THE WEST RAND AMATEUR RADIO CLUB

December 2000/January 2001
Volume 1, Issue 5

ANODE

Inside this issue:

Special points of interest:

- Contest Weekend report
- Coax Cable information
- Contact details on back page

Bumper Issue!

To cover the December to January period we are issuing a double sized Anode.

Maybe some of the articles will inspire you to do certain projects over the holiday period.

If you do have any suggestions or projects that you have recently completed tell us about them. No matter how small or large, we will probably publish them. Circuit ideas of all sorts are very welcome as are hints and tips of a practical nature. It doesn't have to be in perfect English (Hi Phillip!)

We have emailed the Anodes of the past few months to everyone who was a member with an email address. Recently we decided to send it only to paid-up members. This doesn't stop you from sending it on to other Hams. It merely means that the members get it first.

I would like to see those amateurs that don't yet have email addresses get their Anode via Packet from the local Packet BBS. Can this be done? Does the BBS have sufficient storage? Is the transfer still only 1200 Baud?

73's and 88's and best wishes for the Xmas season. John

Computing Maidenhead

For those that are not familiar with 'Maidenhead' and are interested in competing in contests we have a great article that explains the fundamentals.

A short paragraph in Radio Communication briefly reported that the International Radio Union (IARU) has agreed that, as from 1 January 1985, a new locator system will replace the present 'QTH Locator' and will be known as 'Universal Locator'. The new system was originally devised by John Morris G4ANB for a meeting of IARU VHF managers at Maidenhead in Berkshire, and was selected from a number of other proposals. This system met the criteria of worldwide application, simplicity combined with reasonable accuracy, and partial compatibility with the system at present in use. Despite the adoption of the name Universal Locator, in general parlance it is known as 'Maidenhead' and we shall be using this terminology throughout this article.

Why locators?

There is nothing new about locator systems; the oldest currently in use is familiar to everyone latitude and longitude. Everyone who has used an Ordnance Survey map will also be familiar with the United Kingdom National Grid Reference (NGR) system, so why must we be burdened with yet another? In essence, the answer is convenience of use. The latitude and longitude system is ideal for use by the pro-

(Continued on page 2)

PC Interrupt Assignments

There are three general types of interrupts that can occur in a PC: hardware interrupts, software interrupts, and processor exceptions.

If the processor in your computer had to continually poll the various I/0 devices, it wouldn't be very efficient at doing the real work you ask of it. So to maintain efficient use of the processor's time, computers use interrupts to handle asynchronous hardware events.

An interrupt signals the processor to perform some special operation. On the IBM PC, the interrupt vector table governs the choice of operation. In 'Real-Mode', this table is located in the first 1024 bytes of

(Continued on page 3)

Interrupt level	Usage
NMI	Motherboard RAM parity and I/O channel check, maths coprocessor.
IRQ0	System timer output channel 0.
IRQ1	Keyboard scan code interrupt.
IRQ2	Available for extra equipment.
IRQ3	Asynchronous communications (COM2) and SDLC (Synchronous Data Link Control) communications.
IRQ4	Asynchronous communication (COM 1) and SDLC communications.
IRQ5	Hard disk drive.
IRQ6	Floppy diskette drive.
IRQ7	Parallel printer.

Computing Maidenhead

(Continued from page 1)

fessional navigator, for it is extremely accurate and relatively convenient to use. However, further criteria arise for the communicator, for not only must the system be positionally accurate, the results must also be capable of being passed accurately over a radio circuit with low probability of error even in conditions of low signal strength and/or severe interference.

Long experience has shown that, in such circumstances, long strings of figures are particularly prone to error. As a position quoted in latitude and longitude may contain up to thirteen figures and two letters, an alternative solution was sought.

QTH Locator

In about 1970, the QTH (then known as ORA) Locator was introduced into Europe. This was based on 'squares' covering two degrees in longitude and one degree in latitude, these being. identified by two letters, the first letter indicating the longitude and the second the latitude. These were divided into eighty smaller squares in eight rows (N to S) of ten (E to W) and numbered 01 to 80. In turn, each of these was divided into nine sub squares of 2 degrees 30 minutes in latitude and four degrees of longitude which were lettered 'a' to 'h' and 'j' in a cyclic pattern. The disadvantages of this system were several but did not cause serious inconvenience for a few years. The first letter of the QTH Locator indicated longitude, A being immediately east of the Greenwich meridian. The same letter would therefore be repeated every 52 degrees eastwards. The same would apply to the second letter in a north/south direction. In the early days this did not matter

(Continued on page 3)

PC Interrupt Assignments

(Continued from page 2)

memory. (NOTE: DOS is usually run in 'Real-Mode'. This means that the address is 'real' not a virtual address.

Each entry in the table is an address that's 4 bytes long consisting of a segment and offset.

Most of these interrupt levels were retained in the 16 and 32 bit microcomputers, but a further 8 are added and some are changed.

