OTN

Old Timers' News

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

Number 68 **September 2021**

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:

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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.

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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 1.825 MHz AM, and 7.146 MHz LSB.
08.00 pm	Victorian time (all year)	VK3REC on 147.175 MHz FM.
08.30 pm	Victorian time (all year)	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 . . .

I am very pleased that it is my turn to write the *From the committee . . .* column. It gives me great pleasure to be able to congratulate Bill Roper on being awarded the Medal of the Order of Australia in the Queen's Birthday 2021 Honours List.

Congratulations Bill, it is thrilling news that I was very pleased to hear and the award is thoroughly deserved.

As I write this column, Victoria has been in its fifth lockdown for several days. It is bad enough to be in lockdown - it is far worse to be in quarantine as well because you happened to go to a Tier 1 site at the wrong time. I speak from experience.

The pandemic is having a drastic effect on many aspects of life. I hope that members and their families are not suffering and their lives are not too disrupted.

Our hobby has also been affected. Club meetings have been cancelled, often at short notice. Rapid and unpredictable changes make planning events like Hamfests, GippsTech, radio conventions, amateur radio licence training courses and other events very difficult, and many radio clubs have given up because it is too hard.

There have been some positive outcomes. Many people have learned how to use on-line conference software. The RAOTC has held its last five committee meetings on-line, the first one using Skype and the rest with Zoom.

The September 2020 AGM was conducted using Zoom with 21 members and one visitor attending. There would have been more attendees but there was a problem with email communications which we are addressing.

One positive outcome of on-line meetings has been that Peter Clee VK8ZZ, who lives in Darwin, has joined the committee. We welcome Peter - it's good to have an interstate member on the committee.

On-line committee meetings enable members who do not live within reasonable travelling distance of Melbourne to join the committee and contribute to the running of the club. We invite interstate members and strongly encourage you to nominate for your committee.

Holding AGMs using Zoom enables members anywhere in Australia or further afield to attend. VK6 members may have to have an early or late lunch but our AGMs are held before the change to daylight saving time when the time difference becomes three hours.

On line meetings have been so successful that the committee plans to hold future committee meetings on-line or as a combination of on-line and live meetings. The committee hopes to hold AGMs as a hybrid live and on-line meeting when we can meet again and hold them at our September luncheon venue.

Jim Gordon VK3ZKK
RAOTC member No 1262
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From the editor . . .

A major concern for every editor is whether there is enough material available to fill each edition of the publication. When I took over the editorship and production of *OTN Journal* as from the September 2003 edition of *OTN*, the journal comprised 32 A4 pages.

Over time the size of *OTN* gradually increased. The first 60 page version was the March 2012 edition and remained so ever since.

Incidentally, 60 A4 pages is the largest size publication we can produce before having to go to a much more expensive form of binding.

Normally, about three months before each edition is due to be published, I have enough material to fill the 60 pages. But this time I only had enough material at the three month mark to fill about 40 pages.

Hence, I spent some time in writing five articles myself, totalling 17 pages, to help make up the shortfall. However, I was unnecessarily pessimistic. 'Murphy's law' prevailed and as soon as I had finished writing the fifth article, over 20 pages of new articles arrived fairly quickly from a variety of contributors.

Currently, at the time of writing, I have eight articles totalling 19 pages prepared and ready for publication in the next edition of *OTN Journal*.

Four are from that prolific contributor to *OTN*, Herman VK2IXV (nice to see Herman has his callsign back); one from Ron VK3AFW; and three are from me.

However, I will need a lot more articles for the next edition of *OTN*, so how about writing about your radio experiences and submitting an article to your journal.

If you don't think that you can write a full article, don't forget letters to the editor which are published as *From the members . .*

At this stage, I would like to thank Clive VK6CSW for his continuing invaluable assistance to the high quality of the material published in *OTN* with his

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Front Cover Photo

An Ultimate 73 reversible bug with a double knob on the circuit closer.
See the article by Herman Willemsen VK2IXV on page 38.

From our members ...

Secret wireless intercept war

Firstly, Bill, congratulations on another excellent issue of *OTN*, the March 2021 edition. It was packed with items of interest.

With regard to the Secret wireless intercept war article on page17, I knew both Steve Mason and Geoff Ballard and have a copy of Geoff's book *On Ultra Active Service*.

My last boss in Telecom Australia, as Telstra was then known, was Alan Flannery, who, with Steve Mason and Geoff Ballard, was a member of the Australian Special Wireless Group (ASWG). Alan and Steve worked together at Central Bureau when it was in Brisbane.

Alan gets a mention in Dr David Dufty's book, *The Secret Code-Breakers of Central Bureau* published by Scribe in 2017, sadly four years after Alan died.

Bill Jamieson VK3HX
RAOTC member No 1117

More about licence renewal

Regarding the article *A cautionary tale about licence renewal*, published on page 14 in the March 2021 edition of *OTN Journal* and the unfortunate series of events with the VK3TX callsign, I have experienced something similar, but from a different viewpoint.

Many years ago when I did the Morse test to upgrade my Limited Licence to a Full one, I was subsequently issued the callsign VK3ALK. I operated with this callsign for some months when, unexpectedly, the authority contacted me and said there had been a mistake issuing that callsign, they were withdrawing it and would issue me with another one. In the subsequent discussion I was then issued VK3DU.

This callsign had become available because the previous holder had moved to NSW and had taken out the callsign VK2DU.

Max, who ran Bright Star Crystals in Oakleigh, was VK3ALK. I did not know him personally but I found out later, from discussions with someone who did, that he had neglected to renew his licence and his callsign was eventually reissued - to me! He then took action to get his callsign back.

Like many other people, I maintain a calendar for the upcoming year with all important dates noted such as family birthdays and relevant anniversaries. In this calendar I also include the renewal date for my amateur radio licence to try to ensure it does not pass by without action being taken. I recommend that everybody set up some form of prompt to remind them of this important renewal date.

Peter Cosway VK3DU
RAOTC member No 1447

Australian codebreaker

The March 2021 issue is another *OTN Journal* full of interesting articles. Another well done!!

Secret Wireless Intercept War written by Steve Mason OAM (SK) especially caught my interest. Those who found this item interesting may also consider reading the book *A Man of Intelligence* by Ian Pfennigwerth.

This book details the life of Captain Eric Nave, an Australian Codebreaker Extraordinary, whose many achievements in code breaking before and during WWII should be more widely known throughout Australia.

He joined the RAN at age 18 as a Midshipman. Some years later, after many successes he was transferred to the Royal Navy - an historic first.

The author, Ian Pfennigwerth, spent 35 years in the RAN, his last 10 years primarily in the Intelligence sphere. He has written a very interesting and readable book.

Alex McDonald VK4TE
RAOTC member No 1411

Melbourne March 2021 luncheon

Bill Roper VK3BR
RAOTC member No 978

The Melbourne RAOTC March 2021 luncheon was held on Thursday, 25th March at the usual venue, the Bentleigh Club in Bentleigh. 47 members and guests were present to enjoy the excellent three course meal and white table service.

Apologies were received from four Club members who were unable to attend at the last moment.

It was a great occasion for Club members to again be able to gather together for lunch, a good 'ragchew' and listen to an interesting presentation after the two previous luncheons had to be cancelled because of Covid-19 pandemic restrictions..

After all had dined well, those present then listened to and watched a most interesting PowerPoint supported talk from the guest speaker, Peter Freeman VK3PF who spoke about Summits on the Air (SOTA) and Parks.

Peter had originally been booked to speak at the cancelled March 2020 luncheon but, fortunately, was willing and able to come along twelve months later. However, his talk was well worth waiting for.

After his talk was finished, and he had answered questions, Peter was then presented with an RAOTC engraved crystal wine glass as a memento of the occasion.

Photo by Mick Ampt VK3CH

RAOTC President, David Rosenfield VK3ADM, presenting the guest speaker, Peter Freeman VK3PF, with an RAOTC engraved wine glass as a memento of the occasion.

Bill Roper OAM VK3BR

Bruce Bathols VK3UV
RAOTC member No 1090

I am pleased to report that Bill Roper VK3BR has been awarded with the Order of Australia Medal (OAM) in the 2021 Queen's Birthday honours list, and I offer him my heartiest congratulations in achieving this award.

Bill is one of the very few amateurs that have been selected for the award with specific mention of his activities in Amateur Radio, and as such does give Amateur Radio a boost in the eyes of the public.

I have known Bill since the late 1960s, having had the pleasure of working with him as a staff member in the Head Office of the then State Savings Bank of Victoria.

He was my mentor in assisting me to obtain my own amateur licence, which I achieved in November 1971.

Bill was licensed in 1959, was a prolific 'home brewer' and was very active in the VK3 VHF group.

Now, at 85 years of age, Bill still produces the RAOTC bi-annual club publication *OTN Journal*, which usually runs to 60 pages. He also produces the quarterly *Newsletter* of the State Bank Victoria Retired Officers Club.

Here is the list of Bill's activities that enabled him to receive the OAM.

Wireless Institute of Australia

- Editor, *Amateur Radio*, 1972-1976.
- Federal Office Manager, 1988-1993.
- Honorary Life Member, 2006.

Radio Amateur's Old Timers Club Australia Inc

- Committee Member since 2000.
- Editor, *Old Timer News*, since late 2002.
- Membership Secretary since 2002.
- Former President.
- Former Secretary.
- Life Member.

State Bank of Victoria Retired Officers Club

- *Newsletter* production since 2002.
- Honorary Life Member, 2015.
- *Newsletter* Editor, since 2019.

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From the editor . . .
(continued from page 3)

outstanding proof-reading of all the articles published in this edition of *OTN*.

Although *OTN Journal* is only published twice a year, Club members can keep up-to-date with current RAOTC news, plus many other interesting radio items, by listening to the regular monthly RAOTC news broadcasts produced jointly by Bruce VK3UV and Ian VK3JS who do an excellent job. These broadcasts are available to listen to at a multitude of times and frequencies, as well as on the internet.

Basic details of the broadcast frequencies and times can be found at the bottom of page 2 of this journal; more complete information can be found by looking at the RAOTC web site - *www.raotc.org.au*

As you can see from the membership statistics published on page 32, total RAOTC membership has fnot achieved our target of 500 members, even though we had a record number of 17 new members join in the past six months. Numbers were reduced, sadly, by the seven Silent Keys recorded in that same six month period.

When was the last time you considered recruiting a new member or two to membership of the RAOTC?

Due to good stewardship by the RAOTC committee, and particularly by our treasurer Michael Goode VK3BDL, we have managed to keep the annual membership fees unchanged since 2014. One way to put off an inevitable rise in membership fees is to increase Club membership.

I am sure that many Club members have amateur friends who are eligible for RAOTC membership who would benefit by becoming Club members.

Membership application forms are readily available from the RAOTC's web site or from me, wearing my hat as the Club's Membership Officer. Details are available on page 2 of this journal.

Can you do your bit to increase Club membership?

As can be seen from the notice on the back page of this journal, the RAOTC AGM 2021 will take place on Thursday, 23rd September on line via Zoom. As many RAOTC members as possible are encouraged to register and participate in AGM 2021. Keep your eye on the RAOTC web site for any changes.

And finally, on a personal note, a big thank you to all who contacted me with best wishes for my cancer fight, and those who congratulated me on the OAM.

Bill Roper VK3BR

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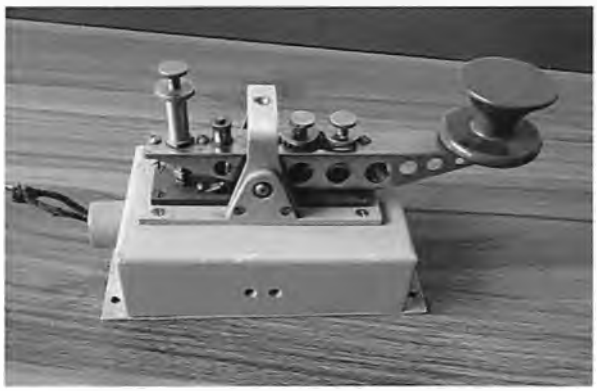
My keys have holes in them

Herman Willemsen VK2IXV
RAOTC member No 1384

This is a tale about two similar looking aviation Morse keys which I purchased in 2020. One, used on civilian aircraft, came from an amateur radio operator in New Zealand and the other one, used on fighter aircraft, was acquired from a Morse key collector in Germany. My efforts to find out more about these keys opened a Pandora's box!

The only information the New Zealand seller could tell me was that this Morse key was an aviation Morse key made by the Dutch company NSF around the mid to late 1930s.



Herman's NSF key made in the mid to late 1930s.

My magnet test revealed that the whole key is made of a lightweight aluminium alloy, but the trunnion pin is ferrous metal. The key's lever is of a hollow inverted U-shape with 'Swiss cheese' holes drilled in it to reduce the weight of this aircraft key even more [1]. The key's knob is a combined one-piece knob-and-skirt and appears to be made of pre-war ebonite. Inside the housing underneath the lever and trunnion is a key-click suppression circuit.

Missing is the key's removable protective key cover. Instead of the usual two pairs of contact points for 'make' and 'break', this key has two pairs of 'make' contacts, of which the ones closest to the knob are most likely keying a supplementary circuit.

A close-up of the multiple contact points.

But first a bit about radio manufacturer NSF. NSF (Nederlandsche Seintoestellen Fabriek) or Dutch Signal Apparatus Factory, was founded in Amsterdam in 1918 and settled in Hilversum as a joint venture of Marconi

KLM's first plane fitted with wireless in 1923.

UK (40%), Philips (40%) and Radio-Holland (20%). Initially, NSF produced professional radio stations for the Dutch Navy, Air Force, KLM (Royal Dutch Airlines) and the Dutch Colonies[2].

In about 1922, the company also produced radio sets for the public, as well as transmitters and receivers for the Merchant Marine (you may recall my stories in *OTN* about their HL7 receiver and MZ11, MZ32 and MZ33 transmitters). NSF also carried out the assembly of Marconi transmitters and Philips radio sets for consumers.

In 1923, after having paid KLM's Albert Plesman[3] numerous visits, NSF sales department boss Willem Vogt finally received permission to demonstrate NSF radio equipment on a KLM Fokker FII training plane, with radio callsign H-NABC[4], on a flight from Rotterdam to London. Contact was made by wireless telephony and telegraphy with ground stations in Holland and ship stations in the English Channel. This trial proved to Plesman that wireless equipment would not only enhance the safety in the sky, but also speed up the flow of transit passengers on the ground. It was the start of a strong and lasting relationship between NSF and KLM.

Not just KLM was interested in using NSF radio equipment, but many overseas aviation companies were as well. Air and ground radio equipment, made by NSF, consisted of transmitters and receivers for Wireless Telegraphy, Wireless Telephony, and also Radio Direction Finding (RDF) apparatus, radio compasses and radio beacons.

From a Morse key collector in the Netherlands I obtained a picture of NSF radio equipment (see next page), including a similar type of NSF Morse key, onboard a KLM DC-3 civil aircraft named after the bird Torenvalk (in English: Kestrel), with callsign PH-ALT[5].

Soon after the Germans invaded the Netherlands on 10th May 1940, they commandeered the NSF factory in Hilversum. Its workers were forced to continue making radio equipment (but now embossed with German wording) to support the German war industry. During the German occupation, non-violent workplace resistance and sabotage cost eight NSF employees their lives.

1937 NSF radio equipment VR35 in DC-3 *Torenvalk*, PH-ALT.

VR stands for Vliegtuig Radio = Aircraft Radio. From top to bottom: Transmitter VZ35, RDF receiver VPK35 and receiver VO35. (Z = Zender = Transmitter; PK = Peil Kompas = RDF; O = Ontvanger = Receiver).

On the far left of the bottom is the NSF Morse key. Jacob Pen, a former employee of Lucent Technologies, confirmed that my key is a similar type as used with NSF aircraft radio equipment VR35 on board KLM aircraft PH-ALT. The other equipment on the left hand side is for RDF purposes.

Underneath the aircraft clock (I believe a type of chronoflite), are the aircraft's call letters PH-ALT. The crank handle turns, via a Bowden cable, the RDF rotating loop-aerial mounted on the cockpit roof. The box above the aircraft clock is possibly a pre-tuning circuit for the RDF receiver.

With regards to NSF Morse keys: The same type of keys were also used with NSF aircraft radio equipment VR22 and Philips/NSF aircraft radio equipment VR27b. Both those aircraft wireless radios were installed on the early Fokker aircraft, like the Fokker CX, used by the Dutch, German, Finnish and Spanish Air Forces in the late 1930s, early 1940s.

Ps 1 - At the outbreak of WWII, KLM plane PH-ALT moved to the Dutch East Indies (now Indonesia) and from there to Australia. After several changes of owners and callsigns, she crashed in 1945 as VH-CXD near Bamaga in Queensland.

Ps 2 - In 1934, NSF aircraft radio VR5 was on board KLM DC2 *Uiver* (Stork) PH-AJU, which was participating in the London to Melbourne air race. It became lost on its final leg in a thunderstorm and was saved by the people of Albury.

On 9th September 1944, the NSF factory lost its electricity as, due to a rail strike, coal could no longer be supplied. Production stopped and most personnel were sent home. The Germans emptied the factory of all equipment, machinery and tools, and transported their loot by rail to the German town of Minden, where they hoped to continue the production in a large underground cave.

At the end of September, the Dutch NSF factory closed its doors, but not before the inside was completely vandalised by a vindictive German commando group stationed in Amsterdam. Only the walls and roof remained intact.

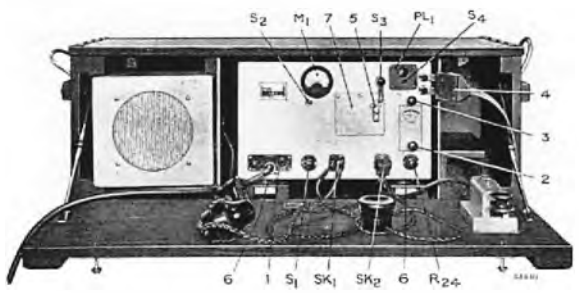
After the war, only 10% of this loot was recovered, albeit now in a poor condition, and returned to the NSF factory. One year after the war, with the support of Philips, the NSF factory recommenced production.

In the meantime, further research into NSF Morse keys opened a can of worms. I found a few other NSF and/or NSF/Philips-type Morse keys with collectors in Australia, Germany, Hong Kong, Holland and the UK. What intrigued me the most were the NSF-type keys owned by Ray Lee VR2UW in Hong Kong, Peter Graack DK7JC in Germany and the RAF museum in Cosford, UK. Ray Lee calls his two NSF-type keys 'sheet metal keys closely related to RAF type 10F/127'. I found a poor picture of RAF key 10F/127, belonging to the late Wyn Davies, in *Morsum Magnificat 41* on page 34 also with the handwritten characters 10F/127 on it.

David Holmes G4ZAO has a similar key. He told me that "somebody has written 10F/127 on the base and protected it with clear varnish. 10F/127 is typical of an English Air Ministry type number, but the key and plug look more like a European design. There is a maker's inspection mark on the top of the case, which has the letters RTE and 76 inside a circle".

David Holmes G4ZAO's RAF 10F-127 key.

I found in Chapter 6 of the RAF *Signal Manual* of December 1938, that this key was used with Transmitter-Receiver radio set TR1148A. Part reference number 10F/127 is the nomenclature for Key, Morse, type K.[6].



A TR1148A with an NSF Morse key 10F-127.

A matching NSF-type key has also been produced by Philips Australia[7], who, for many decades, has had branches in many European and overseas countries, including Australia since 1927.

This could explain the minor differences between keys of this type, the name plate being 'Philips type No 38-09-42 Serial E. No V10 Made in Australia' on the Australian specimen, 'N.S.F. - Holland nr. 40 AF 10' on the Dutch one and the designation 'RAF type 10F/127' on those produced in the UK[8].

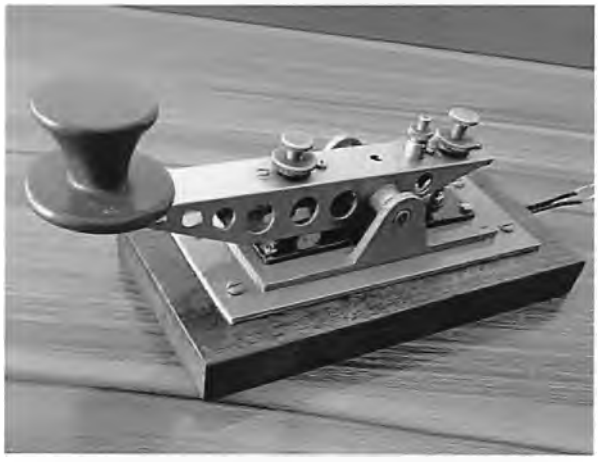
The NSF-type key in the collection of Peter Graack in Germany is described by him as "A lightweight Morse key manufactured by Philips in Belgium in 1943 in a small series of approximately 200 pieces for the German Air Force in WWII".

