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- * Technical Advisor—Rad ZS6RAD
- * Secretary/PRO—Andy ZS6ADY
- * KZN—Don ZS5DR
- * Historian—Richard F4WCD (ZS6TF)
- * Member—Ted ZS6TED

Newsletter

129

April 2017

Reflections:

Having been licensed since 1982, I often sit back and think on the road that my amateur radio activity has taken since first embarking on this most interesting route.

I am sure I am not alone when I say that I have my ups and downs throughout this journey and have at times wondered why I would want to punish myself sometimes with some of the radios I have had, but I have never once felt remorse about taking it.

Not being a person of great technical ability, I still wonder how I got through the exam, from the very beginning, I indulged myself in absolute recklessness, sometimes to my own detriment. I have been from CW to the full DX interest to slow scan to digital to 2m long distance to SSB and back to CW again and never really greatly succeeded in any of them, but also never

really lost interest because of that. I have simply enjoyed all the different aspects that I have been involved in.

All the time having used valve radio, or radios with valves in them, simply because I could not afford the latest and greatest, I soon came to realise that this was one of the joys of Amateur Radio. One did not have to have the latest hi-tech system to get on to frequency. Whether it was made of silicone chips or glass, they all produced the same results. This is one part of life that size doesn't matter.

There are often times that I think there are some radios I should never have sold or swapped or given away, but then, I would not have the ones that I have today if there had not been that constant change taking place. Had I kept them all, I would not have place to

put them now.

I do still wish I had kept my first ever ham gear, an HT37 transmitter and SX100 receiver, but they would just be gathering dust now, sitting forlornly on a shelf.

I do hope that somewhere, some radio enthusiast has them and they are still in regular use, but how would you ever know that.

Nostalgia can be a terrible thing sometimes. But it can also bring back such pleasant memories of things that we had and days gone by.

I know of a few people who still have their first radios and still use them on a regular basis. To you, well done.

May they bring you years of service and pleasant memories of contacts gone by.

Best 73

DE Andy ZS6ADY

WIKIPEDIA

Electrical Telegraph

In 1846, Alexander Bain patented a chemical telegraph in Edinburgh. The signal current moved an iron pen across a moving paper tape soaked in a mixture of ammonium nitrate and potassium ferrocyanide, decomposing the chemical and producing readable blue marks in Morse code. The speed of the printing telegraph was 1000 words per minute, but messages still required translation into English by live copyists. Chemical telegraphy came to an end in the US in 1851, when the Morse group defeated the Bain patent in the US District Court. For a brief period, starting with the New York-Boston line in 1848, some telegraph networks began to employ sound operators, who were trained to understand Morse code aurally. Gradually, the use of sound operators eliminated the need for telegraph receivers to include register and tape. Instead, the receiving instrument was developed into a "sounder," an electromagnet that was energized by a current and attracted a small iron lever. When the sounding key was opened or closed, the sounder lever struck an anvil. The Morse operator distinguished a dot and a dash by the short or long interval between the two clicks. The message was then written out in long-hand.

Royal Earl House developed and patented a letter-printing telegraph system in 1846 which employed an alphabetic keyboard for the transmitter and automatically printed the letters on paper at the receiver, and followed this up with a steam-powered version in 1852. Advocates of printing telegraphy said it would eliminate Morse operators' errors. The House machine was used on four main American telegraph lines by 1852. The speed of the House machine was announced as 2600 words an hour.

HF Happenings

New amateur radio regulations for Cuba were published on 10 March 2017. The new legal body consists of 17 chapters and 182 articles, which contain the regulations governing radio amateurs in Cuba. It includes an important group of modifications with respect to the previous Regulation, including new authorized bands, extension of the expiration period of Licenses, Capacity Certificates and regulations for the importation of equipment, antennas and other accessories.

Cuba has adopted the approach of listing permitted modes by band with up to 31 Emission Designators specified for some bands. A drawback of attempting to list every possible Emission Designator for each band is that some will inevitably be missed. For example, the new regulations do not appear to include the F7W and FXE designators for D-STAR and DMR.

Cuba has three classes of license - 1st Class - Prefix CO – 2 000 watts max; 2nd Class - Prefix CM - 100 watts max and 3rd Class - prefix CL - 10 watts max

1 April is Portugal's National Summits on the Air Day

All radio amateurs are invited to participate in Portugal's National SOTA Day, on 1 April, an event that is meant to both highlight and encourage participation on the Summits on The Air program. The 'party-on-the-air' is also meant to celebrate SOTA – Portugal's sixth year in activity, started precisely on this day, in 2011.

Long time and current participants, as well as amateur radio clubs, are particularly encouraged to invite other amateur operators to tag along their planned activities in order to increase the program's awareness. Diplomas (electronically sent) will be available to activators, chasers and SWL registered on SOTA's Database and after the upload of their day's logs. No other rules apply other than the Summits on The Air own set of procedures. This is not a contest, just another way of enjoying and celebrating SOTA's unique pleasure of amateur radio activity. Pedro Carvalho, CT1DBS/CU3HF is the "point man" on this event and all queries regarding Portugal's National SOTA Day 2017 should be sent to his email (lookup QRZ.COM) or diasotaCT@gmail.com

DXCC News

The ARRL DXCC Desk has approved the 2016 November operation by E44CM from Palestine for DXCC credit.