The table shows the 16 and 32 bit interrupt levels:

Interrupt level	*Usage*	*Availability*
NMI	Motherboard RAM parity and I/O channel check.	Not available
IRQ0	System timer output channel 0.	Not available
IRQ1	Keyboard scan code interrupt.	Not available
IRQ2	Cascade to IRQ9.	Not available
IRQ3	Asynchronous communication (COM2) and SDLC communications.	If a serial port is fitted not available
IRQ4	Asynchronous communication (COM1) and SDLC communications.	If serial port is fitted not available
IRQ5	Parallel printer (LPT2). Especially ECP/EPP.	Available
IRQ6	Floppy diskette drive controller. .	Not available
IRQ7	Parallel printer (LPT1). Especially ECP/EPP.	Not available
IRQ8	Real-time clock.	Not available
IRQ9	Redirected IRQ2	usually available
IRQ10	Not assigned	Available
IRQ11	Usually used by SCSI controller if fitted.	Available
IRQ12	Available for use in older pc's though in modern pc's probably used by PS/2 mouse.	Not available
IRQ13	Maths Coprocessor. Most processors have FPU	Not available
IRQ14	Hard disk drive controller. Now IDE - Primary channel	Not available
IRQ15	Secondary hard disk controller. Now Secondary IDE	Not available

Computing Maidenhead

(Continued from page 2)

very much, for the distances worked on VHF (and the system was only used on VHF) were not very great and any ambiguities could be resolved by knowing the other operator's national prefix

Dramatic Increase

More recently, however, particularly with the development of meteor scatter and satellite working, distances have increased dramatically.

Considering the fact that the QTH Locator system could repeat itself many times within a country the size of the USA or USSR, the implications are obvious.

(Continued on page 5)

Eniac

Ask any computer scientist at the University of Pennsylvania in Philadelphia for the name of the very first programmable electronic computer and he'll tell you it was called Eniac - the 'Electronic Numerical Integrator And Computer'.

The project was started in 1942 at the University of Pennsylvania following a proposal by John Mauchly and J Presper Eckert to the US government. And as might be expected, the funding was for military applications - calculating ballistic tables, to be specific. So it's somewhat ironic, perhaps, that by the time of Eniac's first public demonstration on 14th February 1946, the war was over and the immediate military application had evaporated.

In passing, however, it's interesting to note that one of Eniac's first post-war applications was concerned with the development of the hydrogen bomb. So what was Eniac? Well the words electronic, computer and programmable all apply. So those who would claim its place as the first electronic programmable computer do have some irrefutable evidence on their side. However, unlike all modem computers, it was programmed by hardware jumpers and patch leads, not by software in the accepted meaning of the word today. And as such, re-programming it from one task to another would have been a long-winded and laborious process, and errors would have been very difficult to track down. Indeed it's this lack of a stored program capability, which most clearly differentiates Eniac from modern computers.

Decimal points

Another important respect in which Eniac differed from present-day computers is that it operated on decimal rather than binary numbers, a decision made on the ground of reducing the number of valves. Memory was made out of so called ring counters, circuits containing 22 valves which could store a single decimal digit. Each accumulator could handle 10 digits and a sign, so a complete accumulator used a total of 222 valves. It's hardly surprising, therefore, that Eniac only had 20 accumulators. Even this modest memory specification needed 4,440 valves which would have occupied some serious space.

To celebrate the 50th anniversary of Eniac, the University of Pennsylvania planned to create a replica of this, the world's first electronic programmable computer. But unlike many of the other recreation projects, the replica wasn't intended to look like the original Eniac, it just had to operate in the same way. In fact, there was no need to rebuild a physical replica - unlike virtually all the other pioneer computers, portions of the original Eniac are still around and the section at the University of Pennsylvania was fired up as part of its 50th anniversary celebrations. So, no rummaging through junk boxes looking for ancient valves or 50-year-old resistors. Instead, the project to re-build Eniac was to make use of the very latest semiconductor technology - it was to produce an 'Eniac on a chip'.

A group of students in the Electrical Engineering department designed the chip under supervision of Prof J Van der Spiegel, in collaboration with Dr F Ketterer. The completed circuit integrates the whole of Eniac on a 7.44x5.29mm chip using a 0.5 micrometer CMos technology, and contains about 174,569 transistors. This compares with the original Eniac which stood 10 feet tall, 80 feet wide, and tipped the scales at 30 tons. It contained 17,000 valves and drained enough electricity in an hour to light three houses for an entire year.

But wait a minute - since a transistor does basically the same job as a valve, how come the modern Eniac on a chip has 10 times more transistors than the original Eniac had valves? This is a good question, especially in view

(Continued on page 5)

Eniac

(Continued from page 4)

of the designers' goal of re-creating the original Eniac following its architecture and basic circuit building blocks as much as possible. This discrepancy is explained in part by the fact that most of Eniac's valves were double-triodes - effectively two valves in the same glass envelope and are therefore equivalent in operation to two transistors.

But there's a much more fundamental reason than this for the vastly greater number of transistors in the new design. You'll recall that the original Eniac was programmed by patch leads and jumpers. But if this same philosophy had been adopted for the Eniac on a chip, it would have resulted in many more connections to the outside world and the chip would, therefore, have been much larger and more difficult to handle. So each of the possible patch lead connections has been replaced by a digital switch which can be turned on or off by sending the appropriate digital signal to the chip. In operation, therefore, the chip is connected to a PC and specially designed software is used to program the chip by making or breaking these virtual patch leads. And yes, these electronic switches are their control circuitry accounts for quite a lot of those 174,569 transistors.

The Eniac on a chip has been created first and foremost as a teaching tool. The chip will be mounted on a small, printed circuit board and connected to a PC equipped with a graphical interface that allows a user to interact with the chip.

