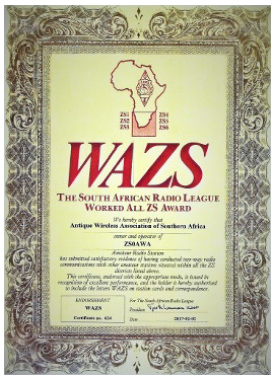
Newsletter
The Antique Wireless Association of Southern Africa
18th Anniversary

181 Aug 2021



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Reflections:

Once again during this last month, I was reminded about the importance of radio communications in times of complete breakdown of our existing infrastructure.

This is not something that we usually want to talk about, because it means that with that comes destruction of property and very often loss of life.

To me this was well illustrated in the KZN uprising, be it for whatever reason, but it became a reality.

I do believe that as Radio amateurs, we have a responsibility to be prepared for instances such as this, be they man made or weather made.

Electricity went down in many areas. Cell phones, to which we have become so reliant in our everyday lives, were also made useless through the destruction of towers.

Fortunately this was not as widespread as it could have been, but the possibility was there.

I have heard many Radio Amateurs saying "I was not prepared for this".

For many of us up here in Gauteng, life went on with really not much to be concerned about. Life was still good and all of our systems were working. All we heard about was small patches of unrest in one or two area's. Not that News coverage told us much, but social media certainly did. I think people were more concerned about the possibility of fuel shortages than anything else. Damned people in KZN, do they not know we need fuel to keep the wheels of industry turning up here ?

My point here, is not about shortages or going without, but about how prepared are we for problems ?

My radio shack runs on 220v. I have one radio in there that can operate on 12v, and that has a transformer to keep it supplied.

Some time ago I employed the use of an inverter, with a single 105A/H battery. It was a second hand battery that was given to me, deep cycle, and during a few of the outages we have become so used to, my shack could run for up to four hours. That is desktop PC, an HF radio and VHF/UHF station.

The battery has cycled a few times over the past year and a half, and has now become tired, leaving me with about an hour of operation. This is when I realised I'm not in a good position anymore.

It may just be something worthwhile attending to. We have had a few discussions on the AWA Saturday morning net on this same subject, and in general many were interested in making some additions to their homes/shacks.

Now could be a good time to re-consider those additions.

Stay Safe and Stay Warm

Best 73

DE Andy ZS6ADY

Wikipedia

Sunspots:

Sunspots have two parts: its centre umbra, the darkest part, where the magnetic field is approximately vertical (normal to the Sun's surface) and the surrounding penumbra, which is lighter, where the magnetic field is more inclined.

The temperature of the umbra is roughly 3,000–4,500 K (2,700–4,200 °C), in contrast to the penumbra at about 5,780 K (5,500 °C) leaving sunspots clearly visible as dark spots, occasionally visible even to the naked eye. This is because the luminance (which is essentially "brightness" in visible light) of a heated black body (closely approximated by the photosphere) at these temperatures varies greatly with temperature. Isolated from the surrounding photosphere, a single sunspot would shine brighter than the full moon, with a crimson-orange colour.

