OTN

Old Timers' News

Journal of the ***Radio Amateurs Old Timers Club Australia Inc***

Number 70 **September 2022**

Contents

Radio Amateurs Old Timers Club Australia Inc

Established 1975 Incorporated 2002 Member of the WIA

Correspondence

Please note that all correspondence for the **RAOTC** and for *OTN Journal* is to be addressed to:

RAOTC
PO Box 107
Mentone VIC 3194
or by email to: ***raotc@raotc.org.au***

OTN Journal

OTN Journal is published twice yearly by **RAOTC Australia Inc** and is mailed to all members in March and September of each year. *OTN* is **dependent upon material supplied by members** and all contributions are most welcome, particularly those describing your experiences in your early years of amateur radio communication.

RAOTC Office Bearers

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Vice President	John Cheeseman VK3XM	***OTN* Editor**	Tel: 0416 177 027
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Secretary and Treasurer	Mike Goode VK3BDL Tel: 0412 221 649	**Web page co-ordinator**	Andy Walton VK3CAH
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Administrative Officer	Jim Gordon VK3ZKK Tel: 0428 138 886	**Committee Members**	Peter Clee VK8ZZ

RAOTC Membership and Fees

With the objectives to maintain the interest and original pioneer spirit of amateur radio, honour the history and heritage of our hobby, and encourage good fellowship amongst all radio amateurs, **Full membership** of the **RAOTC** is available to any person who has held, or has been qualified to hold, an Amateur Licence for a minimum of 25 years.

Associate membership is available to any person who has held, or has been qualified to hold, an Amateur Licence for a minimum of 10 years. Associate members are entitled to all the privileges of Full membership except the right to vote or to hold office.

Membership subscriptions, which fall due on 30th April each year, are: a $5.00 joining fee for new members (to cover the cost of a membership certificate, recording of membership, and initial postage); $18.00 for a one year membership; **or** $32.00 for a two year membership; **or** $375 for a Life membership.

An RAOTC member, on achieving 90 years of age and having been a member for a minimum of 10 years, automatically qualifies for a free Life membership.

The **address flysheet** accompanying your mailed copy of *OTN* journal shows your **RAOTC** membership number and your membership financial situation in a line immediately above your name and address. In addition, if your membership subscription is due, a reminder notice will appear in red ink below your name and address.

Application forms for membership of the **RAOTC** are available from the RAOTC, PO Box 107, Mentone VIC 3194 on receipt of a stamped self-addressed envelope, or on receipt of an email request to *raotc@raotc.org.au* or as a download from the RAOTC web page at *www.raotc.org.au*

Enquiries will be welcomed by Membership Officer Bill Roper VK3BR on 0416 177 027; or by email to *raotc@raotc.org.au*

RAOTC Broadcasts

VK3OTN, the offical callsign of the RAOTC, transmits news and information sessions for the benefit of members on the first Monday of each month (except January) at the following times and frequencies:

10.00 am	Victorian time (all year)	VK3REC on 147.175 MHz FM, plus 7.146 MHz LSB.
12.00 noon	Victorian time (all year)	1.825 MHz AM.
08.00 pm	Victorian time (all year)	VK3REC on 147.175 MHz FM plus 3.650 MHz LSB.
Interstate relays		
10.00 am	WA time (all year)	VK6OTN on 7.088 MHz LSB and NewsWest FM repeaters.
01.00	UTC (all year)	14.150 MHz USB beaming **North** from Victoria.
07.30 pm	Tasmanian time (all year)	via the VK7RAA network across northern Tasmania and the VK7RTC network in southern Tasmania.
08.30 pm	Local time (all year)	VK7AX Video Stream via BATC - *www.batc.tv/streams/7ax*

Check the RAOTC web site regularly for any broadcast variations plus other broadcast and beacon relays including DMR and D-Star. Call back sessions follow many broadcast transmissions.

RAOTC web site: *www.raotc.org.au*

From the committee . . .

The woes of finding a new Melbourne luncheon location have caused a few problems in recent months.

The RAOTC was advised earlier in the year that the Bentleigh Club, where our luncheons had been held for the past thirty plus years, had been sold to developers. August 2022 was to be the last month for luncheon bookings.

However, finding a new venue for our luncheons proved to be much easier said than done.

The committee decided the requirements for a new luncheon venue and set forth to see what was available.

These requirements were: located within 20 km of the Melbourne CBD, preferably in the southeastern suburbs; have public transport available close by; have good car parking facilities; provide table service for the meal which needed to be within the same private area as our meeting; have audio/visual facilities in the area/room; and be reasonably priced.

All that sounds simple enough, but it proved not to be so. It has taken most of this year to locate such a venue.

For a while it looked as though Melbourne RAOTC luncheons may become a thing of the past as venue after venue was checked out without finding something which satisfied our requirements.

However, thanks to the keen eye of our Vice President John Cheeseman VK3XM, the Caulfield RSL was found to satisfy all our requirements.

We hope all those who can attend on Thursday, 22nd September enjoy the new venue as well as a very interesting presentation from Don Bainbridge VK3BIG

Please let us know what you think.

On a different matter, I am not very impressed with the current sun spot cycle. My preferred bands of 10 m and 6 m commenced this winter with a bang but have now diminished to a whimper. RAOTC members who have regular skeds with the USA and the UK tell me that a telephone QSO is currently the preferred method.

Our Treasurer Michael Goode VK3BDL and his XYL Allison have just flown to the USA for a QSO with their daughter who resides there. It just so happens she is getting married.

I look forward to seeing as many of you as possible at the September Melbourne luncheon.

73,

David Rosenfield VK3ADM
RAOTC President
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From the editor . . .

Readers will find that this edition of *OTN Journal* does not contain as many individual articles as usual. This is because we have included quite a number of multiple page articles which readers will enjoy.

A big thank you to those who did contribute material for this issue of *OTN*. Your support is much appreciated.

I must confess I was quite relieved that there was enough material to fill this edition; it was very different to the previous issue where I experienced an editor's nightmare of not having enough copy to fill 60 pages and had to hurriedly produce four articles myself to fill the empty pages.

Currently there are five articles totaling 11 pages now ready for the next edition of *OTN*. These were received from John Drew VK5DJ, Herman Willemsen VK2IXV, Andrew Walton VK5CAH and a reprint from the UK *OTNews*.

However, obviously I need lots more material for the March 2023 *OTN Journal*.

A common request I receive from club members when discussing *OTN* is for more personal stories from individual amateurs.

It is indisputable that radio amateurs are always keen to read about the exploits and experiences of other amateurs, and to see photos of their stations and equipment, particularly from when they first started out.

I would love to be inundated with articles and letters from club members. You all have many interesting stories to tell!

If you are concerned about your ability to tell your story in so-called 'good' English, don't let that stop you. Simply write it down as you would tell it to one of your mates and send it along, preferably with a photo or two (or more).

If it needs any 'polishing', I will look after that for you. The most important thing is for you to get it down on paper, or on to your computer, and send it along to me.

When I prepare any article or letter for publication, I always send the end result back to the author to give them the opportunity to make any changes, deletions or additions.

Any material published in *OTN* is what the author wants it to be, and is pleased with, not what I may have sub-edited it to.

RAOTC monthly news broadcasts

OTN Journal is not the only way that the RAOTC communicates with members. There are the monthly broadcasts which are

(continued on page 59)

Editor
Bill Roper VK3BR
Typesetting and Layout
Bill Roper VK3BR
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Enveloping and addressing
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Mailing
Bill Roper VK3BR

Front Cover Photo
Left to right: David Rosenfield VK3ADM, Ian Godsil VK3JS, Bruce Bathols VK3UV and Bill Roper VK3BR on the occasion of the farewell presentation to two long serving members of the RAOTC committee (see page 7).

From our members ...

John Farnan VK6AFA

Dear Bill,

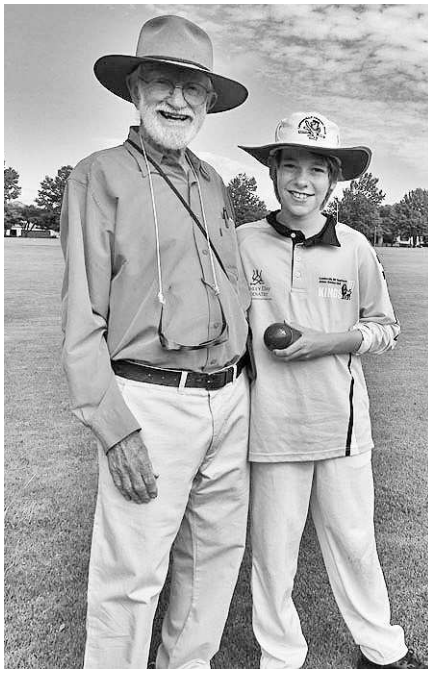
I hope to achieve 90 years on 24th August this year and I wanted to say thanks for your services to the hobby, particularly to the magazine *OTN* which has engaged my interest for many years. I did have one article about fire spotting in Victoria published a few years ago.

My interest in radio began in 1946 as a schoolboy in Melbourne when I built a crystal set from a *Radio and Hobbies* circuit and in 1949 built a ten-valve short wave radio, again from a *Radio and Hobbies* circuit.

My interest in electrical matters continued when I qualified in engineering with diplomas in mechanical and electrical engineering. I never had any interest in Morse code and was very busy with my job in engineering project management, so I looked at amateur radio only in 1979 when the Novice Licence was introduced and I moved with my family to Port Hedland (WA). I had N, K and Z calls briefly before I attained the full call VK6AFA around 1980. I was Secretary of the WA Division of the WIA at one stage, around 1990 I think.

I have very positive memories of my time in amateur radio and of the people I met or spoke to.

Unfortunately, I have been very inactive in amateur radio for the past ten years or so since I returned to Perth, and may relinquish the licence in the coming year. I am healthy but living alone after my wife of 57 happy years together died in 2015. I have eight surviving children - four males and four females - (plus 20 grandchildren) and, as I am computer literate I communicate with them twice a week on Zoom.



John Farnan VK6AFA with Billy, one of his grandsons.

I have attached a picture of myself with one of my grandchildren taken about a month ago.

Thanks again, and very best wishes

John Farnan VK6AFA
RAOTC member No 1409

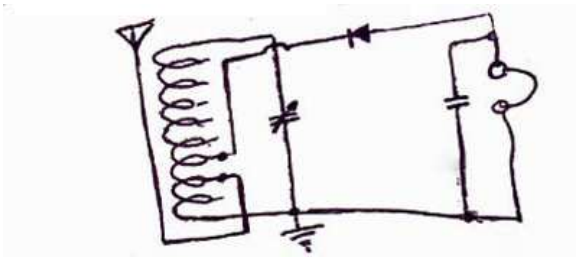
An old letter and a crystal set

In my recent letter I mentioned my entry into radio through my construction of a crystal set in 1946. By a strange combination of circumstances a letter I wrote to a school friend of my age came back into my hand a few years ago and here for is a copy of my hand written letter:

27 - 10 - 1946

Dear Dick,
Sorry I didn't answer your letter straight away; you must have thought I'd forgotten you. I don't seem to have had time lately but as I just had nothing to do now, thought I had better write and answer your letter. You know when you told me how to make a crystal set, well I have always wanted one and I got it out of Radio and Hobbies.

This is the circuit:



I haven't finished the set yet because as there are no trains running I couldn't get a crystal. The last few days, I haven't been going to school because of the same thing. I've got a beaut aerial. Maybe you remember those two pine trees next to our place, well, I've made an aerial about 100 ft high, joined to one of them like this:

I ought to get extra good reception. At the moment, Dad's got the USA on the radio, and it's coming in so well it sounds just like the locals. I hope the rail strike ends soon, because the combined sports is on 1st Nov. That's all I've got to say now, so I'll close.

I remain,
Yours sincerely John Farnan.
(PS. I hope you'll excuse the writing and tidiness but it's pretty late and I feel pretty tired.)

Incidentally, the radio that my father used receiving the USA was the usual dual wave radiogram of the time.

John Farnan VK6AFA
RAOTC member No 1409

March 2022 OTN Journal

Dear Bill,

Thank you for another good *OTN* with the No 69, March 2022 issue.

As usual, it contained much interesting reading.

I particularly enjoyed reading *The hedgehog transformer* by Richard VK7RO, *Declassified military*

secrets by yourself and the two *Radio Australia Shepparton* articles by Rodney VK3UG.

Also, I thought Ian VK3JS's closing comments in the *From the committee . . .* column were particularly apposite to our ageing amateur population. We need to do something about it now.

Bill Jamieson VK3HX
RAOTC member No 1117

Some comments on the last *OTN*

Bill, firstly thank you for your efforts as editor of *OTN* and please pass on my thanks to the team. It's a terrific magazine with such a variety of topics, and so full of interesting facts and history - it beats any other radio type magazine 'hands down'.

Also, thanks to Herman VK2IXVfor his efforts on the VTS/PMG key. Herman has done a terrific amount of research and I would imagine the late Ron Petrich VK4ACZ would fully approve as he loved Morse.

I was very fortunate to have known Ron. He was a genuine and terrific bloke although, at an amateur radio camp at Warbirds Mareeba some years ago, Ron and his bottle of Scotch caused us to stay awake yarning well into the Sunday morning. I ended up sleeping on a 'chunk of oily carpet' in the hangar whilst Ron had previously organised his stretcher!!

I had a laugh about Herman's *Try the other foot* article as it brought back memories of a humorous CW contact I had with Eric Neal VK4EDN, ex PMG. I was having a dreadful morning with my 'fist' and he said "try the other foot", which I knew was his humorous way of letting me know that I was making a hash of sending. We knew each other well enough for me to not take offense, as I could but concur.

I paid my RAOTC membership for a further two years this morning. The lady at the Westpac branch was very curious and said it sounds like an interesting magazine.

Further to the *Declassified military secrets* article, another Navy quote that was spun by the RAN Oberon-class submariners was: There are two types of ships - targets and submarines.

Whilst another that developed from the 1970s onwards was: Anyone know what that alarm is for?

I remember when the 500 kHz alarm went off on the bridge of HMAS *Flinders*. No one had heard it before and didn't know what it was until the LRO (Leading Radio Operator) informed us that it indicated a distress beacon had been triggered. It turned out that an RAAF F/A-18 had run into the top of Palm Island whilst on exercise and the alarm had triggered on impact.

Mike Patterson VK4MIK
RAOTC member No 1467

New member Chris Chapman VK3QB

Hello Bill,

Thanks for your email welcoming me to membership of the RAOTC. I was a member of RAOTC some years ago *(2009 to 2014. ed)* and confess it lapsed in one of life's busier moments.

I was first licensed in 1984 as VK3VCC while I was a Year 10 high school student. During HSC in 1986 I studied madly and upgraded to VK3BMG. My high school teachers, Tom VK3BUF and Steve VK3CAX, were great tutors at the time. I'm still in touch with Steve some 37 years later. Another mentor was Tim VK3IM *(RAOTC member No 504. ed)*, whom I assume you will know of.

As my school studies suffered (too much time on-air and not enough time doing homework), Tim would tutor me after school to get my maths up to speed for the final exams; then we'd have a beer and work some DX on 20 m. I also have fond memories as a kid sitting in the back seat of Tim's Mazda 808 as we drove through the main street of Mt Eliza setting off shop alarms - the filtering just didn't stand up to his 160 m mobile signals!

Not long after gaining my Novice licence Tim helped me wind a helical whip for 80 m which we installed on my push-bike. Needless to say it wasn't very efficient, but I had a QSO with Phil VK3PMJ about 15 km away. Phil and I were the same age so naturally became friends, a friendship which remains strong to this very day. Phil was VK3YB but took on his late father's callsign VK3VB when Peter became an SK in 2006.

I really enjoy DXing and DXpeditions. I've been to Vanuatu three times, Norfolk Island four times and Lord Howe Island twice. It's a bit of a bug that's for sure - and of course a great way to combine a holiday with the hobby.

During the early years of the 21st century I lived and worked in Sweden and operated extensively from that part of the world.

In more recent years, my wife and I moved to country Victoria. I enjoy a very low noise floor and am busy building a decent HF station. 95% of my operation is on CW, but I dabble in WSPR and am getting my arms around DMR and D-Star.

I've collaborated with Ian VK3BUF and Bob VK3XP to develop the online resource QRM Guru - a platform of 'hams helping hams' to fight RFI. If you haven't seen it check it out at *www.qrm.guru* Almost 30 hams have contributed to the resource and we really enjoy keeping the platform current, thus helping people identify and attack their QRM gremlins.

Anyhow, a little bit of background for you. I look forward to receiving the magazine.

Chris Chapman VK3QB
RAOTC member No 1832

Working in a quartz crystal factory

I enjoyed reading Andrew Walton's account of his time with Hi-Q making quartz crystals (*It's crystal clear - OTN*, September 2021, page 51). It brought back memories of a summer vacation job in the Pye quartz crystal facility in Clayton, Victoria. All this was some 60 years ago, so I cannot be certain that my memory is 100% accurate; but I do remember that the work was tedious, boring and dirty.

The foreman was responsible for orienting the bars by X-ray diffraction and gluing them to a platform. My job was to slice up the bars into crystal blanks using a diamond saw. The platform could be rotated to achieve the exact orientation. After each cut a stepwise slider controlled by a lever at the side of the machine moved the bar horizontally. A jet of oil kept things lubricated and cool. The whole apparatus was enclosed in a glass hood that could be raised to access the platform and change the bar.

The machines were very old and the screw threads that controlled the platform were badly worn with lots of backlash - a real challenge since the exact orientation of the crystal was critical.

The order of operations was also critical. I don't think I ever stuffed up, but it was a close thing. Close the lid, turn on the oil, turn on the saw and slowly

(continued on page 26)

RAOTC financial statements

Mike Goode VK3BDL
RAOTC member No 1610

Below are the RAOTC Financial Statements for the year ending 30th April 2022 with comparative figures for the preceding two years. This report was accepted by the RAOTC Management Committee at the meeting on 26th May 2022 and will be presented for approval at the Annual General Meeting to be held on 15th September 2022. If you have any queries about the results presented here, please do not hesitate to contact me.

Financial Statements

	Year to 30-Apr-2020	Year to 30-Apr-2021	Year to 30-Apr-2022
INCOME			
Donations	256.00	39.39	60.85
Sales OTN Digital	170.00	175.00	70.00
Joining fees	75.00	140.00	90.00
Interest	769.94	0	43.65
Receipts from functions	1,710.00	1,656.00	1,368.00
Subscriptions	5,493.40	8,379.40	4,442.40
TOTAL INCOME	**8,474.34**	**10,389.79**	**6,074.90**
EXPENSES			
DVD/USB costs	22.50	42.50	12.30
Administrative costs	386.59	148.00	408.00
Function expenses	1,530.00	1,470.00	1,261.50
OTN printing	3,300.55	3,285.70	3,604.70
OTN mailing and packing	1,758.16	1,909.76	2,073.55
Postage and Stationery	261.34	314.20	257.06
Insurance	546.35	614.82	646.27
Internet web services	285.00	285.00	285.00
Radio licences	110.00	110.00	110.00
Subscriptions	0	59.00	25.00
TOTAL EXPENSES	**8,200.49**	**8,238.98**	**8,683.38**
SURPLUS / (DEFICIT)	**273.85**	**2,150.81**	**(2,608.48)**
BALANCE SHEET	**30-Apr-2020**	**30-Apr-2021**	**30-Apr-2022**
ASSETS			
Cheque Account	37,405.97	14,683.20	13,003.37
Term Deposit	0	25,000.00	25,013.13
Prepaid expense	250.00	0	0
TOTAL ASSETS	**37,655.97**	**39,683.20**	**38,016.50**
LIABILITIES			
Prepaid subscriptions	12,786.60	12,304.20	14,004.80
Account payable etc	540.00	898.82	140.00
TOTAL LIABILITIES	**13,326.60**	**13,203.02**	**14,144.80**
MEMBERS' FUNDS			
Retained Funds	24,055.52	24,329.37	26,480.18
Surplus / (Deficit)	273.85	2,150.81	(2,608.48)
Closing balance	24,329.37	26,480.18	23,871.70
TOTAL MEMBERS' FUNDS & LIABILITIES	**37,655.97**	**39,683.20**	**38,016.50**

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Farewell to two RAOTC stalwarts

Bill Roper VK3BR
RAOTC member No 978

Earlier this year, two of the longer serving members of the RAOTC management committee reluctantly resigned from the committee, mainly due to age and health problems.

Bruce Bathols VK3UV gave outstanding service to the RAOTC as a Committee Member since 2002. During those 20 years, Bruce served several terms as Vice President and as Broadcast Officer from 2015.

Ian Godsil VK3JS also had given outstanding service from 2005 when he joined the committee and immediately took on the position of Secretary.

Ian also became a member of the broadcast team as from 2015. In recent times, Ian has also been reading the contents of each edition of *OTN Journal* as it is published into an audio file for the benefit of Club members with eyesight problems.

Ian will be continuing this *OTN on Audio* service in his retirement from the committee.

On Friday, 25th March, RAOTC President David Rosenfield VK3ADM and I travelled to Bruce's home.

Ian Godsil was also there and suitably mounted Certificates of Appreciation were presented to Bruce and Ian in an appropriately worded ceremony.

We wish both Bruce and Ian a long and enjoyable retirement.

They are already sorely missed from the RAOTC committee, and we urgently need replacements for them on the committee!

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David VK3ADM and Bruce VK3UV.

David VK3ADM and Ian VK3JS.

Melbourne March 2022 luncheon

Bill Roper VK3BR
RAOTC member No 978

The RAOTC Melbourne luncheon took place on Thursday, 24th March 2022 at the Bentleigh Club, the venue for our lunches for over 30 years.

38 members and guests were present to enjoy, for the last time, the excellent meal and white table service at the Bentleigh Club. Sadly, the Club has been sold and, in a sign of the times, is to be bulldozed and replaced by multi-storey apartment blocks.

It was a great occasion for attendees to be able to join together for lunch and catch up with old friends after having missed the September 2021 luncheon because of Covid-19 pandemic restrictions in place at that time.

After all had dined, those present then listened to an interesting and informative PowerPoint supported talk from pilot (now retired) Rodney Richards from Angel Flight Australia.

Many present did not know about Angel Flight. We do now. Rodney explained that it is a charity which coordinates non-emergency flights to assist country people to access specialist medical treatment that would otherwise be unavailable to them because of vast distances and high travel costs.

Rodney Richards from Angel Flight delivering his talk to the March luncheon group.

Rodney related several interesting anecdotes and then answered a number of questions from the interested audience before being presented with an RAOTC engraved crystal wine glass as a memento of the occasion.

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The active life of William (Bill) Mitton Rice VK5BP / VK3ABP

Lloyd Butler VK5BR
RAOTC member No 1495

For those who had close contact with Bill Rice, he was someone not to be forgotten. Personally, I thought he was a genius! Bill became a Silent Key in May 2007 and his long time friend Bill Roper VK3BR wrote an obituary, which was published in the July 2007 edition of *Amateur Radio* and also in the September 2007 edition of *OTN Journal*. Bill Roper wrote about Bill Rice's life based on what information was available at that time. But there was clearly a lot more about the Bill Rice history which might be written and I set out to find out what I could. For example, when sailing on Lake Eyre, he communicated mobile by amateur radio, something nobody had attempted to do before. This was unique because the lake doesn't get water very often and only fills years apart.

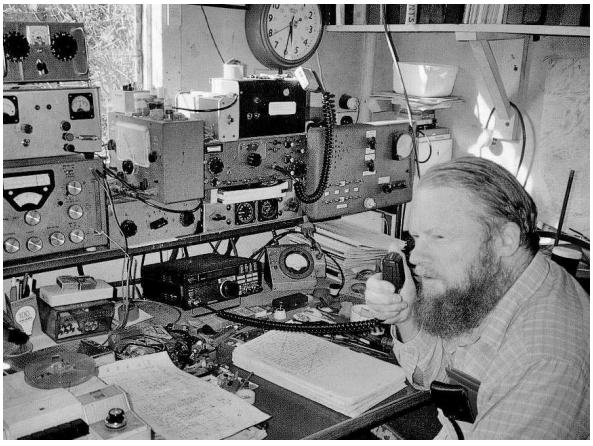
I have collected quite a lot of information about Bill's sailing and other items such as on his fox hunting. Much of this has come from Peter Rice, Bill's son, now also VK3ABP, Tim Robinson VK3YBP and Brian Richardson VK3CCR. I will start this article from when I first met Bill Rice just after he had finished his school days in Murray Bridge, South Australia.

By 1946 the war had finished and some of the pre-war radio amateurs in Murray Bridge were re-applying for their old licences. Frank Millar VK5BF and Bob Grundy VK5BG were the first to appear on air in the town. I had already passed the amateur radio exam in 1941 and was granted a licence with VK5BR as my callsign in January of 1946. Also in 1946, ex-Navy Jack Trevor VK5AM popped up in the town. Then 1947 came around and we became aware of Bill Rice building his radio station VK5BP.

Bill Rice in South Australia

Bill Rice was certainly an asset to amateur radio in Murray Bridge. He was born in Pinnaroo and home-schooled on the family farm there. With his parents, he moved to Murray Bridge and attended Murray Bridge High School, where I did, too. But he was three years younger than me and I hadn't known of his existence until the call sign VK5BP appeared on the air waves. Bill had been assembling his radio station in his parents' garage, building his own gear, much as most radio amateurs were doing in those early years.

As radio amateurs, we used components where we could find them, such as variable tuning capacitors recovered from the early TRF wireless sets. But Bill was going one better and he would attempt to construct the individual items themselves. I am sure that if he had found a way to do it, he would have tried assembling evacuated electron tubes.

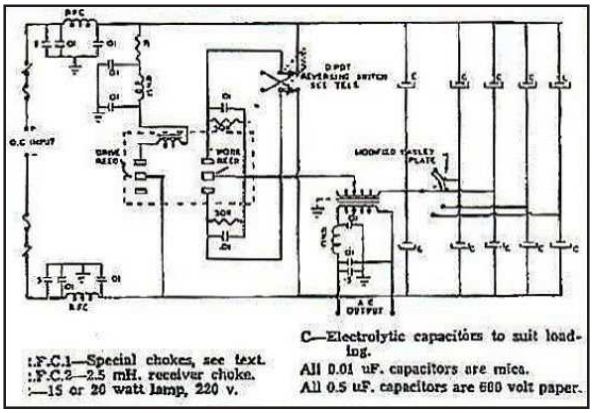


Bill Rice operating as VK3ABP at Altona, Victoria.

Bill's skill for making things seems to have been born into him. I remember he made good use of the lathe at the home in Murray Bridge of Bob Grundy VK5BG. He certainly had the skills to construct radio components.

Bill's original VK5BP transmitter operated on the 40 metre band with the transmitter consisting of a Franklin VFO using 6AC7 valves, a 6L6 driver and a push-pull 807 final amplifier. The final amplifier was modulated by a further push-pull pair of 807s. The VFO was later modified to a Clapp oscillator using a 6J5 valve.

We were all on DC mains in Murray Bridge and Bill built a DC to AC vibrator inverter so that a higher voltage could be generated and rectified, sufficient to operate the 807 valves at their full ratings.



DC-AC vibrator inverter by Eric Cornellius, the basis for the inverter built by Bill Rice VK5BP.

As discussed later, Bill moved to Adelaide which had AC mains. As he didn't need the inverter there, he loaned it to me to run my gear in portable mode when I went home to Murray Bridge on week-ends.

VK5BP at Murray Bridge soon moved on. Bill attended the University of Adelaide to commence an Engineering Degree and the VK5BP amateur station went with him to Adelaide.. He also went on to achieve Honours after the initial degree qualification. To achieve Honours, he chose to investigate slotted antennas. By that time I had decided that Bill was a genius. Impressed with Bill's skills, we became close friends.

A slot antenna consists of a metal surface, usually a flat plate, with one or more holes or slots cut out. A narrow width slot, with a length similar to a dipole, performs much like a normal dipole. Considering Bill's future work was connected with RAAF aircraft, my guess is that Bill was researching the narrow width slot to fit in the metal fuselage of an aircraft.

Around Murray Bridge and Adelaide, Bill gained a few active amateur radio friends including John Lamprey VK5JL, Jim Milway VK3CX (ex VK5CX), Rob Gurr VK5RG and John Millard VK5FC. A typical activity of this group was a visit in 1948 to the Clare showgrounds, driven there by John Lamprey in his parents' motor car.

The field day was sponsored by the amateur radio 'Northern Net' and the small travelling group enjoyed a stimulating conversation between John and Bill on the new mode of SSB which was beginning to appear on the amateur bands.

At this time, petrol rationing was still in force and the group had to borrow some petrol from one of the members of the Clare Net to get back to Adelaide. As the address of John Millard is listed in Crystal Brook, it is unlikely that he was a passenger in the car from Adelaide as indicated in one of Rob's articles in *Amateur Radio*.

The Adelaide Group at Clare. From left: Jim Milway, Bill Rice, Robb Gurr, John Millard, John Lamprey (ladies and children not identified).

Bill was regularly on the air with his radio station, particularly with John Lamprey who was also attending the University. I too spent quite a bit of time with Bill. At one stage Bill developed an interest in golf and bought several golf clubs. So I bought some too. One day we headed up the hills to the Belair National Park Golf Course. My means of transport was a rather well-used ex-army motor bike and we mounted ourselves, plus two bundles of clubs, on board it. It was never designed for such a burden, but somehow we made the grade to Belair and back without any problem.

Of the golf, I am not sure how Bill managed the course. But a lot of the first drives headed into deep gullies and I always managed to hit the ball into them. Such locations made it difficult to retrieve the ball and hit it out of the gully. I guess I left many balls where they lay!

Bill Rice VK3ABP in Victoria

On graduation from University, Bill joined the Department of Supply, later the Department of Defence. I was also working in the same Defence Department, but at Salisbury, South Australia. With security restrictions, I could well understand Bill's reluctance to release much detail of his activities.

In 1953, the Aircraft Research and Development Unit (ARDU) moved from Edinburgh RAAF base to Laverton RAAF base in Victoria, and so Bill and his newly married wife Margaret moved to Altona, Victoria where they started their family. Bill's amateur radio activities continued at Altona.

Here is a quote from Brian Richardson VK3CCR:

"I met Bill when I was posted to RAAF Laverton in 1970 and he worked there in ARDU. I gained my amateur licence that year and formed a friendship with Bill. There were numerous memorable incidents relating to Bill and I relate some of those memories here to the best of my memory:

"Bill had a hand in many things among which was the design of the Non Directional Beacons (NDB) antenna towers for the RAAF airfields. He calculated that the top guy wires could double as a top hat provided that their length was broken by an insulator before they effectively screened more than the top 40% of the mast; if they were continuous below that height the antenna efficiency was reduced. That stuck with me.