The interface will display the front panels of the Eniac with its programming switches, control switches, and interconnection cables, thereby providing a 'real' Eniac experience. The user will select the switches to generate the proper program settings and interconnections to create a data file. The file will be sent to the chip and the output of the chip will be read back into the PC for display, allowing the user to evaluate results. According to its developers, the Eniac-on-a-Chip Kit, consisting of chip, printed circuit board, PC software, and a set of demonstration programs, will be available to a variety of organisations and institutions, including the National Science Foundation and the Smithsonian Institute.

According to the designers, "the multi-dimensional educational and intellectual benefits of the kit will not only inspire students in engineering and science but will reach out to a larger audience ranging from historians to high school students and the public at large".

Computing Maidenhead

(Continued from page 3)

Looking further into the QTH Locator system, the method of numbering the smaller squares and the cyclic system of determining the last letter added complexity to the programming of small computers, which by the late 1970s and early 1980s had become almost universal for computing distance worked, contest scores, etc. Faced with these disadvantages the IARU sought an alternative locator system, and after examining quite a number adopted that proposed by John Morris, G4ANB.

The Universal (Maidenhead) Locator

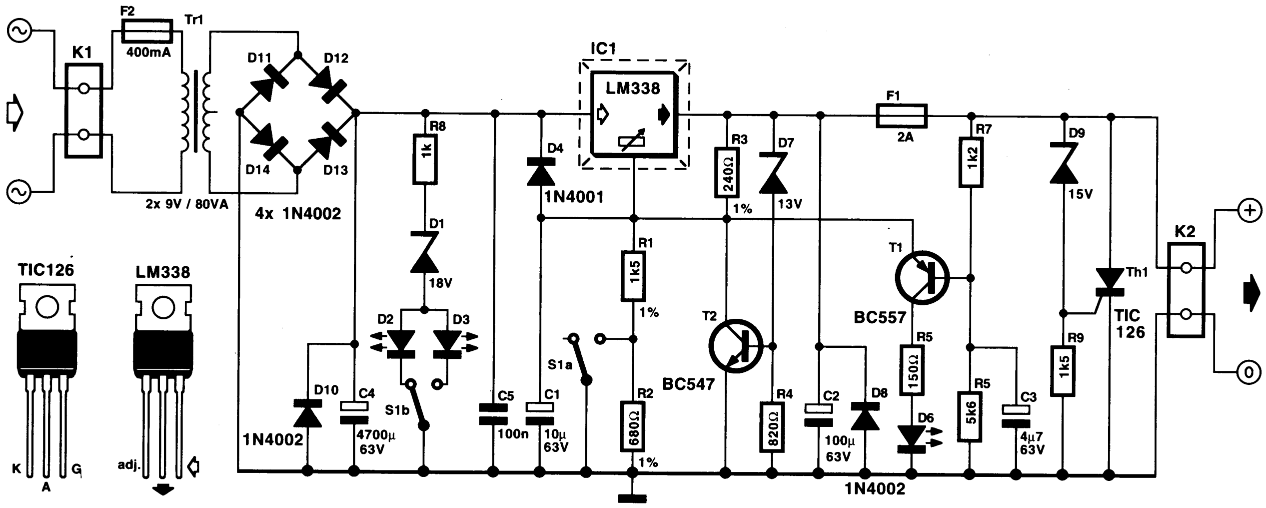
The Maidenhead system will define any position in the world by means of two letters followed by two figures then a further two letters.

The first two letters define the 'field'. The world is divided into 324 fields, each 20 degrees in longitude by 10 degrees in latitude. Starting at the South Pole facing the International Date Line and moving in a clockwise (i.e. easterly) direction, the first letter indicates longitude and the second latitude.

Each field is then divided into 100 smaller squares, covering two degrees of longitude by one degree of latitude, these

(Continued on page 6)

Rugged PSU for Ham Radio Transceiver



Design: VU3NSH

This rugged supply is based on the popular LM338 3-pin voltage The LM338 is capable of supplying 5Amps over an output of 1.2 V to 32 V with all standard protections like overload, thermal shutdown, overcurrent, internal limit, etc., built in. In this supply, some extra protections have been added to make it particularly suitable for use with low to medium-power portable and mobile VHF/UHF (ham) and 27 MHz transceivers.

Diodes D4 and D5 provide a discharge path for capacitors Cl and C2. Diode D8 protects the supply against reverse polarity being applied to the output terminals. Capacitor Cl assists in RF decoupling and also increases the ripple rejection from 60 dB to about 86 dB. If junction Rl-R2 is not grounded by switch S1A, transistor T2 starts to conduct, causing the regulator to switch to zener diode D7 for its reference voltage (13 V). The PSU output voltage will then be 12.3 V Normally, T2 will be off, however, and the PSU output voltage is then about 8.8 V The high/low switch is useful to control the RF power level of modern VHF/UHF handhelds.

Transistor T1, a p-n-p type BC557, acts as a blown-fuse sensor. When fuse Fl melts, Tl starts to conduct, causing LED D6 to light. If, for whatever reason, the PSU output voltage exceeds about 15 V, thyristor THR1 is triggered (typically in less than a microsecond). Such a high-speed 'crowbar' may look like a drastic measure, but remember that this kind of protection is required by digital ICs that will not stand much overvoltage. The crowbar, when actuated, will faithfully destroy fuse Fl rather than allow the PSU to destroy expensive ICs. The two LEDs on the S1B contacts not only act as 'high/low' indicators but also as power-on indicators which are turned off when the mains voltage drops below about 160 V If you envisage 'heavy-duty' use of the PSU, then voltage regulator 1C1 should be mounted on as large a heatsink as you can get. The minimum we'd say is an SK129 heatsink from Fischer (Dau Components).

