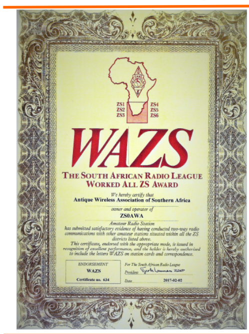
Southern African ZSOAWA Antique Wireless Association

Newsletter

136

November 2017

A Member of the SARL



Inside this issue:

AWA Committee:

- President—Jacques ZS6JPS
- Vice President and Western Cape—John ZS1WJ
- Technical Advisor—Rad ZS6RAD
- Secretary/PRO—Andy ZS6ADY
- KZN—Don ZS5DR
- Historian—Richard F4WCD (ZS6TF)
- Member—Ted ZS6TED

Reflections:

"Where have all the OM gone, long time passing ? "

Some of you may recognise the words of the song above, but I really have been wondering what has happened to all our long time followers.

The AWA Valve QSO party was probably at its worst for the submission of logs in November this year.

Our Saturday call in is probably at its lowest since the inception of the Saturday net.

The Saturday morning and Wednesday evening AM net is more often than not, nonexistent.

So often we blame the poor band conditions on all of this, yet many of the stations who do call in are quite readable. There have been means put in place to allow people who do suffer with poor reception to call in. The Sandton club opened up their 2m repeater to us for sole use for the duration of the Saturday morning net. This repeater has now been connected to Echolink thanks to the work of Henry ZS6MC.

You can download and register with Echolink on the internet and it opens up a whole new system of communication for one, local as well as world wide.

There is a relay of this net on 3620 for those who want to use SSB and can't hear the control station on 7140.

Signal reports that have been received on all of these are pretty good, yet for some reason our numbers are still down.

Be that as it may, the discussions held on the SSB net are still interesting and draw a lot of interesting discussion from all those who are there.

It really would be wonderful to have a call in of about 15 or more stations again.

Please diarise the AGM at the SAIEE in Observatory . It promises to be a good gathering again and we are looking forward to meeting up with so many of you again. Remember to bring along any valuable junk that you may want to dispose of, there are always people looking for bits and pieces.

This will be our 14th year since the founding of the association in 2003 with a start up membership of about 10. We have seen 10 past Presidents and this year will see a new President inaugurated.

Looking forward to shaking hands with many of you again, or if you don't like that I'll even give you hug.

Best 73

DE Andy ZS6ADY

WIKIPEDIA

Amateur radio The many facets of amateur radio attract practitioners with a wide range of interests. Many amateurs begin with a fascination of radio communication and then combine other personal interests to make pursuit of the hobby rewarding. Some of the focal areas amateurs pursue include radio contesting, radio propagation study, public service communication, technical experimentation, and computer networking.

Amateur radio operators use various modes of transmission to communicate. The two most common modes for voice transmissions are frequency modulation (FM) and single sideband (SSB). FM offers high quality audio signals, while SSB is better at long distance communication when bandwidth is restricted.

Radiotelegraphy using Morse code, also known as "CW" from "continuous wave", is the wireless extension of landline (wired) telegraphy developed by Samuel Morse and dates to the earliest days of radio. Although computer-based (digital) modes and methods have largely replaced CW for commercial and military applications, many amateur radio operators still enjoy using the CW mode—particularly on the shortwave bands and for experimental work, such as earth-moon-earth communication, because of its inherent signal-to-noise ratio advantages. Morse, using internationally agreed message encodings such as the Q code, enables communication between amateurs who speak different languages. It is also popular with homebrewers and in particular with "QRP" or very-low-power enthusiasts, as CW-only transmitters are simpler to construct, and the human ear-brain signal processing system can pull weak CW signals out of the noise where voice signals would be totally inaudible. A similar "legacy" mode popular with home constructors is amplitude modulation (AM), pursued by many vintage amateur radio enthusiasts and aficionados of vacuum tube technology.