"I was with Bill one day in 1971/2 when he received a phone call relating to the latest amateur satellite which was at least partly built in VK and the receiver was in testing in USA prior being loaded into a launch vehicle. Apparently it failed some test for signal rejection and an urgent fix was needed. Bill produced a bundle of used photocopy paper, on which he did all his designs in pencil, and proceeded to make calculations with his slide rule before pencilling in changes which were phoned to the caller and the satellite. Oscar 6, I think, was successfully launched. Nothing fazed Bill."

ARDU moves again but Bill stays in Altona

In the mid 1980s, ARDU again moved, away from Laverton, and Bill joined the Aeronautical Research Laboratories at Fishermans Bend in Victoria.

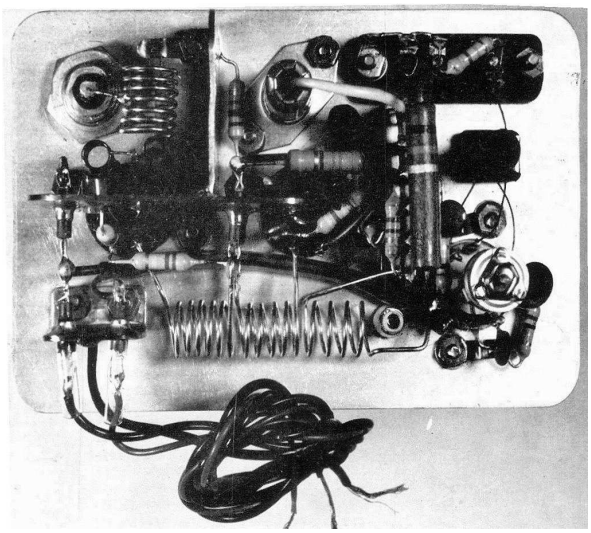
Bill had transferred his amateur radio activities to Victoria as VK3ABP and was based in his home at Altona. With my eldest son Kym working at Werribee, the visits by my wife Margaret and me to Victoria were frequent and we invariably called in to the Altona home of Bill and his wife Margaret. As it happens, the two Margarets knew each other from earlier days (and a common interest in teaching). At the time of each visit Bill was involved in different projects. I remember one visit when he was experimenting with some gear he had put together to monitor the weather patterns generated from the weather satellites.

But Bill talked a lot about the WIA. He became very interested in the running of the WIA organisation and its directing Board. He was editor of *Amateur Radio* for 15 years. He became firm friends for many years with the likes of Bill Roper VK3BR and Ron Fisher VK3OM.

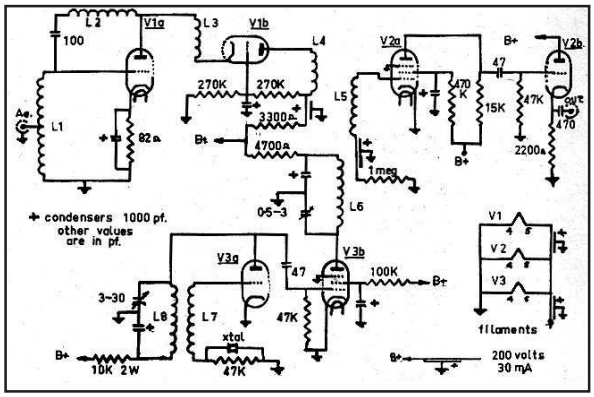
Bill Roper managed the office administration from 1988 to 1993, was involved with the production of *Amateur Radio* and was a member of the Publications Committee (with its related tasks) from 1963 through to 2015 (a total of 51 years). This period also included being editor of *Amateur Radio* from 1972 to 1976. Later, Bill VK3BR also took on the task of *OTN Journal* editor. Ron Fisher did a lot of technical writing for *Amateur Radio* including technical assessment of amateur transceivers. For a few years Ron Fisher and Bill Rice ran a Sunday night net on the 80 metre band. I called into that net a few times from my home in Adelaide.

The frequency converters

Bill Rice was well known for his design of circuitry and hardware which provided conversion from HF to 2 metres. As Bill VK3BR pointed out in Bill VK3ABP's obituary, it was one of the most popular pieces of equipment ever published in *Amateur Radio*. The photo of the converter and its circuit diagram shown on the next page were copied from the November 1962 edition of *Amateur*



The HF to 2 Metre VHF converter by Bill Rice VK3ABP, published in *Amateur Radio*, November 1962.



Circuit Diagram of the Bill Rice VK3ABP HF to 2 metre VHF converter.

Radio. Bill later published a 6 metre version of the unit (*Amateur Radio*, June 1967) and further on, when transistors became available, a transistorised version (*Amateur Radio*, May 1982) .

Foxhunting with Bill Rice

Bill Rice had a lot of different activities and was involved with many different projects. One amateur radio activity was 2 m fox hunting and on this subject I include comments from Jock Walsh VK3UB, Bill Roper VK3BR, Tim Robinson VK3YBP and Brian Richardson VK3CCR. First, here is an extract from an article on fox hunting in the 1970s by Jock Walsh VK3UB:

"I started fox hunting in about 1969 with a group of hams that included Bill Rice VK3ABP, Graham Farthing VK3AFR, Kevin Philips VK3ZYP and Tony Saunders VK3BZT. We used all home-brew gear, most of which would be consigned to the scrap heap today.

"Bill Rice drove an old Valiant AP5. The fox transmitter was also home-brew, courtesy of Bill Rice I think, and was packed into an old ammunition box to allow for the rough treatment it received when being placed in some of the hiding places. Bill came up with some weird and wonderful pieces of tracking equipment, one of which included a CRO installed in the dashboard of the old Valiant.

"One of the most difficult locations, where most of the hounds were within a hundred yards of the fox and still unable to pinpoint its location, was when Graham Farthing floated the fox transmitter out on a motor car tube raft into the middle of a lake in the Moonee Ponds Gardens. No one was prepared to go into the water and it was not until someone tripped over the fishing line to which it was attached that it was reeled in."

Here is a quote from Bill Roper on fox hunting in 1960:

"I was a keen 2 m fox hunter in the early 1960s. I recall that Bill Rice VK3ABP developed a continually polar plot rotating beam which was mounted on the roof of his Valiant and read the direction of the 'fox' from a small CRO. I seem to recall that on at least one occasion Bill was stopped by the police who were intrigued by the rotating antenna on the roof of the Valiant. Bill managed to talk his way out of any possible charges. I only have mostly fading memories now, but I certainly remember the fun of fox hunting. I enjoyed those monthly fox hunts for several years. We used to start out from College Crescent, Parkville, close to Melbourne University and covered a lot of territory around the suburbs trying to find the hidden transmitter."

A quote on fox hunting by Tim Robinson:

"I used to ride as 'Melway (street directory) reader' in a fox hunt team which consisted of myself in the back seat, Gil Sones VK3AUI on beam bearings, and Kevin Phillips VK3ZYP, now VK3AUQ, as driver. Kevin had an Austin A40 in which he had cut a hole in the roof so that the pole of a three element Yagi could be dropped through. Most others had to mount on ski bars and put a hand out of window to turn the beam. Not good these days (protruding limbs from moving cars)! We were the only car that did not have to drive with the passenger seat window open.

"Things started to get serious once the fox left to go to his first location. We would get bearings and try to follow a path by checking the street directory. We also timed the fox to get a rough idea of how far he might have travelled. Whilst we missed a few fox locations, I was surprised how close we often came to the actual location of the fox before being called in.

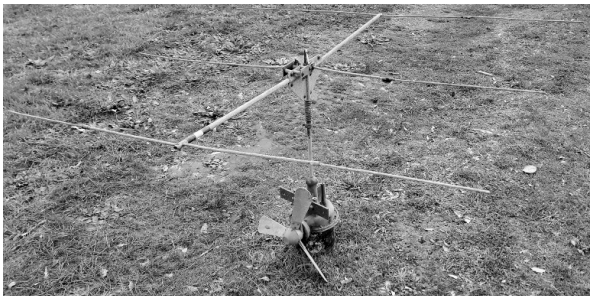
"Bill Rice VK3ABP won the prize for the most sophisticated direction finding setup in his Valiant AP5 car. Being an engineer and designer in the electronics industry, he had a vast knowledge in this area. He is known for the design of the VK3ABP 2 metre converter, a 2 m two stage valve amplifier unit. It did not have the best signal to noise ratio obtainable, but it worked well when the incoming signal was passed through a 20 dB FET preamp. Two Selsyn motors were employed. One drove the antenna sweep at about 50 RPM and the other provided the 'positioning' information to a cathode ray tube (CRT) with a long persistence phosphor. The antenna sweep output was amplified and sent to a second input of the CRT.

"Bill had designed this setup with a rotating antenna connected to the CRT. It plotted the signal strength as the trace turned radar style and plotted a 360 degree readout showing all the antenna lobes. It was quite impressive. One just had to observe the strongest lobe and the direction it was pointing in relation to the front of the car. It was fascinating to watch as you could instantly see the full 360 degree radiation pattern of the antenna.

"The output from the fox transmitter was a modulated tone usually warbled in frequency. The fox operators sometimes made the warbled tone quite annoying. Also, sometimes we were given very strange looks from people when we pulled up in a local laneway or a public area."

And finally a quote on fox hunting by Brian Richardson VK3CCR:

"We used to join the Melbourne fox hunt group on a Friday night and, travelling in Bill's old Valiant, would tear around town at high speed chasing the fox. The interesting point was the radio setup. Bill mounted a three element 2 m Yagi on a pole on ski-bars on the roof. The antenna rotated, driven by a windscreen wiper motor, and its position was relayed via a synchro to the 5 inch (12.7 cm) CRT in the cab. It was my job to read the CRT and call directions to Bill. However, the windscreen wiper motor lacked the power to drive the antenna when Bill was travelling at his preferred speed so he fabricated a forward facing fan which, when driven by the wind, added to the motor torque and it all rotated at any speed.



The recently found VK3ABP foxhunting 2 m Yagi, windscreen wiper rotator and forward facing fan.

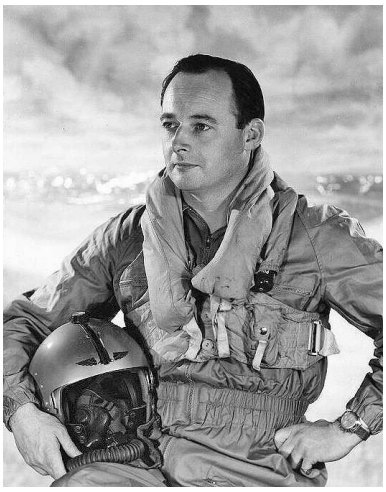
"It was not uncommon to see looks of total shock on the faces of pedestrians as this old Valiant, with fan and antenna spinning around on the roof and driven by this intense bearded man, went speeding by. Most days this setup provided such an advantage that Bill could have won the hunt but, as that would require him to host supper for the next hunt, he only ever came second."

Bill Rice, a sailor on Lake Eyre

Another Bill Rice activity was sailing. It was Bill's adventurous spirit that saw him inspire his first successful attempt at sailing on Lake Eyre in South Australia in May 1975.

The lake was named in honour of Edward John Eyre, the first European to see it in 1840. Lake Eyre is no puddle to sail in. It and some other lakes in the centre of Australia only fill when there are heavy rains delivered via the Cooper Creek, which flows from Queensland. Normally the lake beds are dry.

Cooper Creek is one of three major Queensland river systems that flow into the Lake Eyre basin. But the rains are only spasmodic and the lake does not fill often.



Donald Campbell.

Until 1985, Lake Eyre only filled with water four times during the 1900s, 1916-1917, 1950-1955, 1974-1977 and 1984. The deepest water level ever recorded in the lake was 6 metres, in 1974. When the water has evaporated, a large floor of salt is left without undulation and it is an ideal location for land speed

The record-breaking Bluebird CN7 on display.

tests. In 1964, Donald Campbell broke the land speed record on the Lake Eyre salt floor at 403.1 miles-per-hour (648.7 km/h) in his Bluebird-Proteus CN7 gas turbine-powered vehicle.

After settling as a dry salt-filled lake, in 1975 the river system flowed again and, led by Bill Rice, a group of amateur radio members and their families, headed from Melbourne to Lake Eyre within South Australia. They settled camp at Level Post Bay on the shore of Lake Eyre. Bill had contacted skipper Roger Bullock by this time, who had been marketing the Red Baron yachts. Roger Bullock and his partner joined Bill's entourage, and Roger's yacht (#5) was the first Red Baron which sailed on Lake Eyre, its hull painted red and labelled in large lettering with the Red Baron designation.

A typical Red Baron catamaran yacht similar to Bill's *Kathleen M*.

In May 1975, Bill Rice and skipper Roger Bullock launched the Red Baron yacht. The family group had quite a task controlling the yacht's progression down the steep sand slope into the water. Handheld radios designed by Bill were used by the group to co-ordinate the launching. Once afloat, they rigged the mast and sails, and the crew ultimately got the boat under way. On 14th May 1975 an expedition to Brookes Island was undertaken.

The crew was made up of Roger as skipper and navigator, Tim Robinson VK3YBP as the camera man using a 16 mm camera and Bill Rice as radio communicator who, with his gear on board, carried out amateur radio sessions. They sailed from Level Post Bay to Brookes Island, staying long after the sun went down and onto 3.00 am the next morning. They headed

back to Level Post Bay and Roger made use of the stars for navigation. During the dark period, Jack Taylor VK3ZKF manned a shore station, keeping scheduled 'skeds' and acting as a relay in case of emergencies. The return in the early morning to Level Post Bay was assisted by a flashing light beacon on the shore at Level Post Bay. The light might have been mounted on the top of the Bill Rice Wind Generator tower (discussed in following paragraphs).

Sailing into the centre of Madigan Gulf, they could see little of land in the distance around them and it was here that Bill carried out a lot of QSOs with other distant radio amateur stations. Early in the session, he was able to make contact with a radio amateur in the USA. But his first DX contact was the one he was pleased with. It was loud and clear, with 'Snow ' Campbell VK3MR in Melbourne and Bill returned S9.

He was obviously excited as he figured he had achieved a first operation, the first radio contact whilst maritime mobile on Lake Eyre. The whole operation was recorded on quarter inch reel-to-reel audio tape; that tape is now a prized archive possession of Peter Rice.

A film was made from Tim's 16 mm filming of the terrain around Lake Eyre and the communications activity on board the Red Baron yacht. 'On Eyre' was released for publication to a number of television and media channels, notably the ABC, Channel 9, and National Geographic, but unfortunately it failed to gain traction. Later, the film was digitised and distributed on DVD by Tim Robinson (Art-Media Services). The film and DVD was the work of the following: direction and camera by Tim Robinson, script by Bill Rice, narration by Ron Fisher, and location sound by Roly Roper.

The photo below of young Peter Rice, splashing around with his two sisters Janet and Kathy at the side of Roger Bullock's yacht, was taken near the beach at Level Post Bay.

Young Peter Rice splashing around with his sisters Janet and Kathy beside the Red Baron yacht.

The party camp site at Level Post Bay is shown in the photograph at the top of the next column. It is close to the shore of Level Post Bay and about a mile from the mouth of Goyders Channel. (Level Post was named by Warren Bonython in 1949 when he used a 'level' at or near the point the water reached the greatest depth.)

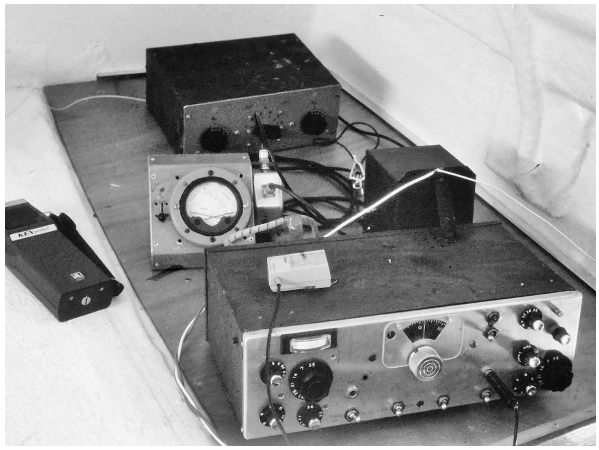
The vehicle at the front of the photograph with the roof rack was used by Roly Roper and Tim as transport to get from Melbourne to Lake Eyre. In the distance, and around the centre of the photo, the Holden HK wagon of Ron Fisher VK3OM is closely parked to the

Lake Eyre camp site on the shore of Level Post Bay.

right of Roger Bullock's Ford. The roof and roof rack (with spare wheel), and the right hand rear pillar of Bill's Valiant AP5 car, are barely evident behind the Fisher's car. At the rear there are the Bill Rice and Ron Fisher tents. The wind generator on the tower seen behind the camp was hand-made by Bill to charge the radio gear battery. The wind vane was made from steel salvaged from a Morris Minor front fender.

Light winds meant the wind generator could not deliver sufficient power and instead, a petrol-driven generator belonging to Ron Fisher, was used.

The following photograph is the transceiver gear made by Bill and used when maritime mobile. It was used in Roger Bullock's yacht, which was sailed to Brookes Island, and later in Bill's Red Baron yacht.



The VK3ABP Maritime Mobile gear.

The photo clearly shows the transceiver unit in the foreground. The box at the back is the transmatch antenna matching and tuning unit.

Peter Rice described to me how the antenna was set up. The output line was coupled to the base of the metal mast of the yacht and the mast was the main radiating element. A counterpoise was formed by a conducting plate dropped into the highly saline water of the lake. It was thought that, with the high salinity of the lake, the coupling loss resistance to the water earth plane might have been reasonably low. Bill seem to mainly work on 40 metres and at that wavelength, the 20 ft (6.1 m) mast was about 0.3 of a wavelength long and would have worked very well as a top loaded quarter wave antenna. It certainly put a good signal into Melbourne in the contact with 'Snow' Campbell.

Bill Rice's yacht

Bill acquired a 20 ft (6.1 m) fibreglass yacht, a Red Baron catamaran, made in Australia in the 1970s by Hill and Cameron Yachts. This one was painted white. I remember seeing Bill's yacht when I visited his Altona home and it dominated the front garden of the house. He also called in one day at my Panorama home with the boat on a trailer and offered to take me sailing on Lake Eyre. I was a member of the local Brighton and Seacliff Yacht Club and familiar with sailing yachts, but at that time I was probably otherwise engaged. Bill also sailed that yacht several times in the Marlay Point races on the Gippsland Lakes in the 1990s. The yacht was unquestionably a cruiser rather than a racer, and Bill received the wooden spoon in the Marlay Point Race three times.

In the mid 1970s, Lake Eyre received a record amount of water on two occasions. It was navigable and Bill introduced his Red Baron catamaran to Lake Eyre, complete with his communications gear. Keeping that gear working with power was a problem, so Bill built a wind driven battery charger using recycled materials and put his propellor-making skills to work in fabricating a 2 ft (61 cm) diameter propellor. The coupled generator was salvaged from a motor car and its windings were resonated with capacitors to raise the efficiency. To form the blades, Bill cut the tops and bottoms off aluminium cans and unrolled the remaining aluminium flat, linking the metal sheets by folding the edges and then gluing them together with Kwik Grip. The charger worked with an output of up 25 watts but was not quite adequate to keep the batteries charged.

In February 1976, the lake was less than four metres deep. In May 1976, Bill Rice towed the *Kathleen M* from Altona in Victoria to Lake Eyre, and circumnavigated Madigan Gulf in five days, visiting Eric and Ibis Islands. Bill was the skipper and the members of the crew were Ron FisherVK3OM, Peter Fisher, Sid Clark VK3ASC and Janet Rice. Ron Fisher also sailed his Mirror yacht on the lake.

Bill and wife Margaret aboard the *Kathleen M*.

Both Bill Rice and Ron Fisher had major boat trailer mishaps on the trip up in 1976. One evening, not long after they had left Marree and only a few kilometres up the road to Muloorina, one of the bearings on Ron's boat trailer collapsed. They limped back into Marree and inquiries were made about night accommodation, and also where the trailer could be repaired.

They were directed to abandoned railway 'navvy' huts in the centre of the railway reversing loop on the north-western outskirts of Marree, and stayed there for a few days while they repaired the Fisher's boat trailer axle.

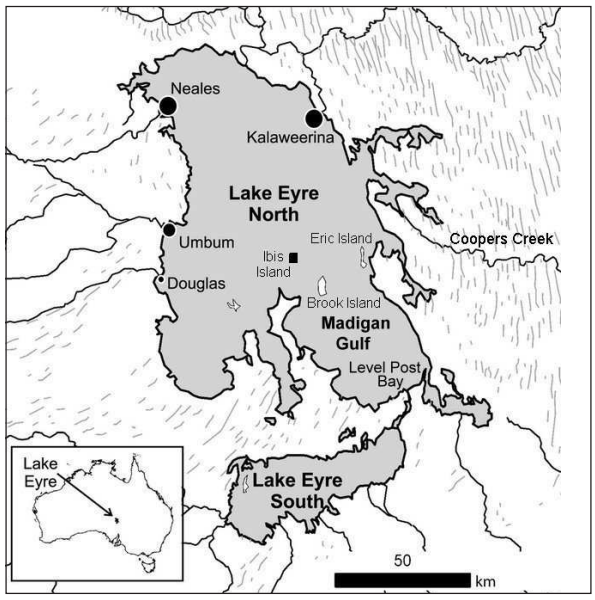
After a few days the group started out for Lake Eyre once more. About halfway between Muloorina Station and Level Post Bay, there was a great thump and grinding from behind Bill's Valiant, and a considerable drag was felt on the car. Once stopped, they learnt that the left hand suspension unit of the boat trailer had completely failed, having dislodged and been torn away from the trailer itself. Corrugations on the track had caused total destruction of the trailer suspension unit, requiring complete replacement.

Their amateur radio units were the means to get rescue help back at Marree. But they were stuck on the side of the Muloorina track for the better part of a week while a new trailer suspension unit was shipped up to Marree. Welding work had to be done at Marree before they resumed their trip to Lake Eyre.

Margaret Rice was a kindergarten teacher and had to return to Melbourne at the end of the school break. So Margaret, with several of her children plus one of her children's friends travelling with them, caught the standard gauge railway at Marree and travelled to Port Augusta, where they connected with a bus service to Adelaide.

In the school holiday break of August/September 1977, Bill Rice and Ron Fisher, each with several of their family members and with their two cars towing their yacht trailers, set out from Melbourne for their Lake Eyre base.

By this time much of the water in the lake had evaporated leaving a depth of only three to four feet. The water was extremely salty and Peter recalls it was

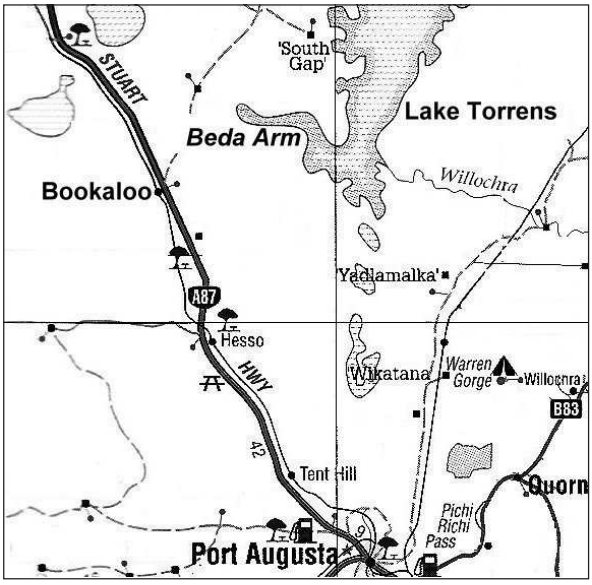


The Lake Eyre locations including those visited by Bill Rice with his Red Baron yacht.
Original drawing modified by Bill Roper VK3BR.

impossible to go swimming without coming out with a thin layer of salt covering one's skin.

The Rice family headed off again to Lake Eyre South in September 1989. Bill, Margaret and son Peter launched *Kathleen M* on Lake Eyre, but strong winds prevented them from sailing. Undaunted, Bill and son Peter relaunched at Beda Arm on Lake Torrens, investigated the southern end of that lake, and possibly became the first (and only ones) to sail on that lake.

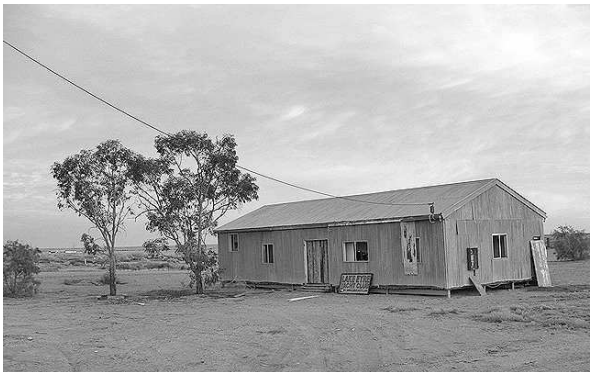
Lake Torrens, some 200 km south of Lake Eyre, is about 250 km in length and about 30 km in width. Bookaloo Railway Station is 85 km west from Port Augusta, along the Trans-Australian Railway. Beda Arm is a bay at the south-western part of Lake Torrens, 26 km from Bookaloo Railway Station.



The Lake Torrens and Beda Arm locations visited by Bill Rice with his Red Baron yacht in 1989.
Original drawing modified by Bill Roper VK3BR.

The Lake Eyre Yacht Club

The Lake Eyre Yacht Club was formed on 1st April 2000. The club was formally opened on 9th July 2000 and Bill Rice was granted Life Membership in 2001. The club had the aims of collecting and disseminating accurate information about the Lake. The types of boats used have varied, but one- or two-person catamarans have been popular because of their ability to navigate shallow waters.



The original building on the outskirts of Maree which later became the Lake Eyre Clubhouse.

The clubhouse is on the outskirts of Maree and around 95 km southeast from Lake Eyre. It was constructed by the United Aboriginal Ministry in 1950s and originally used as a church. It was abandoned in the 1980s and in 2006 was purchased by the Yacht Club. The building was in a derelict state and the club had to clean it up. In 2008 the building was cut in half and each half lifted 3 m. The original building is now the second level.

A front view of the completed Lake Eyre Yacht Club clubhouse.

The Lake Eyre Yacht Club has accumulated a membership of about 200 people from all over Australia and some from the United Kingdom, the United States and Germany. The Commodore is Bob Backway.

The club first hosted a regatta in 2010 but had not held another event until 2016 because of a lack of water in Lake Eyre coming down from the eastern states. But that is the periodicity of filling Lake Eyre.

There have been a few other happenings to stop sailing on Lake Eyre. A spanner had been thrown into the works by National Parks refusal to allow sailing on the lake until they had obtained the approval of native title claimants. It appears that around 2011, sailing on the lake was prevented and the Club presented arguments against the decree. However, judging by its active web site, the club is still an active organisation.

Lake Eyre was established as a National Park on 31st October 1985. The lake's official name was altered in December 2012 to combine the name 'Lake Eyre' with the Aboriginal name, 'Kati Thanda'. The National Park was renamed as Kati Thanda-Lake Eyre National Park on 14th November 2013. It was considered as Australia's biggest lake (in May 2019, it was quoted as being 144 km long and 77 km wide).

The native title over the lake and surrounding region is held by the Arabana people. It is not clear whether sailors of the future will be allowed to sail on the lake.

Sadly, Bill didn't live quite long enough to enjoy these events. Bill joined the ranks of Silent Keys on 29th May 2007 after suffering a health problem for a number of years.

That ends the information gained from the research. To finish off the article, I am going to quote a couple of sentences from Bill Roper's obituary of Bill Rice: "He was a quietly spoken, deliberate but personal man, with a brilliant always inquiring mind. He was one of the most knowledgeable and practical people I have ever met." Bill Roper was a friend of Bill Rice for over 45 years.

Note

I acknowledge the research and contributions of Peter Rice VK3ABP, Tim Robinson VK3YBP and Brian Richardson VK3CCR in writing this article.

ar

Wood borers ate Herman's Morse key

Herman Willemsen VK2IXV
RAOTC member No 824
and **John Daniel**

This article about the resurrection of a badly damaged historic Morse key has been jointly written by our well known contributor to *OTN Journal*, Herman Willemsen VK2IXV and his wood working friend John Daniel. It tells an interesting story of how two hobbyists with totally different skill sets combined to produce a wonderfully restored old Morse key.

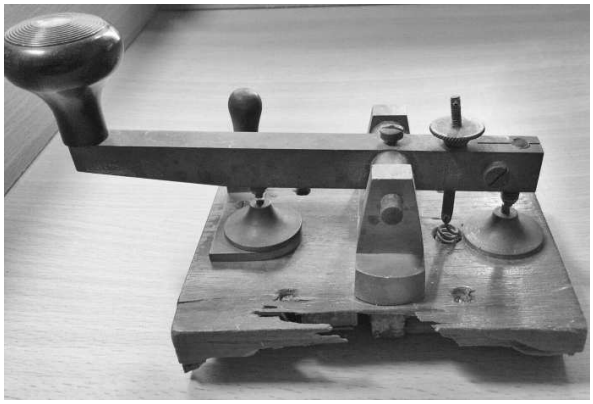
Bill Roper VK3BR editor

John Daniel:

It seems of late that I never have an idle moment up in the shed. For instance, a week or so back, Herman Willemsen, a Morse telegraph key collector, appeared at the shed door with a bit of a relic in his hand, better described as a bit of a challenge. So here's the tale of one of those not so 'idle moments'. As a 'moment' in my shed played a small part in bringing this rare PMG[1] key to light, Herman felt that this now resurrected Morse key was worthy of a combined article for *OTN Journal* and also the Kiama Woodcraft Group *Newsletter*.

Herman Willemsen:

At first glance I steered well clear of this dilapidated Morse key. The top of the backstop contact adjustment screw was sliced off and a more than large bit of its wooden base was missing. However, when I turned the key upside down, I noticed the impressions S123 6 C2044-40 stamped into the undamaged bottom part of the wooden base. Those characters indicated that this was a PMG-made brass and wooden key. I therefore decided to buy this wreck and try to have it restored to its former glory.



A 'first glance' at the heavily damaged historic PMG Morse key.

From the sparse amount of data I received, I deduced that all hardware and spare parts used by the PMG were catalogued. It became clear from research that the characters S123 were a Stock number[2] and in this case the warehouse ID number for a particular model of PMG-owned Morse code key or Sounder.

PMG stock numbers on bugs

It is also known that PMG operators with a medical certificate for Repetitive Strain Injury (RSI) were issued with bugs[3]. I have owned a PMG-owned Vibroplex Lightning bug with the markings of PMG 2639 and seen a Pendograph marked with a PMG stock number. Those bugs were used by the PMG well before they adopted the Simplex Auto bug in 1923 as a standard sending aid for the Commonwealth of Australia.

A closer look at the borer (Lyctus Beetle) damage underneath the base of the PMG key.

I am not certain about the number 6, but the C2044-40 characters were the maker's contract number, followed by the year of make, 1940.

A closer look at the rejuvenated key base showing the original PMG stock number.

When my friend John, a local craftsman, saw the key, his immediate impression was that the wood had been attacked by borers. He pointed out the borers' exit holes in the sides of the wooden base and a large part of the wood was weak, tunnelled and brittle. Who had used this Morse key and why was it stored or left abandoned in a place where hungry borers had access?

