



# AWA Newsletter

# 98

March 2014

Affiliated  
to the  
SARL



Antique  
Wireless  
Association of  
Southern Africa

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## AWA Committee:

- \* President—Ted ZS6TED
- \* Technical Advisor—Rad ZS6RAD
- \* Secretary/PRO—Andy ZS6ADY
- \* Western Cape—John ZS1WJ
- \* KZN—Don ZS5DR

## Reflections:

It seems to me that every year, as we pass our founding date, there are more new things happening in the AWA. Not only have we now been around for 11 years, but our membership has grown, we have introduced two new portfolios to the Committee, that of Historian held by Richard, and that of Don ZS5DR as liaison for Division 5.

Under Richards guidance, we have become involved with the SAIEE (South African Institute for Electrical Engineers) and are busy setting up a display in the museum at SAIEE.

The first transmissions from the museum have already taken place using the call sign ZS6IEE.

Our new website for AWA SA is under construction and the majority of the groundwork has been com-

pleted. By the time the next Newsletter comes out, it should be up and running and we will publish the link for it.

Generally speaking it has been a good year for the AWA and we are looking forward to many more years of happy QSO's under the banner of ZS0AWA.

I find it almost breathtaking to see how many people are still interested in preserving the fine old valve radios and associated equipment, being keys, bugs, test equipment etc. A few of our members are involved in commercial radios, amplifiers, guitar amplifiers, in fact anything that works with valves.

What would be more interesting would be to hear from those people who are doing more than amateur radio. Write me a small article on

your interests in valve related equipment and lets get it into the Newsletter so more people can become aware of what's out there. Who knows, there may be a good lot of spares out there that you don't know about.

I've said it before and I'll say it again, what an interesting hobby this is that we are involved in. There is just so much that we don't think about, until you come in to contact with someone who is doing something different to what you do.

It really broadens the horizon and when you realize how much there is still to do, it puts a different perspective to our hobby.

Best 73

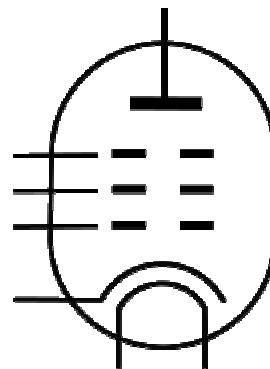
DE Andy ZS6ADY

## WIKIPEDIA

The simple tetrode tube -also called a 'straight tetrode'- offered a larger amplification factor, more power and a higher frequency capability than the earlier triode. However, in the tetrode the anode may emit more *secondary electrons* than it receives (the excess being collected by the nearby screen grid). Secondary electrons are those knocked out of the anode when the electrons from the cathode strike it. The result is a reversal of net anode current. In other words, the anode current  $I_a$  is found to *decrease* with increasing anode voltage  $V_a$ , over part of the characteristic curve. This negative anode resistance ( $\Delta V_a / \Delta I_a < 0$ ) can cause the tetrode to become unstable, leading to oscillation in some circumstances.

The pentode, as introduced by Tellegen, has an additional electrode, or third grid, called the suppressor grid, located between the screen grid and the anode, which solves the problem of secondary emission. The suppressor grid is given a low potential, it is usually either grounded or connected to the cathode. Secondary emission electrons from the anode are repelled by the negative potential on the suppressor grid, so they can't reach the screen grid but return to the anode. The primary electrons from the cathode have a higher kinetic energy, so they can still pass through the suppressor grid and reach the anode.

Pentodes, therefore, can have higher current outputs and a wider output voltage swing; the anode/plate can even be at a lower voltage than the screen grid yet still amplify well.<sup>[5]</sup>



**Pentode symbol**  
Electrodes from top to bottom:  
:anode (plate)  
:screen grid  
:suppressor grid  
:control grid  
:cathode  
:heater (filament)

## CW Activity:

Every month when I sit down to write this column, I think about what more could we be doing in SA to try and increase activity in CW and get more people involved.

Often I read (I can still) on the SARL forum about somebody complaining about their new found interest in CW, but you never hear them on the air.

Then I think, well maybe I am never on the bands at the right time. Is there some other time that people will come up and call on CW on the bands ?