A Crystal Alternative (Part 2)
On My Bench – Renato Bordin June 2021

Before we begin the DDS oscillator to radio test I'd like to report on some changes made to the micro firmware. The on-board dipswitch used to select 1 of 16 frequencies was read in a continuous loop regardless of a state change in the dip switch, this meant that I would read the dip value, look up the frequency associated to the dip value and transmit configuration data to the DDS module. This meant that every 500mS or so, the oscillator would receive new configuration data. This caused the oscillator to reset and begin oscillation with new setting regardless of any dip switch state change. This caused a very short interruption in oscillation and could be heard when a tone was resolved on a receiver set to SSB. This short tone change was a bit irritating and I suspect a CW operator on the receiving end would probably get annoyed with the sender. I decided to simply read the dip as separate switches as opposed to a port value. So by reading the state of the switches and responding with a conditional program loop I was able to get rid of the annoying beep beep. The new parameters of the same Vero board prototype featured last month are as follows – On power-up set frequency to 3615Khz, switch 1 and 2 selects 80M frequencies and switch 3 and 4 frequencies in the 40M band. Please note that this is no fault of the AD9833 device but rather a fault in the quality of firmware I wrote for the 16F818. I suspect that reading the dipswitches on a micro interrupt may solve this problem however this development will be for another day. Right now I just want a frequency derived from an AD9833 DDS oscillator device hooked up to my transmitter on the crystal socket. This time I won't forget to switch it to VFO mode. I should also mention that the 16F818 micro has 128 bytes of eeprom which I could use to remember the frequency requested by the user and power-up with the last know frequency sent to the DDS oscillator. By using the non-volatile RAM built into the micro we could add another useful feature considering load shedding. Perhaps one day I'll do a part III.

My HP nixie tube counter is the only frequency counter I have that allows my camera to capture a decent image of frequency display using the flash. Led displays are terrible.

Before testing we start with some specifications –

<u>AD9833 DDS oscillator</u>

The DDS oscillator with PIC16F818 controller and preamp as a system on Vero board. Powered by lab bench PSU and amplitude measurement with HP54602B oscilloscope – no load. Harmonic content measured with Hameg HM8028 SA 50Ω termination.

Vin = 12.0VDc
Module I = 75mA (including led)

Output @ 3615Khz = 3.6Vpp
Output @ 7020Khz = 2.5Vpp

3615Khz 1st harmonic -32dB
3615Khz 2nd harmonic -32dB
3615Khz 3rd harmonic -40dB
3615Khz 4th harmonic -45dB
3615Khz 5th harmonic -28dB

7140Khz 1st harmonic -15dB
7140Khz 2nd harmonic -25dB
7140Khz 3rd harmonic -30dB
7140Khz 4th harmonic -38dB
7140Khz 5th harmonic -45dB

<u>Trio TX-88A (10W)</u>

The Trio transmitter operated with crystal on 40 and 80m into 50Ω dummy load via Diawa SWR/power meter set on the 15W scale. Operated in CW mode. Harmonic content sampled with near field probe placed close to the dummy load and consistent with all tests, probe is attenuated by 20db with Spectrum Analyser attenuators. The crystals used for the transmitter tests are all I have. Remember that for DDS tests the transmitter is operated in VFO mode, DDS output is fed to VFO input on the rear panel of the transmitter. Please note that I am adjusting the plate, loading and oscillator drive (Vc1) for best possible power output for both 80 and 40m tests.

3579Khz crystal power output = >8W

3579Khz crystal 1st harmonic -28dB
3579Khz crystal 2nd harmonic – not seen

7034Khz crystal power output = >6.5W

7034Khz crystal 1st harmonic -35db
7034Khz crystal 2nd harmonic – not seen

3615Khz DDS power output = >8W

3615Khz DDS 1st harmonic -40db
3615Khz DDS 2nd harmonic – not seen

7140Khz DDS power output = <5W

7140Khz DDS 1st harmonic >-45db
7140Khz DDS 2nd harmonic – not seen

Immediately here we can see a power output drop when using the AD9833 on 40m. The 3.6Vpp output of the DDS oscillator using the 2 transistor amplifier and isolation transformer is adequate for equivalent 80m crystal power output levels. The 2.5Vpp available on 40m is not enough to drive the Trio transmitter to full power. I was already struggling to get max power output of the Trio transmitter using crystals and would suggest a better buffer amplifier if operated on DDS 40m.

I don't believe we need to experiment with low pass filters to better spectral purity as the DDS oscillator behaves better than using a crystal. The tank, Pi and low pass filters featured on all transmitters will attenuate harmonic content from the oscillator.

Hallicrafters HT-40 (40W)

The Hallicrafters transmitter operated in CW with the same crystals on 40 and 80m into 50Ω dummy load via Diawa SWR/ power meter, this time set on the 150W scale as the HT-40 can deliver 40W. The test conditions are the same as the Trio tests. The HT-40's VFO input are the same front panel sockets used for crystal operation.

