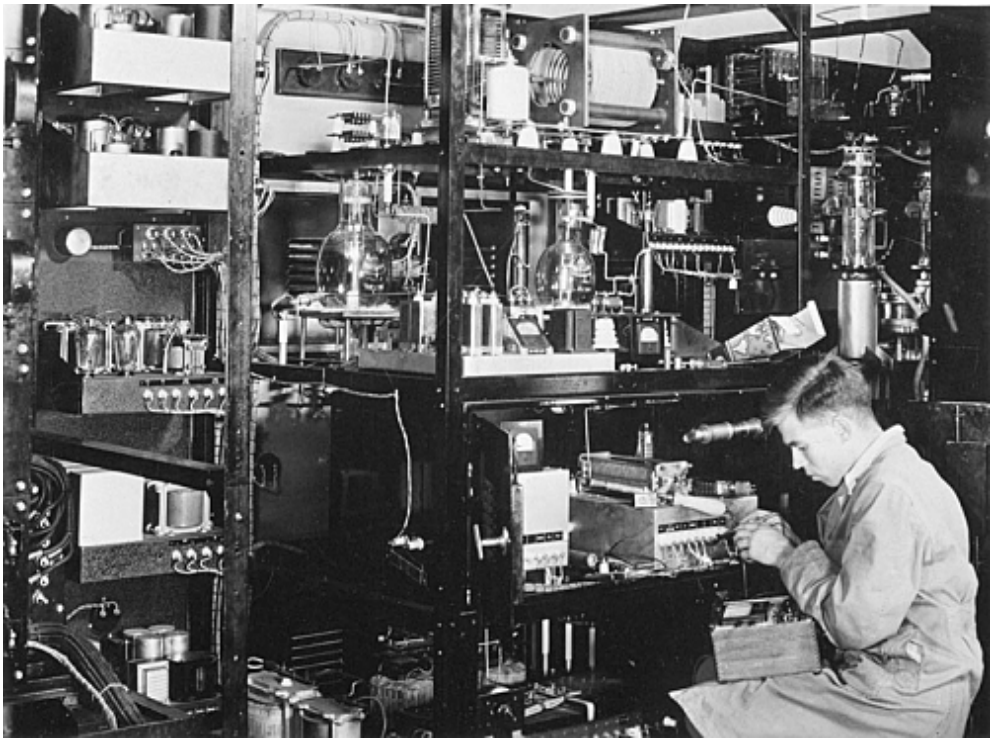
NZVRS BULLETIN

Vol 34 No 1 **February 2013**



2YA Titahi Bay circa 1936?

NEW ZEALAND VINTAGE RADIO SOCIETY INC.

A non-profit organisation devoted to the preservation of early radio equipment and associated historical information.

Postal address - PO Box 13 873, Onehunga, Auckland 1643.
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David handles editorial, financial and membership matters. A list of members is available on application with a stamped, self-addressed envelope for the personal use of members only. Please address all NZVRS monies to NZVRS, P.O. Box 13873, Onehunga, Auckland 1643, N.Z.

NZVRS LIBRARY
The NZVRS librarian is Ross Paton with assistance from Bruce Churcher. Requests may be forwarded to the NZVRS, PO Box 13873, Onehunga, AK 1643 or Email; library@nzvrs.pl.net

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Contributions, letters, etc can be sent to:

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ASB Bank account 12 3067 0168223 00

A Calendar of Events is listed on our website at www.nzvrs.pl.net/aaa/calendar

AGM: Auckland Saturday 13 July

AUCKLAND MEETINGS are held at the Horticultural Society Hall, **990 Great North Road** (opposite Motions Road.) Western Springs, on the third Monday of the month from 7.30pm.
May: Monday 20 Test Instruments
June: Monday 17 Auction Nite
July: Saturday 13 AGM from 10am
August: Monday 19 Auction Nite

TARANAKI AREA MEETINGS are held on the second Sunday in even months. Visitors most welcome; contact either Bill Campbell, Phone 06-753 2475 or Graeme Lea, Phone 06-758 5344

WELLINGTON MEETINGS are held typically from 1pm on the second Sunday of every month at Tireti Hall, Te Pene Ave, Titahi Bay. For details contact Tony Humphris, Email: tony_h@xtra.co.nz Phone (04) 298 1550 .

CHRISTCHURCH MEETINGS are held on the first Tuesday of odd months at the Christchurch West Radio Clubrooms "Auburn Park", 333 Riccarton Road.
For further details contact Jim Lovell, 41 Yardley St, Avonhead, Christchurch 8004. Phone 03-342 7760

SUBSCRIPTIONS: The subscription year is a calendar year (1 January – 31 Dec). Subscription renewal slips are sent with the November Bulletin with final reminders in the February issue.
The NZ Rate is $30. An E-version is available at the world-wide rate of $20 p.a. or $5 per issue via download. Note these are usually about 20 Meg files.

EDITORIAL

It's always good to get feedback – it shows that people are alive and kicking. There is some variety in the Correspondence column in this bulletin – feel free to keep it up.

As is now usual, this bulletin is an issue late – however there are some good signs with copy already waiting for the next issue – hopefully the catch-up issue. Also we have had an offer from the "TradeMe Triode" to add their observations from the fields of internet auctions to the bulletin on possibly a regular basis. Similarly if any other members feel they can contribute – even a picture, pencil sketched idea or simple letter, that would be appreciated. Often a writer's initial idea or comments sparks further research and revelations. Many thanks too, to our regular contributors – always appreciated.

On the library situation I can report that this has now been safely relocated to a generous floor space in secure storage where the committee and librarians are slowly working through the collection (480 archive boxes of books, magazines and papers) with the view of sorting this into essential, nice to have and offer elsewhere piles. The storage facility operator has been generous in a low monthly rent, creature comforts (bar tables, sofas & fridge ie leftover furniture) and the space is well lit, dry and ventilated. This will be an ongoing project for a while as we continue to look for the (semi?) permanent home for the collection. Also as this bulletin is the issue before the 13 July AGM there is a nomination form enclosed. Do feel free to get more involved in the society – the existing mob have been at it for a while and I think I can say that we would all like a break if anyone was interested in taking up any of its roles. Please don't be shy. On a more celebratory note John Dodgshun (who won the last AGM's Restoration Project competition and so was the NZVRS entry in the Canadian World Wide Competition) came in second overall. We can now include his item in this bulletin – well done John! Don't forget we have a crystal set competition this year – just get it to the hall. Cheers, David

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NZVRS Bulletin
P.O. Box 13 873, Onehunga,
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The Cover Picture:

By the mid 1940's the 2YA transmitters were relocated from Wellington's Mt Victoria to Titahi Bay (the building was officially opened by Joseph Savage in January 1937). Here is an unnamed technician working in the (water cooled – see just above his head to the right) transmitter bays possibly before cutover but the Porirua library have the picture dated c1945 – perhaps he was fault finding?

New Members

Hawtree G	**Wanganui**
Rawstorn G	**Wellington**

Noted Passings

Murray Stevenson	**Auckland**

Obituary: Murray Frederick Stevenson (6 Nov 1938 ~ 1 Mar 2013)

Murray passed away on the first of March after a long period of progressive deterioration. Murray was a long serving committee member and was the president of our society from March 1992 until April 1995. He was an avid collector and repairer, with a range of interests including radio and motoring. His interests in things electrical led him to produce a comprehensive missive on the variations and development of 3 pin electrical power plugs used in Australia and New Zealand. This item was submitted to a previous editor who published it with some initial trepidation, however the item became a serialised hit of some interest (issues: 22/4, 22/2, 22/1, 23/1, 23/2, 24/1, 24/2, 25/3) and even elicited request for reprints from Australia – effectively making Murray an international expert on the (Australasian) three pin plug. Murray wrote items on a number of areas; Radio development in Radio (1936) Ltd set designs, hints and suggestions on valve adapters, even magic eye testers – a topic we will return to in a future issue. Murray also introduced his cousin Richard (Dick) into the society who was also was a regular if not prolific scribe on matters radio historical until his death a couple of years ago.

At our last meeting, a minute's silence was held in respect for Murray. Thereafter, Ian Sangster told of Murray's involvement with the club, an ex President and long time member of the club and committee, where Murray was held in high regard. He started his working career as an apprentice with Columbus in the 1950's and took a lot of interest in the more common radios such as the Ultimates of the 40's and 50's. He and his wife ran a coffee bar in Balmoral for a number of years and he had also worked as an Electrician. DKC

Introducing: "Trade Me Triode".

Hopefully in our next bulletin we will welcome a semi-regular feature where-in our "roving reporter" will bring you their very best observations from the internet trading site "Trade Me" (and the occasional E-Bay "snippet" too). Gasp in awe as you stagger from the "giddy heights" of prices asked for and fetched for some items. Recoil in horror when you discover just how cheaply you could have had that 1925 Kennedy Battery set - had you not taken the dog for a walk just the auction was closing. Smile contentedly as you learn that the same set you 'picked up' at the local Flea Market last Saturday for just $20 - has recently sold for $300 on the net!

It is not the intention of 'Trade Me Triode' (nor the NZVRS whose opinions are not necessarily those of "The Triode") to comment in any way on sellers, purchasers, nor to judge sets as seen on Trade Me but its simply to bring a selection of what you may have missed - or indeed, what you may have been lucky enough to acquire! It is hoped that this feature will stimulate knowledge, conversation, research and perhaps even encourage some of those among us who may wish to place on Trade Me (and so make available to others) items relating to our wonderful radio history that would otherwise have languished up on that dusty shelf in the workshop. Trade Me Triode's "Observations" will generally cover the following 'genre':

- Battery/Neutrodyne/Early A.C. sets and equipment from the 1920's
- Early to mid 1930's radios and equipment.
- Late 1930's, 1940's/1950's radios and equipment
- Speakers from the 1920's to the 1950's.
- Communications equipment, 'Tubes & Valves', books and other radio ephemera.
- Notables at Random. ("One man's Jewels are another man's Junk" *or visa versa Ed.*)

Correspondence & Feedback etc

Greetings to all the dedicated team at the NZVRS Inc.
It is with reluctance that I will not be renewing my membership to the society. I have enjoyed receiving and reading the Bulletin. Whilst similar to the HRSA Radio Waves it has contained items that are different in emphasis which I have enjoyed. In Volume 33 No 4 the article on Coastwatching Stations of the 1940's I was particularly interested in the short article on Campbell Island, etc. Whilst I have never been there I used to contact Campbell Island occasionally by radio from Macquarie Island (VJM) in 1967. I was the Radio Supervisor that year. I wish your society all the best for continued success.
Yours Sincerely, Rodney Champness