We have a calling frequency, which is so seldom used, that one can actually sit there and have a 20 minute QSO without anybody else breaking in. That is when you find somebody there, its generally 7020.

Would it not be possible to find some time that would suit most people, you can never

satisfy all of the people all of the time, and try and get some interest going in CW again.

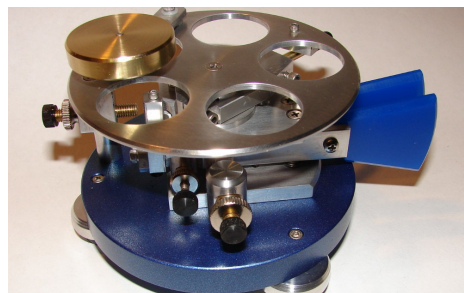
Generally I will give a call on CW around 10:00 on a Saturday morning after the AWA SSB net. Often I will find ZS5DM old man Derek there and have a chat with him. Is this time convenient to anyone else.

Then we have the AWA CW net at 14:00. I will often come up at about 13:30 and give a few calls to see if there is anybody out there.

What is a suitable time for most who want to use CW? I have heard the Div 1 stations on 7020 early morning before the SSB nets, but sometimes they are not very strong.

Should we be trying other bands and times for contacts to Div1 ?

I know there are still a few out there who are interested in using CW. Lets hear who you are and when you can be on frequency and get some activity going again. When there is activity, it will promote more activity. What more could we ask for ?



Rotobug

## SSB activity:

Conditions, although not fantastic, certainly are working in our favour. We still have regular callers on the SSB net with most stations reporting in at around 5/7 to 5/9 signals.

As far as I am concerned, if you are Q5, then you are readable, who cares what S level your signal is running at ?

The Western Cape net can be heard on 7080 at 08:00 and most times can be copied quite well in to Div6. The problem is that of course after 08:30, the band is already starting to fade to Div1 and they drop out quite fast.

We have had a few teething problems with the 20m relay, but hopefully this will improve as we go along. Sigs received in the

Western Cape are fine, but the problem seems to be in relaying back to 40m from this end.

Richard ZS6TF has been operating from the museum at the SAIEE under the call sign of ZS6IEE, and all who make contact with the museum station will receive a QSL card from them. Richard and Jacques have put in a lot of time and effort in getting the station on the air and have good signal reports from across the country so far.

We will have a feature on the SAIEE Museum once the finishing touches have been put to it.

In the meantime, listen out for the call sign if you are interested in making a contact with them and getting yourself a QSL card.

The bands will probably still hold out for the winter and we can look forward to some good comms on 40m and on the DX bands.

Keep on keeping on, and we'll hear you on the bands.



Geloso G212

## AM:

So far AM has been pretty good in the morning net and conditions certainly hold up well.

We still suffer with the further stations going out a bit earlier than the local guys, but then the time that we do have is starting to get longer as winter fast approaches.

If we can still get out on frequency at the same time as we have been doing during the summer months, then we can look forward to having the best of 80m. The problem of course lies in going out to the shack when it is still really dark and cold.

The Wednesday evening nets have become quite well attended with up to 6 stations at times. Of course there is always a lot more time available on the Wednesday evening,

depending on how late you are prepared to stay up.

With the summer storm moving away, the band has become fairly quiet and conditions are really quite good.

Now the only problem will be the cold fronts that move across the country, bringing with them a fair amount of static to upset the band. But we will deal with that when we get there. Usually, winter conditions are pretty good and there are more good evenings than bad ones.

One of the discussion points the other evening on the AM net was, how many listeners are there tuned in to the AM net, either on Saturday morning or Wednesday evening ?

That would really be nice to know. We do

realise that not everyone has AM facilities or really wants to try transmitting on AM, but listening is so easy.

You can even use an SSB rig to listen to AM quite easily by zero beating it. So listen out for us and send us some reports. It would be good to hear from you.



Hallicrafters SX28

## Vintage satellites Part 1

### Richard ZS6TF AWA Historian

Sputnik 1 was the first artificial Earth satellite, and was launched by the Soviet Union into an elliptical low Earth orbit on 4 October 1957. It was a 58 cm diameter polished metal sphere weighing 84 kg, with four external radio antennas. It was visible all around the Earth and its crude morse code telemetry signals were receivable on ordinary terrestrial receivers on 20.005 and 40.002 MHz. by amateur radio operators throughout the world.