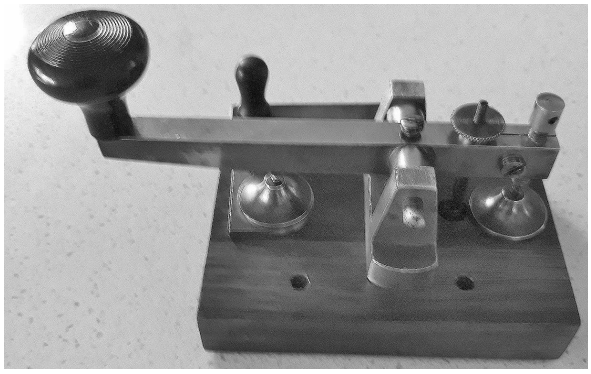
To repair this severely damaged Morse key, John had to pull out all stops. His first task was to find a matching piece of wood to shape and replace the flaky, honeycombed part of the wooden base.

He used Tasmanian Blackwood with matching grain and texture. The restoration was a time consuming, delicate job with much fitting, gluing, filling in of holes and polishing.

John's repairs to the damaged key base in progress.

Compared to that onerous task, making a new brass backstop contact adjustment screw must have been for him, 'a walk in the park', but definitely not for me.

The Morse key came up very well and I can now add another rare brass and wood PMG key to my small collection of Australian-made keys.



The fully restored historic PMG Morse key.

Footnotes

1. Upon Federation in 1901, the PMG (the Postmaster General's Department) was created to run Australia's Post and Telecommunications Services. In 1975, the PMG was restructured as two individual identities, namely Australia Post and Telecom Australia. In 1995, Telecom Australia was renamed Telstra.

2. Ron McMullen's collection of keys, sounders and various other telegraph equipment (Ron is Australia's most prolific collector of Australian and overseas, telegraph instruments) can be seen on The Australian Telegraph Office website at:
https://australiantelegraph.wordpress.com/

So far I have come across S123 markings on six PMG keys and two PMG Sounders[2].

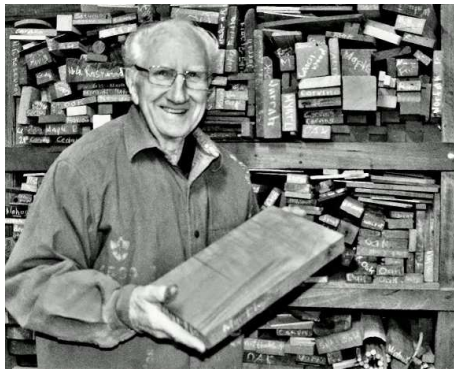
3. See my story in *OTN* No 53, March 2014, page 59, *Restoration and preservation of two bug keys*. The RSI (Repetitive Strain Injury), 'Glass Arm' or Carpal Tunnel disease, is caused by compression of the median nerve when it passes through the wrist.

Acknowledgements by Herman

John Daniel, member of The Traditional Tools Group (Inc) and the Kiama Woodcraft Group (Inc); David Burger VK2CZ; Kees van der Spek VK1KVS; Lloyd Butler VK5BR; John Elliott VK5EMI; and other members of the Adelaide Hills Amateur Radio Society (AHARS).

John Daniel - the challenge!

The pictures tell most of the story; however, as with all restorations, much thought must be given to the history of the object and the integrity of the end result. In other words, preserve as much as one can, especially in the case of this project with its serial number still intact.



John Daniel ready to start work on repairing the borer damaged PMG Morse key.

As can be seen, the borer damage was extreme. However, there was enough solid wood remaining on the surfaces of one side of the base although the borers had had a good feed internally.

Where to start? Well, firstly the loose piece of numbered wood was removed and safely put to one side before removing the irreparable side which needed replacing. This allowed access to the borer damage which then had to be 'cleaned-out' with a narrow chisel and a bit of luck, as the damage was very close to the top surface and the wood was very brittle.

The cavity now needed to be filled with small layers of wood, not just to increase the gluing surface for the replacement side, but also to support the piece that completed the serial numbers on the bottom side of the base.

Enough said, the tension now behind me, it was just a matter of adding a bit of detail to the underside of the replacement side before gluing in place. The replacement piece was then trimmed flush with the mating piece before a final sand, a touch up of stain here and there, surface borer holes stopped up, and finally a couple of coats of shellac which was then waxed.

It was quite satisfying to have played a role in bringing back to life a PMG relic that, under different circumstances, would have been stripped down and used for spare parts;

Herman's smile when he picked it up said it all!

Acknowledgement by John

The photos of the assembled key and the technical information, were contributed by Herman Willemsen. Herman Willemsen served as a Radio Officer on Dutch Merchant ships and then as a Coast Radio Manager with OTC (now Telstra). Since retirement, he has become a serious collector and researcher of Morse telegraph keys. **ar**

Radio Australia Shepparton A short history (part 3)

Rodney Champness VK3UG
RAOTC member No 1086

Parts 1 and 2 of this article were published in the March 2022 edition of *OTN Journal.* Part 1 covered: How it all began; Construction; Power to the station; Early transmitters; Early antenna systems; The versatile matrix; and The new Harris transmitters. Part 2 covered: Antenna system upgrades; Continental transmitters; Staffing, housing and sheep; Frequencies and services; and The end of an era. This final part covers: The last hurrah of VI3RA; A summary; and quite comprehensive Appendices.

The last hurrah – VI3RA

The Radio Australia Shepparton site owner (on 12th November 2019 Broadcast Australia [BAI] was rebranded to BAI Communications Australia) was approached by one of their staff members, Rex James, back in 2019 to see if the antennas could be used by amateur radio operators for a short period as a last hurrah for the site.

Permission was granted which allowed the Shepparton and District Amateur Radio Club (SADARC) with Rex James as the owner's representative, to ensure everything was kosher to use the antennas for the weekend 14/15th March 2020. This involved a group of club members in addition to Rex James organising a special event call sign (VI3RA), endeavouring to get a high power permit (refused by ACMA), organising publicity, inviting amateurs with specialist communications experience to attend, and arranging times for amateurs who registered to operate from the site physically so that all got a reasonable chance to operate over the 48 hours of time the event was programmed for. It was necessary to abide by occupational health and safety measures and the Covid-19 restrictions at the time. These became harsher after that weekend.

EME equipment set up for Moon Bounce experiments 14-15th March 2020.

It was necessary to check that the antennas were all functional as no equipment maintenance had occurred since 31st January 2017. One or two required maintenance and were serviced whilst one rhombic was too expensive to maintain it so it was not used.

The Marconi matrix also required maintenance but this was not practical to do. All transmission lines where they entered the matrix building were removed from the matrix and attached to 300 ohm to 50 ohm baluns then, via a remotely controlled switching network and coaxial cables, to three operational stations in rooms at the back of the transmitter hall. This was all tested prior to the allocated weekend.

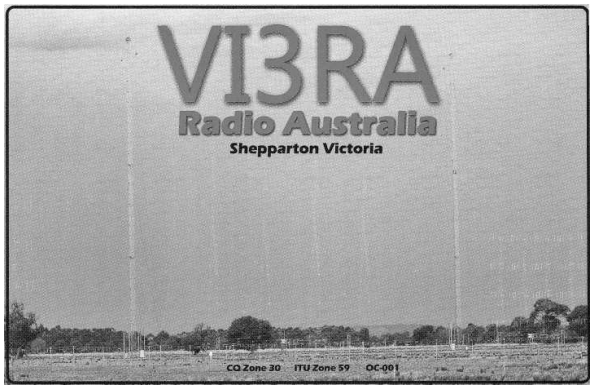
The opportunity gave a chance to try again to bounce signals off the moon. This was successful but digital transmissions had to be used as amateurs are only allowed 400 watts transmitter output whereas in 1947 around 50 kW and 70 kW was used (two different transmitters).

Watching for the moon bounce signals on 21 MHz.

This was a very successful weekend which proved that large high gain antennas make all the difference to having strong signals far afield. DX addicts had a great time and many others had fun trying the antennas on frequencies that they were not really designed for with interesting results. This was possibly the only time that the antennas had officially been used for both transmission and reception.

As a last hurrah for the station this was something to remember with around 90 amateurs and short wave operators attending with many thousands in many countries hearing VI3RA communicating by voice, Morse code and digital modes.

If the antennas are not removed in the short term it may be possible for amateur radio operators to use these magnificent antennas again.



The front of a VI3RA QSL card.

In the early days of Radio Australia, QSL cards were exchanged but this practice ceased over the years. Since the last hurrah with VI3RA around 1,000 QSL cards were distributed to overseas and Australian radio amateurs who contacted the station, making it a time in history to remember.

The back of the QSL card has a short story about the history of the site, as follows:

The Radio Australia site in Shepparton Victoria was responsible for broadcasting worldwide a range of content on the shortwave bands between 1939 and 2017. Since the closure of the site for international shortwave broadcasting an opportunity developed to reactivate the station on the 14th and 15th of March 2020 using amateur radio. With the dedicated work of employees of BAI communications (the owners of the site at the time of the event) and members of the Shepparton and District Amateur Radio Club, the event was a huge success. A range of antennas including several high gain curtain arrays and a large rhombic antenna at the Radio Australia Shepparton site were made available for the weekend and over 90 amateur radio operators participated. It was a historic event for amateur radio and for the site which will always be a major part of Australia's proud broadcasting history.

A group of happy amateurs using the Radio Australia antennas.

Summary

Radio Australia at Shepparton provided the overseas service of the ABC from mid 1944 on a continuous basis until closure in 2017. Other sites have come and gone but Shepparton just kept on going and going, gradually improving with tweaks here and there, until closure of some of the transmitters in 2015. It finally closed in 2017.

The site will not be used as an International HF Broadcasting station again as a lot of the plant has been de-commissioned and removed from the site. However, at this stage (2021) the transmitter facades, buildings and antennas remain. Without maintenance the facilities will deteriorate.

The keys to the Radio Australia site at Shepparton were handed over to a consortium of Shepparton business men on 8th May 2020.What the consortium intends to do short or long term is unknown although one hope is that part of the site could become a working communications museum, which would be unique to Shepparton and possibly for the southern hemisphere of the world. However, at this stage the consortium is not contemplating any such action of the site for 10 to perhaps 20 years. It is hoped that the site equipment will not deteriorate dramatically over this period.

Videos of Radio Australia

After the completion of this article some videos of Radio Australia and particulars of Radio Australia at Shepparton became available via YouTube. It is understood that they were largely produced by David J Stuart VK3ASE and the first two are excellent. The other two may have little interest to the general public but are a trip down memory lane for many in the broadcasting industry.

The first two videos with the same YouTube content give a brief overview of Radio Australia in general and show the actual close down of the station at Shepparton on 31st January 2017. Either site shows the same video as at 29/9/2021:

https://www.youtube.com/watch?v=PKUsl7PZNr4 or *https://m.youtube.com/watch?v=PKUsl7PZNr4*

The other videos are raw and unedited and will be of interest to those who worked there and they are:

https://youtu.be/BZuThNVJ1vo and *https://www.youtube.com/watch?v=0tck8*

Appendices

The evolution of transmitter modulation methods

From the start of AM broadcasting in Australia in 1923 a variety of methods of impressing voice and music on the carrier wave were employed. Initially the most common methods were called efficiency modulation (grid), Heising modulation (plate) and series modulation (plate). These were all quite inefficient as they used a large Class A modulator or a variable efficiency transmitter stage, so the transmitters, ranging in power output from 50 W through several hundred watts and into the low kilowatts, drew a lot of power for a modest output.

It is unclear to me what method of modulation was used at Lyndhurst in the period before ***Australia Calling*** was implemented in 1939. The first transmitters at Shepparton were all plate modulated using Class B high power modulators. The efficiency of these transmitters was higher than the earlier types, but the power drawn and the cost of it was still considerable.

Large high-power transmitters are expensive to operate. For example, the annual cost of electricity for Radio Australia Darwin was several millions of dollars. Therefore, the more efficient a transmitter can be made in the conversion of electrical power to radio frequency power the better.

A form of series modulation, somewhat similar to that originally used with transmitters, was developed and used by the Harris transmitters at Shepparton. It is Pulse Width Modulation (PWM) and is described below. Even this has been refined in the later Continental transmitters as they use a solid state PWM system. There is still a valve in the output of these transmitters.

Some transmitters now are all solid state and the conversion efficiency from mains power to RF power is around 70%, much better than the initial systems that had overall conversion efficiencies as low as about 17%.

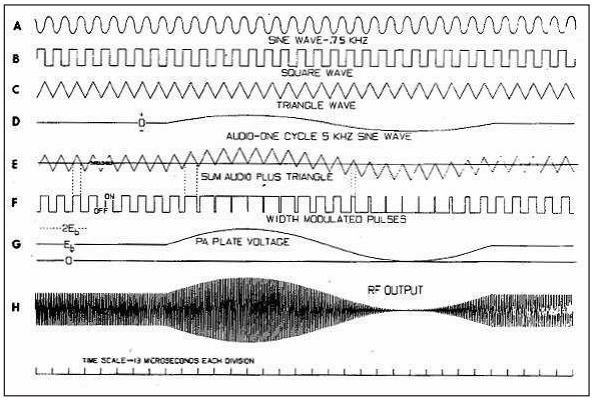
The Harris SW100 and SW100A transmitter operation and specifications

For a 100 kW radio frequency output the input is around 180 kW without modulation. The overall efficiency for total power input to the transmitters is of

the order of 55% to 60%. The earlier transmitters were only around 33% efficient.

The Harris transmitters use what was a fairly new technique in the 1970s, Pulse Duration Modulation (PDM). There are only five valves in the transmitter, a 4CX1500A audio driver, a 4CV100,000E modulator output, a 4CX1500A RF driver, a 4CV100,000E RF power amplifier (PA) and a 2CX10,000F damper diode. The PA is series modulated by the PDM audio modulator.

Below is a diagram of the Pulse Duration Modulation system showing the processes involved in transferring a normal analogue audio signal to a digital signal and back again to an amplitude modulated (AM) radio frequency signal. In the process very high efficiency is achieved via the PDM system. Well worth it to minimise power usage.



The waveforms through the Pulse Duration Modulation process in a Harris transmitter.

The modulator initially has a sine wave oscillator running at around 75 kHz, which is converted into a triangle wave. The triangle wave and a variable DC voltage are applied to a comparator. When the triangle wave is greater in value than the DC reference the modulator output valve is switched on hard producing a square wave and the transmitter operates. If the triangle wave only exceeds the DC reference by a small amount only a small output power will be produced.

However, if the DC voltage reference is low (in comparison to the triangle wave) the modulator will be switched on for much more of the time and the RF output will be much greater. The 75 kHz square wave is filtered so that the average of these square wave pulses goes to the PA stage. Without the filtering the transmitter output would splatter (interference) across around 200 kHz of spectrum.

However, to modulate the transmitter the DC reference voltage is varied at an audio rate so causing the RF output to vary at the audio rate - in other words it is now modulated. This rapid switching off and on develops very high back EMF so a damper diode is used to overcome this and return this peak energy back to the power supply.

It is quite possible to run the transmitter from a kilowatt or so up to the full 100,000 watts just by varying the small power control pot - the same sized unit as used in domestic vintage radios. The audio gain into the transmitter has to be varied at the same time so that the correct level of modulation is retained.

The high voltage in the power supply is approximately 29 kilovolts and that is certainly a killer voltage. The PA runs on 12 kilovolts at 10 amps to provide 100,000 watts output, and the stage efficiency is around 83 %. The modulator is at least 90% efficient, being switched hard on or off at around 75 kHz.

Vintage radios are often said to be steam radios, and the Harris transmitters are literally steam cooled. Each of the 4CV100,000E valves is enclosed in a boiler and in operation they generate a lot of heat, which boils the water in the boiler. A total of around 13 litres of water is used and reused in each transmitter. The steam is piped to the roof in two 90 mm copper pipes, condensed, and comes down as water to recharge the water reservoir.

The rest of the transmitter is air cooled by a total of eight fans within the unit. The largest fan is around 900 mm in diameter. One of the nastiest faults that the transmitters have from time to time occurs when there are water leaks. Some quite impressive big bangs happen as well as, on rare occasions, a fire is started in the transmitter high power stages.

So that transmitters can rapidly change frequency there are 10 frequency and tuning control cards fitted to each transmitter. There are seven tuning controls of which the main band selector is permanently selected on a card by a diode matrix. However, the tuning of each circuit is accomplished by servo-motors which move the settings on coils or capacitors to the correct value for operation as set on the presets on the cards.

The presets are 10-turn trim potentiometers. The servo motors also turn another 10-turn pot and, when the voltage across a bridge circuit of the two potentiometers matched, the servo stops due to the operation of a comparator. The circuit is then considered tuned. However, the transmitter is only approximately tuned although the tuning will usually be quite close to optimum. It is necessary to peak the tuning of the transmitter after the servos have done their job for peak performance.

Occasionally the servo-mechanisms do not get the transmitter correctly tuned and manual retuning is mandatory to ensure efficient operation and prevention of damage to the transmitter.

Nominally each transmitter can only tune to ten frequencies, but the transmitters can be tuned manually and any number of frequencies can be selected and tuned to, providing the correct PA band switching is selected on the plug in frequency card.

Frequency Control

In the early days of the station the transmission frequencies were generated by individual quartz crystals on the output or sub-multiple of the output frequency. The crystals would have been likely to have been cut to a frequency that was well within 0.01% of the transmitted frequency.

For example, when the transmitter was nominally set for 9,580 kHz the actual transmit frequency could at worst be 958 Hz either higher or lower than the nominated frequency.

As time went by a central frequency source was used which was of higher accuracy than the individual crystals. A Schlumberger synthesiser was one of those devices which were highly regarded for their frequency accuracy before Atomic frequency standards became readily available.

Ultimately the frequency master control was obtained from a Rubidium Atomic standard, which went to individual frequency synthesisers at each transmitter where the output frequency was generated. Transmitters could be locked to the same frequency but transmitted on different antennas. This was done occasionally.

One day, a report from the Commonwealth Radio Monitoring station at Quoin Ridge in Tasmania stated that our transmit frequencies were some many degrees (fraction of a hertz) away from their allocated frequencies. The number of degrees depended on the actual transmit frequency. So the transmit frequencies were within less than one hertz from the assigned frequencies and all due to the use of the Rubidium Frequency standard in use at Radio Australia Shepparton. Such was the accuracy of the Radio Australia transmitters!

Ancillary equipment

A dummy load

To test the transmitters without putting them on an air into an antenna and possibly causing interference to other International Broadcasting stations, it is necessary to use what is called a dummy load. This consists of high power resistive elements that mimic a radio antenna that a transmitter could use. The photo below is of the one used in latter days at Radio Australia and was rated at 200 kW.

200 kW RF dummy load as at 2007.

Program supply

Initially the Radio Australia program from the Melbourne studios was by land-line (telephone lines). To get the audio quality required to reproduce music faithfully, three carrier channels were used together to obtain a frequency range from around 50 Hz to 10 kHz, The normal telephone only required around 300 to 3,000 hertz.

As time went by better methods were employed such as coaxial cable systems, microwave links, satellite and finally optical fibre systems.

Equipment precision and complexity

When a group of radio amateurs were shown through Radio Australia, one was heard to say that, when he looked inside a transmitter which was down for repairs, it didn't look very complicated.

An amateur AM transmitter, when compared to a single sideband transmitter, is basically simple. It would seem that the person concerned may not have thought that scaling the size of components up from perhaps 100 W to 100 kW would not cause the complexity to be dramatically increased.

The circuits and other diagrams occupied 28 A3 sized pages for the Harris SW100A transmitters and this did not include the ancillary equipment information!

An amateur transmitter does not need many protection circuits and is designed to operate on an attended basis in an intermittent mode. High power broadcasting transmitters are designed to operate continuously and largely unattended. The voltages used are considerably greater than an amateur station would use (up to around 29 kV) and are supplied at quite a number of amps (the overloads trip at 7.5 amps in Harris SW100A transmitters). Insulation and spacing needs to be sufficient that arc overs do not occur or if they do that there are spark gaps to dissipate energy.

The basic RF circuit was not greatly different to that in an amateur AM transmitter. A carrier at around 20 mW was applied to the transmitter and then boosted in level by four stages of amplification to an output of 100 kW. The 20 mW was obtained from a synthesiser which had a Rubidium frequency standard as its reference.

The stages consisted of two broadband amplifiers followed by two tuned amplifier stages. Basically simple, but there were several power supplies for different stages as well as monitoring circuits to ensure that operating conditions remained as near optimum as possible. The driver and output stages were both neutralised and the screens were taken to earth to make neutralisation easier to adjust and maintain. However, the combination of many simple circuits was used to ensure that a 100 kW transmitter could operate safely.

The frequency precision of the transmitters was not measured in hertz away from the nominated frequency but in degrees of phase difference. The source of the high accuracy signal was supplied by a Rubidium frequency standard as mentioned above.

To do various tests at full power and not cause interference to other external stations, a dummy load was used. The dummy load was made up of a non-inductive 200 kilowatt resistance element consisting of a solution of sodium carbonate within a heat exchanger system. Water flow from the load was circulated and externally cooled. The temperature rise was monitored and the output power of the transmitter was calculated by the temperature rise and showed on a digital display. At a temperature of 70° C and a flow rate of 12,000 litres per hour, the impedance across the sodium carbonate was 300 ohms.

In recent times the audio input to the transmitters was processed through a device which improved the effective audio modulation. When switched out of circuit the audio was nowhere near as effective. The audio was filtered so that signals above 4.5 kHz were severely attenuated. Audio programs were received from many inputs, satellite, optical fibre and, earlier on, trunk telephone lines.

The whys and wherefores of getting the Radio Australia signals to where they were desired

Transmitter powers and antenna requirements

In the 1920s and 1930s, AM domestic broadcasting was limited to about 1,600 kHz and the aim was for the transmitted signal to be heard as far and wide as possible. It was not unusual for the radio stations to receive letters from overseas telling them that they were heard in some remote location. They were all proud to know that their signals were heard so far away. But that was to change.

The antennas used were predominantly some form of horizontal antenna which suited long distance reception of their signals but often did not provide good signals close to the station. The commercial

operators with lower transmitter powers came to realise that distant listeners did not provide any advertising revenue for them so some means of concentrating their signals within a radius of around 50 miles (80 km) to 100 miles (160 km) became important.

Vertical antennas became the norm as the strength of their signals in the area where their revenue would come from was better than that provided by horizontal antennas which are usually directional. Antenna masts were expensive to build and suitable locations for their erection had to be found to give the best performance.

The antenna systems ranged in height from around 1/8th of a wavelength to an optimum height of 5/9th of a wavelength. These 5/9th wavelength antennas provided the maximum range before night-time fading and distortion of the signal became troublesome.

In this era the Australian Inland service (ABC) on short wave frequencies emanated from various capital cities, used horizontal antennas of various sorts as written about early in this article and they were intentionally directional.

The requirements of ***Australia Calling*** and later ***Radio Australia*** were very similar to those of the Inland service but with additional criteria that had to be met.

To provide a signal into an area of interest, sufficient transmitter power was necessary. Initially transmitter powers of 2 to 10 kW were used with Shepparton commencing with 50 kW in 1944. Ultimately, power rose to 250 kW at Darwin and 100 kW at Shepparton. The increases in power of the transmitters served two purposes, firstly to provide a strong signal into the areas of interest which were overseas, and secondly to endeavour to overcome jamming signals from unfriendly countries during the Cold War. This is done more subtlety these days.

Transmitter power alone was not enough to provide strong signals into the areas of interest and antennas with much more gain in the favoured directions were necessary to achieve this. The original antennas were in many cases simply a centre-fed half wave dipole slung between two masts of around 20 metres high. Although directional, this antenna is only mildly so and is considered an elementary antenna with no gain of consequence.

Very soon antennas were installed that were mostly rhombic or curtain arrays. Their size and height (up to 91 metres) determined their effective gain. The largest curtain arrays at Shepparton had gains of around 20 decibels (100 times the effective signal in the favoured direction) when compared to a dipole antenna. The increased gain narrowed the directivity of the signal both vertically and horizontally, giving a very strong signal into many areas of interest. This directivity could be changed electronically if needed. There was no point in sending a signal all over the world when you were only interested in a particular area with the type of program you were sending.

At its peak Radio Australia Shepparton had 10 transmitters of various powers that could be coupled to up to any of 35 antennas pointing into various parts of the world. Signals could be projected into all continents including Antarctica.

The majority of the antennas were classed as narrow band types and as such would have covered, for example, only the 11 MHz international broadcast band and no other. This meant that separate antennas for 6, 7, 9, 11, 12, 13, 15, 17, 19 and 21 MHz were needed. The rhombic antennas were broadband and would operate satisfactorily over several bands where less antenna gain was needed.

Decisions by the government and the ABC were made in the 1980s into the early 1990s that the areas of interest were contracting, so fewer antennas and transmitters would be needed to transmit to the South Pacific in the east, through north to northwest of Australia into Asia. It was decided that only six transmitters were needed along with one transmitter which was to be used as a spare. They were all to be 100 kW of the same make and models compatible with each other.

The spare, as described elsewhere in the article, was used for special programs (in times of emergency, etc) and to ensure program continuity when maintenance or fault rectification to other transmitters was undertaken. It had also become a requirement that a standby transmitter should be the same power as the one being replaced.

There were plans for the installation of 250 kW transmitters at Shepparton but this didn't get further than the planning stage, although provision was made in the power distribution system to accommodate such powerful transmitters.

It was also determined that most of the 35 antennas could be removed so that transmissions could be concentrated in areas of interest and that many of the single band antennas could be replaced by multi-band antennas. Five new multiband high gain curtain arrays were installed around 1992 and the six original single band high gain antennas were retained, as well as two rhombic antennas, which meant that 35 antennas were reduced to 13. Overall this meant that high power transmitters and generally higher gain antennas were used on all services with improved signals into the areas of interest.

As an aside, during the Cold War era Radio Moscow had arguably the strongest signals in many parts of the world. How did they do it? Two ways - they had high power transmitters and highly directional arrays with electronic beam slewing (changing the direction that the signal was radiated) plus what we believe no other country did at the time, electronic slewing of the vertical takeoff angle of the antennas.

Part of an antenna slewing network at Radio Australia Shepparton.

The general philosophy of getting the Radio Australia signals into the areas of interest

A lot of the transmissions had a political overtone in early years. The transmissions of ***Australia Calling*** during WWII were aimed to the areas where our troops were operating to give them encouragement, to tell

them what they were doing was appreciated and they were achieving something. It would also have been intended to be heard by people in occupied countries to tell them we were fighting for them and we intended to be back soon. The transmissions showed the enemy that we were on the way back as our transmissions were becoming stronger (new transmitters and antennas) not weaker as if we were losing the war.

During the following period the name became Radio Australia. Following WWII, during the time that the Allies occupied Japan and her territories, transmissions to the troops continued. From then on transmissions were intended to assist the various war-torn countries in Asia and also into other areas of the world to show that Australia cared.

There were transmissions that assisted listeners, particularly in Asia, to learn English. Many foreign languages were used in this period. The actions and programming showed Australia as a benevolent nation that helped other nations in various ways through these radio transmissions. Radio Australia was renowned for its unbiased news broadcasts and general program content.

Into the 2000s the foreign language broadcasts were gradually reduced. Few remained by about 2015 and the number of transmitters in use was reduced to three. The government and the ABC decided that the services were no longer required on high frequency radio and Radio Australia Shepparton closed on 31st January 2017.

Many small overseas countries pleaded with the government of the day for its resumption. The government believed it could supply the Radio Australia programs by other means, but most in the service areas disagreed.

How the signals were provided into the areas of interest

Domestic broadcast band radio station transmitters and antenna systems needed no alteration once installed.

This was certainly not the case with high frequency broadcasts due to the variations in the way high frequency radio waves are influenced by the condition of the ionosphere as well as the optimum time to transmit to overseas countries, considering that they may be several time zones away from Australia.

Radio signals intended to be transmitted over thousands of kilometres are influenced by various ionised layers in the ionosphere between around 80 km to around 500 km above earth. These layers at various times may reflect the signals emanating from the transmitting antennas or may absorb them.

Often the angle of the radio waves determines whether the signals are reflected or pass through a particular ionised layer. These conditions can quickly change and do vary between time of day, month, yearly or even longer due to the 11 year sunspot cycle.

The frequency assigners had a very complex job to do in working out what frequency bands needed to be used for a particular signal destination under all circumstances.

Signal propagation was the main area of concern, but interference from stations on the same or neighbouring frequencies could also occur for a variety of reasons and could mean that frequencies might have needed to be changed to escape the interference.

Generally, if a target audience was within a couple of thousand kilometres, transmission frequencies between 6 and 12 MHz would be used, with 6 MHz at night and

The author and his wife standing alongside the Harris HW100A transmitter.

12 MHz during the day. If the distance was perhaps five thousand or so kilometres the night frequencies may have been in the 9 MHz range and during the day they may have been 17, 19 or 21 MHz.

The characteristics of reflecting layers of the ionosphere will cause the signals to be heard for perhaps up to around 50 kilometres and then the signal disappears to people further afield until a distance of perhaps a thousand kilometres or so is reached when the reflected signal is again heard on earth. It may be heard over a distance of several hundreds or even thousands of kilometres. It may then bounce off the earth and be reflected again perhaps another few thousand kilometres away.

Because the ionosphere is such a variable conduit for the effective transmission of radio signals to target areas, the frequencies used, the bands in use, the antenna in use, the time of day, time of month, whether it is summer or winter and the long term 11 year sunspot cycle, had all to be taken into account.

Experience over many years did help the frequency assigners arrive at a reasonable combination of frequencies, times to use those frequencies and which antennas to use. This combination varied with time. As the short wave frequencies are a shared resource between many countries the use of frequencies was negotiated for the optimum success for all users.

This meant that in some cases a frequency may only have been used for a set period, not just at any time desired, as other international high frequency services may have also used the frequency on a time sharing basis.

Determining which frequencies, antennas and times suited particular areas was done by considering the reports of operators listening to receivers in the target area.

Sometimes this was done clandestinely in some countries hostile to us. This information was then relayed by various methods back to the frequency assigners to assess the best chances of good performance into an area.

In recent times, staff travelling overseas could take a small receiver and report their observations on return. Remotely operated receivers in various target areas achieved the same results within minutes instead of weeks by surface mail. Each method gave the planners information from which to plan the operating schedule for best effect.

Overall, it was a complex task to get the best results from the transmitting station into the target areas with appropriate programming.

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Refurbishing a Collins R-390-A//URR

The evolution of a Cold War warrior 1950 ~ 1955

Mike Charteris VK4QS/VK4XQM
RAOTC member No 1329

Prior to 1950, the US Military had been operating the Collins 51J series of receivers. The Army Signal Corps then approached Collins to develop a more advanced receiver to cover a frequency range of 500 kHz to 32 MHz. The Army also wanted improved selectivity, frequency accuracy, image rejection, dynamic range, stability, and good electro-mechanical design. Thus was born the engineering miracle, the Collins R-390-A//URR Communications Receiver.

