THE WEST RAND AMATEUR RADIO CLUB

November 2000
Volume 1, Issue 4

ANODE

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THE CHAIRPERSON PONDERS .....

"The Club has now settled all its teething problems and is only awaiting its wisdom teeth....."

Words of wisdom or just plain nonsense?

During September 1953, when "The Scribe" penned theses words in the "Carrier". He was most satisfied with the progress of the West Amateur Radio Club. "The Carrier" was the forerunner of the Anode and "The Scribe", the Editor.

During the ensuring years, I find no writing or print pertaining to the Club's progress. They had their "Wisdom teeth" and were now content with past achievements, and all efforts ceased!

Let us observe this lesson from the past. We cannot stand still; we either go forward or backwards. There are times when we take a deliberate step backwards to give a running leap forwards, but the rate of change is so rapid nowadays that it is necessary to run in order to stand still.

Unfortunately, human nature has not kept pace with change; it is almost a "Law of Human Nature" that we automatically look for what is wrong in something new, rather that what is right!

In 1876, Joseph Coppersmith was arrested in New York for trying to sell shares in a telephone company. After his arrest, a newspaper reported, "All well informed people know that it is impossible to transmit the human voice over the wire, and were it possible to do so, the thing would be of no practical value".
There you have it; the community had its wisdom teeth!

Come now all you Codgers who criticised me when, at the A.G.M., I contrived to solicit your experience and wisdom to help us to modernise our club activities, and to use the young talent, available to us for the benefit of a vibrant W.R.A.R.C.!

We need your support at our meetings; we want you to partake in our bulletins as well as attending our diverse functions!

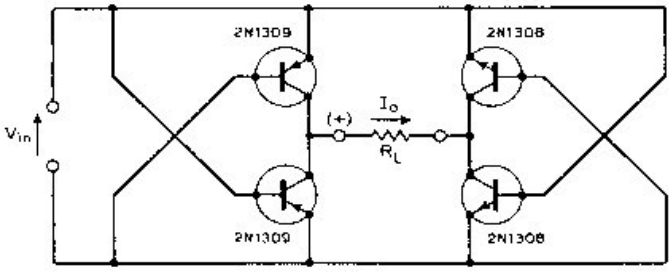
Wishful thinking?
Who knows?

Bill ZS6REV

Cross coupled transistor bridge

I considered this small article and circuit quite useful for hams. The original circuit and letter appeared in Wireless World some years ago. Ed.

This circuit shows a full wave rectifying bridge which has an off-set voltage an order smaller than conventional diode bridges.



The graph shows transfer characteristics for a conventional full wave silicon diode bridge in curve 1, a germanium diode bridge in curve 2, and the cross coupled transistor bridge

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Radian Review

By H. Paul Shuch
San Jose City College

Radian measure is one of the most useful and misunderstood tools of AC circuit analysis. It is easy to be confused by its origin and application, especially if the use of radian was learned by rote memorisation. This article demystifies the radian, and hopefully dispels some of that confusion.

In analysing the amplitude and phase response of AC circuits, one has certainly converted angles between degree and radian measure. RF engineers, of course, do so with great frequency, using the conversion constant which we all have memorised:

radians = degrees / 57.3

If you've ever wondered where the magic number came from, this discussion is for you. Don't let yourself be intimidated by the math, it's really as easy as pi.

Let's start by recalling that the circumference of a circle is related to its diameter by the constant P (a little more than three). You can approximate the value of P by measuring the diameter and circumference of any circle. But P is a transcendental number, which means its digits never end, and never repeat. Its value can be approached through the following infinite series:

P/4 = 1 - 1/3 + 1/5
-1/7 + 1/9 - 1/11 ...

A casual glance at the above series should give you a sense of deja vu, with its uncanny resemblance (signs and reciprocals neglected) to the Fourier series for a square wave.