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**U.S.A. TESTMETER TYPE "834-5" AC/DC 15-RANGES**  
F.S.D. 1,500 O.P.V.; A.C. DC Volts 12/60/300/600v./1,200/6,000v. Milliamps 12/12/60/600 mA. **£6.19.6.** P.P. 2/6.  
Complete in wooden carrying case with leads and internal batteries.

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AC/SGVM	MS4B
AC/PEN	MVS/PEN(7)
AC/VP(7)	MVS/PENB
AC/VP(5)	MVS/PEN(5)
AC/VP2	MS/PEN(5)
AC/HDD	MS/PEN(7)
CTIC	MX40
DDT4	PEN4VA
FC4	PEN36C
GU50	PP36
H30	MS4
MSH4	MS4B
PM24D	12/6 each
PK25	12/6 each

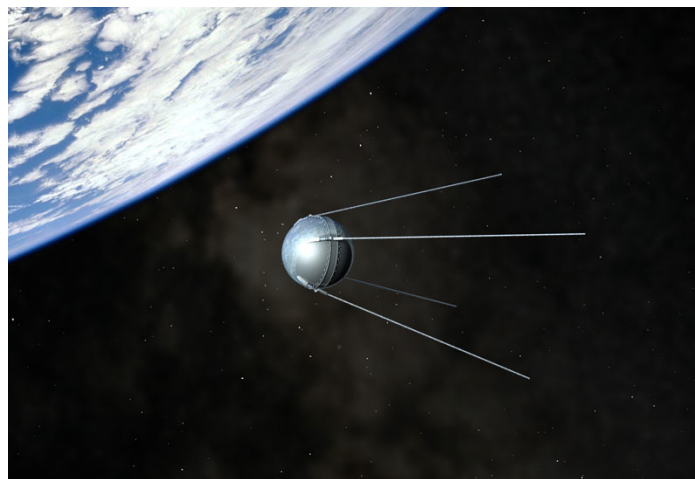
**SEND FOR FREE COMPLETE VALVE LIST OF OVER 400 DIFFERENT TYPES.**

**BATTERY CHARGER**  
Input 200/250 volt. A.C. Output for 12 volt batteries at 11 amp. trickle charge. BRAND NEW. In metal case. **27/6 P.P. 2/6.**

**10/- each**

Here is a very young Brian Otter, now 9J2BO, copying signals from Sputnik 1 on a war surplus R208 receiver.

The batteries had no means of charging and were expected to last 2 weeks but the signals continued for 22 days until 26 October 1957. The satellite travelled at about 29,000 kilometres per hour (18,000 mph), taking 96.2 minutes to complete each orbit. Sputnik 1 burned up on 4 January 1958 upon re-entering Earth's atmosphere, as it fell from orbit after travelling about 70 million km during 3 months.



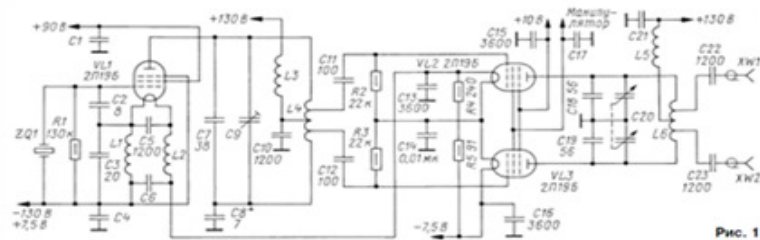
The satellite was constructed with two hemispheres 2 mm thick, bolted together and hermetically sealed with o-rings, covered with a highly polished 1 mm-thick heat shield made of aluminium-magnesium-titanium alloy.

The satellite carried two pairs of antennas at equal 35 degree angles to the axis. Each antenna was made up of two extending whips, 2.4 and 2.9 meters long, and had an almost spherical radiation pattern, with equal power in all directions, to make reception independent of the satellite's attitude.