The contract and security

The Collins R-390/URR was to be capable of receiving AM, FSK, CW and MCW. The details were covered under the US Signal Corps specifications SCL-1134-B and contract No W36-39-sc-44552. This order was placed by the US Army Signal Corps Engineering Laboratories, Fort Monmouth, New Jersey, and it was classified as SECRET, adding "This document contains information affecting the national defence of the United States within the meaning of Espionage laws, Title 18, U.S.C., Sections 793 and 794. The transmission or revelation of its contents in any manner to an unauthorized person is prohibited by law".

The engineering team

The engineering team behind the design and development of the R-390 and R391 was led by Engineer Lou Couillard. Other members included Edgar Schorenike - RF module development and mixer design stages; Chester Rockwell and Tod Hunter - RF Module coil design; Art Eberhardt - IF Sub-chassis design; Ed Hougue - Audio Stage and Power Supply unit; and Bob Griswold and Winston Williams - Mechanical design.

Production and costs

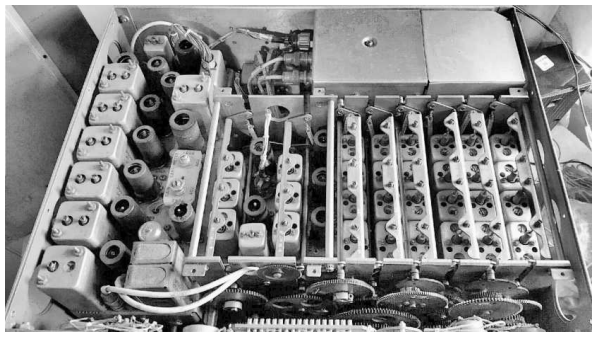
By mid 1950 the Collins engineering team had successfully completed the first units of R-390 and R391, with both units exceeding the expectations and specifications of the US Army. Consequently, Collins was awarded the contract to supply 3,000 receivers by the end of the year.

A further contract in 1951 saw Collins manufacture another 10,000 units over the next two years.

No cost was spared in the production of these receivers with the R-390 coming in at US$2,000.00 and the R-391 setting you back a whopping US$3,000-00. Based on 1950 prices, these figures equate to an increase of 978.5% by 2020 which comes to $21,777.46 for the R-390 and a staggering $32,666.19 for the R391.

By comparison, the average home in the USA in the 1950s cost about US$7,400.00, the equivalent of US$79,808.00 today.

Front view of the Collins R-390-A//URR receiver.



The interior of the R-390-A//URR appears complex but clever design makes it easy to take apart for maintenance.

Brilliant engineering 1950~1953

The R-390//URR and R-391//URR were only manufactured by Collins and Motorola between 1950 and 1953. With 33 valves and no cost spared, they have been described as the ultimate valve communications receivers. They utilised a series of gears, cogs and cams with inductive tuning and a very stable permeability tuned oscillator, complemented by two RF stages, six IF stages, three audio filter settings, and six selectivity bandwidths. Frequencies between 500 kHz and 8 MHz used triple conversion; those between 8 and 32 MHz used double conversion.

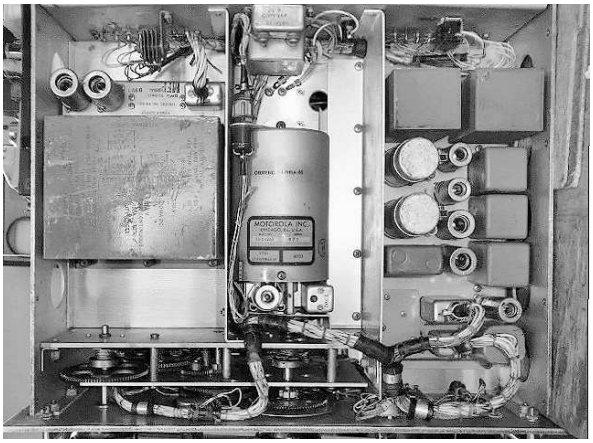
Add to this the Veeder-Root mechanical digital display for very accurate frequency readout down to 1 kHz or better and you have a valve communications receiver of the highest order. If this was not enough, the R-391//URR had the added feature of eight pre-settable frequencies locally, or remotely, by way of a complex set of gears, etc, driven by a 28 volt DC motor. Even more amazing was the 'repeatability' of this function to within 300 Hertz of the former frequency.

Complaints and cost cutting

Despite the fact that the R-390//URR Series had exceeded the expectations of the military across all Defence services, there was still the nagging issue of the excessive price of these units. The Signal Corps had also raised a few complaints regarding the heat generated by the unit's 33 tubes and the side effects it caused in the audio module.

Another complaint centred on the complex serviceability in relation to the dreaded removable 'GREEN' Locking Gear that had to be installed before removing the RF Module.

In response to these concerns, a cost cutting exercise was undertaken in late 1953 to see what could be done to modify the R-390//URR series to effect savings without compromising capability.



Underside view of the R-390-A//URR IF unit.

Transition to the cost reduced Collins R-390//URR

In late September 1953, the R-390 was put under the microscope. It was examined in detail and a list made of units and components that could either be removed for cost reduction or other improvements. These examinations were undertaken by both Collins Engineers and the Signal Corps Electronic Laboratories. Unit savings were as follows: audio unit $34.00; antenna relay $2.00; power supply $12.00; IF unit $20.00; crystal calibrator $12.00; RF unit $56.00; VFO $3.00; crystal oscillator $68.00; and final assembly $26.00. A total savings of US$233.00.

This may not seem like a lot of money, but the equivalent today is in the order of $2,242.00 per receiver. If you consider the fact that about 55,000 R-390-A receivers were produced, then it runs into millions of dollars saved by the government.

The birth of the R-390-A//URR

The next challenge was to actually build this new cost effective R-390-A and test it for performance before contracting it out for manufacture. What came out of this research was a receiver that now consisted of 26 valves (reduced from 33), the same frequency coverage, just one RF Stage, and the IF stages reduced from six down to four.

The frequency conversions remained at triple conversion for received frequencies from 500 kHz to 8 MHz and double conversion for received frequencies from 8 MHz to 32 MHz. However, the IF System now used 'LC' type filtering to obtain essentially the same bandwidths, but retained the crystal filter for the two narrowest bandwidths as on the R-390.

Numerous mechanical changes were introduced to simplify servicing of the R-390-A. The full list of modified parts and components for this cost-reduced receiver is extensive. Thus was born the R-390-A//URR, which saw Collins and Motorola contracted to produce 10,000 units in 1954, with Collins further awarded a contract to produce another 10,000 of them in 1955. Further contracts followed which saw the R-390A produced by many other companies apart from Collins.

The first act of refurbishment is to remove the receiver's front panel.

My first Collins, the R-391/URR

My journey with the Collins R-390//URR series of valve communications receivers began in 1990 when I phoned a guy who was advertising a Collins R-391/URR for sale. I bought the set and the seller even threw in his copy of *Ferrell's Confidential Frequency List*.

Upon arriving home, I set up the receiver and decided to try it out by listening on 11.175 MHz, one of the frequencies the previous owner had noted in Ferrell's frequency list.

The frequency was silent apart from atmospheric band noise and I wondered what my chances were of receiving such transmissions. Then, just as the sun was setting, the R-391/URR burst into life with the following loud and strong transmission: SKYKING-SKYKING DO NOT ANSWER, MESSAGE AS FOLLOWS: B3CF MT6W K4QS VQ4M ETC....YOKOTA OUT.

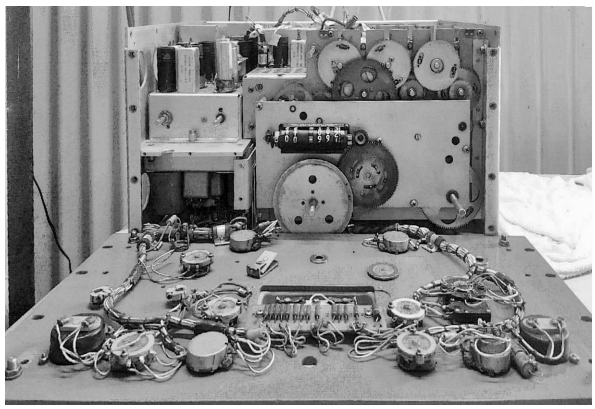
I had just intercepted my first ever EAM (Emergency Action Message), a coded military transmission from Yakota Air Force Base located 45 kilometres northwest of Tokyo, at the foot of the Okutama Mountains. These messages are transmitted across the world simultaneously on various frequencies on the HF Global Communications System.

From that moment forward I was hooked on these incredible receivers and consequently have, over the past 30 years, owned many that have come and gone to the good homes of fellow Collins enthusiasts.

Refurbishing my Collins R-390-A//URR - 2018 to 2020

I have owned my current Collins R-390-A//URR for about 15 years and it has served me well despite the fact it is 67 years old in 2022

In the past few years I had noticed that the sensitivity had dropped off considerably even though it had recently had a new set of valves installed. So, in May 2018, I decided I would have to bite the bullet and dismantle it for refurbishment.



Once unscrewed from the case, the R-390-A//URR's front panel folds down for access.

I thought this was going to be a daunting task as I had never undertaken such work before, despite being a Systems Electrician working on electric passenger trains for 13 years. But I was lucky enough to have the

assistance of my good mate Bert Pitt, a retired ex-Telstra Technician, who visited each Wednesday. Bert's passion is the restoration of broadcast band valve radios to the point of building them from scratch with the precision and skill of an artisan.

He had never seen a communications receiver before I gave him a Racal RA-17 to restore for his collection. Thus, we both embarked on the study and refurbishment of my R-390-A//URR with a view to attaining original specifications, if possible.

If you've ever looked into the depths of a Collins R-390A//URR to consider dismantling it, you could be forgiven for thinking whether or not you could ever get it back together again.

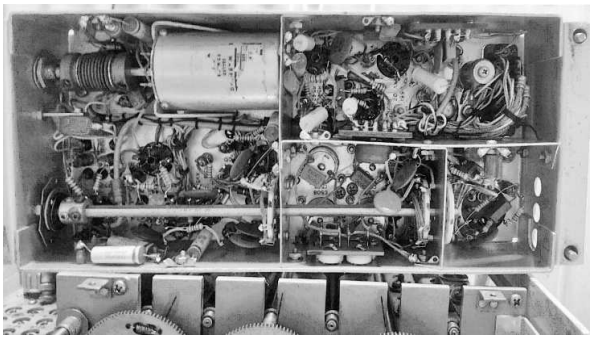
I was fortunate to have the *Y2K Handbook* for this behemoth and a lot of study was undertaken before the first screw was turned. The internet is also a fantastic resource with first-hand information articles on the restoration process from the likes of David Medley, an Australian, and Chuck Ripple WA4HHG, both of whom are renowned R-390 series men.

I am indeed indebted to the written knowledge of these men and the contributors to the *Y2K Manual* for the vast amount of information covering these engineering miracles in order to be able to refurbish one with confidence.

Removal and refurbishment of the IF module

Thus, the Philip's head screwdriver was engaged into the first face panel screw as I embarked on what became a one day a week, two year journey.

As it happens, once the face panel screws are removed all of the pots and switches of the R-390-A stay attached to the front panel as it is lowered down in front of you. There are two coupling connectors on the inside of the panel for the BFO and the IF unit that must be undone as well. When you get to this stage the brilliance of this amazing receiver's construction emerges before your very eyes.



Underside view of the R-390-A//URR IF unit.

Once the front panel is laid forward (see photo on previous page), the green cheese-head captured screws holding the IF unit can be unscrewed. Next is the main multi pin connector at the back of the IF unit that can be unplugged. This leaves a couple of small plugs that look like mini BNCs and need to be dealt with fairly carefully.

Now the IF unit can be removed and rolled over to reveal all the old 10% resistors and paper capacitors that have served so well over the years since 1955.

I replaced all of the old resistors with high quality 5% values. The first step in the refurbishment was to check the value of each of the existing resistors. Most, if not all, started out as 10% ones in 1955. But upon being checked in 2020, most if not all were found to have significantly increased in value. This, of course, leads to the deterioration of the signal stream which sees the sensitivity of the receiver nose dive.

Bert Pitt (left) and Mike Charteris VK4QS working on the R-390-A//URR RF Deck.

Using epay, I had purchased a bulk pack of resistors covering the range of resistance values commonly used. These were sorted and mini bagged up in group values for easy access. Once the values of the resistors had been checked they were systematically replaced one by one in all modules. The method used was a case of necessity whereby the old resistors were cut with as much lead as possible.

Next the new replacement resistor was cut for length and then had its lead spiralled around a thin piece of wire to coil loop the ends. These were now fed over the existing lead of the old resistor and neatly soldered in place. Some did require some plastic tube insulation due to their proximity to other wires.

The same time consuming technique was applied for the replacement of the capacitors.

Removing the RF deck

Once again, when it came to removing the RF deck, it was really pretty straightforward with the unscrewing of a few green cheese-head captured screws and undoing a couple of MBC connectors. This, plus a little bit of jiggling, and out it came. This, of course, had been fundamental in the design of the receiver to enable field repairs if necessary in order to return the unit to service.

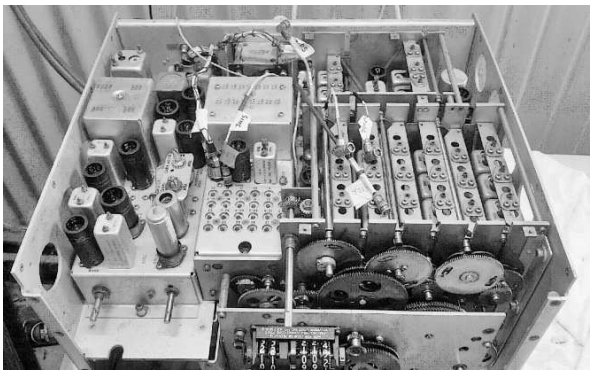
As I wrote above, you can't help but be amazed at the engineering simplicity by which this very complicated receiver can be dismantled in virtually no time at all. To my surprise there was plenty of room to work in and lots of fresh air space to keep everything relatively cool.

The same procedure was carried out whereby all the resistors were checked for their values. True to age and form most if not all were way out from their 10% value ranges and were replaced with 5% ones.

Then we moved on to replace as many capacitors as possible with the same procedure of cutting to the lead and looping the new lead on and soldering. All of the disc ceramic capacitors proved OK and were left alone. Some rather tight spots were encountered but eventually were overcome with persistence.

Problematic MBC (mini BNC) leads

After completing the refurbishment of the R-390-A//URR I reassembled it and switched it on. All my fears were realised when, upon being connected to the antenna, the unit was flat out receiving AM broadcast stations. We carried out further tests with the signal generator but, alas, this unit seemed to have a giant fault that prevented it coming to life.



Top view of the R-390-A//URR receiver out of its case. Note the assembly of gears and cams that drive the receiver's tuning arrangement.

The main suspects were the MBC leads that, after 65 years, were somewhat cracked. Eventually, upon examining and wiggling the MBC leads tagged in the photo above, it was found that one needed to be re-terminated. If ever you have made up BNC leads then you can appreciate how tedious these leads were at half the physical size with wires that were as fine as your hair with tiny bead insulators.

With this now completed, we again re-assembled the receiver and applied power to it. The difference could not have been more remarkable as it just about jumped off the bench with the stations coming in loud and clear from all over Queensland and New South Wales.

Later that afternoon I tuned to 40 m for some CW and SSB with great results; strong signals raised the Carrier Level Meter to 30 dB. Though not designed for the reception of SSB, the unit does remarkably well with a little riding of the RF gain control. Prior to this, an alignment procedure was considered, then dismissed because of the good results.

All expectations exceeded

A new set of valves plus all these new resistors and capacitors actually saw my Collins R-390-A//URR reborn. I hooked it up to my URM-25 signal generator and injected 3 μV into the antenna socket. The response was loud and clear, so the level was lowered further to just 1 μV and again the signal came through quite audibly. So, just to show off, I dropped it to a third of a μV and blow me down if the receiver did not pick it up and show it as an audio signal. I was amazed and gratified that all my work had been rewarded with such excellent results.

What I took away from this refurbishment adventure across the course of two years was that these receivers were indeed a miracle of their day. Over the past few weeks I have compared it to the weakest HF voice and CW signals I could find on my FTDX-9000 and the Collins is there side by side 'with bells on'.

Not bad for a Cold War warrior receiver that had just turned 65 years of age in 2020. I am looking to marry it up with my Johnson Viking Valiant in the near future to create a very nice 1960's CW Station.

One thing we often fail to appreciate when sitting in front of such ex-military receivers is to imagine the places they were operated in service. Be it on a ship, a submarine, a Signals Intelligence station in Asia or just out of the front line during a conflict. If only they could talk of the places they have been we would indeed be privy to their secret world.

I do hope this article inspires others to refurbish one of their ageing communications receivers and to write a review for *OTN Journal*.

References

1. *Final Engineering Report on the Collins R-390/URR*, by L W Couillard, Project Engineer, 15th September 1953, by Des Ball and Richard Tanter.
2. *The Collins R-390-A/URR Y2K Manual.*
3. Various Websites on the Collins R-390 Series; David Medley; and Chuck Ripple.
4. *Collins Service Manual*.

Note

Please note that versions of this article have previously been published in *Amateur Radio* magazine, Number 8, 2020 and in *CQ* magazine, January 2021.

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From our members . . .
(continued from page 5)

advance it through the quartz bar. Then, when the cutting was complete, withdraw the saw blade, index the bar and cut the next slice. Finally, when the bar was completely sliced, withdraw the saw, turn the saw off, turn the oil off, raise the hood and get ready for the next cycle.

With such a boring job it was easy to let the mind wander, but the consequences of a moment's inattention would have been significant.

If you advanced the bar before withdrawing the saw blade, the blade would be bent and the bar damaged. If you forgot to turn on the oil, the saw blade would also be ruined. And if you forgot to turn off the oil prior to lifting the hood, oil would have sprayed all through the room.

I gained a glimpse of one step in the long process of making these precision timing devices and lot of respect for my co-workers who worked under such difficult conditions.

Jim Goding VK3DM
RAOTC member No 1744

Hi Bill,
Thank you very much; the *OTN Digital* DVD has arrived and I have started reading *OTN*s from the early years.

I have come across some familiar names already, as I held a Novice call in 1977, later added a Limited call and finally the combined call VK3KCS from early 1981 until 1989 when I forsook the 'take zinc cream and a raincoat if you are going to the beach' scenario and became VK4KCS.

I also worked in the two-way radio industry so I saw both the amateur and the commercial radio worlds.

One of my daughters still lives in Melbourne, so I must try to align an RAOTC lunch with my next visit to her.

Andy Beales VK4KCS
RAOTC member No 1579

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Wanted!

More original articles and letters about your radio experiences and adventures.
Come on! Club members would enjoy reading about your radio exploits and history.

Wires without wires

Herman Willemsen VK2IXV
RAOTC member No 1384

This article is about Guglielmo Marconi, known for his creation of a practical wireless telegraph system. It contains some well-known highlights, but also some lesser-known achievements in the life of this great inventor. Personally, I wish to thank Marconi for my career at sea as a Marconist (the Dutch term for a 'Sparks') and my career ashore in Papua New Guinea and Australia as a wireless operator on shore-to-ship coast radio stations. By the way, I borrowed the title of my story, which is a play on words, from a 1905 article in *Vanity Fair*.

Guglielmo Giovanni Maria Marconi was born in Bologna, Italy on 25th April 1874, the son of wealthy parents. His father Giuseppi was an Italian aristocratic landowner and his Irish mother, Annie Jameson, was a member of the influential Jameson whiskey family. His mother made sure that Marconi spoke both fluent Italian and English.

Guglielmo did not attend school and never finished any formal higher education but enjoyed his home studies by several private tutors. Through them, and the books in his father's library, he studied the works of Maxwell, Hertz, Righi, Lodge and Morse. From an old friend, a former telegraphist, he learnt Morse code. He was particularly impressed with Hertz who, in 1888, had succeeded in producing aether waves, where the medium was not copper wires or earth, but ether (aether or space). Hertz had shown that electricity could travel through the air, although at a very short distance only. Marconi's wish was to use Hertz' invention in a more practical way by sending telegraph messages using no wires.

In 1895 (aged 21) Marconi began laboratory experiments at his father's country estate at Pontecchio, near Venice. But, like Hertz and other wireless telegraphy pioneers, his radio waves only reached a few hundred metres. A breakthrough came later that year when Marconi found that much greater range could be achieved after he raised the height of his antenna and grounded his transmitter and receiver. With these improvements, he could transmit signals up to 3.2 km.

And so, in 1895, the foundation of wireless telegraphy had been laid. But Marconi still had to secure official recognition for his invention and obtain funds to develop it commercially.

How much of the wireless revolution should be credited to Marconi?

It is true that Marconi did not discover radio waves. It was Heinrich Rudolf Hertz who discovered these waves in 1888. Nor should we forget the many other wireless telegraphy pioneers[1] and Marconi's assistants, scientific advisors, and mediators. But, so far, the wireless telegraphy pioneers had not seen any practical use for this discovery. Their invention stayed in their workshops and laboratories.

It was Marconi who realized that these waves could be used as a means of communication. It was Marconi who succeeded in translating Hertz' concept of Hertzian rays into a functional, practical, commercial, wireless communication system. Marconi was the right man in the right place at the right time!

Marconi wrote to the Italian Ministry of Post and Telegraphs explaining his wireless telegraph apparatus and asking for funding. He never received a response to his letter. They were simply not interested. Besides, the Italian government had just invested a huge sum in a landline telegraph system. Another factor was intellectual snobbery, as Marconi was only self-taught and not a university graduate.

Marconi's 1896 coherer receiver at Oxford Museum History of Science.

Having many family members in the UK, and realising the influence of the huge British Empire and its mighty Navy and Mercantile fleet, the UK was the next best choice. He presented his idea to the British government and impressed William Preece, the Chief Engineer of the British Post Office.

With his support and that of the British government, Marconi was soon carrying out experiments over land, over waterways, over the English Channel, between ships, and between ship and shore. All this with the backing of Post Office, Army and Navy officials. For ships, this new form of communications would greatly improve their method of signalling which at present was by sound, light, and flags only.

In 1897 Marconi was granted a British patent for the world's first wireless telegraphy system. Also that year, Marconi founded the Wireless Telegraph & Signal Company Limited, with the objective of developing the Marconi apparatus commercially. Three years later the Company was renamed Marconi's Wireless Telegraph Company Limited.

In 1900, Marconi started another business, The Marconi International Marine Communications Company Ltd, with the aim to install Marconi communications equipment on shore stations, lighthouses, warships, merchant ships and passenger ships, which could not access the cable network and yet had most need of rapid and secure communication.

Marconi's ambition was to develop a profitable long-distance wireless telegraph service

His next challenge was to prove that radio signals did not travel in straight lines like lightwaves but could bend around the curvature of the earth and thus be received over the horizon.

At 3.00 pm in the afternoon of 12th December 1901, radio signals were sent across the Atlantic Ocean from Poldhu (pronounced Pol-ju) Cornwall (SW England) and received at 1130 am at Signal Hill, St John's Newfoundland, then an English colony[2], over a distance of approximately 3500 km.

To make it all happen, Marconi and his assistants, George Stephen Kemp and William Paget, were at St John's and his scientific consultant John Fleming was at Poldhu. Considering that frequencies could not be accurately measured at that time, it was believed that the frequency used was 366 m, which is 820 kHz.

Although at the last minute the storm-damaged aerial arrays at St John's had to be replaced by a 152-metre wire antenna kept aloft by a kite, dit-dit-dit, the three dots of the letter S in Morse code, buried in QRN, were heard at St John's. The signals, which were being sent out from Poldhu, had travelled the Atlantic, following the curvature of the earth, which so many doubters had considered to be a fatal obstacle.

There are those that say that Marconi's greatest triumph was in 1901, when he succeeded in passing the wireless signals S across the Atlantic. But there are also those that say that Marconi misled himself and the world into believing that atmospheric crackle noises were in fact the Morse code letter 'S'.

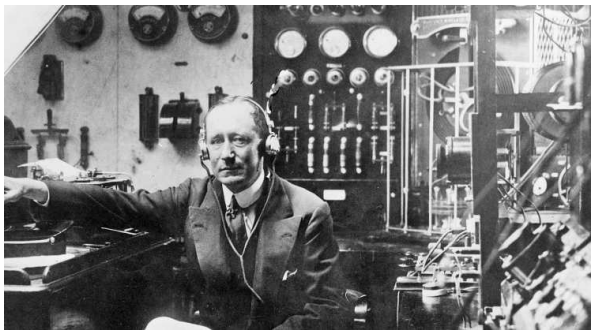
Although controversy and skepticism existed about Marconi's first attempt, this soon disappeared when, on 5th December 1902 a complete wireless message was sent, using a frequency of 182 kHz, from Glace Bay, Nova Scotia to Poldhu. This proved to all that a long-distance wireless link over oceans was reliable enough to support commercial services. Marconi was now seriously competing with the Anglo-American Telegraph Company's undersea cable, which ran from Western Ireland to Eastern Newfoundland. Cable companies and their shareholders were getting concerned.

Speculations about skywaves and the ionosphere

Historians believe that if a signal was indeed received at Signal Hill Newfoundland in 1901, it would most likely have been shortwave (HF) wide-band signals, spurious components, or shortwave harmonics of the high-power spark-transmitter output at Poldhu. It looks as if Poldhu had not only transmitted the 820 kHz MF groundwave, but a high frequency skywave which bounced off the ionosphere and therefore gave the Morse code signal S a longer distance.

At this time, the science of ionospheric propagation was unknown, and it was believed that the best conditions for long distance wireless communications were during full daylight, using low frequencies, very high antennas, and lots of power.

In 1905, Marconi married Beatrice O'Brien, the daughter of an Irish peer. Together they sailed the world on luxury liners. He taught her Morse code and groomed her to meet reporters. They had two daughters and one son, respectively Degna, Gioia and Giulio. Their marriage ended in divorce in 1924 and was annulled in 1927. In 1962, Degna, one of their daughters, wrote a book about her father.



Marconi in his laboratory.

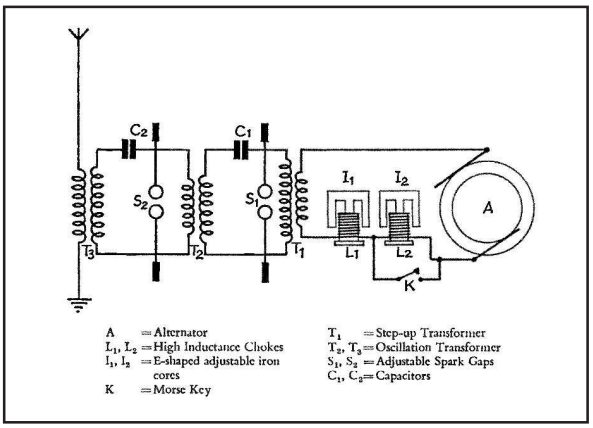
In 1909, Marconi, now aged 35, shared the Nobel prize for physics "in recognition of the contribution made to the development of wireless telegraphy" with German Professor Karl Ferdinand Braun.

In the early 1900s, the below-mentioned four calamities at sea raised the public's awareness of the value of wireless (radio) and brought worldwide fame to Marconi:

a) In 1909, more than 1700 people on board were rescued when the steamer *Republic* sank after colliding with the Italian steamer *Florida* in thick fog off the US East coast.

b) In 1910, wife killer Dr Crippen and his mistress tried to flee from the UK to Canada on the Canadian Pacific liner *Montrose*. After the ship's Captain received a wireless telegram at sea from the British police, both were arrested when the vessel reached the port of Quebec.

c) In 1912, the sinking of the RMS *Titanic*, radio callsign MGY[3], after striking an iceberg. The loss of life of more than 1500 persons was horrific, but the 700 who survived owed their lives to the distress calls CQD and SOS transmitted from the Marconi 5 kW spark



Circuit of Poldhu transmitter in 1901.

Marconi horse mounted wireless set in WWI.

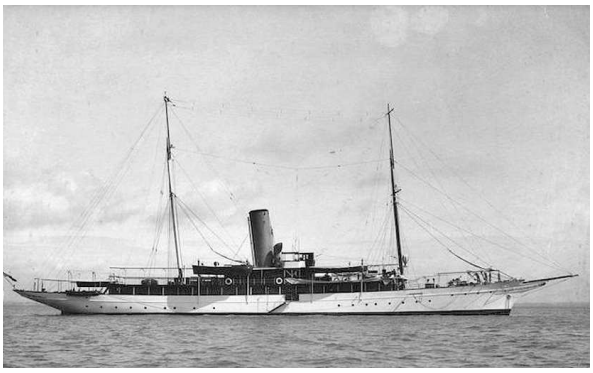
transmitter onboard. By the way, Marconi and his wife had been invited by the White Star Line to be guests on the *Titanic's* maiden voyage, but both had prior arrangements.

d) In 1915, the sinking of the *Lusitania*, radio callsign MFA, after being torpedoed by the German submarine U-20 off the coast of Ireland.

During WW1 (1914-1918), Marconi served as an officer in both the Italian Army and Navy.

Steam yacht *Elettra*

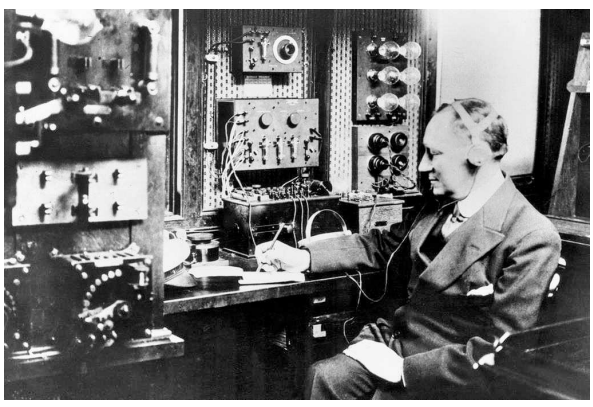
In 1919, Marconi bought the 730 ton, 220 feet long, oceangoing steam yacht *Elettra* from the British government for £21,000. She was converted into a luxurious seaborne laboratory. She also had a wireless room with a dedicated Radio Officer, Marconi's private cabin, accommodation for guests, a dining room for 14 diners and a salon with a piano.



Marconi's steam yacht the *Elettra*.

In the *Elettra*, radio callsign IBDK, Marconi conducted his many experiments with wireless telegraph, wireless telephone and direction-finding techniques. With a crew of 30 and a 15-day supply of coal in her bunkers, she could stay at sea for long periods. Marconi said that the yacht made him not only independent, but it took him away from curious eyes and distractions.