Mills on the Air

So far, 13 Mills have registered for the weekend of fun on 13 and 14 May. Most are British, two in Holland, another from Belgium and the first ever in its decade-long history is a mill in Australia.

Here in South Africa, we have a number of mills – I am aware of four in the greater Cape Town area and a number in the Eastern Cape around Grahamstown and Bathurst.

<http://www.theheritageportal.co.za/article/millbank-closest-historic-mill-johannesburg>



<http://www.theheritageportal.co.za/article-categories/historic-mills>
<http://www.countrylife.co.za/heritage/restoring-historic-mills>
https://en.wikipedia.org/wiki/List_of_windmills_in_South_Africa

<http://blog.sa-venues.com/provinces/western-cape/windmills-in-south-africa/>

The picture on the right depicts a wind pump (in Afrikaans 'n windpomp). It is not a windmill - it pumps water from deep underground. The picture above is a windmill.



Diary

March

31 March to 9 April - Stars of Sandstone, Ficksburg

31 - All schools close

April

to 9 April - Stars of Sandstone, Ficksburg

1 - **RaDAR Challenge;**

6 - van Riebeeck Day; **SARL 80 m QSO Party**

8 - Autumn QRP Sprint

8 to 15 Klein-Karoo Nasionale Kunstefees

11 to 17 - Pesach

13 - Holy Thursday

14 - Good Friday

14 to 16 - Slow festival, Sedgfield

15 - RAE Registration closes; Two Oceans Marathon

16 - Easter Sunday

17 - Family Day

18 - **World Amateur Radio Day;** All Schools open

21 to 29 joBerg2C

22 - SARL Noise Floor Workshop

23 - ZS4 Sprint

24 - Isra and Mi'raj; Closing date for articles for the May Radio ZS

24 to 30 - AfrikaBurn, Tankwa Karoo

27 - Freedom Day

27 to 30 - Karoo Food Festival, Cradock

28 - School Holiday

28 and 29 Prince Albert Town and Olive Festival

29 and 30 - Haenertsburg Food, Wine and Beer Festival; Pringle Bay Village Festival

30 - Knysna Motor Show

Word to the Wise

Stochastic - adjective: being able to be described statistically, but not precisely. In the context of contesting, run rates are stochastic. If the rate is 60 QSOs per hour, contacts do not occur each minute - there are bursts and dry spells.

Testing a hamfest find

Testing a hamfest find before you buy it could be made easier with this project for a pocket-sized variable power supply capable of powering a wide range of battery-powered devices <http://>

Hearing Loss

Researchers believe that not all hearing loss types may be detectable with standard hearing tests. One type of deficit thought to be caused by exposure to loud noise is indicated by difficulty understanding conversations taking place in noisy environments. The conjecture is that loud noise can degrade the ability of a portion of the auditory nerves to deliver enough information to the brain. [http:// www.cbsnews.com/news/loud-noise-hearing-loss-hidden-cause/](http://www.cbsnews.com/news/loud-noise-hearing-loss-hidden-cause/)

Sitting in front of a computer with headphones on for extended periods, with a steady intake of caffeine and snacks, has proven to be hazardous for computer gamers, too. <https://www.nytimes.com/2017/03/15/technology/personaltech/live-streaming-gaming-death.html?emc=eta1>.

Question and Answer on OQRS

Obtaining QSL cards has been made so much easier and more efficient by Online QSL Request Systems set up by the DX stations or their QSL Managers, that it's hard to imagine why any DX station would choose to **not** use OQRS. Online QSL Request Systems eliminate physical paperwork aspects of requesting QSLs from DX stations by replacing it with a web-based form. M0URX operates one OQRS System and has put together a Question and Answer page about how his system works. [http:// www.m0urx.com/3-M0URX/715-oqrs-q-a.html](http://www.m0urx.com/3-M0URX/715-oqrs-q-a.html)

African DX

South Africa, ZS. The call sign of the SA Armour Museum, ZS4AFV (Armoured Fighting Vehicle) will be active on HF during the Stars of Sandstone 2017 event from 30 March to 9 April 2017. Activity will be on phone and RTTY (maybe some other digital modes as well) and the station on the air when Dennis, ZS4BS, is not involved with the morning military vehicle drive or the afternoon "Sound of Thunder" mobility demonstration. QSL via ZS4BS, a special QSL card will be available for QSL cards received.

The Stars of Sandstone event takes place on the Sandstone Estate about 14 km north of Ficksburg on the R26 to Fouriesburg and Bethlehem.