The iterative solution to P is incredibly time consuming. Just for fun, try the BASIC program below which solves the fractional series for as many terms as you care to specify. 10^6 double-precision iterations on a 64 Kbytes, Z-80 based PC, came up with:

P ~ 3.131593653607635

which is accurate to only six of its 16 significant figures, and took nearly three hours to execute! At that rate, the program will calculate it to ten significant figures (the number you can get on a cheap hand calculator) in roughly three years!

Since a circle's diameter equals twice its radius, we can as easily say that a circle's circumference is 2PR, roughly six times its radius. This approximation allows us to draw the circle in Figure 1, with an origin (0) at the centre, radius R, and the circumference divided into six equal arcs by points A through F.

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Cross coupled transistor bridge

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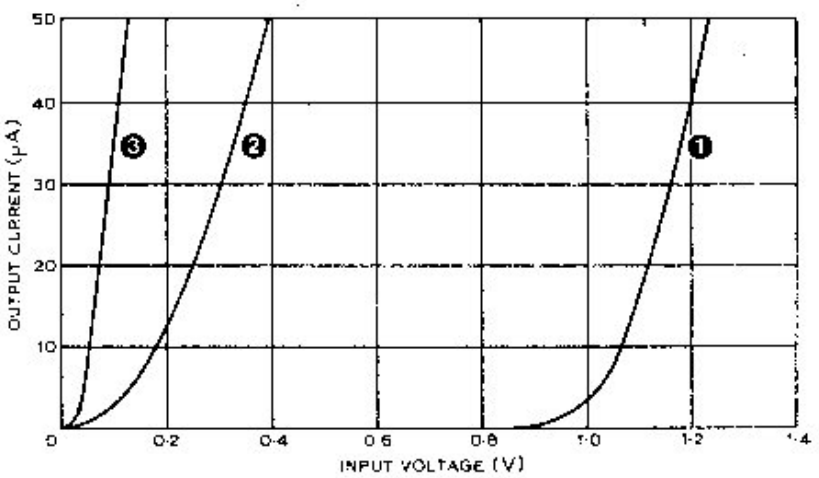
in curve 3. The off-set voltage of the transistor bridge is about 30mV with good linearity above the knee.

The circuit was developed for use in a simple but sensitive field strength meter. The meter is protected by the base-emitter junctions of the transistors. With the devices shown, the frequency response is up to 30MHz and the optimum value of RL is about 2k.

L. D. Thomas, Burton on Trent, Staffs.



Radian Review

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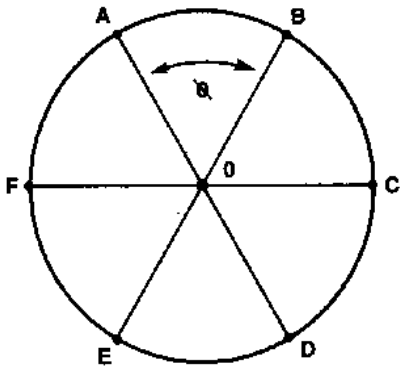
You will note that the radii drawn from the origin to define each of the arcs conveniently divide the circle into six slices. Now for each slice the length of the arc, if we straighten it out, is roughly equal to the radius of the circle, so the circle is about six radians (which sounds better than "radiuses") around. Since a circle, like a cycle, is divided into 360 degrees, each sixth of a circle (radian) contains about a sixth of 360, or roughly 60, degrees.

Actually, the circle is divided into not six, but rather 2P, or roughly six and two-sevenths, radians. Which makes the actual angle F in Figure 1, 360/2P, or 57.3 degrees. It is interesting to note that the gross simplification of P = 3, though it may make a mathematician cringe, has given us an approximation of radian measure which is accurate to within better than



five percent.

If you've been thinking that each segment in Figure 1 looks rather like a piece of pie, you're half right. It's actually a piece of 2P! Which brings us to the subject of angular velocity.

Frequency is commonly measured in the unit Hertz (Hz), which was chosen to honour our old friend Heinrich Rudolph Hertz. You may also remember a time when the unit of frequency was the Cycle Per Second, before Mr. Hertz was so honoured. The point is, we specify frequency in terms of the number of repetitions (cycles) of the wave which occur in a specified time span (one second). We could just as easily have standardised on a given fraction of a cycle (such as a number of degrees, or radians) per unit time. Angular velocity is just such a measure.

