AWA Newsletter

103

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A Member of the SARL

Antique Wireless Association of Southern Africa

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AWA Committee:

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* Technical Advisor—Rad ZS6RAD
* Secretary/PRO—Andy ZS6ADY
* Western Cape—John ZS1WJ
* KZN—Don ZS5DR

Reflections:

Its always great to be able to go away on holiday, no matter where the destination. Its even greater to be able to get back home again and sleep in your own bed, get back in to the old routines and catch up with friends who stayed behind.

One of the things that is not easy to do is to take radio with you wherever you go. For many, portable/mobile installations are really a nice to have.

I am fortunate, that when I travel in SA, I can normally take some form of radio comms with me, but I did find travelling overseas was a totally different kettle of fish.

Not only does one have to worry about getting radios in and out the country without having to bribe someone to bring them back, but then there is also antenna's and whatever else you may need to power the rig.

Then of course, is when you get to your destination, where are you going to put it, are you going to be able to get an antenna up. How many neighbours are you going to interfere with once you finally start putting a signal out.

Of course, today, with our small micro technology rigs, transporting is not too great a problem. Can you imaging lugging a KWM2-A or a Hallicrafters HT37 with you ? Some of the rigs, like the KWM2-A were made to be transported. The KW2000 and maybe some of the FT101's as well as some others I am sure.

It would become a logistical nightmare to try transporting these things. You would have to leave all your clothes behind and then still pay excess baggage.

Besides, if the wife was travelling with, this could present a problem. She certainly would not leave any clothes behind so you could drag a rig along with you.

Its always good to get home and back in to the shack again and fire up the old valve rigs. To hear there are still many of the old friends out there waiting to hear your report of the holiday, and within a week, it seems as though you were never away. After a couple of QSO's, one is back in to the swing of things.

All one is left with are the memories and hopefully photos of the various places you have been to.

Best 73

DE Andy ZS6ADY

WIKIPEDIA

Frequency Modulation:

In telecommunications and signal processing, **frequency modulation** (**FM**) is the encoding of information in a carrier wave by varying the instantaneous frequency of the wave. (Compare with amplitude modulation, in which the amplitude of the carrier wave varies, while the frequency remains constant.)

In analog signal applications, the difference between the instantaneous and the base frequency of the carrier is directly proportional to the instantaneous value of the input-signal amplitude.

Digital data can be encoded and transmitted via a carrier wave by shifting the carrier's frequency among a predefined set of frequencies—a technique known as frequency-shift keying (FSK). FSK is widely used in modems and fax modems, and can also be used to send Morse code.[1] Radioteletype also uses FSK.[2]

Frequency modulation is used in radio, telemetry, radar, seismic prospecting, and monitoring newborns for seizures via EEG.[3] FM is widely used for broadcasting music and speech, two-way radio systems, magnetic tape-recording systems and some video-transmission systems. In radio systems, frequency modulation with sufficient bandwidth provides an advantage in cancelling naturally-occurring noise.
Frequency modulation is known as phase modulation when the carrier phase modulation is the time integral of the FM signal

CW Activity:

Having been away for the best part of August, I was not directly involved in the CW nets during the month.

Barrie ZS6AJY went in to hospital for a serious operation and has been out of action for a few weeks too. Having recently chatted with him, it sounds like he is well on the road to recovery and getting stronger all the time.

One good thing is the operation did not affect his fist, and Barrie says that his recovery time will be well spent at the operating position in his shack.

It would seem that CW is still in recovery mode here in SA and hopefully there will be a few more fists available on the bands than we have at the moment.

The SARL CW contest due at the end of august, should prove rather interesting to see

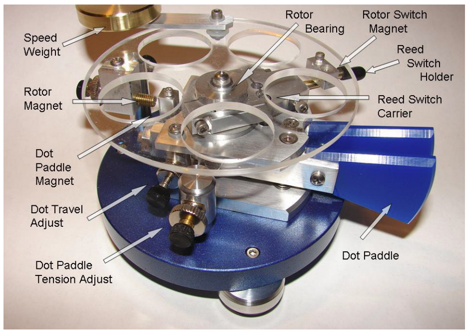
How much activity there will be on the bands.

I have said this before and I will keep on saying it in the hopes that it will sink in some time, CW is not dead. There will always be someone around punching out dots and dashes on the allotted frequencies to see if there is anyone else out there willing to answer them.

I just never seem to be calling at the same time there is someone on the other end, which often gets very frustrating.