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HF HAPPENINGS

Special Event Call Sign from the Northern Cape

From 1 to 30 November, the Bo-Karoo Amateur Radio Club will be celebrating the 40th anniversary of the commissioning of the Vanderkloof Dam with the special call sign ZS40VDK - QSL via the operator's instructions. As part of these celebrations, the Club is hosting the ZS40VDK Bash at the Sandgat Resort just outside the town of Vanderkloof on Saturday 18 November. The Bash includes the Club AGM, a potjieskos competition and a dance.

The Vanderkloof Dam (originally the PK Le Roux Dam) is situated approximately 130 km downstream from the Gariep Dam and is fed by the Orange River, South Africa's largest river. The dam was commissioned in 1977. Vanderkloof Dam is the second-largest dam in South Africa (in volume) and has the highest dam wall in the country at 108 metres.

The new IOTA website live

The new Islands on the Air website and the software system that will run the IOTA programme in the future are now fully up and running. Users will be redirected from the old site to the new one and can log in using their existing credentials. Go to www.iota-world.org to learn more about the programme.

Rain Affects Signal Strength

There are many places in the developing world that do not have accurate weather monitoring for rainfall. Many of these locations do have cellular phone infrastructure, normally consisting of towers con-nected to one another via radio links. It turns out that rainfall causes variation in the signal strength of the links between the towers, which can be used to estimate rainfall https://www.economist.com/news/science-and-technology/21729740-rain-affects-signal-strength-which-means-you-can-measure-it-counting-raindrops.

Word to the Wise

Stiction - static friction that must be overcome to allow touching materials to move relative to one another. Aluminium parts, such as antenna elements, can exhibit stiction.

Operating Tip

Choose the Path That Works. When using directional antennas, do not forget to check the alternative paths for stations when you are calling CQ, or if you cannot hear a spotted multiplier when you are searching and pouncing. It can pay to also try non-traditional or skew paths, such as beaming south-of-short-path to reach the EU from the US.

Manipulate ADIF files

Sometimes it is necessary to manipulate ADIF files, for example when splitting a county-line log entry into separate uploads for each county in preparation for upload to LOTW. Jim, AD1C, has written a utility that fits the bill http://software.ad1c.us/ADIF_Split/index.html.

Keyboards

Keyboards may be getting fancier and smarter, but it seems like the time between when you press a key and when it registers in the logging program might be increasing. Perception may be reality, but someone has actually measured the latency https://danluu.com/keyboard-latency/.

African DX

Malawi, 7Q (Update). Members of the EIDX Group (who brought you 9N7EI earlier this year) will be active as 7Q7EI from an ideal location on the shores of Lake Malawi between 21 March and 3 April 2018. There will be a team of 14 operators. Operators mentioned are Dave, EI9FBB, Jeremy, EI5GM, Declan, EI9HQ, Pat, EI9HX, Enda, EI2II, Thos, EI2JD, Alain, EI2KM (F8FUA), Jim, EI4HH, Padraic, EI5IX, Dave, EI4BZ, Peter, EI4GZB and Alain, F5JTV. Ac-tivity will be on 160 to 10 meters using CW, SSB and RTTY. They also plan to be in the CQ WW WPX SSB Contest (24 and 24 March). There are four ways to QSL. QSL via M0OXO, direct or via his OQRS (direct or Bureau). The entire log will not be uploaded to LoTW for possibly up to 3 months.
The team now has a web page at http://www.7q7ei.com

November

4 – RaDAR Challenge and SDR Work-shop in Cape Town
5 – PEARS HF Contest
11 – Armistice Day
12 – Remembrance Sunday
18 – ZS40VDK Bash = AGM and Year-End function of the Bo Karoo ARC, Vanderkloof
18 - Antique Wireless Association Museum Open Day, Flea market and AGM
17 to 19 Cherry Festival, Ficksburg
23 - Closing date for December Radio ZS
25 - SARL Newbie Sprint; West Rand Flea Market; CTARC End of the Year function
25 and 26 - CQ WW DX CW Contest

December

1 – start of the YOTA Month;
3 - SARL Digital Contest; Day for Disabled Persons
6 – all schools close

What is my SWR meter trying to tell me?