Since 1934, the Dutch manufacturer NSF made radio equipment at the Philips production lines in Leuven, a city 25 km east of Brussels. In WWII, like their counterpart at Hilversum in the Netherlands, workers at Philips/NSF at Leuven in Belgium were also compelled to produce equipment for the German military.

Jacob Pen PA3FYE, a former employee of Lucent Technologies, informed me that a NSF-made key was also used in WWII by members of a Dutch resistance group[9] and a similar model key was made by a Dutch Technical School student during his internship with the NSF in 1941.

An NSF key used by the Dutch resistance in WWII.

In September 2020, I bought Peter Graack's WWII Air Force key and added it to my collection. It has the usual 'make' and 'break' contacts. The material is aluminium and, like the Dutch resistance key, was made without a cover.



Herman's NSF key acquired from Peter Graack DK7JC. This aluminium key was made by Philips, Belgium in 1943, without a cover, for use by the Luftwaffe.

In general, there are still some unknowns about the history, manufacturers and usage of some of these rare NSF/Philips-type Morse keys, which popped up in many countries, with different brand names, with or without a protective cover, with or without a key-click suppression circuit, with either two or three contact pairs and with either a few or a lot of holes in the key's lever.

Footnotes

1. The manufacturers of aviation Morse keys with weight-saving perforations, known to me, were Ducretet/Roger (early 1900s), Italian Adda keys (1930s), NSF/Philips (1940s) and French SIF Air Force key type 473 (1946).

2. In the 1920s, NSF and Philips were equal partners. However, in 1926 Philips bought the Marconi shares and became the major shareholder. As a result, NSF's production control and brand name gradually phased out and ceased to exist in 1947 when its name was changed to Philips Telecommunications Industry (PTI). During the transition from NSF/PTI to Lucent Technologies in the 1980s, most of NSF/PTI's archival material was lost.

3. Albert Plesman (1889-1953). Aviation pioneer and first CEO of KLM founded in 1919.

4. The radio callsign registration of H-Nxxxx was later replaced by PH-xxx.

5. In 1937, NSF received an order from the KLM for 13 long- and short-wave transmitter-receivers type VR35 and the same number of radio compasses (RDFs) type VPK35 for use in their DC-3 aircraft. In the photo, you can see the NSF aircraft radio equipment VR35 on PH-ALT.

6. See https://www.blunham.com/Radar/SignalsMuseum/PDFs/AP1186_2.pdf, Chapter 6 about TR1148A. This key was used by the RAF Balloon Command during WWII with Transmitter-Receiver TR1148A. TR1148A is same as NSF/Philips DR38a. Also see: http://www.wftw.nl/mobileradio.html

7. See item 535 on website: https://australiantelegraph.files.wordpress.com/2020/09/ron-mcmullen-collection-and-description-part-5-.pdf

8. Made in the UK by Philips, or a subsidiary of Philips, for the RAF.

9. This key is on display in the Jan Corver museum at Budel, a village in the Dutch province of North Brabant.

Sources

•VERON, the Association for Experimental Radio Research in the Netherlands.

•Morse key collections of Ron McMullen, Jan van Ooijen PA3EGH and Raymond Lee VR2UW.

•1958 - Book by Willem Vogt: *Spanne en Spanningen* (*Timespan and Tensions*) - The forty-year history of the Philips' Telecommunications Industry (PTI), formerly NSF.

Websites

•https://www.ozatwar.com/ozcrashes/qld198.htm

•https://www.radiomuseum.org/dsp_hersteller_detail.cfm?company_id=12307

Acknowledgements

•Alf Fisher, curator of the Signals Museum, RAF Henlow, Bedfordshire, UK;

•Peter Garwood, Secretary of the UK Balloon Barrage Reunion Club;

•Steve Darveniza VK4VN; Michael Wise ZL3AX; Anton Klok PA3AQV; Kees van der Spek VK1FCLV; David Holmes G4ZAO and Jacob Pen PA3FYE.

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Henry Sutton, the forgotten genius

Bill Roper VK3BR
RAOTC member No 978

When thinking about the early pioneers of radio such as Hertz and Marconi, the name of Australian Henry Sutton certainly does not spring to mind. And yet, this Ballarat man could well stand among the world's great inventors because he was not only involved in the late1800s and early 1900s in radio and television but also in electricity, battery storage, carbon filament electric light bulbs, telephones, aeronautics, automobile engineering, colour printing, hydraulics and wireless telegraphy. So why is this pioneering Australian virtually unknown?

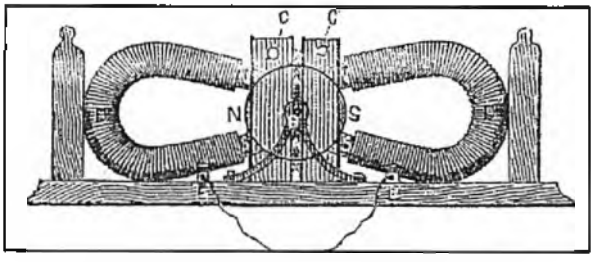
Part of the answer could be because of the relative isolation of Australia from the rest of the world in the late 19th century, but also because Henry disliked patenting his devices, which could have made him more widely known. He believed that anything he invented should be freely available to others and benefit mankind without the restrictions imposed by patents. Also, he did not want personal material gain.

Henry Sutton.

Early days

Henry Sutton had a rather inauspicious start to life, being born in a tent on the Ballarat goldfields on 4th September 1855. He was the only one of the six Sutton children who did not later go into the successful Sutton family music business that became an institution in Melbourne and Ballarat until 1956.

Henry was the studious one of the family. Although all the Sutton children were taught by their mother until the age of 11, he was largely self-taught from then on. But his interest in science had already started and before the age of 14 he had read all the science books in the Ballarat Mechanics Institute, invented a 2.4 m long torpedo and also an electric continuous current dynamo with a practical ring armature.



A diagram of Henry Sutton's continuous current dynamo.

Although Italian Antonio Pacinotti had invented a similar continuous current dynamo in 1860, Sutton's invention was taken up by Belgian Zenobe Gramme and became a standard after 1881. Gramme showed the French Academy of Sciences his own improved version of the Sutton machine, and when in 1873 it was found the device was reversible and could be used as a motor as well as a generator, it was enough to provide the impetus for the fast development of the worldwide electric motor industry.

This early interest in matters scientific led Henry to study the flight patterns of insects that later blossomed into one of his earliest inventions in 1873 - a manoeuvrable model clockwork flying machine known as an ornithopter, which could fly in a circumference of 12 feet (3.7 m). One of its earliest admirers was Lawrence Hargrave who went on to become Australia's flight pioneer.

These experiments with heavier-than-air materials for flight are regarded as the first to be carried out in Australia. Later, in 1878, two of Henry's papers on flight were published by the Aeronautical Society of Great Britain.

Telephones

A student of the Ballarat School of Mines, Henry went on to make Australia's first telephone and install Australia's first telephone system, a complete telephone network between the family's music warehouse and their shop in Ballarat.

Alexander Graham Bell was issued his patent for the telephone in March 1876 and, after Henry Sutton had read a brief account of it in *Scientific American*, within six months he had developed over 20 different versions.

Although Sutton did not patent his own versions, 16 of these designs were subsequently patented by others less scrupulous. In 1878 he invented the first telephone handset.

It was during this time he began corresponding with Alexander Graham Bell and they became life-long friends. In 1910, Dr Bell came to Australia and visited Henry.

Henry broke new ground when, in April 1883, he became the lecturer in Applied Electricity and Magnetism at the Ballarat School of Mines, the first class of its type in Australia. History has recorded that he was one of the best lecturers the School of Mines had employed. His inventing continued while he was a lecturer, with him making improvements to many inventions and donating them to the school.

Not only was he entrusted with teaching a senior class, he was also allowed to install a telephone system around the school. He quickly found there was a shortage of, and a delay in, getting scientific instruments from England so he organised an Australian production facility for instruments, which gave birth to Victoria's scientific instrument industry.

At around this time (after reading about Sprengel's invention) he developed a vacuum pump that he used in his lectures. The pump made possible the development of the electric light bulb, which relied on a vacuum for its efficiency.

Henry Sutton's mercury air pump created a near perfect vacuum. His invention was again a considerable improvement on existing technology and again he declined to patent it, preferring to give it to the world gratis for the benefit of all.

Henry went on to invent the light globe, only to discover that Edison had announced his own light globe invention sixteen days earlier. However, so successful was Henry's vacuum pump, both Joseph Swan and Thomas Edison used the design in the mass production of their incandescent light globes.

During the 1880s, various vacuum pumps and batteries were given freely to the world for the benefit of everyone.

The Sutton storage battery was the first battery in the world to store electricity and be recharged, and it was exhibited at the 1882 Crystal Palace Electrical Exhibition in London. This was the invention that brought Henry world acclaim. Thomas Edison stated that it was the best battery in the world and this was also the view of many scientists at the time.

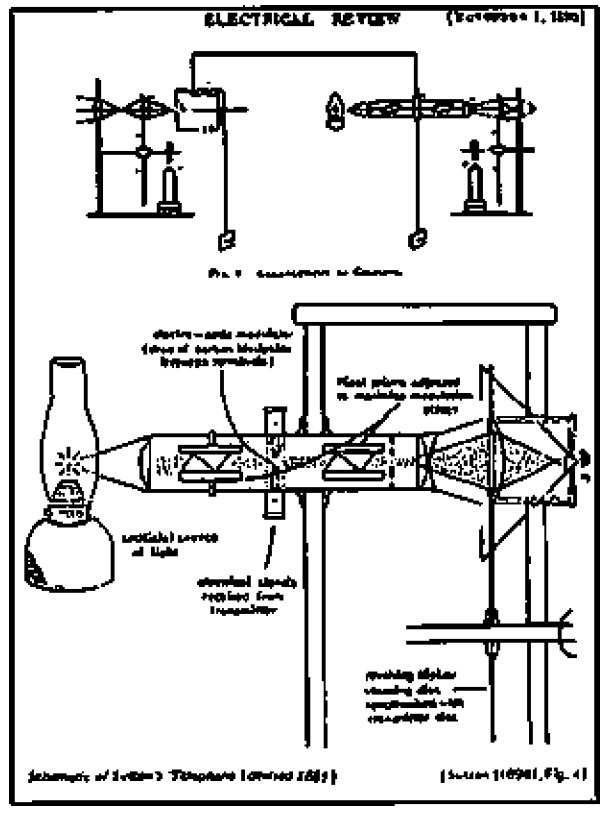
Henry's inventions eventually led him to travel to England in the 1890s where he set up a company based around a new half-tone photographic process he had invented. However, his attempts to market his new Suttontype half-tone photographic printing process met with limited success.

The Telephane

Probably Henry Sutton's most celebrated invention was his development of the 'Telephane' which was a forerunner to television. Henry envisaged sending pictures by wire. One method he devised was sending still images by facsimile and the other idea was to transmit moving pictures.

He is reputed to have successfully transmitted an imperfect but recognisable image along telegraph wires in 1885. Science historians credit Sutton with 'the first feasible television system'.

This venture preceded the 'official' inventor of television, John Logie Baird, by many years (Baird was not born until 1888).



Henry Sutton's Telephane System of 1885.

Crude as it may have been, Henry sent details of the Telephane to R J L Ellery, government astronomer of Victoria "so the invention could be in the hands of someone capable of stating his claims of being the first in this direction".

Henry demonstrated the Telephane to scientists in England and France, and published a paper giving the details of the system. But he did not patent it! This allowed Baird to use Henry's thoughts on synchronisation of transmitter and receiver in his own invention 43 years later.

It was during his time in England that his paper on the first feasible television system was published by the *Telegraphic Journal and Electrical Review* in 1890 and *Scientific American* in 1891, and was re-published two decades later by *Scientific American*.

While in England, Henry met Nikola Tesla and attended his lecture on Alternating Current at the British Institute. Tesla became interested in Henry's method for transmitting pictures by which he had successfully transmitted a still image in Australia before he had travelled to England.

With the aid of William Preece at the British Central Telegraph Office in London, Henry and Tesla successfully transmitted the first still image in England using Henry's system. It was during discussions with Tesla in 1892 that Henry became convinced it would be possible to transmit pictures wirelessly and immediately began working on wireless telegraphy.

Radio

His interest in radio was stimulated after his meeting with Nikola Tesla in London, who was there to give a series of lectures on wireless energy. This reinforced work he was already involved with in sending pictures by radio.

He became involved in the family music business in 1908 and moved to Malvern in Melbourne where he

erected a radio tower 'which was about twice the size of the house and had 700 m of steel cable and he held the world's record for the longest radio transmission during that time'. A year later he was granted Australia's second experimental radio licence, allowing him to transmit up to 400 km.

Henry Sutton with the world's first portable radio transmitter.

In 1910, Henry was credited with inventing the world's first portable radio transmitter that had a range of about 460 m. He then became involved with top-secret work on long-range radio technology with the Australian Navy.

A few years later he was a member of the team that demonstrated sending radio signals between Queenscliff and Devonport - an exercise in which a Marconi representative wanted to convince the federal government to buy Marconi wireless telegraphy equipment.

As a result of this experiment, the Australian government decided to build a radio system around the country and from 1906 to 1912 Henry worked for the government on perfecting the system.

According to his biographer, Henry's experiments in transmitting images by wireless led him into a new concept of radio which is still a mystery, but one his biographer is hoping to solve.

He had talks with the Defence Department about this new technology but he was falling foul of the Post Master General who wanted to prosecute Henry for breaking the law by broadcasting from his Malvern home without a licence.

The argument raged on for two years until the authorities were finally convinced that Henry Sutton was working secretly for the government.

Walter Jenvy, Victoria's chief electrical engineer, is reported to have sent Australia's first radio signals to the escort ship of HMS *Ophiry* on which the Duke and Duchess of York were travelling to open the first federal parliament in 1901. The message, "Hearty greetings of welcome from Queenscliff", was received on board, prompting the reply "Thanks, but where's Queenscliff?"

Henry Sutton's wireless inventions caught the attention of the American Great White Fleet when it visited Australia in 1908 and the wireless officers of the fleet visited Henry upon their arrival. His wireless inventions were later used by the Australian, American, Japanese, and British navies.

Automobiles

Outside radio and electricity, Henry was interested in the advent of the motor car. He designed, built and drove two efficient vehicles with carburettors of his own invention. At a meeting of fifty-five motorists held at the Port Phillip Club on 9th December 1903, Sutton moved the resolution that founded the Royal Automobile Club of Victoria (RACV) in 1903.

In 1899 he designed and built one of Australia's first cars in Melbourne. It was called 'The Sutton Autocar, an Antipodean invention which could go 30 kilometres an hour'. This car may have been the first front wheel drive car in the world. Henry's car was reported in the English press at the time and featured in the English magazine *Autocar* which the car was named after. Two prototypes of the Autocar were built and the Austral Otis Company was going to go into business with Henry to manufacture the car but the cost of the Sutton Autocar was too prohibitive as it could not compete with the cost of imported cars.

The Sutton Autocar designed and built in 1900.

Another car he designed and built in 1900 is now restored and privately owned. It was displayed at the White House Museum in Tasmania in 2009.

Experiments with air-cooled engines running on low-grade fuel led to him designing and building engines and carburettors. He designed and built and, with his son, raced motorcycles and experimented with three-wheelers.

In collaboration with the Austral Otis Lift Co, he helped build Australia's first hydraulic lift, installed in the family's shop in Ballarat. This lift became a novelty attraction for shoppers.

In spite of often working until 2.00 am and beyond, Henry found time to marry at the age of 25 and had three sons. After his wife died, he married again and had another two sons.

Henry Sutton died at the early age of 56 on 28th July 1912, leaving a legacy that is only now just beginning to be recognised.

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An irony of life

Ken Morgan VK3CEK
RAOTC member No 1457

The year was 1972 and I was Senior Engineer in the Property and Buildings Department at the Melbourne University. The EPA (Environmental Protection Agency) had just been created and was looking for some way to ingratiate itself with the populace in general. Vic Hopper was Professor of 'RAAF Physics' Melbourne University and famous for his Upper Atmosphere Research.

He had a team of two skilled technicians who made his balloon packages of instruments and had helped the US Navy with his research, particularly in relation to weather prediction. The US Navy was so pleased it continued to supply him with helium for his balloons.

There existed the 'Carltonion Association'. It was created to watch what the University was doing and how it may affect the surrounding area.

The EPA decided to inform those of the populace who suffered from asthma when the 'Inversion Layer' was low which caused pollens and dust to be concentrated.

Who was to provide this information? None other than Professor Vic Hopper, and the Prof was happy to oblige.

A few weeks after this, a letter appeared in my inwards tray. It was from the Carltonian Association, addressed to the Vice Principal, and complained of an annoying 'beeping' coming from the University. Attached to it was a note from the Controller of Buildings saying, "Please find and rectify this problem".

The Redmond Barry building, Melbourne University.

I had not heard the beeping so, during my lunch hour, I sat near a window listening. Sure enough I heard the noise. It sounded rather like a time-signal. I went outside to find where the noise came from but it seemed to come from all directions.

Gradually other matters occupied my time and finding the location from whence the noise originated was forgotten. Until the Gate Guards told me that the EPA noise locating truck had entered the University grounds that weekend! Fortunately, the noise locating equipment had malfunctioned.

However, it galvanised me into action. Eventually friends suggested I inspect the roof of the Redmond Barry building. This I did, and found a square 'tower' pointing to the sky.

The tower was made of Canite sheets (a low density fibreboard panel made from sugar cane fibres). Peering through a crack I saw a horn loudspeaker 'firing' down into a large dish.

Daylight began to dawn. I walked around the perimeter of the roof examining the top of the parapet. Sure enough, there were three microphones on the parapets, each side of the building.

Professor Hopper was measuring the time it took for each 'beep' to travel to the Inversion Layer and back. In this way he could calculate the distance to the Inversion Layer and report back to the EPA.

The EPA, in turn, could warn when the Layer was low and advise hay-fever sufferers to remain indoors.

What a good way to make the populace admire the EPA! Equally, what a good way to annoy the population near the University!

What to do? I contacted the EPA, Professor Hopper and two of the Carltonion Association Members. With all seated in my office, I explained what had happened.

They were all 'good sports' and saw the funny or rather ironical side of the situation. Professor Hopper said he could reduce the beep intensity and reduce the frequency of transmissions.

This satisfied the Association Members who said they would report back to a full meeting. I was able to report back to the Controller of Buildings that the problem was solved. Thus, 'An Irony of Life'!

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Need to slow down your bug?

Herman Willemsen VK2IXV
RAOTC member No 1384

In order to slow down your bug key, you will need to add an extra weight for your round or square pendulum. An additional pendulum weight from Vibroplex looks the best but, to beat the delay and costs, you could use one or two Empire brass 19 mm stair gauges. They can be bought from your local hardware store or eBay.

Empire brass 19 mm stair gauges.

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Some recollections of Melbourne, Moorabbin, Mildura and Avalon airports in the 1950s

Graeme Scott VK2KE
RAOTC member No 789
WIA Life member

In 1957 I left technical school and began an apprenticeship with DCA (Department of Civil Aviation). My first placement was at the installation section situated in a Nissen hut on the southern perimeter of Essendon airport. Nissen huts were interesting in that they had a curved roofline that cast no shadows.This was a wartime strategy to make buildings hard to see from the air in case of enemy attack.

One of my first jobs was to assemble light fittings that were to be installed as runway lights at the airport. Another early job was to pot up transformers that were installed in the ground at each runway light.

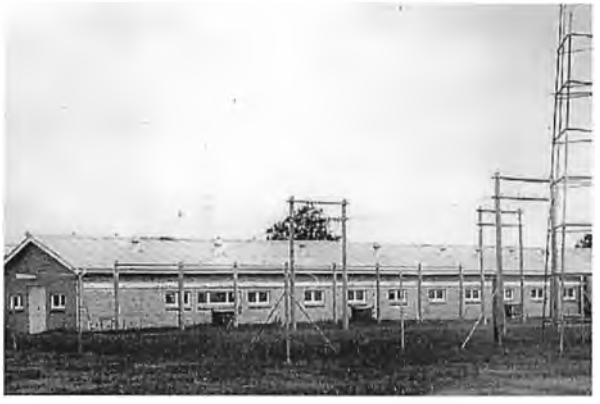
The transformers were potted in epoxy resin to waterproof them from moisture entry while buried in the ground. This was an interesting job in that the transformers were wired in series via their primary winding while the secondary winding fed the voltage to each light globe.

