HAMS haywire news

December 2007

MIDLANDS AMATEUR RADIO CLUB
P.O.Box 1076, HILTON, 3245

www.marc.org.za

The Chairman's Fax

Christmas comes but once a year, thank goodness ! I do think with the latest inflation figures just out it could turn out to be a very quiet one!! Food prices have gone through the ceiling and meat will really be a real luxury in the coming year, I wonder whether ESCOM are going to reduce our electricity bills from the lack of service and inconvenience to us, its consumers. Hi Hi.

Do try and make the annual end of the year get together which will take place at Queen Elizabeth Park on Sunday, 16th December at 11:00 hrs. For those who don't know where the park is situated, phone me and I will put you on the straight ans narrow.

Our boot-sale was fairly successful with many items being sold and bought and many more deals arranged for later on. It was good seeing OM Phillip and Erica all the way from Franklin and the news about the new Swartberg repeater soon to be installed, well done chaps!! Thank you to those loyal members who take the time and trouble to support the club from time to time, it was good to have that short social get together again.

The proposed basic electronics course has been canceled as there was only one taker, quite obvious people know all about electronics and a course on how to win friends and influence people would have been more appropriate.(I wonder whether the Dale Carnegie Organization still exists).

For those of you who won't be able to make the party, a sincere HAPPY XMAS to you and yours and may 2008 be a healthy and prosperous year. From the Commttee. Barbara and myself.

Why don't you join in on the Thursday MARC net at 19:00 on 3,620 MHz

### NEXT MEETING ON 19/01/2008

CU THERE

PS! Don't forget to send your apologies if you can't make it!

73 DE ZS5MQ

The club meets on the third Saturday of every month, except December at 13:00 at the Natal Carbineers Conference Center, Geere Street, PMB. Sunday Morning Bulletins (MARC and SARL) as well as the Club Net from 07:45 on 3620 kHz and the 145.750 MHz repeater.

Sunday Club Net Controller: Mickey Esterhuysen, ZS5QB
National News Bulletin: Robin Seal, ZS5MRS
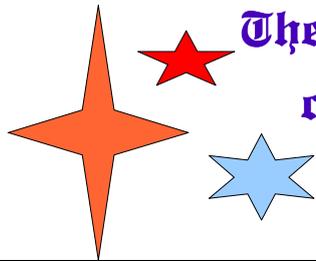
From the Editor

A week or two ago my trusted scientific calculator celebrated its seventeenth birthday by dying on me. Life without such a device is virtually impossible so a speedy replacement was necessary. This is not as easy as it sounds. These new devices are much more sophisticated than their grandparents and require that you spend some time studying the lengthy instruction manual. But what a pleasure this new toy is! I can now get my answers in scientific notation and no longer need to count endless zeros if the answer is pF!

Like my calculator, the year is also at its end and will be replaced with a new one very soon. I am sure that it will also be more sophisticated than the ones that have passed. To cope with it we will need to use the only instruction manual that we have - our experience. Hopefully we will study it and avoid hurting our toes against the same stones. If we were to think that there will be no problems, we are misleading ourselves but, by reading the manual, we will find ways to cope with any problem.

Year-end is also stocktaking time - have each of us given the best that we can to our family, our community, our club and also to ourselves? As the answer to that is probably a "no" for most of us, we can take heart and give it a real go in 2008!

Peace be unto all of you.

Wessel, ZS5BLY.

CLUB BANKING DETAILS

Bank: First National Bank   **Branch:** Bank Street   **Branch code:** 220-825

Account holder: Midlands Amateur Radio Club   **Account Number:** 625057756507

Type of account: Current   *Reference to use is your call sign*

News and Views

ⓘ The Underberg repeater and its antenna have been repaired and is awaiting an opportunity to be put back on its perch.

ⓘ As usual there will be no MARC meeting in December. Members will however be getting together on the 16th December at Queen Elizabeth Park to try their hand at assembling a super hamburger. Components will be supplied by the Club (no soldering iron required!). Bring your own refreshments, plates and whatever tools you may require to eat your hamburger.

ⓘ The Swartberg twins have got almost all the parts together to set up the repeater at Killrush. This seems to be a very good site as they worked Bob, ZS5CU in Pmb on simplex using 30 W into a 5/8 GP.

ⓘ The 750 repeater is back at its old site. Because of interference, the squelch has been turned up so do expect some decrease in sensitivity. Reports to Shaun, ZR5S.

☺ = ?