By John Fielding ZS5JF

Most amateurs have a type of SWR meter and some can also measure power as well as SWR. So what exactly is SWR?

SWR is short for VSWR, which is *Voltage Standing Wave Ratio*. The instrument is connected in series with an antenna feedline, normally today a unbalanced coaxial line, and it can resolve between the forward wave of power and any reflected power. This is displayed as the SWR on the meter. The reason it is called VSWR is because we measure the *Voltage* and not the current flowing in the feedline. This is purely for simplicity as it is easy to measure voltage but more difficult to measure current.

What is SWR?

SWR is a ratio, that's what the R on the end means. The instrument will be designed to operate in a certain impedance line, normally 50Ω, although 75Ω and 60Ω versions are also made for special applications, and as long as the feed line used is 50Ω, or very close to this value, then it should give an accurate result. If the feedline is not close to 50Ω then all bets are off!

Suppose the antenna presents an impedance of 100Ω to the feedline, what is the SWR indicated?

The ratio is always such as to give an answer equalling or greater than 1.

So the numbers have to be the right way around. In this example it is 100 divided by 50, as these are the two numbers we wish to find the ratio of.

So the SWR is 2:1.

If the antenna impedance is 25Ω, what is the SWR now? Well the answer is also 2:1 as the equation is now 50 / 25 = 2, as it is wrong to have the numbers swapped around, which would give an answer of 0.5. SWR cannot be less than 1.

So it is obvious our simple SWR meter doesn't tell us anything very useful, apart from the SWR number. The antenna when it measures 2:1 could be 25Ω or 100Ω and we have no way of telling which one it actually is. For this we need something more specialised, such as an antenna analyser or an impedance bridge.

Impedance

We have mentioned impedance several times, so what exactly is impedance?

Impedance is the ac version of resistance. In ac circuit theory a complex network can consist of pure resistance and reactance. The reactance can be either capacitive or inductive. It is the norm in network and antenna theory to consider the resistance and reactance as being connected in series. By convention a capacitive reactance is assigned a negative value and an inductive reactance a positive value. Complex impedance measurement will often be shown in what is called *J notation*. This uses the lowercase letter to denote the reactive portion.

Hence, a measurement of an antenna might be 22 –j45, or 30 +j30 etc. The first number in 22 –j45 (the 22 part) is the resistance value in ohms. The second number with the j prefix is the reactive value, also in ohms. These are called the R and X values.

Note: In a practical antenna both the R and the X value changes as the frequency varies, the X portion can change from being negative to positive or vice versa as the antenna passes through resonance.

Resonance

Resonance is defined as a complex series or parallel network where no reactance exists. The only portion left is the R value. Below the resonant frequency of a fixed length antenna the antenna reactance is capacitive, as the antenna is too short. Above the resonant frequency the antenna is now too long and it flips to being an inductive reactance.