Hi David,
Nov. NZVRS bulletin finally arrived today. Wonder how far away is Feb. issue? *[right here! Ed.]* Another interesting issue though I did read most of it earlier in E mail colour version. I still like to have hard copy.
Interesting the pics of coastwatchers equipment. I was trying to track down some of this gear for Awarua museum. Have aquired a transmitter unit by C&B similar to that shown (with 3 large National 'N' dials) and a 641SB receiver that has a dial similar to hallicrafters S20R etc. plus assoc. power supply units in bench mount rack cabinet. Can't identify other radio gear such as rx with slide rule dial, (poss. AWA or STC) though the receiver? with single 'N' dial could also be C&B. Domestic rx shown is a model 200 made by C&B for HMV NZ ltd. Ca 1940. Lower right picture, can't ID TX. Mike on shelf could be converted 'candlestick' telephone with carbon transmitter. Box to left of it appears to be a barograph for recording barometric pressure for weather reports.
Also found article on C&B HRO interesting. Mine has lost its label but it is a 941 model from the No. on coil boxes. Also the ZC8 set. Have never seen one of these and no info either.
Best regards, Arthur Williams

Hi David,
This (pix on right) will be the very top shelf microphone in the Coastwatchers hut. The plate on it reads: 250EW Western Electric Made in USA Pat in USA Jan 4 1913. All the best, Murray Dick

Hi there,
I do not know what the equipment rack is, but it appears to be a transmitter at the top, then a speaker, a receiver in the middle, and a power supply at the bottom.
In the No3 Camp photograph, there is a Teleradio 3A receiver at the bottom (square dial, many knobs) and a Teleradio 3A transmitter above it, with a microphone hanging down. It is a telephone handset with the earpiece cut off.
See Figure 4 in http://www.tuberadio.com/robinson/Teleradio/AWA_Teleradio_part1.pdf
In the C.Young photograph, it looks the same, but the Teleradio transmitter has its cover closed. There is another covered one above it, but it could be either a receiver or a transmitter.
Perhaps the operator is using a bug, as the straight key is next to his wrist.
Regards, Ray Robinson robinson@tuberadio.com

Graeme Lea on the lateness of the bulletins;
The Bulletin – the publication date has become later and later with the last issue being the first (and probably only) issue to be released when the next issue is due. Due to the fact that I live outside the Auckland area I rely on the Bulletin for communication with other members. For instance on 21/10/2012 I requested an advert for some parts be placed in the next Bulletin, assuming that it would be out the following month. That advert has only just come to the attention of other members and only those who have email facilities. The same is evident in reverse as well – in the latest Bulletin I see Phil McGechie wants information about the C & B 9xx receivers. I have a copy of the original data, circuit and official photographs of one of them and can only now ask if the information would be of use three months after the Bulletin should have been released.

Graeme Lea on the Tarry Martin Auction;
The Auction – as you will realise several group members bust our butts off to assist Maureen to sell off Tarry's major collection of old radios and radio bits and pieces gathered together over many years. By bust our butts off I mean working three or four days a week (3 hours a day) over the last few months as the stuff was stacked very tightly into very small spaces in tin sheds – very hot work. There was much communication with the secretary in order to attempt to promote the forthcoming auction and the failure to publish the Bulletin by the end of November was a major disappointment. I do realise that the secretary did apparently circulate the auction list to those with email but there was still a percentage that the information did not get to. I suppose I assumed that after all the hard work that had been put in that the group here could at least get the support of the NZVRS executive and members as a whole and I was very disappointed that the auction only attracted one NZVRS member from outside of Taranaki and he was from the Auckland area. Prices were very low for much of the gear and have made a separate brief list that will give you some indication.

004	Zenith	Console	9 Valve	Cabinet Partially Restored - Some Borer - Chassis Restored	$120
008	Hallicrafters	Comms Receiver	S20 Sky Champion	Original - Unrestored - Meter Missing	$6
007	RCA	Console	128	Cabinet Not Restored - Chassis Restored - New Dial	$5
010	Majestic	Console	75A??	Rough But Complete	NB

019	Military	ARC-5 Navy Type	CBY-46105	Close To Original - Needs 26 Volts DC Supply - 3 to 6 mhz Receiver	$1
025	Bell	Table Radio	Colt - 4 Valve	White - No Cracks - Tidy	$6
026	Drake	Single Sideband Transceiver	TR3	Original - Tidy	$2
031	Valves	5 x 6146 3 x 12BY7's		6146's Tested on AVO VCM 163	$4
042	Bingo	Crystal Set	n/a	Tidy	$10
045	Kyoritsu	Tube Tester	Model K-118	In Working Order with Manuals	$26
075	Trio	Amateur Receiver	9R-59DS	Tidy	$20
078	Eddystone	"S" Meter Unit		Tidy	$7

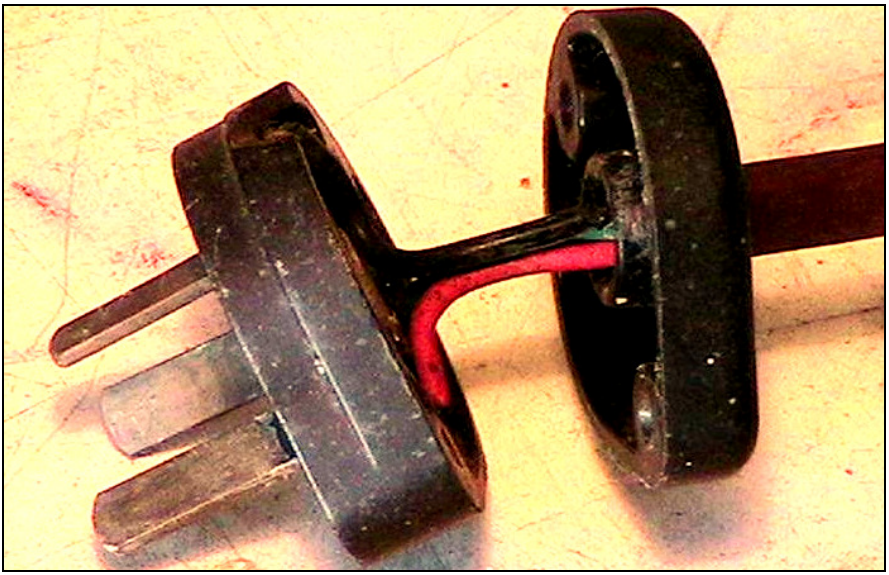
Hi everyone, Could I make a suggestion for the NZVRS website? Would it be possible to set up a members only want ad service, where members who need a dial glass for a Courier Model 26 or a genuine Fahenstock clip for their Hikers One replica could post an ad for, say, a fortnight with an email address to set up contact? I ask this having used a Bulletin ad recently to help someone who wanted some tape-recorder details. I'm sure many members could use such a fast service which would be so much more user friendly than the present 3 month wait for the Bulletin to come out. I guess it might need a computer literate person to edit it each fort night but if someone was willing it would facilitate and expedite our hobby considerably. Just a thought,
Cheers, David Fahy.
[While this idea has merit I fear that the main viewers of such a site will only be the members who are wanting various items, the vast majority of us would probably not bother to check just to see what others are wanting. However if members are interested in this there is the simple capability for such a listing on our homepage – Members' Wanted perhaps? (slight pun intended) Ed]

Hello,
We are looking for people to be in a new TV show and wondered if you had any members that might be interested.
Do you have an obsession, a subject, hobby that you know everything about? A specialist subject that is your life passion? Something you know a heck of a lot about. Can you bore the living daylights out of people with all that you know? Are you a bit-of-a-character? Whatever it is that is rings your bells - Russian ballet, history of Nintendo, All Blacks, WWII firearms, model trains, cats, planes or even Massey Fergusson's - if you're a bit of an expert, up for being on TV and live in the greater Auckland area then we'd like to hear from you.
Please email us at tv3sofunny@gmail.com
Thanks for your help, Regards Belinda tv3sofunny@gmail.com

A Fuse Blower

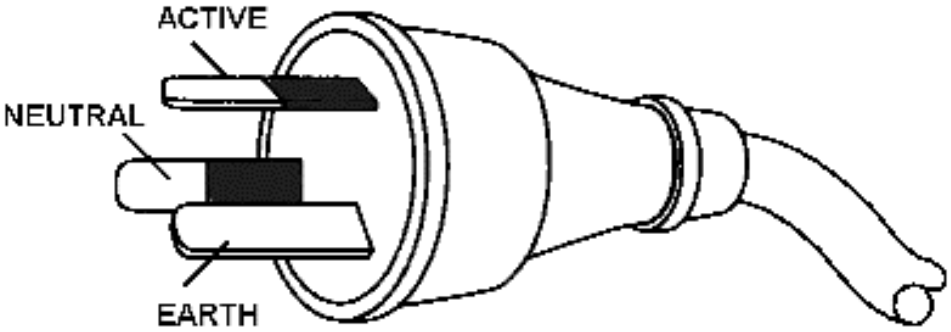
I got an old radio on TM recently and the vendor had described it as blows the house fuse. When I picked it up I asked him if it blew the circuit fuse on his meter board. No way mate, it blew the one on the pole out on the road. Had to call in Vector. I pulled the plug to pieces and as Confuscious said :- one picture is worth a thousand words. *[See following pages Ed.]*

Regards. Albert Cross albert.cross@ihug.co.nz

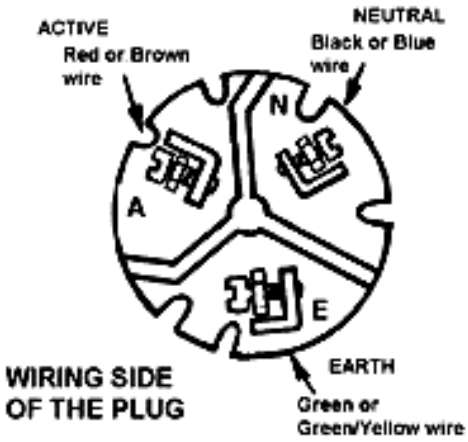


From Albert's picture above it appears that the phase is wired to black and the earth to red (with the neutral to green) however this would also take corresponding incorrect wiring on the set to get the fuse to blow – eg if the black wire (in this case phase) was thence connected to the chassis (making a rather lethal hot set) and the chassis was then connected to earth – perhaps via the antenna earth lead. A phase to neutral (or earth) direct short should ideally blow the local board circuit fuse before the pole fuse so perhaps this was already weakened. A shuddering thought all round and a reminder to follow correct wiring practices; Ed

The following diagram shows the New Zealand plug wiring configuration.