A WWII vintage Nissen hut.

The transformers were fed from current regulators back in the main powerhouse at the airport. This meant that the entire runway lighting circuit was energised by a current fed from the regulators through the series circuit going right around the entire runway. If any lamp failed, as lamps do, it didn't affect the series circuit as would happen with the older style Christmas tree lights that were in a series configuration.

Once I gained my driver's licence at age 18, I was able to drive the DCA cars. I was taught to drive by a bloke from the Department of Supply. As I drove around, he did his shopping - a very convenient arrangement. One thing he did teach me was how to parallel park and I've used his technique ever since. (In fact, I had been driving my dad's five ton truck, from about age 15, on quiet country roads, as well as the milkman's Morris van in the early mornings.)

At times I was sent off by my foreman to the transmitter building on the Hume Highway at Campbellfield. All aircraft communication in those days was by HF radio and the Campbellfield station was full of powerful transmitters that I think were using the AM mode.



The Campbellfield HF transmitter station.

There was a 60 kW diesel generator that provided power if the grid supply failed. One of my jobs was to ensure the diesel would start (automatically) when needed in case of an outage, so I would manually start up the engine, give it a run for, say, 15 minutes off load and monitor its performance. Then I would shut it down and check the batteries were fully charged. The batteries were lead acid type and were kept on a permanent float charge all the time.

Then I would leave Campbellfield and drive to the receiving station at Craigieburn to check the diesel generator and its batteries there.

This station had racks of AR7 receivers that picked up the transmissions coming in from aircraft en-route to places like Hobart, Launceston, Adelaide, Sydney, and Perth. If I recall correctly, the frequencies in use were on 3, 5, 6, 8 and 12 MHz .

Later, with the advent of VHF, the transmitters and receivers at the above stations were made redundant. These sites probably have now become, or are becoming, outer residential estates.

The antennas at both stations were mostly dipoles that were fed by delta matching which seemed to be the

The Craigieburn receiving station had racks of AR7 receivers similar to the above.

most popular method in those days. I'm not sure, but maybe the delta matching gave broadband characteristics that suited the needs of these aviation circuits.

Another job I had to do was to make a periodical trip to Mildura airport to check the diesel generator there and to ensure its batteries were retaining a good state of charge. On running up the diesel on one such visit, as per our usual practice, I noticed that the generator was not putting out its usual voltage. In fact, it was simply delivering no voltage at all.

I performed all the usual checks and quickly found the generator's field winding had gone open circuit. Immediately I got on the phone and called my foreman in Melbourne, advising him of the problem. He promptly jumped into action and despatched a mechanic with another generator in his truck to make a changeover of the faulty generator. This was duly done and Mildura airport once again had standby power.

At the time I was in Mildura, an American/ Australian joint project was underway. It was called the 'HIBAL Project' where a balloon filled with gas was released from a truck and sent soaring into the sky (see *Project HIBAL* by John Sutcliffe VK3TCT, published on page 38 in the September 2015 edition of *OTN Journal*).

The payload of the balloon contained a filter and fan which was designed to capture the amount of dust containing radiation coming from nuclear tests elsewhere on earth. The balloon was eventually destroyed by remote control, and the fan and filter would drop to earth on a parachute. The rescue team used a Land Rover and a Cessna aircraft to track the payload and recover the instruments for analysis.

One of our sites was at Cowes on Philip Island. This was, if I recall correctly, an Aircraft Navigation Station using a VAR transmitter. The transmitter site was in a cow paddock and, once we had completed our work, we walked around the paddock collecting bounteous heaps of lovely mushrooms to take home to cook!

We acquired Avalon Airport some years later and some of us had to drive from Essendon each day to Avalon to do general maintenance and checkups on generators and other equipment.

The control tower had an air conditioner for the controllers' comfort and it was a 'dog' of a machine to lower down for inspection and maintenance. It was not of the modern split unit construction so was heavy and quite cumbersome. It took at least two of us to manhandle it down for cleaning and general service.

One day I was in the tower with the controller while Qantas were training pilots on the latest jets, the Boeing 707. After some 'touch and goes', the American training captain called the tower and asked if he could do a slow flyby past by the tower. He had concerns about whether the main landing gear was lowered and locked as he did not have the three required green lights on in the instrument panel.

A Qantas Boeing 707.

We took a good look at the landing gear as he flew past and we felt it was lowered and appeared locked. The training captain went round again and gently landed the plane on the runway without incident. Later, it was found that a switch on the landing gear had not activated the green light. A small adjustment was made and all was well after that.

It's quite spectacular having a Boeing 707 fly past at low altitude!

At the time we were there at Essendon over many weeks, the French Mirage fighter jet was being built in Melbourne and the brand new planes were being tested at Avalon. It was a great sight to see these jets and the Boeing 707s also being flown in the area at the same time.

At about that time I had to do a run down the runway to service some equipment at the far end. This gave me the opportunity to drive my Falcon station wagon at full blast along the runway which was over one mile long. What a blast! No traffic, no police and no cameras as I pushed the 'pedal to metal' as they say! Needless to say it was a real fun experience. The needle in the speedometer was well up at the top of the scale!

A special installation was made at the end of the runway at Avalon. It was a net that could be deployed at the touch of a button in the control tower. This net was there to stop a Mirage jet from overshooting the runway if the brakes failed on landing.

As part of our work, one day we had to test a long underground cable which was suspected to have a fault. We used the 2,500 V crank-handle Megger to do the test. One thing we did find was that the cable behaved like a capacitor and we received quite a shock if we touched the cable's terminals before discharging it! Needless to say the cable was faultless as it held a charge for quite some time after the test was completed. After that incident, each cable test was treated with great respect!

Some of my work was at Moorabbin Airport and the aircraft of the day included Tiger Moths, Victa Airtourers and another plane, the de Havilland Canada DHC-1 Chipmunk monoplane, with a low wing, fixed gear and a similar engine to the Tiger Moths that were training young pilots.

One of my jobs at Moorabbin was to run up the three diesel generators for tests in the diesel training school. I was able to synchronise the generators and

A De Havilland DH-82 Tiger Moth biplane.

connect them to the grid for short periods. This was an interesting experience indeed.

On a windy day it was quite amusing to watch the young pilots landing the Tiger Moths and the Chipmunks as they would easily 'balloon up' if the pilot was not yet very good at landing in windy conditions.

Usually, after a few bounces, the plane would eventually be safely landed and the pilot would nervously walk away, or maybe even go and try it all again.

There was an old building at Moorabbin in which fire fighting foam was tested. This foam was made from blood and bone! Talk about cheap fire-fighting chemicals! However, the days of the blood and bone are now long gone.

A Victa Airtourer.

These days firefighters use aqueous film-forming foam (AFFF) to help extinguish difficult-to-fight fires, particularly fires that involve petroleum or other flammable liquids, known as Class B fires.

Another job we didn't greatly relish was going down into a certain large tank set in the ground. It was the sewage pumping station that pumped the sewage from the airport into the street main. The land at the airport was substantially flat so the sewage needed help to get it on its way to the distant treatment farm.

Strangely, there was no smell in this tank but I'll bet there was some gas (methane) in the air in the tank although we never detected it. All we had to do was check the pumps and the contactors that controlled the pumps, lock up the tank and move on to another job.

One day I was sent to Nhill Airport in the west of Victoria to deactivate the HT power lines there so the linesmen could do some maintenance on the poles and wires. I stayed at one of the three pubs in the town - the Union I think it was - and we all enjoyed a quiet beer or two after hours in one of the back rooms before dinner and bedtime.

While at Nhill I climbed one of the 70 foot (21.3 m) radio towers. This was in my very youthful days when I still had a devil-may-care attitude and I was able to rock this steel tower as I climbed it. I was quite amazed at how much movement you could get in a steel tower.

While I was at Nhill, a Douglas DC-6 aircraft was flying overhead and I heard him via the radio we had there. The pilot had been given a bomb scare and he had the choice of landing at Nhill or proceeding to Essendon. He chose to fly on to Essendon with no incident. This was in the days when bomb scares were fairly common.

A de Havilland Canada DHC-1 Chipmunk; sometimes known as the poor man's Spitfire.

At the eastern end of the Essendon east-west runway was a series of approach lights. These were switched on by the Control Tower in low light, or night conditions, or if a pilot requested them be energised. As with the runway lights, these approach lights could be selected at a number of brightness settings depending upon the prevailing light conditions and pilot requests. Luckily, I never had to climb the poles on which these lights were installed as some were quite high due to the hilly land there. I guess the lamps had a long life as they were not switched on that often.

The land at the approach lights was very hilly as you came in over Preston and indeed there was a spectacular hill that was very steep. We had fun at times climbing the hill on this road which was called Gaffney's Hill, if I recall correctly.

Another experience I had was when I had to visit the Preston marker. It was a transmitter that gave the pilots a signal that they were on track to the runway. The transmitter happened to be within the local drive-in theatre. Some days when I was there the cleaner was sweeping up the trash on the ground and, while he was working, he switched on the audio system that fed the speakers which were usually placed in the customer's parked cars. It was slightly eery to have a paddock full of sound like that.

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Some more on the AWA lightweight key

Mike Patterson VK4MIK
RAOTC member No 1467

It was once again great to receive the latest *OTN* with a number of wide ranging articles. Here are a few comments relating to the article *A sweet little Bakelite Morse key* by Herman Willemsen VK2IXV which was published on page 58 of the March 2021 edition of *OTN Journal*.

The RAN (Royal Australian Navy) had an HF portable radio transceiver PYE MTR1 in use as back-up on HMAS *Paluma*, from 1959 to 1973, as well as on the GPVs (General Purpose Vessels) *Bass* and *Banks*, and I also believe the Attack Class Patrol Boats. The RAN Hydrographic Service also carried approximately five MTR1s on HMAS *Paluma* and around 12 on HMAS *Moresby* where they were used for communications on Decca Hi Fix and Lambda radio position system shore stations, survey launch camps and tide camps.

The RAN MTR1 differed from an Army version of that radio in that it was built into a metal hinged case. It had a small compartment to the side of the radio which contained the AWA small key, microphone, earth stake with cable attached, and a long wire antenna. It operated on 12 Vdc.

The Instructions for Operation were inscribed into the set and lid, together with the Morse code. The MTR1 was crystal operated with several cans and, if I remember correctly, operated on the lower HF band segment. It had a terrific multi-band receiver so we could listen to Radio Australia and Blue Hills at lunch time.

The Shore camps were expected to monitor the radios 24/7 as the ships worked 24 hours a day for many days or weeks at a time. Both ships also had the operating frequency on the bridge as tidal readings were passed several times per day and radio checks were regularly carried out.

On one occasion, in late 1971, I was on bridge duty on HMAS *Moresby* running/recording the echo sounder depths, ship's position, and the range/bearing of the two patrol boats that were steaming parallel to us at a fixed range so I would advise them of their distance from us in order that they could slightly alter course whilst doing around 18 knots.

Suddenly I received a call from a tide camp during the 0000 to 0400 hours watch, "HELP! HELP!" Initially all went quiet then I replied requesting that the caller please identify their station and problem.

The operator informed us that there was a large animal that had taken over their tent and, consequently, they were perched atop a 44 gallon (200 litre) drum with the radio battery balanced with them. The Officer of the Watch on *Moresby* asked if they were injured and could they still continue with the half-hour tide readings?

Back come the reply, "We're OK, and yes we can still do the readings, but we ain't going near the bloody tent and the monster".

We had a boat camp nearby and when the crew came to their aid early next morning they found a rather large python in residence amongst overturned stretchers, stools and tables, etc.

The radios were low powered and, after HMAS *Paluma's* Radio Shack decided to commence exploding valves, we were left with the MTR1 as the only means of putting out the Position Report at the allocated time. The ship had to orientate her long wire antenna to effect maximum RF radiation towards Cairns from our position in Princess Charlotte Bay.

The LRO (Leading Radio Officer) was using the small red AWA key, sweating and swearing in frustration until Cairns Radio copied us and passed our message onto the RAN radio station. It was the only time I had seen the key in use but it saved the RAN organising a search for us, which tended to bring wrath upon the offending ship. The Petty Officer Communications worked for several hours before he had the Radio Shack back in operation.

I have one of the AWA small keys in my collection and once used it on air; it was conducive to inflicting wrist pain after a short time and speed was slow. Still, it gave the MTR1 the ability to send CW as well as the usual AM. I was told that the MTR1 replaced the AWA Teleradio 3BZ for Coastwatcher operations in the later 1960s.

On reading Herman's earlier article on MV *Noongah* I thought back to *Paluma* departing Sydney en route to Cairns in mid 1972. Once through the heads it was a pretty wild night as we seemed to be more under water than above as seas rolled aboard and our full-ahead-both speed of eight knots was allowing us to 'linger longer' in the 'roughers'. One crew member wryly broached the possibility of us being paid a submarine allowance. Anyone who has served in a ship in rough seas will agree that it brings out groans and creaks from the vessel plus various sounds from the crew!

Later, in 1973, we managed to get 'up close and personal' with a cyclone at Low Isles and it took all day to beat into the safety of Cairns Harbour where we had to get broken bridge windows repaired, some deck lockers re-welded and cargo sorted out.

Ah! The joys of 'going down to the sea in ships'!

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HMAS *Paluma* alongside HMAS *Sydney* in Torres Strait.

Strong force, weak force!

Cal Lee VK3ZPK
RAOTC member No 1510

No, I am not talking about nuclear physics, I'm talking radio. Twice in my career of over 50 years as a radio technician, I have been involved in situations where an unexpected weak force has been the main player in a case of RF Interference.

I bet most radio technicians go into a fault-finding situation with a hunch or a theory as to what the problem might be. I am certainly one of those as I've found that a well thought-through theory (call it a guess based on experience) can save lots of time. BUT, I try to not have a second guess, as continuous guessing is abhorrent to logical fault-finding procedure and will usually be a waste of time. Here are a couple of times where my initial assumptions, however well founded, were totally WRONG.

Case 1

It was early 1989 and I was asked to go to Mt Dandenong to sort out interference to Ambulance Service Victoria's Radio Channel 2 on 76.25 MHz. The interference was mild and only evident on weak signals from mobiles and had been occurring intermittently for a few weeks. I was a newbie and had just been employed by Ambulance Service Victoria, but I was aware that new equipment had been installed at the Mt Dandenong (ATV0/10) site over the past few months.

I set up my spectrum analyser and, 'guess what?' Yes, on a tiny whip antenna, it was reading full scale from 50 to 100 MHz. There was hardly anything below the top of the graticule. "Come on now", I said to myself, "let's reduce the Span and Gain a bit to, say, a 1 MHz Span centred on 76 MHz and +10 dBm".

But there it was, sideband noise from Channel 2 in all its glory and who knows what else. "How", I said to myself, "was I to see a signal near 76.25 MHz at a level of say -90 dBm amongst the swirling turmoil I could see on my screen".

The Dandenong Ranges (commonly known as just The Dandenongs) are a set of low mountain ranges crowned with TV and radio towers, rising to 633 metres at Mount Dandenong, approximately 35 km (22 mi) east of Melbourne. Excellent RF coverage is achieved over Greater Melbourne as well as further afield.

I was expecting that some of this high level crud and generally raised noise floor I was looking at was the source of the hissing noise reportedly accompanying weak signals from mobile Ambulance Vehicles around Metropolitan Melbourne. Then it occurred to me that the most recent piece of equipment to be installed at the site was an experimental vehicle location module which had been set up a few weeks earlier by a contractor.

A view under the chassis of an AWA RMA 900 Receiver. This one is very similar to the one used by K-Rock and Bay FM as a Studio Link. Much of the offending signal was radiated by the ribbon cable at top left.

(Photo supplied by Don Bainbridge VK3BIG/VK3IT.)

I sneaked a peak and found it contained a microprocessor (μP) and 4 Mhz Crystal - I think it was a blue Quartz Resonator. I imagined I saw a change on the spectrum analyser and a swishing noise in the signals from Ambulances on Channel 2 each time I placed my hand near this experimental 'box' or on the cabling to it. But such was the subtlety of the interference, and the irregularity of the transmissions from mobiles on this channel, that I could not be sure.

Surely this innocuous device couldn't be responsible, not amongst all this high-level stuff from the TV, FM and other transmitters on the Mountain. I was tempted to disable the

A front panel view of the RMA 900 Series receiver.
(Photo supplied by Don Bainbridge VK3BIG/VK3IT.)

gadget but I knew it to be under evaluation so I refrained from doing so. Eventually, I wrapped the cables in some foil and reported my suspicions.

Shortly after this a fellow technician discovered that a similar device installed at another site was indeed the problem. Other Ambulance Channels were also affected by harmonics from 4 MHz µP clock crystals too, most famously the Ford Engine Management Systems: 4 MHz x 19 = 76 MHz which was just 10 kHz away from Ambulance Channel 7 (76.01 MHz at the time). Desensitisation occurred in some cases, so much so that signals below 3µV were unreadable most of the time, and the squelch could not be closed. However, the crystal frequency was subject to temperature and therefore, in some vehicles, the problem was only noticeable until or after the car heated up.

Ambulance Service Victoria vehicles typical of the ambulances used in the 1990s. The closest ambulance is a 1992 Ford F-150 4WD.

Case 2

It is 1996 I was asked to investigate why the Ambulance Control Room at Geelong sometimes could not read transmissions from the Lorne (Vic) Cars, although the Cars could hear the Control Room loud and clear in the same location. Now keep in mind that Mt Bellarine (near Drysdale) was chosen as the preferred radio site for this stretch of coastline as it had the best view of the Great Ocean Road including Anglesea and Lorne down towards Apollo Bay.

Mt Bellarine was/is also the transmission site for Bay FM, K Rock and Community FM stations as well as Vic Police, etc with Motorola also using the site. So, pretty much the same situation as at Mt Dandenong though not quite as much macho RF: but, nevertheless, a pretty fair presentation on the spectrum analyser.

I asked Geelong to arrange for the Lorne Car to go to the worst location known from experience. This was where the Great Ocean Road, almost at sea level, turns southeast out of Lorne. Sure enough, he could hear the OPCEN (Control Room) but his signal at Mt Bellarine was just noise. I listened to the test and interpreted for the OPCEN operator.

Afterwards I radiated a signal from my signal generator into a whip antenna set up outside the Radio Shack. I needed to set the attenuator to 95 µV to open the squelch on the base station in question, the antenna for which was about 120 metres up on the tower above me. So, I set this as a threshold and asked the Station (Site) Engineer for help.

Could he turn off the transmitters for a few seconds? "No", he said. So I said, "OK. I'll try a bit harder to identify the offending signal".

I asked if he had anything on the site which had a 4 MHz crystal. Straight away he replied, "Yes, I think the 2 Megabit Studio Link has a µP and clock". When I sniffed around it with a receiver and a 50 mm loop, there it was.

"Can we turn it off, then, just for a moment perhaps?" I pleaded. Then the full extent of the problem reared its head - there were two of them! Yes, there were two AWA 2 Megabit Links from the studio, Main and hot Standby.

"Can we turn them both off?" "Well, yes, I can turn the Standby off now and if you wait till the News finishes I'll turn the other link off for 10 seconds after the news."

Guess what? In that 10 seconds I could now open the squelch of our base receiver with my test signal with less than 50 µV radiated. So, what to do?

The Mt Bellarine radio site as seen by Google Earth. Note the long shadows from the antenna towers.

Eventually it was discovered that the clock oscillator in the main Link was the cause of the problem. The oscillator in the other (standby unit) was a few hundred Hertz lower in frequency so the harmonic product, probably mixed with other on-site noise, was far enough away not to be a problem.

So, with the kind co-operation of Broadcast Op (John S) we fitted, I think it was a 15 pF capacitor, across the crystal of the offending unit so it was also outside our receiver bandpass.

Job done! But can you believe a few milliwatts from a clock crystal in an environment of massive RF Fields can be so significant.

I can, now!

It couldn't be done!

Albert E Sonn W2GC (SK)

This article is reproduced from the February 1967 edition of the *Spark-Gap Times*, the publication of The Old Old Timers Club **in the USA. It was spotted by Michael Goode VK3BDL, RAOTC member No 1610, who thought it would be of interest to readers of *OTN Journal*.**

They said it couldn't be done! Who ever heard of a wireless transmitter in an auto? "Nonsense," said the Radio Inspector attached to the old Department of Commerce back in 1922. "Anyhow, we do not have wireless licences for such novelties for crazy ideas for kids; forget it."