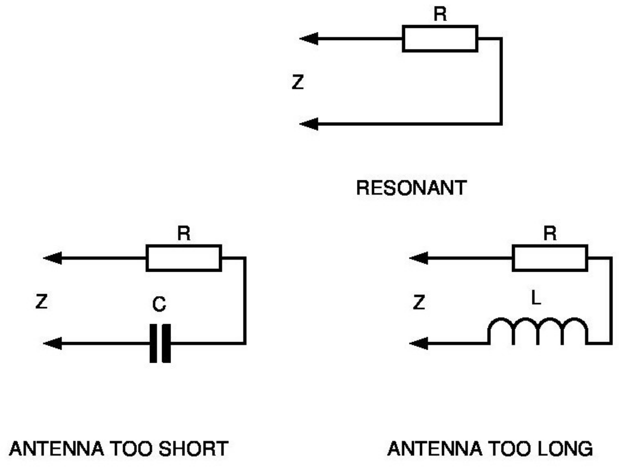

Figure 1 Antenna resonance diagram

Calculating Impedance

Impedance is the summation of the R and X portions to arrive at the *equivalent ac resistance* of the network. There are two methods to ascertain the impedance, either by mathematics or graphically. The R value is plotted as a horizontal line on graph paper by a length representing the value, say 100mm for a 100Ω resistance. Similarly, the reactive value is also plotted as a vertical line, again scaled to length. So a reactance of 50Ω could be 50mm long. It is the convention that R always starts at zero and moves to the right of the chart and the reactance can be either pointing up or down on the chart. Conventionally the inductive reactance points upward and the capacitive reactance points downward. But this isn't cast in stone, it is the lengths that are important, not the direction it points. (Negative resistance – yes it does exist – is pointed to the left on the horizontal axis).

If you remember Pythagorean geometry for right angle triangles then it becomes simple. The two lines are at 90° and the missing side of the triangle is the hypotenuse. This represents the impedance value, Z. Figure 2 shows the two different cases.

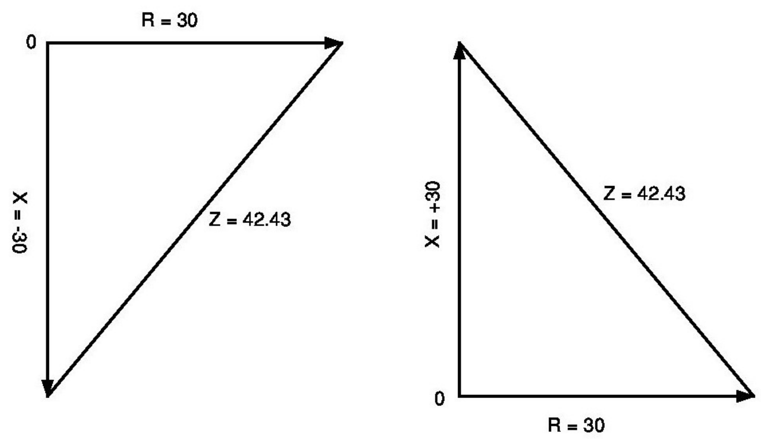

Figure 2 Impedance plot for capacitive and inductive reactance.

In Figure 2 the left hand graph shows a series network with a resistive portion of 30Ω and a capacitive reactance of 30Ω. (Because X is negative it points down). The equivalent impedance, found by measuring the length of the slant side Z, is 42.43Ω.

The other graph shows the case for the same resistive and reactance values when the reactance is inductive. As both the R and X for both cases have the same values the value of Z is also the same.

To solve the same problem with mathematics we use the formula:

$$Z = \sqrt{(R^2 + X^2)}$$

Using the values from Figure 2 we get:

$$Z = \sqrt{(900 + 900)} = 42.43W$$

This network when measured with a 50Ω SWR meter would present a SWR of (50 / 42.43) = 1.178:1, which is pretty close to ideal. However, since both cases yield a Z of 42.43Ω, one being net capacitive and the other net inductive, the SWR meter will indicate the same result. Again the SWR meter tells us something is amiss, but cannot determine what is actually wrong.

Impedance Conversion

Suppose we have an antenna that has a resistive part of 30Ω and we wish it to have an impedance of exactly 50Ω, what value of reactance do we need to add in series?

50 squared is 2500 and the resistive part of 30Ω when squared is 900. To arrive at 2500 we need to add a reactance which when squared equals (2500 – 900) = 1600. Hence, the reactance needs to be a value of 40Ω. It matters little if the reactance is positive or negative; either type will yield the correct result.

The SWR meter measures impedance, but nothing in the circuit is 50Ω. But the combination of the R = 30Ω and the X = 40Ω gives Z = 50Ω. At resonance the reactance portion disappears and all we are left with is the 30Ω resistive part.