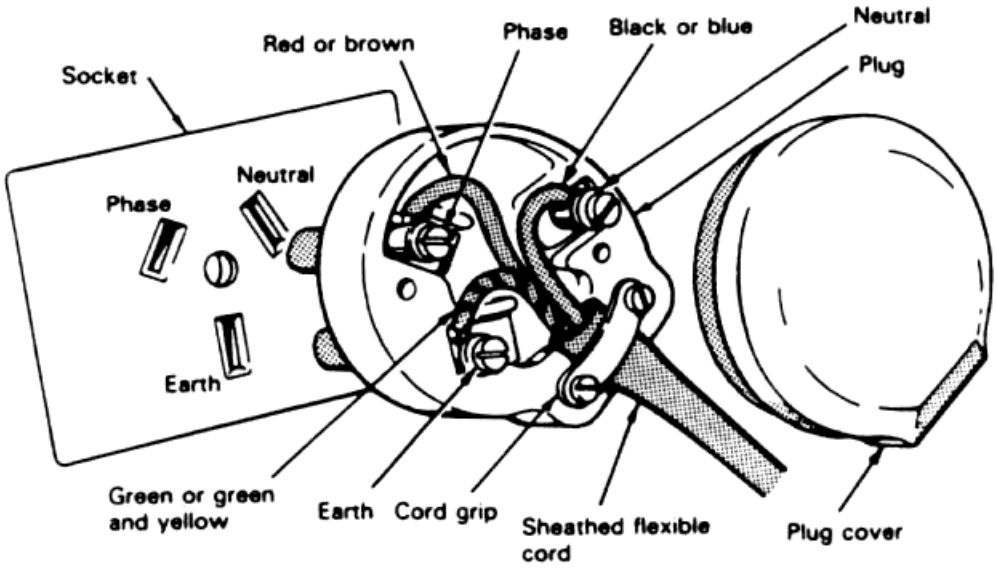


The diagram below shows rear wiring for a 240V mains cord plug and colours.



Standard wire colours are:

Conductor	**Marking**	**Flex conductor colours**	**Older flex**
Active (Phase)	A	Brown	Red
Neutral	N	Blue	Black
Earth	E	Green/Yellow	Green



See: http://www.ewrb.govt.nz/content/Handbooks/ESTAHANDBOOK-JUNE2006.pdf

Restoration of a Philco Model 18 Cathedral Radio

This is John Dodshun's well earned first place winning entry in the NZVRS 2012 AGM Restoration Project Competition and overall second place getter in the International Basket Case Restoration Project Competition organised by the SQCRA the Quebec Vintage Radio Collecting Society, Canada. For more details see:
http://sqcra.org/interrestocontest/PARTICIPANTS_Rest_Int_2012-2013.html

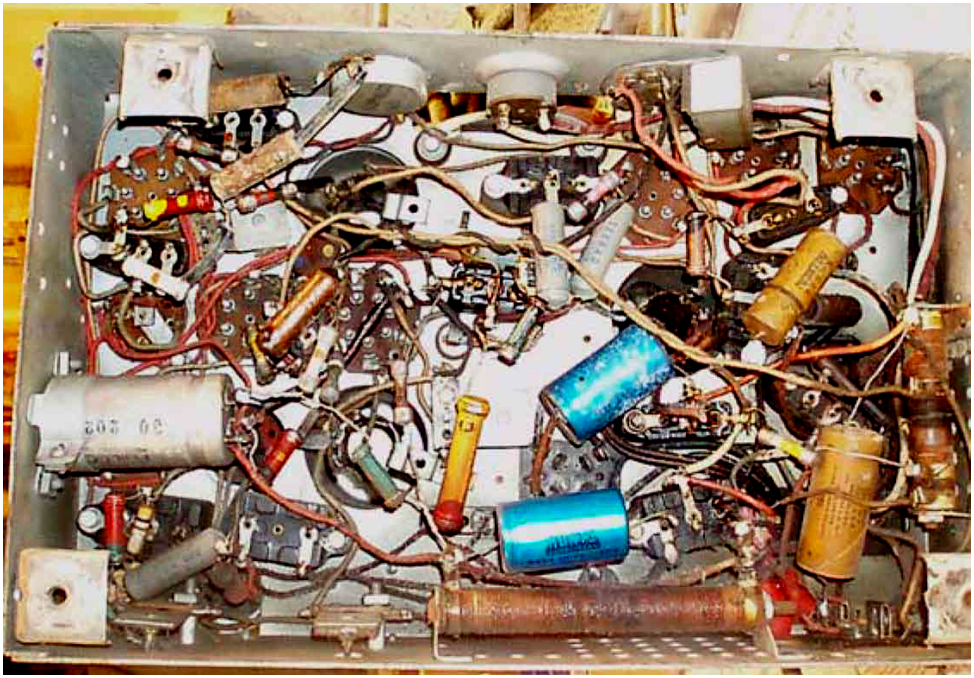
I purchased this radio via Trademe in November 2010. It was described as needing "lots of TLC". How true that was! This model is a single band, eight valve superhet using valve types: RF-78, Mixer/oscillator-6A7, IF-78, Detector/1st audio-75, Audio driver-42, Output-push pull 42s, Rectifier-80. The three 42s are triode connected and, according to Ron Ramirez, *produced a "Super Class A" audio with an output of fifteen watts which gave the radio better fidelity*. I suspect it hadn't been heard for a long time! It is equipped with a shadow meter.

The cabinet was missing veneer and some of the laminate on the front and back of the front panel, the moulding around the bottom was badly mutilated and the bakelite escutcheon had pieces missing around the shadow meter. The ply had also delaminated in many places. The chassis was badly corroded and, as I was to find out later, most of the components were faulty. A 5Z3 had been substituted, incorrectly, for the original 80 but the rest of the valves were at least correct. The power cord, 2 core only, and plug looked like the originals and were very unsafe. The whole set looked as though it had sat in the corner of a barn for many years. Inside the cabinet was the original chassis layout diagram and a service label from Begg's, Christchurch. Unfortunately only the dates are readable.

To Work:

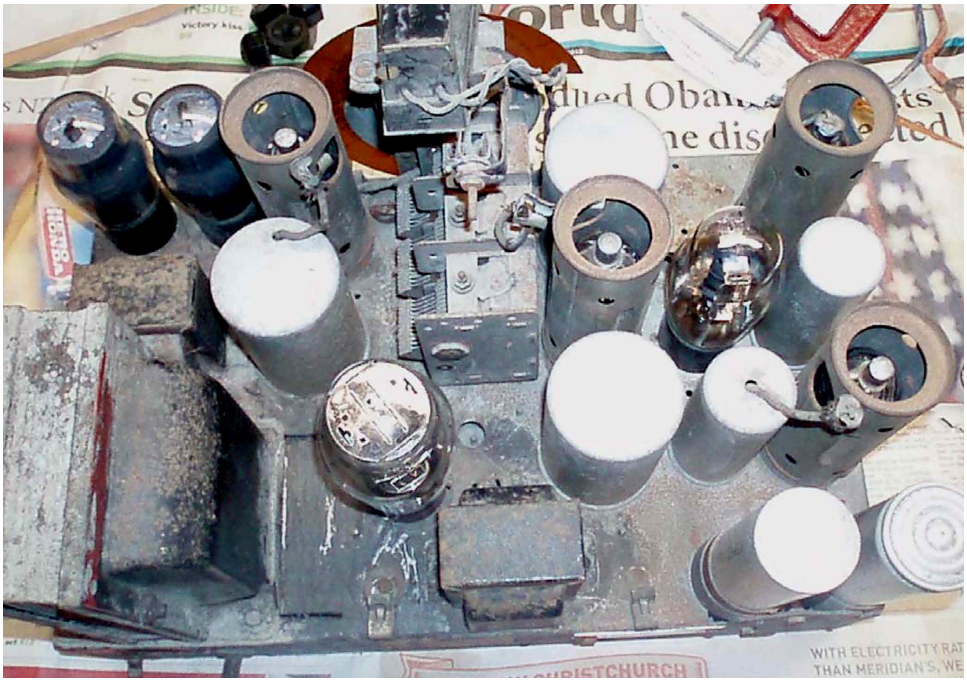
First up was to carefully document and strip the chassis. Once again Nostalgia Air provided valuable circuitry, layout and alignment information. From the photo below it is evident that over the years faulty components, mainly the bakelite block capacitors and power supply electrolytics, had been replaced with individual units. The underside of the chassis was a mess. Fortunately all the original cans and blocks were still present. There are two wire wound resistors, one in the bias chain and the other in the main HT line, both of which were open circuit. The mixer and oscillator coils both had open circuit primaries, the shadow meter coil was open circuit and most of the carbon resistors were wildly different from their stated values. There wasn't one capacitor in the whole set that was able to be reused! All the transformers, the power supply filter choke, the IF and aerial coils and the speaker magnet coil were continuous and tested well for insulation with my 500V megger. Later at initial switch-on, the

primary of the audio driver transformer went open circuit after about 2 minutes of operation. This necessitated a complete rewind because the primary winding was the first on the former. – of course!