The Hamnet frequency has established a good thing, that people will normally call in on the hour to see if there is someone else listening out there.

Maybe we should do the same with CW ? Try calling on the hour to see if there is someone out there when you are in your



Rotobug

SSB activity:

Conditions have been really variable this last month, from having S9 copy from the Western Cape to very poor copy on local stations, to a total inversion of those mentioned.

Oddly enough, division 5 always seem to be on a good footing with favourable conditions to Div 6 nearly all the time.

Once again, coupled with band conditions, the total number of stations calling in on the SSB net also seem to wane accordingly. On a good condition day, there are always a fair number of stations on the net, which is probably understandable, as the rest cant hear the net control or other stations on the band.

DX conditions still seem to be quite favourable with many different countries being heard on the bands.

The topics for discussion have certainly kept the SSB net going and most people will have a point to put in the forum. We know too that there are a few who listen to the discussion on the net and just call in at the end to get their names on the log.

This of course is fine, but we would certainly love to hear your point of view sometime. I am sure with the many different topics that have been chosen, there must be something you can add to the conversation ?

Don't feel that you do not have a choice but to sit and listen to the theories being expounded by many others. You certainly have the right to be heard.

If the EFF can do it, so can you.

Trio TS510 Transceiver

AM:

Since being back from leave, I have managed to be up on the Wednesday evening net almost every week. Conditions have not been great early on in the evening, but by about 20:00 the band seems to open and gives excellent conditions. The only problem is, there is no one else out there to enjoy them.

On the odd occasion there have been one or two stations there, but for the majority, the cupboard is pretty bare.

Saturday mornings, the band conditions are certainly getting better with the band opening a bit earlier every week as we head toward the summer solstice, and there are usually a good number of stations heard on frequency.

Its always nice to hear new call signs on AM and there have been one or two calling in and even playing MF with the rest of us. Do keep it up guys, AM is a very challenging mode to use and always has some kind of problems to keep you on your toes. If not the mode, then the old rigs that we use, as many will attest to.

Heathkit DX40

RADIO IN THE FIRST WORLD WAR: by Richard ZS6TF AWA Historian

Britain declared war on Germany on 4 August 1914. The flashpoint of the war is generally regarded as the assassination of Archduke Franz Ferdinand, heir to the throne of Austria-Hungary, on 28th June during a state visit to Sarajevo. This triggered a chain of mobilisations and declarations of war bringing Austria-Hungary, Serbia, Russia, Germany, France, into the conflict and then Great Britain, as an ally of France, declared war on Germany less than a month and a half after the assassination of the Archduke .

It was obvious from the outbreak that technology would make a critical impact on the outcome. New weapons such as tanks, the Zeppelin, poison gas, the aeroplane, the submarine, the torpedo, and the machine gun, brought increased casualties, and no escape for civilian populations. The Germans shelled Paris with long-range guns with 100kM range; London was bombed from the air for the first time by Zeppelins. The military importance of radio was immediately apparent. In August, 1914, the Belgians had to completely destroy a major international communications station located near Brussels, in order to keep it from falling into the hands of the advancing German army. “Wireless” had become a technology of great strategic importance .despite the enormous size of the equipment, batteries, and steam powered chargers which limited its tactical role. Before the outbreak of WW1 many of the circuits to be used in later years for CW radio communications had already been invented, although most of these were still at an early stage of practical implementation. These circuits include the detector, the oscillator, the heterodyne, the RF amplifier and regeneration. However there were few valves available in 1914 for use in radio equipment. The de Forest Audion was erratic in operation, fragile and had a short filament life. The Marconi soft valves, the C and T, were produced in 1913. The C was a receiver valve and the T a transmitter valve. Both of these were difficult to manufacture and not suited to the rigours of the battlefield. Apart from this the T valve required a power of 6-volts, 4-amps for its filament which meant very frequent replacement or recharging of the battery. Also an HT of several hundred volts was required. The major technical factor affecting the successful development of CW radios for battlefield communication was the unavailability of robust radio valves: these did not become available until late in 1915 with the introduction of the French TM valve subsequently copied by the British known as the type R. This meant that until then almost all radios were spark transmitters and crystal detector receivers. Their transmitted signals were noisy and rich in harmonics which were spread over a wide spectrum aiding interception and the radios had to be widely separated to prevent mutual interference.

