



A Member
of the
SARL



**Antique
Wireless Association
of Southern Africa**

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AWA Committee:

- * President—Don ZS5DR
- * Technical Advisor—Rad ZS6RAD
- * Net Controller—Willem ZS6ALL
- * Secretary/PRO—
Andy ZS6ADY

AWA Newsletter

#53

May 2010

Reflections:

It seems like it was only yesterday, well maybe a few more days than that, but a short while ago that the top range of radio's were the Kenwood TS820, Icom 720 and the Yaesu FT 757.

How well I can remember drooling at the thought of having one of those fine radio's to replace my HT37 transmitter and SX100 receiver.

The amazing thing was in those day's they also seemed to be a pipe dream as they were always out of reach, or out of pocket reach. Today I could probably well afford to buy one of those radio's then, but have you looked at the price of some of today's rigs. More than what I paid for my first car. And are they much improved compared to those rigs, I

wonder ?

So now we get one rig that can do four things at the same time. Has a built in graphic equaliser to make your voice sound all basey and boomy and bleed 10Kc either side.

Maybe that's a bit unfair, but I have yet to hear any-one who can set up these new rigs so they work the way they are supposed to.

The problem with these rigs is should your 2m go south, you need to send the whole rig in to get it repaired. Then you got no HF because your 2m is not working. Could present some serious withdrawal symptoms.

But then, most hams I know don't only have one rig. So when the 2m stops working, you get the old 2m rig out the cupboard

which has been lying there since you bought the new one.

Or if you send the new one in to get repaired, you get your trusty old valve rig fired up and start to enjoy amateur radio again.

You find out how good it feels to tune up a rig for maximum smoke, and talk in to the old crystal mic again and when you get someone on frequency they compliment you on a great signal and really good audio.

I would think at a time like this you would ask yourself why you ever paid all that money for a radio that's broken, when you could just as well have kept using the valve rig you can repair yourself ?

Best 73

De Andy ZS6ADY

SILENT KEY



In the early hours of Monday the 12th April, Dave Abraham ZS5DTA went silent key.

Dave had retired to Hillcrest in KZN a few years ago and was often heard on the AWA SSB net, whenever conditions allowed it.

Although suffering for many years with a back problem that often laid him flat, Dave was always cheerful and loved rag chewing on 40m.

He had just celebrated his 80th birthday a few days before.

His voice will be missed on the air waves

CW Net:

The CW net has certainly started to become more active on a Saturday afternoon with a good 5-6 stations calling in at any one time. I am sure this is a result of the improvement in the bands because at long last we can all hear each other again.

With John ZS6JB pushing a 599 from Witbank, and other John ZS5JON running a good 579 from Durban as well as hearing all the local div 6 stations, 40m is certainly working well.

Now we just need to be able to hear the Div 1 stations and get them to come up and join us on frequency. What a pleasure that would be.

Listening to the Dx bands, one can hear how active CW still is in other parts of the world, even though the same rules apply across the board. Maybe it's because we

have so few Radio operators in SA and even less who actually use CW that it always seems so quiet on the bands here.

I was reading a thread on the SARL Forum about "Lids", and one of the comments made there was perhaps it's because people don't have to do CW anymore that radio etiquette no longer has any importance and the ways in which people operate today has changed. This may be true to a large extent as I believe a lot of operators learned radio etiquette through CW.

Of course I can hear the voices saying "Stuck in the mud", "Old fashioned", etc, but at least no one calls me a "Lid". Well I hope not anyway.

Still, we do enjoy operating on CW and I am so glad there are still a few good CW operators around who also have a desire to



Monarch Bug

hear the bands alive with the distinctive sounds that only Morse Code can give.

I think we have all developed little bad points in our operating skills, so let's be careful who we put labels to. We can all do with some radio etiquette at times.

De ZS0AWA/CW-

SSB activity:

Firstly our thanks to Dudley for taking calls while we were all at the AWA Open Day enjoying good conversation and good eyeball company. It was so nice to meet up with many of the voices heard on frequency again and just enjoy the conversation around Amateur Radio.

The bands are certainly giving a lot more joy than what they used to and conditions seem to improve as the morning wears on. Now we just need to encourage people back to calling in on the net with their old radio's and new radio's. It certainly does not matter which radio you use, as long as you have an interest in the old valve rigs and are inter-

ested in keeping our heritage alive, then do come up and join us.

