February 2007

HAMS haywire news

MIDLANDS AMATEUR RADIO CLUB

www.marc.org.za

P.O.Box 1076, HILTON, 3245

AFFILIATED TO THE SARL & IN ASSOCIATION WITH THE NATAL CARBINEERS

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The Chairman's Fax

Many things have taken place over the past month to bring forward various decisions relating to the Club's facilities which are offered to its members and other hams who would like to make use of them. The Estcourt repeater has been upgraded to enable a link to be used between Griffins Hill and the hub at Pinewood. This should be operational very soon, a work party is is to be arranged by your committee. The other good news is that the Greytown repeater is also ready for installation with a link connected to the Pinewood hub. Work has commenced on the Hilton 700 repeater to upgrade it and this will be made available to Hamnet as and when they require it.

The Walter Reid competition has been agreed on in principle and the new rules will be published soon. In the meantime it has been suggested that members continue with any projects they may wish to enter, this does apply to kits and any electronic item which might have been built over any period of time but which has **never been entered** in a previous Walter Reid competition. Please make the effort to take part as it would look funny if you don't, no excuses will be entertained!

The bands are still cockeyed with lots of QRN in the evening but a group of dedicated hams are taking part in the Thursday night net and it is hoped that those who don't take part will relent and will join us.

Remember a ZR licence does entitle you to use portions of the HF bands.....use it or lose it!

DON'T FORGET THE MEETING ON 17-02-2007

CU there

73 de ZS5MQ

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The Club meets on the third Saturday of each month, except December, at 11h00 at the Natal Carbineers Conference Center, Geere Street, PMB. Sunday Morning Bulletins (MARC and SARL) as well as the Club Net from 07h45 on 3620 kHz and the 145.750 MHz repeater

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

From the Editor

Fortunately radio amateurs are like magpies – they collect things. Most of us do so because, at the time of acquiring the object, we have very definite ideas about a future project where said object is to be used. At other times we merely add useful items like valve bases, feed through capacitors, transformers, etc. to our collection as they may come in handy at some stage. We never seem to use all these things, but their presence in our collection also serves another purpose: a fellow amateur may desperately need one. Maybe you are looking for some obscure part for an even more obscure piece of equipment that you wish to restore to its erstwhile glory because it was your "first"many moons ago. Come and join the Chairman's Chat on a Thursday night at 19:30 (just after the SABC news) and ask for that long sought after part. During the last three weeks a number of our members have obtained just what they were looking for! You may, of course, also make you needs known at a club meeting or even in this newsletter.

By some sleight of tongue the SW has persuaded me to help out at the school teaching Physical Science on a temporary basis to grade 11 "learners". I am not impressed by the enthusiasm of my class, but I am impressed with the modern textbooks that go with the job. If you, like me, have completed your school physics in the first half of the previous century, you may find the books very enlightening. When next in town, visit one of the bookshops and check out the Physical Science handbooks for grades 11 and 12 – you'll love them, they even do transistors!

With all the repeater hardware in the clubhouse, I am sure that there will soon be a need for working parties to install these devices in their respective places of operation. Do yourself a favour and join one of these excursions. You get a view of the countryside, fresh air, another repeater and lots of fun!

VHF and Repeater News.

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Lots of good news this time! OM Craig has completed the work on the Estcourt repeater with its UHF link. These items, with the VHF antennas, have been delivered to the clubhouse. Unfortunately the UHF antenna is too long for my mobile, but we will get it there.

Craig has also acquired another repeater and decided to use it in Underberg. The existing Underberg repeater with its UHF link has therefore been taken to PMB to be installed at the Greytown site. The antennas for this station will be brought along to the next meeting.

OM Bert and Mike took a trip to the Hilton site and removed the repeater for servicing. They also checked the antennas and feed lines and found them to be in good order. They suggested that the antennas be turned through 90 degrees so that they are not screened from PMB by the mast.

Capacitors and their uses

Aluminium Electrolytic Capacitors

Ideal for use in filtering or smoothing rectified A.C. energy storage as in power supplies.Also used for bypassing and coupling in audio applications and as the timing element for non-critical circuits.

Solid Tantalum Capacitors

Lower leakage, high reliability, long life and also a size advantage over their Aluminium cousins.

Ceramic Capacitors

Offer low cost and high capacitance in a small physical volume.There are generally two types:

1. High stability, temperature compensating types for use in resonant circuits and filter applications. These have linear temperature characteristics, and their value is largely independent of voltage and frequency.

2. Bypass and coupling capacitors for use in less critical applications. These are less stable, have non-linear temperature characteristics and their values are somewhat voltage dependant.

Paper Capacitors

An original construction of capacitors for use in A.C. Circuits. Still used for power factor correction in mains supply applications eg. lighting and electric motors.