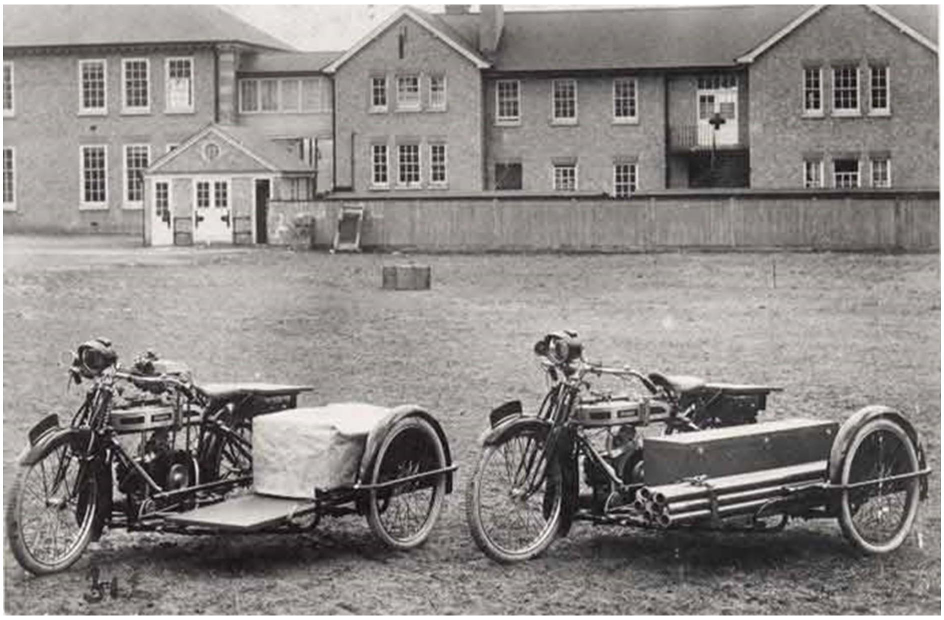
One important application of the Marconi C valve was strategic counter-offensive using direction finding receivers and these continued to be used throughout the War until suitable hard valves became more plentiful.

In early1916, Zeppelin routes were tracked by Marconi Direction Finding equipment and on 27–28 November 1916 two German Zeppelin airships used for reconnaissance and for bombing raids were shot down off the east coast of Britain.

Marconi Bellini-Tosi Direction Finder, by Marconi’s Wireless Telegraph Co. Ltd, c.1916. Marconi Collection

A one and a half kW Marconi wireless telegraphy set mounted in a wagon. This picture was taken in Mesopotamia during World War I.

Interior of Royal Engineers, British Army forward wireless station at Moyenneville, the Somme in 1917.



250 watt wireless telegraphy set mounted on two Douglas motorcycles.

The Army were slow to utilise radio because of their unwieldiness and the aerials made them a target, relying mostly on land-lines and telephones in the trenches.

The British Navy however were faced with the possibility of action in any of seven seas and set about creating its own world communication network for its scattered fleets. The British government immediately took control of parts of the Marconi company, such as its latest transatlantic stations in Wales and its factory in Chelmsford, and embarked on an ambitious training programme for wireless operators. A dozen stations on widely separated and sometimes isolated sites were built and the development of shipboard wireless sets was a crucial part of the war effort. One reason why the German forces in East Prussia defeated two invading Russian armies in August 1914 was that the Germans intercepted Russian radio messages. These messages were broadcast in plain language because the Russians did not have time to distribute code books to their radio operators. British naval telegraphy messages were encoded from the outset of the war and were centrally coordinated from "Room 40" nearby the First sea Lord's office in the Admiralty building in London. The British managed to obtain keys to all of the German codes. It was detection of wireless traffic that alerted the British navy to the movements of the German fleet and precipitated the Battle of Jutland in May 1916.

In 1912 the Royal Flying Corps had begun experimenting with "wireless telegraphy" in aircraft. Lieutenant B.T James was a leading pioneer of radio in aircraft. In the spring 1913, he had begun to experiment with radios in a B.E.2a. developing it to a high state of efficiency before he was shot down and killed by anti-aircraft fire on 13 July 1915. Using telegraphy, observation aircraft were able to call in accurate artillery fire and act as forward observers to report the fall of artillery shells for correction of fire.

30 watt Aircraft Spark Transmitter. No 1

In 1917 AT&T invented the first air-to-ground voice radio transmitter. Although proved viable, worthy of refinement and advancement, it was too late for significant service in the war. The Telephone Aircraft Mk. II had two B or F valves, one being used for control and other an output valve. An accumulator was used to supply the valve's filaments and the HT was derived from a wind-driven generator. It had a range of 3.2km to other aircraft and 2km to ground stations using a100–150ft trailing aerial with a lead weight at the end .A receiver for use with this transmitter was the Tuner Aircraft Mk III which had three R type valves, one for the detector and two for low-frequency amplification.