80m seems to be fading a bit and Cliff was saying the other day it is easier for him to hear all stations now on 40m than it is to hear the relay on 80m. But we will keep transmitting on 80m for those who do want to use it.

It has still proved useful when 40 is not fully open to Div 5.

There certainly has been a lot more activity on 40m these days and I often hear stations on the new frequencies above 7100. Of course after sunset the Dx band becomes really active and there are many ZS stations

being heard chatting with US and Eu stations. Even without big power output and small antenna, it is quite easy to work some of the Dx stations.

So come up on frequency and have a ball.



Hallicrafters SX42

AM:

Just at the time when AM should be improving, it seems as though all are losing interest in a wonderful mode.

Wednesday evenings there are very seldom more than 2 stations on AM. Saturday mornings there is not very much more activity than a Wednesday evening.

To me this is a great pity as there used to be quite a few active stations on AM and it is such a great mode to play with.

Our list for the Yaesu FR50B draw at the end of the year has grown considerably during a time when propagation has not been great. So if you want to stand in line to win this

wonderful receiver, which is going to be fully restored, then you need at least to be listening in on the AM net and giving a report either on SSB or sending us an email or SMS giving some reports of the stations you heard on the net. That is of course if you can't transmit on AM. If you can transmit on AM, then come up and give a report. Even if you go in to listening mode afterwards, but get your call sign on the list for the draw.

The band is starting to open a bit later in the winter months, which in itself is a blessing as it means we don't have to be out of bed so early on a Saturday morning. But anytime from around 06:00 one can listen out for us

on 3615.

Do come along and join in the fun of using a great mode of operation.



Yaesu FR50B Rx

AWA Open Day Saturday 10 April 2010

This year was no different to any of the previous open day's held at Rand Airport at the TAC. From early morning it was a beautiful day. The previous day had been cloudy and we were expecting it to be a cool wet windy day, but it turned exactly the opposite.

For me, the day started out collecting Barrie ZS6AJY from his QTH and then on to pick up Don ZS5DR, our illustrious President, from the airport. Don used some of those well earned voyager miles he has been collecting flying in to the darkest parts of Africa, to fly up and join us for the day. Of course he stayed overnight and on the Sunday morning I had him in the workshop sorting out a problem on my Collins 30L-1 Linear. Of course one could say there is method in my madness, but that would be pushing it a bit far.

After setting up at the TAC, Rad had a whole table full of goodies that had been donated to the AWA plus a few radio's that also found their way on to the table.

Richard ZS6TF had a few interesting goodies on a table too and there were one or two others who came along with a few bits and pieces.

We had a good turnout, with many popping along to see what was on the go and also the big attraction, which is the aircraft taking off at the far end of the runway, right opposite the TAC. We were treated to a few rounds from the Harvard boys which really made it worth while.

Our thanks of course to Dudley Z22JE, for taking calls on the SSB net frequency while we were out enjoying ourselves. I am sure those who attended would say it was a good day.



The Gathering Under the shade at the TAC



Richard with some of his fine wares



Honourable President and Cliff ZS6BOX



Fagin Cairns attempting to persuade Oliver Smythe to part with the Collins meter he has just bought for R5 from yours truly, (Richard) egged on by Barrie (Bill) Sykes.



The Three Musketeers—Willem ZS6ALL;
Barrie ZS6AJY and Don.



Rad ZS6RAD with his table of goodies



Eager Onlookers with some of the fine rigs for sale.



A Fine example of antique wireless. Richard's 1926
Marconiphone



Some of the wonderful boatanchors on sale



A reply from Ian ZL2AIM to my last CW Posting

"How much pleasure can one get out of listening to a computer generate CW for you and then decode what comes to you from another station. But then, maybe I'm just biased. What say you ?"

Hi Andy

As always thank you so much for such a well prepared newsletter. You ask the question above and my thoughts are written below...

I passed my 12 wpm CW in January 2001 and whilst I was passed at 12 wpm, I was only confident in working stations that would reply to my call at about 9 wpm at the same speed. It was only due to some very kind operators on the air that I built up confidence and slowly increased my speed by having general chats (ragchews) using CW as the mode. I now confidently send at about 20 wpm and get most of my answers at around the same speed. I can read a good fist from a paddle at up to 25 wpm in confidence. A bad fist even at 12 wpm where all the characters are sent as alloneletterwhichrollson to all oneword and all onesentence" gives me no pleasure at all and in fact is a put off for me.