But we knew different, it would work - we already tried it - licence or no licence. And we told the brass that we were going ahead with our experiments. "Go to it, but don't get yourself in trouble," they said.

I was radio editor of the old *Newark Call*; it was up to me to play the part of 'stunt man' to keep the eye of the public upon scientific matters.

The Boys' Day Parade was planned a few days ahead. My city editor was a wonder, so he gave us the OK, thinking at least we would have fun trying to get the wireless working in a car. As he mentioned, if it was a success I would have my name plastered all over the front pages.

A far-ahead-looking City Editor said that if the thing worked he might apply the idea of a reporter covering any and all events occurring in the city from a car to the City Editor thereby saving time; scooping the other papers.

I told the Editor that we might need a little capital for hiring the car and supplying 'B' batteries and storage batteries. We needed an antenna and other essentials.

I got out a pad and submitted my costs - $35 for everything and we could use a *Sunday Call* car to save hiring one. We promised not to drill any holes in the chassis. We managed to borrow the transmitter, a 2-5U made by Adams-Morgan Co of Upper Montclair, New Jersey, a firm which built the first mobile transmitters and the Paragon receiver, popular sets in those days.

Al Sonn crammed into the back seat of the old sedan, with hardly any room for him to sit because of the wireless equipment, operating 2CNJ.

Al Sonn 2GC

Albert Edwin Sonn was born 13th October 1892 in Newark, New Jersey. Besides being the first licensed mobile, he was better known as 'The Man On The Moon' to thousands of children who listened to his twice weekly half hour radio show on WOR and WJZ from 1920-1923.

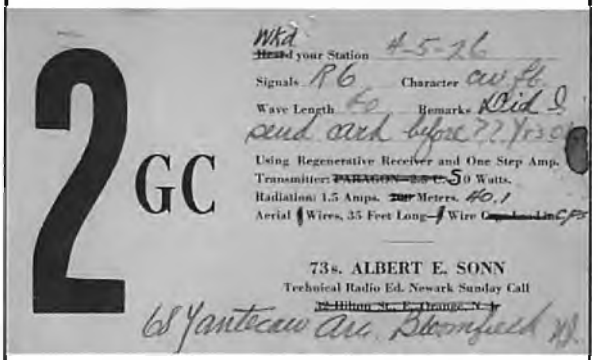
During that time he received 43,000 fan letters.

Albert also developed a radio receiver during WWI which was used to trace the location of secret German transmitters in the New York area which were sending messages to submarines off the coast.

He was the radio and camera editor for the Newark *Sunday Call* from 1917 to 1938.

He then joined the lamp division of Westinghouse in Bloomfield, New Jersey and retired in 1957 after 19 years with the company.

He died on 22nd May 1968 at age 75.



A 1926 QSL card from the amateur station of Al Sonn 2GC.

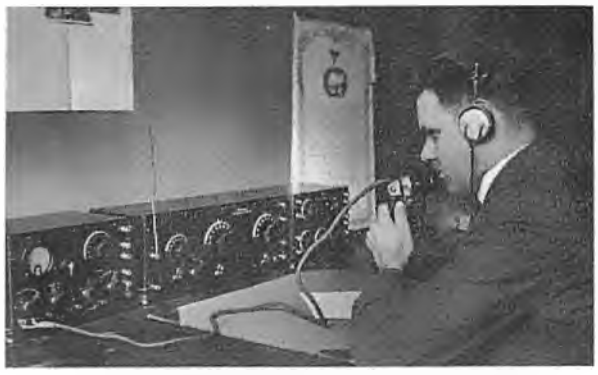
The 2-5U was a five watter, using a UV-202 for the output tube, quite a clever affair. We got hold of some wet B batteries to make 45 volts which we hoped would be enough because we were not going to cover more than a mile or so. Someone loaned us a microphone, a large one that weighed about three pounds barefoot.

A four-wire antenna on spreaders was constructed for the top of the car. The spreaders were four feet wide with four wires evenly spaced, like antennae used in those old days.

So the old car, a sedan, was rigged up with the wireless equipment with hardly any room to sit inside. On the rear of the car was a large sign reading:

Newark Sunday Call Wireless
Reporting this Parade by Radiophone

Two similar signs were rigged up front across the hood (*the engine bonnet, to us Australians ed*). The signs were so large that we could hardly see out front, but we made sure that the spectators lined along the curb and the side-walk along Broad Street could read them.



Al Sonn talking to 2CNJ on 6th May 1922.

I checked everything to make sure that all was in readiness for an inspection, and we tested the set back and forth to the *Sunday Call* a short distance away. But we had no radio licence thus far.

The Department of Commerce was contacted by telephone in New York City. "Can you send over a Radio Inspector to check our automobile wireless before we use it? We need a licence pretty quick," I shouted over the land line. "We are going to use the set to cover a Boys' Day Parade in Newark, New Jersey next Saturday."

"What's that?" the fellow at the New York end of the line said.

I tried to explain what it was all about but received the reply that they never heard of such a thing, wireless in a car. "Better think up something else - you had better forget - besides we do not have licences printed for such a stunt" were their final comments.

We also were told that there were no Inspectors available as all the men were out checking ships in the harbour and no one would be available for several days. The parade was to be held the next Saturday - three days away!

An hour or so later the phone rang again. The Radio Inspector was on the wire. "*Sunday Call* we are sending you our best Inspector to check your apparatus, but don't keep him too long as he has other work of more importance to do."

The Inspector they sent over was Emory Lee who arrived during the afternoon with a suitcase full of the best test equipment. He unpacked it piece by piece and laid it on the ground. I had never dreamed there was so much apparatus needed to check over a small, low-powered wireless. He had a General Radio wavemeter which I had seen before at a millionaire's ham station. I did not know how to use it anyway, I told the Radio Inspector.

"What wavelength are you going to use?" the Inspector inquired.

"I dunno, probably around 400 metres if you say it is OK."

We could use almost any wavelength in those days up to 600 metres, but we were informed that we couldn't get on 360 metres as that was the broadcasting wave then used by WJZ, then in Newark.

'Really, I don't know where to begin. This bunch of junk will never work, why take up my time with such foolish kid stuff?" was his comment.

But he went on making his tests. I had never used a wavemeter; it was fascinating to see the Inspector twirl those dials. "Go turn on your power," he said. So I climbed into the car over storage batteries and finally found a bit of space where I could operate. The hot-wire ammeter started to jump around; we were getting out - maybe!

'Can't find you anywhere on this instrument," the Inspector said. "Try again."

So we did something else and we must have been doing right. "Fine," Mr Lee said. 'I've found you; you're up on 550 metres. Don't touch anything, we will leave it that way."

But we had no licence to show the cops in case they asked us, but cops those days did not know what it was all about and thought we were crazy kids out for thrills with some make-believe Rube Goldberg contraptions. Wireless didn't mean a thing to the cops. Mobile radios were something for the future to worry about. We did request the Radio Inspector to hurry the licence along as time was getting short.

Finally, the licence did arrive the morning of the Parade day. A happy thought, a real mobile licence dated 22nd March 1922. The Department of Commerce really came across. They gave us the call letters 2CNJ - meaning *Sunday Call*, Newark, New Jersey. It was the first auto licence ever issued in the US, something to be proud of to say the least.

We had already installed our Paragon receiver on my desk in the *Sunday Call* building where the early tests were conducted. The entire outfit worked to perfection and signals were Q5 S9 all the way up and down Broad Street, down to City Hall. We had our pictures taken and I still have a few left.

The spectators lined the sidewalk and curb but they did not know how hard we were working inside the sedan trying to get our voices across the half mile range of our transmitter. We were thrilled when we learned that the mobile transmitter was working out to perfection. We had a one-way setup at the time, just the car to the office. We leaned out of the window when the car passed by to signal that all was OK.

Next day the car's transmitter was given tests and worked dandy but finally the A and B batteries died down and we called the deal off for the time being and did more experimenting later on. The City Desk got the Parade news direct from the car.

The front pages were covered with pictures and stories about the *Call's* first newspaper scoop via wireless.

The *Sunday Call* was discontinued in 1942 and joined the *Newark Evening News*. **ar**

RAOTC membership

The RAOTC membership has been fairly static over recent years at around 485 full and associate members. However, with costs steadily rising, it is not clear how long we can retain our low membership fee of $18 pa. One way to stave off an inevitable rise in fees for a further period is to increase Club membership. When was the last time you recruited one of your radio mates to become a member? Membership forms are available as a download from the RAOTC web site, or on request from the Membership Officer. Come on! Do your bit to future-proof our Club membership fees!

The old narrow gauge railway line, Port Augusta to Alice Springs, and the Ghan

Lloyd Butler VK5BR
RAOTC member No 1495

This article is about the development of the original narrow gauge railway line to Alice Springs which commenced being built in 1878. This followed the surveyed access route from the south of Australia through the centre to the north by John McDougal Stewart in 1860/1862 and the later telegraph line built over this route, directed by Charles Todd, and finished in 1871. The author did a lot of travelling on that Ghan railway line in the 1940s and recalls some of his experiences on the way.

They were not to know until the train line was built and tried that there were a few places on the route which were subject to flooding and to track washaways. This led to a new Ghan route to Alice Springs which was completed many years later in 1980 and with a new standard gauge line compatible with other national lines.

The new Ghan operated all the way from Adelaide to Alice Springs via the Indian Pacific line between Adelaide and Tarcoola. It wasn't until 2004 that the line was extended and ran the Ghan all the way further north to Darwin.

The first section of narrow gauge line from Port Augusta to Marree was completed and made operational in 1889, via the Pichi Richi pass, to Marree. The Pichi Richi pass section had been opened previously in 1879.

Early train passing through Pichi Richi pass.
Photo: National Railways Museum.

The first sleeping car train was introduced at Terowie in 1923 and it ran via a newly built narrow gauge line from Terowie to Quorn and onwards north. From 1917 to 1926 all of the narrow gauge lines going north through Quorn from Port Augusta and Terowie were part of the South Australian Railways.

But, between 1926 and 1975, Commonwealth Railways took over control of the narrow gauge system, except for the Terowie to Quorn section which was retained by the South Australian Railways.

Changing trains at Quorn to get on the Ghan was then required.

In the early 1940s, WWII was still in progress and working in the Transmission section of the PMG we, the technical workers, were required to go on projects to the north, initially via the early Ghan.

Throughout the article, as one of the workers, I will comment on my own experiences with the old train. For those early journeys, we changed trains at Quorn to board the Ghan and in at least one instance I remember having a one-night stay at the Quorn Hotel (see photo below).

The first coal trains started in early 1940 from Leigh Creek mines on the narrow gauge rail tracks passing through Quorn and the Pichi Richi Pass to Port Augusta. This opened up part of the Ghan section considerably until 1956 when a new standard gauge line was opened between Leigh Creek and Port Augusta. However, at this point there was apparently no function for the line section between Hawker and Marree and this section was closed and dismantled.

Since 1973, volunteers of the Pichi Richi Railway Preservation Society have restored historic steam and diesel locomotives, railcars and timber carriages, and run them on the Pitchi Richi section of the narrow gauge railway. At least this section of the old railway to Alice Springs is still in use.

Between 1975 and 1981 the Commonwealth Railways became Australian National.

Many passengers going north had their first glimpse of the Ghan train at Quorn and proceeded north

Quorn Hotel. This was the staging point where, in the 1940s, we changed trains between SA Railways from Terowie and Commonwealth Railways to Alice Springs (both were narrow gauge).
Photo – 'When we rode the Rails' by Patsy Adam-Smith

from there, as I did myself. I will attempt to proceed with the discussion along the Ghan line in the same chronological order as passengers would see train sidings or train terminals.

After that first run with the sleeping car train from Terowie, it picked up its name from the Afghan cameleers, 'Ghan' being short for 'Afghan'. The Afghan migrants with their camels did much to open up Central Australia. For many years camel teams (see photo below) supplied the telegraph, railways and pastoral stations with supplies, no matter how isolated or far away they were. They were even involved in the establishment of artesian bores.

The precise detail of exactly how the Afghan name was adopted is a bit confusing. There seem to be two stories promulgated, one referring to an incident at the Quorn Hotel.

An early Camel Train. Afghan cameleers did so much to open up Central Australia, transporting between those hardy people of the outback. The train was named after the Afghan cameleers, 'Ghan' short for 'Afghan'. The train line commenced being built in 1878.

The earlier Ghan trains were a mixture of sleeper cars and trucks containing supplies. On the Ghan trains on which I travelled in the 1940s there was also a dining car. The sleeper cars had a walkway right through the centre of the car with bunks either side at two levels. Privacy was provided by a curtain in front of each pair of bunks. One had to dress, or undress, sitting in the bunk. I had seen this type of sleeper car before in an American movie. In the new Ghan there are separate cabins of two or four bunks and the walkway runs along one side of the carriage.

Marree siding was the first intermediate stop for the train in 1889. There were many sidings along the Ghan track. If there was nothing else at the siding, there would be a hotel. Some of them looked alike. The Marree Hotel looks the same as the one we used at Copley siding when working for the Department of Civil Aviation at Leigh Creek.

Stopping at one of these sidings, there was always a stream of people heading for the hotel. Sometimes it was a long stop while the locomotive renewed coal and water. The whistle would blow when the train was about to depart. But no one took any notice. One had time to walk (and, if necessary, run) back to the train which very slowly gathered speed.

The second intermediate stop was Oodnadatta, opened in 1891. Below is the railway station in that era. I am not sure what the passengers are doing walking across the lines. It looks like the train came from the south and is heading north. Perhaps the passengers are disembarking, but more likely heading for the hotel.

The early Oodnadatta Railway Station. Oodnadatta was the second intermediate stop in 1891.
Photo - Flinders Ranges Research

In the wartime 1940s, the PMG Transmission Section sent two of us from their technical staff to install a Train Control Console for the Commonwealth Railways at Oodnadata. Before WWII, rail service to Alice Springs was about one train per week (essentially the old Ghan) on the old narrow gauge route. The system operated on train orders, but with the war extending to the east of the world, the line became important to the war effort. The number of trains increased to about seven per day carrying service personnel and equipment. There were problems handling the high level of train traffic and the PMG's Department was contracted to install a new train control system.

We booked into the old hotel at Oodnadatta .The multitude of cockroaches running around my bedroom floor was not my cup of tea. However, I did enjoy showering under the steaming hot water which oozed from an outlet pipe at a bore a little distance from the hotel. Next time I was in an installation team working at

An early photo of the Marree Hotel. Marree was the first terminal point for the train in 1889.

The early Oodnadatta Hotel (cockroaches were running around the floor in our 1940s visit).
Photo - Flinders Ranges Research

Part of the old Ghan narrow gauge line running 25 km south of Alice Springs. Now probably on display by the Ghan Preservation Society, or the old Ghan Heritage Railway & Museum.

Photo – 'When we rode the Rails' by Patsy Adam-Smith

A Rail Trike on the Ghan narrow gauge line. The maintenance gangers were probably simulated by visitors to the Ghan preservation societies.

Photo - 'When we rode the Rails' by Patsy Adam-Smith

Alice Springs today. Alice Springs was the terminal for both the old Ghan in 1929 and for the new Ghan in 1980.

Photo - Lloyd Butler VK5BR

Oodnadatta, we found brand new, and empty, RAAF multi-bed cabins. And I didn't see any cockroaches. We had no idea what the Air Force was going to do with all the cabins.

The terminal point for the narrow gauge and the Ghan train was Stuart (renamed Alice Springs after the train first arrived). In 1980, it became the main stopping point on the way up to Darwin on the newer standard gauge line.

In Alice Springs today there is a heritage museum run by the Ghan Preservation Society and a 25 km section of narrow gauge line (the end of the Ghan line to Alice Springs) run by the Ghan Heritage Railway. The two photos to the left are sampled from Patsy Adam-Smith's excellent book concerning work on the railway lines by the fettlers (or gangers).

Not long after 1878, when the narrow gauge line from Port Augusta to Alice Springs started its 50 year project, another narrow gauge line construction, the North Australia Railway, proceeded south in 1887 from Darwin. It made Adelaide River by June 1888, Pine Creek by October 1889, Katherine by May 1917, Mataranka by July 1928, and terminus Birdum by September 1929. After WWII, it was extended five miles further down to Larrimah. The line closed in February 1981. Whilst I had worked on a number of installations in that upper northern region, I never had reason to travel on that railway.

I travelled by train on the old narrow gauge line to Alice Springs many times in the 1940s. Many stories can be told about what happened on the way. One day the steam locomotive blew a boiler tube. The driver and fireman jumped to get away from the steam and the train travelled on for many miles with no driver until the steam ran out. We were stuck in the middle of no-where with no locomotive, and no driver and fireman.

On one Ghan trip, we were heading north, I think somewhere between Oodnadatta and Finke River, and our train-line ballast sank into the mud. The ballast looked intact but the bottoms of the carriages scraped in the mud. I think the steel tracks were still fixed to the sleepers, but the whole track became out of alignment and two carriage couplings parted. It took some time for Commonwealth Railways to sort that out. We were supposed to reach Alice Springs on a Saturday night but finally arrived there on the following Monday morning.

The wash-away was typical of what happened on the route taken by the Ghan narrow gauge train. Rail crews were continuously repairing or replacing parts of the track and this caused periods when the train was out of service. The intermittent service finally led to the establishment of the new standard gauge route via Tarcoola, first to Alice Springs and later to Darwin.

An early Ghan steam train moving along a flooded rail track.

Photo: National Railways Museum.

On another occasion, we were returning from Alice Springs on a train with ordinary carriages, normally used to transport troops and working parties. I remember that this one had side seats along the length

of the carriage. I think one gentleman must have had too much of the amber liquid. He climbed up between carriages and proceeded to run along the top of them, jumping from each one to the next one, just like they did in the Wild West movies. The train was stopped and shunted back to the nearest siding where the gentleman was removed from the train and left at the somewhat deserted siding. Of course this was the 'Wild North' not the 'Wild West'.

Everyone interested in engineering likes to see the locomotive pulling the train and I haven't been very successful in collecting photos of the early narrow gauge rolling stock. However, the locomotives running in the days when I rode the rails in the 1940s, looked very much like the early Rx engines of the time, operated by South Australian Railways. These were built at Islington Workshops in Kilburn, a suburb of Adelaide. The large workshops, controlled by South Australian Railways, built numerous locomotives and other rolling stock for the State railways. The old railway's broad gauge engine in the photo below is displayed at the Murray Bridge wharf, but there are also displays of the railway engines at Kapunda, Loxton, Victor Harbor, Tailem bend and the Port Adelaide Railway Museum.

An early Rx steam locomotive (broad gauge) displayed at the Murray Bridge Wharf and built by Islington Workshops in South Australia. It is of a similar design to that used on the narrow gauge Ghan line in the early days.

Photo - Wongm's Rail Gallery - Murray Bridge, SA.

To finish the article, I leave the reader with a photo of the new Ghan on its way to Darwin in 2005 whilst the train takes a break at Alice Springs. Organised by my son, this particular Ghan had the Chairman's Carriage coupled which two of our families hired for that particular Ghan run.

The new Ghan at the terminal for trains in Alice Springs. The new standard gauge line took over the train service to Alice Springs when opened in October 1980 and the old narrow gauge Ghan line became redundant.

Photo - Lloyd Butler VK5BR

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Are you enjoying reading this issue of *OTN*?

If so, how about writing 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!

Time is running out!

The story of amateur radio should be told through the eyes of those who participated in it, particularly during the early days.

Now is the time to put pen to paper (or fingers to keyboard) and tell your story, be it ever so short a piece of interesting history, otherwise it may be lost for ever!

Do it NOW and send it to <u>your</u> magazine, *OTN* .

An easier way to transfer files from your mobile phone

Andrew Walton VK3CAH
RAOTC member No 1599

Here are some technical tips and information that some of our Club members may find quite useful, in particular when dealing with some of our newer technology. There is no doubt that during the last few years the humble mobile phone has really transformed many aspects of how we live. There is one phone currently in use, for every two people on the planet. Besides actually making phone calls, they can be used for a wide variety of other things. One popular use is to take photographs, or perhaps play podcasts and music. One hassle often encountered is getting files either on or off the phone.