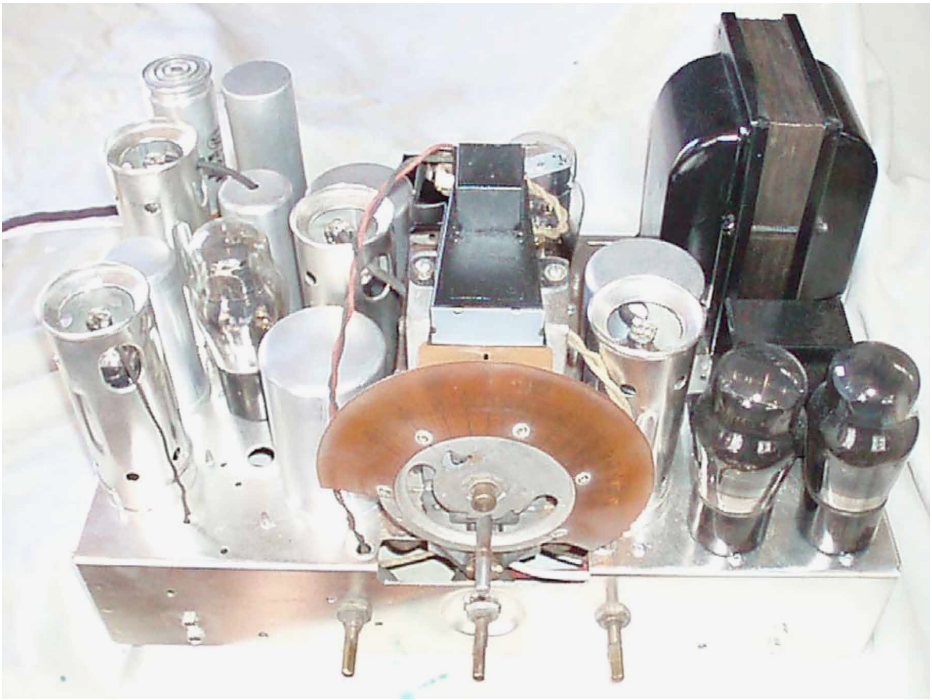


After removing all the components and dismantling the speaker completely, the chassis and speaker frame were sent off to a local electroplater for bead blasting and re-plating with tin. The plating is a two-fold process. The chassis is nickel plated first then tin plated, tin sticking better to nickel than mild steel. While this was being done, all the block and electrolytic capacitors had their old contents removed and they were repacked with new capacitors. Rewinding the shadow meter coil was a tricky job. It has 10,800 turns of 0.071 mm wire on a very small former. A special mandrel had to be made so that it would fit into the winding machine. After reassembly it was necessary to re-adjust the meter vane to get it to move freely. – a very delicate operation. The reassembled unit, with its original wires was then re-sprayed black and a new screen fitted because the original one had become completely opaque. I used a piece of opaque plastic from an ice cream container. The primaries of the mixer and oscillator coils were relatively easily rewound. After putting them in the drying oven at work for a week, the new windings were sealed by melting wax over them with the soldering iron. The power transformer leads, which were originally rubber insulated, had become completely perished so they were replaced with new, replica leads and the cover shells were re-sprayed black. The output transformer, power supply choke and audio driver transformer were also cleaned up, re-sprayed and re-assembled. The aluminium coil cans were cleaned up with wire wool and now look “as new”. For a restoration such as this, I like to re-use as many of the original parts as possible, including wiring. Where this was not possible, I substituted parts that were as close as possible to the originals. Exceptions were the repacking of the block and electrolytic capacitors where I used new components and placed them in the original housings. I guess it is a bit of “what the eye can’t see”! For electrolytics there isn’t much choice and modern capacitors are so much better than the old ones ever were.

On return of the brand new looking chassis, re-assembly began with the installation of the valve sockets, cans, transformers and tuning condenser on new rubber mounts. Then, many hours of pouring over the circuit, photos and notes, disappeared before the chassis was again complete. Yes, the waxed paper capacitor connected to the volume control is the only non-

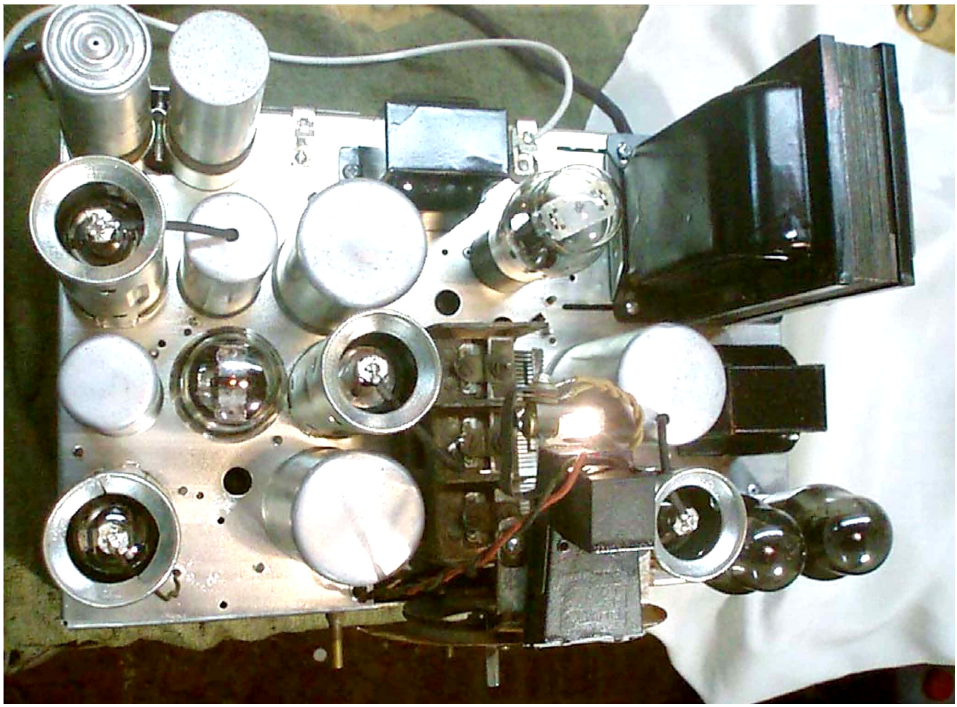


block capacitor in the whole set. I was able to rewind the bias wire-wound resistor but not the HT one which has been replaced with a ceramic wire wound resistor although the original is still in place. The speaker was reassembled and this proved to be a time-consuming, precise job. After the fitting of a new power cord, with an earth this time, it was switch-on time.

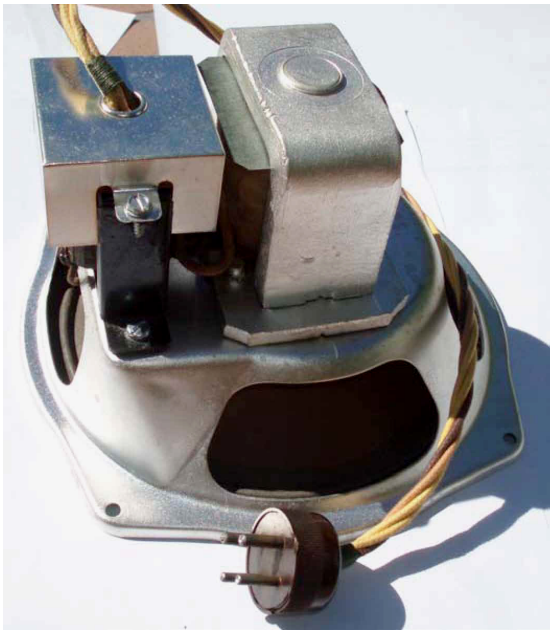


The set leapt into life, probably for the first time in many years, but as mentioned earlier, the primary of the audio driver transformer went open circuit after a couple of minutes. I was however able to proceed, in the interim, by connecting the output transformer to the 42 driver. I was amazed at how little re-alignment was required to obtain maximum sensitivity. The set performs particularly well and with the push-pull output certainly has some grunt! The response of the shadow meter is extremely good and I found there was no need to include the shunting resistor, as shown in the circuit diagram, to reduce the sensitivity. It moves freely over a good range and it is very sensitive. The positioning of the lamp behind the meter is quite critical to centre the shadow. The four step tone control is interesting in that it works in both the grid and plate circuits of the 75 first audio tube but it really does not work very satisfactorily at all.

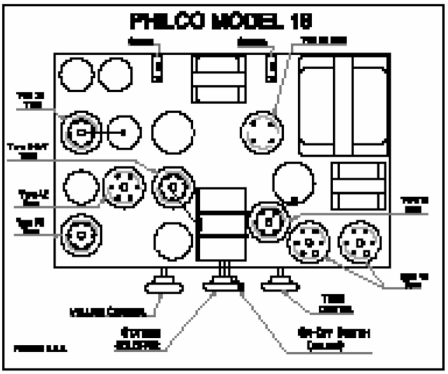
Repair of the dial escutcheon was achieved with the help of some epoxy resin. After this had set it was filed into shape and sprayed black. Nearly eighty years had taken their toll on the celluloid dial which was coated in dirt and almost unreadable. The dirt was removed using Brasso and a surprising amount of elbow grease. Luck was on my side here as the dial markings are on the underside and the dirt was on the top side. A new replica ARTS&P label and the cleaned



and polished makers label, which was in particularly good order, were reattached to the chassis to complete this part of the job.



During the February earthquake, the completed chassis was thrown off the bench and it landed upside down on the valve shield in the bottom left of the photo (the 75). The shield was bent and suffered a small split as can be seen but, despite the valve being inside the shield and the set being very heavy, this was the only damage the set sustained – remarkable.



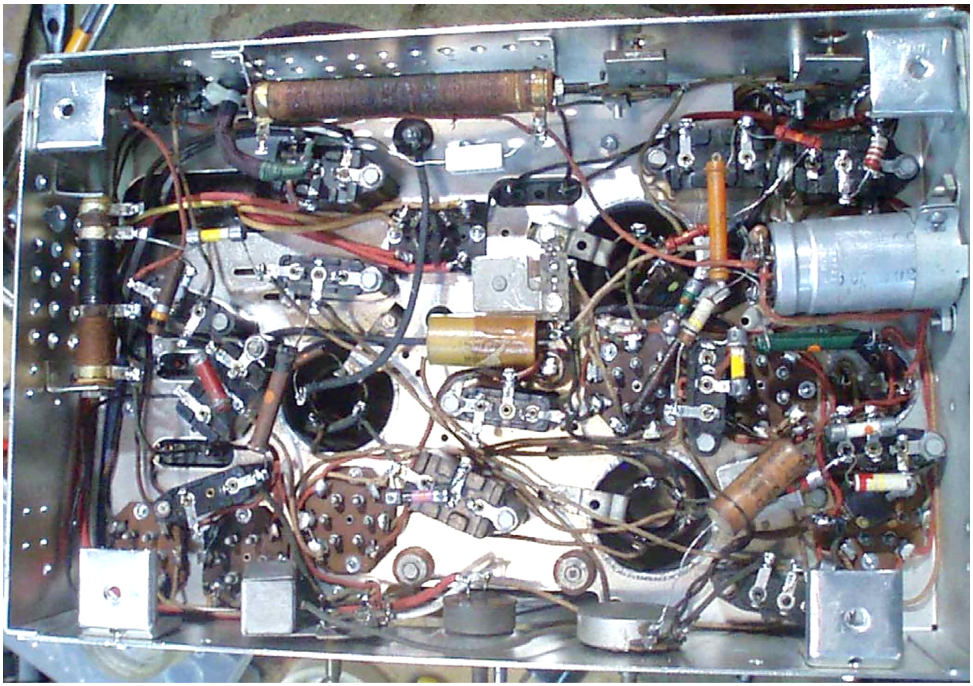
Now to the cabinet:
The centre piece of veneer around the dial escutcheon was of good quality and it was in good order, but it was very apparent early on that the only way to repair the larger part of the front was to replace the veneer. Before removing the old veneer a rubbing of the lined pattern was taken so that it could be reproduced in the new veneer. Also the removal of the two pieces of thick, high quality veneer, one to each side, and the moulding around the bottom was needed. It was a painstaking job to remove these pieces as, in contrast to the rest of the gluing on the cabinet, they were stuck fast. However patience prevailed and in time I was rewarded. The rest of the front veneer came off very easily. The curved top of the case fits, and is glued into, a slot routed into the back of the front, but over time, the back two layers of ply had fallen off and there was only one small piece remaining. It was a tricky job to set up the router to remake the missing pieces so that they fitted snugly around the case. Once again patience prevailed and the reward was granted. During this time, at the end of each session the painstaking job of forcing glue into the delaminated ply and cramping each little piece with small G cramps continued. There were numerous places where the glue between the ply laminates had failed and the case had become quite unstable. However this came right slowly and the cabinet became rigid again.
I had a local joinery firm copy the moulding for the bottom and this is where a bit of New Zealand crept in as the new moulding is made of Rimu. Replacement veneer for the front is American cherry and was sourced locally. Gluing the new veneer on was definitely the easier part of this section of the job. Cutting it around the fretwork was slow, tedious work and routing the pattern back, using a 2 mm router bit and specially made router guides, was quite scary. One slip and it was all over. However, when completed, the cabinet started to look a lot better. It was time to clean the remaining varnish off the rest of the cabinet. I used a very sharp chisel drawn backwards, as a scraper. This is very effective and, provided it is carefully done, does not harm the wood in any way. I agree that liquid stripper is necessary for some hard to reach places but I avoid it if at all possible. This was followed by a thorough sanding with finer and finer grit paper.