Computing Maidenhead

(Continued from page 5)

corresponding exactly to the QTH locator squares used at present.

These are numbered 00 to 99, starting in the southwest corner and counting northwards and eastwards. Thus the square in the southeast corner is 90 and that in the northeast corner is 99.

To further define position, each of these squares is divided into 576 sub squares formed into a 24 by 24 grid. Each of these is therefore 5 minutes E-W and 2.5 minutes N-S, which is very slightly larger than the present sub squares which measure 4 minutes E-W by 2.5 minutes N-S. Lettering follows the system of the fields, commencing with AA in the southwest corner and XA in the southeast corner, with XX in the northeast.

Computing Maidenhead

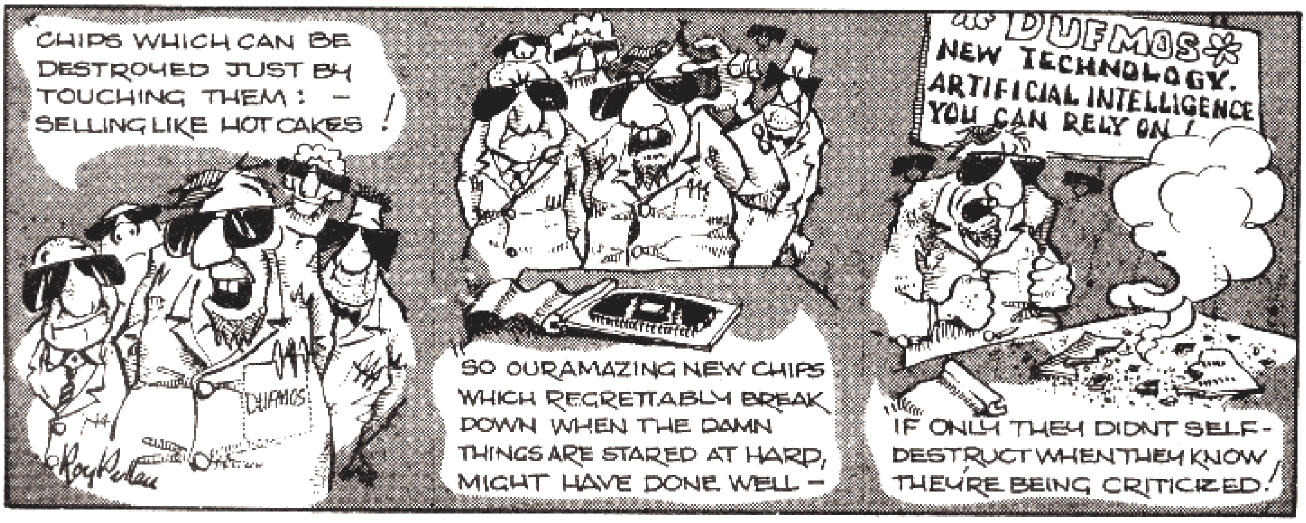
The Universal (Maidenhead) Locator system is thus capable of defining a geographical location with an accuracy only slightly less than the present system, but with the overwhelming advantage of worldwide application without ambiguity.

Program One :-

```
10 REM - MAIDENHEAD TO LAT/LONG CONVERSION
20 REM - J.M.HOWELL JULY 1984
30 DEF FNA (I) = ASC(MID$(MD$, I, 1)) - 65
40 DEF FNB (J) = (J - INT(J)) * 60
50 CLS
60 PRINT
70 PRINT "ENTER MAIDENHEAD LOCATOR"
80 INPUT MD$
90 D = FNA(2) * 10 + FNA(4) - 73
100 M = FNA(6) * 2.5 + 1.25
110 PRINT
120 PRINT "LATITUDE- ";
130 IF D >= 0 THEN PRINT D; INT(M); FNB(M); "N"
140 IF D < 0 THEN PRINT -1 - D; INT(60 - M); 60 - FNB(M); "S"
150 D = FNA(1) * 20 + FNA(3) * 2 + INT(FNA(5) / 12) - 146
160 M = INT(FNB(FNA(5) / 12) * 2 + 5.01) / 2
170 PRINT "LONGITUDE-";
180 IF D >= 0 THEN PRINT D; INT(M); FNB(M); "E"
190 IF D < 0 THEN PRINT -1 - D; INT(60 - M); 60 - FNB(M); "W"
200 PRINT
210 PRINT "RUN AGAIN (Y/N)"
220 INPUT M$
230 IF UCASE$(M$) = "Y" THEN GOTO 60
240 END
```

Program Two :-

```
10 REM - MAIDENHEAD BEARING DISTANCE AND SCORE
20 REM - J.M.HOWELL JULY 1984
30 DIM P(2, 2), M$(2)
40 M = 57.2958
50 DEF FNA (I) = ASC(MID$(M$(J), I, 1)) - 65
60 GOSUB 470
```