R type valve

As the war dragged on, casualties increased to more than 10 Million, and the war became unpopular with ordinary people. Revolution in 1917 led to the end of Russian participation in the war and precipitated the Bolshevik regime. Just over a year later, a worker's revolution in Germany forced the abdication of Kaiser Wilhelm II on 9 November 1918. With the militaristic Kaiser out of the way, Germany requested an armistice. Two days later German delegates signed the Treaty of Versailles marking the cessation of hostilities.

Although the war was over, its ramifications were far reaching. A number of the terms of the treaty were so controversial, that it also set the stage for World War 2. Great technological strides had been made in "the war to end all wars", which statement unfortunately would prove to be untrue in less than a generation.

(With acknowledgements to the Marconi museum and the Museum of the History of Science for the illustrations)

EDWIN ARMSTRONG: THE UNKNOWN HERO OF RADIO

By Ronald N. Yeaple Ph.D.
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When we think of college-age entrepreneurs who had the vision to see the potential for major new businesses, we think of people like Bill Gates, Michael Dell and Mark Zuckerberg. But in 1914, Edwin Armstrong, an undergraduate at Columbia University, invented and patented a circuit using the new deForest Audion amplifying vacuum tube that revolutionized the design of radio receivers.

By feeding part of the output back to the input, he achieved much greater amplification, creating a much more sensitive radio.

A display of Edwin Armstrong's actual laboratory equipment at the Antique Wireless Museum. It includes the 1914 patent model of his regenerative receiver (small case) as well as his superheterodyne circuit and Empire State Building FM transmitter (large case).

This was just the first of three major inventions by Armstrong that transformed the radio industry. Four years later, in 1918,he patented the superheterodyne circuit, which makes tuning a radio much simpler and more stable, and is still the basic circuit used in most AM radios today. Prior to the introduction of the superheterodyne, a typical broadcast receiver might require the adjustment of half a dozen or more knobs and switches to tune a station. A superheterodyne radio can be tuned from station to station with just a single knob. With the introduction of this circuit, radio rapidly became a mass consumer product, with over six million radios in use by the mid-1920s.

Armstrong's third major invention was FM radio. Unhappy with the static and tinny sound of AM radio, he set out in the 1920s to develop an entirely new system for radio that would provide the full fidelity of music without static, even during lightning storms.

In 1920, Armstrong met David Sarnoff, the president of RCA, who initially was impressed with the potential for FM broadcasting. From May 1934 until October 1935, Armstrong conducted the first field tests of FM broadcasting from an RCA laboratory on the 85th floor of the Empire State Building, using a spire on the top of the building as an antenna. The FM signals were successfully received some 80 miles away.

Following this successful demonstration, Sarnoff began to see FM as a threat to AM broadcasting, which RCA dominated. He refused to license Armstrong's patents on FM and initiated lawsuits claiming that RCA had invented FM. In 1945 he successfully lobbied the FCC for changes in the assignment of broadcast frequencies for FM that he hoped would prevent FM from becoming dominant.

This change in broadcast frequencies made obsolete all the FM radios that had been sold up to that time and was devastating to the early FM radio stations. A patent fight between RCA and Armstrong was won by RCA, and Armstrong was no longer able to claim royalties on FM receivers or television receivers (television sound uses FM). These costly legal battles eventually brought financial ruin to Armstrong, and on January 31, 1954, he took his own life. After his death, many of these lawsuits were settled in his favor, making millions for his widow and restoring his reputation as the true inventor of FM broadcasting. But it was too late for Armstrong himself to enjoy the fruits of his magnificent invention.

Despite these setbacks, FM broadcasting eventually became hugely successful. In 1961, General Electric introduced stereo FM broadcasting, which brought even more enjoyment to the experience of listening to FM radio. Today FM has become the preferred way to listen to music, while AM has settled into a niche for talk radio.

Why isn't Edwin Armstrong better known? He was truly the unsung hero of radio. He was not a self-promoter. He perhaps was naïve about expecting the excellence of his technologies to overcome the raw power of companies like RCA who were threatened by them. But in the decades after his death, as the superheterodyne circuit and FM broadcasting became recognized as the standards for the highest quality of radio technology, Armstrong received the most prestigious honors and recognition that the profession of electrical engineering can bestow.