What is more often the case is that we have an antenna with a SWR which is considered too high and we need to reduce it, ideally to 1:1 if possible. To solve this problem we need to measure the R and X values of the antenna and then to calculate the required value and type of reactance to add to bring the impedance to 50Ω. If the antenna has a net capacitive reactance, meaning it is too short, we need to add some inductive reactance to cancel the existing reactance and then a bit more to make the antenna slightly net inductive. Electrically we are lengthening the antenna by adding inductive reactance, although the physical length is not changed.

Alternatively, we could simply connect an ATU in circuit and twiddle the knobs in the hope of finding the correct setting to bring the SWR to 1:1. In most cases this works but in some cases the ATU does not have enough tuning range to correct the problem.

Power

Power can only be dissipated in a pure resistance. In a reactance the voltage and current are 90° out of phase and hence no power can be dissipated. So in our example above with the R and X values the power is dissipated only in the 30Ω resistive part and no power is dissipated in the 30Ω reactive portion of the network. At resonance the 30Ω resistive part presents a SWR of (50 / 30) = 1.66:1 to the measuring instrument.

Most transmitting antennas are not 50Ω resistive at resonance but present an impedance of 50Ω, which is made up of some value of R and X such that Z is 50Ω.

A half wave dipole antenna when mounted sufficiently high above ground present a resistive portion at resonance of 73.1Ω. As the tendency is to feed this with 50Ω coax cable the SWR at resonance should be (73.1 / 50) = 1.46:1. Amateurs often prune the antenna to make it look like 50Ω impedance, but in reality now R and X are simply altered so that Z is now 50Ω. The antenna is now no longer resonant at the operating frequency, but the SWR is 1:1.

This rather shoots down the purists who insist that their antennas are resonant because the Z is 50Ω. They are not *resonant* any longer, but they do match well to the 50Ω feedline.

A better method with half wave dipole antennas is to use 75Ω coax with a 75Ω SWR meter, then at resonance the SWR meter will read (75 / 73.1) = 1.02:1, which is nearly perfect. Another factor is the attenuation of different impedance cables. The minimum attenuation versus length occurs with an impedance of 77Ω, which is why television coaxial cables settled on 75Ω cable and today it is offered in many types, such as RG-6/U, the cable type with the highest production volume today. If you are concerned about power loss in the feeder then 75Ω coax cable is a better choice. It is not difficult to modify or construct a SWR meter with a 75Ω characteristic impedance. The Breune Bridge type (designed by Collins Radio engineer Warren Breune, W0TTK) is the most common type used at low frequencies and by changing two resistors (In Figure 3 below these are the resistors marked R) it can be calibrated to any desired impedance.