An Introduction to Direct Digital Synthesis (2)

The diagram below shows a simplified block diagram of a typical DDS system. The value of M in the parallel phase register determines with how much the accumulator will increase with each clock pulse. For our test this is set to one. n is the number of bits in the accumulator and usually lies between 24 and 32. The output frequency Fo is given by the relationship:

$$Fo = \frac{M \times Fc}{2^n}$$
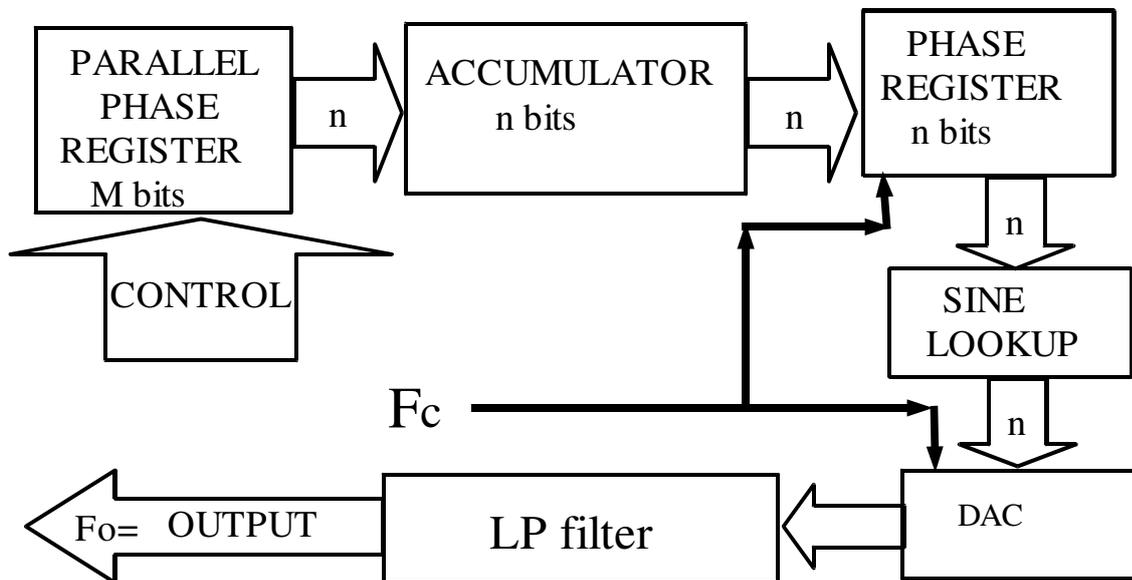
This means that for a clock frequency of 120 MHz. and a 24 bit accumulator, the output frequency will change by $\frac{1 \times 120 \times 10^6}{2^{24}}$ which amounts to 1.2×10^{-16}, an incredibly small number.

In practice the full 24 bits are not passed on to the lookup table, but are truncated, leaving only the first 13 to 15 MSB's. This reduces the size of the lookup table but does not affect the frequency resolution. The resolution of the DAC is typically 2 to 4 bits less than that of the lookup table. This gives us a flexible and very high resolution frequency generator. The frequency can be changed instantaneously with no phase discontinuity by simply changing M.

Nothing is perfect and in the case of the DDS, the 15 bit truncation and the finite resolution of the DAC generate spurs in the output. By judicious choice of M and n these can be reduced to 90dB below the full-scale output. In an application note by Analog Devices (AD 9850), they produced a system covering the frequency range of 0 to 40 MHz with a resolution of 0.0291 Hz. That is good enough for even the most discerning HF operator! If we multiply this up to the 2m band we end up with a resolution of 0.07 Hz!

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Satellite Orbits (2)

Herewith then the rest of the terms used in our orbital data files:

Epoch time: A reference time at which the orbital elements are specified.
Inclination: The angle between the orbital plane of the satellite and the equatorial plane of the earth.
RA of node: (Right ascension of ascending node or RAAN): This is the angle that specifies the orientation of the satellite's orbital plane with respect to the fixed stars. The angular distance, measured eastward along the celestial equator, between the vernal equinox and the hour circle of the ascending node of the spacecraft.
Eccentricity: How close the orbit is to a circle.
Argument of Perigee: The polar angle locating the perigee point of a satellite in the orbital plane; drawn between the ascending node, geocenter and perigee; and measured from the ascending node in direction of satellite motion. When the AoP is between 0 and 180°, perigee is over the northern hemisphere and when it is between 180° and 360°, perigee is over the southern hemisphere.

Most of this may be conveniently forgotten unless you are serious about spacecraft and wish to understand what other people are talking about. Happy satelliting!