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Radio Reflections
Radio Developments During the Late 1920s

By Jim Cook
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The last half of the 1920s was a time of significant improvements in radio technology. For the first time, radio beacon stations were installed for aircraft navigation. Phonograph records were created and played using vacuum tube amplifiers, improving the sound quality far beyond what was possible with mechanical recording. More powerful audio systems were developed for installation in auditoriums and motion picture theaters to show the new "talking pictures." These developments also benefited radio broadcasting and home receiver design. Most of the radios being sold still used TRF ("Tuned Radio Frequency") technology but the receivers were easier to use and provided more enjoyment for the listeners. An increasing number of radios used AC power, avoiding the expense and nuisance of batteries. This was initially made possible by the development, in 1925, of the Raytheon Gaseous Rectifier, which provided an economical and reliable way of rectifying alternating current to provide the direct current needed for radio power.

Radios that had been designed to use batteries could be converted to AC power using "battery eliminator" power supplies incorporating the Raytheon rectifier. By the end of this decade, RCA had introduced the popular type 80 full-wave rectifier tube that was widely used in AC-powered radios until octal based tubes were introduced in 1935.

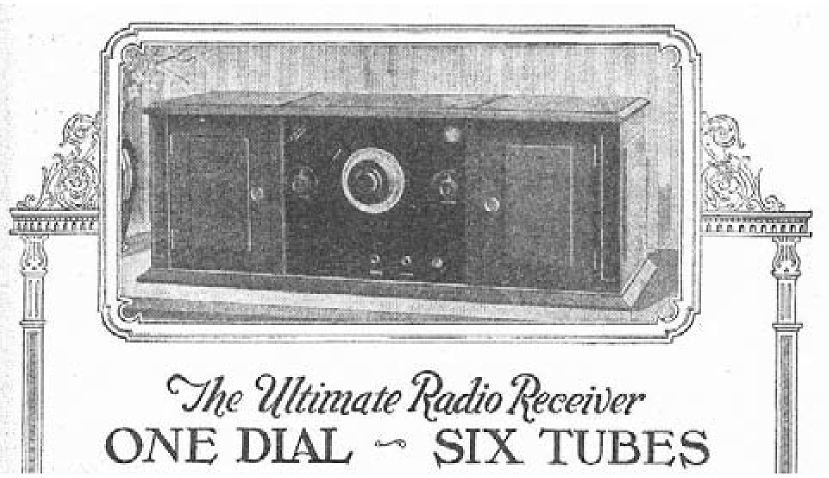
Single-knob tuning was replacing the less convenient "three dialer" tuning. This was accomplished by mechanically linking the three variable capacitors, either by mounting them on a common shaft or by using metal belts to ensure that they all turned together. In preparing these articles, I often rely on my collection of radio magazines published during the decades I am researching. While browsing through issues from the 1920s, I discovered an ad for the "Brandola" receiver in the October 1924 issue of Radio Broadcast magazine. This is one of the earliest I have found for a TRF radio receiver with single knob tuning.

Another improvement made during the era was the replacement of headphones with loudspeakers, originally in the form of horn speakers. These were better than headphones, but they had poor audio quality. By the end of the decade, electrodynamic cone speakers provided better sound with better frequency response.

For more expensive radios, it became common practice to mount the power supply on a separate chassis with the electrodynamic speaker. The speaker's electromagnet coil received its DC supply voltage as it acted as a filter choke for the power supply. While type 71-A and 45 power triodes were the most commonly used audio output tubes, type 50 tubes were introduced to take audio output power to higher levels. Sometimes these tubes were arranged in a pushpull parallel configuration for even higher output power. Tetrads such as type 24-A, which had a screen grid between the control grid and the plate, were used as RF amplifiers in newer radio designs to improve performance.

They not only avoided problems with unwanted oscillation but also provided higher gain. By the mid-1920s, radio interference was common and frequency assignments became controversial. At that time, Herbert Hoover was U.S. Secretary of Commerce, overseeing radio regulation. Hoover took an active role in developing legislation to avoid the conflicts among the various users of radio. At the same time, radio amateurs and engineers began to explore the "short wave" bands. The term "short wave" does not have a precise definition, but generally refers to frequencies above the standard broadcast and, ranging from approximately 1.5 MHz to 30 MHz. References to frequency and wavelength can be confusing in articles about early radio.