Angular velocity, abbreviated w (the Greek lower case omega), is an expression of the rate of change of an AC waveform, expressed in radian measure. Since each cycle of a wave can be divided into 2P radians, we can see that:

w = F (cycles/sec) x 2P (radians/cycle).
= 2 P F (radians/sec)

which explains the presence of the ubiquitous 2P factor in AC equations. Examples include the familiar expressions for resonant frequency, filter cut-off frequency, and inductive and capacitive reactance and susceptance.

Why Radians?

The chief advantage of using radian measure is that it reduces otherwise cumbersome trigonometric manipulations to a few simple steps. A related unit, the steradian (perhaps the subject of a future "Designer's Notebook") affords similar simplification in spherical trigonometry, used in antenna pattern and gain analysis and free space loss computations. And, of course, radian measure is convenient in analysing the behaviour of frequency dependent circuitry. But we should hope angular velocity never replaces the familiar units for frequency altogether. For those many RF Design readers who happen to be ham radio operators, how would you feel about having our 2-meter band start at 905 M rad/sec?

About the Author

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Radian Review

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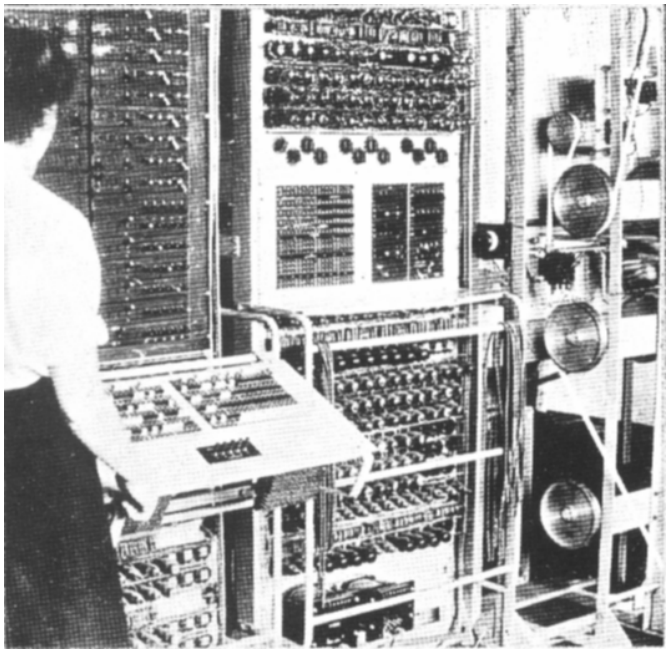
The QBasic Program :-

```
'
' PI.bas - originally by H. Paul Shuch N6TX in 1985
'
'
CLS
PRINT "This program calculates the value of PI from the infinite se-
ries:"
PRINT
PRINT "PI/4 = 1 - 1/3 + 1/5 - 1/7 + 1/9 - 1/11 + 1/13 - 1/15 + ..."
PRINT
DEFDBL A-Z
'DEFINT B, I-J, X
X = 1
P = 1
'
Start:
'
INPUT "How many iterations do you desire?    ", A
'-- start time
st! = TIMER
'
B = INT(A / 100 + .5)
FOR I = 1 TO B
    FOR J = 1 TO 50
        X = X + 2
        P = P - 1 / X
        X = X + 2
        P = P + 1 / X
    NEXT J
'
'CLS
PRINT P * 4
NEXT I
'
et! = TIMER
'
BEEP
CLS
PRINT "After "; A; " iterations, PI ~ "; P * 4
PRINT "Time taken to do "; A; " iterations = "; et! - st!; "Seconds"
PRINT
INPUT "Do you wish to continue (Y/N)?     "; D$
IF UCASE$(D$) = "Y" THEN
    GOTO Start
END IF
'
END
```

NOTE: You can copy the text from this pdf file by using the text tool and highlighting the text. Simply then use copy and paste the text into notepad. Save the file as "Pi.bas" (include the quotes in the filename)

COLOSSUS

Let's go back to the closing stages of the Second World War - to January 1944, to be precise. Germany had set up an encrypted radio teleprinter link between Berlin and von Rundstedt, the Commander-in-Chief of Western Europe, and this was used for the highest priority traffic. Clearly, the content of these messages would have been invaluable to the allied forces, but in the eyes of the German high command, this communication link was 100 percent secure - such was their confidence in the sophisticated cipher which was used.