3579Khz crystal power output = 40W

3579Khz crystal 1st harmonic -30dB
3579Khz crystal 2nd harmonic – not seen

7034Khz crystal power output = 40W

7034Khz crystal 1st harmonic -35db
7034Khz crystal 2nd harmonic – not seen

3615Khz DDS power output = >40W (VFO mode)

3615Khz DDS 1st harmonic -40db
3615Khz DDS 2nd harmonic – not seen

7140Khz DDS power output = >40W (VFO mode)

7140Khz DDS 1st harmonic -35db
7140Khz DDS 2nd harmonic – not seen

No question that the Hallicrafters 6CX8 Pierce oscillator is very comfortable with the DDS module running on both 40 and 80 meters, in fact a bit better power output with our modern equivalent. I also tried running the DDS oscillator with the transmitter set to crystal mode, this time I felt confident my isolation transformer would keep any possible smoke in the radio. It worked! Even though the HT-40's black crystal socket is only grounded when in VFO mode the DDS oscillator, without a ground had enough drive to keep the 6CX8 oscillating and radio delivering full power. Thumbs up to the HT-40 transmitter. This particular radio followed me home after a visit to William's farm for an AWA event several years ago, I believe Cliffy was the previous owner?

I used a Kenwood TS-430s receiver in narrow band CW mode to monitor the tone quality of the transmissions from both transmitters and cannot detect anything abnormal in the quality of tone using the DDS oscillator on 3615Khz and other 80m band frequencies available on the Vero board prototype.

There's no doubt that a DDS oscillator can be paired to a vintage transmitter and not rely on suitable ham band crystals. Provided the output is buffered from the DDS digital to analogue converter, both DDS oscillator and transmitter are comfortable with each other. I added the isolation transformer to the amplifier but I do not think this is necessary, one can drive the oscillator grid directly from the amplifiers output via a capacitor. Both the Trio and Hallicrafters transmitters feature a crystal drive

control on the front panel so a DDS buffer delivering more than the prototype 3 or 4Vpp will not overdrive the valve oscillator in any way by reducing oscillator drive. Interfacing the DDS oscillator to the radio could be a bit of a challenge, the HT-40 features 2 receptacles with ½´ centre separation, similar to FT-243 crystal. Perhaps modifying a nonworking crystal with wires leading to the oscillator could work. The Trio features a rear panel connector, which I replaced with a BNC type to receive external oscillator. Your radio may have its own challenges but regardless of how you get the DDS oscillator to the radio we need power. I recommend using a separate linear 12Vdc power supply to power the oscillator. The prototype as you remember features a small 5V regulator for the micro and oscillator. The radio may feature a 12V transformer winding for relays etc and could be ushered into DDS power service. It has been brought to my attention that the DDS device relies on the internal 25Mhz oscillator to derive user frequency hence can only be as stable as the master oscillator. Any drift on the output is directly proportional to the 25Mhz master clock drift. During development I did not notice any deviation, I had a frequency counter connected to the DDS oscillator for the duration of the tests and did not notice any frequency change. As mentioned I was also listening to the tone of transmission using a receiver and again did not notice any change in tone.

The AD9833 device was a pleasure to use and I cannot report on any glitches or abnormal behaviour from the silicon. It responded exactly as expected and in practice followed the data sheet operating guide. The AD9833 is Analog Devices DDS entry level offering with the company having many other devices in their inventory. The AD9850 would be a better choice for RF applications and many VFO kits featuring this device are available. The DDS module including all the other bits, micro, regulator, transistors etc cost about R200 with the DDS module arriving via courier from a Chinese on-line ordering company. If any readers would like to try their hand at DDS oscillators I will gladly provide the PIC 16F818 programmed with the AD9833 code. I will also add a 5V regulator and dip switch for frequency selection, you just get the DDS module and tell me what frequencies you would like.