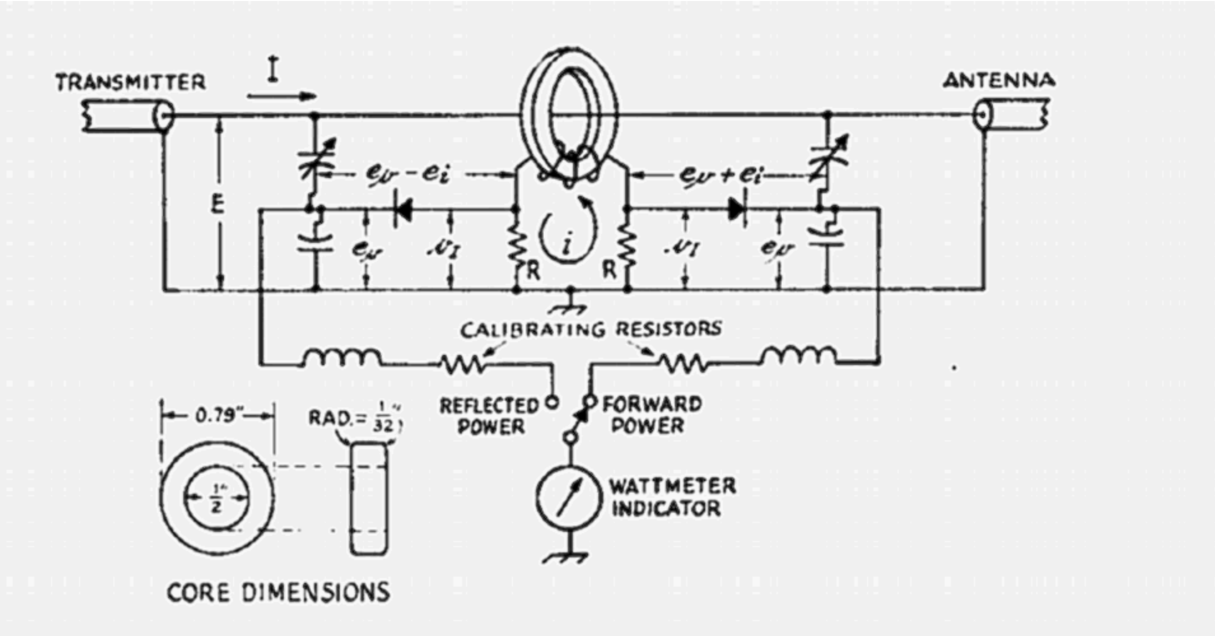

Figure 3 Breune Bridge SWR meter

Random length antenna

It is a well-documented fact that any random length antenna radiates equally well whether it is "*resonant*" or not. All we are concerned about is the ability of the transmitter to be able to deliver maximum power into the antenna. Maximum power is the same as maximum antenna current. It is the current flowing in the antenna that produces the flux field to perform the radiation. (In earlier days before the Breune Bridge was invented RF ammeters were the method to measure antenna current and hence power). To ensure a good transfer of power into the antenna from the transmitter often means we have to resort to some sort of "*Matching Network*" often called an Antenna Tuning Unit (ATU).

50Ω impedance can be made from a myriad of different values of R and X, but none of them has a value of R that is 50Ω. The only time R = 50Ω is a resistive dummy load!

In Part 2 we will consider other methods of getting maximum radiated power with our antennas and what the transmitter really looks like.

The Telegraph Office

T. A. Edison of Newark, N.J.

An early 1870's vintage key made in Thomas Edison's shops

by Neal McEwen, K5RW

k5rw@telegraph-office.com

Thomas Edison is most famous for inventing the light bulb, phonograph and moving pictures. He was granted 1,093 patents for his inventions. A little known fact is that 150 of these patents pertain to telegraph technology. Edison started his career as a telegrapher. At age 15, in 1862, he started work in a small town Western Union office. As his skill grew he moved to higher profile jobs. By 1869 he had positioned himself in the telegraph service and manufacturing business.

The Edison key shown in the photos is representative of keys made in the early 1870s for landline use. Besides being very ornate, there are several interesting electro-mechanical features of this key. Notice that the circuit closing lever does not slide under a leaf spring as we are used to seeing. There is a point on the circuit closing lever and a point under the "anvil" contact. The two points mate and are held in place be a locking mechanism at the pivot point of the circuit closing lever.

Also note the lack of a compression adjustment screw on the conical lever return spring. This indicates an early design. Latter keys had a screw for adjusting the compression of the lever return spring and hence the force that the operator was required to use to depress the lever. The lever on this key is perfectly straight. Earlier keys had a "camelback" or humped design and latter keys had a gently curved lever made of steel such as in the Bunnell Triumph key.

Note the legs on the key. This key was mounted by drilling holes in the table, then tightening the wing nuts to hold the key in place. The required electrical connections are also made via these legs and wing nuts. It is unusual for the legs to remain on a key of this type. Often the legs are sawed off so the key can be used without modifying a table or sawed off such that the key can be displayed flat on a shelf.