Nevertheless, to cut a long story short, the British Government Code and Cipher School, located at Bletchley Park, had developed a means of reading these messages by March 1944. Towards the end of May, this revealed that Germany had correctly predicted the area between Le Havre and Cherbourg as being the most likely area for the expected allied invasion. This intelligence arrived in time to change the plans for the landing and this had an important effect on the outcome of the Second World War. In fact, this is just one example of how code-breaking at Bletchley Park proved itself to be the "secret weapon which won the war", to quote Winston Churchill. Two of the famous names at Bletchley Park were Alan Turing, of Turing Machine fame, and Max Newman, who would both subsequently play important parts in the development of various pioneering electronic computers. So it'll probably come as no surprise that a number of computer like devices, most notably Colossus, were key elements in the code-breaking process. You'll notice that I used the phrase 'computer-like devices' rather than 'computers'. Exactly which was the world's first electronic computer is hard to say. Really it depends on your definition of the word "computer". Today we'd be inclined to say that a computer has to be a general purpose device, the exact function of which is determined by the programming.

Well Colossus was electronic, and it was programmable - albeit by hardware links - but only to a degree. Much of its design was specific to cracking the German Fish cipher and most people would, therefore, be inclined to call it the world's first electronic programmable calculator. Nevertheless, it was an important milestone and it paved the way to the development of the first true electronic computer, shortly after the war. A pair of Colossus Mark 2s remained in use at GCHQ until 1960, when they were dismantled and the plans burned as required by British intelligence - such was the sensitivity of the technology, even 15 years after the war.

With this bit of background, it's not hard to appreciate the enormity of the task of re-creating a Colossus, a project which is being undertaken by Tony Sale of the Computer Conservation Society and Director of the Bletchley Park Trust. And in passing, it's worth noting that funding is currently being sought to make the historic Bletchley Park site a permanent museum of computing and cryptography. But how do you re-create a computer when nothing remains of the original and all the official plans were destroyed almost 30 years ago?

The short answer is that it's not easy. But this didn't deter Tony Sale. The only documentation which had escaped Churchill's

(Continued on page 6)

Letters/eMail to Anode

Hi John

Pls. Put this Questions to the good people that receive Anode if you can. I'm desperate

Hi To All

1. I'm look for info on the **MAX 690** & **MAX 692** IC Chips. Can any body help or point me in the right direction.

2. Can any body tell me more of the Toroidale core in you Computer power supply. The Choke with the yellow and white coating on the DC side of things. I need to know the Material etc or the correct number like T200-20.

Pls. E-Mail me :
zr6pdd@mweb.co.za

Packet Radio :

ZS6PVT @ ZS6RO.SRJ.ZAF.AF

Thank you - **73's de ZS6PVT**

Phillip van Tonder

Spare a PC Guv?

Sparrow Ministries Home for children and adults with HIV/ Aids is in need of.computers and printers.

They don't have to be new, just as long as they are in working order. These computers and printers will be used as a form of education by those who are unable to attend school.

All educational toys, or just anything you wish to throw out will be gladly accepted.