This project is also very useful as a general purpose shack frequency marker or beginnings of a transmitter. My remaining module is going to enter shack service as a 400,800 and 1000Hz general purpose audio source. An accurate 455Khz IF alignment oscillator and a marker for 80 and 40M bands, audio and RF available on separate outputs. All on one chip, this is the versatility of the DDS oscillator.

Is the DDS oscillator the answer to getting a vintage radio on air without crystals? In my shack a definite yes. The real estate I save from having a small DDS board programmed with frequencies I desire as opposed to a purpose VFO or using the radio with a limited supply of crystals justifies me acquiring another radio or oscilloscope…..what the heck, both. But first I must put back the smoke that escaped from the first HT-40 I tested.

Personal Opinions of Radio's I have Had
Andy ZS6ADY

I somehow feel that this is becoming a one side affair and would love to hear of similar reports from those of you who have had radio's that you perhaps wish you had never sold, but never the less they went through your hands and you had the experience of operating them.

From my last article in June 2021, I experienced the first of my Collins radio's with the 75A-4 receiver and the 32V-3 Tx. This was the start of my Collins collection of which I felt very humbled to have had.
The next to come into my hands was the S line which consisted of a 32S-3 Tx and 75S-3 Rx. Although they were separate rigs, they could be inter-coupled to run as a transceiver.

Typical Collins construction made as per Mil specs with aluminium chassis which stood the test of time. An all valve radio with no transistors at all and the 75S-3 having one of the best receivers of all time. The later versions of the 75S-3 were the 75S-3B, but still did not match the standard S3. The S3 line was the last of the split units and after that they were all transceivers, being the KWM2, KWM2-A. Of course Collins had many different types of radio's, mostly destined for military use, but these were all amateur frequencies.

The S3 line was given by a customer who noted I was a radio amateur and had these two radios that he had been asked to look after by a friend and had been lying in his garage for about 5 years. The friend had migrated back to the UK. I took these two radios straight to the late OM Bushy ZS6YQ, who first drooled over them in his customary way, and then offered to restore them completely. I had to promise to look after them faithfully and also buy a Power Supply, the 516F-2 for the radio. This was one of the things I enjoyed about the Collins radio's, none of them had built in power supplies. The KWM2 and 2A came with either a piggy back power supply or also used the 516F-2 PS.

As a result of this sudden enlistment of some Collins equipment, I actively pursued finding more of them and the accessories

The first of the Collins equipment : 75A-4 Rx; 32V-3 Tx; SB200 Linear; 32S-3 Tx; 75S3 Rx; Station Control x 2; Heathkit SB620 Scope; 30L-1 Linear; KWM2-A Transceiver and an FC102 Ant tuner in between.

that went with them. So much so that within a short period of time, I had replaced all my Yaesu equipment with Collins. I

swore I would never just buy them for the sake of having them, but that all of what I had must be in operating condition and be used on a regular basis. I purchased my first KWM2-A from Bushy too.

Later I came across a KWM2, that had also been lying around in a garage for a few years. This came with a 516F-2 ps and a station control, which had the built in patch system for relaying. In the early days of our first relays from 40m to 80m, I ran the KWM2-A and patched it with the S line. This worked extremely well.

I then came across a 30L-1 linear which used 4x811A valves and put out a bout 600w. I had to buy the complete station which consisted of a KWM2-A, 516F-2 ps, Station control and the 30L-1 linear. This meant I had two KWM2-A's, and so I sold one of them to stay true to what I had promised myself.

Through all this time I had been using the 75A-4, coupled to the 32V-3 AM transmitter. The S Line for the AWA Saturday nets, coupled to the KWM2-A to do the relays between 40m and 80m, and the KWM2 for CW using a Heathkit keyer.

The end result after some serious collecting

At as later stage, I came across a Collins 51S-1 receiver, which can be seen standing in the far corner next to the 32V-3. I did not keep it for long, because I could not really find a use for it. I don't think I have been strong on receivers, unless they were coupled to a transmitter of some kind.