A quick check of Google reveals there are around 2 ½ billion Android devices and around 1 billion Apple iPhones, currently in use. Originally I intended this article to cover both Android and iPhones, however, this article is applicable to mobile phones that use the Android operating system. This is because of the way Apple have locked down the file system, and what users can and can't get to on iPhones. One is pretty much locked into using the appropriate Apple software, ie iTunes. For Android phones, this is not so.

There are several possible solutions to get around this, bypassing what the mobile phone manufacturers offer. You don't even need to be connected to the Internet and you don't need special cable or special software. Here's a summary of one way of how to go about it.

Over 30 years ago, when the Internet was a new type of computer network, before even the World Wide Web was in common use, the way to transfer files from one place to another was called File Transfer Protocol, or FTP. FTP is still very much in use today; for example, uploading files to a web server. We've all seen HTTP, which stands for Hyper Text Transfer Protocol, used on our web browsers. Another protocol is SMTP, Simple Mail Transfer Protocol, which is used when you check your email. FTP is also a very common protocol, or language, that computers use to talk to each other.

The concept of Client and Server

When you browse the web using your web browser, such as Firefox, Chrome, or whatever, you use a piece of software which is referred to as a Client. This connects, usually over the Internet, to a web Server. It's this Client Server relationship we are about to use to get files off (and on) our mobile phones. All we need is one to be a Client, and the other to be a Server,

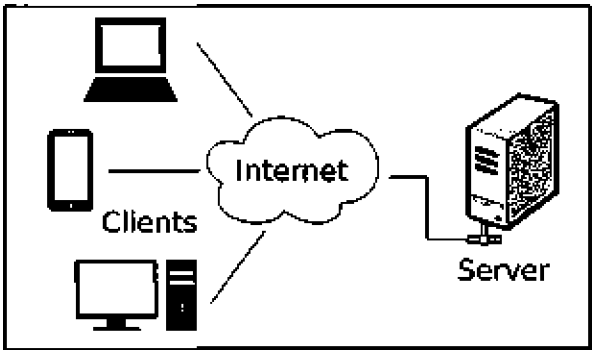

Fig 1 - A computer network diagram of clients communicating with a server, via the Internet.

To start things off, on your computer you already have a Client installed - your web browser. It doesn't matter if you use a Mac, or Linux, Android, or Windows, they all work pretty much the same. They all allow you to receive files via HTTP, or FTP. The FTP server doesn't need to know (or care) what sort of operating system the receiving end is using. All we need now is an FTP Server to install on our mobile phone.

An FTP Server for Android phone users

There are plenty of free and very low cost programs available, many with some banner advertising - generally it's worth paying a few dollars to get rid of them. To get you started, here are three to try out. They are all fairly simple to use. Once installed, two or three button presses are generally all that is needed to start copying files.

- **FTP Server**, by developer 'The Olive Tree'. The Pro version, with no ads, that only costs several dollars is also available. Go to the Google Play store, download and install it. Press the Start button to activate it.
- **ES File Manager**, by developer 'GreenSoft Infotech'. A search will reveal there are quite a few programs named ES File Manager. Get the one by the developer GreenSoft Infotech. Once downloaded and installed, the home screen has a button named Transfer to PC. Press this, and then press the Start button to bring up an address you can connect to. It mentions a web server, but in actual fact it is an FTP Server.
- **WiFi FTP Server**, by developer 'Medha Apps'. Once downloaded and installed, run the program, and press the Start button.

An example using an Android phone

For this example, I've chosen FTP Server by developer 'The Olive Tree'. There are a couple of screenshots of what you should be seeing in Figure 2 at the head of the first column on the next page. One button press to start, and another to stop. How simple is this?

In the case of my Android phone, when I use FTP Server, I see an address of ftp://192.168.1.170:2221 . This tells us that we want to 'talk' using FTP, to an address of 192.168.1.170 and use a port number of 2221. These numbers make up the IP or Internet Protocol address of the phone. You don't have to worry too much about what all this means, just make sure you use the address precisely as you see it. Put in the wrong numbers and things simply won't work.

An FTP Server for iPhone users

With around a billion iPhones currently in active service, there are a couple of FTP programs or apps available. Unfortunately, users seemed to be denied

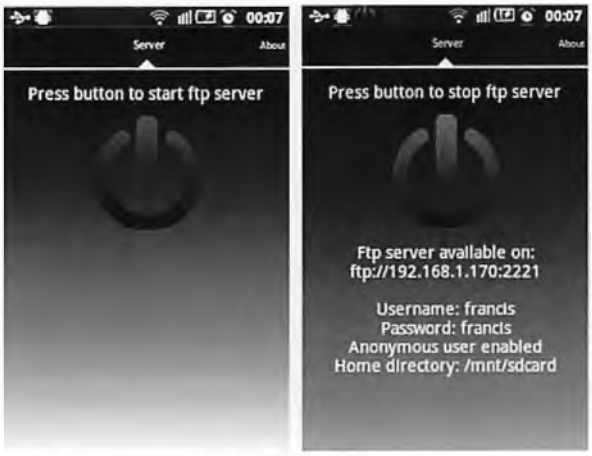

Fig 2 - Android phone screenshots. See text on previous page.

direct access to most of their files, as previously discussed, without using special Apple software. In the file manager, Files, you can't really see anything. It is, however, possible to plug the iPhone directly into a USB port of a Windows PC - Windows 7 operating system or newer - and, if the PC is connected to the Internet, it will go off and find the appropriate driver software and install it, allowing you to copy photos from the phone. If you own an Apple Mac, things seem to work seamlessly. To date no tests have been made using Ubuntu Linux.

Ready to go

That's pretty much all we need to do to start to copy files. It's important to note that both the computer and phone are connected to the same WiFi network. Don't use a public network - for example a shopping centre - as there is no security, and everything on your phone is wide open for anyone to look at, copy and delete. There are plenty of people about with lots of idle time who have malicious intent to damage computer systems, and mobile phones are no exception.

Getting files onto your computer

This is applicable for all flavours of computer, Windows, Mac, or Linux. To view files on your phone, start your Web Browser and type the FTP address, that is the IP address displayed by your FTP server program on your phone, into your browser's address bar, and press enter. This doesn't seem to work consistently with Google Chrome for some unknown reason.

With this in mind, generally it doesn't matter what browser you are using, It could be Safari, Firefox, or Microsoft Edge, even Internet Explorer. It's important to put in the address precisely, otherwise things simply won't work. You should be able to see something like the screenshot Figure 3 at the bottom of the previous column.

You can drill down into folders or directories. The DCIM folder contains any photos taken with the phone - see screenshot Figure 4 below.

You can right click on a file, and download it off your phone onto your hard disk. It's easy to get photos and other files off your phone.

Transferring files to and from a mobile phone.

Now that you can see it's easy to copy files off a mobile phone, it's also almost as easy to transfer files to your phone. You simply need to use a different type of FTP Client. Luckily there are several options available for all three main operating systems, all at no cost.

Microsoft Windows

On Microsoft Windows the file manager is called Windows Explorer. This method will work on Windows 7 and later versions (but not Windows XP). Explorer has an FTP Client built right in. This is one of many undocumented features that is generally not advertised. Start Explorer, and in the address bar type in the IP address. In the example below, it is ftp://192.168.1.103:2221

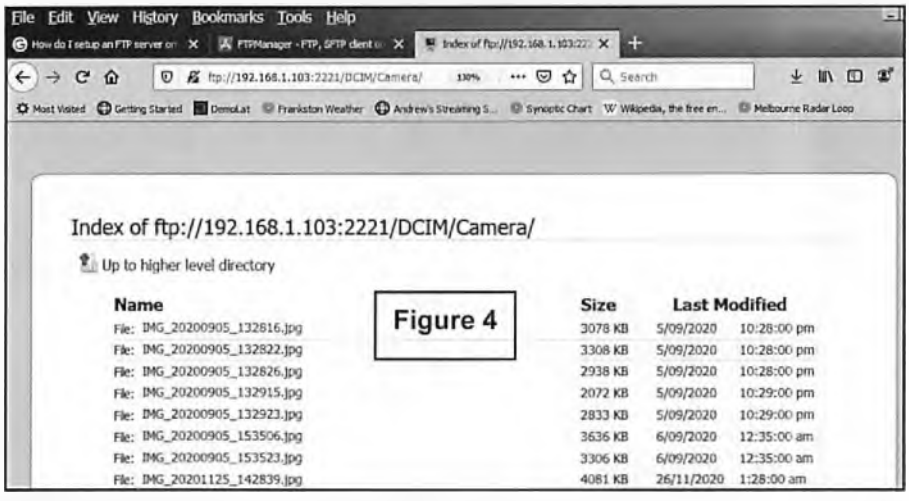

Figure 4

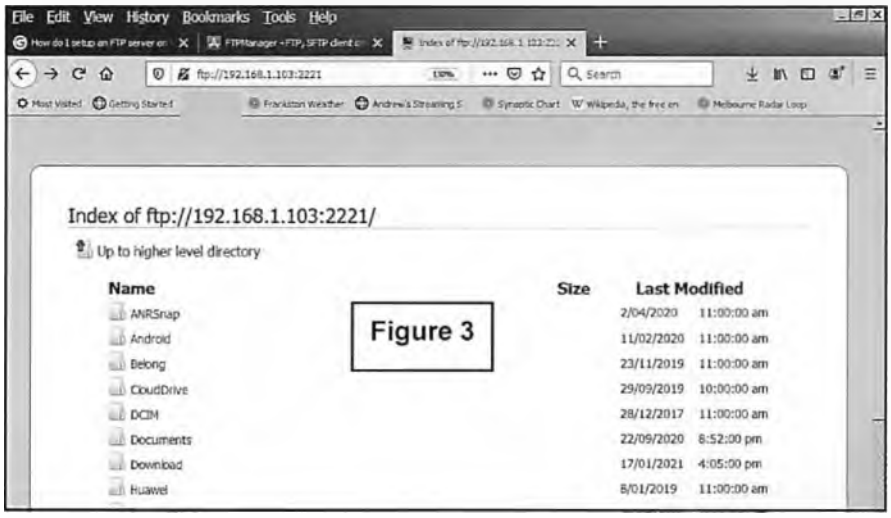

Figure 3

You should now be able to see the contents of your phone's SD card in Windows Explorer, similar to what you see in your web browser (see screenshot Figure 5 on next page).

You can cut, copy and paste files around as required. You can open up another Explorer window, and copy

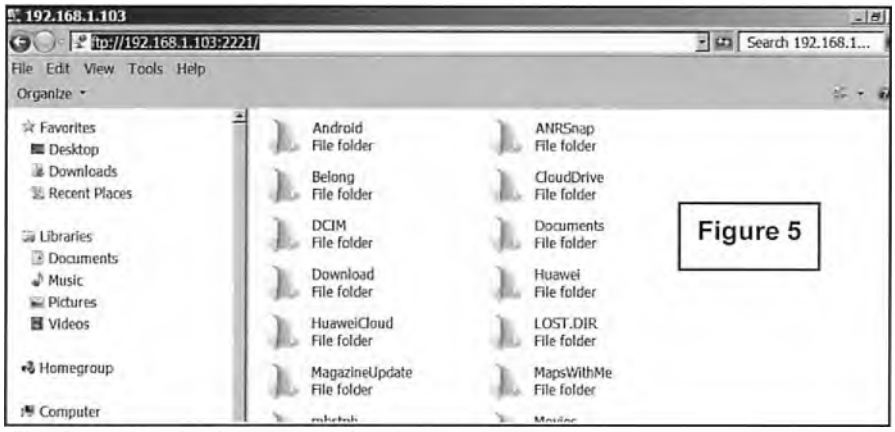

Figure 5

files from, or upload to, the mobile phone. You can also easily move and delete files. (This is why you don't ever use public networks!) With the Android system on my particular phone it appears there are restrictions on precisely what permissions are available on what operations. Cut, copy and paste do not always work as they are restricted by the phones operating system. You can even copy files from one phone to another phone this way.

Apple Mac

The file manager on a Mac is a program called Finder. How do I open FTP in Mac Finder? The easiest way is to open the Finder Window and select from the main menu, Go -> connect to Server. A dialog box will appear. Enter the server name (including ftp://) and click connect. In the example I used previously, I would enter ftp://192.168.1.170:2221

Linux

The Linux version I've used is Ubuntu Linux, one of the more popular distributions. The file manager in Linux is a program called Files. This is pretty straight forward. Select the Other Locations button on the lower left, and enter the IP address where one is prompted to Enter server address. In the example I used previously, I would enter ftp://192.168.1.170:2221.

I must stress, if you don't enter the address precisely, things won't work.

On all three flavours of operating system

An alternate program you can use is FileZilla Client, available free for Windows, Mac OS X or Linux. I had one report it was a little tricky to find a version that worked successfully on Apple iOS. It seems that you need to have the appropriate version for your particular version of iOS. Use Google to find out more about this program. It looks a little like this: https://filezilla-project.org/

One important point to note (or a trap to fall into).

Sometimes the mobile phone won't at first realise you've made changes to its file system by adding or removing files. Go into Files, and you should be able to see a Refresh button. An alternate method is to power the phone completely off, and then restart it. This allows the phone to refresh, or reindex its files.

Summary

With more computing power than was used to place astronauts onto the moon some 50 years ago, it never ceases to amaze me the usefulness of these gadgets. One example is visitors come around and have some photos you would like in your family collection. The only problem you have is you don't have a cable to connect to their phone; they've got USB C, and you only have Micro USB cables. It all starts to get very hard, very quickly.

What drove me to explore other options was when using two different models of Huawei handsets. The older one, much smaller than the newer one, is semi retired, and used as a mini tablet, or to take photographs. Most of the time, it's turned off. One example, I take it along to a hardware store when solving some particular maintenance issues. A picture always tells a thousand words. It fits into my pocket a lot easier than my newer phone, and besides I'm a little bit old school in that I don't have a mobile phone within 2 metres of me, 24/7. I can go to the shops quite easily without having the thing firmly in my grasp (much to the horror of grandchildren!).

You install the appropriate software on your PC for the old model phone, and it doesn't work on the newer phone. You then install the software for the newer phone, using the same name for the executable file, and the same default install folders, and it then doesn't work with the older phone. My grandson recently arrived with his new Christmas present, a Samsung Galaxy product, and it wanted more software installed. How much software does one actually need to have installed on a PC? There had to be a better way.

Please note, I don't endorse one particular FTP program over another, nor make or model of mobile phone(s) over another.

Thanks are extended to everyone who assisted me in testing the assortment of operating systems available, in particular to VK3MK, VK3AWX and VK3JST, in exploring the limitations on the second most popular mobile phone in use in the world.

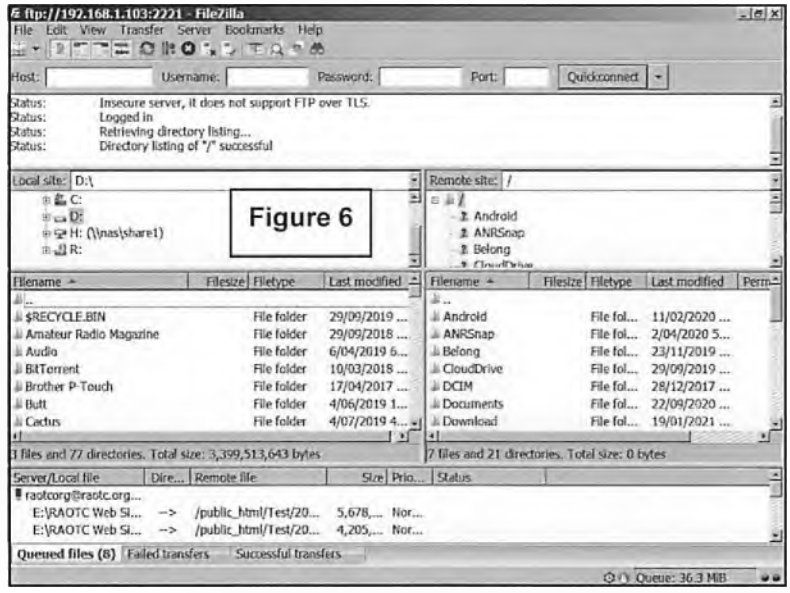

Figure 6

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When is a fault not a fault?

David Swallow VK3AWX
RAOTC member No 1747

This is a tale of a Grand Old Lady - the Yaesu FTDX570 HF transceiver (circa 1970).

One of my interests is restoring, and bringing back to life, old Yaesu radios, with one additional caveat. It must have valves or, in other words, be a 'steam driven radio'. I recently purchased a Yaesu FTDX570 from a deceased estate, and this radio has an interesting history.

The gentleman I purchased the transceiver from was the son of the original owner, who apparently purchased the set from Bail Electronics back in the early 1970s.

Not being a licensed amateur, the original owner purchased the set specifically for use as an SWL.

Fast forward to 2021. The FTDX570 is now in its new home, having not been turned on for around 30 years.

I turned the power on - no smoke, so it was a good start. After replacing two valves in the receiver - it was displaying low gain - the receiver started singing and dancing again. An S9 signal strength on 80 - 10 m for 50 µv signal in. The preselect - PRESELE control - peaked up nicely on all the bands.

One has to appreciate a radio nearly 50 years old that still works after being stored for 30 years!

Then I moved swiftly to the transmitter section, as we radio amateurs always seem to do. Unfortunately, the transmitter showed no life at all, using the Carrier Control in Tune Mode, on any band. Examining the circuit, with the aid of a Spectrum Analyser, revealed that the Balanced Modulator is supposed to deliver around 40 mV when the 50 k 'Carrier Control' is at its maximum.

However, the Balanced Modulator only delivered less than 1 mV, hardly enough to light a bedside Night Light.

I must admit that a few months passed while I considered the problem, returning occasionally to try different things, but all to no avail. That was until last week when I noticed a TAB pot soldered to the back of the motherboard. Measurements showed the combined resistance of the TAB pot and the 50 k Carrier Control in parallel was close to zero Ohms.

This was the 'aha' or Eureka moment since the offending TAB pot did not appear on the circuit diagram. It was evident that someone had soldered the TAB pot in place at the point of sale to render the transmitter inoperable thereby making it impossible to tune up the radio and operate on any mode.

One can only imagine the mindset of a dealer who found it necessary to disable a radio, but was no doubt trying to ensure that the SWL purchaser was not tempted to illegally operate the transmitter.

No doubt Bail Electronics would have quickly, and cheaply, restored the transmitter to working order if the SWL owner did became a licensed radio amateur

An interesting postscript to this tale is that, at some stage, the previous owner tried to have the FTDX570 repaired. A transcript of the quote, dated 13th November 1987, is below. This quote arrived buried in the FTDX570 documentation. Due to the faded age of the

The quote

13 / 11 / 87
Mark,

As requested here is the list of parts needed to get the Yaesu going.

2 x Relays
2 x 6KD6 Valves
1 x 7360 Valve
1 x Neutralization Capacitor (Variable)
1 x Tin of Cat Piss removed

Other parts could be well be needed but would have to get going first,
Most of the above parts are expensive and only available from Bail Electronics.
Set is really BER *(beyond economic repair?)* but could be fixed by a hobbyist who didn't need to account for time.
Signed
GB

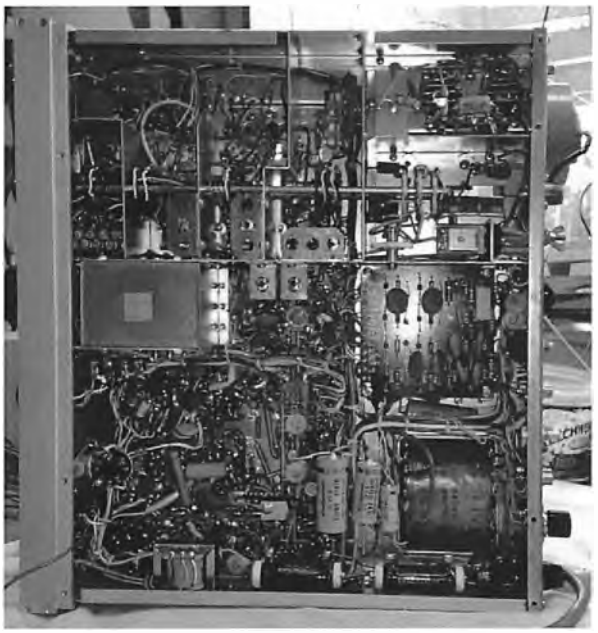
A front panel view of the author's restored Yaesu FTDX570 HF transceiver.

quote I was unable to provide a scanned copy for publication.