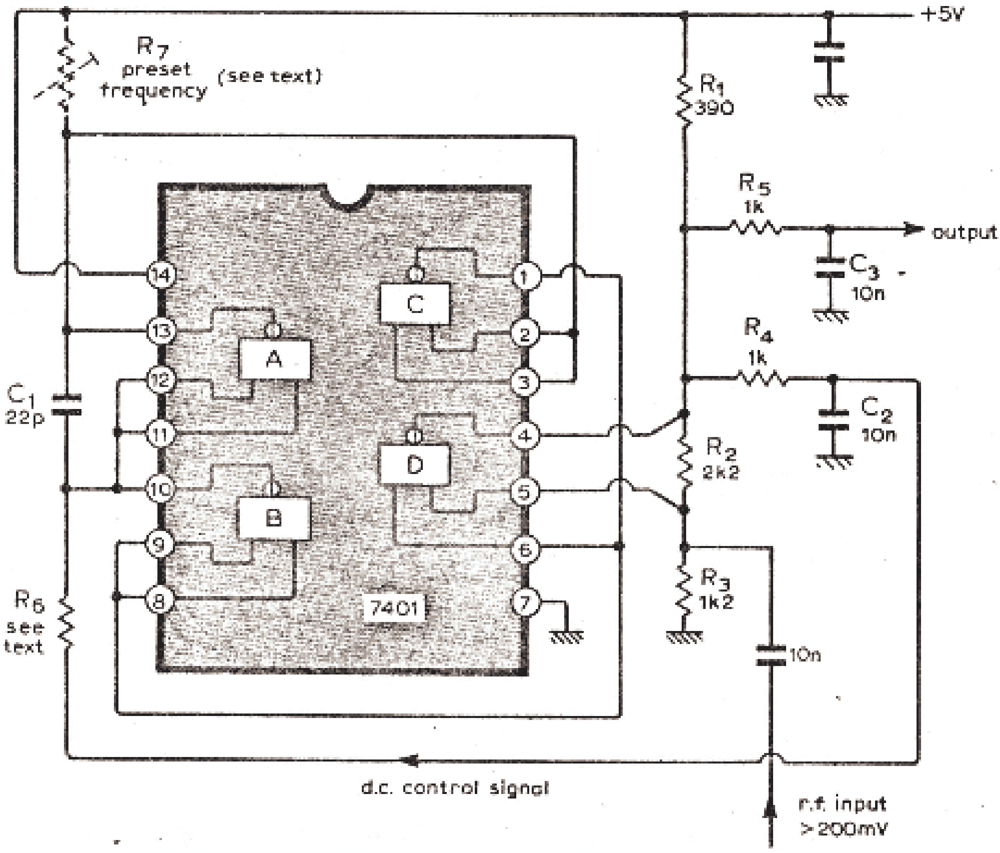


Phase-locked loop demodulator

In the November 1972 issue of *Wireless World* Pat Hawker showed a circuit for a low-cost phase-locked loop demodulator using three digital integrated circuits and two transistors ("Synchronous Detection in Radio Reception-2", page 527). Here is an even simpler circuit, which can be built for about a third of the price.

Gates A, B and C constitute a relaxation type of voltage-controlled oscillator whose output frequency is determined by the value of C, and positive current sources supplying pins 10 and 13. It should be noted, however, that the inputs to gates A and C supply part and whole of these currents respectively. Similarly, no resistor is required on the output of gate C, pull-up being provided by the input current to gate B.

D is arranged such that when pin 6 is high the gate is biased by R2 and R3 to operate as a linear amplifier for the input signal. In operation, however, pin 6 is alternately high and low due to the oscillator output and hence gate D performs as an amplifying phase detector. The output from this stage is fed via the low pass filter R4 and C2 to the voltage-controlled oscillator, completing the phase-lock loop. A separate filter R5 and C3 provides the audio output.



With C1 is equal to 22pF the circuit operates at a frequency of approximately 10 MHz. Making R6 270 Ohms or 10k Ohms maintains lock over a frequency range of 2MHz or 300kHz respectively. In both cases the output swing is just over 1 volt. An additional component R7 may be incorporated if desired to obtain fine adjustment of the operating frequency.

Although this circuit is somewhat dependent on the device characteristics, which will vary from one sample to another, it is capable of giving satisfactory performance for most amateur experimenters requirements. The small size and very low cost make it eligible for substitution into existing equipment using other types of demodulation.

Rodney King,
Hastings, Sussex.

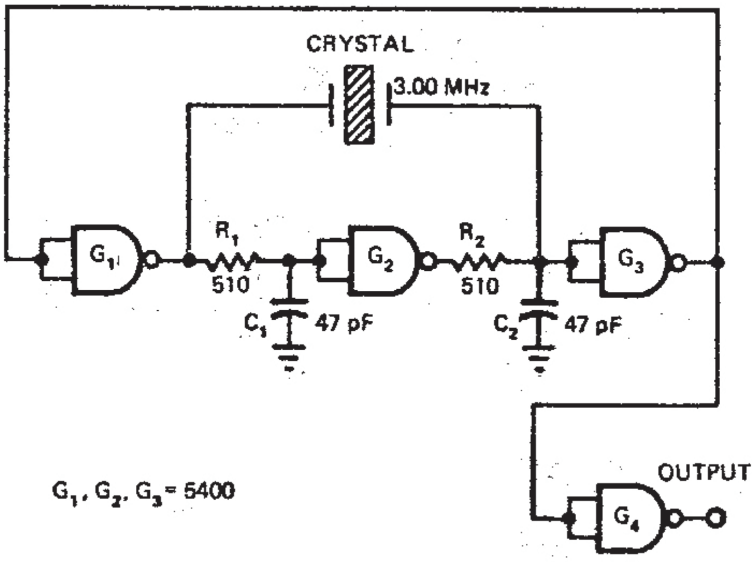
Crystal-oscillator design eliminates start-up problems

You can build a simple, low cost, crystal controlled oscillator with one TTL-gate package. The circuit operates slightly below the crystal's series-resonant frequency, but it is much more accurate and stable than one-shot multivibrators, etc. Other advantages of the design include

- Obvious simplicity
- Direct TTL compatible output levels
- low cost (less than $10; the crystal is by far the most expensive item)
- Small size (components mount in approximately the same area as two 16-pin DIP'S; you don't need large inductors)
- Lack of precision components (only standard ceramic capacitors, such as those used for decoupling, are required)
- Use of only one standard +5V supply voltage.