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TLC for Antennas

Most radio amateurs tend to think of antennas as " put up and forget" parts of the station setup. Then one day your regular sked tells you that your signal has been deteriorating over the past few weeks and that you are now level with the noise. On lowering the offending antenna, you find that the center lead of the feed line has been eaten away by corrosion. So much for a good soldering job done in 2002!

What has happened has nothing to do with a good or bad soldering joint, it is a normal chemical reaction that takes place between dissimilar metals in the presence of oxygen and/or moisture, both of which abound in the atmosphere where we erect our antennas. Whether, or how fast, such a reaction will take place depends on the position of the metals on the so-called *reaction table* or *relative galvanic series* and the presence of moisture. A list showing the most commonly used materials for antenna construction is shown below with the most active elements on the top (anodic metals) and the least active at the bottom (cathodic elements). The further apart the metals are, the easier they will react with each other. Depending on the source used, some of the metals may go up or down one position - quite frankly, I would trust the list in the chemistry books (which is NOT the one reproduced here) but in practice, this would make little or no difference to what we observe in practice. Our primary aim is to try and prevent or otherwise delay the reaction as far as practically possible without incurring great expenses.

The first step is to avoid contact between metals that are far apart in the reaction list: this is not very easy as the most used materials copper and mild steel (for HF dipoles at the lower frequencies) and copper and aluminium (for Yagis) just don't like each other.

Magnesium
Zinc
Aluminium
Mild Steel
Iron
50/50 lead/tin solder
Stainless Steel
Cadmium
Tin
Nickel
Brass
Copper
Silver
Gold

As far as the copper/steel connection is concerned, it is best to clean all surfaces thoroughly and then tin both. Now solder the two together and try to seal the joint to keep moisture out. Bear in mind that most sealants become brittle with age, especially if exposed to sunlight, and should be further covered with self-vulcanizing rubber tape to prevent any ingress of moisture and so ensure a long life. Coating the joint with a silicone rubber and then applying some heat shrinkable tubing over it is another possible way of obtaining a gas tight connection.

  Using aluminium is a bit more troublesome as it is located near the top of the reaction list. The metal oxidizes within minutes of being sanded sanded down so connections have to be made in quite a hurry. The usual trick is to tin the copper wire to ensure a gas tight seal between the copper and any other material. The tinned copper wire is then placed between stainless steel washers and attached to the aluminium using stainless steel hardware. Once more it is a good idea to seal this connection from the atmosphere using an appropriate sealing agent. A further problem arises when we make use of telescoping aluminium tubing for the construction of elements used in Yagis. In this case the connecting surfaces of the tubes need to be sanded to remove any oxide present (that is , the outer side of the thinner tube as well as the inside of the larger tube). It is recommended that steel wool be used for this process as it produces a very smooth surface and hence a greater pressure contact area.

Either zinc-plated or stainless steel clamps should be used to hold the sliding connection in position. (I have had some interesting effects when using cadmium plated clamps!). The entire joint can then be sealed using heat shrinkable tubing.(Some of the larger diameter shrink tubing contains a low melting point plastic inside which melts when heat is applied to the tube and so ensures an air tight connection when the molten plastic is squeezed out by the shrinking action.)

        Existing beam antennas, both home-brew and commercial models, also need some TLC from time to time. For this operation it is necessary to take the antenna apart and clean all the parts before re-assembly following the guidelines given above. Aluminium is one of the few metals that is attacked by both acids and alkalis. Baking soda, or bicarbonate of soda (sodium bicarbonate) is slightly alkaline and is often used to clean aluminium. When hot water is added, it breaks down to sodium carbonate which is more alkaline and a faster cleaner. So most of the time we use washing soda which is sodium carbonate by another name and also cheaper than the bicarbonate version. Only in extreme conditions we may use caustic soda (sodium hydroxide) as the reaction is violent, the solution is rather corrosive and also produces hydrogen during the reaction (do it outside!). A concentrated solution will remove your skin in a few seconds so use a very diluted version. Caustic soda is generally available as a drain cleaner in crystalline form; always add the powder to the water in small amounts and stir with a non-metallic rod. Wear rubber kitchen gloves and apply the solution to the element using a sponge. Rinse well when done.

        All this may seem like a lot of work, but you will be rewarded by a long period of uninterrupted communication and a well radiating antenna. My 80m antenna, a coaxial-resonator-match broadband dipole with no less than 11 solder joints, has survived almost eight years of Berg weather using the foregoing caveats.

Hints and kinks

        We may use the same chemical principles as mentioned above to clean silver-plated variable capacitors. The capacitor to be cleaned is placed on a piece of aluminium foil and a good electrical connection between them is made. Place the combination in a glass or plastic container and add about two teaspoons-full of bicarbonate of soda. Pour enough lukewarm water over to cover the capacitor and watch the silver reappear!

