. The audio was quite tolerable and I listened for several minutes before they identified themselves in Afrikaans. I picked another station.

I had lots of other things to do so I left the setup running. This

```
SUB Delay (Period AS SINGLE)
'
'=====
' Delay
'=====
'
DIM T0 AS LONG
DIM Dummy AS INTEGER

'--
T0 = TIMER
'
DO WHILE TIMER - T0 < Period
  '-- if we cross midnight, back up one day
  IF TIMER < T0 THEN
    '-- overflow here!
    T0 = T0 - 24& * 60 * 60
  END IF
LOOP
'
END SUB
```

NOTE the appended & makes 24 a 'long'.

Having fixed the program, I thought, I proceeded to set up the pc to automatically boot and run the program. I did this by putting a 'shortcut' into the StartUp folder. This link has Qbasic running a program with an command line option /R to automatically run the file named after it. This was to allow for possible power cuts or momentary power failures that we in Roodepoort seem to have on a semi-regular basis. I don't have a UPS that end of the study and I really could afford to extend the UPS power from the other end.

DOS manner of 8.3 for file-name and extension.

The meter wasn't reading anything. Was the tuner broken? Very carefully I plugged a computer amplified speaker set into the sockets that would normally go to the main amplifier. A very loud hiss emerged from the speakers. The Volume control was of course at full. [Note to self: Xmas present = Ear Muffs]

When it got dark the signal rose out of the mush and the

was Tuesday night.

Wednesday morning, the day of the eclipse. I got into the study around 07:30 and checked the file. It had stopped at midnight again! I checked the program and it had an overflow error. Qbasic like all Basics 'cast' values temporarily when multiplying etc. This I had come across before and it was easy to fix. See the code fragment for the & appended to 24. I restarted the program and had a quick breakfast in the gloom. The eclipse had already

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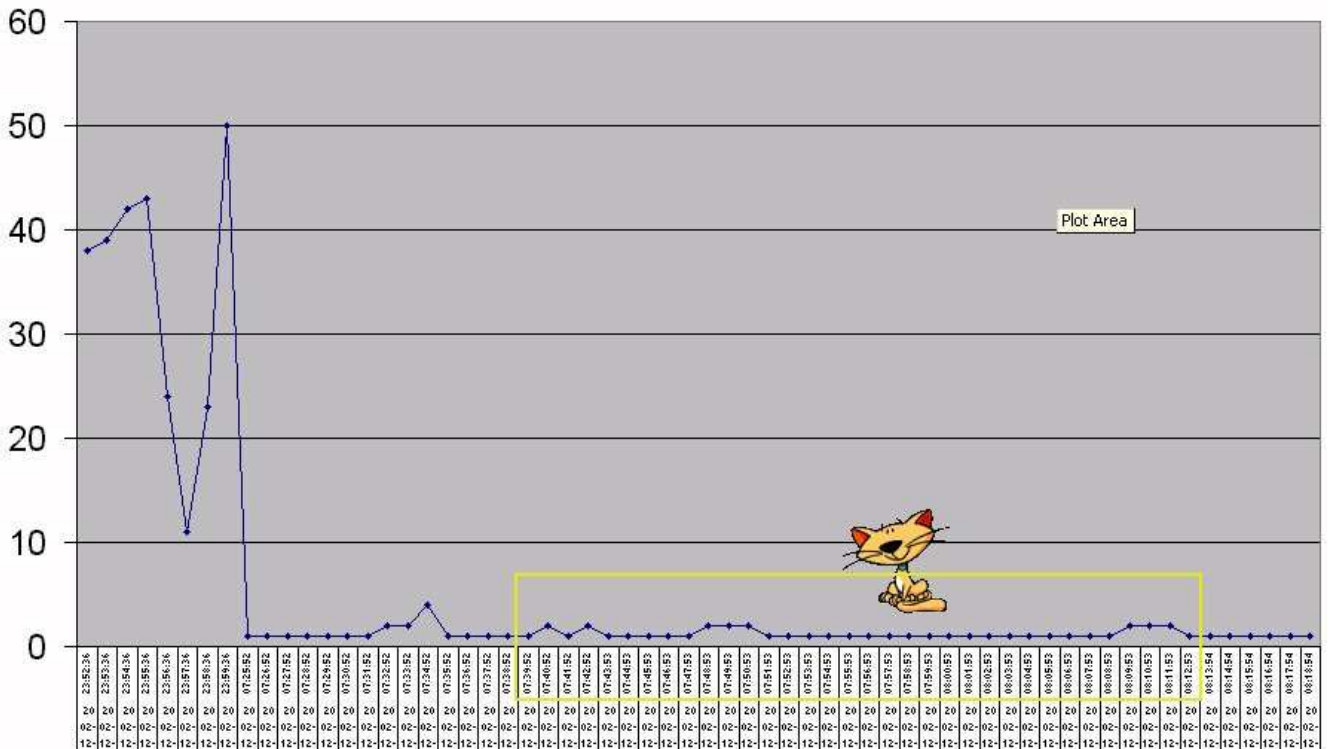
# The Great Eclipse Debacle