Nine years ago my answer would be that I would not bother to even reply to CW that was generated from a computer.

Nine years ago I wrote every letter down that I heard from the speaker

Nine years ago I used NuMorse on my computer to teach me the code

Nine years ago I used a Morse Mate to help me fill in the words that my brain missed- this helped to build my confidence in receiving CW

The Fists motto is "Accuracy Transcends Speed"

Nine years ago I was less mature than I am now

Nine years after passing my CW exam, I am very happy to get an answer to my CQ call from a straight key, a paddle, a bug, or a keyboard, provided that the CW sent is easy to read in my head. I have even had a ragchew with an operator that used the up and down buttons on his microphone as dits and dahs! Thankfully it was not a long QSO! But it worked for him out in the field.

OK, there is not the "fist" from a keyboard as there is from a paddle, key, bug etc. I know this from experience of having many keyboard QSO's via CQ 100. Bear in mind that the CW in CQ 100 is sent from a keyboard but is still read in your head! I believe I sent perfect CW from my keyboard as I am an experienced touch typist.

I am now nearly 64 years old and it is quite possible in years to come, that due to arthritis or some other ailment, I might not be able to control a paddle or key as well as I do now. But amateur radio is my real hobby and using CW is what unzips my banana. Should an ailment ever happen to me, I would rather be in the position of being able to continue my hobby by sending good CW via a keyboard and reading the replies to my ragchew in my head.

I would hope that if I ever had to resort to using a keyboard that there would still be stations at the other end that would be tolerant of my using a keyboard and give me the same pleasure of a good ragchew no matter what instrument I held in my hand.

So Andy, I hope that gives you something to think about!

I would like to also mention those operators who had the patience to ragchew at speeds that I could read in order for me to build up my confidence.

They were;

ZS4XJ old man Mossie who had INFINITE patience in having long ragchews with us newbies.

ZS5BBW old man Mo whilst he kept his ragchews short, he at least came back to your CQ call and would have a 10 minute chat with newbies.

ZS5TUB old man Tubby who would quite happily have a 60 minute ragchew with you. He helped build up my confidence by acknowledging what I had sent and in so doing, let you know that he could read what I was sending – very important to a newbie on the air.

ZS5FX old man Roger who was very rarely on the band, but would give you a half hour ragchew on Saturday mornings on so many different topics from bee keeping to horses

ZS5UR the Ugly Rat, (old man Bert) that would hold station at 7012 (the parade ground) every day at 11am local and 2 pm local and send at 25 wpm. After those sessions, he was quite prepared to give you a workout at any speed you felt confident using.

So Andy, I don't mind what instrument generates the CW, as long as the bands are active and someone comes back to my call – even if he is using a bent straight key!

73 de ZL2AIM
NZART member

Which 6146 valve is the best ?

John ZS5JF

History

The 6146 series of valves (tubes) were designed by RCA. The first in the series was the 6146 with no suffix letter. This was released in early 1952, the first datasheet is marked "tentative" and is dated May 1st 1952, the first advert for the 6146 appeared on the back page of QST in January 1952. The 6146 was primarily designed for AM or FM mobile radios operating in the 30 to 75MHz band, although RCA gave some data for operating up to 175MHz. Operation was intended to be Class-C to achieve high efficiency and low anode dissipation. No mention is made of linear operation for SSB, this only came later with the 6146A.

New! RCA-6146

MAXIMUM ICAS* RATINGS	
	Below 60 Mc
CW	750
Plate voltage	435 volts
Plate current	150 ma
Plate input	65 watts
At 150 Mc	
Plate voltage	350 volts
Plate current	115 ma
Plate input	48 watts

Another RCA advance in Beam Power Tube design

Here's a power tube that will outperform anything in its class. Rated to 175 Mc—only a trifle larger than a 2E26—the new RCA-6146 beam power tube is tailor-made for the amateur 2-meter band.

Rated at a heater voltage of 6.3 volts and current of 1.25 amperes, the RCA-6146 can deliver a CW output (ICAS) of approximately 69 watts at frequencies up to 60 Mc. At 150 Mc, the CW output (ICAS) is approximately 35 watts or better. An RCA-5763 or an RCA-2E26 is an excellent driver for this trim powerhouse.

It goes without saying that the new RCA-6146 incorporates all of the advantages of RCA beam power design . . . including the economy of a low-voltage power supply, and multi-band operation without the requirements of retuning.

