SHACKNEWS

HIGHVELD AMATEUR RADIO CLUB

May 2014

We're on

ZS6HVB
Affiliated to the
SARL

COMMUNICATION IS THE NAME OF THE GAME

There was no meeting during April. The meeting date was in the middle of the Easter weekend and seeing that a number of members were unavailable it was decided to cancel.

There will be a meeting this month - 17 May, usual time and venue.

From the SARL HQ Sunday bulletin 4 May 2014

Scientists at George Washington University have devised a new technique to manufacture super capacitors at a fraction of the current cost.

The research team made the new ultracapacitor out of graphene flakes and single-walled carbon nanotubes by using a special technique involving a high voltage arc. They then combined graphene flakes and carbon nanotubes, spread them on paper, and rolled them into a new light-weight, high-performance, low cost ultracapacitor.

Ultracapacitors sometimes called Supercapacitors are generic terms for a family of new electrochemical capacitors. These devices don't have a conventional solid dielectric. Rather the capacitance value is determined by two storage principles, which both contribute to the devices total capacitance.

The significance of this new ultracapacitor is its light weight and low cost making it useful in a variety of tasks from acting as a source of voltage to maintain static memory to larger jobs such as being part of the power system in electric cars.

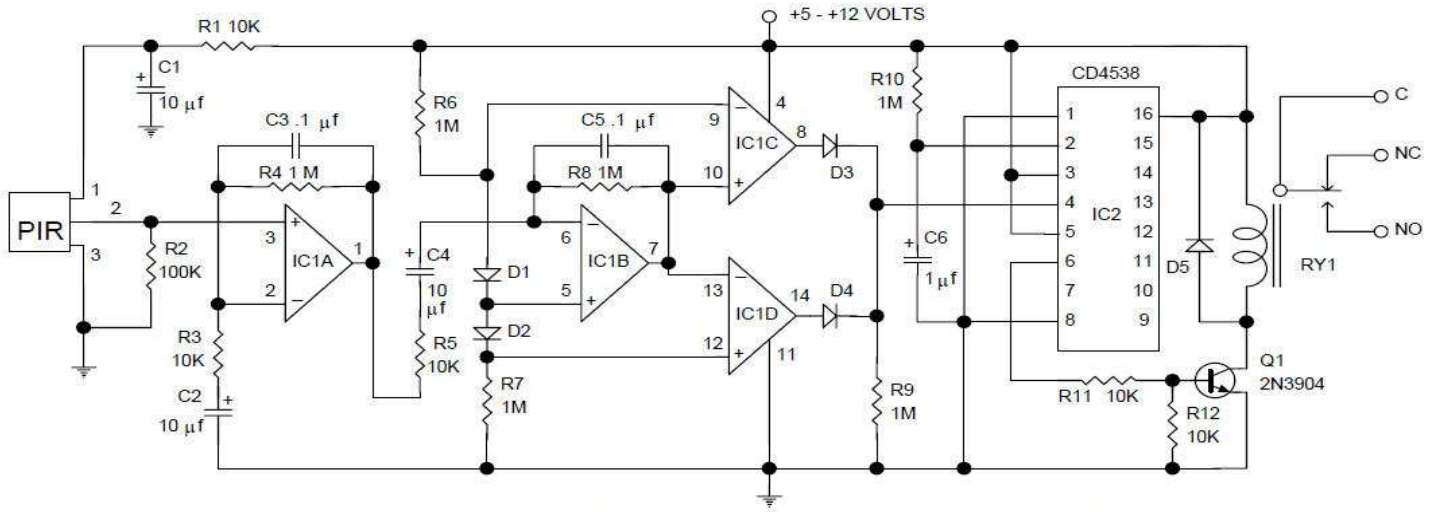
An in depth abstract on this research report is available from the Journal of Applied Physics at tinyurl.com/low-cost- ultracapacitor

On getting older…

When you are dissatisfied and would like to go back to youth, think of Algebra.

First you forget names, then you forget faces. Then you forget to pull up your zipper...
it's worse when you forget to pull it down.

Motion Detector Could be useful



MOTION DETECTOR

VSWR

VSWR = Voltage Standing Wave Ratio
or
ISWR = Current Standing Wave Ratio

As you can see the Standing Wave Ratio (SWR) can be measured by Voltage or Current. The results will be the same. The SWR is derived from the measurement of RF power supplied by the transmitter/amplifier (forward power), compared to the power reflected back to the transmitter/amplifier (reflected power). The reflected power is created by the impedance bump resulting from a mismatch between the antenna and its feed line. For our purpose we can define impedance as (RF) resistance. However, in the real world it also involves reactive components. The SWR is an indication of how well the feed line impedance matches the antenna impedance at a particular frequency. No change other then to the antenna or feed line affects SWR. Normally the antenna is adjusted to match the feed line.

My Antenna Tuner Changes My SWR!

NO, it does not. An Antenna Tuner/Matcher adds either Capacitance or Inductance either in series or parallel which counteracts the existing mismatch. It fool's the radio, allowing it to dump it's full power into the antenna system. All the while the mismatch remains unchanged and the components inside the turner dissipate a portion of your RF power as heat.

Why is SWR important?