That job complete, I stained the new veneer and moulding with a water based, rub-on stain. The rest of the cabinet still had some colour so I lightly stained it with a diluted stain until everything matched. The timber of the two pieces that had been removed from the front and the central part of the front are of dark, beautifully grained timber which did not need any staining. It was time now to fit the new moulding and refit the two pieces of veneer to the front. The cabinet was now complete and certainly looked a lot better than when I had received it! As I am not very proficient with a spray gun, I finished the whole cabinet using satin polyurethane thinned 50% with turps, put on with a brush. There is a total of eight coats with a sand using 00 wet & dry, dry, between each coat. The shine slowly builds and the finish is smooth and rich. After the second polyurethane coat and with a fine artist's brush, I painted all the necessary edges and lines with black paint. The remaining coats of polyurethane brought the paint to the same finish as the rest of the cabinet. Finally a replacement transfer was floated onto the cabinet.

I had left the hardest and in my view the worst job till last. – fitting the new grille cloth to the cardboard backing. I have always had trouble with this and this set was no exception. I wrote off a piece of cloth in my efforts. I then found that ADOS F2 is, for me anyway, the best product to use. I painted a small section of the cardboard and pressed the cloth into it immediately. This way there is a short time to put some tension onto the cloth. After drying, the next section is glued and so on until complete. Lastly, a reproduced chassis layout diagram was stuck into place.

This restoration has taken me six months but I am satisfied that the result is the best restoration I have ever done. It is interesting to compare the time this took me with the time the Philco Radio & Television Corporation would have spent on it given that in their heyday they produced 1.5 million radios in one year!

Completed radio rear view

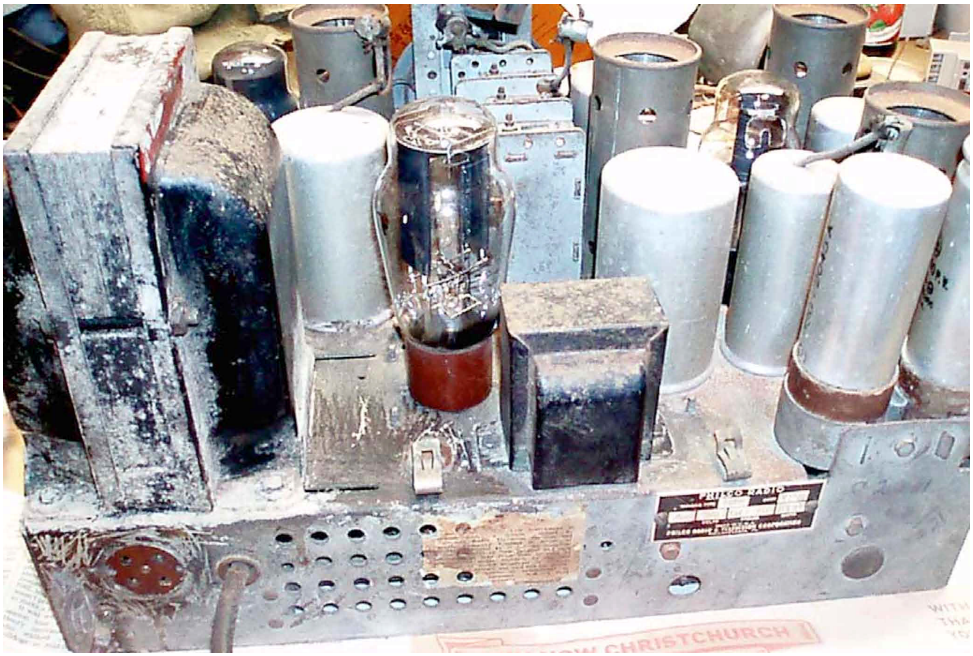


Completed chassis underside

Cabinet repair in progress

Above: Cabinet recoloured

Below: Chassis 'as received'.



Restored radio in cabinet

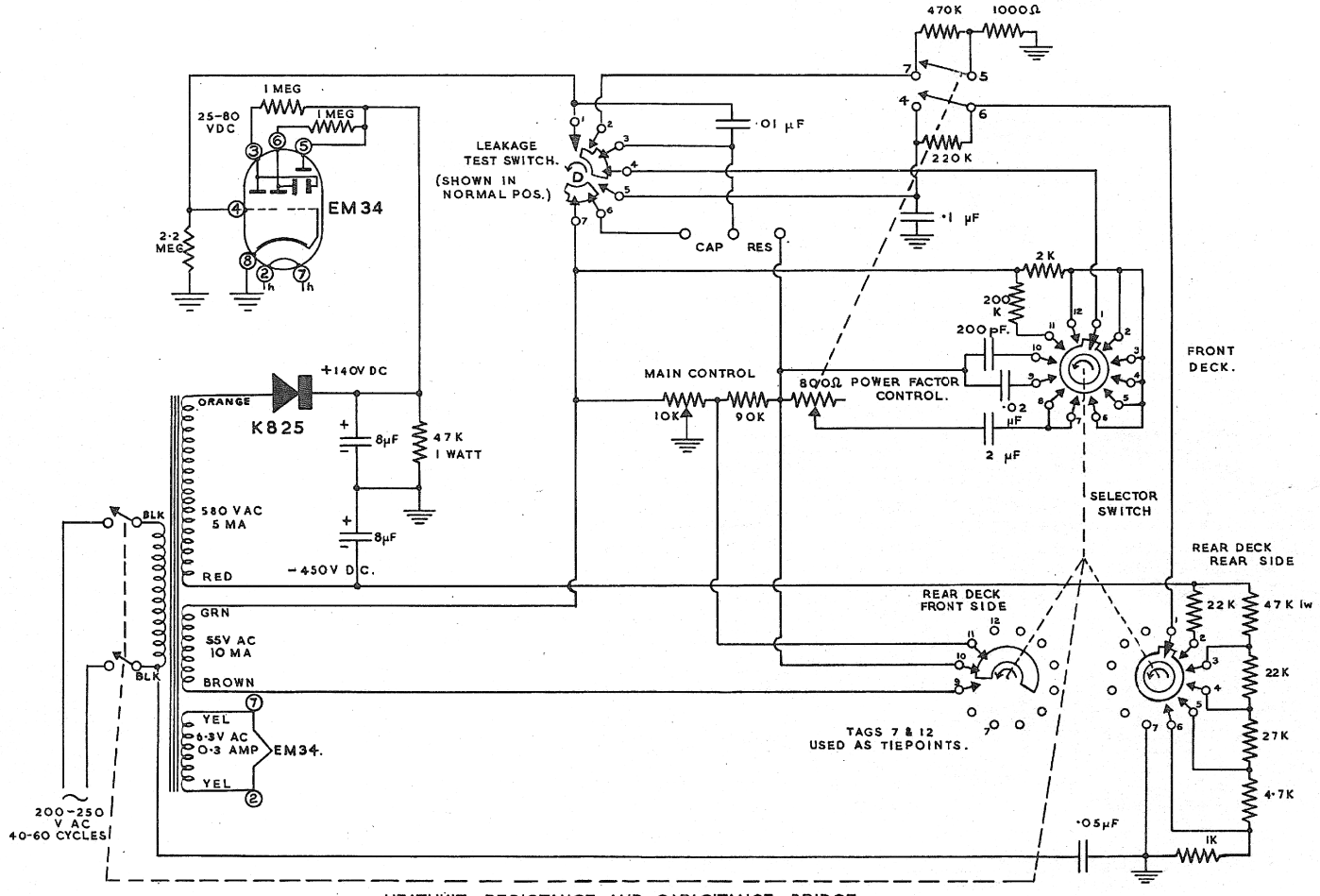
The Heathkit Resistance Capacitance Bridge by Don Beswick

A useful item of test equipment for servicing vintage radios is the resistance - capacitance bridge which uses a magic eye to indicate the balance condition. Typical bridges of the 1950's and 60's were the Healhkit, Paco, and the Japanese TMK. They all used the principle of the

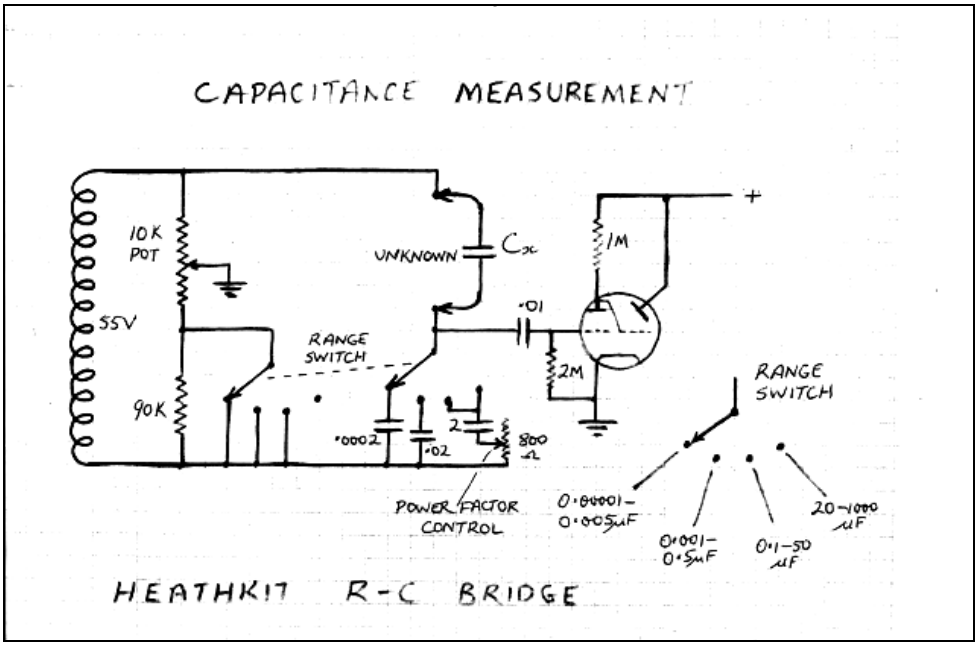
Wheatstone bridge which was energised by about 50 volts AC which was applied to opposite corners of the bridge while the detector (magic eye) was connected across the other two corners. When the bridge is balanced, there is no grid voltage on the detector and the shadow is wide open. When looking at the circuit it is not at all obvious how the instrument works, and when you see an unintelligible circuit my advice is "when in doubt, redraw" to show the separate functions such as measuring R and C and testing for leakage.