Polyester Capacitors

Low cost, good stability and available in a large range of values. These are the most widely used capacitors for general purpose applications.

Greencaps and MKT type capacitors are examples of of polyester (polyethylene terephthalate) film capacitors.

Polycarbonate Capacitors

Offer low temperature coefficient and lower dielectric losses at high frequency. Most often chosen for temperature stability characteristics.

Polystyrene Capacitors

Usually chosen for applications requiring tight tolerance coupled with high stability. Predictable temperature coefficient used in conjunction with particular ferrite coils makes highly stable tuned circuits or oscillators.

Polypropylene Capacitors

Offer very low dielectric losses rivaling polystyrene. Suitable for high power inverters, converters and T.V. Deflection.

Film Capacitor Types

KP Polypropylene film/foil
KT Polyester film/foil
MKC Metalized polycarbonate
MKT Metalized polyester
MKY metalized low-loss polypropylene
KS Polystyrene film/foil
MK metalized plastic film (general)
MKP Metalized polypropylene
MKT-P metalized polyester/paper
MKL (MKU) Metalized lacquer (cellulose acetate

TIME, GENTLEMEN! Part 2

Calibrated candles, lamps, water clocks and hour glasses had the advantage that they also worked during the night. It is recorded that some of the more affluent Romans had a special slave at the timekeeping device who called out the hours!

The first mechanical clocks date from the thirteenth century and were driven by weights. These were later replaced by springs to obtain a more compact construction. Though Galileo made some notes regarding the pendulum, he never applied the device to timekeeping. This was left to the Dutch scientist, Christian Huygens, who in 1657 developed the first functional pendulum clock. It was said to have an accuracy of 10 s per day! The accuracy was vastly improved as the external influences on the pendulum were identified and eliminated. More modern pendulum clocks (Grandfather Clocks) boast a very good accuracy.

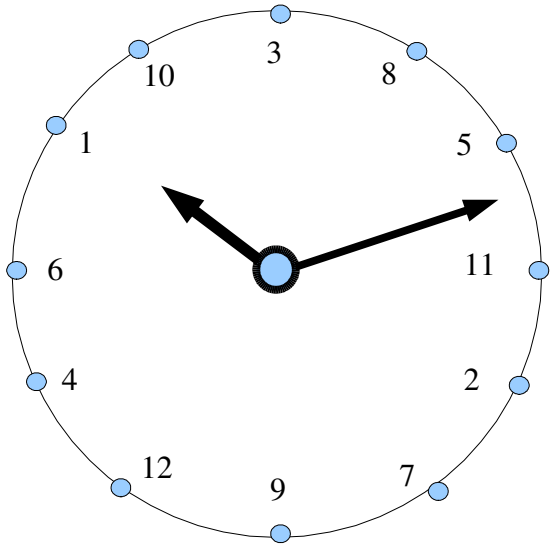
The quest for an accurate clock was driven by the need to have such a device available on board ships to enable them to determine their longitude at sea. So great was this need that in 1714 the English Parliament offered a prize of £20 000 to anyone who could solve the longitude problem. The money prompted the English carpenter and clockmaker, John Harrison, to begin work on a chronometer. His first unit failed to meet the tests of the Board of Longitude but he continued for a further nineteen years and in

1757 produced model H4 which weighed only 1,45 kg and had an accuracy of 0,84 s per day. James Cook took an exact copy of H4 on his voyage to the Antarctic and the South Sea Islands in 1772. He had high praise for its performance even under drastic temperature and climatic fluctuations. In 1773 the Board of Longitude at last gave Harrison his dues (this having been forced on them by George III !). As a matter of interest, the chronometer was only introduced to Americans in 1802 by Nathaniel Bowditch, but they beat the English by having all U.S. Navy ships equipped in 1820, followed by the Royal Navy in 1825.

When the first electric clocks appeared in 1845, they were also pendulum driven and received their jolts from electro-magnets. Only in 1920 did the first quartz crystal based clock appear. It was used in 1930 to determine that the the rotation of the earth was not constant and started a further search for yet more accurate clocks. It is rather difficult to define exactly what is meant by the term “chronometer”. In 1730 it meant 1s per day and in1920 it meant 1s in three years! In 1940, when physicists knew more about sub-atomic particles and understood the shell-orbital level behaviour of electrons, some Americans got the idea of using this phenomenon for measuring time. When an electron moves from a higher shell to a lower one it releases a packet of light or a light quantum with a wavelength proportional to the difference in energy levels. In a simple atom like that of hydrogen which contains only one electron, the movement is restricted and only a simple spectrum of a small number of lines is generated. In the more complex atoms there is much more scope as the outer shells may also be made up of sub-shells and the movement of electrons between these shells provide a very wide spectrum of lines. Magnetic fields caused by electron spin and their movement within the atom cause yet finer splitting of the energy levels which, in turn, give rise to the so called “hyperfine structure”. When energised this structure gives rise to microwave quanta rather than light quanta and this frequency is then used as a standard. In caesium this frequency is 9 192 631 770 Hz. This highly stable constant, which can be repeated in any well equipped physics laboratory, was the used to give us our modern definition of the ISO unit of time, the second. In 1967 the second has been defined as *9 192 631 770 times the period of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the 133Cs atom.*