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started and it was a cloudy, overcast day. At about ten past eight I went out onto the patio to see the sun's crescent suitably darkened by the cloud and took a couple of pictures.

Lies and damned statistics" because I have no reference data here only relative readings. But it does look good though. Maybe I'll print it in colour and hang it on the wall.

Whilst all of the above is partially tongue in cheek, I have no doubt that most Radio Amateurs could duplicate the hardware and software I used. They probably could make more realistic measurements



When it came to knocking-off time that day I went to look at the file. Not surprising by now, the readings had barely moved around the time of the eclipse. But there were small increases in values during the sun's shadows progress across Africa. Hmm, food for thought there. But what am I going to do with all this data? I could print it out on a 'toilet roll'. However Excel came to the rescue. I could chart the data and produce a picture of the data. This chart for the data of about three days and half-nights produces a very spectacular picture. I am reminded of the saying "Lies,

## AGC

AGC or Automatic Gain Control is a form of compression. Its used to keep the output volume of a received signal roughly constant as the input signal varies. It may vary by quite a large amount, typically 60db with aircraft receivers and typically 30-40db with short wave fading. As a result the feedback voltage used to control the front end and if stages follows roughly a logarithmic curve on the signal strength.

and produce more reliable data.

73 to you all.

© JB 2002-12-08

**The West Rand Amateur Radio Club**  
26.14122 South - 27.91870 East

P.O. Box 562  
Roodepoort  
1725

Phone: +27 11 726 6892  
Email: john.brock@pixie.co.za

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

**Frequencies**  
145,625 MHz (West Rand Repeater)  
10,135 MHz (HF Relay)

**Radio Amateurs do it with more frequency!**



Please note this has been just been registered. Our site will be up in the new year.

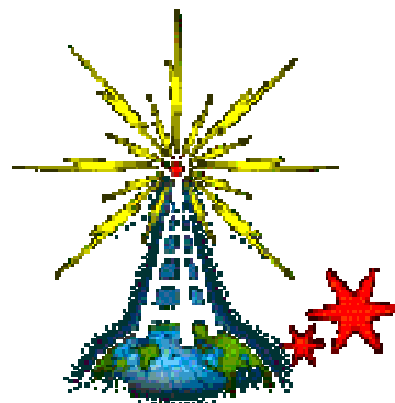
Chairman/Treasurer	Dave	ZR6AOC	475 0566 (H)	zr6aoc@mweb.co.za
Vice-Chairman/Events	Simon	ZR6SS	084 308 2665	ssnyman@securehome.co.za
Secretary	John	ZS6FJ	672 4359 (A/H)	
Technical	Phillip	ZS6PVT	083 267 3835	
Technical	Greg	ZR6JDD	083 289 2072	gjarrett@webb.co.za
Member	Craig	ZR6CRW	795 1550 (H)	craig.woods@absamail.co.za

**West Rand members input - 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 November 2001, we published an Anode Compendium on CD. It has the issues from July 2000 until November this year. This included IE5.5 and the new Adobe reader. It is soon to be updated, check with the vice-chairman for details.



**We need your input! Email us articles, comments and suggestions please.**  
john.brock@pixie.co.za