For 18 years, Marconi spent at least six months per year aboard the *Elettra*. The yacht was used by Marconi for experimental purposes and played an important part in practically all of his investigations and discoveries. In 1937 she was bought by the Italian Ministry of Communications for the sum of 820,000 lire. In 1943, the *Elettra* was requisitioned by the German Kriegsmarine and armed with five machine guns, but not before Marconi's wireless equipment had been removed.



Marconi in the radio room of the *Elettra*.

In 1944, the yacht was attacked by Allied bombers and sank near Zadar (Yugoslavia). In 1962, she was refloated and towed back to Italy, but never restored. It was eventually decided that the remains of the yacht *Elettra* would be cut up and parts distributed around Italy to places that had been associated with Marconi and his work.

In 1924, Marconi's company developed the beam radio system, a shortwave (HF) directional system. A beam radiotelegraph service between Australia and Britain lasted from 1927-1969. Due to lower operating costs and therefore cheaper rates for telegrams, this beam radio service undercut the conservative cable companies and threatened them with bankruptcy.

In 1924 Marconi and his wife Beatrice O'Brien divorced.

In 1927, Marconi married Maria Cristina Bezzi-Scali of Rome. Their daughter, Elettra, born in 1930, was named after Marconi's yacht.

Marconi and his second wife Cristina in 1933.

In 1933, Marconi opened the world's first commercial microwave telephone system, on a wavelength of 50 cm (600 MHz), between Vatican City and Pope Pius XI 's summer residence Castel Gandolfo, 25 km southeast of Rome.

On 20th July 1937, Marconi, aged 63, died of a heart attack in Rome. He received a state funeral. After his passing, his daughters Elettra and Degna continued to spread the story of Guglielmo Marconi and remained the spokespersons for his accomplishments.

Footnotes

1. To name a few: Nicola Tesla, James Clerk Maxwell, Temistocle Calzecchi-Onesti, Aleksander Stepanovitch Popov, Adolph Carl Heinrich Slaby, Jagadish Chandra Bose, David Edward Huges, Karl Ferdinand Braun, Sir Oliver Lodge, John Ambrose Fleming, Augusto Righi and Edouard Branly.

2. Later it became a province of Canada.

3. M stood for Marconi Wireless.

Acknowledgements

•Kees van der Spek VK1KVS; and •Claudio Ruggieri IZ0KRC

Sources

•https://www.fgm.it/it/marconi/biography.html

•*The History of the Marconi Company* by W J Baker.

•*My Father Marconi* by Degna Marconi.

ar

RAOTC members list

as at 31st July 2022.

Legend:	L = Life Member	A = Associate Member	B = Associate Life Member
	* = Licensed 50 years or more	+ = Aged 90 years or more	

Name	Call	No	Name	Call	No	Name	Call	No

Names and callsigns omitted for privacy reasons.

Name	Call	No	Name	Call	No	Name	Call	No

Names and callsigns omitted for privacy reasons.

Name	Call	No	Name	Call	No	Name	Call	No

Names and callsigns omitted for privacy reasons.

Membership statistics

198	Life members
251	Full members
6	Associate Life members
17	Associate members
472	**Total membership**
	Including
131	Licensed 50 years plus
18	Aged 90 years plus

ar

Obituary

Ken Morgan VK3CEK

RAOTC member No 1457

Born in 1933, sadly Ken Morgan VK3CEK passed away on Thursday, 7th April 2022.

Ken was a past Moorabbin and District Radio Club President and a keen clubman. When meetings became unruly he brought them back to order with a deft hand.

He joined the RAOTC in 2008.

Weather satellites were his speciality and he had some of his received images published in journals dedicated to remote weather sensing. He maintained a capable HF and VHF station until recently and was a regular on the M&DRC Club nets.

Ken was always cheerful and believed the best of everyone he met. He was a thorough gentleman and a very competent electrical engineer. There were many stories concerning engineering problems that he was

presented with and how he came to a solution, some of which were published in the M&DRC magazine and *OTN*.

He was happy to mentor anyone if they asked and made sure any visitors to the Club were made welcome.

Ken was a keen sailor and off-the-bitumen traveller when younger. He bought a Ford Maverick in 1990 and put it through its paces on trips such as traversing the Canning Stock Route. He and his wife Brenda travelled far and wide. Not only did he have tales of the outback but, to back this up, he had a fine collection of photos and videos.

Ken is survived by his wife and children, grandchildren and a great grandchild. He will be missed by all at the Club.

Vale Ken.

Ron Cook VK3AFW
RAOTC member No 824

ar

Obituary

Peter Zwarecz VK6APZ

RAOTC member No 1715

It is with much sadness I report the passing of Peter Zwarecz, VK6APZ on 4th June 2022.

Peter, born in Germany 73 years ago, came to Kalgoorlie aged two. Later, he moved to Esperance where he worked as a TV technician and a butcher.

Afterwards, he resettled in Kellerberrin, finally moving to his last home in North Tammin.

He became a Novice ham in the early 1980s then upgraded to full-call status. He held his callsign of VK6APZ until his passing. All the time he had big plans for an antenna farm.

He built most of his fantastic antenna farm, 15 towers, unaided. Some excellent photos of his remarkable work can be seen on his QRZ.com page.

Peter was devoted to amateur radio and was a great ambassador for our hobby.

Right up until his passing he thrived working DX, as seen by 29,672 log entries on his QRZ page and his huge collection of QSL cards.

Peter was my mentor and I wouldn't be where I am today in our hobby if it wasn't for him. He wouldn't tell me the answers to my questions but would tell me where to look for the information I needed, thus increasing my store of knowledge. Such knowledge helped me to restore my collection of hybrid transceivers.

His love for old Kenwood hybrid radios was passed on to me. For the past eight years I have used a Kenwood TS-530 exclusively when relaying the WIA broadcast every Sunday, frequently receiving compliments on the excellent audio quality and signal strength.

Whether or not you knew him, Peter is a great loss and will be missed by his many friends in amateur radio all around the world.

73 and vale Peter VK6APZ

Neil Beeson VK6NSB

ar

New RAOTC members

It is with pleasure that we record and welcome the following new RAOTC members:

Name	Call	No	Grade

Names and callsigns omitted for privacy reasons.

ar

Silent keys

It is with regret that we record the passing of:

Kevin	Parsons	VK2JS
Ken	Morgan	VK3CEK
Brian	Baker	VK3HB
Colin	Durrell	VK3UDC
Doug	Raper	VK3VBA
Len	Eaton	VK4FIAA
Kevin	Dickson	VK4IW
Bryan	Scott	VK5NOS
Peter	Zwarecz	VK6APZ
Noel	Sanders	VK6NS
Tom	Moore	VK7FM

ar

Obituary

Thomas Frederick Moore VK7FM

RAOTC member No 1593

13/12/1923 - 2/6/2022

Tom VK7FM passed away in the Launceston General Hospital on Thursday, 2nd June 2022. I was fortunate to be able to visit him on the morning of the day before.

Tom was born in Hobart on 13th December 1923. Tom was a World War II veteran having been mobilised into the Army Signal Corps in May 1942 as a Radio Mechanic based in Hobart. In January 1943, Tom was discharged from the Army - the reason given on his Mobilisation Certificate was that he 'was required for Service by the RAAF'.

This was the start of a flying career for Tom of which he was deservedly proud to the end of his life.

Tom started his flying training at Western Junction, followed by more training at Point Cook in Victoria, before completing his final training in England. Tom flew several types of aircraft including trainers of various types as well as the Bristol Blenheim Mk4 and the DH (de Havilland) Mosquito, the latter being his favourite. Tom was discharged from the RAAF in 1946 with the rank of Warrant Officer.

Tom had many and varied interests. He was a keen Amateur Radio Operator, gaining his licence and the callsign VK7FM in June 1948, and he constructed a lot of his own equipment. For many years he took part in the RAAF Net, a regular scheduled radio net, talking with other licenced ex RAAF members.

At age 98, Tom outlived many of his contemporaries and the RAAF net folded several years ago. However, Tom kept up the weekly sked with good friends Robert Reid VK7RF, me VK7HW, and other amateurs who occasionally called in. Tom was also active in the 24 hour Remembrance Day Contest held in August each year. Of course, as he aged, 24 hours became a bit too long for him, but until several years ago he made enough contacts to allow him to put a logbook into the contest organisers. Tom remained active on the Tuesday evening radio skeds until he entered hospital.

Tom had a variety of jobs but was working for the then Post Master General's Department (PMG) when, in about 1960, television came to Tasmania. Tom transferred to the ABC where he was part of the technical team installing equipment in the new ABC television studios.

I first met Tom 57 years ago in 1965 after I started work with the ABC in Hobart as a Technician in Training, at that time affectionately referred to as TIT's. In about 1966, Tom was appointed as the head of ABC training in Hobart. In his first year he only had eight or so Technical Trainees, but in subsequent years this built up to over 30 trainees. Over the years, Tom being Tom and always planning ahead, arranged for extra activities.

Bringing in his experience as a radio amateur, station VK7CB was set up in the basement/laundry - which was complete with a 'Log Fire Heated Laundry Copper'- of the old house in Wilmot Street where the training school was situated. Tom was also very interested in photography and, if my memory serves me right, when the radio was not being used then it was a dark room for the photography enthusiasts.

Tom was also a keen sailor, initially in keel boats. However, seasickness became a problem. He tried everything to fix the cause, trialling several medications including THE Pill, but that did not work.

Tom then started sailing in an Enterprise Dinghy. Tom built three wooden Enterprise dinghies and with others also imported a fibre glass Enterprise hull and deck from the UK. Tom fitted his out naming it *Odyssey*. Later, Tom returned to a wooden Enterprise hull when he purchased *Lara*.

As we grew older and finished our training, Tom became a mentor to me and others, and also became a great family friend. When he finished in the ABC TV training area, Tom changed roles and became the Head of Radio Operations. We all ended up working in the new ABC Studios at the Railway Roundabout.

Tom retired in 1988, but did not stop following his hobbies.

Tom was always a good planner, constructing many electronic items as well as the metal and wooden boxes to fit them in. Tom was always happy to discuss and give guidance on just about anything.

A full 98 years coverage of Tom's life would take too long. However, as an example of how being helpful to someone can affect the direction or contribute to the success in their life I would like to finish with this:

In 1951, Corporal Tom Moore was in the CMF Signals Unit in Battery Point. The unit had its own amateur radio station VK7SR. A younger soldier carrying out his National Service commitment was impressed with this hobby and asked Tom for advice on building his own equipment. The soldier, a university student, obtained his licence in 1953 and Tom invited him to his home to try out the new transmitter the soldier had built. Tom offered more encouragement, advice and loaned equipment.

After many years, Tom received a letter from this person, now an eminent scientist, thanking Tom for the assistance and guidance Tom had given him ….. 66 years previously.

Here are a couple of lines from that letter:

"The electronic experience I gained in amateur radio from you was a major contributor to my subsequent career. The amateur radio you introduced me to was an important component of my education as a 'space scientist'."

During his lifetime, Thomas Frederick Moore passed on to many people knowledge, skills, encouragement and, at times, even a shoulder to cry on.

I know - I am one of those fortunate people.

Vale Tom - a long life well lived

Herman Westerhof VK7HW
RAOTC member No 1604
ar

Obituary

Colin Durrell VK3UDC

Colin was born on 20th January 1933 and passed away on 19th March 2022 after a battle with cancer.

His early years were spent around Footscray and he remembers the unsuccessful 'ack-ack' gunners attempting to shoot down the Japanese biplane that flew over the defence factories in Melbourne on 26th February 1942.

As a youngster, Colin was presented with a 'Rastus the Cat' crystal set. The cat's tail connected to the tuning capacitor and the detector's 'cat's whisker' was one of the cat's whiskers. This helped move Colin toward a career in radio, radar and TV but it wasn't until relatively late in life that he acquired an amateur radio licence.

Colin was a man of many skills, having rebuilt a stained glass window for a local church, built a house, and maintained classic Standard Vanguard and Mazda cars. He was an active member of several car clubs as well as the Melbourne Computer Society.

He was a keen cyclist and enjoyed camping holidays. An apprenticeship with the Department of Civil Aviation led to him becoming a communications and Radar expert, resident at Essendon Airport.

There is a secret in his life, hinted at in the article *The Errant Dove* published on page 29 of *OTN Journal*, edition 38, March 2007.

When, in 1956, it was apparent the Dove airliner carrying the head of BHP on a flight from King Island to Melbourne was lost, Colin hurriedly reinstated a retired 200 MHz Radar to search for it. The Radar had been retired to make way for the new TV channels. A new Radar on loan from the RAAF for the Olympic Games was not due to be installed for some months. Although the first official Channel 9 programs were not transmitted until early 1957, test patterns and experimental programs were put to air before this to allow for antenna adjustments among other things.

The Radar cut the pictures to shreds in a swathe south of Essendon. Many people were not amused and the culprits, who included Colin as the senior Radar technician, kept a very low profile. The Dove airliner was directed to turn to starboard and subsequently safely landed in Tasmania with a near empty fuel tank.

Colin VK3UDC with a vintage microphone.

Early in his career Colin invented a new type of light dimmer. He set up a private company to manufacture and sell this equipment.

In 1960, an opportunity to join the technical staff at the ABC TV station in Melbourne arose. He remained with them until he retired.

After getting his radio amateur's licence he was a regular on the 2 m 'Drive Time' net. His signal was always one of the loudest. He joined the Moorabbin and District Radio Club (M&DRC) and took on the task of curating the Club's equipment museum. He hosted a number of museum open days and was responsible for making the display more clearly visible with LED lighting and new shelving. He also produced the first catalogue of the artefacts.

He joined the RAOTC in 2006 and subsequently had several articles published in *OTN Journal*.

When the government of the day mandated minimum model constitutions for not-for-profit clubs, Colin pushed hard to see that all the clubs he belonged to adopted the new rules.

In recent years he became his wife's carer in addition to his own health issues, but still was a regular at M&DRC meetings.

Colin was a clever man who was modest and dogged, but easy to work with. His passing is a big loss to the M&RDC and his friends.

Colin is survived by his wife, three sons - Chris, Ray and Bruce - and several grandchildren.

Farewell, Colin.

Ron Cook VK3AFW
RAOTC member No 824
ar

Celebrating 90 years of the ABC - Australia's public broadcaster

Andrew Walton VK3CAH
RAOTC member No 1599

Launched in 1932, the ABC has become a much loved part of Australian society and its cultural fabric. From a single radio service the ABC has developed into a multi-platform media operation and a public broadcaster of international renown, delivering Australian stories and conversations across the nation and to the region. It effectively replaced the Australian Broadcasting Company, a private company established in 1924 to provide programming for A-class radio stations.

The ABC Charter, set down by Parliament, requires the Corporation to provide informative, entertaining and educational services that reflect the breadth of our nation. Although the ABC is celebrating 90 years, the forerunners to the ABC are almost 100 years old. Back in the 1920s, governments worldwide were trying to figure out ways to regulate the new medium of wireless - the genie could not be put back in the bottle!

There were 12 founding stations that formed the initial ABC network. Call signs were allocated by the PMG at the time, with the first character a number representing the state in which the station was located, similar to the way that amateur call signs were allocated up until recently. Here are those 12 founding stations listed in callsign order:

2BL Sydney - the first public radio station in Australia opened in Sydney at 8.00 pm on 23rd November 1923. Its first call sign was 2SB - the SB stood for Sydney Broadcasters Limited. However, the callsign was soon altered to 2BL for Sydney Broadcasters Limited.

2CO Corowa (Albury/Riverina) - 16th December 1931.

2FC Sydney - 5th December 1923 and officially went to air on 9th January 1924. 2FC stood for Farmer and Company, the original owner of the station before the ABC bought it in 1929.

2NC Newcastle - 19th December 1930.

3AR Melbourne - 26th January 1924. Associated Radio Company of Australia, organised by Esmond Laurence Kiernan and others.

3LO Melbourne - 13th October 1924. 3LO operated on long wave, using 174 kHz (1720 metres). The frequency was subsequently changed to 810 kHz medium wave on 2nd July 1925.

4QG Brisbane - 27th July 1925. Queensland Government (operated by the Queensland Radio Service, an agency within the Office of the Chief Secretary).

4RK Rockhampton - 29th July 1931.

5CK Crystal Brook (Port Pirie) - 15th March 1932.

5CL Adelaide - 20 November 1924. Central Broadcasters Limited.

6WF Perth - 4th June 1924. It was the last Australian station to commence under the sealed sets scheme. It was originally owned by Westralian Farmers Co-operative and operated from a studio in the Westralian Farmers building in Perth.

7ZL Hobart - 17th December 1924.

Over the years, the stations occupied several different frequency allocations. One of them, 3LO, was on long wave for a short time. The ABC then rolled out a national network across the country, somewhat similar in nature to the BBC National Programme. The ABC has never really stopped evolving and re-inventing itself.

Later, along came some more stations:

2CY Canberra - 23rd December 1938.

2NA Newcastle - 20th December 1943.

4QR Brisbane - 7th January 1938.

6WN Perth - 5th October 1938.

The first transmitters for 2FC, 5CL and 4QG were made by AWA with a power of 5 kW, defined in terms of DC input to the final amplifier, typically about three times that of the power into the antenna. This power today would be stated as about 1.7 kW. Class C was not in common use, or particularly well understood, in those days. These used an MT7A valve for the final high power RF stage and an MT7B for the modulator. The power supply was 12,000 volts from a three phase power source rectified by MR7 valves. 4QG commenced with a 500 watt transmitter which continued for about six months until the 5 kW unit was commissioned

The radio transmitters for 3AR and 2FC were upgraded to 10 kW in a contract let in 1938 to STC. These transmitters were designed by Charles Strong in London and were notable for using negative feedback to ensure a high quality flat frequency response.

From 1947 until the mid-1980s, Radio 2 (as it came to be known) was broadcast to the major metropolitan centres with a large broadcast footprint in adjacent areas due to the powerful AM transmitters in use. It contained most of the ABC's national programming.

Many of the frequency allocations on the lower end of the AM broadcast band are allotted to the ABC. Lower frequencies travel further via ground wave for a given power, provided an efficient antenna is used. It is no accident that most of the allocations on the lower end of the AM broadcast band are used by the ABC.

A 5/8th (0.64 actually) wave length mast provides the best angle of radiation for optimising ground wave propagation. This was discovered 99 years ago by Charles Ballantine and first published in 1924. Height is always might; however, height costs money. The use of a capacity hat to artificially increase the electrical height of an antenna achieves the same result at a far lower cost. (See the September 2015 edition of *OTN* for the very interesting article *Four-fifths of five-eighths of?* by Clive Wallis VK6CSW.)

The power level of 2FC and 3AR was upgraded to 50 kW in the early 1950s. The transmitters for these stations were housed in the same building as the Radio 1 network, 2BL and 3LO. They were manufactured by STC. The final stage amplifier contained three parallel 3J/261E air cooled triodes running in class C at 90% efficiency. These were driven by a class B push-pull modulator with the same type of valves. 5CL had to wait until late 1961, when a new joint facility with 5AN was opened at Pimpala, Adelaide.

A timeline - some of the highlights of the ABC

It's very easy, with the information now available, to write a book on various aspects of the ABC; I'm certain that in 2022 quite a few will be published. What I've attempted to do here is a timeline to discuss the various aspects of the ABC. Space prevents me from documenting everything.

The 1930s

The Australian Broadcasting Commission Act was passed in 1932 by the federal government. The Australian Broadcasting Commission (the ABC) was officially launched on 1st July 1932 by Prime Minister Joseph Lyons and ABC radio announcer Conrad Charlton. "This is the Australian Broadcasting Commission," Charlton said before the Prime Minister inaugurated the ABC for listeners at home.

Prime Minister Joseph Lyons. *(ABC)*

Prior to that first ABC broadcast, Australians relied on licensed wireless broadcasting services operated by the Postmaster-General's Department. The system was run by a conglomerate, formed in 1929-1930, of individually operated radio stations across the country (this conglomerate was also called the Australian Broadcasting Company).

The ABC, however, was formed by the government as a way to regulate broadcast services and to ensure that audiences had reasonable access to a range of high standard radio services. The ABC was based on the BBC model and was originally funded by a combination of licence fees and some government funding. The ABC's early services included the twelve radio stations mentioned above located across the country offering live music, sport and information programs for 11 hours a day. It was quickly embraced by Australian households and became a fixture of daily life for many.

In establishing the ABC, the government appointed a board of directors with five commissioners, including a chairman and vice-chairman. The board met for the first time on 27th May 1932; however, they did not appoint the ABC's first General Manager, Walter Tasman Conder, until the following year.

In its early years, the ABC worked within the constraints of technological barriers of the times. For example, until a cable upgrade in 1933, the landline between Sydney and Perth could only carry speech and not music. Additionally, Tasmania was not connected to the mainland for broadcast services until a phone line was constructed across Bass Strait in 1936.

The ABC's first journalist, P C Murphy, was appointed in 1934. Consistent with the times, news reports were often lifted from newspapers. The ABC's first Federal News Editor, Frank Dixon, was appointed in 1936 and the ABC's first Canberra correspondent, Warren Denning, commenced broadcasting from the Parliament House press gallery in 1939.

The ABC radio schedule in the 1930s included a range of content, including: the Children's Session with Bobby Bluegum and the first pilot for the Argonauts Club; race calls from Sydney's Randwick racecourse on Racing Notes; cable news from London including stock exchange reports and shipping news; ABC Women's Association broadcasts of housekeeping advice; and a schedule of assorted dramas, plays, sketches and lectures. In 1934, music broadcasts became a mainstay following the appointment of Sir Bernard Heinze as conductor and musical adviser.

The 1930s also saw the beginning of cricket broadcasting on the ABC with test matches in England relayed, ball-by-ball, via cable to the Sydney studio. There they were read out by ABC commentators, including Charles Moses (who went on to become ABC General Manager) and Mel Morris who described the match as if they were at the ground, 'knocking' a pencil against the desk to imitate the sound of a cricket ball on a bat.

Charles Moses at his desk working on 'synthetic' Test cricket broadcasts. Coconut shells were also popular in generating sound effects. *(ABC)*

By the end of the decade, the ABC suite of stations had grown to 26, broadcasting over 16 hours a day and producing more than 132,000 hours of content a year. Australians were increasingly reliant on the ABC, not only as a source of news and information but also for their nightly entertainment, including music, comedy shows, children's programming and sport.

Its central position in Australian life was evident in the closing year of the decade where people gathered around the wireless and learned of both the death of Prime Minister John Joseph Lyons and the declaration of war by Robert Menzies in 1939.

The 1940s

During the Second World War, as Australian forces joined the Allied effort on multiple battlefronts around the world, Australians turned to the ABC for regular updates. The strong demand for credible news and information led to the ABC opening overseas bureaux in Europe, the Middle East, Greece and the Asia-Pacific.

The ABC sought to continue to provide an independent news service; however, it encountered some government interference and censorship by way of the newly formed Department of Information, run in 1940 by newspaper proprietor Sir Keith Murdoch. The Department took editorial control of the ABC's 7 pm news bulletin for several months in 1940, censoring stories related to the war effort. However, after six months, media outlets demanded an end to the curtailment of the freedom of the press.

Editorial control was returned to the ABC by September 1940. However, all media remained subject to the Department of Information's process of vetting news and information for the remainder of the war.

Throughout the war many ABC broadcasters were 'embedded' with Australian infantry units, sending back news of life on the front and the experiences of Australian soldiers. Their work established a high standard for ABC News and its journalists that continues to this day.

During the early years of the war, shortwave radio broadcasting commenced from Northern Australia into the Pacific, as the precursor to the ABC's international radio service, Radio Australia.

With many Australian men posted overseas fighting in the war, women began to be recruited for presenter roles at the ABC, including the first female ABC News presenter, Margaret Doyle.

Margaret Doyle. *(ABC)*

On 15th August 1945, Prime Minister Ben Chifley announced the end of WWII on the ABC. ABC journalist Talbot Duckmanton (who would go on to become the ABC's General Manager from 1965 to 1982) stood atop a mobile recording studio near Sydney's Martin Place and recorded the celebrations.

In 1942, parliament introduced legislative framework for the ABC by way of The Australian Broadcasting Act. The Act provided for the ABC to be fully editorially independent, including its broadcast of political speech. As a result, any communications from government ministers concerning broadcasts and content had to be made in writing and recorded in the annual report. In 1946, the Act was amended to include a requirement for the live broadcast of select parliamentary sessions.

In 1945, the Country Hour was first broadcast and quickly became the ABC's flagship rural affairs program, providing audiences outside of the city centres with vital information such as weather and stock reports as well as emergency information in times of need. By the close of the decade, and as the nation entered a great period of economic growth, the ABC made plans for its future including the launch of the (then) new medium that would redefine the electronic media - television.

The 1950s

The Commonwealth passed the Television Act in 1953, opening the way to a new era of broadcast communications. The ABC launched its new television services on 5th November 1956 with Channel ABN2-Sydney and presenter Michael Charlton, whose father Conrad had announced the first ABC radio service in 1932. Charlton welcomed viewers and introduced Prime Minister Robert Menzies to officially launch the network. The launch also included the first ABC television news bulletin presented by James Dibble.

ABC Children's programming remained popular on radio, with the radio club The Argonauts attracting new members at a rate of 10,000 a year. However, kids' programming proved equally popular on ABC TV with programs including Kindergarten Playtime launching in 1958.

Children's Hour: The Argonauts Club. *(ABC)*

By 1956, educational radio programming was being used by 88 per cent of the nation's school teachers, playing programs like The World We Live In and the Adventure series in class. Elsewhere across the nation, mothers kept younger children entertained at home with Kindergarten of the Air and Let's Join In.

For Australian adults in the 1950s, ABC radio was characterised by the long-running Blue Hills serial, first broadcast in 1949. Blue Hills aired twice a day and offered drama that covered social issues of the day. An increase in the number of radio transmitters in regional town centres also helped to increase the ABC's audience share across the country.

ABC Radio teams engaged audiences with new ways of telling stories thanks to new recording technology. The 1950s also saw the ABC open new international bureaux in London, New York and Port Moresby. Over the same period, Radio Australia became a favoured international broadcaster in the region with local audiences in the Pacific preferring it to the Voice of America or the BBC World Service.

The 1960s

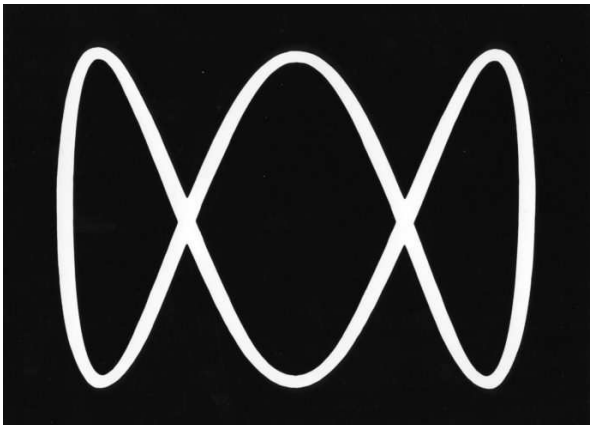
Throughout the 1960s, the ABC launched key programs that shaped the broadcaster and its relationships with audiences for decades to come. Four Corners, the ground breaking weekly current affairs program that continues to set the national agenda today, commenced broadcasts in August 1961. This Day Tonight helped to cement the ABC's reputation as the home of news and current affairs in Australia, complemented by the PM program on ABC radio.

The age of rock and roll led to the introduction of Johnny O'Keefe's Six O'Clock Rock, while shows like Hit Scene profiled the cultural change underway in the 1960s.

Australia's involvement in the Vietnam war, and the tumultuous social upheaval of opposition to conscription, saw ABC News bulletins and journalists once again delivering the latest news to audiences. ABC correspondents covered the conflict in South-East Asia just as their predecessors had done in war zones before them. Journalists in the region, such as Tim Bowden in Vietnam or Philip Koch in Jakarta, became nightly guests in Australian homes with their reports. Radio Australia also worked on special news bulletins for troops and dozens of Australian journalists covered the Vietnam war from 1965 until the last troops departed in 1972.

The growing engagement with Asia also saw the establishment of new international ABC bureaux in Jakarta, Kuala Lumpur, New Delhi and Tokyo, while Washington joined the bureau roster in 1967, a sign of Australia's increasingly close relationship with the US.

The wavelength design logo Australians associate with the ABC was designed by Bill Kennard in 1965. Known as the 'Lissajous' after the French physicist Jules Lissajous who studied vibrations using tuning forks, the three arms of the logo reflected the way broadcast engineers used Lissajous patterns to help tune equipment. Originally, the design was to feature two arms - one each for radio and television - but was changed to three arms to avoid a copyright infringement with the University of Sydney. The three arms today can be seen to represent radio, television and online.



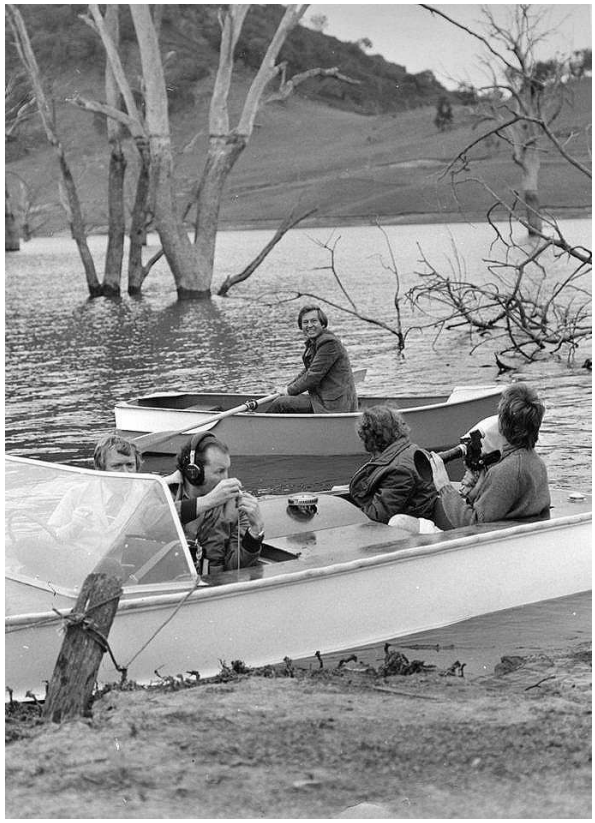
The wavelength logo. Known as the 'Lissajous'. *(ABC)*

Children's programming was redefined with the launch of Play School in 1966 which has since entertained and educated many generations of Australian children. In 2016, the much-loved show celebrated its fiftieth anniversary on air.

In 1968, a new television program, A Big Country, was launched focussing on issues in rural and regional Australia, while Bellbird launched in 1967 and offered Australian viewers a modern, home-grown drama focussing on life in country Australia. It resonated well with Australian audiences and an average of 1.2 million viewers tuned in every night.

The 1970s

Moving with the times, in 1972 the ABC employed its first full time female journalist for Four Corners, Caroline Jones. In 1974, one of the ABC's more popular presenters, Bill Peach, presented a well-received documentary series, Peach's Australia which quickly gained one of the ABC's largest audiences at that time.