Of course I could now say "Been there, done that, got the T shirt". The Collins Radio's were certainly a pleasure to work with. I always received good signal reports and comments about the quality of the audio. They really are a "no frills" radio without any accessories and enhancements . They look good work well and don't die on you for any reason at all.

More than anything, even I could repair them when something went wrong because they were so easy to get in to and more often than not it was simply a case of replacing a valve or two, with the help of a diagram this was quite easily done.

I do believe that anyone who has owned and used a Collins radio will never have a bad word to say about them. After all they have been through a world war, and certainly proved their worth in a few others too.

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HAM PRIDE: OUR LEGACIES AND TRADITIONS
By Dave Ingram, K4TWJ

We occasionally hear fellow amateurs say they thoroughly enjoy on-the-air operations, but lack an electronics background for fully understanding technical details of modern equipment. Is that a deficiency? Absolutely not. Every amateur has a special place only he/she can fill in our great hobby/service and "technical know how" is not mandatory. The following tale exemplifies that statement. Remember it and pass it on to future generation amateurs later in years as one of our proud legacies.

Although a little known fact, telegraphy and the Morse code were not invented by a technical genius, but by an artist and portrait painter.

That's right friends: Samuel F. B. Morse was an internationally recognized artist. While traveling between Europe and North America, he met Joseph Henry plus several other pioneers in electromagnetism.

Soon afterwards, he devised an electromagnetic signalling device that worked by moving an artist's pen from side-to-side on a painter's canvas while it was being slowly drawn through a windowpane type stretcher. Like every innovation or invention, a series of small and natural steps followed.

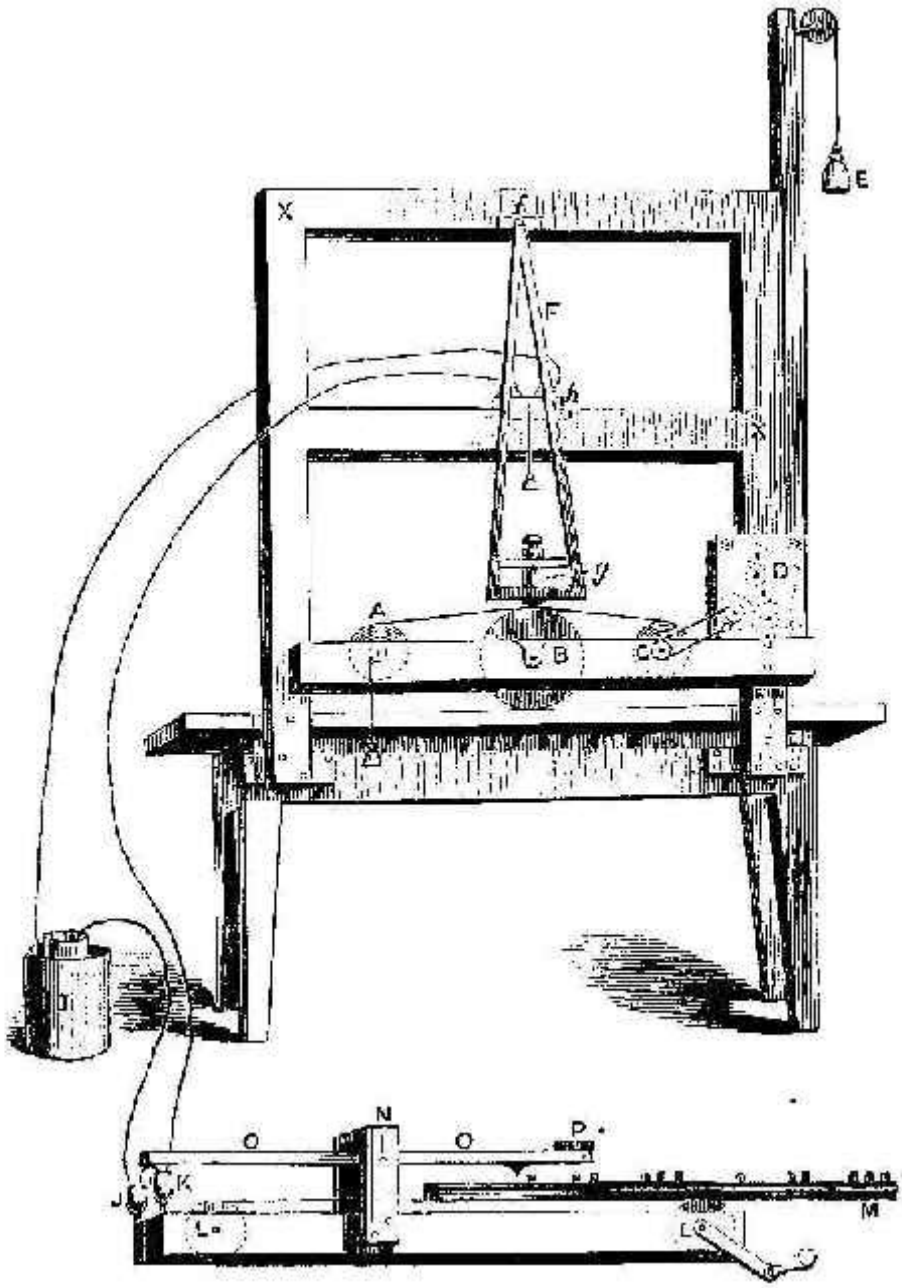
First, Morse devised a dot/dash code for converting pen movements into letters and words transmitted over wires. Then Morse's assistant Alfred Vail designed and built a full mechanism key to replace the crude strap key Morse had quick-devised to use with his setup. Noting the difference in sound between dots and dashes, Vail also built an electromechanical sounder, to replace Morse's original pen-and-canvas setup.

