



# SHACKNEWS

## HIGHVELD AMATEUR RADIO CLUB

MARCH 2008

### COMMUNICATION IS THE NAME OF THE GAME

**Meeting** At this month's meeting two types of DIPPPERS were shown and demonstrated. One was a Heathkit HM-10A tunnel diode dipper and the other a Tech TE-15 transistor dipper (if anyone has the circuit for this one please let me know Ed.) There will be NO meeting at the beginning of April as the venue is being used by Wits Rifles Command. On the same Saturday (5 April) the ZSOAWA will be at the Transvaal Aviation Club from the morning onwards. Come and eyeball your fellow amateur. *Bulletin readers please check regularly to see if there are any changes made to the Sunday roster.*

**SSC Meeting** There was no meeting held this month. The next meeting will now be held at the home of Errol and Betty on Saturday 12<sup>th</sup> April.

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#### **Kids!**

A little boy got lost at the YWCA and found himself in the women's locker room. When he was spotted, the room burst into shrieks, with ladies grabbing towels and running for cover. The little boy watched in amazement and then asked, "What's the matter haven't you ever seen a little boy before?"

On the first day of school, a first grader handed his teacher a note from his mother. The note read, "The opinions expressed by this child are not necessarily those of his parents."

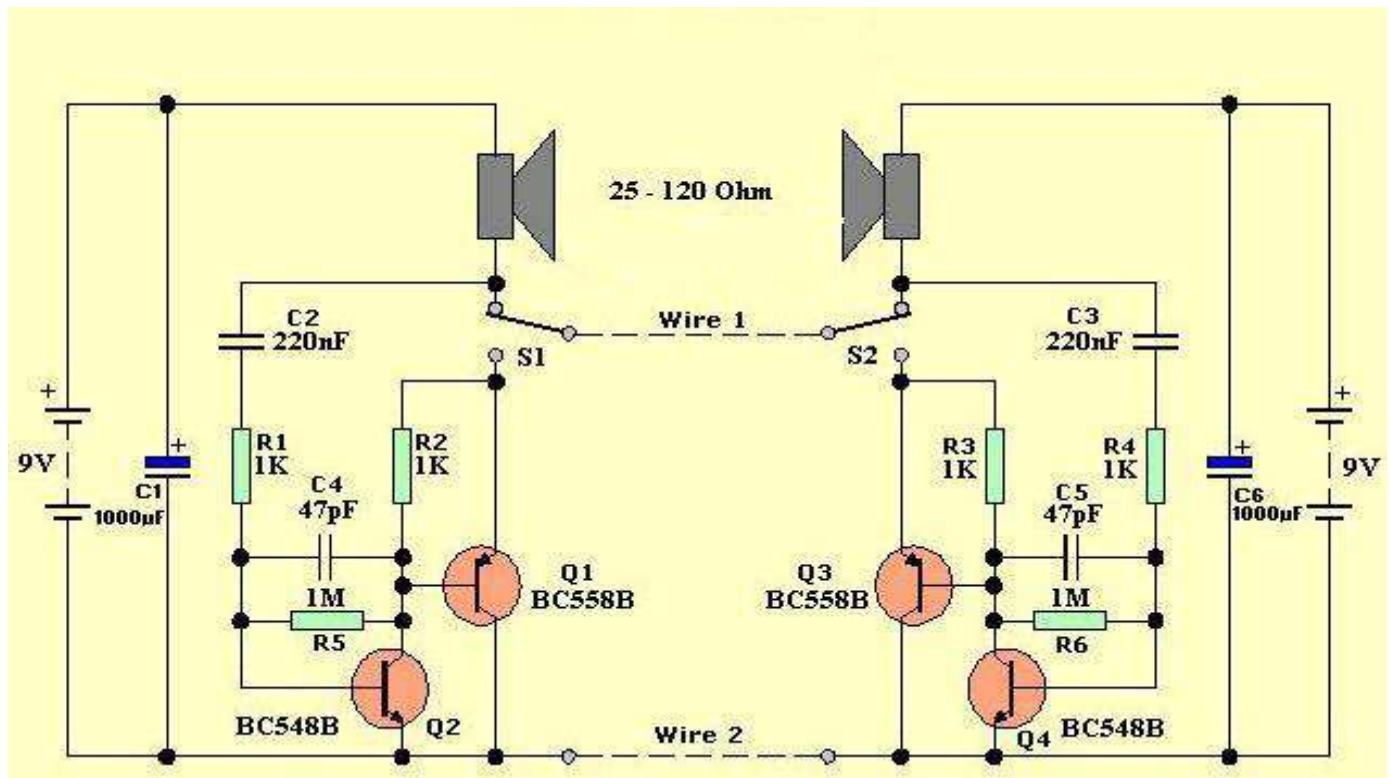
A little boy opened the big family bible. He was fascinated as he fingered through the old pages. Suddenly, something fell out of the Bible. He picked up the object and looked at it. What he saw was an old leaf that had been pressed in between the pages. "Mama, look what I found", the boy called out. "What have you got there, dear"? With astonishment in the young boy's voice, he answered, "I think it's Adam's underwear."