Filming Peach's Australia 1975. *(ABC)*

In 1974, the ABC took a financial gamble on a new music show, Countdown, fronted by a then largely unknown music industry personality. However, the program, produced in the ABC's Ripponlea studios in Melbourne and hosted by Ian 'Molly' Meldrum, rapidly became one of the ABC's most successful productions. Reruns of this program are still regularly aired in 2022.

1975 introduced the AM rock station 2JJ as an experiment in Sydney, or Double J, as it became popularly known. Also in 1975, television switched to colour and Robyn Williams went to air on radio with the first episode of The Science Show.

In 1976, classical music moved into a new era with specialised broadcasting on FM from the ABC's Adelaide studios. Until then, classical music was the domain of ABC Radio 2, which was later rebranded Radio National.

In 1979, the Fraser government commissioned an inquiry into the ABC by businessman Alex Dix as it prepared to celebrate its fiftieth anniversary. The Dix Review was delivered in 1980 and called for fundamental change at the ABC with 273 wide-ranging

recommendations on the future objectives, powers and policies of the ABC.

The Dix Review urged the ABC to become more innovative and competitive, and to do more to market itself. It recommended that, while maintaining quality programming, "the organisation must become more entrepreneurially minded, it must overcome its distaste for the commercial". It also required the ABC to embrace cultural and demographic diversity, stating that the "ABC has a duty to provide programs to Australian society as a whole and its constituent community elements".

The 1980s

In July 1982, there were public celebrations marking the fiftieth anniversary of the ABC. That year also saw a changing of the guard as Sir Talbot Duckmanton, who had been ABC General Manager since 1965, resigned.

In 1983, the Australian Parliament passed the Australian Broadcasting Corporation Act (1983). This helped move the ABC into the modern era and established requirements for the ABC to be both innovative and comprehensive in its services, and to broadcast programs that would inform, educate and entertain.

Audiences in the 1980s saw more comedy, greater coverage of indigenous affairs, more current affairs and a growing amount of local television production. Radio Australia began carrying more broadcasts from indigenous communities across Northern Australia.

Closed captioning was introduced in 1983 to meet the needs of hearing-impaired audience members.

Double J became Triple J in 1980, with a shift to FM.

The first ABC shop opened in Sydney in 1981, selling the ABC's own publications and other products.

The ABC launched the current affairs program The 7.30 Report in 1986. Lateline and Media Watch joined its current affairs stable soon afterwards and have remained there ever since.

The 1990s

In 1990, Triple J started a national expansion, building on and establishing new youth audiences around the nation. By 1996 it could be heard in 44 cities and regional centres.

The ABC moved into new accommodation in Ultimo (Sydney) in 1991 and Southbank (Melbourne) in 1994.

ABC-FM relaunched as ABC Classic FM in 1994 with subsequent programming changes offering a wider range of music to audiences.

The ABC embraced the digital age ahead of many other media companies, going online in August 1995.

The 1996 election, won by Liberal leader John Howard, saw the ABC offer audiences the first online election coverage featuring up-to-date and interactive polling information and analysis.

Newsradio launched in October 1996 to take on, among other things, parliamentary session broadcasting. Trials for digital radio service started as well, mapping out the direction for the future of radio broadcasts.

The 2000s

Seen as a watershed decade for the media industry both in Australia and overseas, the rise of digital technology and its effect on broadcasting platforms became increasingly apparent.

The ABC continued to meet the digital challenge through its online presence, new streaming services for ABC Radio and, in 2000, by taking the first steps into digital television broadcasts and internally by over-hauling and digitising its production, post-production and transmission facilities. New shows like Grass Roots and Something In The Air were broadcast in widescreen digital formats.

An example of a capacity hat, as used at many ABC AM broadcast sites operating on the lower end of the band. *(Wikipedia)*

The advent of TV multi-channelling resulted in the addition of two channels, ABC for Kids, and the short-lived FlyTV, billed as TV's equivalent to Triple J.

In 2002, the ABC launched Australia's first Internet digital radio station ABC DIG, which was listened to through the internet and increasingly via digital television sets. Digital services grew during the decade, culminating in the complete launch of digital radio in 2009, a comprehensive range of digital radio services broadcast in Sydney, Melbourne, Brisbane, Adelaide and Perth.

In 2005, ABC2 was launched as a digital-only channel with comedy, drama, news and sport content. This followed with the launch of ABC digital transmission of ABC1.

The next phase of digital broadcasting arrived in 2008 with the launch of ABC iview, Australia's first on-demand service allowing viewers to watch ABC programming at a time of their own choosing. Mobile technology led to greater streaming of all content and the introduction of the first apps to allow greater access to content. ABC Mobile launched in March 2009.

The end of the decade saw additional drama production at the ABC, the launch of a new children's digital TV channel - ABC3, and the creation of ABC Open, a digital initiative through which to encourage digital media literacy and story-telling in rural and regional Australia and to share these stories with the rest of the community.

The ABC's emergency broadcasting services proved invaluable during the terrible Black Saturday bushfires in 2009 with the ABC establishing fly-in radio stations for affected areas including the Victorian town of Kinglake. ABC broadcasting was credited not only with providing emergency information during the fires but also in helping affected communities get back on their feet in the aftermath.

The 2010s

Enabled by strategic reinvestment, the ABC launched ABC News 24 in 2010, the first free-to-air 24-hour news channel enabling audiences to access news coverage whenever they needed. ABC News 24 would continue

to grow and build audiences, and become a prime destination during breaking news events.

The full suite of ABC TV channels now included ABC, ABC2, ABC3, ABC News 24 and the on-demand provider ABC iview. Never before had Australians had so many viewing options open to them.

Additional government funding in 2013 provided for an increase in ABC news and current affairs services, and online content distribution, further enhancing the ABC's ability to meet audience expectations in the digital age. The ABC also commenced work on new premises in Southbank, Melbourne. Upon completion in 2017, staff from the Elsternwick, Ripponlea and Southbank sites were consolidated, together with radio and TV studios at ABC Southbank.

In 2014, the Corporation created two new divisions - Digital Network to drive new digital capabilities, and ABC Regional to ensure the needs of audiences in rural and regional Australia were being met. ABC Regional officially launched in July 2015.

New investment in digital platforms including apps, the ABC Radio Player, and better streaming facilities, have enabled the ABC to meet audience expectation in the digital age. Podcasts and iview first-release productions such as the Katering Show have been well received with audiences.

What use is a stop watch?

Sometimes, the listener doesn't get to hear quite what they would otherwise like to hear. It is perceived reporters sometimes favour one political persuasion over another, When an ABC journalist interviews someone, for example a state or federal minister, a stop watch is often used. If the person gets 4 minutes and 25 seconds, the opposing interviewee, gets precisely the same time. No more, and no less.

Sometimes the subject at hand can be controversial which places the respondent in a very awkward or difficult situation. Usually an evasive tactic is employed, and they choose to decline an interview, or fail to return phone calls, or are unavailable for comment or interview. It would seem all political persuasions do this to some degree. All journalists, along with all public servants for that matter, are answerable via the relevant minister to question time on the floor of the parliament. I'll allow the reader to decide if bias exists, or not.

From the initial 12 radio stations, the ABC has grown quite a lot in 90 years, with a vast network of radio and television, most available free of charge anywhere in Australia via satellite, and let's not forget online services when internet connectivity is available. Australians should be proud of what has become of it.

Amateur radio and the ABC's 90th birthday

The ABC celebrated its 90th birthday on 1st July 2022. During 2022, amateur radio operators across Australia are using the special event callsign VK90ABC (see sidebar in next column) to make contact with other amateur radio operators across Australia and around the world.

This special event call sign is available for clubs and individuals to activate. RAOTC members are welcome to apply. How about joining in and helping to celebrate the ABC's 90th anniversary as well as promoting our great hobby of amateur radio?

Amateur Radio celebrates the ABC's 90th anniversary!

During 2022, amateur radio operators across Australia will be helping the ABC to celebrate its 90th anniversary. The special event callsign VK90ABC is being used by VK amateurs to share this good news story with fellow amateur radio operators across Australia and around the world. In just four weeks after introduction, VK90ABC made over 2,100 contacts across 80 countries using SSB, CW and FT8. As of March 2022, the website *vk90abc.net* has been visited by about 1700 people and word of the event is spreading.

Already there have been two interviews with ABC radio stations, with Paul VK5PAS being interviewed by ABC Riverland broadcaster Matt Stephens and Andy VK3VKT being interviewed by Macca on Australia all Over. You can listen to these interviews by heading to the web site *vk90abc.net* and following the links.

VK90ABC really is a good news story for amateur radio and a great way to promote the ABC's 90th anniversary. We're planning more events and news releases to help celebrate 'Aunty's' 90th anniversary and, of course, promote the hobby of amateur radio.

If you'd like to be a part of this special event and use the callsign, just head to the website *vk90abc.net*, read the Policy of Use and then click the 'Book VK90ABC' link.

If you have any questions or would like more information, please drop me an email at *info@vk90abc.net*

Chris Chapman VK3QB
RAOTC member No 1832

Please note, VK90ABC is not directly affiliated with the ABC. Also, VK90ABC is not a broadcasting station - it is an amateur radio callsign!

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Are you enjoying reading this issue of *OTN*?

If so, how about contributing an article, or a letter, or sending along a photo.
In order to keep publishing these bumper issues of *OTN* we need lots more material!

Two-way communication - a brief look at where we have come from

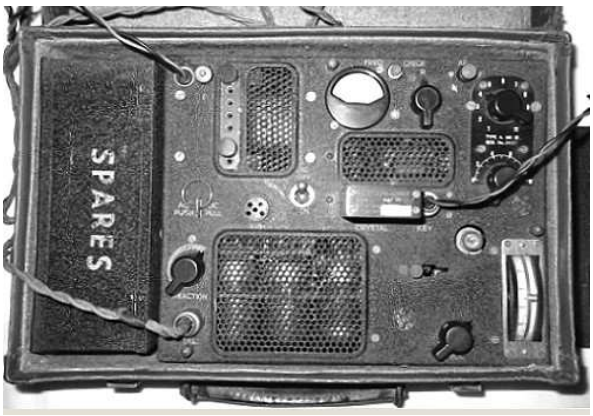
Cal Lee VK3ZPK
RAOTC member No 1510

The need to talk to and hear from people on the move seems now to be an obvious requirement, but technology had to evolve to enable it. Here are some words and a few pictures which tell the story of the origins of mobile communications from the early days until now. Perhaps some *OTN* readers can add to this story from their knowledge base and experiences.

I have spent most of my life in two-way radio communications, having missed out on the glamour of TV. In 1959 I got a job in the second-best radio business, two-way radio. Now I think it was the best.

An observation from the present time, looking back, was that mobile communication was always waiting for something. Waiting for radio, then waiting for something faster than Morse. Can you imagine multiple police cars involved in a chase, communicating by Morse relayed through an operator?

1926 Police Wireless Patrol Car (note the Morse Key).



A Type A Mk3 HF portable (CW) transceiver. We did get portable during WWII.

Then it was waiting for VHF, that provided a leap forward in antenna efficiency. When I started back in 1959 we were waiting for the following:

Transistors

Transistorised power supplies came first. Valves still performed the radio functions, and the odd germanium diode was the only other solid-state element for some time. Only after transistors were low enough in noise figure to be used in receiver front ends did we see fully transistorised VHF receivers.

A 1949 Pye PTC-114/5, the oldest two-way radio the author worked with.

A Pye VHF Walkiephone. This model made it to Mount Everest in 1953 with Sir Edmund Hillary.

A look inside the Pye Walkiephone.

Trials

Part 1: Rural Ambulance, it's mid1989 and for the past year or so there's been a pressing need for a UHF to mid-band VHF repeater so Ambulance Officers in the field can use handheld portables to communicate when away from their vehicles. Management want it, everyone wants it.

We figure it would take hundreds of base stations to cover all of Victoria for portable use on UHF, so mobile repeaters is the way to go. None was available that offered the facilities we wanted, so I was asked to build a prototype. I built two which were trialled in several locations in country Victoria.

Sequential selcall tones were used to enable and disable the repeater, and several safety/timer features were built in. We didn't want it to be possible for lots of these repeaters to remain enabled willy-nilly as interference would result. One day I received a phone call from an Ambulance Officer in a country town where one of the repeaters was being trialled. After asking if I had a few minutes to hear a story, he said: 'A few days ago I was on my own at the Branch when a call came in of an accidental stabbing at the abattoir. A worker had stabbed himself in the upper inside leg and got the femoral artery. Three things, though, were in his favour."

He continued, "I was able to be there in a minute and managed to control the bleeding by pressure, but I couldn't have contacted the hospital without my portable radio and repeater outfit - I literally couldn't move, or I would have lost him. I received specific instructions by radio from a visiting surgeon at our local hospital.

"He (the surgeon) was soon ferried to the scene by our other ambulance which had returned from another case and our patient was stabilised. It turned out the surgeon was a specialist in arterial grafting.

The Officer went on to say, "I don't know what followed at the hospital, but our patient is today alive and well after losing most of his blood supply; when will we have portables and a repeater in every car?"

Part 2: We approached several companies for tenders to design and build a production repeater for us (500 were required) and eventually IMark produced a prototype, microprocessor controlled and smarter than my basic unit.

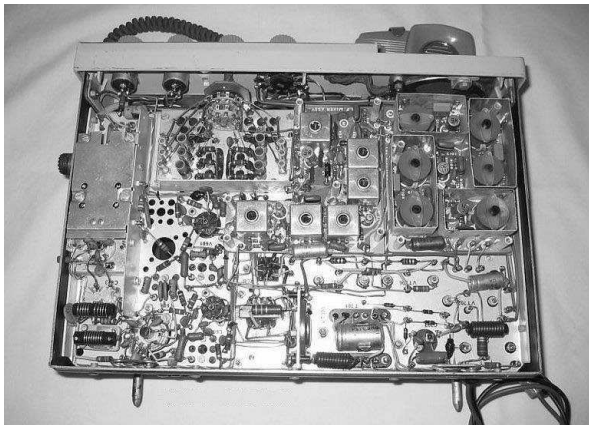
A couple of the IMark repeaters were trialled over the whole of Victoria to gain acceptance, particularly with some of the user control features. Our engineer drafted a feedback questionnaire to accompany the trial cars. When the completed questionnaires came into our Head Office one, in particular, stood out. I received a call from our engineer who said: "I have the form from Portland here. I see they have answered the question of 'range achieved during the trial' and they've written 11.5 km. That's a long walk from their car! Can you find out if that's correct or is it meant to be 1.5 km."

I rang Portland Branch and this is what I heard from the Officer there: "No, its 11.5 km all right; well, near enough. We had a case phoned in to us of a sailor on a passing ship. It sounded like a ruptured appendix. We went out on a port tugboat and got him off the ship and eventually to the Portland Hospital. He was OK. I had used the portable whilst out there to talk to control, etc and it worked fine.

"Then, when we came to fill out the form, we asked the tugboat skipper and were told it was about 9 km from the shore to the ship. But we had driven to the pier in the wrong car, the one without the repeater. The trial car with the repeater was back at the Branch which was 2.5 km from the wharf, hence the 11.5 km."

Our R&D team had never envisaged much more than a 2 km range requirement of the repeater. Such honest feedback from the field was gold!

A Pye PTC 108 from 1958 - the first under-the-dash two-way radio the author encountered.



An under chassis view of the Pye Cambridge two-way radio.

The first of these hybrids that I got my hands on was the Pye Cambridge. Imported from the UK, we fitted out a fleet of cars and trucks with these.

Eventually, Pye in Clayton, Victoria turned out their own hybrid design, the Pye Premier.

Both these designs used the AFZ11/12 Philips/Mullard germanium transistors in the front end and, for the Cambridge, the OC170/171 in the IF. The Premier used silicon transistors in later runs.

There was a version of the Cambridge which used harp cathode (quick heat) tubes in the transmitter (although I never saw one). With most of these hybrid designs a Standby position was added to the On/Off switch so that the transmitter filaments could be switched off to conserve current.

Vehicle electrical systems

Flat batteries were a common problem in cars, especially during the early days. With 6 volt systems in

A Melbourne made Vinten Vantage two-way radio from the 1960s

the 1950s, and a genemotor as the source of HT voltages within the radio, you could be looking at a 6 or 7 amp battery drain just on receive. Emergency vehicles batteries, such as in ambulances, even in the 1970s with 12 volt systems, could be called upon to deliver over 20 amps to rotating beacons and flashing lights, etc.

By then, though, most ambulances were fitted with a dual electrical system and they sure needed them. It's fine to have the vehicle lit up and everything flashing while mobile with the alternator delivering it all, but an emergency vehicle stationary on the roadside needs to be visible too.

The solid-state FM92 was designed by Philips in the early 1980s for commercial two-way radio.

In my days at Ambulance Victoria, I used to test the Philips FM92 two-way radios at just below 11 volts to see that they at least transmitted some power. With a patient loaded and ready to transport, I wanted to be sure that even if the vehicle wouldn't start at least the crew could radio for assistance

Solid state radios, and then LED lighting, changed all that for the better.

The Users/Spectrum

The pictures accompanying this brief article probably indicate how, from the earliest days, Police, Fire and Ambulance were the leaders in taking up two-way radio. Later, once it caught on, taxis and all manner of businesses took it up.

Until mobile phones came along there was real pressure for spectrum space for two-way radio. Maybe there still is?

I can remember the 69-88 MHz band having 120 kHz channel spacing, which then went to 60 kHz. Now I think we are looking at 12.5 kHz between channels in most bands, including the UHF Bands.

The crew or the car

Two-way radio transceivers were initially big boxes that drew lots of current and couldn't be carried around, but it has always been the people, not the car, with whom communication was required. For Emergency Services this is often facilitated by an overlay of usually UHF portable transceivers.

Mobile repeaters were developed by Ambulance Victoria in the 1980s for their own use and are still in use today. I was personally involved in this project and in the sidebar on the previous page I have related a couple of stories, one serious and one very funny, involving the development and trials of the first mobile repeaters for Rural Ambulance Victoria.

The pictures accompanying this article show how the mobile communication hardware has evolved from roadside telephone boxes to MF Morse sent to a vehicle filled with radio gear with the crew phoning back from fixed roadside boxes for instructions, through two-way voice and then direct tactical mobile-to-mobile voice communication.

Eventually, two-way voice, then direct tactical mobile-to-mobile voice communication eventuated. Today, using Emergency Services as the example, through GPS the dispatcher knows what and where the vehicles are, what resources he has at his/her disposal and their status.

-Old technology-
A BC-611 WWII 3.5 to 3.6 MHz handheld Walkie Talkie alongside an early Flip Cellphone.

-New technology-
A Motorola DTR550 Digital features the next generation of two-way radio technology which operates at 900 MHz.

If required, the dispatcher can communicate directly with the crew. Mobile cell phones, although not a commercial level service, also provide another means of communication.

We've come a long way, but what's to come? I can't think of a better example of 'pull strategy development' so far, but now, is the technology pushing us? Do we have the technology before we know how we can use it? Does the take-up depend on cost?

One of Ambulance Victoria's Agusta Westland AW-139 twin-engined helicopters.

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Radio VNG - Australia's own time and frequency service

Andrew Walton VK3CAH
RAOTC member No 1599

Operating an amateur station usually requires demonstration of some degree of technical competence, hence we have an examination regime in order to obtain a licence. It is not unreasonable that the licensing authority in whatever country you're operating in, and in Australia we have the ACMA, requests that you demonstrate that you are able measure your transmitted frequency with some degree of accuracy. This is so we keep within the allocated frequency bands and, more importantly, do not interfere with other users of the RF spectrum.

It's not a very difficult concept to grasp. Many amateurs still like to dabble to some degree with home-made equipment. A multimeter of some sort, usually several, perhaps an oscilloscope, an RF power meter and perhaps a frequency counter, are items of test equipment that hams usually possess or at least have access to. A low cost spectrum analyser these days is also often on many radio amateurs' shopping list.

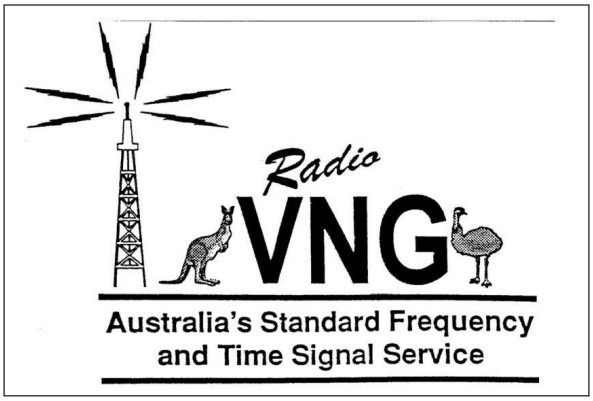
In order to check the accuracy of a frequency counter, the ultimate gadget to use is a GPS Disciplined Oscillator, which can be purchased at a cost of less than $200. These devices receive signals from one or more Global Positioning System (GPS) satellites and these precision signals are then used to phase-lock the device's 10 MHz internal oscillator, itself often oven stabilised. They also provide a precise time output of one pulse per second to drive a clock. The accuracy that one can expect with these is around 0.0001 Hz @ 10 MHz. Without going into too much detail, the GPS system works on extremely precise timing information.

Since the late 1990s, providing you had access to an internet connection, it has been possible to connect to an Internet Time Server using a service called Network Time Protocol. Using appropriate software, one is able to synchronise a local clock with accuracy to within 10 microseconds (of UTC or GMT). In 2022, clocks in desktop computers and smart phones use these time servers.

Most people don't realise that they walk around with a clock on their phone that is referenced via an Internet connection to a Caesium Beam Standard, with accuracy down to within a few microseconds. And all this they carry around in their pocket!

In years past, before the Internet and GPS, equipment with this type of accuracy was simply prohibitive in cost. Amateurs, along with many commercial organisations and operators, had to revert to the next best thing and that was to use a time and frequency service. For many years, people and organisations throughout Australia made use of the timing signals broadcast by Radio VNG.

These timing signals were used for purposes such as surveying, geophysics and navigation. Radio VNG users included seismologists, astronomers, upper atmosphere physicists, surveyors, geophysicists studying the Earth's magnetic field and amateur radio operators. This service formed part of Australia's technological infrastructure by providing a signal of moderate accuracy (1 millisecond) that could be readily accessed with relatively inexpensive equipment. It was also used to confirm any ambiguities inherent in more precise methods of time comparison



An early VNG QSL card issued in the 1960s.

Time and frequency services have been established for just over 100 years. Probably the first such radio station was WWV which was established in 1919 by the Bureau of Standards in Washington DC, USA, making it one of the oldest continuously-operating radio stations in the United States. WWV is best known for its continuous time signal broadcasts which began in 1945, and were used to establish official United States government frequency standards, with transmitters operating on 2.5, 5, 10, 15, and 20 MHz, as well as an 'experimental mode' transmission on 25 MHz.

WWV is operated by the US National Institute of Standards and Technology (NIST), overseen by its Time and Frequency Division, which is part of NIST's Physical Measurement Laboratory based in Gaithersburg, Maryland. In addition to WWV heard here in Australia, we often hear the Pacific sister station WWVH, which was established in Hawaii in 1948. WWV is identified by use of a male voice, and WWVH is identified by a female voice.

There have been other time and frequency services over the years, one being JJY located in Japan. However, JJY ceased shortwave services on 31st March 2001. As technology changes, these time and frequency services are being closed down, one by one, in order to save costs.

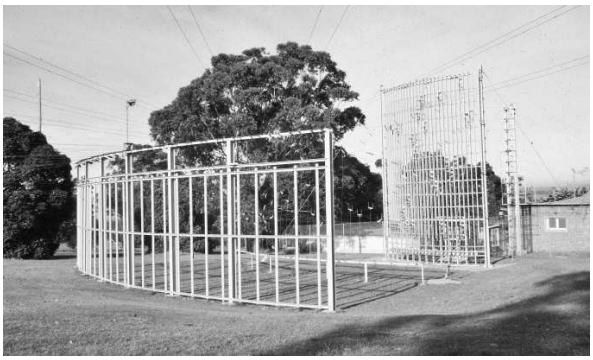
WWV received a reprieve from the US Congress in 2019 when the NIST proposed closing it down to save costs in its budget. NIST celebrated WWV's centennial on 1st October 2019. How long WWV will remain on air is unknown.

Radio VNG, Australia's own Standard Frequency and Time Signal Service

Australia once had its own time and frequency service, VNG, operating from a transmitter site at Lyndhurst, which is now a suburb of Melbourne, Victoria. Lyndhurst is 36 km south-east from Melbourne's central business district, about half way between Dandenong and Cranbourne. The site has since closed and has been developed as a housing estate.

The early years - March 1946

The history of VNG, with its familiar ticking sounds, goes back more than 50 years. Test broadcasts from a 2 kW transmitter at Lyndhurst in Victoria under the callsign VLX were first noted in March 1946. At the time, this transmitter was carrying a relay of the ABC programming in parallel with the other shortwave station VLR. However, soon afterwards, this transmitter began to broadcast only time signals with a standard tone on a single frequency.



The antenna switch at Radio Lyndhurst

These routed the signals from the STC 10 kW transmitters located in the transmitter hall to the required antenna using the 'Armstrong method', which relied upon a system of ropes and pulleys. No automatic or computerised control here!

The operator had to ensure the contacts being operated were not 'live' with 10 kW of RF power, otherwise some serious arcing and sparking would cause considerable damage, putting the entire station off-air in order to effect necessary repairs.

Pole supported open wire feed line.

After the antenna was selected, the 10 kW of RF power was routed across the antenna farm (paddock) via open wire feed line. One of the maintenance headaches at the time was maintenance of the support poles. With lots of RF around, these were required to be made of an inert material, in this case timber. The local termites or white ants kept a maintenance crew constantly on their toes!

Call sign change to VNG

On 21st September 1964 the call sign was changed to VNG, perhaps reminiscent of earlier time signals that were emitted by maritime radio stations such as XNG. The NG is believed to have stood for NaviGation and the X was an abbreviation for transmission. In the very infancy of licensing, before Australia adopted, via the ITU, the letter 'V' to prefix radio stations and aircraft, the first letter issued by the PMG at the time was X, signifying eXperimental.

An improved service was introduced using a 10 kW STC transmitter. Subsequently, two more transmitters at 10 kW were installed at Lyndhurst for this service. Radio VNG transmitted on 4.5, 7.5 and 12 MHz from the Lyndhurst transmitters. Encoding details are described below, and also in the VNG Leaflet. If a leap second had to be introduced, a further voice announcement occurred.

VNG broadcast time in binary coded decimal (BCD) format during seconds 21-58. It also broadcast DUT-1[1] information during seconds 1-16. Tones were usually of 1 kHz. Radio VNG also broadcast a spoken time signal every 15 minutes. The exact words used at Lyndhurst were: "This is VNG Lyndhurst, Victoria, Australia on 4.5, 7.5 or 12 MHz. VNG is a standard frequency and time signal service of the Australian Telecommunications Commission. This is VNG Lyndhurst, Victoria, Australia on 4.5, 7.5 or 12 MHz."

Lyndhurst radio station closed

In October 1987, the Australian Government officially closed its Lyndhurst radio station, although the VNG service remained on air for a few months longer. It should be noted that the ABC has never operated any of the actual broadcast equipment. The ABC produced the audio, as they still do, and fed it via landline (or other means) to the transmitter site of the agency responsible for transmitting it.

Initially the PMG was responsible for the transmitters. However, over the years, other agencies have been vested with the responsibility. The National Transmission Agency, or NTA, was subsequently sold off as a private concern as Broadcast Australia, which is now BAI Communications Australia.

In 2022, when you listen to or view ABC or SBS broadcasts, the transmission facilities are now all privately owned. There are many commercial broadcast services that also contract out their transmissions to BAI Communications Australia.

The Lyndhurst site had served Australia very well. However, the main transmitters were only 10 kW, being mainly used for Radio Australia. In the age of modern international shortwave broadcasting, 10 kW was considered very low power. Please remember that a broadcast listener wants to hear a nice loud signal on what is usually a fairly basic and inexpensive receiver, using the bare minimum for an antenna. The target area really has to be saturated by an RF signal. Transmitters of 100 kW or more seemed to be the general order of the day, almost the minimum.

There was, at the time, a much higher power broadcast station at Shepparton, several hundred kilometres further north, which eventually closed in January 2017.

Lyndhurst has since been converted to housing estates with the only hints to the former site at Lyndhurst and the vast antenna arrays for VNG and

other radio services ever existing is 'Tower Hill Park' and a road called 'Towerhill Boulevard'.

VNG relocates to Llandilo, NSW

In late 1986 the Precise Time Working Group (now the National Time Committee), under the auspices of the Commission, learned of the impending closure of Radio VNG and conducted a survey to ascertain the usage of the service as well as the scientific and economic impact of its closure.

The survey results showed that there was an extensive and diverse usage of the service throughout the community. However, it was a usage which, by the very nature of its application, was difficult to quantify economically.

Following the closure of Radio VNG in October 1987, the Commission convened a seminar to investigate what provisions needed to be made for an intermediate accuracy time service and to consider the extent to which the provisions for high accuracy time comparisons were meeting Australia's needs. Several alternatives to Radio VNG were discussed but each was found to have significant disadvantages in terms of accessibility and cost compared with Radio VNG's time service.

It was recommended by the many participants at the meeting that Radio VNG be reinstated; that the service be recognised as part of Australia's technological infrastructure; and that it be funded by the Federal Government. At this time, no single department or authority was identified to fund the operation of Radio VNG..

VNG Users Consortium

The VNG Users Consortium was formed to re-establish Radio VNG and to collect donations from former users to dismantle, pack and transfer the transmitting equipment to a new location. More than $10,000 was raised and the equipment was relocated to Airservices Australia's (formerly the Civil Aviation Authority) International Transmitting Station in Llandilo, NSW, about 50 km north-west of Sydney.

The Australian Surveying and Land Information Group (AUSLIG) agreed to finance the operation of Radio VNG on a partial cost recovery basis from users. AUSLIG merged in 2001 with the Australian Geological Survey Organisation to become Geoscience Australia. Initially, there were both technical and licensing problems before eventually going to air,

In 1988, four of the 10 kW STC transmitters were removed from Lyndhurst and transferred to Llandilo. From Llandilo the frequencies used were 2500, 5000, 8638, 12984, and 16000 kHz . All four transmitters were STC units at 10 kW. The transmitter for the Sydney coverage on 2500 kHz was listed as a 1 kW Harris transmitter.

The antennas for the four main transmitters were described as quadrant dipoles, and the antenna for the Sydney service was a vertical monopole. A few years later, VNG bought two more transmitters. One was the 10 kW ABC unit VLQ, near Brisbane in Queensland and the other was a broadcast transmitter from commercial station 2KA in the Blue Mountains, west of Sydney. This probably coincided with 2KA converting from 783 kHz in the AM band to the FM band.

Over the years, various transmitter configurations were used on various frequencies at VNG Llandilo. VLQ was part of the ABC domestic short wave service that was closed down around the time, and had operated out of Bald Hills in Brisbane, the main ABC AM transmitter site.