Telegraphy was then off and running. Quick-formed telegraph companies on several continents began installing telegraph lines across sparse lands. Hundreds of small telegraph companies, most without interconnecting lines quickly flourished. In many cases, runners hand-carried messages between companies lacking interconnecting lines. As time progressed, the largest telegraph company purchased hundreds of small telegraph companies and combined them all under the now internationally recognized name of Western Union.

The next big step was Marconi's development of spark gap communications or wireless telegraphy. A slightly modified form of Morse code—using different combinations of dots and dashes for a few letters to permit easy copy with an earphone followed. That international version of Morse code prevailed, and is still proudly used by radio amateurs today.

It has relayed desperate messages by radio, by hammer taps on sinking submarine hulls, via eye blinks by the severely handicapped and prisoners of war, and more (original text messaging!). Many radio amateurs even carry medic-alert cards illustrating the Morse code and explaining if severely injured, but able to move any body part, they can communicate via Morse code.

Simply stated, this is a mode that promises to live forever!



MORSE ORIGINAL CANVAS-TYPE TELEGRAPH

This is an original 1850s-era sketch of Samuel F. B. Morse canvas stretcher-type telegraph setup that he nailed to the back of a drawing table.

Weighted pulley was used to slowly move canvas forward while dot and dashes moved pen from left to right. Some imagination is helpful in visualizing how it works.

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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.

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Notices:

Net Times and Frequencies (SAST):
Saturday 07:00 (05:00 UTC) —Western Cape SSB Net— 3640
Saturday 08:30 (06:30 UTC)— National SSB Net— 7125; Sandton repeater 145.700
Echolink—ZS0AWA-L; ZS6STN-R
Relay on 10.135, 5,430 and 3615
Saturday 14:00 (12:00 UTC)— CW Net—7025

AWASA Telegram group:

Should you want to get on the AWA Telegram group where a lot of technical discussion takes place, send a message to Andy ZS6ADY asking to be placed on the group. This is a no-Nonsense group, only for AWA business.
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Yaesu FL DX2000 linear amplifier in working condition. Asking R5000

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