This key has several markings. On the top of the lever, as seen in the bottom photo is "T. A. Edison, Newark, N.J." Beside it on the lever is "62." This is probably a serial number. However it could also be the mark of the machinist that put it together; this is not uncommon. Let's hope it is a serial number and there are at least 61 more of these keys remain to be discovered.

It is well documented that Edison had a manufacturing plant in Newark, New Jersey where he made stock tickers. This plant commenced operation in 1869. The design of this key and "Newark, N.J." markings suggest that this key was made in the early 1870s. Edison employed 50 men at his "Newark Telegraph Works" during this time period.

Noted telegraph historian, Roger Reinke, has documented that Edison was partners in "Pope, Edison & Co.", 78-80 Broadway, New York, c. 1869, "Edison & Murray" at 10 Ward St., Newark, N.J., from 1869 to 73, manufacturing registers and keys and

"Edison & Unger" c. 1873.

It is interesting to note that Edison and Franklin Pope advertised themselves as "electrical engineers" in October, 1869 of "Telegrapher" magazine. This is believed to have been the first use of the term. Pope later become editor of the "Electrical Engineer."

It is also interesting to note that Edison crossed paths with other principals of telegraph history including George Prescott, Charles Williams, Walter Phillips and George Milliken. Edison shared the quadruplex patents with Prescott, Phillips tested the quadruplex technology early on, Milliken gave Edison a telegrapher's job in Boston and Williams leased space in his telegraph instrument shops to Edison early in the inventor's career.

John Heck found this key, a Phelps Am. Tel. register and a very, very old relay. They had been locked away in an abandoned telegraph office in Tipp City, Ohio for 100 years. The local historical society found John and later John and I made a trade. I am quite pleased to have this key in my collection and would consider it one of my top 10 items.

Results of the Valve QSO Party

The following are the results of the October Valve QSO Party:

AM:
First place: Barry Nugent ZS2NF

SSB:
First Place: Thanie Gibson ZS4AZ
Second place: Theunis Potgieter ZS2EC
Third Place: Barry Nugent ZS2NF

The AM session did not attract many participants this year and even less log entries.
The only Log received was from Barry ZS2NF.
Using the ZS0AWA call sign, I only managed 4 contacts and that from some of the QRP contesters which was held on the same day.

The SSB session was much better attended and Thanie ZS4AZ actually had the highest number of contacts that I can recall in the history of the QSO Party, being 66 contacts and using an FT101, doubling his points.
Even with the high number of contestants, only 3 logs were received.

Once again, I think that band conditions played a large part in participation, but it goes to show, that many contacts can still be achieved, even in these times.

Thanks for the logs and well done to those who took part.

Cliff ZS6BOX, Founding president of the AWA

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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 yesterdays 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. Join by logging in to our website: www.awasa.org.za

Notices:

Net Times and Frequencies (SAST):

Saturday 06:00 (04:00 UTC) —AM Net—3620
Saturday 07:00 (05:00 UTC) —Western Cape SSB Net— 3630
Saturday 07:30 (05:00 UTC) —KZN SSB Net—3615
Saturday 08:30 (06:30 UTC)— National SSB Net— 7140; (Echolink, connect to Sandton repeater ZS6STN-R)
Experimental relay on 3620 for those having difficulty with local skip conditions.
Saturday 14:00 (12:00 UTC)— CW Net—7020; (3550 after 15 min if band conditions not good on 40)
Wednesday 19:00 (17:00 UTC) — AM Net—3620, band conditions permitting.

AWASA AGM & SWOPMEET 2017

When: Saturday 18 November
Where: SAIEE (South African Institute of Electrical Engineers)
18A Gill St, Observatory, Johannesburg, 2187

08h30 museum station on air for those who wish to come early.
10h00 AGM, followed by a braai and fleamarket/swopmeet.
Bring a chair and something for the braai, and a table if you wish to sell some goodies.
Vendors welcome!

More info and directions on the AWASA website