As a side note, it is believed one of the surplus 10 kW STC transmitters from Lyndhurst was relocated to the main ABC transmitter site at Brandon, near Townsville for use for Radio Australia. Both Bald Hills and Brandon (in Queensland) are still used as ABC transmitter sites, all with 50 kW medium wave transmitters.

The replacement Radio VNG service operated, until 30th June 2002 on 2.5 and 8.838 MHz. The remaining three transmitters (5, 12.984, and 16 MHz) were finally closed down on 31st December 2002 due to a lack of funding. Many scientific and astronomical users of the service at the time were somewhat inconvenienced at the shutdown, and daytime reception of overseas time signal services from Australia was generally thought of as rather poor (and still is) as the nearest time signal services are BPM in China and WWVH (or WWV) from the United States. It was the end of an era.

One of the many antennas at Radio Lyndhurst in the early 1980s.

Radio VNG technical details at Llandilo

The service employed STC double sideband, full carrier AM, HF broadcast transmitters. The 2.5 MHz service used a STC 4SU55A/S transmitter whilst the 5, 8.638, 12.984, and 16 MHz services employed STC 4SU48B transmitters.

The transmitter frequencies, powers and transmission modes were:

- 2.5 MHz 1 kW, emission mode to be advised
- 5 MHz 10 kW, emission mode 6K00B9W
- 8.638 MHz 10 kW, emission mode 3K00A1A
- 12.984 MHz 10 kW, emission mode 3K00A1A
- 16 MHz: 5 kW, emission mode 6K00B9W

Note that the 8.638 and 12.984 MHz were frequencies on loan from the Royal Australian Navy. The 2.5, 5, 8.638, and 12.984 MHz transmissions were continuous; the 16 MHz transmission was only running from 2200 to1000 UTC.

Voice station identification announcement.

This was provided on the 2.5, 5, and16 MHz services only, using an AWA digital voice recorder. It was given during the 15th, 30th, 45th and 60th minutes without interruption to the time signal. The speech was 'notched' to allow seconds markers to continue and had spectral components around 1000 Hz removed to avoid erroneous operation of the tuned relay time circuits.

Morse station identification

This was provided on the 8.638 and 12.984 MHz frequencies only. It was given during the 15th, 30th, 45th and 60th minutes without interruption to the time signals. VNG was transmitted in slow Morse at a frequency of approximately 400 Hz up to six times per

minute. Broken 'idents' may have occurred at the beginning and end of the minute.

Talking clock

This gave Coordinated Universal Time each minute, immediately after the minute marker. It operated on the 2.5, 5, and 16 MHz services only.

Accuracy and traceability

The time and frequency information broadcast by Radio VNG was traceable to the standards maintained by the Telstra Research Laboratories at Clayton, Victoria. The carrier frequencies and 1 kHz tone broadcast by Radio VNG were within 1 part in 10^{11} of Telstra's frequency standard (24 hour average value). The time interval information had the same accuracy as the carrier frequencies except for intervals which were subject to routine step adjustments. The time of day information was maintained within 100 µs of UTC and was typically within 10 µs of UTC.

Unfortunately, due to effects such as ionospheric jitter, the accuracy of the frequency information received from the VNG broadcasts may have been degraded to around 1 part in 100. The time signal accuracy is typically of the order of 1 millisecond.

Radio VNG time code format

Radio VNG broadcast time was in binary coded decimal, during seconds 21-58. It also broadcast DUT-1[1] information during seconds 1-16. Tones were usually of 1 kHz. (See full details in diagram below of VNG time code format.)

Footnote

1. DUT1 is a time correction equal to the difference between Universal Time, which is defined by Earth's rotation, and Coordinated Universal Time, which is defined by a network of precision atomic clocks.
DUT1 = UT1 - UTC.

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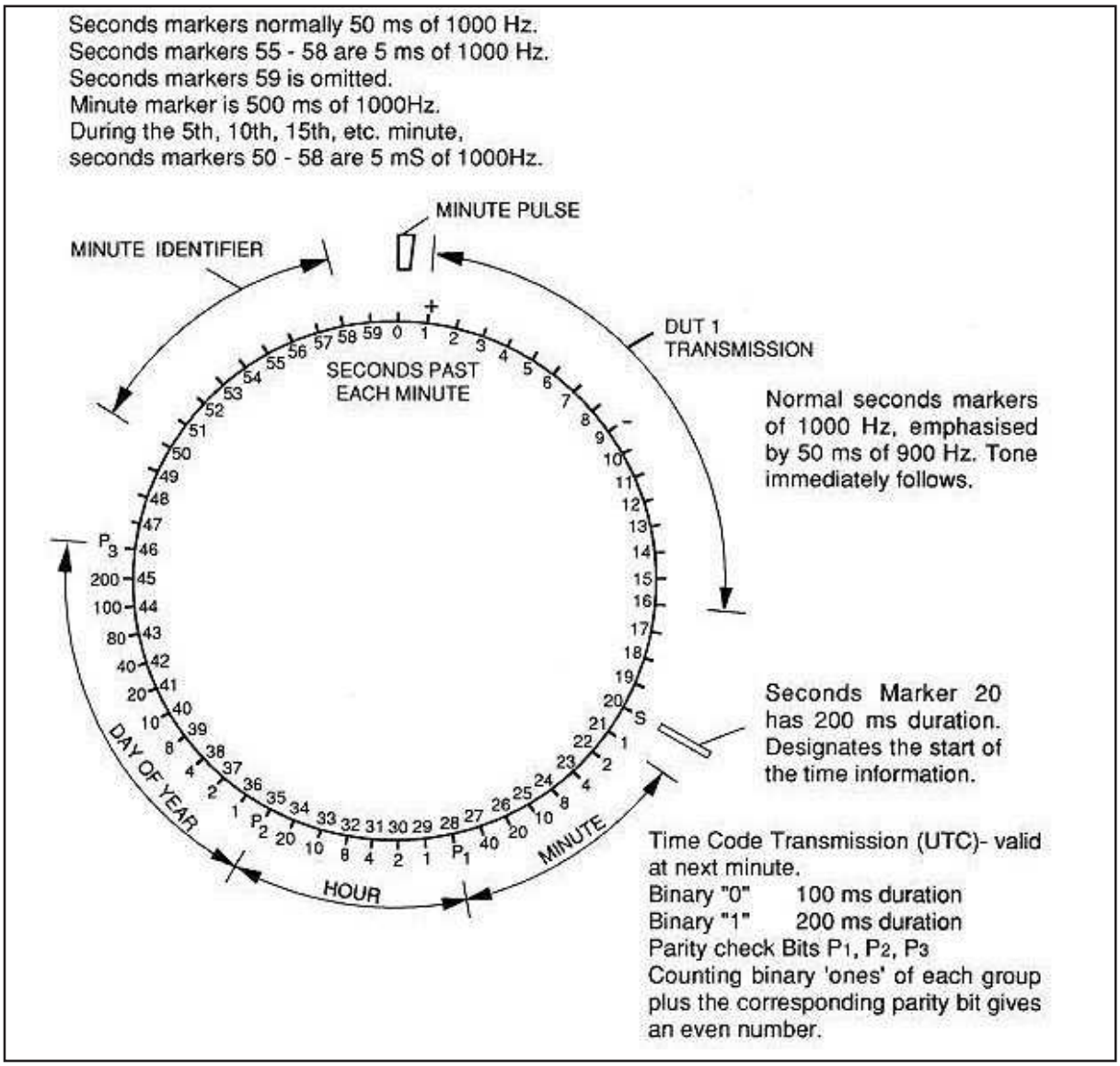
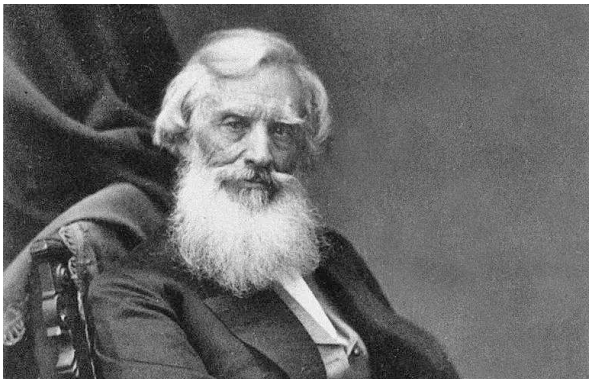


A patient waiter is no loser

Herman Willemsen VK2IXV
RAOTC member No 1384

In my collection I have a small memorial pewter plaque which shows that, 178 years ago, a middle-aged Samuel Finley Breese Morse, surrounded by Miss Annie Ellsworth[1] and members of Congress, sent the first official telegram over a short telegraph line from Washington to Baltimore. It is rather amazing that a man like Samuel Finley Breese Morse (1791-1872), a portrait painter with little formal scientific or technical training, established the first commercial telegraph system in the United States.

The small pewter plaque in the author's collection which shows the occasion of the sending of the first official telegram.



A photo of Samuel Finley Breeze Morse in his retirement.

Although he made friends easily and liked the company of people from all walks of life, the life of Samuel Morse had not been a bed of roses. He went through periods of poverty when he could hardly afford to support himself and his family. For many years he was ridiculed and knocked back by private investors, as well as the American Congress, when lobbying for funds for his telegraph invention. Repeatedly he was called a daydreamer, was met with scepticism, and his scheme was condemned as ridiculous.

In 1811, after he finished University, Morse went to Europe to study and practice painting. In 1815, he returned to America, set up a studio in Boston and became a highly successful artist, painting prominent citizens.

A self portrait of Samuel Morse as a young man in 1812.

In 1818, aged 27, he married 19 years-old Lucretia Pickering (née Walker). In 1825, when he was away from home on a painting commission, Morse received an urgent letter from his father, delivered by a messenger on horseback, that his wife, soon after the birth of her third child, had become gravely ill. Morse immediately hurried home but, by the time he arrived, his wife was dead and had been buried.

Some say that 'heartbreak may have inspired the telegraph', because a grieving Morse vowed to figure out a way to deliver messages in a timely manner. However, it would be nearly two decades before he would invent a device that could send long distance messages instantaneously.

From 1829 -1832, Morse went once more to Europe to learn about the latest painting styles and left his three children in the care of relatives.

In 1832, during his return voyage from Le Havre to New York on the ship *Sully*, Samuel Morse and fellow passengers, amongst them Charles Jackson[2], discussed at length the recent discoveries of electromagnetism by Hans Christian Oersted[3] and Michael Faraday[4].

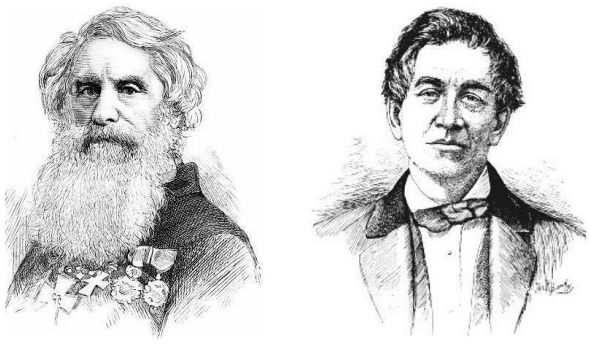
When Morse began to understand how this worked, he became convinced that these inventions could be used to send messages via a wire. Immediately he went to work making his own telegraph apparatus.

The success of Morse's telegraph invention and code was, for a great part, due to the skills and contribution of the academics he had read about, had contact with, and the ones that became his partners. Men like Charles Thomas Jackson of Boston (his acquaintance on the ship *Sully*), Leonard Gale, Joseph Henry[5] and Alfred Vail.

From 1837 to 1848, Alfred Lewis Vail joined Morse as a partner, giving him mechanical, technical, and financial support.

In 1839, Vail married Jane Elizabeth (née Cummings) and they had three sons. She died in 1852.

Alfred Vail.



Pen and ink sketch of Samuel Morse and Alfred Vail.

Vail made many improvements to the design of Morse's original rather impractical and crude telegraph apparatus, and added a simple sending key called the Lever Correspondent[6] (see photo below).

He changed Morse's original numerical code, in which Morse had given each word in the English dictionary a number. Morse spent many months compiling this code dictionary. For example, the message '215-36-2-58' meant 'successful-experiment-with-telegraph'. However, because the names of people, companies, or townships, were not part of Samuel Morse's huge dictionary, the code became quite cumbersome.

Alfred Vail developed a much simpler alphabetical system of a dot and dash code, and Morse's impractical numerical code and bulky dictionary were never used again. Because the terms of Vail's partnership agreement specified that all patents would be in Morse's name, Vail's code was called 'Morse code' [7].

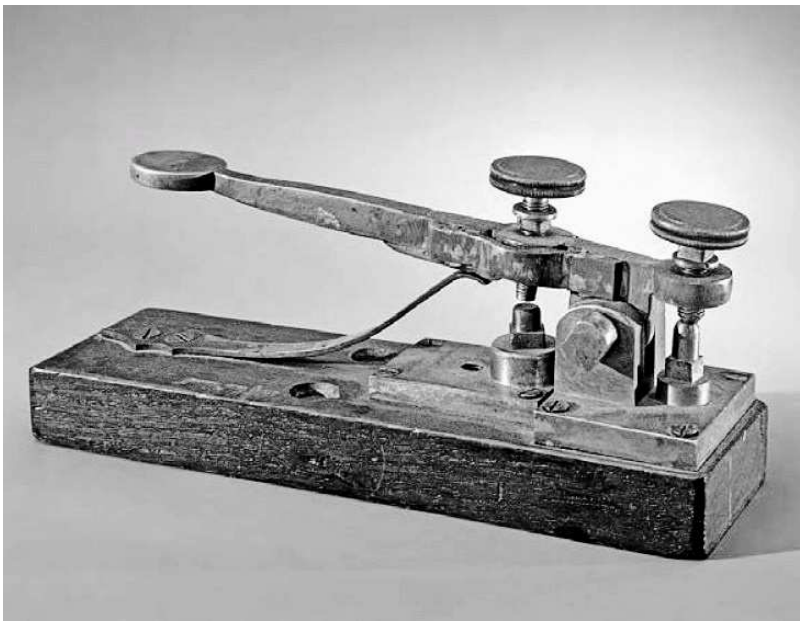
On 6th January 1838, the first successful completion of a transmission with the new system and code was used at the Speedwell Iron Works, owned by Vail's father, across 3 km of wiring. The message read: "A patient waiter is no loser".

It was Morse's university colleague Leonard Gale, a professor in chemistry, who showed him that Joseph Henry's use of relays would improve the distance of transmission. As a result, by November 1838, a message could be sent through 16 km of wire arranged on reels in Dr Gale's university lecture room.

It appears that Morse hijacked Henry's innovations. However, between 1839 and 1842, Morse frequently kept in touch with Henry, seeking both scientific advice and public endorsements of his telegraph. Henry gave both willingly, but he also made it quite clear that he regarded Morse's apparatus as the application of scientific principles discovered by himself and other scientists. Henry was more interested in demonstrating his invention to his students and not, like Samuel Morse, commercially to the outside world.

As early as 1838, Samuel Morse tried in vain to secure the aid of Congress in the construction of an experimental telegraph line between Washington and Baltimore. In desperation he travelled again to Europe from 1838 -1842, this time hoping to get recognition and raise funds, but to no avail. A less energetic and driven man would have given up after so many rejections, but Morse believed in his invention and kept on going.

In 1842, he tried Congress again and his invention was finally formally discussed. The story goes that, during debate in the Congress, one of the Congress members ridiculed Morse's invention, comparing it to 'sham scientific practices like mesmerism and animal magnetism'.

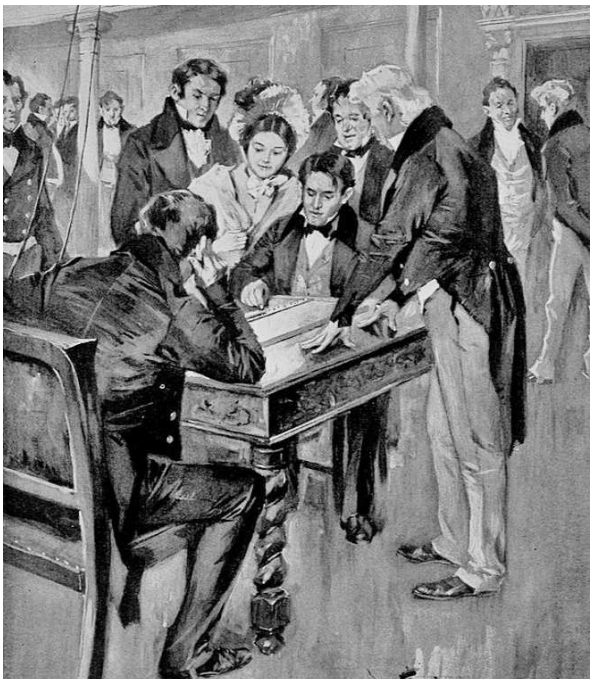


Alfred Vail's late-1844 simple sending key, the 'Lever Correspondent' now in the Smithsonian Museum.

It was not until March 1843 that he obtained from the Congress the princely sum of US$30,000 (equivalent to about one million US dollars in today's money) for his invention. He could now finance the construction of a 38-mile (61 km) telegraph line to be strung on poles between the national capital, Washington, and Baltimore, Maryland.

It was over this line, on 24th May 1844, that Morse tapped out his famous message, "What hath God wrought". At the other end of the line Vail sent the same message back to him.

The newspapers gave all the credit for this major break-through in



A painting depicting the first telegram, sent on 24th May 1844. Professor Samuel Morse is seated, sending the despatch "What has God wrought", as dictated by Miss Annie Ellsworth.

long distance communications to Samuel Morse, the better-known partner and forceful personality. Alfred Vail was only referred to as the 'assistant' of Morse and was more or less overlooked.

In 1853, Alfred Vail, more philosophical than hurt about this, wrote: "I do not seek renown for myself. I care little for the world's applause, which at best is very hard to maintain even when justly yours, and given often, where they cannot and will not discriminate and justly award."

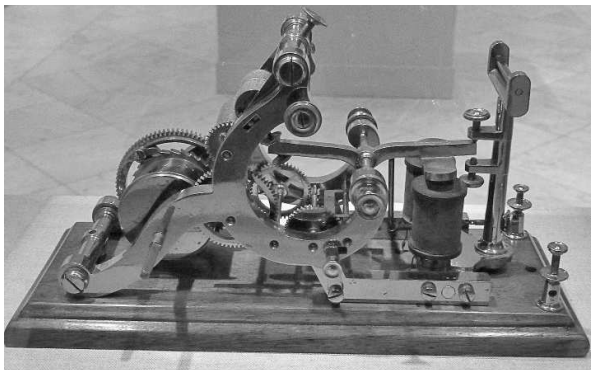
For his achievements, Samuel Morse became an international superstar and received decorations from the heads of numerous countries in Europe, but the reputation of his modest partner was allowed to suffer.

In 1848, aged 57, Samuel Breeze Morse married his penniless cousin, the 26 year old Sarah Elizabeth (née Griswold) and had four more children.

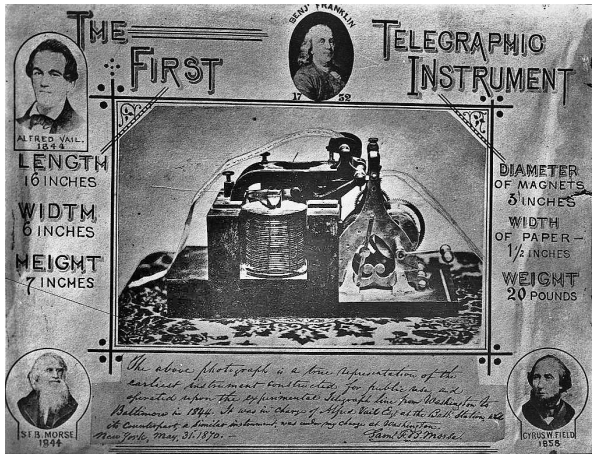
In 1858, Vail married Amanda Orpha (née Eno).

In 1859, Alfred Lewis Vail died in poverty at the young age of 52.

Morse became a famous man who settled down to a life of wealth and family. He was generous in his



Samuel Morse's receiving instrument used in the sending of the first telegram. The paper tape used to record the incoming Morse characters is absent in this photograph.



The above was published in New York in May 1870 and details Morse's earliest apparatus for receiving Morse telegrams.

financial gifts to universities, religious organisations and struggling artists. In his retirement he grew a long beard that turned white, giving him the appearance of a man of great knowledge and wisdom.

Before and after his death, the validity of his inventions was unsuccessfully challenged by Charles Thomas Jackson, Joseph Henry and Alfred Vail's son Stephen.

Samuel Morse died of pneumonia in 1872, aged 80, at his home in New York.

Footnotes

1. The father of Annie Ellsworth was Henry Ellsworth, the US Patent Commissioner, who had supported Samuel Morse's invention and helped secure funding for it. On 24th May 1844, Annie handed Samuel Morse a bit of paper (the first telegram) on which she had written the biblical phrase from the book of Numbers 23:23, "What hath God wrought" (What has God done).

2. Dr Charles Thomas Jackson had visited Europe for three years where he studied both medicine and geology. During this time, he had met prominent European scientists and physicians. He claimed later that it was his original ideas that led to the creation of the electromagnetic telegraph.

3. Hans Christian Oersted discovered in 1820 that electrical currents create magnetic fields.

4. Michael Faraday, known for his 1831 Law of electromagnetic induction.

5. Joseph Henry invented and constructed, in 1830, extremely powerful magnets. See Ron Cook's article about Joseph Henry in *OTN* 39, September 2007, pages 11, 12 and 13.

6. More on the Vail Correspondent key in *OTN* 66, September 2020, page 15.

7. It was said by Samuel Morse supporters that Vail, in public and private writings, never claimed the code for himself. According to one researcher, in a February 1838 letter to his father, Judge Stephen Vail, Alfred wrote, "Professor Morse has invented a new plan of an alphabet and has thrown aside the Dictionaries."

In an 1845 book, Vail wrote describing Morse's telegraph and attributed the code to Samuel Morse. However, for a different view, please read the story on website: *https://telegraphy.eu/pagina/artikels/About-Morse-Vail-v4-2jan2021.pdf*

For some variations of Morse code, see *Morsum Magnificat* No 19, page 2, at: *http://www.n7cfo.com/tgph/Dwnlds/mm/mm.htm*

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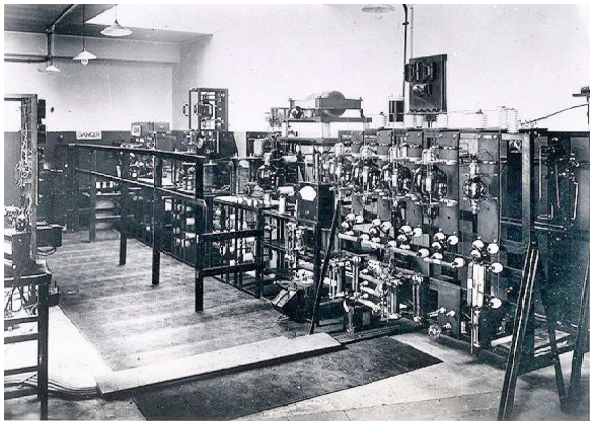
Celebrating 100 years of the BBC

Andrew Walton VK3CAH
RAOTC member No 1599

There are several very important anniversaries being celebrated in 2022 by some well known broadcasters, many of which were founded by amateur operators nearly 100 years ago. The ABC is celebrating 90 years, along with Melbourne commercial broadcaster 3AW. In 2022, the British Broadcasting Corporation is marking 100 years of broadcasting. The BBC has a rich history and this short article cannot do justice to such a long standing institution. However, I will attempt to outline some highlights to which many Australians can relate. I don't intend to discuss domestic UK programs that were never broadcast into Australia. There is abundant information available on the Internet for the reader to explore further.

The beginning

The British Broadcasting Company, as the BBC was originally called, was formed on 18th October 1922 by a group of leading wireless manufacturers, including Marconi. A broadcasting studio was constructed within Marconi House on The Strand, London, and the medium-wave transmitter was housed in the same building with antennas on the roof.



The original 2LO transmitter with 22,500 volts running through the system. The power output was 1.5 kW on 820 kHz.

At 5:33 pm on 14th November 1922, regular programming commenced with a mixture of news, music, drama and talks. Programmes were initially broadcast for just a few hours a day. By 1926, the transmission power had increased to 3 kW when an improved transmitter was established with antennas on the roof of Selfridges department store in London. The studios were located at Savoy Hill. Several regional transmitters were installed around the UK, carrying the same programming.

Technical advances

At home, people first listened in on primitive 'crystal' sets with the help of a cat's whisker that was moved until it made best contact with a galena crystal. The radio signal could then be heard on earphones. More advanced valve sets followed.

By the 1930s, there were mains power sets contained in Bakelite cases. The opening of the first long-wave high-power transmitter at Daventry in 1925 made it possible for nearly all of Britain to hear the BBC. By 1926, there were two and a quarter million licences, far more than anyone anticipated. That figure increased to eight and a half million by 1938. By that time 98% of the country's population could listen in to the BBC's radio services.

Editorial independence

The General Strike of 1926 brought the BBC its first serious confrontation with the Government over editorial independence. With no regular newspapers being published, the country turned, not for the last occasion in times of national turmoil, to the BBC. Winston Churchill, then Chancellor of the Exchequer, favoured the BBC being taken over by the government, but this was resisted by the Prime Minister, Stanley Baldwin, and John Reith, the BBC's founding father. Although the BBC's coverage of the strike was cautious and far from comprehensive, historians consider that it was reasonably fair.

Governance structure

In 1927, the British Broadcasting Company became the British Broadcasting Corporation when it was granted its first Royal Charter and John Reith was knighted. Sir John Reith looked westwards in the 1920s to America's unregulated, commercial radio, and then east to the fledgling Soviet Union's rigidly controlled state system. Reith's vision was of an independent British broadcaster able to educate, inform and entertain the whole nation, free from political interference and commercial pressure. The innovation of a Post Office licence fee of ten shillings (about £60 in today's currency), of which half went to the BBC, ensured that the BBC was not financially dependent on the Government of the day or on advertising revenue.

The BBC operates under a Royal Charter which defines the BBC's objectives, powers and obligations. The previous Royal Charter, the eighth since 1927, ran until 2013. Under the Charter, the BBC was answerable to the BBC Trust (replacing the earlier BBC Board of Governors) which was appointed to act as trustees for the public interest and to ensure that the organisation is properly accountable while maintaining its independence. The ninth, and current Royal Charter, is different again, doing away with the BBC Trust. This is discussed further on.

By 1932, the BBC had outgrown the Savoy Hill studios and a purpose-built centre was commissioned. Broadcasting House opened in May, with many architectural features created by the modernist designers of the day. The Empire Service was formally inaugurated that December with programmes emanating from the new centre.

In November 1936, the BBC started its television service with studios and a transmitter located at Alexandra Palace, a high point in north London that looked down over much of the city. It didn't last long. On 1st September 1939, at the outbreak of WWII, it was closed down. No official explanation was given but it has been speculated that authorities were worried the

strong broadcast signal could act as an aid to enemy aircraft. The last programme to be viewed was Mickey Mouse's Gala Premiere. When TV returned in June 1946, the same Mickey Mouse programme was the first thing to be aired!

The BBC commenced foreign language radio broadcasting in January 1938 with a programme in Arabic. This was soon followed by many more languages. In 1941, the BBC External Services were transferred to their own building, Bush House.

A timeline of some events

1923

•First outside broadcast.
•Postmaster-General grants BBC licence to broadcast.
•First daily weather broadcast.
•First experimental broadcast to America.
•First continental programme relayed by landline.

1924

•First religious service broadcast.
•First Greenwich time-signal broadcast.
•Big Ben time-signals inaugurated.
•First national broadcast to schools.
•First broadcast by King George V (opening the British Empire Exhibition in Wembley).
•First live running commentary from an Outside Broadcast (from the Lord Mayor's Show).
•First relay from America.

1925

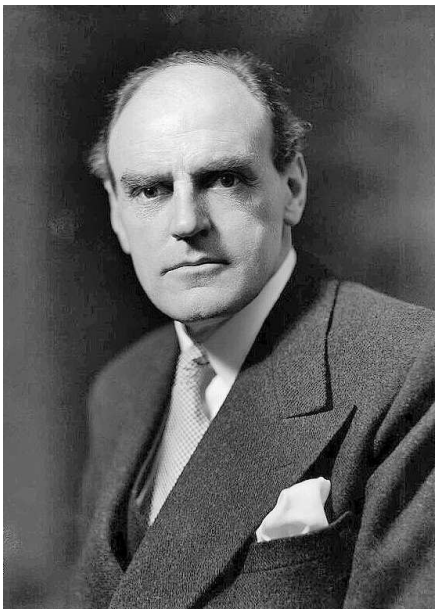
•Daventry Long Wave transmitter opened.

1926

•Scottish inventor John Logie Baird succeeds in transmitting television pictures
•General strike begins. In the absence of newspapers, the BBC broadcast five news bulletins daily.
•British Broadcasting Company Ltd dissolved.

1927

•The BBC established by Royal Charter as the British Broadcasting Corporation.
•Sir John Reith becomes the first Director General.
•First meeting of the Board of Governors.
•First running commentary on a sports event which was a Rugby International match between England and Wales at Twickenham, followed in the spring and summer by first commentaries on Association Football, the Grand National, and the Oxford and Cambridge Boat Race.



Sir John Reith, founding father of the BBC.

•FA Cup Final, cricket, Royal Tournament, Trooping the Colour and Wimbledon tennis.
•Experimental broadcasts to the Empire began from Chelmsford short-wave station. First BBC Christmas Fund for Children (later Children In Need).

1928

•Regular weekday religious services begin.
•Ban on broadcasting controversial material lifted.
•First broadcast by the BBC Dance orchestra, led by Jack Payne.

By 1928, John Logie Baird's television experiments could progress only with the help of the BBC with its broadcasting monopoly. But the radio men - themselves just finding their feet - didn't know how to react to this complex new medium. John Reith was jealous of Baird and would not support his work, favouring instead the Fultograph, which could only send still pictures into people's homes.

1929

•First transmission of John Logie Baird's experimental 30-line television.

1930

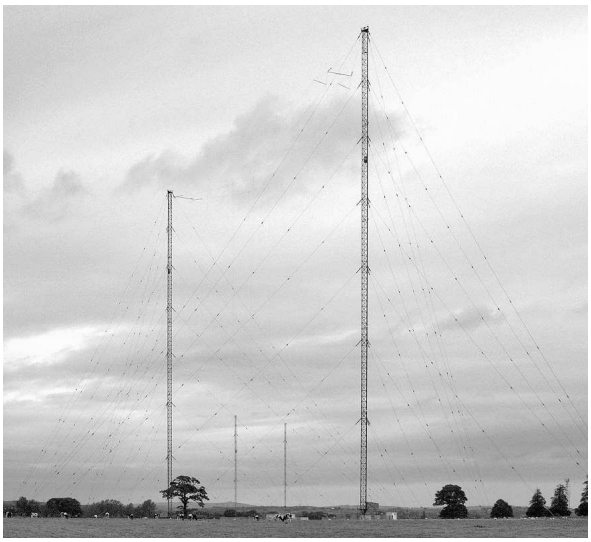
•First experimental television play, The Man with the Flower in His Mouth, transmitted using Baird's mechanical television system

Crystal Palace station, the main London broadcast facility. The tower height is 219 metres.