Two factors ensure oscillator start-up: The connection of NAND gates G1, G2, and G3 into an unstable logic configuration and the high loop gain of the three inverters, which arises from a small-signal ac gain (at each TTL gate) greater than one in the frequency range of interest.

After oscillation begins, the second internal loop-consisting of R1, C1, G2, R2, C2 and the crystal-provides a 360 degrees phase shift near the crystal's series-resonant frequency, while G1 and G3 also furnish a parallel 360 degrees phase-shift path. Because the crystal operates slightly below its series-resonant frequency, it ap- prevent start-up or spurious operation of the oscillator at higher harmonics, a problem common to many TTL oscillator circuits.



This loop-within-a-loop oscillator design requires no tedious selection of components to ensure reliable starting.

pears capacitive and supplies a good deal of the phase shift (lag) beyond that furnished by G2 when the oscillator achieves steady-state operation. Note that gate G2 also provides the basic loop gain (greater than one) in the steady-state condition. G4 improves the shape of the output TTL waveform.

The values of R1, R2, C1, and C2 aren't critical for oscillator operation. Select them so the oscillator operates at a frequency 70 to 90% higher than the crystal frequency when the crystal is disconnected. By limiting the natural frequency of the inverters, you

TEMPERATURE (C)	FREQUENCY* (Hz)
-25	3,000,000
0	3,000,000
+25	2,999,978
+50	2,999,934
+75	2,999,905
+100	2,9990920

*3.00 MHz AT-CUT CRYSTAL, 7500 TTL GATE, AS SHOWN IN DIAGRAM

Lab test results show reasonable temperature stability over -25 to +100C certainly a performance more than adequate for many digital-system applications.

(Continued on page 11)

Flexible Coaxial Cable 50Ohms impedance types

Part No. M17/xx	O.D (in.)	Minimum Operating Temp. Range Cel-sius	Maximum Operating Temp. Range Cel-sius	Jacket (Note 1)	Max Freq. GHz	Centre Conductor	Shields (Note 2)	Loss Max. dB/100 ft	Loss Max. dB/100 ft	Loss Max. dB/100 ft	Power Max Watts	Power Max Watts	Power Max Watts	VSWR Max.	VSWR Max.	VSWR Max.
								0.4GHz	1GHz	2GHz	0.4GHz	1GHz	2GHz	0.4GHz	1GHz	2GHz
RG178	.071	-55	+200	FEP	3	Stranded	1:SC	33	52	76	115	68	45	1.18	1.25	1.36
RG316	.098	-55	+200	FEP	3	Stranded	1:SC	21	38	47	220	135	94	1.16	1.20	1.24
RG174	.110	-40	+ 85	PVC	1	Stranded	1:TC	25	45		26	17		1.21	1.26	---
00001	.114	-55	+200	FEP	12.4	Stranded	2:SC	25	40	47	210	130	92	1.11	1.16	1.19
RG122	.160	-40	+85	PVC	1	Stranded	1:TC	18	30	--	62	35	--	1.18	1.23	---
RG303	.170	-55	+200	FEP	3	Solid	1:SC	8.6	15	21	1100	630	430	1.11	1.14	---
RG58	.195	-40	+ 85	PVC	1	Stranded	1:TC	17	28	--	88	50	---	1.12	1.15	---
RG142	.195	-55	+200	FEP	12.4	Solid	2:SC	3.6	19	28	1100	650	420	1.15	1.18	1.23
RG400	.195	-55	+200	FEP	12.4	Stranded	2:SC	10.5	17	28	1100	620	420	1.14	1.18	1.22
RG223	.212	-40	+ 85	PVC	12.4	Solid	2:SC	12	21	31	86	50	33	1.12	1.15	1.19
RG304	.280	-55	+200	FEP	12.4	Solid	2:SC	6.4	11	17	1450	870	550	1.12	1.15	1.18
RG212	.332	-40	+ 85	PVC	11	Solid	2:SC	6.5	12	19	330	200	140	1.12	1.15	1.27
RG393	.390	-55	+200	FEP	10	Stranded	2:SC	5.0	8.8	14	820	280	130	1.13	1.16	1.19
RG213	.405	-40	+ 85	PVC	1	Stranded	1:BC	4.8	9.0	--	320	180	---	1.10	1.12	---
RG165	.410	-55	+250	FG	3	Stranded	1:SC	4.7	8.0	12	2700	1600	1050	1.10	1.14	1.22
RG115	.415	-55	+250	FG	12.4	Stranded	2:SC	5.7	9.8	17	2600	1500	1000	1.11	1.16	1.20
RG214	.425	-40	+ 85	PVC	11	Stranded	2:SC	5.5	9.6	15	380	210	135	1.18	1.22	1.24
RG119	.465	-55	+200	FG	3	Solid	2:BC	4.4	7.2	11	2600	1500	1000	1.10	1.10	1.12
RG217	.545	-40	+ 85	PVC	3	Solid	2:BC	3.7	7.0	10	470	250	160	1.44	1.44	1.44
RG211	.730	-55	+200	FG	1	Solid	1:BC	2.3	4.0	--	10000	6000	---	1.15	1.17	---
RG218	.870	-40	+ 85	PVC	1	Solid	1:BC	2.8	5.0	--	1200	600	---	1.93	1.93	---
RG177	.895	-40	+ 85	PVC	12.4	Solid	2:SC	2.6	5.0	10	1600	780	450	1.93	1.93	1.93