<http://www.starsofsandstone.com/>

<http://starsofsandstone.com/images/pdf/Newsletters>

[Sandstone_NL15_build_FINAL.pdf](#)

<http://www.starsofsandstone.com/images/pdf/>

[Stars_of_Sandstone_Illustrated_Rail_Programme2017.pdf](#)

<http://www.starsofsandstone.com/images/pdf/>

[Stars_of_Sandstone_illustrated_Event_Programme_2017.pdf](#)

Botswana, A2. A UK Team will be active as A25UK from Botswana between 25 April and 6 May. Operators mentioned are Nobby, G0VJG, Dave, G4BUO, Nick, G4FAL, Graham,

G4FNL, Tony, G4LDL, YL Glenys, G8KWD, Guy, G0UKN, Martin, M0MDR, Toby, M0TBS, and Giles, M0TGV. Activity will be on 160 to 6 meters using CW, SSB, RTTY and PSK. Suggested frequencies are available as a PDF file per the following languages (EN, IT, ES, FR, DE, JA, RU) at <http://www.a25uk.com/2017-2#mhz>. QSL via M0OXO or via ClubLog's OQRS. Also, visit their new web page at <http://www.a25uk.com>

African Islands

IOTA frequencies

CW: 28 040 24 920 21 040 18 098 14 040 10 114 7 030 3 530 kHz

SSB: 28 560 28 460 24 950 21 260 18 128 14 260 7 055 3 760 kHz

Chagos Islands, VQ917. Jim, ND9M (VQ96JC), from Diego Garcia Island (AF-006) informs OPDX on 14 March, "Well, the local licensing office came through for me again. The VQ917JC license I asked for just came through here this afternoon." So start looking for Jim to be on the air signing as VQ917JC. Jim told OPDX he would not make an effort on 60 m at this time. His operating hours are still limited to 12:00 – 16:00 UTC max, which does not do much good for the NA/SA ops. He states that he will probably focus on 30, 20 and 17 meters just to get VQ9 into some logs. Jim also mentioned he did bring his satellite equipment. QSL via his home call sign. Look for more details to be forthcoming.

Canary Islands, ED8. Alvaro, EA8JR, Jorge, EA8TL and Manuel, EA8DO, will be active as ED8W from La Palma Island (AF-004) during the CQ WW WPX SSB Contest (25 and 26 March) Multi-Op entry. QSL via EA8DO or LoTW.

makezine.com/projects/pocket-sized-power-supply/.

Operating Tip

Helping with the Exchange.

Helping a station through a contest exchange during a phone contest is a courteous thing to do and at slow times may not damage your rate. Why not also invest in a faster rate for future CW or RTTY contests by noting calls that are sending non-standard or inefficient exchanges and following up with a polite email *outside of the contest* with suggestions on how to improve their exchange for the next time. Newer contesters may just be using the default messages included with their logging program, which can sometimes stand improvement.

Radiation from USB 3 devices

USB 3.0 devices and cables have the possibility of radiating across a wide range of frequencies from LF to beyond 7,5 GHz. This Intel paper discusses the specific case of USB 3.0 interference to 2,4 GHz band devices, but contains information on USB 3.0 radiation characteristics and potential ways to mitigate that radiation. [http:// www.intel.com/content/www/us/en/io/universal-serial-bus/usb3-frequency-interference-paper.html](http://www.intel.com/content/www/us/en/io/universal-serial-bus/usb3-frequency-interference-paper.html)

Restoration

By Dave Oxborrow

On the subject of restoring vintage radios complete with bat droppings and years of grime and rust, my preference is for stuff around the mid 30's to late 40's. You can see the cost cutting in sets made after the war.

The big American radios have big chassis, big valves and are easy to work on. Usually these sets have an RF stage, PP output and sometimes an extra IF. Although they are not much good above 20MHz, they are still worth restoring.

When an old piece arrives and it's something I like, first step is to find a schematic and have a look at how it is put together. On some sets I have removed all the transformers, tuning capacitor, IF's and then drilled out all the valve holders and other parts riveted to the chassis. Once this is done, you can virtually lift out all the parts including the wiring loom, controls and coils. This gets put in a box for later on. The chassis is degreased and then washed in a weak solution of acid and rinsed off and left in our hot sun to dry. You have to be careful doing this as the acid can remove the plating if left too long. The parts put in the box get washed in water soluble degreaser which removes a lot of the dirt off the wires and components. Everything gets washed off with a good blast from a hosepipe. This also gets put in the sun to dry out.



The old Favourite AR88

Transformers are tested for function and insulation and if good, the covers are resprayed and then reassembled. IF cans get polished with Brasso if made of aluminium, tuning caps get washed, also in weak acid till the vanes are bright and the steel work is clean. Once the courage is plucked up for the next step, the chassis is reassembled and then the rebuilding process starts. All rotten wiring is replaced and capacitors and suspect resistors. Final check with the schematic to see if all is well.

Controls and band switches are also cleaned up, dial mechanisms repaired, dial cords restrung and everything mechanical sorted out.