You'll want the full story on this new tube for amateur services. So, ask your local **RCA Tube Distributor** for the technical data bulletin or, write RCA, Commercial Engineering, Section AM-68, Harrison, New Jersey.

To get all the tube power, performance, and life you pay for . . . buy genuine RCA tubes in the familiar red-black-and-white cartons from your local RCA Tube Distributor.

RCA RADIO CORPORATION OF AMERICA
ELECTRON TUBES
HARRISON, N. J.

6146A version

The first major update to the 6146 was the 6146A; electrically this was identical to the 6146 but had several internal differences to improve the life of the valve at full rating. These are of no concern to us, RCA states that the 6146A is directly interchangeable with the 6146. The introduction date of the 6146A is given by the RCA datasheet as 5-63, being May 1963. The 6146A is also known as the 8298 being the US military designation for this valve. (I call this a "major update" as with all manufacturing there are continuous ongoing changes of minor nature throughout the production. Some of these we are not aware of, but might be as simple as a different material being substituted in a non-critical area).

6146B version

The second major update came about when the 6146B was released (also designated as the military part number 8298A), electrically they are identical to the 6146 and 6146A, the only difference was the introduction of RCA's patented "Dark Heater" technology. This featured a different cathode coating that allowed a slightly lower heater current for the same emission as the earlier valves. The earlier valves drew 1,25A at 6,3V; the 6146B drew 1,125A for the same voltage, so not a big differences for the user. RCA states in the datasheet that it is interchangeable with the 6146 and 6146A / 8298. The 6146B version datasheet issue 1 is 2-64, being February 1964.

6146W version

Now we come to the ruggedised version, the 6146W / 7212. This came about because the American military needed a valve that could withstand high shock and vibration. The internal differences are that the supporting wires for the electrodes are thicker, but electrically the valve remained the same as the earlier types. The RCA version of the 6146W is in fact an upgraded 6146A, and we can tell this by looking at the heater current of 1,25A and anode-grid capacitance of 0,24pF, the same as the A version. (Also we can track the introduction from the datasheet dates). Otherwise there are no significant electrical differences between it and the others. The first copy of the 6146W datasheet I have is 7-63 (July 1963), before the 6146B was announced. (In later years the W version could be based on the A or B depending on the manufacturer, it seems there was little control over the various manufacturers making them under licence. As so much uncertainty exists I have to rely on the RCA datasheet as being the "design specification" and ignore the others as being spurious data).

Of interest is that the 6146 was also made with 12V heaters, the 6883B / 8032A is a 12V version of the 6146B.

How can we tell the difference?

We only have to look at the RCA datasheets for the different versions of the 6146 to see there are no significant differences. Two parameters tell us pretty much all we need to know. These are the inter-electrode capacitance between the anode and the grid (Cag) and the transconductance value (gm).

The capacitance between the anode and grid determines how stable the valve is, or how much neutralising is required to make it stable at high frequencies. The smaller the capacitance the better the valve is able to work at high frequencies without oscillating.

The transconductance parameter tells how good an amplifier the valve is going to be. RCA and most American valve manufacturers at the time gave the transconductance in micro-mho's (m-mho, where mho is the inverse of ohm, hence why it is ohm

spelt backwards), today we use the parameter of mA per Volt (mA/V) or more recently the ISO unit of Siemens or milli-Siemens. It is simple to convert between them, 1000m-mho is 1mA/V or 1mS. The higher the transconductance the more anode current it will draw for a certain input drive signal, or in simple terms how much potential gain it will have in a practical circuit. Looking at the various RCA datasheets gives us the following data.

Type	Cag (max)	gm	Heater Current
6146	0,22pF	7000	1,25A
6146A	0,24pF	7000	1,25A
6146B	0,22pF	7000	1,125A
6146W	0,24pF	7000	1,25A

The anode dissipation for all the 6146 versions is identical: 20W for CCS rating and 25W for ICAS rating. (CCS means “Continuous Commercial Service”, ICAS means “Intermittent Commercial or Amateur Service”). By comparison the 6JS6C television sweep tube favoured by other manufacturers is Cag = 0,7pF max, gm = 11500, so it has considerably more gain than any of the 6146 versions, almost twice as much. The 6JS6C has an anode dissipation of 30W CCS rating and 35W ICAS rating. (The 6146 was also modified for colour television sweep tube service under the RCA part number of 6159, 6159A, 6159B and 6159W and are the same as the 6146 versions except the heater voltage is 26,5V).