The power supply consisted of 3 silver-zinc batteries, with a mass of 51 kg which were packed in a hollow octagon with the one watt radio transmitter in its centre. Two of them powered the radio transmitter and one powered the temperature regulation system.

The transmitter was a one-watt valve transmitter weighing 3.5 kg and analysis of the radio signals was used to gather information about the electron density of the ionosphere. Temperature and pressure were encoded in the 0.3 second bursts of transmission.





The launch of Sputnik completely surprised the American public generating a “wave of near-hysteria” shattering the belief that the United States was the technological superpower and the Soviet Union was a backward country. It also evoked fears that with the Soviets extending into space and orbiting vehicles over American sovereign territory, it would put the U.S. at their mercy. Small wonder it triggered a space race the like of which mankind had never seen, and the pouring of immense resources into science education, engineering, mathematics, technological research and a total reform of defensive strategy for the west as the cold war mounted. The lowest point of what followed was the Cuban missile crisis in 1962 and the highest point was surely the American Apollo 11 mission to the moon in July 1969 and Armstrong’s “That’s one small step for man, one giant leap for mankind”

# Clandestine Radio During WWII

*Compiled by agent Tim ZS6IM*

## The Guerrilla Operative

The radio operator with a guerrilla group came in for his share of difficulties too. First of all, he usually arrived at his destination by parachute. Often his equipment was damaged in the drop. Many times he had to lug it over almost impassable terrain in a wild scramble to protect it and avoid capture. Sometimes he never got on the air at all, and he and his teammates would be the subject of melancholy speculation on the part of his comrades at headquarters until some word trickled back as to what had happened to them. The radio man was expected to do his share of the fighting when the situation demanded it; and injured or sick, he was supposed to keep at his radio as long as he was strong enough to operate it.



Carl Bauman Norway 1944 using a "Berit" suitcase set, note the Sten gun and revolver close to hand

The operative in the country usually had a specified mission such as the retraining of an already infiltrated agent or the transmission of information being gathered by specific sources. He frequently could use some city-type methods of operation, being protected by watchers as he worked in some lonely spot, or had the advantages of the guerrilla type, in that he was among friendly irregulars or in their territory. Very often he had little privacy, let alone security, of operation, and his sole protection was the good will of the populace of the area through which he was traveling. Frequently he had to meet contact schedules in the open in broad daylight, with interested indigenous bystanders looking on. Given good will, however, these circumstances were not bad; often providing volunteers to crank the generator and hold up the poles on which his antenna was strung.

## The Lone Country Operative

The country operative was usually no worse off than his counterparts in other situations, and sometimes much better off; occasionally he was treated as an honoured guest. But his status varied with the moods and political views of the so-called friendly leaders of the area, and at times he was viewed with suspicion or open hostility. The agent or agents he was supposed to retrain often resented him and added to his difficulties. He developed skills beyond those he had brought with him: equivocation, tact, flattery, subterfuge, and downright dishonesty became abilities essential to the doing of his job. His one thought was to get it done and get out in one piece and on to the next assignment.

## The Ingredients of Partnership

What kind of person made a good agent operator? His special qualifications required that he be young or old, tall or short, thin or fat, nervous or phlegmatic, intelligent or stupid, educated or unlettered. His political views were of no consequence. If he had a burning resentment at having been thrown out of his country, of having lost family or friends to the enemy, so much the better -- or maybe worse: uncontrolled hatred could create security problems. He didn't even have to like radio very much. About the only attributes he really needed were: ability to put up with all the unpleasantness of six weeks of radio training to get at least a nodding acquaintance with the subject; a willingness or desire to go anywhere by any reasonable means of conveyance -- "reasonable" included dropping fifty feet from a plane into water -- and stay for an unspecified period of time; and the abiding conviction, in spite of feeling constantly that someone was looking over his shoulder, that it would always be the other guy who got caught. In short, he must come to like his work and take the view that he was just plain lucky to get such a good job.