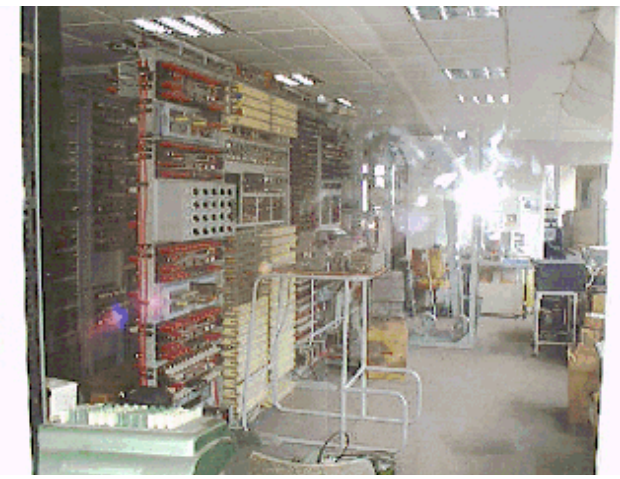
Contact Dawn at 763-1466 or 760-5812.

If you missed the Boot Sale on the 30th of September, don't worry there's another on November the 25th.

COLOSSUS

(Continued from page 5)

destruction orders consisted of eight photographs and a few portions of circuit diagrams which had been held illegally by ex-Bletchley Park staff. Beyond this, all that was available was the reminiscences of those people who had worked on Colossus, many of whom were, by the early nineties, in their eighties. But even this doesn't start to hint at the enormity of the task.



Todays Replica of Colossus at Bletchley Park

Most of the other reconstruction projects are, by and large, technical challenges - the Colossus re-creation was also a legal and political challenge. In 1992, when Sale first became interested in bringing this computer back to life, all the available information - mainly that which was in the heads of the ex-staff - was protected by the Official Secrets Act. The code-breaking technology embodied in Colossus was considered to be so far ahead of its time, it was still classified, almost 50 years after it was built. And re-building Colossus would, of course, reveal just how the German codes were cracked all those years earlier. But persistence paid off, and eventually Sale was given permission to reconstruct a Mark 1 Colossus - the original had no memory. However, under no circumstances was he to connect it up and he certainly wasn't to build the more sophisticated Mark 2. Still undeterred, Sale proceeded, in secret, to build a Colossus Mark 2. Then, in March 1996, the US government released formerly classified documents, including details of the code-breaking principles employed by Colossus. With this information now in the public domain, government objections to the rebuild were withdrawn and the by now completed Colossus could be exhibited openly.

The West Rand Amateur Radio Club
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Roodepoort
1725

Phone: +27 11 726 6892 (After hours)
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!

We are going on the Web www.zs6wr.org

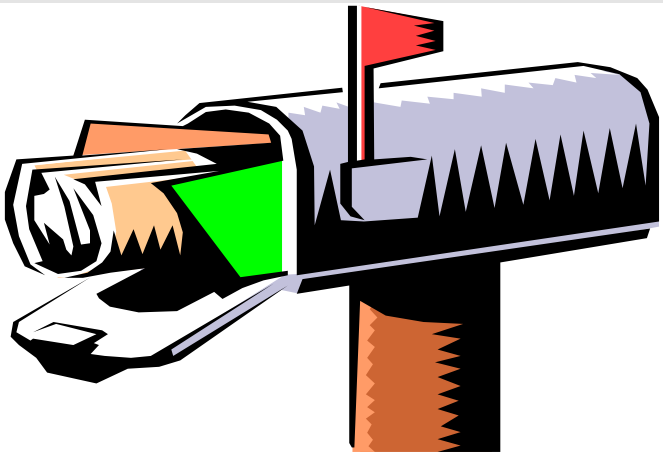
Have you contributed to the Christmas Tree fund yet?

Chairman	Bill	ZS6REV	726 6892 (A/H)	---
Vice-Chairman	John	ZS6BZF	768 1626 (A/H)	john.brock@pixie.co.za
Treasurer	Dave	ZR6AOC	475 0566	david.cloete@za.unisys.com
	Simon	ZR6SS	704 3314	simsny@global.co.za
	Anton	ZR6OST	953 5564	anton@xglobe.com
	Chris	ZR6AVA	673 2726	botham@global.co.za
	Keith	ZS6AGF	763 6929	mwbronie@iafrica.com
	John	ZS6WL	791 3620	c/o arthurmono@ananzi.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.



We need your input! Email us articles, comments and suggestions please.
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