While working for an organization that delivers lunches to elderly shut-ins, I used to take my four-year-old daughter on my afternoon rounds. She was unfailingly intrigued by the various appliances of old age, particularly the canes, walkers and wheelchairs. One day I found her staring at a pair of false teeth soaking in a glass. As I braced myself for the inevitable barrage of questions, she merely turned and whispered, "The tooth fairy will never believe this!"

I was driving with my three young children one warm summer evening when a woman in the convertible ahead of us stood up and waved. She was stark naked! As I was reeling from the shock, I heard my five-year-old shout from the back seat, "Mom! That lady isn't wearing a seat belt!"

My son Zachary, 4, came screaming out of the bathroom to tell me he'd dropped his toothbrush in the toilet. So I fished it out and threw it in the garbage. Zachary stood there thinking for a moment, then ran to my bathroom and came out with my toothbrush. He held it up and said with a charming little smile, "We better throw this one out too then, 'cause it fell in the toilet a few days ago'."

# An Intercom



This Intercom is powered by two 9volt batteries and uses only current when the Intercom is used. Both units are connected via a two-wire little cable or simply two wires (dotted lines). The loud speakers act both as loudspeaker and as a microphone. When you press S1 and speak into the loudspeaker then this signal is amplified by the transistor stage and made audible in the right loudspeaker and vice-versa. An added benefit of this system is that when the switch is pressed it is quiet, not even annoying noise.

If there is no audio output when the button is pressed problem is always that a low-impedance loud speaker is used and although the circuit is working normally there is no audio or very little. Indeed it maybe difficult sometimes to obtain high-impedance loudspeakers, which probably is that by modern radio's the final audio stage is a transistor amplifier and they can provide a lot more current than a tube.

To accommodate those in that situation, below is a solution which will solve the problem by using a audio transformer with a ration of 1:2 or 1:4 to 'up' the impedance. What that means is that the ohm's value at the primary side of this transformer is about 82 ohms. That will accommodate about 100mA max and because the collector voltage is pretty 'nil', it is impossible for the transistor to get hot. If it does, you have the incorrect transformer!

## Substitues

For BC548B = 2N4401, 2N3904, 2N2222A

For BC558B = , 2N4402, 2N4403, 2N3906

220nF = 0.22uF, 25V minimum. Any type or combination will do.

1000uF = 1000uF/25V, electrolytic. Any working voltage over 25V works.

Most (perhaps all) radio hams who build home-brew equipment use batteries: in measuring equipment, in portable receivers (e.g. foxhunt receivers), in microphone pre-amps, and what not. Many of these applications still use non-rechargeable batteries, as the use of rechargeable batteries is not always cost-effective. Unfortunately few electronic hobby projects are designed and constructed with efficiency in mind, which means that their batteries could last a lot longer than they often do. A few simple design rules can extend the life span of the batteries used in home-brew equipment significantly, and thereby reduce the cost of battery replacements.

### *Battery compactness vs. efficiency*

As a rule of thumb, the more compact a battery is, the lower is its efficiency. The most compact battery models commonly used in hobby projects are 1.5V AAA ("small penlite") and 9V rectangular "transistor radio" batteries. The AAA type is a single, thin and narrow cell, while the 9V model consists of a stack of 6 tiny disk-shaped cells. This causes the internal resistance in these batteries to be relatively high; even more so for the 9V type than for the AAA one.

Due to this high internal resistance the losses that occur in these batteries quickly become excessive. When current is drawn from the battery, power is being dissipated across the battery's internal resistance, which in turn heats up the battery. The battery's clamping voltage drops accordingly, and a significant percentage of the energy stored in the battery is being wasted and can never be recovered again.