Even a simple caesium atom clock can produce a relative accuracy of one second in 3 000 years while their more sophisticated cousins achieve one second in 30 million years! With such a high level of accuracy these clocks may develop differences between each other due to drift. They are therefore regularly compared with each other and corrections are made on a basis of some 200 clocks located in 50 different institutions around the globe. It is used to produce a world time standard called *International Atomic Time.*

If you are interested in obtaining one of these, the simple ones cost about £20 000 and the better ones a factor ten more!

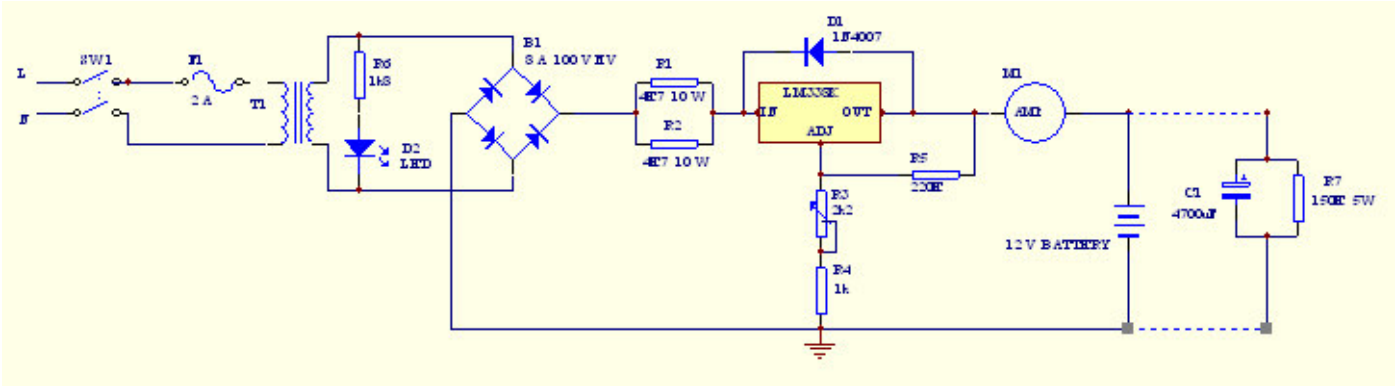


WHO CARES ?

The Battery Charger

This simple project will safely charge a 12 V lead acid battery. The output voltage is electronically limited to 13,85 V. This voltage value will never overcharge the battery. As soon as the lead acid battery is fully charged, the battery's internal EMF will effectively oppose the voltage of 13,85 V and only a small trickle charge of +/- 100 mA will flow.

You can permanently apply this charger to a battery provided that it is in good condition. The figure below shows the circuit diagram of the charger. The procedure to be followed to adjust the charging voltage will be explained at the end of this article.



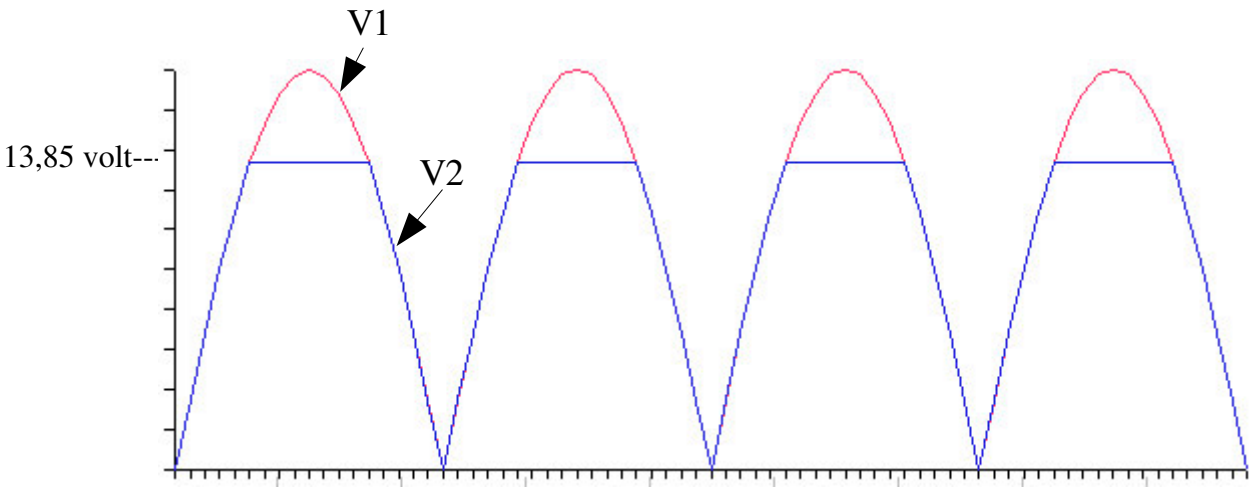
The circuit description is as follows: The transformer, the full wave rectifier bridge and a fuse supply the rectifying and isolation. It is very important to note that there is no reservoir capacitor in this part of the circuit. The lead acid battery likes to be charged by pulses, rather than by a perfect direct current. The transformer ratings are 230 Vrms to 15 Vrms at 2 A or better. The primary is protectedby a 2 A fuse. The 8A bridge must be of the type that can be mounted on a heatsink. A heatsink measuring 40 mm x 40 mm may be used.