Quick check for HT shorts and then the set is fired up. Usually the audio side will work but the IF's and RF ends have to be realigned. So, at the end of the day you end up with a nice clean chassis that works. It's around 30 to 40 hours of solid work.

Then we start on the cabinet which is also many hours of work. I have done this on many audio amplifiers over the years and some vintage guitar amplifiers. Of late my hobby has turned slightly away from radios and amplifiers to 40's to 50's record players, same treatment for them. Remove all the electrics, degrease all the mechanics, dismantle, respray the chassis and reassemble. Also a lot of man hours of work so will rather look for stuff that will respond to a cleanup instead. There are a few of us here in Durban that play with valve based stuff but of late there seems to be less time to spend on hobbies. My involvement with Lehman's goes back many years to my high school days. Then they were making a range of PA and industrial amplifiers plus other industrial types of equipment as well as transformers.

A friend and myself used to come down to the factory after school and we were allowed free run of the place as long as we did not get in anyone's way. The founder of the company was very generous and allowed us to make chassis for Mullard 5-10 amplifiers which were all the rage then plus he would load us up with obsolete electronic equipment to do with as we liked. I ended up working during my holidays for them and it was a great experience. The family eventually moved away from our street to pastures greener. One night and this is pre cell phone days I was driving around Durban North and my car broke down. By this time it was after 10pm. What to do, as I did not fancy a 15 mile walk back home and knowing where one of the son's lived, I thought I have got nothing to lose by knocking on his door. This was duly done and a warm welcome received even though he was half asleep. I told him my dilemma and he said no problem, he will take me home. At that stage of my life I was doing quite a lot of design work privately at home and we got chatting in the car. Next thing I was given a project to do and at the successful conclusion of this I was offered a job at the company and have been here ever since.

There is an awful lot I have left out on restoring old equipment such as getting seized ferrite cores to move without breaking them. I also have rebuilt a lot of pre-war Philips set which can be something else to do compared to more conventional American radios. None of the Philips sets have been restored to the level indicated in the previous section, as they are just too complicated to do a complete strip down. I don't know if you are familiar with pre-war Philips top of the line sets. They are very clever designs and work amazingly well when rebuilt and aligned as per Philips instructions.



Phillips 291A

A model 291A is one of my favourite beasts, it is a massive table radio which weighs as much as a vintage TV and is about the same size, has complicated dial drive arrangements and very well designed circuitry. It also has an excellent band spread arrangement where on certain bands, an extra dial indicator needle pops out, a light comes on, you pull the main tuning knob out and that small section of band now gets spread over the whole dial length. It was what is known as electrical band spread where there is a separate beehive capacitor that varies the oscillator frequency and you use the main tuning control to peak the RF circuits.

What always impressed me with this era and make of sets is the attention to detail. Special low noise pentode designed by Philips for the RF amp, low loss coil formers, negative and sometimes positive feedback for frequency response correction in the audio stage, the speaker, audio amp and cabinet are designed as a whole to get good sound, trimming of the inductance of the canned coils by rolling grooves in the can. Even the tuning capacitors are unconventional in that they are not the normal vaned type but look like giant beehive trimmers mounted in a rigid steel frame

with porcelain insulators and lots of brass bits and pieces for the drive. I suppose in this day and age, the performance of these sets would be a joke but they were way ahead of the Americans and enlightening to fiddle with.

The model after this which was an export only model was of even more advanced design complete with bicycle spokes mounted diagonally across the chassis corners. The spokes were tightened up which stopped the chassis flexing. I suppose adding all this extra cream and butter into the design, economies had to be made somewhere. The mains transformer laminations are usually secured with nuts and bolts, this model had nails driven into the holes and bent over. Nothing wrong with this, when the nails are bent over, they tension up against the laminations anyway, bit unconventional though.

One of the common problems on this era of sets was corrosion of the primary wire on the output transformer. Philips decided that this was due to the fact that the primary wire is sitting at high voltage in a metal cage which is at earth potential. Their solution was to mount the transformer on an insulated board and connect the transformer core through a high value resistor to HT. This means that the core and windings were at the same potential. Problem solved and transformer failure on these sets which are now around 80 years old is rare.

I think that it is important to keep this hobby alive as there is not much interest from the younger generation (yet?). As to the argument in what is the point of restoring what the Americans call a piece of old junk when a modern set performs so much better. Well, why do people restore old cars, record players, steam engines, appliances, old tools and furniture. The answer to some extent is that a lot of old stuff is well made and fairly simple to restore plus there is a worldwide resurgence in retro mixed in with a bit of modern styling. Modern stuff, especially electronics, has branched out into so many fields and you will need special knowledge to fix most of it, whereas in the old days circuits were simple by comparison.

(Dave is one of our non-ham readers and sent me this article in response to a few emails passed - Ed)

AWA Anniversary

On the 22nd March 2003, 7 founding members got together on air and the AWA of Southern Africa was breathed in to life.

Since then, there have been 10 presidents from around the country and membership has grown to a staggering 274, with members from 10 different countries around the world.