It is commonly assumed that a good swr match is required in order to put out the strongest possible signal. While this is true, many old timers will tell you of using antennas with SWR of 5:1 or 7:1 or even higher with great success. However, if you get more detailed information, you will find that they were using very rugged vacuum tube transmitters, rugged antenna tuners and open wire feed lines.

As the SWR and the reflected power increases there will be points alone the feed line where the maximum voltage of the forward power and the maximum voltage of the reflected power are in phase, these points may see as much as several thousand volts even at very low power levels. While open wire lines tolerated this with only an occasional arc over or two, it is a killer for coax with its closer spacing. Another major consideration is that the reflected power must be dissipated somewhere. If an antenna tuner or matcher is being used it will see not only

an occasional arc over or two, it is a killer for coax with its closer spacing. Another major consideration is that the reflected power must be dissipated somewhere. If an antenna tuner or matcher is being used it will see not only the forward power but the reflected power as well. If it is rated for 100 watts and you are transmitting 100 watts connected to an antenna with a 2:1 SWR, approx. 11% of the power is reflected back resulting in the tuner having to deal with 111 watts of total power. It is obvious that the tuner or the transmitter final output transistors, if no tuner is being used, become subject to damage. Most modern transistor equipment's have ALC circuits built in that reduce the output power if a high SWR is encountered. Consider the possible damage to be far more important then the signal strength issue.

Signal Strength

When you consider that the "Signal Strength Meters" used in ham receivers are normally calibrated to 6db per S-unit, the signal strength vs. SWR issue becomes far less important. This 6db calibration means that in order to go from a S5 to an S6 the signal strength must increase by a factor of four. If you are receiving a station running 500 watts at S5 inorder for that signal to increase to an S6 2000 watts would be required. The same station would have to reduce power from 500 to 125 watts to go from S5 to S4.

SWR 1:1 = 100% efficiency
SWR 1.5: 1 = 96% efficiency
SWR 2:1 = 89% efficiency
SWR 3:1 = 75% efficiency

Even with an SWR of 3:1, 75% of the power is accepted by the antenna, while 25% is reflected back into your equipment.

Relativity

What does the ratio mean?
A transmitter output circuit built and adjusted for a 50 ohm match, using 50 ohm coax cable, connected to a 50 ohm load = 1:1 SWR

The same equipment connected to a 100 ohm load = 2:1 SWR

The same equipment connected to a 25 ohm load = 2:1 SWR

double or 1/2 of 50 ohms equals a 2:1 SWR

Characteristic Impedance

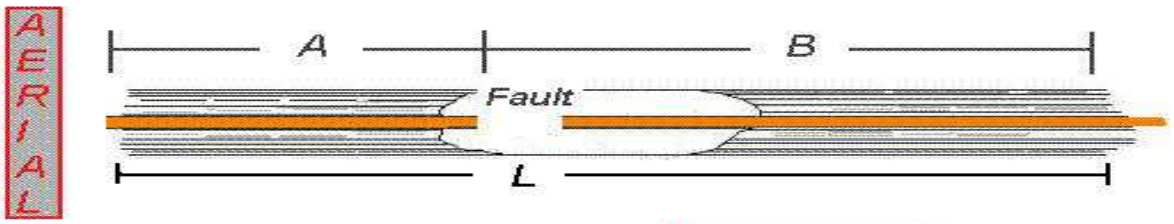
The characteristic impedance of a transmission line, Zo, is the impedance with which it must be terminated at the load end in order to be flat - i.e., not have any standing waves (SWR = 1:1). If a transmission line is not terminated in its characteristic impedance, there will be a reflection of energy at that mismatch which will in turn be responsible for a buildup of standing waves.

Baluns and RF on the Coax Shield

A centre-fed antenna with open ends, of which the half-wave dipole is an example, is inherently a balanced radiator. If the antenna is fed at the centre through a coaxial line, this balance is upset because one side of the radiator is connected to the shield while the other is connected to the inner conductor. On the side connected to the shield, a current can flow down over the outside of the coaxial line. .... these "antenna currents" flowing on the outside of the line will be responsible for radiation.

A Balun is one of the ways in which antenna currents on the outside of the coax can be reduced or eliminated.

Coaxial cable fault finding. Capacitance dependant on coax type.



Measure capacitance of lenght A — A= 350pF

Measure capacitance of lenght B — B= 1400pF

Total lenght of cable = 29.488m

Formula $\frac{A}{A+B} \times L$ = Distance in meters

$\frac{350}{1750} \times 29.488 =$ 5.889m Distance from aerial end

Cut cable 100mm short of this lenght from aerial end.
Measure with ohm meter cutting of 20mm at a time until fault is found, it should be very close to measurement.
U should be able to use quite a bit of coax normally to be dumped.

Radio comm, Oct 196
G2AOX

Club Information

Postal address PO Box 19937 Sunward Park 1470

Website http://www.zs6hvb.za.net
Back Issues of Shacknews available on the club website
e-mail zs6hvb@zs6hvb.za.net
Repeater 145.1875 MHz input - 145.7875 MHZ output

Bulletins Sunday morning - 145.7875 MHz & 7062 KHz @ 08h45.
Relay - 80M - 3662Khz (Winter) 30M - 10.132Mhz (Sum)

Monthly meeting venue

Germiston Methodist Church
Room at back of the offices
Lady Duncan Rd
Germiston

3rd Saturday of the month at 14:30

Committee

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