R1 and R2 are series resistors that provide current limiting. Current limiting can be supplied electronically, but this will complicate the circuit tremendously. Take note that both resistors have a power rating of 10 W. IC1 is the well known LM338K adjustable voltage regulator. It MUST be the TO-3 metal package. Mount the regulator on a relatively large heatsink, at least 70 mm x 80 mm. If you are not comfortable with the mounting procedure of the TO-3 package, consult the dealer who supplied the device. Make sure that he supplies you with the hardware required (mica plate, plastic spacers, etc.)

R3 is a preset potentiometer which we will use to adjust the precise output voltage. R4, R5 and R6 are standard 0,25 W resistors. D1 is a safety diode to make sure that the regulator will not be damaged by negative feedback pulses. The LED indicates that the device is switched on. C1 and R7 are used to calibrate the system and will be permanently removed thereafter.

The ammeter is optional. It can be useful to see what the charging current is, but panel meters tend to be rather expensive. Use a 3 A or 5 A full scale meter. After the transformer's output flowed through the diode bridge, the waveform will look like V1 in figure 2. This signal will be fed into the LM338K regulator. The regulator is set to precisely 13,85 V and the final output to the battery will look like V2. The battery receives 100 pulses per second with a peak value of 13,85 V. If you have constructed the circuit of Fig.1, V2 (peak) must be set to 14,85 V.

You will apply the special method as follows: connect C1 and R7 to the output. Remember that they do not form part of the charger, but are only used for this procedure. They are used to fill the “gaps”between pulses so we can measure the peak value of the output signal.Connect a good quality voltmeter across R7. Adjust R3 until you get precisely 13.85 V. A preset POT like R3 is likely to deteriorate with time and needs to be replaced by fixed resistors. After the adjustment, carefully remove R3, measure its resistance and replace it with a fixed resistor. You will probably have to use a combination of series and parallel resistors to obtain the correct value. Install the fixed resistors and check calibration once more. It may be that you have to add a further series or parallel resistor to get back on target. Now permanently remove C1 and R7 from the circuit and start charging your lead acid battery.



[*The article above has been taken from* ***Lifestyle Electronics*** *Vol 3, January,2003 with the kind permission of the editor and publisher, Nico Oosthuysen. The seven issues published to date contain a wealth of information as well as practical construction projects. All seven of them are still available in a package deal for R200. Contact OM Nico at (016) 429-2274 or nitronik@lantic.net for further information.*

I have constructed two of these chargers and found them to work very well. One of them is permanently connected to my emergency standby battery. Ed.]

Bulletin Readers

February 11	**Bert**	**ZS5MQ**
February 18	**Mike**	**ZS5BGV**
February 25	**Wessel**	**ZS5BLY**
March 04	**Rod**	**ZS5RK**
March 11	**Craig**	**ZS5CID**
March 18	**Mike**	**ZS5BGM**

On the Giggle-Hertz Bands

A father was on the beach with his children when the four-year-old son ran up to him, grabbed his hand, and led him to the shore where a seagull lay dead in the sand. “Daddy, what happened to him?”the son asked. “He died and went to Heaven,”the Dad replied. The boy thought a moment and then said, “Did God throw him back down?”

They said it

I have not failed.
I have only found 10 000 ways that do not work — Thomas Edison

Protocol is not there to dictate to you. It is there to help you.
You have to have the courage and security to do it your way.. — Barbara Bush.

Of course I can keep secrets. It's the people I tell them to that can't keep them. — Anthony Haden-Guest