CW nets, Newsletters, Saturday morning nets, AM nets, CW open days, Valve QSO parties have all become part and parcel of this great organization and we have really made quite a mark in the Amateur Radio development and heritage of radio in Southern Africa.

The best of all and one of the trade marks of the AWA is that Membership is free and by association. This was the cornerstone of the founding and has since become the Capstone. Thanks to the members who have donated radios and money and time to raise money, we have not only survived, but thrived.

Whether you are a new member or a founding member, we salute you and thank you for wanting to be part of this organization. It is an honour and a privilege to be associated with so many like minded people.

The AWA Committee.

The following information was sent to me by Jess Hawes ZS5YAT - ED

James Pastorfield shared a link to the group: Amateur Radio News March 8 at 11:15pm 2017

Italian special event **Collins Collectors Association of Europe (CCA)**

Look for special event station II0CXX to be active between March 1st and May 31st, on Saturday during the Collins Collectors Association of Europe (CCA) Net, at 1000z on 7165 kHz.

This activity is in remembrance of the 30th anniversary of Arthur A. Collins's, W0CXX, death (1987-2017) founder of the Collins Radio Company -- he became a Silent Key in 1987.

QSL via IK0IXI only direct, NO Bureau and NO eQSL.

OPDX (SOUTHGATE)

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James Pastorfield shared a link to the group: Amateur Radio Newline. 8 March at 23:21 ·

Cape Cod National Seashore to Host W1MGY **Titanic Memorial Special Event**

Cape Cod National Seashore in Massachusetts has invited organizers of an Amateur Radio special event in April marking the 105th anniversary of the RMS Titanic disaster to set up at its Salt Pond Visitor Center. The Titanic/Marconi Memorial Radio Association of Cape Cod — W1MGY — is sponsoring the worldwide commemoration to honor the approximately 1,500 passengers and crew who died when the Titanic — thought to be unsinkable — struck an iceberg and sank on its maiden voyage from England to the US. W1MGY operators have permission to operate from the national park for 3 days and 2 nights.

Sponsors point out that the 740 Titanic survivors were rescued by the Carpathia as a result of wireless messages sent from Marconi's Wellfleet Station, today preserved within Cape Cod National Seashore as its "Marconi Beach" site. Between April 13 and April 22, the national park will host commemorative events, including the special event, centering on the Titanic disaster and the evolution of wireless communication, culminating in the worldwide International Marconi Day. All Titanic events will be held at the Salt Pond Visitors Center in Eastham. Events are free and open to the public.

"We will operate from there on April 13, 14, and 15 until 0527 UTC, the time the Titanic's last radio message was heard by the Virginian. The vessel foundered 20 minutes later," said Barry Hutchinson, KB1TLR — the new trustee of W1MGY, which itself recalls the Titanic's MGY call sign. W1MGY, which has been on the air for past Titanic on-the-air events, will transmit a message at the time the ship foundered.

For more than a decade, W1MGY special operations have marked Titanic anniversaries. ARRL Lab staffer Mike Gruber, W1MG, became W1MGY's trustee in 2003, and he and others operated Titanic special events in April from the Titanic Museum in Indian Orchard, a part of Springfield, Massachusetts.

"These events were always very special to me personally," Gruber said. "I'm thrilled to see someone with Barry's experience and enthusiasm now making it happen at Cape Cod National Seashore."

W1MGY will set up two stations staffed by about two dozen volunteers and operate on CW, SSB, and possibly PSK31. All operating will be done in the General class band segments. As starting points, Hutchinson suggested 3.950 MHz, 7.270 MHz, and 14.285 MHz, adding that band conditions would dictate whether they try 15 and 10 meters. W1MGY will be on the air for a public demonstration on April 15, from 9:30 AM until about 2 PM EDT, when the Cape Cod National Seashore will show the movie Titanic to close out the event.

Hutchinson said park visitor center staffers have been enthusiastic and very supportive of the event, and he hopes the park will be willing to host future Titanic events.

The park is a sponsor of the Marconi Cape Cod Radio Club KM1CC. The Marconi Beach site, 6 miles north of the Salt Pond Visitor Center, features exhibits and displays of Marconi memorabilia, including a model of the old Marconi station near the site and a bust of Marconi.

"I expect W1MGY and KM1CC will partner for events in future Aprils, as the dates of the Titanic event are the beginning of the week of the annual International Marconi Day event that is very popular at the park," said Barbara Dougan, N1NS, who is the current KM1CC trustee and a national park employee. "We average about 400 visitors to our operating location as well as make over 1000 on-the-air contacts."

The event will also feature stories of early marine wireless communication and a short film, The Voice of Cape Cod, which describes the building in 1901 of the Marconi Wireless Station in South Wellfleet and the first transatlantic transmission sent from the US to Europe on January 18, 1903.