Note 1:
FEP = fluorinated ethylene propylene
PVC = polyvinyl chloride
FG = fibreglass
Poly = polyethylene

Note 2:
1:SC = 1 silver plated braid
2:BC = 2 bare copper braids
1:TC = 1 tin plated braid

Note 3: Attenuation at 20C and power at 25C and sea level

Astro Facts

Quantity	Symbol or Abbreviation	Nominal Value
Astronomical Unit	AU	1.5 x 10E8
Earths Mass	6 x 10E24 Kg	
Earths radius (average)	6370 Km	
Light year	LY	9.46 x 10E12 Km
Moon distance (average)	380000 Km	
Moon mass	6.7 x 10E22 Kg	
Moon radius (average)	1738 Km	
Parsec	pc	3.1 x 10E13
Parsec	pc	3.26 LY
Parsec	pc	2.06 x 10E5 AU
Sun distance	AU	1496 x 10E8
Sun mass	2.0 x 10E30	
Sun radius (average)	700000 Km	
Year	days	365.24 days
Year	seconds	3.1556925 x 10E7

Crystal-oscillator design eliminates start-up problems

(Continued from page 9)

Frequency stability with temperature should be more than adequate for such digital-system uses as crystal clocks, as. well as for low-cost test equipment that operates only over limited ambient temperatures.

Depending on the type of TTL gate used and, of course, the crystal, this oscillator design produces frequencies from 1 to 20 MHz. For 1-2 MHz operation, a low-power 75100 IC is recommended; for 2-6 MHz, a standard 7500 type; and for 6-20 MHz, a 75H00 or 75S00.

J E Ruchanan - Westinghouse Electric Corp, Baltimore, MD

Taken from EDN FEBRUARY 20, 1978

“And for Christmas I want a 1 kilowatt 2 metre boot!”

ZS6WR Contest Weekend

Aim

The aim for the team was to participate, put ZS6WR on the air that weekend, and attempt to improve our recent competition rankings. While still enjoying the weekend!

The Team

The team started out with quite a number of participants of which only 7 members remained. These guys gave their all during the

build-up and a lot of time was spent away from their families to come to the club house for meetings and repair jobs that made up the preparation for the weekend on the hill. There was no issue to big for the team to take on. They did not hesitate to volunteer their time and equipment in order to get things done. All this happened with the greatest enthusiasm. All issues were discussed as a group and solved as a group. A finer team one would have to search very far for. I was more than once astounded by the spirit of the team when things got rough they just smiled and found a workaround or solution.

Build-up

There were a lot of things to prepare for the contest. Many meetings and discussions were held before we actually started doing anything. We were successful in obtaining the blessing from the mine in order to use their premises, as this was probably one of our biggest stumbling blocks. Radios were as big an issue and we did not quite get the equipment that we expected but we had enough equipment in order to make our presence known. The team decided that we needed to use some of the clubs antennas but these needed some attention first before they could be connected to any radio. The '2BCX was at-

tacked first and was restored to it's previous glory, followed by the 6m Yagi. Not to mention all the other pieces of equipment that was required that needed to be tested and or repaired before we could use them.

Site

Although the view is stunning the site is probably the most unforgiving piece of land on the west rand. It is extremely rocky and very exposed to

the elements. During the contest weekend we had some severe winds, which made setting up very difficult. Since we could not use tent pegs to hold anything down we had to resort to other devices such as pipes rocks, trailers and cars to hold the tent and antennas down. There were no "facilities" on the hill hence we had to take our own. A field kitchen was set up and we were looked after in the culinary sense from there. We also had to provide our own power, which was supplied by a 5Kv generator placed well away so as not to cause the operators any disturbance. As can be seen from the pictures below. These pictures were taken on the Sunday when the weather chose

ZS6WR Contest Weekend

(Continued from page 12)
to clear up.

Band	Contacts	Raw Score	Multiplier	Weighted	Longest
6m	17	101	3	303	7154.24
2m	61	221	2	442	308.13
70cm	24	82	7	574	214.43
23cm	0	0	11	0	
Total Basic Score				1319	
Potable multiplier				1978.5	
Total points claimed				3297.5	

Contest

The contest itself went very well. We operated out of the tent that you can see in the pictures above. The tent was rather small and cramped. This did not deter us, as we knew we had to do the best that we could with what we had. Some of the op-

erators were at first rather intimidated by the sheer volume of contestants on the air. But this did not last long once the jest of it came through, the heads went down and the contacts were made one after the other. And the points were rolling in. Good cooperation between operators secured many contacts that would otherwise have been lost. All operators used their headphones and this helped make the whole operation run very smooth in the confined space. Some on the fly education also took place which some of the operators would not have otherwise learnt. We had all our bands well covered and did not let opportunities slip by. The back up from the guys that were outside the tent at the time was also highly commendable with the supply of food and drink at the right time. We did well as far as points are concerned as can be seen from the table below. Unfortunately we could not capture the contacts into the PC, as we would have liked but due to the space limitation it was almost impossible to get more hands on deck, thus it had to be done afterwards.