Measuring resistance and capacitance.

In the redrawn circuit the 10K pot makes up two arms of the bridge and the wiper is earthed. With this method, when one arm increases its resistance the other arm decreases its resistance, and the wide choice of ratios enables us to measure a large range of resistors or capacitors on a single scale. The scale is almost logarithmic, which would mean that sequential decades, e.g. 0.1 to 1, 1 to 10, 10 to 100 would have the same angular rotation on the scale. When measuring resistance, the unknown resistor is placed in series with a standard (reference) resistor e.g. 2K or 200K, and when measuring capacitance the unknown capacitor is placed in series with a choice of standard capacitors, and these series pairs form the other two arms of the bridge. The power factor control inserts resistance in series with the standard capacitor (on the higher ranges) to balance the bridge when the unknown capacitor is lossy.



HEATHKIT RESISTANCE AND CAPACITANCE BRIDGE
MODEL C-3U.



The Wheatstone bridge was originally designed to measure resistance and will work with an AC or DC supply, but when measuring capacitance we need an AC supply, and in fact we are measuring reactance (Xc) in ohms at 50 Hz rather than capacitance, but fortunately the manufacturers have done the calculations for us and the scale is calibrated in microfarads rather than ohms reactance.

Most of us will (or should) know that reactance or "'apparent resistance" of a capacitor is given by the formula $Xc = \frac{1}{\sqrt{2\pi fC}}$

where C is measured in Farads, $2\pi f$ is angular frequency measured in radians per sec, and when f = 50Hz, $2\pi f$ = 100π = 314 rad/sec. When we substitute these in the original equation we get

$Xc = \frac{1}{314C} = \frac{0.00318}{C}$ and if C is measured in microfarads the answer will be a million times greater, which means that the decimal point is shifted six places to the right to give

$Xc = \frac{3180}{C}$ in μF

For example if C is one microfarad then Xc = 3180 ohms.

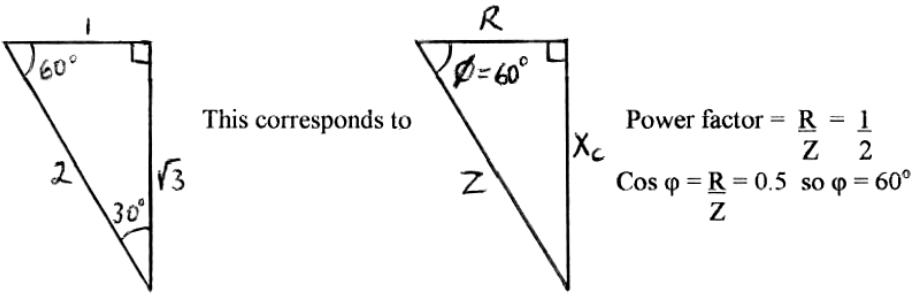
Two figures are worth remembering: 1pF at 50 cycles (Hz) equals 3180 ohms, and knowing that $X_L = 2\pi fL$, 1 Henry at 50 cycles equals 314 ohms.

When measuring lossy capacitors, the resistive and reactive (capacitive) components are balanced separately, so we are still measuring R and C, although the total opposition (impedance) is greater when resistance is present. A few simple experiments with resistors in series with capacitors shows negligible change in capacitance reading, although the power factor control will need to be advanced to obtain balance as more resistance is added.

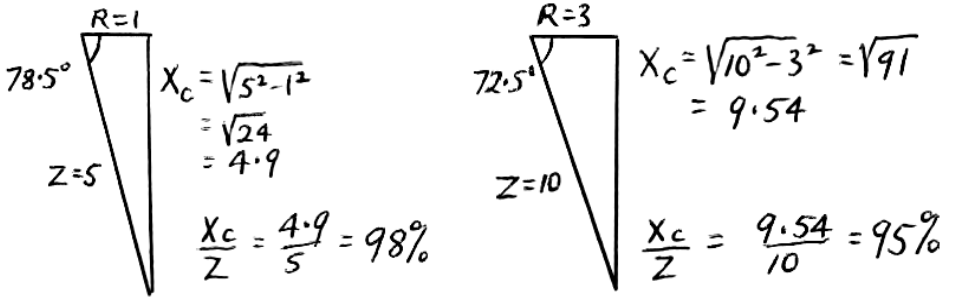
Readers who have the English Heathkit bridge C-3U may have noted the curious paragraph near the bottom of page 14 which says:

> *The power factor is a measure of the energy loss in an imperfect capacitor. In filter applications, a higher power factor decreases the effective capacity so that the effective capacity at 20% power factor is 98% of the measured capacity. At 30% power factor, the effective capacity is decreased to 95%. While at 50% power factor, the effective capacity is decreased to 87% of the measured capacity.*

That comment is based on the flawed assumption that when measuring lossy capacitors the capacitance scale is showing impedance (Z) rather than capacitance. It is not. In fact it is still showing capacitance because we are balancing C against C and (series) loss resistance against the resistance of the power factor control. What the Heathkit manual is describing can be seen in an impedance triangle. Consider the third example, that with a 50% power factor the effective capacity is reduced to 87% of the indicated capacity on the scale. If we draw an impedance triangle, many readers will recognise the 60-30-90 degree triangle with sides in the ratio of 1:2:√3 (or 1.732).



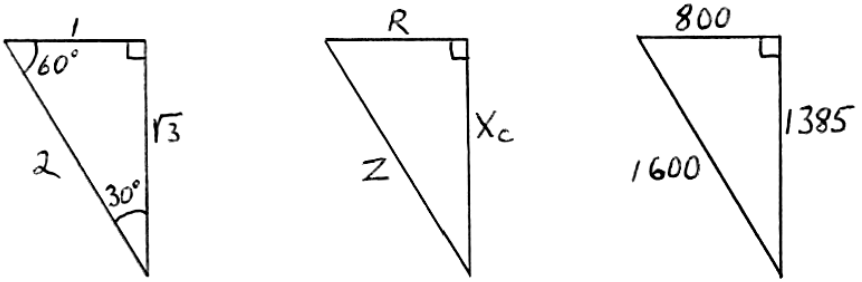
In this situation the ratio Xc $\frac{Xc}{Z}$ is $\frac{\sqrt{3}}{2}$ or 0.866 (or 87%). In other words the reactance is 87% of the impedance (Z), but the scale on the front panel shows C which is derived from Xc and not Z. The following impedance triangles show the other two cases mentioned in the manual.



When the power factor is 20% it is true that the capacitive reactance is 98% of the impedance, and when the power factor is 30% the capacitive reactance is 95% of the impedance as stated in the manual, but it has no relevance to our measurements because we are not measuring Z but we are measuring R and C as separate quantities.

There is a professional instrument called a vector impedance meter (the sort of gear that Reg Motion uses) which measures Impedance (Z) and the phase angle rather than R and Xc. In terms of the impedance triangle it measures the hypotenuse and phase angle rather than the horizontal and vertical sides of the triangle.

Note on power factor readings on front panel.
In the Heathkit bridge, the power factor control happens to be 800 ohms and the markings on the front panel are 0 to 50%, but they should not be taken literally. It may not be obvious but there is only one value of capacitance where a resistance of 800 ohms represents a power factor of 0.5. We saw earlier that a power factor of 0.5 denotes a phase angle of 60° which means that we have the 60-30-90 degree triangle with sides in the ratio 1:2:√3 or 1.732.

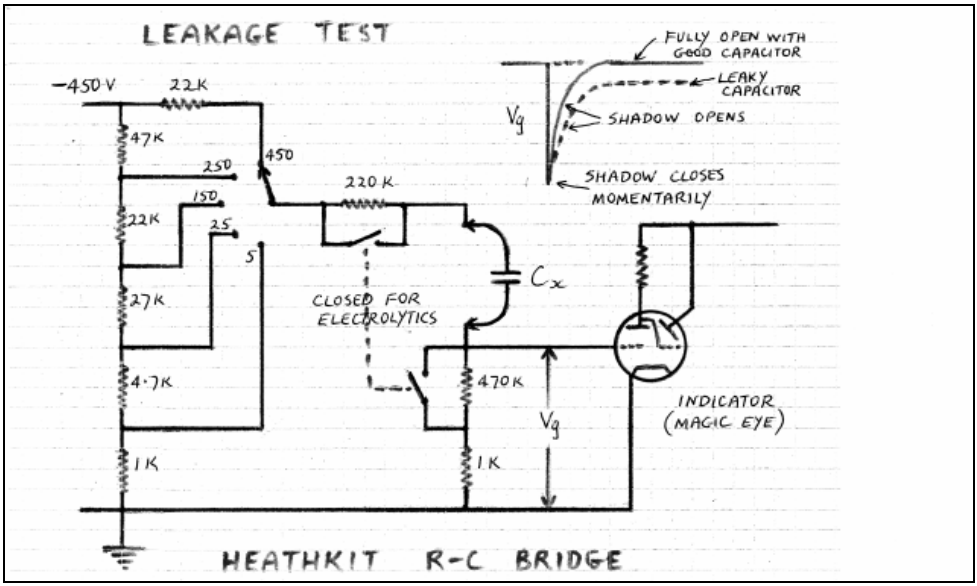


In this situation Xc = √3 R = √3 x 800 = 1385 ohms. And the value of capacitance is given by C (μF) = $\frac{3180}{Xc} = \frac{3180}{1385}$ = 2.3 μF.
What this shows is that with a frequency of 50 Hz there is only one value of capacitance (2.3μF) where a resistance of 800 ohms, meaning full rotation of the power factor control, corresponds to a power- factor of 50% as marked on the front panel. In all other situations the control simply shows the presence of series resistive losses. The series resistive losses are easier to measure but the parallel equivalent is easier to visualise and it can be shown that a

low series resistance transforms into a high value of parallel or leakage resistance. It can be done without trigonometry or the j-operator, and perhaps we can look at this another time.