On April 21, the longer film, Rescue at Sea, will be shown. It chronicles the collision of the Republic and the Florida off Nantucket in January 1909, and the role of Jack Binns, the Marconi radio man aboard the Republic, who stayed at his key as the ship was sinking. He became known as CQD Binns — the first hero of wireless, more than 1,500 passengers and crew were saved. In 1909 CQD was the Marconi signal used to call all ships in an emergency. Like the Titanic, the Republic, also hailed at the time as unsinkable, was owned by the White Star Line. Binns later turned down an offer to work on the Titanic.

On April 22, the Marconi Cape Cod Radio Club's KM1CC will take part in International Marconi Day on April 22 from the Nauset Coast Guard Station in Eastham, Massachusetts.

<https://www.qrz.com/db/w1mgv>

(ARRL)

New Life for an FT-101E Power Transformer

John Golby ZS1ZC



This old beauty came to me via a swapshop advert earlier this year and I gave it a good once-over, cleaning moving parts and replacing the HV electrolytic capacitors. Once it was done all worked well, but I kept hearing a hissing or sputtering sound from the mains transformer, and it quickly got very hot. On closer inspection with a variac on the primary, I noticed the heating was producing a distinctly chemical smell, so it was clear that there was some actual damage under way. This pointed to either a replacement or a repair job. Since the only source of second-hand FT-101 transformers seemed to be overseas via eBay, I embarked on the journey of a partial rewind.

The whole FT-101 series uses the same spec transformer. It has two primaries to cope with different mains voltages. It has four secondaries: 1.5V-0-1.5V (for the DC-DC converter), 0-120V for the screen voltage and -100V bias, 240V-0-240V for the HT supply, and a multi-tap low voltage winding for the tube filaments and low-voltage electronics.

My winding setup is pretty straightforward. I have a lathe that I can run slowly enough to control winding alignment with my fingers (around 40 rpm). You can see the lathe chuck at the top left. I placed a short length of 10mm steel rod into it and positioned a block of green HDPE that I had lying around about halfway along it, securing it with a 4mm bolt and a hole that I threaded accordingly. I chose the block specifically to fit into the rectangular hollow of the bobbin – you can use any material for this and fix it in place any way you see fit.

I also made a jig for mounting the wire coil, which was just more white HDPE and a 15mm rod that I had available. Any mechanism and mounting will do for this.

The main challenge in a transformer wind is counting turns. So I modified my PIC-based CW keyer (PICAXe with an LCD display) by utilizing the dit and dah paddle inputs and downloading new code to it. I made another “key” cable and connected each line to a reed switch mounted on some hot-melt-glued pieces of veroboard (see left). I mounted that assembly on a magnetic base that came with my lathe’s dial test indicator. I then took another piece of HDPE, placed a small magnet into the end of it and secured it with duct tape, and then mounted it on the winder shaft in the same way as the bobbin former. This was quite a learning experience, discovering how reed switches actually work and the way they need to align with the magnetic field (but that’s another subject).

The way it works is that as the lathe winds, the magnet end of the arm sweeps down past the upper reed switch and then the lower one. The PICAXe code figures out the direction of travel from that and either increases or decreases the turns count accordingly. This is very convenient when you have to undo windings that haven’t gone quite where you want them to. That’s when the lathe gears are disengaged and the chuck rotated by hand to get the positioning you need.

I added a feature to the PICAXe code whereby I could use the keyer speed potentiometer to set an initial winding count – I found this useful when taking a break in the middle of the 480V winding (just under a thousand turns in total).

I should add that none of the above is actually needed to wind a transformer, it just makes it a lot easier. A manual winding jig will work fine, and a bit of concentration and careful note-taking will eliminate the need for an automatic counter.

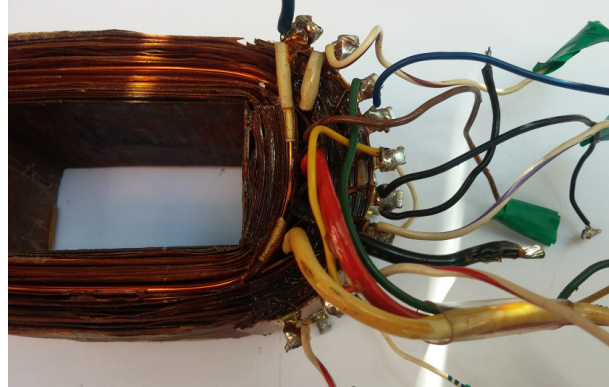
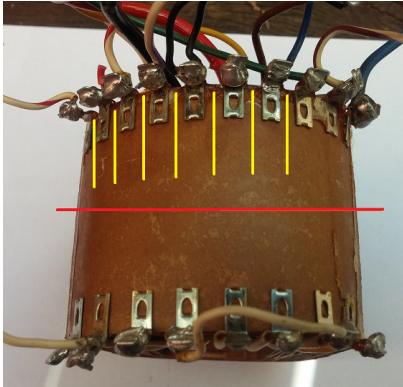
It took around half an afternoon to get the transformer out in one piece with most of the connecting wires intact – this and regular photographs would prove very useful later when piecing everything together again.