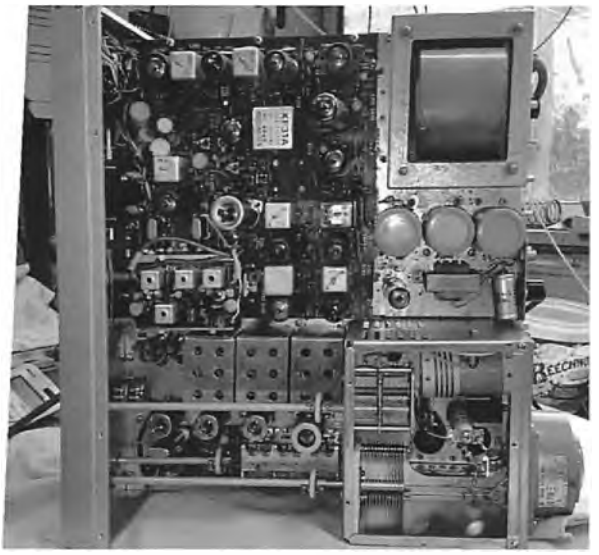
Interestingly, having read the quote a few times, there seems to be not one jot of truth anywhere. I do like the part about the 'Tin of Cat Piss removed'.

In reality, the 'Cat Piss' turned out to be the remnants of a small spiders web, which instantly dissolved without a trace after a light spray of Detoxit D5.

Below are some photos of the restored FTDX570 with the covers removed. All photos were taken by Andrew Walton VK3CAH.



A view of the underchassis construction of the FTDX570 clearly showing the typical 1970s component layout.



A view of the top of the chassis construction of the restored FTDX570. Again a very typical 1970s layout.

A rear view of the FTDX570 out of its case.

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FTDX570 sidebar

I purchased a new late model FTDX560 (which included the noise blanker, etc used in the FTDX570) from Bail Electronics in the early 1970s, just on 50 years ago.

It was an excellent performer for the time and I was a very satisfied user of the FTDX560 for several years. Here are a few specifications and more information on the FTDX570.

FTDX570 Basic Specifications

Year: approximately 1972.
Valves/Tubes 20: 6BZ6, 6CB6, 6BA6, 6BE6, 6BA6, 6BZ6, 6BA6, 12AU7, 12AU7, 6BM8, 6U8, 7360, 12AX7, 6CB6, 6AH6, 6GK6, 6KD6, 6KD6, 12AT7, 0B2.
Semiconductors (transistors): 12.
Power supply: 110/220 Vac @ 50/60 Hz.
RF Power Input: 560 W SSB; 500 W CW.
Loudspeaker: Requires external speaker(s).
Audio Power out: 1 Watt.
Dimensions (WHD): 15 x 6.25 x 13.7 inch (381 x 159 x 348 mm).
Net weight: 40 lb/18.160 kg.

The FTDX series of transceivers began with the FTDX400 in 1968. The FTDX560 and 570 appeared around 1970. These were both 560 watt rigs with the 570 being a deluxe version with built in cooling fan and noise blanker (the later FTDX560s also had the noise blanker).

The FTDX560 and 570 featured 100 and 25 kHz calibrators which were great for analog tuning. They also featured an RIT control which allowed tuning the receiver a few kHz independent of the transmitter's frequency.

One unusual feature is the backward reading S meter. It reads from right to left on incoming signal strength and ALC. It reads left to right for cathode current and power output. It's a little hard to get used to until you use the rig for a while.

The FTDX560 and 570 share the same basic layout and tubes, and feature a built-in power supply. With an output of around 200-250 watts they put out an impressive signal.

The bands covered are 80 through 10 meters (no WARC bands) as well as WWV and two aux positions which could be used for CB or the addition of a WARC band.

They also had the capability to use an external VFO (FV400) for cross-band operation. These transceivers were manufactured in Japan in the late 1960s and early 1970s.

The FTDX570 was a state-of-the-art HF transceiver when it was produced and acquitted itself very well on-air. It still performs very well when restored and used today.

Bill Roper VK3BR
editor.

RAOTC members list

as at 31st July 2021.

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

	Name	Call	No	
	ACT			
L	Ted Peppercorn	VK1AEP	1314	*
A	Chris Thompson	VK1CT	1717	
	Graeme House	VK1IO	1803	
L	Ernie Hocking	VK1LK	1260	
B	Andrew Robertson	VK1NRO	1611	
	NSW			
	Don Hunt	VK2ADY	1141	
L	George Paterson	VK2AHJ	1333	+
L	Jim Patrick	VK2AKJ	1003	
	Alan Whitmore	VK2ALA	1381	
L	Max Mondolo	VK2AML	1227	
	Max Riley	VK2ARZ	1518	*
	Ray Morris	VK2ASE	1763	*
L	Tony Mullen	VK2BAM	882	*
L	John Trenning	VK2BAR	1226	*
	Steve Leatheam	VK2BGL	1498	*
L	Brendan Connolly	VK2BJC	1213	
	John Pickett	VK2BKP	1748	*
L	Ray Gill	VK2BRF	1592	
	Dave Rothwell	VK2BZR	1414	
	Ken McCracken	VK2CAX	1730	*
L	John Clark	VK2CF	903	+
	Peter Presutti	VK2CIM	1705	
L	Ray Turner	VK2COX	1348	*
	Peter Balnaves	VK2CZX	1774	
	Dot Bishop	VK2DB	1403	
	Dean Davidson	VK2DJD	1423	
	Brian Kelly	VK2DK	1645	
	Al MacAskill	VK2DM	1277	*
	Robert Moldenhauer	VK2DY	1786	
	Trevor Wilkin	VK2ETW	1570	
	John Boyd	VK2EZC	992	*
A	Syd Brooksby	VK2FACG	1736	
L	Glen Millen	VK2FC	1180	
	Simon Lister	VK2FK	1770	
L	Nick Perrott	VK2FS	1327	
L	Ray Davies	VK2FW	1563	*
L	Gary Baxter	VK2GAB	1504	
L	Allan Mason	VK2GR	1221	*
L	Peter Ritchie	VK2HC	1326	
	Ian Jeffrey	VK2IJ	1571	
	Herman Willemsen	VK2IXV	1384	
	John Lockwood	VK2JL	1678	*
L	Pat Leeper	VK2JPA	1629	
	Kevin Parsons	VK2JS	1586	
	Graeme Scott	VK2KE	789	*
	Greg Hilder	VK2KGH	1375	
	Mark Bosma	VK2KI	1767	
	Kevin Green	VK2KTG	1769	
	Barry Wood	VK2LA	848	*
	John Trist	VK2MOP	1814	
L	Tom Sanders	VK2MY	1393	
L	John Gaynor	VK2NCE	1475	+
L	William Spedding	VK2NLS	1394	
	John Sullivan	VK2OH	1687	
L	Mike Rautenberg	VK2OT	1335	
L	Peter Mair	VK2PF	1318	
L	Roger Conway	VK2RO	1255	
	Robert Ward	VK2TAX	1625	
L	Robert Taylor	VK2TR	1469	
A	Reg Hawkins	VK2TRH	1727	
L	Trevor Thatcher	VK2TT	1080	*
	Ray Wells	VK2TV	1076	*
L	Eric De Weyer	VK2VE	1253	
	Vol Pleuger	VK2VP	1802	*
L	Barry Mitchell	VK2WB	1456	
L	Keith Sherlock	VK2WQ	1138	+
	Brian Rodgers	VK2XFL	1608	
	Jack Hodge	VK2XH	1605	
L	Richard Cortis	VK2XRC	1474	
	Ron Cameron	VK2XXG-ex	1410	
	Gary Ryan	VK2ZKT	1267	
L	Steve Grimsley	VK2ZP	465	+
	Bob Ecclestone	VK2ZRE	1758	
L	Robert Alford	VK2ZRJ	1444	
	Steve Pettet	VK2ZVG	1752	
L	Sam Faber	VK2ZZ	1359	
	Victoria			
	Peter Doolan	VK3ACJ	1549	
L	Graham Rutter	VK3ACK	1322	
L	David Rosenfield	VK3ADM	1622	*
L	David Wardlaw	VK3ADW	408	*
	Merv Quinn	VK3ADX	1789	
	Peter Cole	VK3ADY	1815	*
L	Ron Cook	VK3AFW	824	*
L	Bob Duckworth	VK3AIC	1245	*
L	Dave Parslow	VK3AIF	1552	
L	Rob McNabb	VK3AIM	829	*
	Marty Orive	VK3AKG	1794	
L	Ken Young	VK3AKY	1103	+
L	Tony Smith	VK3ALS	1521	
	David Waring	VK3ANP	1037	*
	Roy Badrock	VK3ARY	1211	*
L	David Stuart	VK3ASE	1346	
	Ivan Brown	VK3ASG	1669	*
	Tony Atkins	VK3ATR	1808	*
L	Max Carpenter	VK3AUA	1489	+
L	Ron Mackie	VK3AVA	1478	
	Laurie Middleton	VK3AW	1152	
	David Swallow	VK3AWX	1747	
L	Rod Green	VK3AYQ	1380	
L	Roy Thorpe	VK3BAM	1323	
	Bob Hillebrand	VK3BAY	1757	
	Brian Young	VK3BBB	1058	
	Carl Dillon	VK3BBW	1618	*
	Neil Muscat	VK3BCU	1695	
L	Brian Tideman	VK3BCZ	1184	
	Mike Goode	VK3BDL	1610	
L	Digger Smith	VK3BFF	1424	
	Peter Cossins	VK3BFG	1257	
	Ed Roache	VK3BG	1692	*
	Denis Babore	VK3BGS	1756	
L	Muriel Plowman	VK3BJO	1511	
	Alan Hyslop	VK3BLP	1811	
L	Noel Jeffery	VK3BMU	1021	+
	Alan White	VK3BOK	1809	*
L	Alex Edmonds	VK3BQN	1341	
L	Albert Hubbard	VK3BQO	1506	
L	Bill Roper	VK3BR	978	*
L	Stan Roberts	VK3BSR-ex	1272	+
	Mark Gillespie	VK3BU	1661	
L	Graeme Brown	VK3BXG	1542	
L	Andy Walton	VK3CAH	1599	
L	John Machin	VK3CCC	1421	
	Bob Crockford	VK3CDE	1777	
	Bob Crowle	VK3CDV	1588	
	Ken Morgan	VK3CEK	1457	
L	Mick Ampt	VK3CH	1365	
L	Vic Punch	VK3CKD	1250	
	Colin Schultz	VK3COL	1797	
L	Dick Webb	VK3CP	972	*
	Clint Jeffrey	VK3CSJ	1648	
L	Don Jackson	VK3DBB	1290	
	David Dunn	VK3DBD	1252	*
L	Mike Pain	VK3DCP	1204	
	Helmut Inhoven	VK3DHI	1742	
	Jim Goding	VK3DM	1744	*
L	Russell Ward	VK3DRW	1376	
	Peter Cosway	VK3DU	1447	*
	Peter Milne	VK3DV	1546	*
	Bill Fanning	VK3DWF	1038	*
L	Nigel Holmes	VK3DZ	1435	
L	Sarjiet Singh	VK3EAM	1052	
L	Dallas James	VK3EB	1238	
L	Steve Harding	VK3EGD	1524	
L	John Eggington	VK3EGG	1683	
L	Mark Harris	VK3EME	1574	
	Bob Frencham	VK3EQQ	1684	
L	Ellis Pottage	VK3FG	1087	+
	Dave Bell	VK3FGE	1339	*
	Noel Ferguson	VK3FI	1416	*
L	Ernie Walls	VK3FM	1401	
A	Robert Ferguson	VK3FPJ	1781	
	Peter Lord	VK3FPL	1590	+

	Name	Call	No	
L	Ray Taylor	VK3FQ	1216	
L	John Brown	VK3FR	1407	
	Geoff Wilson	VK3GJW	1658	*
L	Lee Moyle	VK3GK	1363	
	Max Morris	VK3GMM	1265	
	Graeme Harris	VK3GN	1630	
	Bruce Stokes	VK3HAV	1613	
	Brian Baker	VK3HB	1093	*
A	Phil Maskrey	VK3HBR	1387	
	Tony Zuiderwyk	VK3HC	1733	
A	John Kirk	VK3HCT	1427	
A	Andrew Clinkaberry	VK3HFA	1792	
L	Luke Steele	VK3HJ	1432	
L	Steve Bushell	VK3HK	1001	*
B	Phil Cardamone	VK3HPC	1539	
	Alan Hall	VK3HV	1793	
L	Bill Jamieson	VK3HX	1117	*
L	Gavin Brain	VK3HY	1304	*
	Ian McFarlane	VK3IDM	1332	
	Peter Collins	VK3IJ	1686	*
L	Tim Hunt	VK3IM	504	
L	Ian Palmer	VK3IN	1643	
	Don Bainbridge	VK3IT	1766	
	Ray Proudlock	VK3JDS	1585	*
	John Frost	VK3JF	1776	
L	Graeme Mann	VK3JGM	1274	
	Ray Lenthall	VK3JH	1663	
L	Anthony Rogers	VK3JIA	1287	
	Craig Gliddon	VK3JK	1701	*
	Fred Storey	VK3JM	1010	
	Ian Sturman	VK3JNC	1218	
	John Walters	VK3JO	1288	*
L	Ian McLean	VK3JQ	1215	
	Frank Nowlan	VK3JR	1286	
L	Ian Godsil	VK3JS	1220	
L	Bill Magnusson	VK3JT	1342	*
	John Baker	VK3JWC	1818	
L	Steve Phillips	VK3JY	1266	
	Barrie Halliday	VK3KBY	1523	
L	Ralph Comley	VK3KDD	1461	
L	Jim Baxter	VK3KE	1354	
L	Craig Cook	VK3KG	931	*
L	Paul Karlstrand	VK3KHZ	1528	
L	Jim Hinton	VK3KJH	1366	
L	Reg Lloyd	VK3KK-ex	506	*
	Victor Self	VK3KSF	1254	
L	Mike Ide	VK3KTO	1194	
	Peter Clark	VK3KU	1573	
	Gary Briant	VK3KYF	1779	
L	Alan Heath	VK3KZ	1151	
	Colin Middleton	VK3LO	1153	
	Warren Moulton	VK3LX	976	*
	David Davies	VK3MHV	1293	+
	John Ross	VK3MK	1798	
	Ian Williams	VK3MO	1749	
L	Rob Whitmore	VK3MQ	1352	
	Peter Young	VK3MV	1400	

	Name	Call	No	
L	Graeme McDiarmid	VK3NE	1485	
L	Neville White	VK3NZ	1343	
L	Alan Baker	VK3OA	1646	
	Jock Mackenzie	VK3OQ	1619	
L	Peter Freeman	VK3PF	1443	
	Phil Harbeck	VK3PG	1784	
	Mark Stephenson	VK3PI	1632	
	Stewart Mair	VK3PR	1641	
L	Peter Simons	VK3PX	1408	
	John Longayroux	VK3PZ	1553	
L	Bruce Plowman	VK3QC	1448	+
L	Ian Hocking	VK3QL	1594	
L	David Learmonth	VK3QM	1765	
L	Darrell Edwards	VK3RE	1185	
L	Blayne Bayliss	VK3RF	1412	
	Ron Sutcliffe	VK3RS	1425	
L	Peter Wolfenden	VK3RV	1484	*
	Ray Wales	VK3RW	1471	
L	Damien Vale	VK3RX	1239	
L	Sarah Dowe	VK3SD	1535	
	Barry Schrape	VK3SW	1560	
L	Barry Abley	VK3SY	1496	
	John Sutcliffe	VK3TCT	1589	*
	Peter Marks	VK3TPM	1805	
A	Jaimie Hall	VK3TZE	1782	
	Colin Durrell	VK3UDC	1244	
L	Mike Thorne	VK3UE	1473	
	Rodney Champness	VK3UG	1086	*
L	John Blackman	VK3UI	1319	
L	Bruce Bathols	VK3UV	1090	
	Doug Raper	VK3VBA	1812	
	Kevin Trevarthen	VK3VC	1115	*
L	Trevor Pitman	VK3VG	1246	
A	Jeff Silvester	VK3VJS	1582	
L	David Harms	VK3VL	1383	
L	Greg Williams	VK3VT	1402	
L	Peter Dempsey	VK3WD	1544	
L	Brian Endersbee	VK3WP	1491	*
L	Jenny Wardrop	VK3WQ	1656	
	Dennis Sillett	VK3WV	1668	*
L	Ian Keenan	VK3XI	1527	
	John Cheeseman	VK3XM	1746	
	Bob Tait	VK3XP	1689	
	Ted Egan	VK3XT	721	*
	Drew Diamond	VK3XU	1140	
L	Derek McNiel	VK3XY	1370	
L	Tim Robinson	VK3YBP	1617	*
L	Brewster Wallace	VK3YBW	1126	
L	Terry McIntosh	VK3YJ	1532	
	Jon Nicholls	VK3YKB	1772	
L	Peter Godfrey	VK3YPG	1685	
	David Ditchfield	VK3YSK	1732	
L	Alan Hayes	VK3ZAH	1711	
	Ken Benson	VK3ZGX	1377	
L	John Horan	VK3ZHJ	1541	
	Kevin White	VK3ZI	1568	
	Ian Baxter	VK3ZIB	1519	
	Don Seedsman	VK3ZIE	1068	*

	Name	Call	No	
L	Jim Gordon	VK3ZKK	1262	
	Geoff Angus	VK3ZNA	1482	*
	Cal Lee	VK3ZPK	1510	
	Peter Mill	VK3ZPP	1788	
	Eric Gray	VK3ZSB	1451	*
	Leigh Tuckerman	VK3ZTU	1468	*
L	Bill Adams	VK3ZWO	1356	+
	Queensland			
	Terry Stewart	VK4AAT	1739	
	Colin Gladstone	VK4ACG	1703	
	Ian Saunders	VK4ACU	1390	
	Doug Hunter	VK4ADC	1697	*
	Geoff Adcock	VK4AG	1718	
	Jim Brown-Sarre	VK4AGF	1640	*
	Barrie Smeaton	VK4ALK	1800	*
	George McLucas	VK4AMG	1675	*
L	Harold Cislowski	VK4ANR	1550	
	Glenn McNeil	VK4BG	1633	
L	Graeme Dowse	VK4CAG	1417	
L	Les McDonald	VK4CLF	961	*
L	Jon Walton	VK4CY	842	*
L	Ian Browne	VK4DB	1283	
L	Merv Deakin	VK4DV	1230	*
	Ron Goodhew	VK4EMF	1516	
	Ron Kerle	VK4EN	1706	
	Bob Lees	VK4ER	1609	*
	Len Eaton	VK4FIAA	1606	
A	Bob Coupland	VK4FRC	1759	
	Felix Sceri	VK4FUQ	1533	
L	Geoff Bonney	VK4GI	969	*
	Gary Bray	VK4GRB	1775	
	Kevin Dickson	VK4IW	1158	
L	Andy Beales	VK4KCS	1579	
	Tony Dore	VK4KJD	1737	
L	Norman Fiori	VK4LD	1296	
A	Mike Patterson	VK4MIK	1467	
L	Mario Antoniutti	VK4MS	1470	
	Mike O'Connor	VK4MW	1603	
A	Ray Crawford	VK4NH	1653	
	Dick Pietrala	VK4OP	1075	
	Ian McCosker	VK4PF	1162	*
A	Graham Hassall	VK4PMM	1773	
	Allan Downie	VK4QG	1565	
	Mike Charteris	VK4QS	1329	
A	Rob Young	VK4QX	1795	
L	Rod Rush	VK4RA	1477	
	Ron Grandison	VK4RG	668	+
L	Ross Ramm	VK4RO	1433	*
L	Alex McDonald	VK4TE	1411	*
L	John Roberts	VK4TL	1005	*
L	Mick McDermott	VK4TMD	1317	
L	Paul Blake	VK4TPB	1514	
	Peter Elton	VK4VQ	1790	*
	Ray Thorn	VK4WY	1724	*
L	Chris Bourke	VK4YE	1436	
	Nick Watling	VK4YT	1263	*
	Frank Adamson	VK4ZAK	1406	
	Philip Tomlinson	VK4ZPE	1624	*