Training radio operators -- RAE classes 1940's style - Hi Hi

At the base end of a clandestine circuit a good operator was, in his own way, different from any other radio operator developed during the war. And he was proud of it. In the first place he had to learn to live in a world of noise, an experience which occasionally resulted in permanent psychoses or suicide. The agent transmitter was a miserably feeble communications instrument, capable under the best of circumstances of putting only very small amounts of radio energy into the ether. Being illegal, it had to compete with jammers, commercial telegraph, and broadcast stations, whose signals often exceeded its power tens of thousands of times. If you can picture yourself surrounded by the brass section of a large orchestra playing one of the louder passages from







The "Paraset" receiver covers 3.0 to 7.6 Mhz. in one band, while the transmitter covers slightly more than the receiver in two bands of 3.3 – 4.5 Mhz and 4.5 – 7.6 Mhz, respectively when selected by a toggle switch. Power output is a modest 4-5 watts CW only, which probably makes the Paraset one of the first QRP radios to be used for official purposes. The power supply was an AC main unit 110 - 250V, 40-60 Hz, using a 6X5GT rectifier tube and a 6 volt DC vibrator unit. The transmitter – receiver weighed a miniscule 1.04Kg

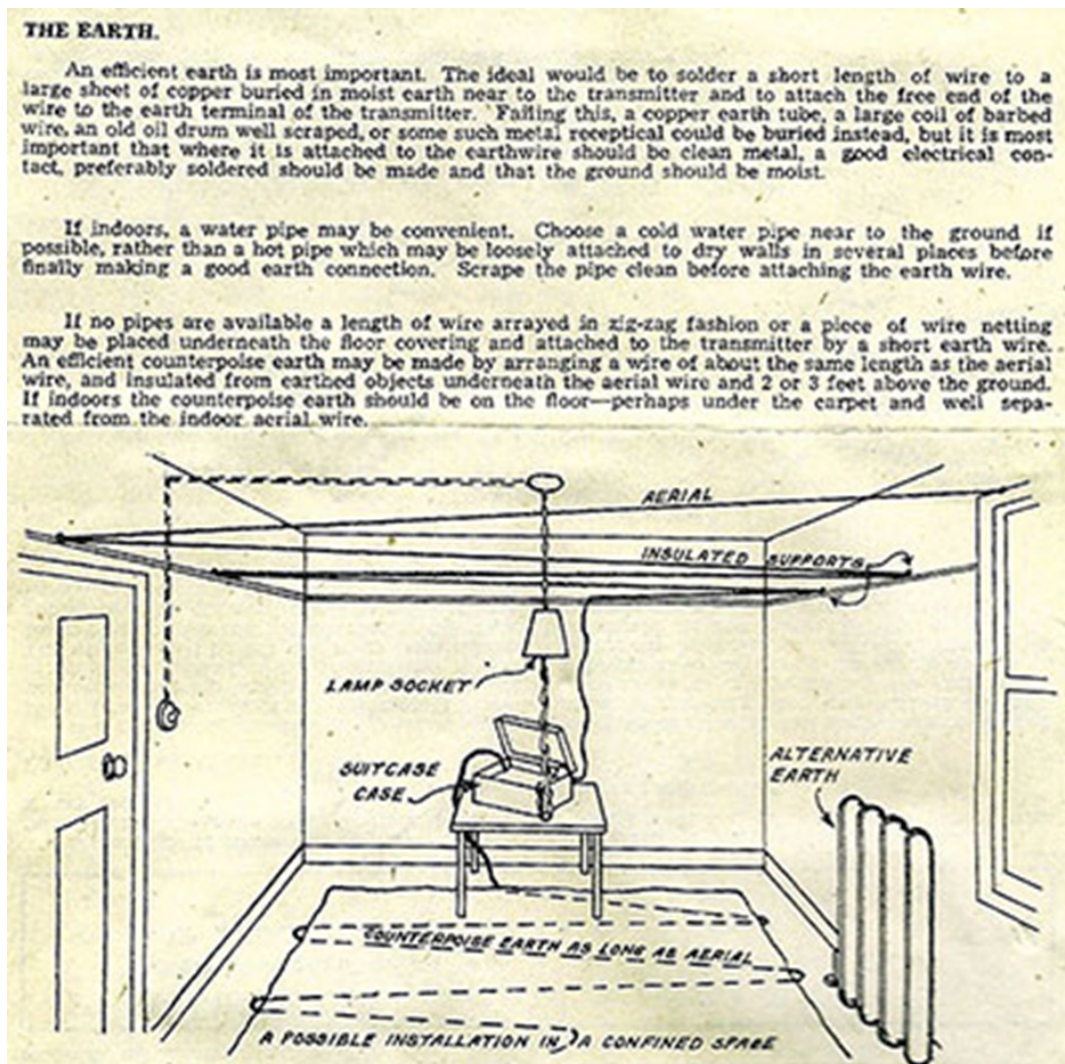
The receiver uses a regenerative detector with a single stage audio amplifier. This design was common among radio-amateurs at that time, as it used the least number of valves.