The copper band around the transformer is easily removed by melting its solder joint with a hot air gun (it’s an electromagnetic shield). It has the various winding voltages written on it, so I marked it to make sure I kept the correct orientation at reassembly.

Of course, a major challenge was still ahead – separating the windings from the core. I don’t mind saying that this is a major job and requires that the entire tranny be baked at over 100°C for a few hours to melt the varnish, and then prying the layers

apart with gloved hands. So I didn't do it. The short version is that when I took the tranny to a well-known local transformer manufacturer for a quote and advice, the owner very kindly offered to have one of his staff do it for me – free of charge. What a gentleman, exemplifying the best of ham spirit.

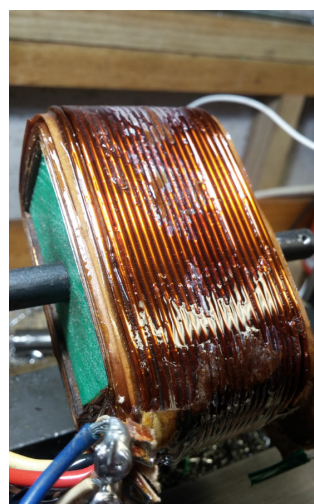
So below is what I was left with (along with a box of neatly piled E and I pieces). You can see how the original manufacturer used cardboard as a mounting for the crimped terminals. I cut across this carefully with a craft knife (red line) to fold the lower mains-side terminals outwards and then cut the secondary terminals away from the outer insulation layer for use later (yellow lines). I then proceeded to peel away the secondary windings layer by layer. Bear in mind that power transformers usually have the primary closest to the core and the secondaries towards the outside.



In the second picture you can see the various layers, and how the designers used a basic cardboard bobbin. I would say Yaesu used pretty basic engineering on this given the absence of a more solid pre-formed bobbin.

Anyway, it was now time to find out what was really wrong with this component and the only way with a transformer is to unwind it

until you find something significant that explains the symptoms. I unwound the outer 3V centre-tapped winding and the 120V winding – both were fine. But this is what I found underneath where the 480V winding should have been:



What a mess. The insulation and enamel have been burned well and truly to cinders, whatever paper insulation was there had been carbonised (creating shorts), and it clearly happened over a considerable period. This winding needed to be peeled back completely. After stripping it back and carefully counting the turns, I reached the low-voltage secondary (on the right), and this seemed to be in perfect condition. I decided to wager that I'd found the only fault in the transformer and cleaned and prepped this layer with a solid coat of transformer varnish to smooth the

surface and provide extra insulation against the 480V that will be generated by the replacement layer (third picture above). Once that dried for a day, I gave it a few layers of polyester tape as a bed for the new HT winding. You can get the idea here (although this picture is for the 120V secondary winding):



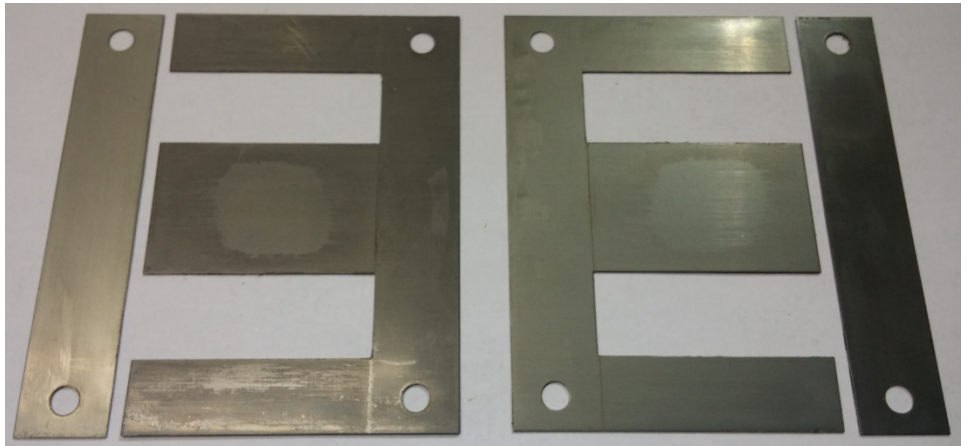
This is the famous polyester "yellow tape" - a high-temperature variety used by transformer manufacturers. It has a dielectric strength of over 4kV and is happy up to 130°C.

It's good practice to try and align adjacent turns in a winding. The problem is that once you're a few layers up the surface gets bumpy and the placement of each turn is difficult to control. The only real impact will be on reliability, in the sense that turns crossing over each other are vulnerable to compressive weakening and possible shorting with the ones underneath – so I figured that as long as we weren't having wild deviations across the winding it would be low risk.