Wavelength was the preferred designation during the early years of radio development, but the relationship between frequency and wavelength can be easily shown by the following formula: f (frequency in kHz) = 300,000/λ(wavelength in meters) The frequency unit used at that time was cycles or cycles per second. "Hertz" replaced cycles as the international unit of frequency in 1960 to honor Heinrich Hertz, one of the first scientists to explain and demonstrate radio waves. From that time, radio frequencies were expressed in kiloherts (kHz) or megahertz (MHz).



Detail from a Brandola Radio ad that appeared in the October, 1924 issue of Radio Broadcast. Single dial tuning was a major selling point.

When amateur radio operators were required to limit their transmissions to wavelengths below 200 meters after World War I, they were surprised to discover that these shorter wavelengths had some significant advantages for long-distance communications. Commercial broadcasting stations also realized that using shorter wavelengths could expand their broadcasting reach to a world-wide audience.

Early electrodynamic speakers were sold as radio accessories as shown in this item from a 1929 Allied Radio catalogue offering units by Silver Marshall.

Radio listeners at home learned about short wave broadcasting and wanted an inexpensive way to listen to these new international stations. Articles appeared in radio magazines describing short wave converters that could be inserted between the antenna and their existing broadcast band receivers to give them access to these higher frequencies. Radio manufacturers began to offer short wave converters to meet this demand and, later, to include short wave bands as an option in broadcast receivers. I have a nice example of an early short wave converter in my antique radio collection. It was manufactured by the Stewart-Warner Corporation, a company that also manufactured automotive products such as speedometers and dashboard instruments.

This converter is packaged in an attractive wooden case that probably complemented the appearance of a Stewart- Warner radio that was in production at that time. The circuitry was simple, consisting of only two vacuum tubes: a type 24-A RF amplifier and mixer, and a type 27 local oscillator. By “mixing” the short wave signal from the antenna with a signal produced by the local oscillator, the converter produced a lower-frequency signal that could be tuned by a standard broadcast radio.

Many radio magazines printed lists, wavelengths and schedules of foreign short-wave broadcasting stations. A major technical improvement was just being offered as the 1920s came to an end: it was the superheterodyne radio receiver, which has been the subject of other articles in recent issues of the AWA Gateway. Edwin Howard Armstrong, the same man who invented the regenerative detector receiver, developed this important circuit during World War I, but it required more tubes than other receivers in use at that time and needed more refinement before it was suitable for home use Nevertheless, this new circuit fascinated radio enthusiasts in the 1920s. Although most home radio manufacturers didn’t adopt the circuit until the early 1930s, an article titled “How to Build a Super-Heterodyne Receiver” appeared in the November 1923 issue of Radio Broadcast magazine. That design used seven vacuum tubes, which made the superheterodyne more expensive to build and operate than other receivers that were available at that time. It used an intermediate frequency of 50 KHz, a low IF frequency compared with later designs but common in the 1920s. Radio Age magazine published a similar article in their December 1924 issue.

Meanwhile, the stock market crash of October, 1929 started the Great Depression making life difficult for nearly everyone, including radio designers and manufacturers. Sales declined and a number of companies that produced radios and vacuum tubes either merged or went out of business. Nevertheless, innovative companies survived by producing new radios with less expensive circuitry that could still provide low-cost entertainment for their customers.

Short wave converter by Stewart-Warner from author’s collection.

(From the Autumn, 1024 issue of The AWA Gateway, copyright 2014 by The antique Wireless Association and reprinted with permission.)

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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's and associated equip-ment. To encourage all like minded amateurs to do the same thus ensur-ing the maintenance and preservation of our amateur heritage.

Membership of this group is free and by association.

Notices:

Net Times and Frequencies:

Saturday 06:00—AM Net—3615
Saturday 07:15—Western Cape SSB Net— 3630
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.

AWA Website is operational;

Visit the website at : **http://awasa.org.za/** and register on the site.

Disposal:

Mac-Afric 2kW petrol generator for disposal. Still in excellent condition.
Rated Power Output: 2 kW (2.5 kVA)
Maximum Power Output: 2.2 kW (2.8 kVA)
Voltage: 220V Single Phase
Frequency: 50 Hz
DC Output: 12V/8A

Single Cylinder, 4 Stroke, Air Cooled, Petrol Engine
Horsepower: 5.5 HP
Rated Speed: 3600 RPM
Displacement: 389 cc
Electric Start / Oil Cut Off Sensor
Oil Sump: 0.6 L (SAE30 Oil)
Fuel Tank: 12L Petrol

Contact Andy ZS6ADY 0824484368 or email. Price R3200