The transmitter uses a crystal controlled oscillator which is connected to an output coupling system that can effectively match quite large variations in impedance. From there the signal is fed directly to a single wire antenna, which was never more than 20m long and often much less. This was also a common design at the time.



An original Whaddon Mk VII

Page from an operators manual for a suitcase set showing the antenna and suitable counterpoise earth.



The small number of tubes and low power output from the transmitter also contributed to low power consumption, an important factor in clandestine sets. Batteries were often used in these sets as the primary power source for reasons of dependability. Mains power was not always available, and could disappear at any time. In many instances, agents had to operate in rural settings where electrical power was non-existent.

Even though the Paraset was relatively frugal in its use of power, it was still necessary to carry along at least one or more automotive batteries. Also, the batteries had to be charged relatively frequently and that posed considerable operational risks. However, the use of batteries also provided a defense against a common detection technique used by German direction finding teams. The teams would routinely cut off power to a section of the city while listening to what they thought might be a clandestine transmitter. If the transmissions stopped when the power was turned off, they could narrow their search to that part of the city.

The low power output was however, adequate for the purpose, given the large antennas and sensitive receivers at the listening sites in England. A recent propagation study has shown that an antenna efficiency of just a few per-cent would probably have resulted in a signal to noise ratio of 20 dB or so for a path from Calais in France to the receiving site in Whaddon. A path from Marseille to Whaddon would have resulted in a similar signal to noise ratio. It is highly unlikely that the Paraset designers would have done such a study and more likely that they would have relied on personal knowledge of communications at that time. Another factor in favour of the agents was that 1945 corresponded with a solar sunspot maximum, giving the war years some very good propagation conditions.

My interest in this particular set came about when I stumbled on a website devoted to the building of replicas of the "Paraset", ([www.paraset.co.uk](http://www.paraset.co.uk)).

After much research I decided to build a replica with some minor modifications to the circuit to enhance its use on the amateur bands. Also it had to suit the available parts that I could lay my hands on (24 caret unobtainium).

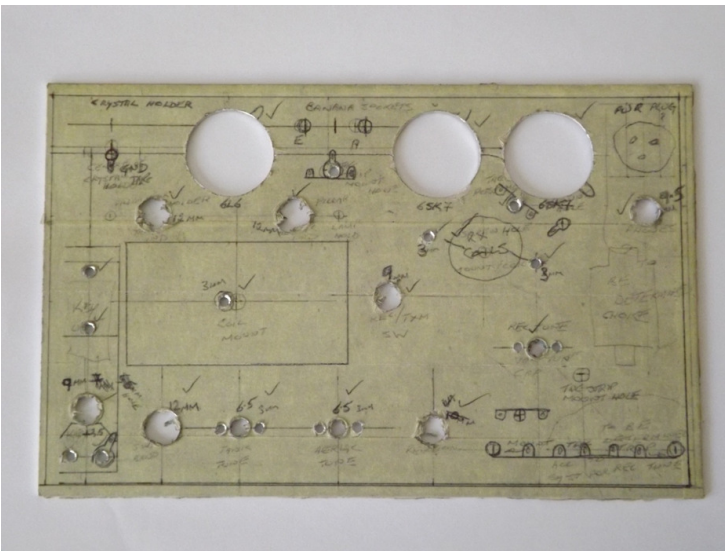
In essence my set retains the spirit of the original with the advantage of being a bit more Ham-user friendly.