A battery with a high internal resistance is fine for applications that only draw a trickle of current (e.g. a clock or smoke alarm) or that briefly draw current at large intervals (e.g. a TV remote control). But as soon as the battery has to supply more than just a trickle of current, the internal losses in the battery soon become excessive, resulting in a short battery life.

### *Efficiency and self-discharge rate*

As a side note, it should be mentioned that alkaline batteries perform much better than carbon-zinc batteries in two ways. Alkaline batteries are famous for their increased power density, which makes them the batteries of choice for applications that draw high currents (such as anything with an electric motor inside). Less well-known, but at least as important, is that alkaline batteries also have a much lower self-discharge rate than carbon-zinc batteries do. In applications that are used only occasionally and then stored for long periods (such as measuring equipment) the use of cheap carbon-zinc batteries can actually be more expensive due to their higher self-discharge rate.

### *How to avoid using inefficient batteries*

The main reason for the use of AAA batteries is their small size. The main reason for the use of 9V batteries is their higher voltage in comparison to single-cell (AAA, AA, C or D type) batteries. While using AAA or 9V batteries is often a quick and easy way to fit a battery power supply at the required voltage, it's by no means the best.

Until recently we didn't have all that much choice when designing and building equipment; one had to accept either a low voltage or a large battery compartment. Fortunately this is no longer the case. Modern power control and conversion ICs (especially those manufactured by Maxim) can now come to the rescue. For example the MAX1832 DC-DC booster (a small 6-pin IC typically used with only five or so passive external components) can turn 2 AA cells into a 5V power supply at more than 90% efficiency.

The "traditional" solution to make 5V (e.g. for TTL ICs) has always been to combine a 9V battery with a 78(L)05 voltage stabilizer. That works well, but the voltage drop over the stabilizer amounts to 4/9 or 45% due to the stabilizer's dissipation alone! Add other losses (e.g. resulting from circuit resistance, component resistance and internal battery resistance) and power losses easily amount to 50% or more!

Compared to this scenario, two AA batteries combined with a 90+% efficient DC-DC boost converter to transform 3V into 5V is obviously much preferable. Advanced components such as the MAX1832 also compensates for the battery's voltage drop due to discharge, and provides protection against polarity reversal.

## Solar heating

This subject was discussed during a Porky Club session one morning. These web sites refer to various methods that can be built.

[http://www.jc-solarhomes.com/how\\_to.htm](http://www.jc-solarhomes.com/how_to.htm)

[http://www.builditsolar.com/Projects/WaterHeating/water\\_heating.htm](http://www.builditsolar.com/Projects/WaterHeating/water_heating.htm)

<http://www.builditsolar.com/>

<http://www.motherearthnews.com/Do-It-Yourself/1984-01-01/Build-an-Integral-Passive-Solar-Water-Heater.aspx>

<http://www.motherearthnews.com/Renewable-Energy/1979-09-01/A-Homemade-Solar-Water-Heater.aspx>

[http://www.treehugger.com/files/2007/08/make\\_a\\_solar\\_wa.php](http://www.treehugger.com/files/2007/08/make_a_solar_wa.php)

[http://www.eere.energy.gov/consumer/your\\_home/water\\_heating/index.cfm/mytopic=12850](http://www.eere.energy.gov/consumer/your_home/water_heating/index.cfm/mytopic=12850)

<http://www.kbears.com/sciences/science-fair/sfwaterheater.html>

### **CLUB INFORMATION**

**Postal address** PO Box 19937 Sunward Park 1470

Monthly meeting venue

**Website** <http://www.qsl.net/zs6hvb/>  
<http://www.qsl.net/zs6ssc/>

Witwatersrand Rifles HQ  
Cnr Barlow and Cavaleros Str  
Industries West  
Germiston

**e-mail** [zs6hvb@gmail.com](mailto:zs6hvb@gmail.com)

**Bulletins** Sunday morning - 145.7875 MHz & 7062 KHz @ 08h45.

#### **Committee**

Chairman	Doug Wetton	ZS6BXU	011-680-4906
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Secretary/Treasurer	Berridge Emmett	ZS6BFL	011-893-1291
Repeater/Packet/Technical	Ton van Dijk	ZS6ANA	011-432-5494
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Shacknews Printing	Harry Lautenbach	ZS6LT	011-888-5362
Webmaster	Yvonne van Dijk	ZR6TBL	011-432-5494

#### **Repeater**

145.1875 MHz input

145.7875 MHz output

Linked on a Sunday morning during bulletin time to 70 cm - 438.850 MHz