PS. It also works for the SW's silver jewelery, but don't tell her - you will get even more to do!

Christmas bonus pages

The construction of an Analemmatic Sundial

Analemmatic sundials are comparatively rare, and there seems to be a feeling that they are difficult to make. Actually their construction is no more difficult than that of a horizontal dial. Whilst the style of most sundials lie parallel to the earth's axis, the gnomon of the analemmatic dial is a vertical pin or rod which is moved according to the sun's declination. It does not have hour lines in the usual sense, but hour points which fall along the circumference of an ellipse. Construction by graphic means is rather complicated but the computational method described here is straightforward.

Laying out the hour points. [refer to fig.1]

(1) Lay off AB and CD mutually perpendicular and intersecting at O. The point O does not show in the diagram because it is obscured by the central scale of dates; but we shall continue to refer to point O as a point from which to measure.

(2) Take AB as the major axis of the ellipse along which the hour points will fall, and designate by M the length of the semi-major axis, AO or OB. Let M = 1

(3) The semi-minor axis of the ellipse, m, will be OC with its length found from the relationship

$$m = \sin \Phi$$

where Φ is the latitude of the point where the dial is to be erected. (we will use 30° for PMB) so

$$m = \sin 30° = 0,50$$

(4) Let the times of the various hour points be represented by their hour angles from noon. That is, for example, the hours of 11 A.M. and 1 P.M. are each one hour from noon and have hour angles of 15°; 10 A.M. and 2 P.M. have hour angles of 30°, and so forth. Call this hour angle for any hour "t", and find the horizontal distance, H, of the hour point from O by means of the formula:

$$H = \sin t$$

Horizontal values for an analemmatic dial

Hour	Noon	11 A.M.	10 A.M.	9 A.M.	8 A.M.	7 A.M.	6 A.M.
	-	1 P.M.	2 P.M.	3 P.M.	4 P.M.	5 P.M.	6 P.M.
H	0.000	0.259	0.500	0.707	0.866	0.966	1.000

(5) Find the vertical height,V, of each hour point above the major axis, AB by thr relationship

$$V = \sin \Phi \times \cos t$$

Although the values of H will be the same for every analemmatic dial, the values of V will obviously vary with Φ, and in our case, with $\Phi = 30°$, repeated solution of the formula yields the values shown in the table.

Vertical values for an analemmatic dial

Hour	Noon	11 A.M.	10 A.M.	9 A.M.	8 A.M.	7 A.M.	6 A.M.
	---	1 P.M.	2 P.M.	3 P.M.	4 P.M.	5 P.M.	6 P.M.
V	0.500	0.483	0.433	0.354	0.250	0.129	0.000

(6) We now use the values of H and V as computed in the tables above to locate the hour points themselves. Thus to locate the point for 10 A.M. we measure out horizontally 0.500 units to the right from O, and then vertically upwards 0.433 units to reach the hour point. All the other hour points are similarly located placing morning points to the right of OC and afternoon points to the left.