Post Mortem

This contest was done to the best of our abilities and with all good intention. It saddens me that so many of the club members did not take the time and or make the effort to give their team a point or two. This contest is a teaching and learning tool and what better opportunity for all the critics to rather educate. The team have pointed out the areas that they feel need to be improved and I am sure that next time these will be implemented. As noted in the aim part of this document, the team did very well. I for one enjoyed the contest and what

ZS6WR Contest Weekend

(Continued from page 13)

it means to be an Amateur. I could not have asked for a better team in a million years.

I thank them all.

ZS6AGF	Keith Little
ZS6JG	John Heymans
ZR6AXS	John Friend
ZR6RTR	Rowan mcHarry
ZR6COB	Cobus Greyffenberg

From ZR6SS Simon Snyman
Contest Coordinator

Computing Maidenhead

```
70 PRINT "HOME STATIC"
80 J = L
90 GOSUB 350
100 PRINT
110 PRINT "DISTANT STATION"
120 J = 2
130 GOSUB 350
140 A = P(2, 1) / M
150 B = P(2, 2) / M
160 L = (P(1, 2) - P(1, 1)) * 2 / M
170 E = SIN(A) * SIN(B) + COS(A) * COS(B) * COS(L)
180 D = ATN(SQR(1 - E * E) / E)
190 IF D < O THEN D = 180 / M + D
200 IF A <> B THEN F = 90 * (1 + ABS(A - B) / (A - B))
210 IF L <> 0 THEN F = 90 + M * ATN((SIN(A) * E - SIN(B)) / (SIN(L) * COS(A) ^ 2))
220 IF SIN(L) < 0 THEN F = F + 180
230 GOSUB 470
240 PRINT
250 PRINT "FROM ", M$(1); " TO "; M$(2)
260 PRINT
270 PRINT "BEARING =", INT(F)
280 PRINT
290 R = 6365.11 * D
300 PRINT "RANGE =", INT(R * 100) / 100; " KMS"
310 PRINT
320 PRINT "SCORE =", 799 - 2 * INT((20000 - R) / 50)
330 GOTO 100
340 PRINT "ERROR - TRY AGAIN"
350 INPUT M$(J)
360 CLS
370 PRINT
380 IF LEN(M$(J)) <> 6 THEN 340
390 FOR I = L TO 2
```

Computing Maidenhead

```
400 A = FNA(I)
410 B = FNA(I + 2) + 17
420 C = FNA(I + 4) + .5
430 IF A < 0 OR A > 18 OR B < 0 OR B > 9 OR C < 0 OR C > 24 THEN 340
440 P(I, J) = A * 10 + B + C / 24 - 90
450 NEXT I
460 RETURN
470 CLS
480 PRINT
490 PRINT TAB(5); "MAIDENHEAD LOCATOR"
500 PRINT
510 RETURN
```

Program Three :-

```
10 REM - LAT/LONG TO MAIDENHEAD CONVERSION
20 REM - J.M.HOWELL JULY 1984
30 CLS
40 PRINT
50 PRINT "ENTER LATITUDE (D,M,S,N/S)"
60 INPUT D, M, S, A$
70 IF A$ = "S" THEN GOSUB 250
80 I = INT(D / 10)
90 J = INT(D - I * 10)
100 K = INT((M + S / 60) * 2 / 5)
110 PRINT "ENTER LONGITUDE (D,M,S,E/W)"
120 INPUT D, M, S, A$
130 IF A$ = "W" THEN GOSUB 250
140 F = INT(D / 20)
150 G = INT((D - F * 20) / 2)
160 H = INT((ABS(D * 60 - INT(D / 2) * 120) + M + S / 60) / 5)
170 PRINT
180 PRINT "MAIDENHEAD LOCATOR"
190 PRINT CHR$(F + 74) + CHR$(I + 74) + CHR$(G + 48);
195 PRINT CHR$(J + 48) + CHR$(H + 65) + CHR$(K + 65)
200 PRINT
210 PRINT "RUN AGAIN (Y/N)"
220 INPUT A$
230 IF A$ = "Y" THEN GOTO 40
240 END
250 D = -1 - D
260 M = 59 - M
270 S = 60 - S
280 IF S < 60 THEN 310
290 S = O
300 M = M + 1
310 IF M < 60 THEN 340
320 M = M - 60
330 D = D + 1
340 RETURN
```

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!

We are going on the Web
www.zs6wr.org.za

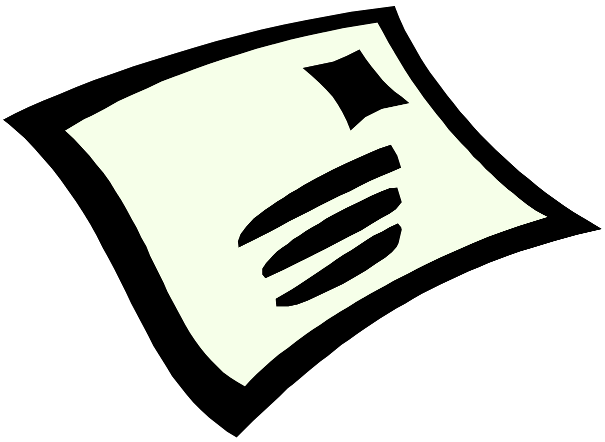
Please note this has been just been registered. Our site will be up in the new year.

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



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