Leakage testing.

The redrawn circuit may be unconventional in that the negative voltage of 450 volts is at the top of the circuit, but this has been chosen so that a negative voltage can be easily seen between grid and cathode of the magic eye. We notice that two resistors are shorted out when testing electrolytics because their higher leakage produces sufficient grid voltage across the 1 K resistor. The leakage test control has a return spring to automatically disconnect the capacitor because 450 volts could be bad for the operator. When the leakage switch is turned clockwise (against the spring) the shadow closes momentarily then opens quickly but as the shadow opens wider the opening becomes slower. The voltage across the grid resistor (1K or 471K) is proportional to the charging current of the capacitor and the opening of the shadow is a visual indication of the exponential charging current as shown by the waveforms in the top corner. The charging current decays exponentially and the shadow opens at a slower rate as the current drops to zero.



Those who have read this article on the magic eye bridge will no doubt agree that there is more to these bridges than meets the eye.

The Miniaturization of Radio Valves: Was it all for the good?

By Peter McQuarrie <petermcq@xtra.co.nz>

The miniaturization of radio valves as a part of overall valve development between the 1920's and 1960's had its disadvantages as well as advantages. Here we look at some of the pros and cons and consider the specific example of the type 41 audio output valve and its smaller equivalents.

The push to make smaller, lighter and more economical radio valves was motivated by the desire to produce smaller portable domestic receivers as well as small equipment suited to aviation and maritime safety use. There were also many military requirements for small portable radios.

Valves in smaller glass envelopes were more robust than their larger counterparts with stronger glass and short internal elements and connections, making them less prone to damage from vibration. But one disadvantage of small valves was higher operating temperatures. Small valves got hotter because of their reduced volumes from which heat could dissipate. Also with the desire for smaller radios, the entire radio chassis would be encased in smaller cabinets. With the introduction of printed circuit boards (pcbs) with miniature 7 and 9 pin valve sockets mounted directly on the bakelite or paxolin pcbs, it was common for the valve sockets and the pcbs to be damaged by the high temperatures produced.

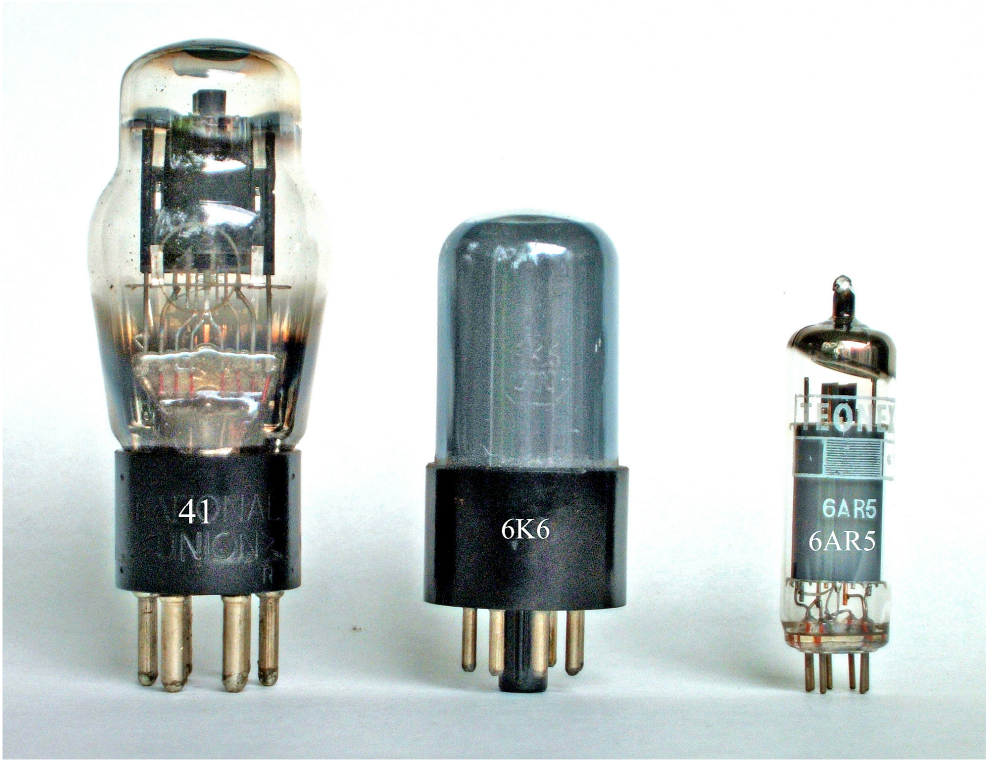


Figure 1: 41 6K6 6AR5

Towards the end of the valve era this problem was overcome with the use of heat-resistant glass-fibre pcbs and ceramic valve sockets which were mounted slightly above the boards to allow the flow of cooling air between. Another problem with miniature valves was that they did not use nickel-plated, brass valve pins to make connection with their sockets as their forerunner valves had done. Instead, the nickel-iron pins which came through the grass envelopes were themselves used as the connecting pins. This iron alloy was used so as to match the metals thermal expansion characteristics to those of the glass, ensuring a good vacuum seal. Unfortunately the electrical connective properties of this alloy are not great and the result was "noisy valve sockets" a problem encountered far less with octal valves and almost unheard of with the older, larger 6-pin valves because of their larger brass pins. In severe cases, small valve pins were actually found to be rusting.

A further draw back was that smaller valve bases meant pins that were spaced more closely together with consequently lower insulation resistance between them. This produced far more "arc-overs" and burnt-out valve sockets than with equivalent larger valves. No doubt the higher valve temperatures exacerbated this problem.

To compare some of the differences between larger and smaller valve types see Table 1, which compares the type 41 audio power output pentode with types 6K6 and 6AR5. The three valve types are electrically equivalent but made in different physical sizes, shown in Figure 1. I tested the valves under identical conditions using the same radio to test all three.

Valve type	Height (mm)	Envelope Volume (cc)	Gap between pins (mm)	Power out (W)	Op. Temp (degrees C)	Date (circa)	Base type
41	82	70	6	2	74	1931	U6A
6K6	62	40	4.5	2	93	1936	K8A
6AR5	52	10	2.7	2	106	1947	B7G

Table 1

It can be seen from the table that the 41 contains seven times the volume of the 6AR5. Its pins are spaced at 6 mm compared to only 2.7 mm for the 6AR5. In terms of the temperatures measured in my tests (with a handheld IR thermometer) with the valves operated under identical electrical conditions and producing the same audio power; the measured envelope temperature of the 41 valve was a mere 71°C compared to 93°C for the 6K6 and 106°C for the small 6AR5. [The 3 valves are electrically equivalent when operated within their rated specs. All will give a maximum signal output of 3.4 Watts with 250 volts of anode voltage and all produce 8.5 Watts of anode dissipation which is largely responsible for the heat produced.]

The valve type I chose for this study, the American 41 valve, was commonly used in radios of the 1930,s. It is a 6-pin pentode with equivalent octal and 7-pin miniature in the 6K6 and 6AR5. I could have compared the more common 6V6 and 6AQ5 valves with which we are more familiar, but these are "beam power pentodes" more efficient than straight pentodes and not directly comparable to the 41 valve.

So although valve development over a long period of time brought improved materials, technology and reliability, miniaturization in itself was not always an improvement.

Valves Containing Radioactive Elements – from the VMARS.

Members should be aware that some valves (albeit specialised) can contain radioactive material and hence be a tad more careful with their treatment and disposal. The following list comes from the VMARS site: www.royalsignals.org.uk/articles/radioactive-valves.pdf

CV Number	Commercial Number	Manufacturer	Isotope	Approx Qty (uCi)	Valve Type	Notes
508	1B49	Westinghouse	Ra 226	2	Spark Gap	
539	1B23	Bomac	Co 60	0.15	TR Cell	
539	1B23	Cent	Co 60	0.5 to 1.0	TR Cell	
576	1B26	Bomac	Co 60	0.15	TR Cell	
577	1B36	Bomac	Co 60	0.25	TB Cell	
713	1B27	Bomac	Co 60	0.15	TR Cell	
725	1B24	Westinghouse	Ra 226	2	TR Cell	Superseded by CV3548
761	1B22	Bomac	Co 60	0.25	Spark Gap	
1793	724B	Bomac	Co 60	0.15	TR Cell	
1832	0A2 etc.	Raytheon	Co 60	0.0067	Voltage Stabiliser	
1833	0B2 etc.	Raytheon	Co 60	0.0067	Voltage Stabiliser	
2248	VX9115	Ferranti	H3	60	Spark Gap	If made before April 1961 contain Radium Bromide.
2249	VX9112	Ferranti	H3	70	Spark Gap	If made before April 1961 contain Radium Bromide.
2250	VX9054	Ferranti	H3	70	Spark Gap	If made before April 1961 contain Radium Bromide.
2251	VX9113	Ferranti	H3	80	Spark Gap	If made before April 1961 contain Radium Bromide.
2252	VX9114	Ferranti	H3	80	Spark Gap	If made before April 1961 contain Radium Bromide.
2374	GD60	Ferranti	H3	45	Gas Filled Diode	If made before April 1961 contain Radium Bromide.
2375	GD100	Ferranti	H3	60	Gas Filled Diode	Diode If made before April 1961 contain Radium Bromide.
2483	VX9108	Nore Electric	H3	92	Attenuator	
2573	5651	Raytheon	Co 60	0.0067	Voltage Stabiliser	
2615	313C	Western Electric	Ra 226	0.01	Gas Relay	
2626	346A	Western Electric	?	?	Cold Cathode Triode	
2626	346B	Western Electric	Ra 226	1	Cold Cathode Triode	
2626	346C	Western Electric	Kr 85	?	Cold Cathode Triode	
2826	1B63A	Bomac	Co 60	0.15	TR Cell	
2826	1B63A	Microwave	Co 60	0.5	TR Cell	
2826	1B63A	Sylvania	Co 60	1	TR Cell	
2914	1B40	Bomac	Co 60	0.2	TR Cell	
2914	1B40	Sylvania	Co 60	1	TR Cell	
3539	6024 / ATR387	Bomac	Co 60	0.45	TB Cell	
3548	1B24A	Bomac	Co 60	0.15	Spark Gap	
3548	1B24A	Microwave	Co 60	0.5	Spark Gap	
3548	1B24A	Sylvania	Co 60	1	Spark Gap	
3548	1B24A	Westinghouse	Ra 226	2	Spark Gap	
3549	1B38	Bomac	Co 60	0.9	TB Cell	
3550	1B41	Bomac	Co 60	0.25	Spark Gap	
3550	1B41	Westinghouse	Ra 226	2	Spark Gap	
3628	1B35A	Bomac	Co 60	0.4	TB Cell	
3628	1B35A	Sylvania	Co 60	1	TB Cell	