	Name	Call	No	
	Bill Wilcock	VK4ZWJ	1373	
	South Australia			
	Mike Hall	VK5AGI	1615	
	Morris Rieger	VK5AMR	1761	*
	Peter Reichelt	VK5APR	1612	
	Alan Raftery	VK5AR	1791	*
	Trevor Quick	VK5ATQ	1813	*
	Adrian Wallace	VK5AW	1637	
	Wolfe Rohde	VK5AXN	1628	
	Ben Broadbent	VK5BB	1796	
	John Dawes	VK5BJE	1764	
L	Lloyd Butler	VK5BR	1495	+
	Dick Turpin	VK5BRT	1347	
	Barry Williams	VK5BW	1551	
	Henry (Curl) Blythe	VK5CL	1654	
L	Brian Condon	VK5CO	291	*
A	Colin Mason	VK5COL	1806	
	John Drew	VK5DJ	951	*
	Mac Macdermott	VK5FLEN	1631	
	Jeff Farmer	VK5GF	851	
L	Paul Spinks	VK5GX	1214	
	Colin Hurst	VK5HI	1716	*
	Harro Krause	VK5HK	1275	
L	Ian Sutcliffe	VK5IS	1355	
	Trevor Niven	VK5NC	946	*
L	Bryan Scott	VK5NOS	1202	
L	John Butler	VK5NX	1120	
L	Terry Franklin	VK5OC	1430	
	Tony Wilkinson	VK5PBB	1453	
A	Ron Zimmermann	VK5PCZ	1449	
	David Poole	VK5PL	1729	
	Peter Russell	VK5PR	1702	*
	Trevor Greig	VK5PTL	1601	
	Phil Day	VK5QT	1722	
L	Ivan Huser	VK5QV	477	*
	Rob Gurr	VK5RG	1500	*
	Colwyn Low	VK5UE	1361	*
	Rod Cunningham	VK5UV	1694	
	Bill Thomas	VK5VE	1321	*
L	Ian Werfel	VK5VJ	968	
A	Lyle Whyatt	VK5WL	1680	
	Colin Luke	VK5XY	1168	*
	Hans Smit	VK5YX	1517	
	Geoff Cleggett	VK5ZAE	1734	
	Adrian Waiblinger	VK5ZBR	1614	
	Ian Coat	VK5ZIC	1682	
	Ian Maxted	VK5ZIM	1562	
	Peter Temby	VK5ZJ	1229	
L	Peter Whellum	VK5ZPG	1479	
	Western Australia			
	Brian McDonald	VK6ABM	1508	*
L	Barrie Burns	VK6ADI	1273	*
	John Farnan	VK6AFA	1409	
	Peter Zwarecz	VK6APZ	1715	
L	Mark Bussanich	VK6AR	1334	
	Allen Tighe	VK6ART	1816	*
	Geoff Wood	VK6AT	1721	
	Tony Argentino	VK6ATI	1591	

	Name	Call	No	
	Graeme Smith	VK6ATS	1719	
	Al Taylor	VK6ATX	1807	
	Anthony Benbow	VK6AXB	1566	
L	John Van-Tiel	VK6BCU	1481	
	Bob Good	VK6BI	1652	
	Richard Grocott	VK6BMW	1555	
L	Barrie Field	VK6BR	377	+
L	Bob Crowe	VK6CG	1405	*
B	Ken Taylor	VK6CO	1529	
	Clive Wallis	VK6CSW	1289	
	Clem Patchett	VK6CW	742	*
	Arthur Eder	VK6CY	1303	
	Chris Walker	VK6DDX	1750	
L	Doug Wells	VK6DEW	1458	
	Doug Jackson	VK6DG	1243	
	John Gouteff	VK6FD	1817	*
B	Noel Fagence	VK6FNAJ	1780	
B	Rob Hatton	VK6FX	1708	
	Gary Liljegren	VK6GAL	1804	*
	Gerry Wild	VK6GW	1112	*
	Phil Hartwell	VK6GX	1494	
L	Bob Howard	VK6HJ	1623	*
A	Richard Campbell-Morrison	VK6HRC	1698	
	John Tower	VK6IM	1691	
L	Glen Hufner	VK6IQ	1072	*
	Peter Scales	VK6IS	1700	
L	John Farnell	VK6JF	1297	
	Chris James	VK6JI	1587	
	Jim Preston	VK6JP	1121	
	Keith Bainbridge	VK6KB	1664	
	Dudley Donovan	VK6KBY	1672	
L	Chris Hill	VK6KCH	1741	
	Phil van Leen	VK6KHV	1655	
L	Bob Lockley	VK6KW	1172	
L	Glenn Ogg	VK6KY	1358	*
	Bill Toussaint	VK6LT	1561	*
A	Gary Dewar	VK6LX	1799	
	Mike Crack	VK6MJC	1771	
	Nick Vitalone	VK6NA	1745	
	James Price	VK6NJP	1801	
	Lindsay Hirschausen	VK6NO	1714	
L	Noel Sanders	VK6NS	1493	
L	Alan Gibbs	VK6PG	815	*
L	Ray Peterson	VK6PW	346	*
L	Phil Zeid	VK6PZ	752	+
L	Graham Rogers	VK6RO	1302	
	Geoff Matthews	VK6SI	1738	
L	Phillip Bussanich	VK6SO	1247	
	Lee Thomson	VK6TY	1751	
	Bob Knight	VK6UK	1778	
	Wayne Jefferies	VK6VE	1731	
	Duncan Page	VK6VO	1340	
	Brian Green	VK6WG	1783	
	Bill Rose	VK6WJ	1463	
	John Tuppen	VK6XJ	1525	
L	Roy Watkins	VK6XV	1181	
L	Eddie Saunders	VK6YA	1762	

	Name	Call	No	
	Trevor Dawson	VK6YJ	1662	
	Peter Savage	VK6YV	1671	
	Tom Berg	VK6ZAF	1133	*
	Max Shooter	VK6ZER	1431	*
L	Igor Iskra	VK6ZFG	1559	*
L	Phil Casper	VK6ZKO	1445	
	Robert Randall	VK6ZRT	1225	
	Tasmania			
	Allen Burke	VK7AN	1270	
	Tony Bedelph	VK7AX	1676	
L	Nicholas Chantler AM	VK7BEE	1538	
	Anne Landers	VK7BYL	1439	
	Mike Hawkins	VK7DMH	1597	
	Jerry Smutny	VK7EE	1595	
	Winston Nickols	VK7EM	899	*
	Tom Moore	VK7FM	1593	+
L	Herman Westerhof	VK7HW	1604	*
	Terry Pool	VK7JAI	1785	*
	Chris Holliday	VK7JU	1667	*
	Reg Emmett	VK7KK	1709	*
L	Charles Spiegel	VK7KS-ex	660	*
	Bob Geeves	VK7KZ	907	*
B	Ross Broomhall	VK7LH	1699	
L	Rex Moncur	VK7MO	1298	*
L	William Maxwell	VK7MX	1418	
L	Peter Dowde	VK7PD	1554	*
	Bob Reid	VK7RF	1666	*
L	Richard Rogers	VK7RO	908	*
	Trevor Briggs	VK7TB	1316	
L	Justin Giles-Clark	VK7TW	1712	
L	Winston Henry	VK7WH	1526	*
	Ross Bonney	VK7WP	1787	
A	Wayne Hardman	VK7XGW	1723	
	André Bochenek	VK7ZAB	1725	
L	Paul Edwards	VK7ZAS	1324	*
L	Idris Rees	VK7ZIR	1713	
	John Jongbloed	VK7ZJJ	1584	
	Northern Territory			
L	Mike Alsop	VK8MA	1743	*
L	Peter Clee	VK8ZZ	1728	
	Overseas			
	Juergen Wagner	DL4KE	1810	
	Fred Luthi	HB9JW	1760	
L	Ira Lipton	WA2OAX	1344	*
L	Martyn Seay	ZL3CK	1159	

Membership statistics

193	Life members
260	Full members
6	Associate Life members
20	Associate members
479	**Total membership**
	Including
128	Licensed 50 years plus
20	Aged 90 years plus

Obituary

Lance G Rock VK6LR

RAOTC member No 1509

Lance Rock was a very well respected long-term member of the amateur radio community in Western Australia. Lance used to tell us stories of his early working life as an apprentice technician, then running a shop in Wellington Street and moving on to owning a Retravision store in Mandurah.

He became a Director of both the Retravision Board and a Western Australian TV and radio broadcasting network. He was the Founding President of the Peel Amateur Radio Group, a founding member of WA Amateur Radio News, an avid Rotarian, an old-time foxhunter and a regular at the weekly VK6 'Prawnheads' lunches.

Lance settled in Mandurah where he and his wife Hazel raised four children. Their house, on the foreshore of the estuary on the Halls Head side of Mandurah, was unmistakably that of a radio amateur, sporting a huge HF log periodic antenna. Until very recently Lance continued as a very active Life Member of the Peel Amateur Radio Group. Another passion that Lance had was sailing and we heard many tales of his exploits in club and international sailing races.

As a founder and life member of many organisations, Lance was a very active man in the Mandurah Community. A devoted husband, father, grandfather, great grandfather, businessman, yachtsman, and Rotarian - the list goes on - Lance touched the lives of so many in the Peel community. Knowledgeable and always the first to volunteer when there was work to be done - whether it was shimmying up a tower, or supporting the Mount William and Mount Saddleback 2 m repeaters - Lance will be remembered as a great friend and, as one member put it, 'a Grand Old Man of Amateur Radio'.

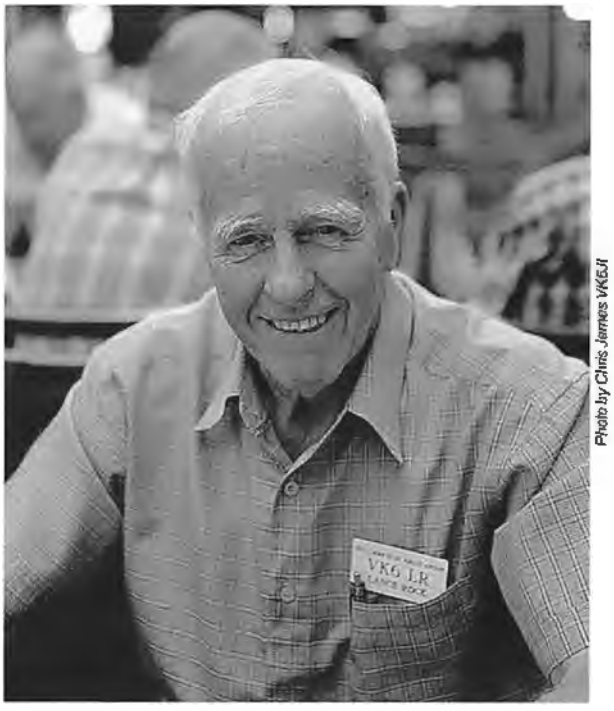

Photo by Chris James VK6JI

Lance Rock VK6LR at a 2015 Old Timers' Lunch.

Lance passed away peacefully on Saturday, 27th February 2021 leaving behind his wife Hazel and four sons, Stephen, Neil, David and Ian. On behalf of the amateur radio community, we express our deepest sympathy to Hazel and the family.

From your many friends with sadness and deep respect, 73 and vale, Lance VK6LR.

***Contributed by Tony Boddy VK6DQ on behalf of the members of the* Peel Amateur Radio Group, *Bob Bristow VK6POP on behalf of* NewsWest *and Mac McDonald VK6MM on behalf of the* WA Repeater Group.**

New RAOTC members

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

Name		Call	No	Grade
Vol	Pleuger	VK2VP	1802	F
Graeme	House	VK1IO	1803	F
Gary	Liljegren	VK6GAL	1804	F
Peter	Marks	VK3TPM	1805	F
Colin	Mason	VK5COL	1806	A
Al	Taylor	VK6ATX	1807	F
Tony	Atkins	VK3ATR	1808	F
Alan	White	VK3BOK	1809	F
Juergen	Wagner	DL4KE	1810	F
Alan	Hyslop	VK3BLP	1811	F
Doug	Raper	VK3VBA	1812	F
Trevor	Quick	VK5ATQ	1813	F
John	Trist	VK2MOP	1814	F
Peter	Cole	VK3ADY	1815	F
Allen	Tighe	VK6ART	1816	F
John	Gouteff	VK6FD	1817	F
John	Baker	VK3JWC	1818	F

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Silent keys

It is with regret that we record the passing of:

John	Bishop	VK2ZOI
Bill	Babb	VK3AQB
Jim	Downman	VK4FAD
Gordon	Loveday	VK4KAL
Keith	Metcalf	VK5ND
Lance	Rock	VK6LR
Poppy	Bradshaw	VK6YF

ar

Wanted

More original articles about your radio experiences and adventures.

Come on! Club members want to read about your radio exploits and history.

Obituary

Poppy Bradshaw VK6YF

RAOTC Life member No 1191

24th October 1926 – 4th June 1921

It is with great sadness we announce that the well known and much respected Poppy Bradshaw VK6YF passed away peacefully on 4th June 2021, at the Carramar Residential Aged Care Home, Morley, Western Australia, aged 94. Our sincere condolences go to her children Lynda, Jude and Glen and their families.

Poppy Ellen Bradshaw (nee Petersen) was born on 24th October 1926. During WWII and still in her teens, Poppy enlisted in the Women's Australian Auxiliary Air Force on 20th December 1944 and trained as a Flight Mechanic at Ascot Vale, Victoria. Later, she served at Port Pirie, SA, Pearce and Wembley, WA.

Flight Mechanics worked on aircraft engines; however, as the war was 'slowing down' by the time Poppy enlisted, she worked in the Technical Library where her technical knowledge was needed. She also worked in maintenance doing clerical work. Post-war, she returned to civilian life on 18th June 1946.

Until quite recently Poppy remained an active amateur radio enthusiast and was always a great supporter of our hobby. She and her husband Les VK6BE were long-time members of the West Australian Repeater Group and both were popular members of the Hills Amateur Radio Group in Perth.

Sadly, Les died in 1996 but, despite her loss, Poppy maintained her interest in amateur radio.

Poppy was a long-time and dedicated supporter of ALARA, the Australian Ladies' Amateur Radio Association. She joined the Association in 1978, not long after its formation in 1975, and remained a member until her death.

During most of her 43 years with ALARA she served in a number of roles including Publicity Officer, Sponsorship Secretary and VK6 State Representative, holding the latter post for many years.

On occasion she also contributed to *Amateur Radio* magazine as a guest writer of the ALARA news column.

In September 1992, Poppy was awarded a plaque for Outstanding Service to ALARA. Some readers may even remember the presentation at the Westrail Centre in Perth.

Poppy was both an avid contester and supporter of the regular ALARA weekly nets, often acting as Controller on 80 metres, as well the DX YL 222 Net, an international 20 metre SSB net on 14.222 MHz. She regularly participated in the various ALARA Contests, DXCC and always supported the annual Remembrance Day Contest.

Poppy was a regular participant in ALARA Meet, a regular get together of ALARA members from far and wide held every three years and in locations as diverse as Dubbo in NSW, Hamilton in New Zealand followed by a trip to Norfolk Island, and Murray Bridge in South Australia, to name but a few.

Those who knew Poppy will remember her as a gentle, kind and loving person who throughout her long and happy life was an inspiration to us all. She will be greatly missed yet fondly remembered. Amateur radio is the poorer for her passing.

Vale, Poppy VK6YF.

Clive Wallis VK6CSW
RAOTC member No 1289
ar

The story of John Bishop VK2ZOI / VK2BK (SK)

Dot Bishop VK2DB
RAOTC member No 1403

Sadly, John Bishop VK2ZOI / VK2BK, RAOTC member No 1404, became a Silent Key on 29th January 2021 at age 75. This interesting story of John's full life was supplied by his widow, Dot Bishop VK2DB.

John was born at St Kilda Hospital, Hornsby, on 12th October 1945. He was the fifth child of his parents, Lorna and Roy Bishop, and grew up with two older sisters and two older brothers. His childhood was much like others of the day, playing all day long till the sun went down and being ravishingly hungry for dinner. He spent a lot of time with his brothers and friends playing with their billycarts, and playing cowboys and Indians with the usual cries of "Bang! Bang! I got you".

Sunday was the day the family got together, attending morning Church at the Hornsby Church of Christ, followed by a big roast lunch and evening church. As he grew up John took on many duties in Church life.

John's father owned a rather large short-wave radio which was able to tune into voices all around the world. Thus began John's interest in radio. His Dad was also interested in electronics and wired up most of the rooms in the house with old Army telephones from Army surplus stores. "When it was time for sleep, we children would be in our beds to get the call. 'Ring ring' then Dad would read a bedtime story and we'd listen. But I'm not sure if Mum really enjoyed having a house with all that extra wiring!"

John attended Hornsby Primary school and then Normanhurst Boy's High. He always strove to be top of his class and told a story about one assembly when he received a prize. His mother, who was running late, had raced straight from work without lunch and crept into the very quiet auditorium, unwrapped a Violet Crumble bar and crunched into it loudly. John was mortified, but he also inherited his mother's sense of humour.

His aim to be top of the class continued into his years at North Sydney Tech and the Institute of Technology where he studied Electronics and Communications. Actually, he had planned to be an Industrial Chemist but thought there was more money in electronics. He began his working life in January 1963 as an 18-year-old trainee at AWV, Rydalmere, first qualifying as a Technician, then progressing to Technical Officer and Electronic Engineer.

1963 was also the time that John first met me, Dot, when I visited the Bishop home one breakfast time. Over the next few months, John got to know me a little more. In January 1964 I needed a partner to accompany me to two weddings on the same day. Big lunch, big dinner! Needing someone with a BIG appetite, I invited John. As John was just 18 and didn't own a car, his parents drove him the 50 km south to see where I came from, size up my family, and to be assured the baby of their family would be returned home safely.

We courted for almost three years, having to wait till he turned 21 which was then the legal age of marriage. Impressed with my car tool kit, both metric and imperial, for the two cars I had owned and serviced, John drove up to Dubbo where I was teaching and proposed in

John Bishop VK2ZOI / VK2BK

December 1966. He managed to convince his family, and the church minister, to hold the wedding in the school holidays in two weeks time. On Boxing Day, 26th December 1966, we were married at the Church of Christ, Hornsby.

Our family home in Hornsby Heights was built on a sloping bush block, chosen for its good outlook for ham radio and, on a clear day, we have a view over the valley to the mountains. It started off as a small home but grew a room larger with each of the four children. Years later, John's tower, with a beam for 6 m, was attached to the wall, later to be replaced by my tri-band beam.

John had moved from AWV and was working for AWA when he saw an advertisement for the Department of Defence. He began there in August 1975, working as the Project Officer for the Naval Ordnance Electronics Laboratory. He was responsible for the Fleet Services section controlling the operation and maintenance of Ikara missile telemetry (Ikara was an Australian ship-launched anti-submarine missile) and often went out to sea to conduct a test firing. He then moved to become the manager of the Engineering Services Section.

John loved going to sea in the Navy ships. He didn't get seasick, except once when there wasn't a bunk for the civilians and he had to sleep in an empty torpedo launcher. He couldn't eat breakfast the next morning.

In 1977, he took part in a Navy exercise in the Pacific and enjoyed playing games with 38 ships from Navies of four countries, out on the high seas. Another time he had to go to sea to test missiles with the New Zealand Navy. After the tests the ship was not returning to the dock, so John had to be helicoptered off. He made sure that was the one and only time he ever did that!

In 1979, as a civilian, John was seconded to the Ministry of Defence Procurement Executive, UK, and attended the Royal Military College of Science at

Shrivenham, Wiltshire. He did the Naval Ordnance Quality Assurance Course, studied Naval Guided Weapons and also did a study of science and technology in the field of Munitions covering the entire spectrum of weapons. He was Dux of the course, of course!

I took the two children and joined him in living on an army estate. Every weekend, no matter the weather, we went out sight-seeing and trying the lovely little English pub lunches.

The next year John was back in Australia responsible for the Naval Ordnance Electronics Laboratory and assisted with Electrical Explosive Hazards trials for the RAAF at Air bases Williamtown, at Port Stevens and Butterworth in Malaysia. He assessed government and private firms' Quality Control systems and appeared on the TV news presenting awards to complying companies. He also did road trials around Sydney, checking where aerials were along roads where explosives may be carried.

In 1982, he completed the Naval Staff Course at the RAN Staff College, HMAS *Penguin*, with distinction. One test he had there was being interviewed by a TV presenter, with probing questions. He was to give a lot of words but no information, just like politicians. He really enjoyed that and answered well, but sat back far too relaxed.

Towards the end of his career, to make companies check their own quality, he had to disband his Quality Assurance Team. That meant that John had to sack about 400 workers. He interviewed each person. If they had a mortgage and needed to keep working, he found them an exchange job in another department. If they wanted a redundancy package, they got it. He negotiated re-training for some men. This was a particularly stressful time for him as he knew his job would be the last to go. He managed to negotiate a one year job writing reports to see him to retirement.