(7) For computational purposes we have "let M = 1". To make a larger dial with, say, the semi-major axis of 100 mm, (the length AB will then be 200 mm) we simply multiply all the values in our table by 100.
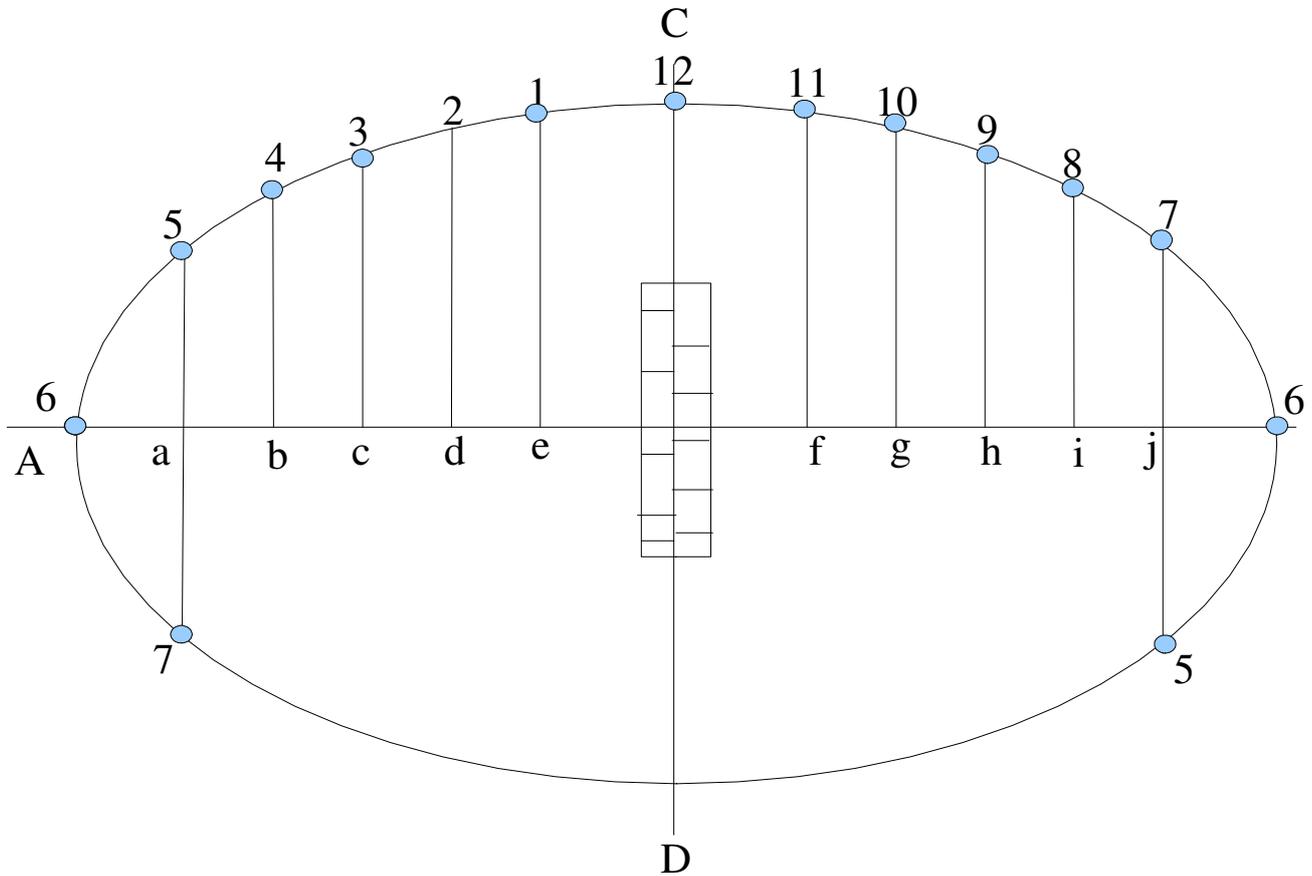

Figure 1

(8) For ease of construction, use an A3 size graph paper. Draw the axes AB and CD and lay out the hour points. Place a vertical rod at point O and align the paper with the line CD pointing North-South with point D facing North. We will construct the scale of dates or zodiac next month. Have a good time!

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At the end of the year

And there's a hand, my trusty fiere,
And gie's a hand o'thine;
And we'll tak a right guid-willie waught,
For auld lang syne.

And surely ye'll be your pint-stowp,
And surely I'll be mine;
And we'll tak a cup o' kindness yet
For auld lang syne

Robbert Burns

(For our non-Scottish readers: *fiere* = comrade; *guid-willie* = hearty; *waught* = draught)

Bulletin Readers

9th December	Mike	ZS5BGV
16th December	Robin	ZS5MRS (probably no bulletin, lucky Robin!)
23rd December	Bert	ZS5MQ
30th December	Wessel	ZS5BLY
6th January	Mickey	ZS5QB
13th January	Mike	ZS5BGV
20th January	Robin	ZS5MRS

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On the Giggle-Hertz bands

The grade 1 class was asked to make a drawing of the flight to Egypt. Little Johny drew the inside of a passenger plane with four people in it. The teacher said that she could identify Joseph, Mary and Jesus and asked about the fourth person. " Oh, " said Johny, " that is Pontius, the pilot"

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They said it

Discovery consists of seeing what everybody has seen and thinking
what nobody has thought.

Albert von Szent-Györgyi

In autocracy, one person has his way, in an aristocracy a few people
have their way; in a democracy no one has his way.

Celia Green

Elections are won by men and women chiefly because most people
vote against somebody rather than for somebody.

Franklin P. Adams

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NEXT MEETING

There will be no further meetings of the club until next year. The time usually taken up by meetings may be used to check out your station from the power supply to the antenna(s). However, my very faintly printed 2008 calender (courtesy KZN Dept. of Education) indicates that the third Saturday in January will fall on the 19th day of the new year. Please highlight this date on your newly acquired calenders.

Please note the starting time of 13:00

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SWOPSHOP

You will have to wait until after Christmas for those lucky ones getting new rigs to sell off the old ones.