Further comparison of valve parameters

For those who are still not convinced, we can list the other inter-electrode capacitance values, which clearly show there is no significant difference between any of the 6146 series.

Type	grid-kathode (pF)	output capacitance (pF)
6146	13,5	8,5
6146A	13,0	8,5
6146B	13,0	8,5
6146W	13,0	8,5

Some erroneous statements

When the 6146B version was introduced some HF transceivers when fitted with them exhibited instability on the higher bands. Incorrectly, some people stated this was due to the 6146B being radically different to the 6146 or 6146A. This is untrue, you only have to look at the RCA datasheets to see they are pretty much identical, the difference in Cag was only 0,02pF. So why the problem? The fact of the matter is that some HF transceiver designs had insufficient neutralising range and could not cope with the B version. In fact the neutralising was also marginal with the 6146 or 6146A when the valves were brand new but improved after a few hours use. This was because a brand new valve can have a higher than specification gm until it has run for a few hours, but this fact had been glossed over as “not a major problem”! To blame the 6146B, when the problem was the HF transceiver neutralising design, is simply wrong. Once the manufacturer’s corrected the neutralising circuitry error the problem went away. It seems that some manufacturers had a better understanding of neutralising circuits than others!

The way RCA measure the transconductance value is not with a full anode voltage, as in normal use. RCA specifies the value with the anode and screen grid both supplied with +200V and the grid bias adjusted to give an anode current of 100mA. In this condition the anode dissipation is 20W, the maximum CCS rating. The reason it is measured this way is common in RF amplifiers as the anode voltage swings towards ground during half the RF waveform and up towards twice the DC supply voltage on the other half cycle, the valve needs to have sufficient gain under this low anode voltage condition. The screen grid is normally supplied with a stabilised supply and RCA recommends that this should not exceed +200V, the anode voltage swinging from the off load value of +600V to +200V is considered a valid operating mode. If the anode voltage swings below the screen grid voltage (by more than about 20V) the anode current falls to zero. When this occurs the screen grid starts to behave as the anode and high current flows in it, this is a potentially damaging mode as the screen grid has limited power dissipation.

Another thing to bear in mind is that measurement of the transconductance is a static (DC) test condition. By varying the grid voltage the anode current varies for a fixed screen grid voltage, for a 1V change in grid bias if the anode current changes by 7mA/V. If the screen grid voltage is also varied, all bets are off!

Kenwood used the Matsushita S-2001A in their designs, it being a direct equivalent of the RCA 6146B, and these transceivers hardly ever experienced a problem with neutralising, and for those that did it could be traced to a faulty valve. There is a design note released by Yaesu America about changing the 6JS6C in the FT-101 series of transceivers from the Japanese version to the

American version of the valve, where the neutralising feedback capacitor needs to be reduced from 100pF to 10pF, a significant change! It seems the Japanese 6JS6C is not the same as the original General Electric version of the valve.

European versions

Several European manufacturers, notably Philips (Holland), Valvo (Germany) and Mullard (Britain), which were related companies, also made the 6146 under licence, as well as the M-O Valve Company (GEC) and English Electric Valves (EEV was also a GEC company). The European valve manufacturers used a different part number designation, which gave some details of the valves performance in the part number. The European version was the QV06/20. The Q denoted a RF tetrode or pentode (the 6146 is a pentode) and the V denoted the cathode type, being an indirectly heated oxide coated type. The 06 denoted the maximum CCS anode voltage in kV, being 600V, and the 20 denoted the CCS anode dissipation in watts. The 6146 introduced by Mullard has the first datasheet dated 12-57 (December 1957) although some of the charts are dated 7-56 (July 1956). It was also designated as the CV3523 for UK military users. A picture of an early version has "Mullard made in Holland" screened on the glass envelope. A later designation is the QE5/40, which caused confusion with the anode dissipation value, which was still 20W!

Changing to 6146s

A modification for transceivers using the 6JS6Cs is to change the valves to 6146s, as they are more readily available. This modification involves changing the valve bases and extensive modifications in the PA compartment. What is not adequately covered in the modification is the neutralising components. As the value of Cag for the 6JS6C is 0,7pF against 0,24pF for a 6146, the neutralising network is now grossly over compensated and this can also lead to instability. The writers personal opinion is that this modification is best left alone and new 6JS6Cs purchased to replace the old valves.

So which 6146 is the best?