Crystal Palace

Crystal Palace is located on the site of the former television station and transmitter operated by John Logie Baird from 1933. The mast is the eighth-tallest structure in London and is best known as the main television transmitter for the London area. As such, it is the most important transmitter in the UK in terms of population covered. The transmitter is owned and operated by Arqiva. It is also used for FM radio transmission of local radio stations along with medium wave transmitters on 558 kHz ,720 kHz and 1035 kHz. Since the tower is grounded, a wire aerial span close to it is used for the MW services.

1931
•First broadcast from BBC Broadcasting House.
•Broadcasting House in London officially opens after the Savoy Hill studios close.
•First experimental television broadcast from Broadcasting House.
•Empire Service inaugurated on short-wave.
•First Empire Service Christmas Day programme and message from King George V.
1933
•First female radio announcer, Sheila Barrett.
•Droitwich long-wave transmitter replaces Daventry 5XX.
•Radio covers its first Royal Wedding, the Duke of Kent to Princess Marina.



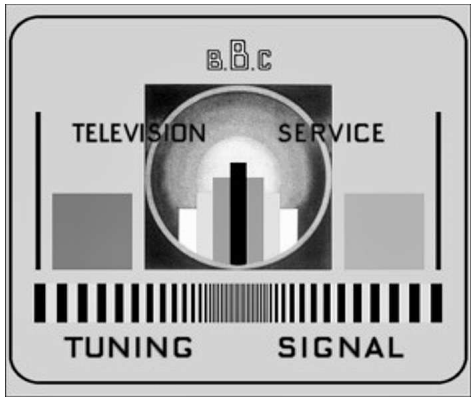
The 213.36 m tall masts at the Droitwich station transmitting on 198 kHz at 500 kW. The LW transmitter also serves as a time and frequency reference.

1935
•The American Half Hour with Alistair Cooke began on radio.
1936
•Death of HM King George V announced by Sir John Reith.
•First female television announcer (Elizabeth Cowell).
•Experimental (closed circuit) high-definition television transmissions to Radio Olympia.
•Inauguration of BBC television service (world's first regular high-definition service using 405 lines).
•King Edward VIII's abdication broadcast from Windsor Castle, announced by Sir John Reith.

The 405 line monochrome analogue television broadcasting system was the first fully electronic television system to be used in regular broadcasting. The number of television lines influences the image resolution, or quality of the picture.

It was introduced with the BBC Television Service in 1936, suspended for the duration of WWII, and remained in operation in the UK until 1985. The sound was transmitted using AM which was prone to suffering static from lightning and other forms of electrical noise.

Sometimes called the Marconi-EMI system, it was developed in 1934 by the EMI Research Team led by Isaac Shoenberg. The figure of 405 lines had been chosen following discussions over Sunday lunch at the home of Alan Blumlein. The system used interlacing;



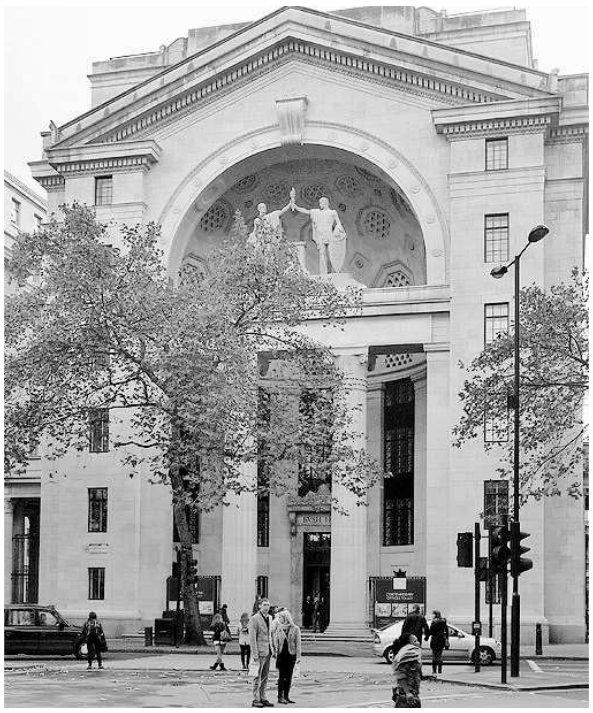
Early BBC TV test pattern.

EMI had been experimenting with a 243-line all-electronic interlaced system since 1933. In the 405 system the scanning lines were broadcast in two complementary fields, 50 times per second, creating 25 frames per second. The actual image was 376 lines high and interlaced, with additional unused lines making the frame up to 405 lines to give the slow circuitry time to prepare for the next frame; in modern terms it would be described as 376i.

At the time of its introduction the 405-line system was referred to as 'high definition' - which it was, compared to earlier systems, although of lower definition than 625-line and later standards.
1937
•King George VI's coronation procession televised. First use of TV outside broadcast van.
•First televised coverage of the Wimbledon Tennis Championships.
1938
•First BBC foreign language service (Arabic) began.
•First news bulletin on television.
•First televised coverage of the FA cup final.
•First televised coverage of the Trooping of the Colour ceremony.
•Sir John Reith leaves BBC.
•Start of the European Service (news in French, German and Italian).
1939
•BBC Monitoring Service begins.
•Television service closed down for defence reasons - Home Service replaces National and Regional Programmes.
•Broadcasts by Prime Minister Neville Chamberlain and King George VI on the declaration of war.
•First wartime broadcast by Winston Churchill.

1940s - radio's war

With the television service closed for the duration, it was radio's war. Ministry of Information 'guidance' on censorship took two forms. One covered Defence Forces security and the other the morale of the nation. Scripts had to have both stamps before being broadcast. Regiment names, troop numbers or locations were never given, nor were the whereabouts of cabinet members or the Royal Family. And there were no weather forecasts, which would reveal conditions for bombing.
1940
•Forces Programme began.
•Winston Churchill's first broadcast as Prime Minister.
•Winston Churchill, in delivering a speech to the House of Commons on 4th June 1940 said: "We shall defend our island, whatever the cost may be, we shall fight on the beaches, we shall fight on the landing grounds, we shall fight in the fields and in the streets…we shall never surrender". This speech was never actually broadcast



Bush House in London.

live; however, extracts were read by the newsreader on that evening's BBC news broadcast

Bush House in London was home to the World Service between 1941 and 2012 (70 years). Bush House was conceived as a major new trade centre by American industrialist Irving T Bush and commissioned, designed, funded and constructed under his direction. The design was approved in 1919, work began in 1925 and the building was completed in 1935. Erected in stages, by 1929 Bush House had been declared by some as 'the most expensive building in the world'.

The final BBC broadcast from Bush House was the 12 noon BST news bulletin on 12th July 2012. The BBC World Service is now housed in Broadcasting House.

1942

•First daily news bulletin in Morse transmitted for the Resistance in Europe.

Winston Churchill, who had no love for the BBC in the 1930s when he was virtually boycotted, found that the BBC did have its uses. Many of his inspirational wartime speeches were broadcast on radio, including "This was their finest hour…" in the summer of 1940. The BBC emerged from the war with an enhanced reputation for honesty and accuracy in its news broadcasts.

By the end of WWII, the BBC was broadcasting in 40 languages. Josef Goebbels, Hitler's master of propaganda, was said to have admitted that BBC Radio had won the 'intellectual invasion' of Europe.

1946

•Television service resumed on 405 lines. A combined £2 radio/TV licence fee was introduced.

1947

•Radio and TV cover Princess Elizabeth's marriage to the Duke of Edinburgh.

1948

•Coverage of the XIV (14th) Olympiad was the most ambitious television event yet undertaken. It took 12 months to plan. A cable was laid from Broadcasting House to Wembley and two new mobile units were brought into service - using, for the first time, cameras with turret lenses.

The 1950s - the age of television

In **1950** there were 12 million radio-only licences and only 350,000 combined radio and TV licences. The budget for BBC Television was a fraction of the radio budget, but a single event transformed the popularity of television. This was the Coronation of Queen Elizabeth II on 2nd June 1953 in Westminster Abbey. Permission had never been given before for television cameras in the Abbey. Some even felt it was wrong for people to watch such a solemn occasion while drinking tea in their homes. An estimated 20 million TV viewers saw the young Queen crowned, most of them outside their own homes. This was a turning point and the first time that a television audience exceeded the size of a radio audience.

By **1954** there were well over three million combined sound and vision licences. The television age had arrived and in 1955 the Queen broadcast her Christmas Message on television for the first time. The mid-1950s introduced some major TV names of the future, including David Attenborough - Zoo Quest (1954).

FM sound broadcasting began in the United Kingdom on 2nd May 1955 when the BBC started an FM broadcasting service (the Light Programme, the Third Programme and the Home Service) to the south east of England. The chance for better quality sound, free from the interference that dogged the existing medium and long wavebands, was a huge improvement to the radio service. Wrotham, situated on the North Downs in Kent, reached 13 million people in the London area. There are now over 40 BBC and over 250 commercial FM sound broadcasting stations in the United Kingdom.

In September **1955**, the BBC's broadcasting monopoly came to an end when ITV was launched. The impact of competition had an instant effect on BBC Television and its share of the audience fell as low as 28% in 1957.

The launch of many innovative programmes at the end of the 1950s reversed this decline. Radio had some of its biggest stars in the 1950s, including Spike Milligan, Harry Secombe, Peter Sellers and Michael Bentine (The Goon Show).

1958 saw the introduction of the Vision Electronic Recording Apparatus or VERA. Note the cooling ducts

Vision Electronic Recording Apparatus or VERA.

on the top of the machine (just the thing to warm the shack on a long winter's night!). This was the BBC's first video-recording machine. After six years of research by BBC engineers, instant replay became a reality. VERA was an early analogue recording videotape format developed from 1952 by the BBC under project manager Dr Peter Axon.

In order to record high frequencies, a tape must move rapidly with respect to the recording or playback head. The frequencies used by video signals are so high that the tape/head speed is on the order of several metres per second, an order of magnitude faster than professional analogue audio tape recording. The BBC solved the problem by using 52-centimetre reels of magnetic tape that passed static heads at a speed of 5.08 metres per second.

VERA was capable of recording about 15 minutes (eg 4,572 metres) of 405-line black-and-white video per reel, but the picture tended to wobble because of some jitter (uneven speed) of the tape transport. Later video recorders used a time base corrector to remove this jitter and make synchronisation with the studio house possible. The BBC switched to Ampex, a superior American system, and television production was transformed. Live programmes became ever rarer.

The 1960s

This was a decade of expansion for television and radio. The BBC Television Centre in West London opened in June 1960, the world's first ever purpose-built television building. From the late 1960s, radio listeners were able to enjoy more programmes broadcast in the superior sound of FM stereo. In November 1967, the first BBC local radio station opened in Leicester and within a few years there were 20 local stations. Until then, the BBC was a National service.

On 28th August **1962**, the BBC began regular experimental radio broadcasts in stereo. Initial transmissions were on the Third Programme, the home of classical music. The development of the stereo long-playing record, and availability of stereo hi-fi equipment, meant listeners wanted the same sense of space and detail in broadcast music. Broadcasts, from the Third Programme transmitter at Wrotham, were limited to London and the South-East.

The Zenith-GE multiplex system was chosen for the experiments; it ultimately became the worldwide standard. However, the BBC had been experimenting with stereo sound since the earliest days of radio. In 1925 a stereo broadcast was made using two radio stations, one broadcasting the right and one the left channel.

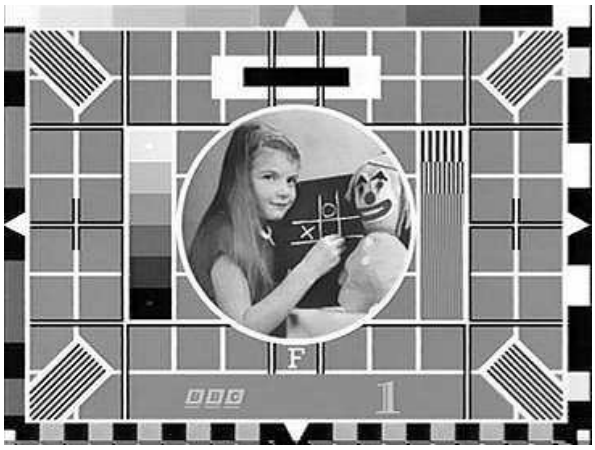
Experiments in FM stereo began in the London area in 1958, with an FM Subcarrier system also evaluated. In the end, the Zenith-GE system was chosen, helped by the fact that it had already been adopted by the US and recommended by the European Broadcasting Union. Over the following years stereo became available to the rest of the country. Radios 1, 2 and 4 went stereo in 1973 with a celebratory Stereo Week.

In **1964** the BBC television launched its BBC2 service on UHF using only a 625-line system, which older sets could not receive. For several years BBC1 and ITV transmitted using the 405-line and BBC2 transmitted the 625-line standard; the only way to receive them all was to use a complex 'dual-standard' 405- and 625-line, VHF and UHF, receiver. The introduction of colour on BBC2 in 1967 necessitated an even more complex dual-standard set to receive all three channels. It is interesting to note that, whilst Australia launched television in 1956, a lot later than the UK, we used the 625 line system whilst the UK was still using the original 405 line system.

The 1960s was an era of momentous technical breakthroughs. A spellbound nation watched pictures from America via Telstar (1962) and live pictures of the first moon landing (1969).

In **1967**, the BBC led the way by broadcasting the first regular colour television service in Europe. In July, during the Wimbledon Championships - and the BBC's first day of transmission - the grass turned green!

In November **1969**, BBC1 and ITV also started broadcasting in 625-line PAL colour on UHF. Their programming was now entirely produced using the new standard, thus the 405-line broadcasts served only as a rebroadcast in monochrome for people who did not have the newer receivers. Thereafter, receivers were of a simpler single standard design which could not receive the legacy 405-line transmissions. Australia, by comparison, adopted colour transmission in 1975, using the identical system as the UK



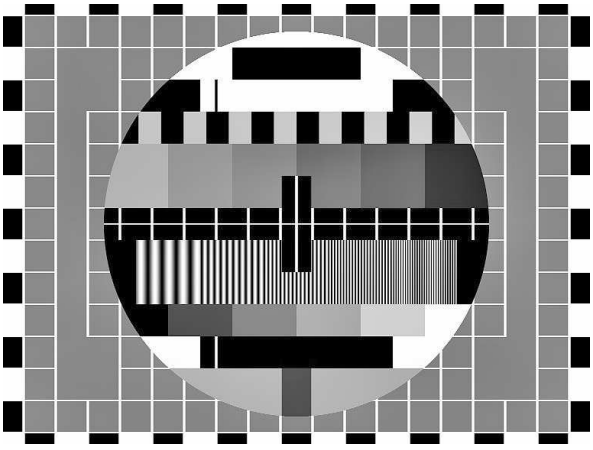
Test Card F

Test Card F was developed by a BBC engineer, George Hersee (1924 - 2001), father of the girl in the central image. It was frequently broadcast during daytime downtime on BBC Television until 29th April 1983 and was still seen before the start of programmes until BBC1 began to broadcast 24 hours a day in November 1997. The central image on the card shows Carole Hersee playing noughts and crosses with a clown doll (Bubbles the Clown) surrounded by various greyscales and colour test signals used to assess the quality of the transmitted picture. It was first broadcast on 2nd July 1967 (the day after the first colour pictures appeared to the public on television) on BBC2.

The 1970s

Teletext was created in the United Kingdom in the early 1970s by John Adams, Philips' Lead Designer for video display units. Public teletext information services were introduced by major broadcasters in the UK, starting with the BBC's Ceefax service in 1974. It offered a range of text-based information, typically including news, weather and TV schedules. Subtitling of programmes on Ceefax began in 1979.

Teletext was also used for a while in Australia. The Seven Network shut down the Austext service on 30th September 2009. They claimed that the technology had come to the end of its useful service life and was not commercially viable. As luck would have it, this



The more familiar digitally generated Philips test pattern as was used in Australia.

occurred at about the same time as I bought my very first modern digital TV, capable of receiving Teletext. The rise of the World Wide Web was probably the main reason for its decline worldwide.

BBC Enterprises Ltd

BBC Enterprises became a limited company in 1979 in response to an increasingly market-oriented culture. Needing a greater source of commercial income to supplement the licence fee, the BBC looked to programme sales, records and tapes, merchandising, home video, education and training, and exhibitions. Now renamed as BBC Worldwide, turnover had increased from £234,000 in 1960 to over £330 million in the current decade.

1971 also saw the passing of Sir John Reith (1889 - 1971) the First Director General of the BBC. The BBC remains his lasting memorial.

1980s - Change and competition

Video recorders arrived in viewers' homes in the 1980s. At the start of the decade, just 5% of households had a video recorder; by the early 1990s that figure had increased to 64%. BBC Television and Radio faced the challenge of growing competition in this period.

1983

•In 1983, the Government authorised the BBC to begin a satellite broadcasting service. It was clear that pioneering a **D**igital **B**roadcasting **S**ystem (DBS) would be a high risk, high cost venture, and the Government said no licence fee monies could be used for satellite. It was reluctantly accepted that DBS was not viable for the BBC, and **B**ritish **S**atellite **B**roadcasting (BSB) was later licensed to go on air in 1990.

1985

•405 line TV system turned off. Those VHF frequencies used by the 405-line system were initially left empty. However, they were later sold off. They are now used for other purposes, including **D**igital **A**udio **B**roadcasting (DAB) and trunked **P**rivate **M**obile **R**adio (PMR) commercial two-way radio systems.

1988

•BBC External Services was renamed the BBC World Service.

RDS - the development of Radio Data System

BBC engineers were at the forefront of the development of RDS, an inaudible data signal added to FM transmissions. Dubbed 'the intelligent radio', the system was hailed as the most significant development since stereo or the transistor. Launched in 1988, it provides automatic tuning to the strongest available signal and immediate access to relevant travel news from the nearest BBC local radio station.

Many readers will have observed in the more modern cars that FM broadcasters often have a text display on the radio's screen. This display depicts the name of the program or song being played, on-air ID of the station, along with perhaps the local weather details. This is RDS, as developed by the BBC.

High Definition Television

High Definition Television, providing a wide screen picture four times sharper than conventional television and with digital sound equal to compact discs, was developed during the 1980s.

The BBC's first full-scale HDTV production was in 1989. But HDTV was ahead of its time and didn't take off in Europe. As part of their digital programme, BBC engineers were developing a digital HDTV system.

Australian produced drama first hits the British screens

The Australian produced drama, Neighbours, first hit the British screens in October 1986. This was the first major export of an Australian produced program demonstrating that Australia could produce programs for the international market.

It's interesting that, in 2022, some major US production houses now film some productions here in Australia using US actors, with the quality of production being equal to anything else available in the world. Without being told, you'd never guess they were filmed in Australia.

1990s - The first digital revolution

With the passing of The Broadcasting Act (1990) the UK Government confirmed the BBC as 'the cornerstone of British broadcasting'. The Act heralded universal changes and the implications for the BBC were fundamental. A quarter of all programmes had to be produced by independents.

The arrival of digital technology and the Internet during this decade marked a new era for broadcasting. The BBC had been broadcasting in analogue since it began in 1922, but it now instigated major investment in digital broadcasting and in internet services, paving the way for even greater change in the decade to follow.

1990

•The BBC begins experimental transmissions using the DAB Eureka 147 standard from the Crystal Palace transmitting station.

1995

•The BBC commenced regular DAB broadcasting. The DAB standard was initiated as a European research project called Eureka-147 in the 1980s. The original version of DAB used the MP2 audio codec.

An upgraded version of the system was released in February 2007, called DAB+, which uses the HE-AAC v2 (AAC+) audio codec and is more robust and efficient. DAB is not forward compatible with DAB+, which means that DAB only receivers are not able to receive DAB+ broadcasts.

The newer DAB+ is approximately three times more efficient than MP2, which means that broadcasters using DAB+ are able to provide far higher audio quality, or far more stations, than they could with DAB, or a combination of both higher audio quality and more stations.

Australia uses DAB+ exclusively whereas the UK uses a mixture of DAB and DAB+. As of the end of 2017, more than 97% of the UK's population are within reach of the BBC DAB multiplex.

1996

•The transmission service was sold - the BBC's first privatisation. Unlike Australia's ABC, where the PMG and its various successors provided transmission services, the BBC had until then provided its own. The BBC, along with Australia's ABC, now relies on a totally privatised transmission network.

2000s - The second digital revolution

Worries over the Y2K millennium bug causing a digital meltdown were unfounded, and the decade was marked by huge and rapid developments in digital technology. Six new digital TV channels were launched by the BBC in 2002 (BBC Three, BBC Four, CBBC, CBeebies, BBC Parliament and BBC News) as an ever-increasing number of households bought multi-channel TVs, radios, and as more home computers went online.

2002

•Freeview launched and provided the BBC's digital channels for 'free' once viewers had bought a set-top box which they could connect to their TVs. Digital radio stations BBC 1Xtra, BBC Radio 6 Music, BBC7 and the Asian Network were added to the mix the same year.

As part of this development, this decade also saw the launch of High Definition television, transforming the impact of many popular programmes, from a reinvented Doctor Who to 3D Wimbledon coverage, providing an opportunity to watch multiple matches in real time. In addition, advances in computer generated imagery (CGI) enabled programme-makers to recreate epic themes and events with startling clarity:

2007

•The BBC launched the highly successful iPlayer, a free service which enabled viewers in the UK to catch up with more than 250 programmes screened over the previous seven days, similar to the Australian ABC's iView, or the 7 Network's 7 Plus. For younger audiences, two digital channels were created providing an advertisement-free zone for children 12-13 hours a day - CBBC for children aged six and over, and CBeebies for the under-fives.

•During the BBC charter renewal process, the Board of Governors was replaced by the BBC Trust. 10 years later, 2017 saw the launch of the new BBC Charter which radically overhauled the governance of the BBC. It dissolved the BBC Trust, and created in its place a new Unitary Board under a new Chairman, Sir David Clementi.

From now on, the BBC's activities would also be regulated by the government body Ofcom (Office of Communications), rather than by a BBC-associated agency.

2008

•On Monday, 18th February 2008, the BBC World Service stopped analogue shortwave transmissions to Europe. The notice stated: "Increasing numbers of people around the world are choosing to listen to radio on a range of other platforms including FM, satellite and online, with fewer listening on shortwave".

•It is sometimes possible to pick up the BBC World Service in Europe on SW frequencies targeted at North Africa.

The BBC's powerful 198 kHz LW transmitter, which broadcasts the domestic BBC Radio 4 to Britain during the day (and carries the World Service during the night), can also be heard in nearby parts of Europe, including the Republic of Ireland, the Netherlands, Belgium and parts of France, Germany and Scandinavia.

The current BBC World Service radio service

In 2022, the BBC World Service is available in Australia overnight on the ABC News Radio Network, and also 24 hours a day on the SBS Television multiplex on one of their six radio channels anywhere in Australia wherever terrestrial televison is available. It is also available, free of charge, via satellite, using a **V**iewer **A**ccess **S**atellite **T**elevision (VAST) satellite receiver.

The World Service in English mainly broadcasts news and analysis. The mainstays of the current schedule are Newsday, World Update, News Hour and The Newsroom. There are daily science programmes: Health Check, the technology programme Digital Planet and Science in Action.

GB100BBC - Special event callsign

As many Australian amateurs are aware, VK90ABC has been issued to celebrate 90 years of the ABC. Likewise, GB100BBC celebrates 100 years of the BBC. The BBC staff amateur radio club, the Ariel Radio Group, was established in 1945 and there has been some form of ham radio club at the BBC ever since.

The current team, the London BBC Radio Group, have secured the callsign GB100BBC to help in the celebrations. GB100BBC will be on-air from the main shack at BBC Broadcasting House in central London, as well as from other BBC premises and members' home QTH around the UK. They are indebted to Ofcom, the UK regulator, which has permitted the callsign to be used for the entirety of 2022.

Broadcasting House in London.

QSL information

The team at the BBC Radio Group look forward to working as many stations as possible. They are not able to issue a schedule of operations, but hope you will find them using all bands and modes throughout 2022. A special commemorative QSL card will be available via the traditional bureau.

A card will be sent out upon receipt of an incoming card. Amateurs can also QSL via Logbook of The World and eQSL.

Please note that the BBC Radio Group is unable to QSL directly under any circumstance. Please do not send any cards to BBC Broadcasting House or to the participating individual club members as you will, unfortunately, not receive a response.

Note

All photographs in this *OTN Journal* article are courtesy of the BBC and Wikipedia. References

•The BBC Story
https://www.bbc.com/historyofthebbc/timelines/
•GB100BBC QRZ page
https://www.qrz.com/lookup/GB100BBC
•Wikipedia *https://en.wikipedia.org/wiki/Main_Page*

ar

From the editor . . .
(continued from page 3)

relayed by up to 20 relay stations on a variety of frequencies and modes right around Australia. These frequencies and times are detailed on page 2 of this journal and also on the RAOTC web site.

Please note that, if you are unable to listen to these broadcasts on-air for any reason (such as the August 20 m relay failing at commencment due to an equipment failure, the first such failure in my umpteen years of relaying the broadcasts!), they can be streamed or downloaded as an MP3 audio file from the RAOTC website for up to six months from the month of the broadcast.

However, if you do listen to the broadcasts via your computer, could you please take a few moments to leave a brief message or comment via the RAOTC email address of *raotc@raotc.org.au* so that we know how many are using this service.

Unfortunately, due to ill health, our regular broadcast compilers and presenters of recent years, Bruce VK3UV and Ian VK3JS, have had to retire from the broadcasts and we are having trouble finding suitable replacements. Andrew VK3CAH has stepped forward and is helping by compiling and presenting every second news and information broadcast, but we are in desperate need of some more assistance.

Because of no other offers to help out, I have had to step out of broadcast retirement to compile and record broadcasts in order to take the pressure off Andrew VK3CAH. Long time members of the Club will recall that I was involved with the compilation, presenting and dissemination of the monthly RAOTC news broadcasts for 15 years from 2001 and had been retired from these tasks for the past six years apart from helping out from time to time with the 20 m and 40 m relays originating from Melbourne.

One or two competent broadcast compilers/ presenters are urgently needed. Fortunately, with the advent of electronic communications, we are no longer dependent upon local Melbournians to assist.

Can you help? Think about it! If you think you can help with the compiling and presenting of these monthly broadcasts every second month or so, please contact me.

RAOTC AGM 2022

As they were 'old style' face-to-face meetings, RAOTC AGMs have for decades only been convenient for Melburnians to attend. Now, thanks to Covid, we have discovered that AGMs conducted over Zoom are not only practical but very effective. One of the real pluses of Zoom AGMs is that RAOTC members from all over Australia can actively participate!

Please note that the RAOTC AGM 2022 will take place from 2.00 pm Eastern Australian Standard Time on Thursday, 15th September. Full details on how you can register and participate in the AGM 2022 appear on page 60 (the back page) of this publication.

Make sure you put a note in your diary now for Thursday, 8th September to ensure that you don't miss out on registering for participation in AGM 2022.

RAOTC management committee

It is generally considered that the optimum term for people to serve on the committee of a leisure activity group is three years. However, the majority of the remaining seven RAOTC committee members have served on the committee for over 10 years, some closer to 20 years.

Fortunately, times have changed. Now, because of Zoom, committee members no longer need to be located in Melbourne and can be located anywhere in Australia, such as, for example, Peter VK8ZZ who lives in Darwin. It would great if we could get some more interstate Club members to nominate for membership of the RAOTC committee to fill vacancies.

Would you like to be involved? Do you feel that you could contribute?

If so, please consider nominating for election to the RAOTC committee at the AGM 2022.

A nomination form to become a committee member is published below.

I look forward to seeing you on Zoom at AGM 2022!

A very 73 to all readers,
Bill Roper VK3BR
RAOTC member No 978

Nomination for RAOTCA Inc Committee

In accordance with Rule 51 of the Rules of the Association.

I, _____ *(name and callsign)*

hereby nominate _____ to the committee of the **RAOTCA Inc**.

Signed by: _____ *(proposer)*

I agree to accept nomination, signed by: _____ *(nominee)*.

All nominations must be returned to: **The Adminstrative Officer,**
at: **PO Box 107, Mentone VIC 3194**
or via email to:
raotc@raotc.org.au

All nominations must be received by **8th September 2022**.

Radio Amateurs Old Timers Club Australia Inc

In accordance with the Rules of Association, notice is hereby given of the

Annual General Meeting 2022

of the ***Radio Amateurs Old Timers Club Australia Inc***

to be held at

2.00 pm AEST (0400 UTC) on **Thursday, 15th September 2022**

and conducted by video conferencing using Zoom.

Business: Confirm minutes, receive the annual report of the committee, adopt accounts, set the membership fees, and elect committee members.

***(Note:** There are vacant positions on the committee - see nomination form on previous page.)*

RAOTC members who wish to participate in this AGM will need to **register beforehand** by sending an email to *raotc@raotc.org.au* **no later than Thursday, 8th September 2022**. Those who register will receive an email prior to the AGM advising of the Zoom meeting ID number and the password to enable them to join the AGM, plus the AGM 2021 reports.

The committee hopes that Victorian country and interstate RAOTC members will take this opportunity to actively participate in the AGM.

Radio Amateurs Old Timers Club Australia Inc

The **Melbourne September 2022 Luncheon**

of the ***Radio Amateurs Old Timers Club Australia Inc***

will take place from

12.00 noon (for a **12.30 pm** start) on **Thursday, 22nd September 2022**

at the

Caulfield RSL, 4 St Georges Road, Elsternwick, Victoria.

The guest speaker at the luncheon will be **Don Bainbridge VK3BIG** who will present a talk and PowerPoint presentation about

'The early days of ABC broadcasting in Melbourne'.

The Caulfield RSL offers a two course meal at a cost of $36.00 per head. Tea and coffee will be available for free. Soft drink, wine and other drinks can be purchased from the bar.

RAOTC members are welcome to bring a friend, but we must have firm bookings to 'RAOTC Luncheon, PO Box 107, Mentone 3194' no later than Monday, 19th September 2022.

Any queries to be addressed to Bill Roper VK3BR at *raotc@raotc.org.au* or 0416 177 027.

To all who read this and are in some way unwell, the committee and membership of the RAOTC, and indeed your fellow amateur friends, wish you well during these trying times. Amateur radio has enabled and kindled millions of worthwhile friendships over the years and most can remember their first endeavours to communicate with another fellow amateur. Long before the internet and social media, amateur radio enabled the first 'world citizens' and it continues to do so. Grasp and hold onto your memories.