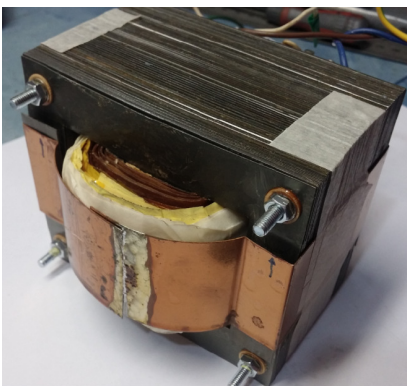
I had measured the various wire thicknesses with a micrometer and the 480V winding had used 30SWG, the 120V used 35SWG and the 3V had been wound with 25SWG. Luckily the 3V winding was only six turns, so I was able to reuse its wire. However, I had to buy a roll of 30SWG for the HT winding and then used the same for the 120V secondary. The initial 480V HT winding requires eight layers of around 120 turns each (this transformer runs at about 2 turns per volt), each alternating with a layer of insulation. I initially used Kapton (a high-temperature insulation tape) on the lower layers, but found it very unwieldy with a tendency to tear, curl and stick on itself. So I settled on the yellow polyester tape for the remainder (which is also a lot cheaper!).

Once all windings were in place I covered the outer layer with masking tape and more polyester tape to mount the terminals that I'd kept aside. I was then able to scrape, tin and wrap each secondary wire end to its respective terminal. A series of continuity checks and resistance measurements confirmed that the connections were correct.

Now the big challenge – final assembly of the core into the windings. This is just a slow process of interleaving E-sections from opposite sides of the winding and then inserting the I-pieces in the gaps that remain. You can see from this photo how they should be arranged in layers, the left pair on top of the right pair, repeating until all are in place.



A few solid taps with a rubber mallet gets them all properly aligned. The only part that requires patience is getting the last few sections squeezed in, and even then I lost about 5% of the core weight because the fit was just too tight. I don't know whether that was because the former got distorted in the winding process or because there had been warping of the sections during disassembly. From what I've read on the internet, some loss of core material is inevitable unless you have the right sort of assembly jig.



A quick reflow of the solder on the ends of the copper band, four new bolts through the core and she's assembled. I insulated the bolts from the core by wrapping them in polyester tape to prevent them shorting the laminations and increasing eddy currents.

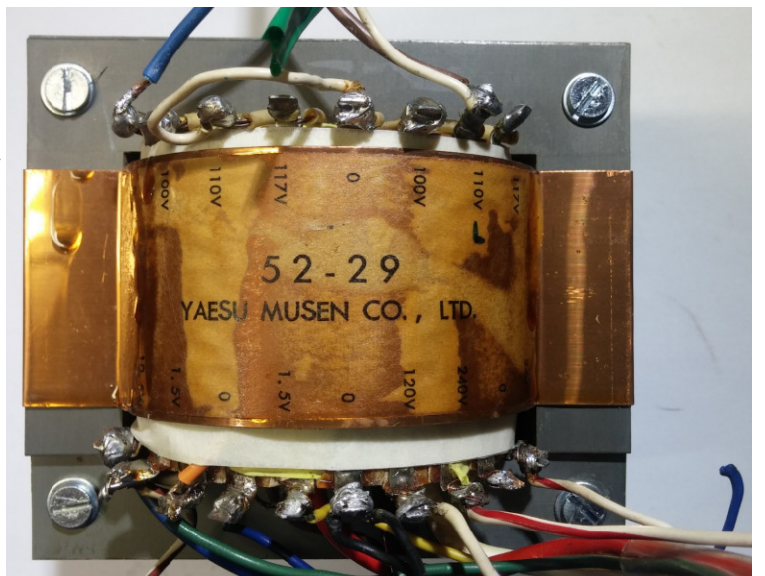
I then put it on the variac and measured secondary voltages with a low input, eventually winding it up to full mains once I was confident nothing was misbehaving. All was good. More importantly – quiet as a mouse, no mains buzz to be heard at all, which is something of a relief since I hadn't varnished it yet.

I then put it under a more demanding test with a 100W soldering iron on the 480V winding but with half mains on the input. An input of 118V yielded 250V on the soldering iron plug, which means that our 230V mains will yield 487V when under load – that is close enough for the FT-101 power supply. Also, there was barely any discernible warmth from the transformer (and no hum), which is a good sign.

So – mounting brackets on, time to install and test. This was quite a labour because the FT-101 cabinet is quite cramped around the power supply. This is where the photos taken during disassembly were extremely valuable. Powering up slowly via the variac, all functioned correctly. The rig needed a basic alignment, which I did, and aligning the transmitter on all bands put the PSU through its paces. It was only after an hour of dummy load tuneups that the transformer became just too hot to keep a hand on for any length of time (which is around 50-60°C).

So I call this venture a success. What would I do different next time? I think I need a mechanism for better control of the winding path around the bobbin, and this should be possible using the power feed of the lathe on a low thread pitch. But mainly, I would make some bobbin endflaps with spacers to place the windings better at the edges, preventing new turns from slipping off.

I must say I never thought I'd wind transformers, having assumed it to be a more complex process. But it's actually very straightforward and requires only a bit of basic ingenuity. And patience...



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Saturday 14:00 (12:00 UTC)— CW Net—7020
Wednesday 19:00 (17:00 UTC) — AM Net—3620, band conditions permitting.