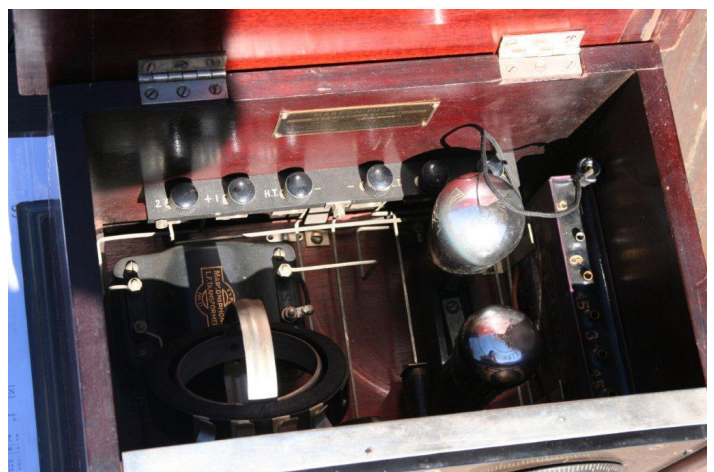
There is no straight answer. If you can purchase 6146Ws at a good price and you consider the better mechanical ruggedness is a factor, then use them. However, be aware that electrically the 6146W is just a plain 6146A, do not expect any magical increase in gain or power output because you will be disappointed if you do. For most HF transceivers there should be no significant difference in performance between any of the series for valves with equal emission. However, comparing a tired 6146 against a new 6146B is not a fair test. A simple method of checking the emission is to measure the idle current for the same grid bias voltage. A valve that has good emission will draw more idle current than a tired valve.

Before you swap the 6146s

In many HF transceivers the driver valve is the 12BY7A, which is a television video amplifier valve pressed into service as a RF amplifier. In colour television service the highest video frequency is about 6MHz. In order to get sufficient gain at higher frequencies some manufacturers run the 12BY7A well above the manufacturers ratings and hence they are dissipating a lot of power, in some cases more than twice the manufacturers maximum rating. This radically shortens the life of the valve and leads to low output power as the gain falls off. Some manufacturers also put a shielding can over the valve; this decreases the life even more as the anode runs at a very high temperature. I have seen 12BY7A anodes glowing red with just the idle current; they are running in full Class-A. Often a suspect pair of 6146s giving less than rated power is simply due to a tired 12BY7A driver being unable to drive the output stage fully. So before you condemn the 6146s try a new 12BY7A. **Note:** Alternatives to the 12BY7A are the 12BV7A and the 12BQ7A, these are all interchangeable without any components changes. The European equivalent is the EL180.



So where does this go ? Check the legs in the background !!



Inside the Marconiphone. Look at the wiring.

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**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 transmitters and receivers. 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.

Notices:

I am busy clearing the old shack and have a few valves that are too good to throw away. They are vhf twin tetrodes type QQV 3/10 and mercury vapour rectifiers type 866A. All brand new. So for someone with an old style vhf rig or an old AM rig, they might be spares. Cheers, Evert ZS6AQW—vdhorst@telkomsa.net

I have some time ago sold all my radios requiring 6146 valves. I now have for sale the following available that may be of interest to the AWA members :

Sylvania	6146B	2 valves	New in original boxes
RCA	6146B	3	New never used
RCA	6146	1	New in original box
Philips	6146B	1	New in original box
Raytheon	8032A	2	Used also listed as 8552 or CK6883B

I can be contacted via E-mail, sela@telkomsa.net or at 028-312-3622.
Kosie ZS1SR

The Antique Wireless Association Valve QSO party will be held on the weekend Saturday 08 May - AM and Sunday 09 May - SSB from 15:00 to 19:00 SAST on both days.

Frequencies: 40m 7053 to 7100 and 80m 3603 to 3650.

Exchange: Call sign, RS and consecutive serial numbers starting at 001, plus type of radio used, eg HT37 Tx.

Scoring: All valve radio - 3 points per contact;

Hybrid (valve & solid state) - 2 points per contact;

Solid State Radio - 1 point per contact.

Log submissions must be sent to:

**Southern African Antique Wireless Association,
PO Box 12320,
Benoryn, 1504.**

E-mail: [andy\[dot\]cairns\[at\]xsinet\[dot\]co\[dot\]za](mailto:andy[dot]cairns[at]xsinet[dot]co[dot]za).

Closing date for log entries is 28 May 2010.