CV Number	Commercial Number	Manufacturer	Isotope	Approx Qty (uCi)	Valve Type	Notes
3745	1B58	?	?	?	TR Cell	
3877	1B56	Bomac	Co 60	0.45	TB Cell	
3897	5787	Raytheon	Co 60	0.0067	Voltage Stabiliser	
3906	6117	Bomac	Co 60	0.45	TR Cell	
3906	6117	Microwave	Co 60	0.5	TR Cell	
3906	6117	Sylvania	Co 60	1	TR Cell	
3933	5783	Raytheon	Co 60	0.0067	Voltage Stabiliser	
3960	5783WA	Raytheon	Co 60	0.0067	Voltage Stabiliser	
4020	0A2WA	Hy	Ni 63	0.01 to 0.05	Voltage Stabiliser	
4020	0A2WA	Raytheon	Co 60	0.0067	Voltage Stabiliser	
4028	0B2WA	Hy	Ni 63	0.01 to 0.05	Voltage Stabiliser	
4028	0B2WA	Raytheon	Co 60	?	Voltage Stabiliser	
5062	5841	?	?	?	Voltage Stabiliser	
5113	5787WA	?	?	?	Voltage Stabiliser	
5186	5651WA	Ch	Ra 226	0.045 to 0.055	Voltage Stabiliser	
5186	5651WA	Raytheon	Co 60	0.0067	Voltage Stabiliser	
5229	GD90	Ferranti	H3	55	Voltage Stabiliser	If made before April 1961 contain Radium Bromide.
5312	VX9156	Ferranti	H3	40	Diode	
5384	12T	Hivac	H3	3.5	Diode	
6028	VX9196	Nore Electric	H3	10.5	TR Cell	
-	446	AE	Co 14	1		
-	423-A	Western Electric	Ra 226	?	Voltage Stabiliser	May have an extremely active external foil source of 1.24 microcuries
-	5791/X6007	Sylvania	Co 60	1	?	
-	GL-1B58	GE	Co 60	0.475	TR Cell	
-	KP-96	York Research	Ra 226	0.7	Kryton	
-	TG-29	Bendix	?	?	Spark Gap	

Hints and tips:

Rusted screw loosener and general purpose penetrating oil:

A 50 – 50 mix of nail varnish remover (Acetone) and Automatic Transmission Fluid (or alternatively; brake fluid if you really really must!) makes an admirable penetrating fluid twice as effective as the most common commercial products.

This mix is especially effective on those stuck grub screws and rusted shaft components. Just carefully mind any surfaces and protect with plastic sheeting or similar if you don't want them etched or pitted - similarly the surface of the removed knob may no longer look the same if excess liquid oozes out and over it. Clean the knob quickly once it is removed with water and detergent - and mind your finger prints while working with this solution. Of course this works best in a metal on metal application where there are no painted or otherwise finished surfaces.

From Radio Web .com

Better Looking Valve Boxes

I recently bought the valve boxes advertised on the NZVRS website (thank you Mr. Burt) and it occurred to me that white is such a plain colour. During a recent clean-out I found a nearly empty can of dark red spray paint so, before I assembled the boxes, I sprayed them.

Looks great!

From: John Roberts <Pentagrid@paradise.net.nz>

MARKETPLACE

Advertisements for the next bulletin should reach the editor by the 15th of the prior month. These must be neatly hand printed, typed or printed on a separate page, posted to the NZVRS (for details see page 2) or emailed to *nzvrs@pl.net*

Please - no verbal or telephoned adverts, also don't forget to include some contact details; eg postal, telephone & email if applicable. There is no charge for members' adverts but please remember that the NZVRS is not responsible for any transactions between members.

AVAILABLE

Valve Cartons – plain white flat packs

- Small size $12 per 100
- GT size $12 per 100
- Medium size $15 per 100
- Large size $25 per 100

NZ & Oz supplied, contact Paul for post and package charges per order.

Contact: Paul Burt, 44 Hastings St West, Christchurch 8023.
Tel: 03 - 960 7158, Mob: 021 0236 1748
Email: **dawn.lloyd@clear.net.nz**

Society Sales:

NZVRS CAPACITORS for sale to NZVRS NZ members only please order via Bryan Powell, 279 Spur Road, RD3, Silverdale, 0993.
Tel: 09 - 44 22 514 or 029 415 5119
Email, . **bryan.powell@emc.co.nz**

Metal polyester film, axial leads, (µF):

0.001	630 Volts	50 cents each
0.002	630 volts	50 cents each
0.01	630 Volts	50 cents each
0.022	630 Volts	50 cents each
0.033	630 Volts	50 cents each
0.05	630 Volts	50 cents each
0.1	630 Volts	50 cents each
0.22	630 Volts	50 cents each
0.33	630 Volts	50 cents each
1uF	400 Volts	$1.00 each

Electrolytic capacitors, **polarized**, axial

10µF	450 Volts	$1.50 each
20µF	450 Volts	$2.00 each
40µF	450 Volts	$3.00 each
47uF	450 Volts	$3.50 each
100µF	450 Volts	$5.00 each

Lamps 6.3 volts 150 mA (low wattage)
MES & Bayonet 50c each

Additional specials while stocks last:

Box of 10, globular 12volt, 250mA MES lamps at $2 per box.
0.1uF 630 Volt (tangential leads), 20c each
0.1 uF 1200 V (axial leads) plastic film, 20c each
0.02uF 250 Volt disc ceramic capacitors 10 for $1.00

Please add $3.50 per order for P&P.

Power plugs (Tilley white plastic type with unprotected brass pins as pictured above) available at 50 cents each plus $4 post and package per set of 4 (ie $6 for set of 4, posted to an NZ address).

KTW62 valves (actually VR100 10E/278 or 6U7 GT, CV1100) NOS $1 each collected club nights or $15 for packs of 5 P&P inclusive. Quantity limited and may be rationed per member.

Contact the NZVRS Secretary Paul Woodcock, 2 Levy Road, Glen Eden, Auckland 0602.
Email: **paul.woodcock@opus.co.nz**

All Society Sales cheques to be made out to the "NZVRS" and crossed "Not Transferable" please. Direct banking options are also available to the NZVRS ASB bank account – see bottom of page inside front cover of this bulletin.

WANTED:

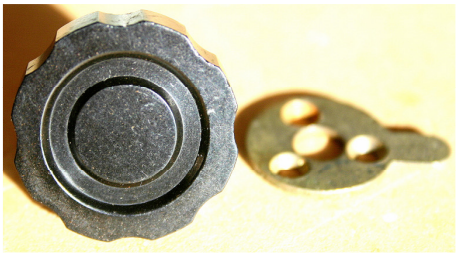
Wanted for restoration project. Complete speaker for Atwater-Kent Model 356, 1935. Speaker No. 41900 Field coil 1100 ohms.
Contact albert.cross@ihug.co.nz
Tel: 09 - 620 6312.

Wanted:
Valves: PEN383 (Mazda Octal) or 7D6 (equivalent but base change required). U403 (Mazda Octal) or U4020 (equivalent but needs base change). Both for Murphy U102A AC/DC set.
Come on fellow members, there must be someone out there that has these valves tucked away somewhere. Thanks for looking Ross Paton
Contact: Roy Arbman mob: 0275 167 507 or email royarbman@gmail.com

Thanks also to the response I had for the knobs for the Philco 730, the picture was a little deceiving, the fluted shoulders do actually taper. Also thanks for response for STC 62 Knobs. Roy Arbman.

Wanted:
Circuit diagram for STC Model 848, 8 valve console (Chassis 84). Valve line up 58, 57, 58, 27, 2x 47, 57 2nd detector and 80. Very similar to 748 (7 valve, doesn't have extra 47 in output) This is not the same as the 748 AVC which uses a 55 as second detector.
Perhaps our Aussie members across the ditch can assist as I am fairly certain the set was bought into NZ from Aussie as it has a Beale (Sydney) cabinet.
Contact: Roy Arbman mob; 0275 167 507 or email; royarbman@gmail.com

Wanted:
I am after a Marconi control knob similar to that shown in the following photograph. The knob is 30mm across (and not the slightly smaller 28mm part) to be used on an R1155 I am currently restoring. Any help supplying this part or indeed any R1155 parts (or complete receivers) would be greatly appreciated. Thank you.
Contact; Ian Thompson
ian.thompson@taitradio.com



Wanted:
3 IF Transformers for C&B Type 938 / 941 SWB series of receivers. They are approx 55 x 55 x 100 mm with adjustable air trimmers accessible from below chassis. See Photo Page 20 of Nov 2012 bulletin. Will buy any part sets condition immaterial but with these items intact

Circuit diagram of C&B Type 641 SWB Receiver.

C&B Type 141 DC 12v Vibrator power supply for 641 SWB receiver. This supply would be mounted on approx 5" wide panel of heavy gauge aluminium for 19" rack and would use one 6X5 tube.

National Radio PW-4 Four gang capacitor as used in the HRO series receivers, needed to replace rusty unit.

Contact Phil McGechie Ph 07 862 7088 or philmcgechie@xtra.co.nz

Wanted:
Tombstone C cabinet or Consul cabinet preferred for 393B American Pilot Cabinet. Prepared to pay.
Please contact Bob Kean on 021870596 or email: bobtheresek@gmail.com

For Tender by 31 May 2013

GEC Receiver Outfit CJA (34 valves) & CJC synthesiser (44 valves)?
2 to 30 Mc/s in 8 bands. Produced around 1965. In steel cabinet measuring 80cm high x 65cm wide x 70 cm deep.
Comes with some spare parts and a huge operator's manual full of circuit diagrams etc. The receiver weighs approx 75kg. The synthesiser weighs in at approx 50kg. Cabinet probably another 20kg. I have seen the whole set running, but it hasn't been switched on for a number of years. Some work may be required before it's ready for use again. Pick-up collection is from Medowbank, Auckland. Offers close 4pm 31 May 2013 (the highest or any other offer not necessarily accepted).
Brian Cotton email: brian2010@hotmail.co.nz

Please Note: The CJA may contain some radioactive components (perhaps regulator valves with isotope starters).