One of the short comings on the original set was a lack of side tone, so that was added to the set. An addition of a 1M Ohm resistor was used on the antenna to bleed any static off the antenna to ground. The original set switched the receiver off when transmitting and this would cause the receiver to drift. To avoid this situation the receiver is powered all the time, as is the transmitter. This is not a problem because the transmitter only operates when you key it. Also to stop a loud crashing noise in the headphones each time you switch from receive to transmit and back the audio signal to the headphones is shorted to ground during transmission.

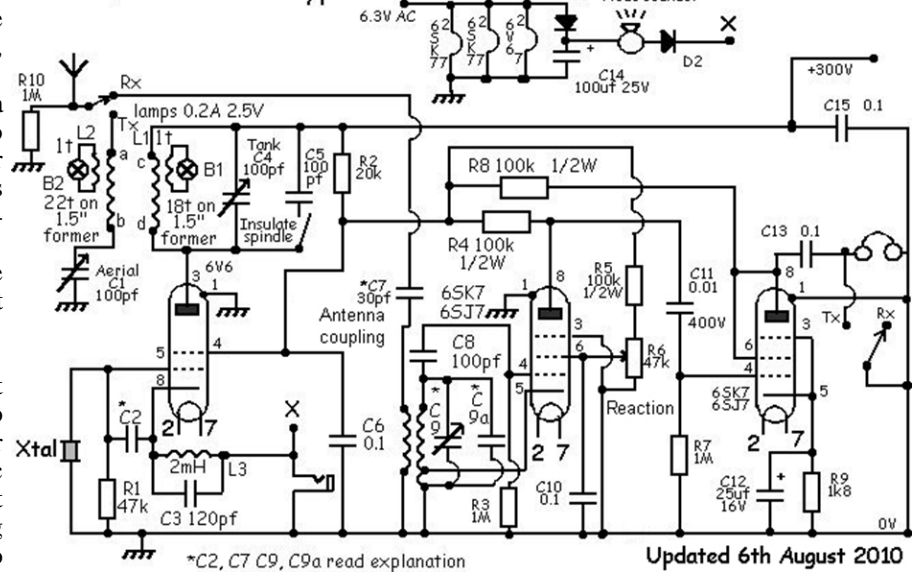
In addition as I am allergic to high voltage shocks, I lifted the tank caps from the high voltage rail and grounded them instead. Trust me, getting bitten by the screw retaining the knob on the tank cap shaft is a memorable experience and one not to be repeated – Hi Hi.

Further additions included the fitting of a band-spread variable capacitor for the 80m band and a zener diode to the detector stage to improve the reaction control. Luckily all this takes place inside the set so from the outside it still looks pretty original.

Marking out the panel and drilling holes



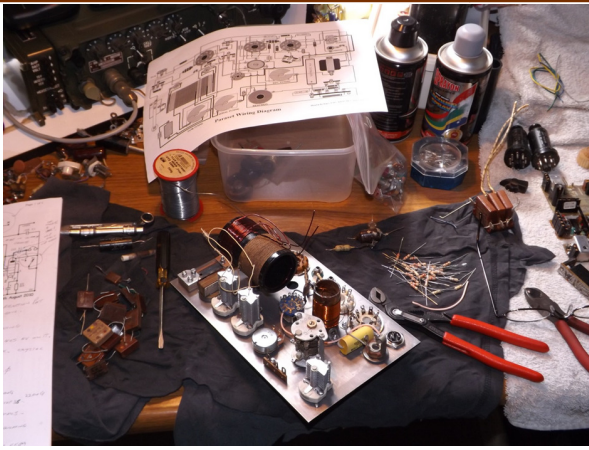
### 80m G3YVF Paraset Type



The build started with marking out the panel and then removing all the unwanted metal, i.e. drilling all the mounting holes etc. After which the plate was sanded and painted prior to fitting the valve holders and other associated parts that would protrude through the panel. The tank and aerial coils were wound on a former salvaged from my junk box and the original silk covered wire was recycled to use for the aerial winding.

Next followed the receiver coils and the key, which I fashioned out of some left over PC board and a piece of hacksaw blade. A bit Heath Robinson in design but it works albeit with a slight rocking action rather than a straight up and down motion like a proper key would work. Now I understand why so many of the guys that build these sets put a socket on for an external key. In fact from my research it came to light that later sets, during the war, included the option of using an external key. "You pays your money and makes your choice", so the saying goes.





An early stage of the construction showing the tank coil and receive coil mounted in position

After that it was a question of wiring the whole thing up. I use a system of crossing out each wire on the schematic as I fit it and have not had many slip-ups using that method. It also allows me to keep track of progress when I have to leave a project in mid-build due to my work taking me out of the country frequently.

Once the majority of the work on the panel was done, I built the wooden box in which to house it all. I used wood because I can do it all at home with the available hand tools at my disposal. Also I like the feel of wood as opposed to metal.

After fitting it into the box, I labelled all the knobs and dials etc. and gave the panel a coat of clear varnish to keep everything stuck down. Then it was time for the power supply. Viv, ZS6VD came to my aid with a circuit he has used and is very reliable, so after a further scratch

through my junk box, for a suitable transformer and choke and some capacitors the power supply was completed. Once again wood was used to house the components, although I used an alloy top and some heat-sink internally for the bits that get warm.

Agent Tim busy earning his "Worked all Neighbours" award. ➡

The first power-up of the set went well and local stations could be picked up fairly clearly. It took a bit of practice to get the hang of the reaction control, but once that was done it was fairly easy to tune them in.

Initially the transmitter would not function but it was traced to a crystal holder that did not make proper contact. Once that was sorted, the set came alive and soon the lamps were shining brightly and Morse was being sent into the ether with a whopping 2,5 watts I might add. I will consider upping the voltage to the set at a later stage perhaps, to boost the output some more, but for now I am very pleased with the set as it is.

All in all, it has been a very satisfying project and has given me hours of enjoyment doing research on the internet and unearthing the rich heritage of the Paraset. It has been wonderful to discover the people behind the set and the numerous agent operators who put their lives on the line each day, many of whom never made it back alive, to tell their tales of heroism. That in itself has been worth the effort of embarking on this journey. I leave you with some photos of the project and trust that you have enjoyed this Article



Tuning for maximum smoke! – Hi



The finished project. ➡



During the construction of this project, several friends gave invaluable assistance and I would like to take this opportunity to thank them. Without their help and encouragement I could not have achieved success. They are, in no particular order:-

ZS6BPA Sakkie Coetzee – my mentor in all things valve related.

ZS6VD Vivian Dold – ever willing to help with anything at any time. (Viv was the first one to power up the project as I was too nervous to switch it on for the first time – Hi Hi)

ZS1VDB Dirk van der Berg – your generous input to my project is greatly appreciated and your Paraset build is an inspiration to me.

ZS6BZM Martin Smuts – my long suffering Morse tutor, a project in progress.

ZS6QL Nico Jansen Van Rensburg – your enthusiasm for this project kept me going.

If there is anyone that I have omitted, the fault is mine and I apologise.

73

Agent Tim

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[http://groups.yahoo.com/  
group/AWA\\_SA/](http://groups.yahoo.com/group/AWA_SA/)

**Antique Wireless Association  
of Southern Africa**

**Mission Statement**

Our aim is to facilitate, generate and maintain an interest in the location, acquisition, repair and use of yester-days radio's and associated equipment. To encourage all like minded amateurs to do the same thus ensuring the maintenance and preservation of our amateur heritage.

Membership of this group is free and by association.

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**Notices:****Net Times and Frequencies:**

Saturday 06:00—AM Net—3615  
Saturday 07:00—Western Cape SSB Net—7080  
Saturday 08:30— National SSB Net— 7140; relayed on 14140  
Saturday 14:00— CW Net—7020  
Wednesday 19:00— AM Net—3615, band conditions permitting.

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**WANTED:**

Looking for a Frequency Crystal for a Hallicrafters HT40 for 40m.  
Looking for a power supply for a Hallicrafters SR160/SR500.  
Looking for a Hallicrafters SX140 receiver.

Contact Andy ZS6ADY—082 448 4368

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**Wanted:**

Tuning dial clamp assembly for Hallicrafters SX28 receiver (fits below main tuning handwheel on front panel).  
James Fairlie ZS5ABW  
033-3867862 072-1799906

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