In the final year, John conducted an in-depth review into contracting in the Navy (the 'Bishop Review'), setting a raft of recommendations of which many were implemented. The hierarchy wanted him to go and work in Canberra for another five years but, as he already had worked there for various periods at various times, he answered, "I don't want to move to Canberra, I want to live with real people".

He had spent a lot of his working life away from home and the family had learned to get along without him.

At first, retirement was a puzzle. John was very set in his ways, rose and ate by the clock, especially morning tea. He tried to manage the family as he managed his offices. It didn't work and he retreated to his ham shack if he saw the 'wife storm' approaching. We finally adjusted to his retirement, but both of us were so busy on committees we had no time for our planned 'sitting on the veranda growing old together'.

From when he was very young, John was always interested in amateur radio. After school John would race up the street to spend time with Dave Duff VK2EO. John was very impressed by Dave's Morse code. Dave could talk to John, have a conversation on CW, write notes or draw diagrams, all at the same time!

John never did his Morse but he joined the WIA in 1962. Getting his licence was another matter. He was always saying, "One day I'll get my amateur radio licence... you'll see.... one day". Well, one day in February 1971, after he'd said it once too often, I said, "Talk, talk, talk, you never do anything about it, you'll never get it."

That day he applied to do the exam. He thought he'd missed the cut-off date for applications and had a few months to study, but he'd applied on the last day before the cut off. Two weeks later, in February, he sat the exam. He received his certificate and callsign in October. For 49½ years he was proud to be VK2ZOI.

Now-a-days people don't believe it, but John was 'mike shy'. At first he used to call on the local 2 metre repeater about 11 pm hoping no one would answer. One night someone did reply and, with much umming and erring, John was finally 'on air'.

John didn't have time to play radio very much while he was working but he joined HADARC, the local Hornsby and Districts ARC. In 1977, he was involved with establishing training and education courses. Then in 1990 he 'accidentally' was nominated as HADARC President. He was very apologetic the night he came home with the news to his family; he knew how much time it would entail, but he loved it. Each AGM he would promise, "This is the last time" but for 30 years it never was.

John was thrilled when I gained my first radio licence in 1978 and became VK2NVQ. He carried a 39 lb (17.7 kg) Yaesu FT-101 home in the peak hour train. As we both had different grade licences and used different frequencies, we couldn't talk to each other on air. John was travelling a lot for work so I studied to upgrade my licence while expecting our fourth child in 1984. I passed the full call to be VK2DDB which meant we could keep in touch when he was away.

The aerial I used was a 2 m 11 element beam on the roof, pointed towards Canberra. On a clear damp night with no wind, John and I could chat on the Mt Ginini repeater. John used an antenna made with metallic tape stuck onto a large piece of cardboard. He placed it at the motel window and it worked well. We also used packet radio a lot which was handy and the children were sometimes allowed to type a message to Daddy.

He was always interested in antenna designs. Our property, with many handy trees, was covered with all sorts of long wire aerials.

He first constructed an antenna that came to be known as the Flower Pot in 1993. It was based on an article by Ian Keenan VK2AYK which was published in

John VK2ZOI demonstrating his 'Flower Pot' antenna to a meeting of HADARC.

Amateur Radio magazine in May 1986. He found it very simple to make and it worked well first time. He gave a demonstration to HADARC, mounting it in a garden pot, covered in plastic flowers, wheeling it in in a wheelbarrow, and with Bill and Ben the popular Flowerpot men attached. And that is why the antenna was called 'The Flower Pot'.

The club had antenna making nights and he also gave the same talk to many other clubs up and down the coast. One day he found a small piece of roofing alfoil and, just by making a sleeve of the alfoil, he found he could make the antenna dual-band. He then spent hours experimenting with the antenna for different frequencies. Son Ben made a web-site for him - vk2zoi.com - and the antenna is known worldwide now. He was thrilled when he received emails from amateurs around the world who had made and used the antenna. Some of them talked of their experiments with it too.

John was a member of the WIA NSW/ACT Advisory Committee for several years and received the WIA President's Commendation Award in 2011 for contributions to amateur radio, particularly for his representation of the WIA on Standards Committees. He was able to represent them by using his handy knowledge of 'how to work with Government departments'.

He explained amateur radio on local and national news. One time he was interviewed by the ABC at their outdoor van in Hornsby and explained how wireless radio works to a five year old. He also appeared on national television news promoting the 'Centenary of the First Direct Wireless Message from the United Kingdom to Australia' event held in Wahroonga in 2018. Jo Harris OAM from the Kuring-gai Historical Society and John planned and worked on it for well over a year, and it was a great success.

John being interviewed on Channel 7.

John loved to attend the field days at Wyong and Port Macquarie and, as I represented ALARA at these meets each year, John helped 'man' the table and enjoyed catching up with radio friends.

After travelling so much for work he didn't really want more travel. But when I wanted to attend the ladies' international radio meetings, he came along - to Germany, England, Denmark, New Zealand, and Canada. He came to know and enjoyed the company of the OMs of the YLs, especially the Scandinavian OMs whose oddball sense of humour matched John's.

Each time we went overseas, I planned tours each side of the meet - a river cruise from Amsterdam to Budapest, one from Moscow to St Petersburg and, especially for John, the wine cruise around the Bordeaux region of France. We always wore our callsign badges on our trips and on one river cruise the concierge tried to welcome Veckayzoce, (VK2ZOI) with a puzzled look. Callsign badges always broke the ice at the dining tables and sometimes we met other amateurs. Coach trips were around Ireland, Scandinavia and eastern Canada, plus a ride on the Rocky Mountaineer and a train trip from Toronto to Vancouver.

John and I joined the Hornsby Branch of National Seniors. We gave talks about amateur radio with a demonstration and did the same for retirement villages, where we heard many war time tales about radios. The club members were impressed with his appetite, which he showed by nicking their chips when they weren't looking, and he enjoyed sitting with members, a glass of beer in hand, solving the world's problems.

John was very proud of his four sons, especially when three of them obtained their amateur radio licences. All sons were very helpful in putting up aerials as it was usually a 'fun boy's event', with a bottle of reward later on the veranda.

He tried to give them words of wisdom: like when Queenslander son Ian showed us photos of a bright blue, long sleek, Corvette. "Don't be a silly idiot", John advised. But Ian had already bought it and John loved the ride up the motorway with the wind in his hair and the distinctive burble of the engine.

Our daredevil Ben VK2FBRB wanted to ride motor bikes; "No, no, cars are much safer", but he'd always pick up Ben and his wretched noisy Ducati when needed.

Roger VK2FOTO was different, he was an artist. John admitted that artists are on a different wavelength but he was intrigued with Roger's work.

John attended TAFE to get his Electricians licence while Peter VK2ZCU was studying there and was not-so-secretly proud of the technical tricks Peter played on his lecturers. "You mustn't tease the lecturers like that", he admonished while doubling over with laughter. They often worked together and had many a long chat about electronics and radio. John loved finding out why something failed and fixed it. The dining room table was covered with things being studied and/or repaired.

After he had retired John, started battling cancer. First it was in his right eye. He presumed it was caused by the fumes of solder flux - after all he had been using it since he was able to hold a soldering iron. He had chemotherapy and operations but never regained proper sight in that eye. He had many skin cancers taken off and then a melanoma cut out of his back.

In November 2020 he began to lose weight and lost his appetite. John's wonderful appetite was well known so we knew he was sick. A biopsy revealed metastatic melanoma. In early December we were told he'd live for three years. He began having scans and tests weekly and on Christmas Eve they said one year so he began putting all his HADARC files onto DVDs for the Vice President.

New Year's Eve they said six months. He began immunotherapy as the cancer was now in his liver, lungs, stomach, and bones. It was not in his brain and he didn't have any pain so could still share a few wicked words and a laugh among the tears.

John had a week in hospital and just simply went to sleep early on 29th January 2021 at age 75.

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This is the Ultimate![1]

Herman Willemsen VK2IXV
RAOTC member No 1384

You may well ask, the ultimate what? In this instance it is the Ultimate Transmitter, a classical semi-automatic Morse key - a small, compact bug. Louis C McIntosh[2] was the inventor and patent-holder of this bug, and its manufacturer was the Ultimate Transmitter Company, Los Angeles, California. This company was in business from 1925 to 1932 and used the trademark '73' inside a five-point star. That is why these keys were often called '73 bugs'.

This portable bug was intended for journeyman telegraphers[3]. It has proven difficult to find information on The Ultimate Transmitter Co and its keys. However, I came across some interesting observations in an article written by Larry Nutting K7KSW in a 1999 issue of the California Historial Radio Society (CHRS) magazine, plus comments about this key in the N7CFO keyletters. I am most surprised that this rare 73 bug does not get any mention at all in any of the 89 issues of *Morsum Magnificat*.

My summation of the several models of the Ultimate 73 bug

At that time, the 1920s, the Ultimate 73 right-angle bug was, as far as I know, the only bug to have a protective cover and the only one to have a cover that locked with either a key or with a snap lock. These small bugs were frequently used as portable instruments and the cover did a good job of preventing unlicensed tampering and protecting the mechanism but, unfortunately, not the finger-pieces (paddles). It is therefore common that Ultimate 73 right-angle portable bug keys are usually missing their original finger-pieces.

You can count yourself extra lucky if you find a 73 bug with a wooden carrying box. My woodworker friend John Daniel reproduced one for me. A box protects all components of the bug.

On 28th October 2020, an unserviceable and total wreck of a pot metal Amateur model 73 bug in a wooden box was sold on eBay for US$107.50. No doubt the buyer just wanted it for its scarce wooden carrying box complete with label.

The earliest or Original two-lever right-angle model

It has a cast bronze cover and base with square edges and is chrome plated. There is a built-in lock with the keyhole on the underside of the base and PAT JUN 23, 1925 stamped into the front edge of the base. Its approximate base size is 57 x 89 mm with a height of 57 mm. The circuit closer knob and finger-pieces are black.

Original model 73 bug with locking key and adjustment tool.

The serial number was stamped into the underside of the base. The serial numbers of the Original models are in the 12500s, 12800s and 12900s.

Nameplate for the earliest Original model.

The later model, the right-angle One-lever or Professional model

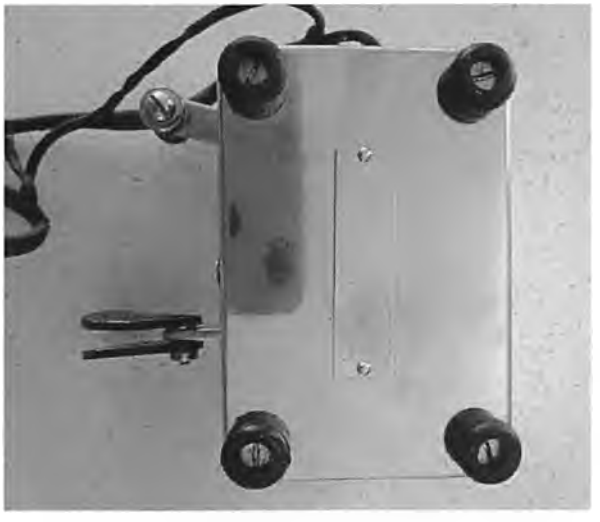
I acquired this fancy looking model in 2020 from a radio amateur in the USA. Its base and cover are of cast bronze and are chrome plated. It has rounded edges and a hinged cover with a snap closer. Compared to the Original model, its base size of 66 x 96.5 mm is a little bit larger, but its height of 50 mm is a little less.

These keys often have a reddish knob for the circuit closer and ebonite, Bakelite or Perspex finger-pieces, which may vary in colour.

The author's Professional model 73 reversible bug No 15931.

I know of only two Professional models with threaded screw holes in the four corners of the hinged top cover[4]. When the four rubber feet are transferred from the bottom to the top and the key has been turned over, it is ready to be used by a left-handed telegraphist.

The top of the author's Professional reversible Ultimate 73.



The underneath of the author's Professional reversible Ultimate 73.

This has been described on page 4, paragraph 35 of McIntosh's patent 1,543,609 as follows: "The present instrument may be readily converted into a left-hand transmitter by removing the feet and applying them to the top of the shell or housing and by reversing or inverting the circuit closer switch[5] and then inverting the entire instrument, so that the housing will be lowermost and the feet thereunder applied to the table or bench".

New larger nameplates on top and bottom are used that include: Patd 6-23-25. (meaning Patented June 23, 1925). The serial number is also stamped on the topside nameplate.

This single model has one lever with two finger-pieces. Compared to the Original model it has a more simplified mechanism and its parts are greatly improved and all chrome plated.

There are a few slight variations, like the pendulum having a damper wheel or a damper rod, the underneath terminals being exposed or covered by a bottom plate and a dot spring with or without a dot stabiliser.

The serial numbers of the Professional models are in the 15700s, 15800s and 15900s. Mine has S/N 15931.

The cheaper Amateur right-angle one-lever or two-lever model

The Amateur model has a slightly larger base than the original. It measures around 100 mm x 63 mm. Some say that the initial issue of 73 Amateur model bugs were all brass, but this cannot be confirmed. However, the Amateur models we know of had their base, frame and cover made from cheap die-cast pot metal and it had a black or blue frosted enamel finish.

Cracked Amateur pot metal Ultimate 73 No 15461.

Pot metal alloy consisted basically of zinc with shredded bits of lead, copper, tin, magnesium, aluminium and cadmium. During the 1920s, the pot metal process was rudimentary and contaminants in the mix affected nearly all pot metal cast products. Therefore, over time, pot metal suffered from 'pot metal disease', a degradation process resulting in gradual disfigurement in the form of cracking, swelling and shattering. Their serial numbers, as far as I can make out, are in the 15400s, but also with five figure serial numbers outside that range.

Amateur pot metal model Ultimate 73 bug No 13968 totally disintegrated.

Note

The Original and Amateur two-lever models sometimes appeared as a one-lever model because the owner removed the second lever on the right-hand side. The

reason was that this right-hand lever was not necessary in the first place, as the left-hand finger piece, when moved to the left, performed the same function.

The Ultimate in-line model bug

All Ultimate 73 right-angle bugs are rare, but even rarer are the Ultimate 73 in-line models. They were made without a cover and their serial numbers, in the 100s, are engraved on the side of the base and those with serial numbers in the 200s on the label which is on top of the base.

An Ultimate 73 in-line model bug.

High serial numbers

The Ultimate Transmitter Co used high serial numbers on their bug keys, for which there is no logical explanation. Perhaps they wanted people to believe that this was a much more popular key than was in fact the case.

Advertising

I have only seen advertisements of the Amateur model in the July 1929 and October 1930 issues of *QST*[6]. It is unclear how and where the other models were marketed. I therefore surmise that Ultimate keys were mainly sold by direct sales.

A bit more about the Professional model

The operating mechanism is unusual, as the right-angle lever has not enough room to stretch out in its limited space. It therefore uses a 90° direction-changing system as follows:

To make room to manoeuvre, the dot-bar section of the 'right-angle' lever becomes an 'in-line' lever, when it turns 90° to the left and right. This 3.5 cm long horizontal (in-line) lever bit, with its fixed pivot pin at the far left, has attached to it the thin metal pendulum spring, the vibrating pendulum arm and the pendulum weight. Pushing the left finger-piece to the right, moves the far-right bit of the horizontal lever away from the lever stop[7], thereby releasing the pendulum. The pendulum starts to vibrate, making semi-auto dots. This also engages the retractive dot spring, which is not a wire coil spring, but a flat leaf spring.

Pushing the right-hand finger-piece to the left, pivots the dash-bar part of the 'right-angle' lever to the left, making manual dashes.

The terminals are attached to a key wedge with cloth cord, which was standard issue with each Ultimate bug. This wedge could be shoved in between the contacts of a straight key or inserted into a jigger jack, as featured on an Australian PMG key. At the end of his shift, the operator could unplug the wedge and take his bug home.

Does this bug live up to its name?

The perception whether this or any other Morse key is the ultimate (topmost) Morse key is entirely in the eye of the beholder.

An Ultimate 73 carrying box made by the author's friend, woodworker John Daniel.

From a collector's point of view, I find that the 73 bug is cleverly designed, good looking and, despite its delicate mechanism, it is built like a tank. It is heavy enough not to slide around the table during usage.

If I had to put a label on this bug, I would describe it as rare and unique.

Footnotes

1. Title 'borrowed' from a 2011 Retrotechnologist blogspot. See under Sources.

2. Louis McIntosh became the Special Sales Agent for the Ultimate Transmitter Company.

3. Journeyman telegraphers were telegraphists who travelled a lot, due to their many short-time jobs in cities all over the USA.

4. This feature can be seen on model 15765 of the Swede, Karc Wallman SM5DSB, and on Herman's model 15931.

5. Another feature on SM5DSB's bug is an additional circuit closer knob underneath the usual circuit closer knob on top. This is in readiness for the bug to be reversed and used by a left-hander.

6. *QST* is a magazine for Amateur radio enthusiasts, published by the American Radio Relay League (ARRL).

7. The lever travel is limited by an adjustable vertical shaft, with a small locking screw holding it up and locking it in the right place.

Acknowledgements

Kiama woodworker John Daniel; Michael Tortorella W2IY; Mike Feher N4FS; Charles Hays VE7PJR; Lynn Burlingame N7CFO; Larry Naumann N0SA; Larry Nutting K7KSW; Adam McCarthy VK2PW; Tom Perera W1TP; Paul Carreiro N6EV; and Kåre Wallman SM5DSB.

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Belt and braces

Ken Morgan VK3CEK
RAOTC member No 1457

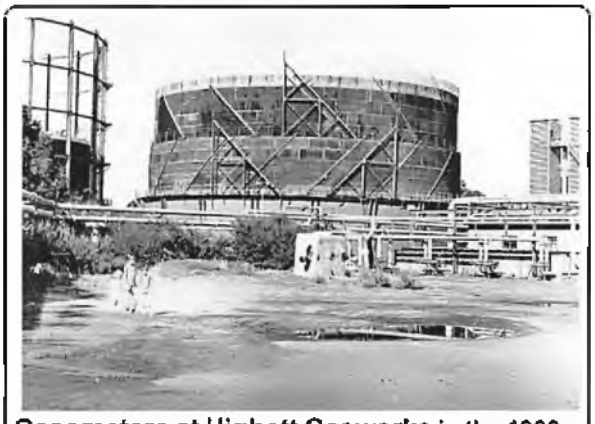
In the early 1960s, the Gas and Fuel Corporation of Victoria manufactured town gas at several plants. The main plant was the West Melbourne Gas Works. However, the cheapest gas was made from briquettes, which in turn were made from brown coal mined at Morwell in the Latrobe Valley.

The Morwell plant used a high pressure process rather similar to a Water Gas Plant. The weak part of this plant was the seal between the top 'bell' and the rotating grate. Once the seal failed, the plant shut down.

The loss of gas through this failure could be made up by starting plants at West Melbourne and by the cushioning effect of the gasometers. However, a prolonged failure time was serious.

To cover this eventually, at Derrimut the Gas and Fuel Corporation had installed a low pressure low temperature propane storage plant with two 15 inch (38.1 cm) impeller centrifugal pumps to pump liquid propane from Derrimut, plus a four inch (101.6 mm) steel pipe from Derrimut to West Melbourne.

In a crisis, liquid high pressure propane could be pumped from Derrimut to West Melbourne where the 'Onia Gegi' plant could reform the propane to a gas which then could be mixed with other gases to form an acceptable 'Town gas'.



Gasometers at Highett Gasworks in the 1960s.

Commonly but wrongly known as 'gasometers', these large cylindrical structures dominated Melbourne urban skylines until the 1970s. An inverted canister (or series of canisters) floating on water, but rising and falling on a frame according to its contents, gas was pumped in at a pressure sufficient to raise the lifts and storage tanks. By this means gas could be stored and delivered when demand exceeded plant supply. In 1856, the Melbourne Company's plant at West Melbourne was the first. Demand for light and power saw gas holders proliferate across the suburbs.

By 1960, the Gas and Fuel Corporation had 30 in its area of supply with two at Preston and Highett each of 3 million cubic feet (84,950 cubic metres) capacity.

The explosion of the Metropolitan Gas Company's large South Melbourne gas holder on 4th April 1920 was one of Melbourne's memorable accidents.

Gas holders have vanished since changes in technology and the supply of natural gas by pipeline from undersea reserves in Bass Strait, their land given over to other uses.

A few technical facts

•LPG remains liquid at -45 degrees F, and atmospheric pressure.
•Two tanks, each holding 1.5 million gallons (6,819,138 litres), were 50 feet (15.24 m) high and 80 feet (24.38 m) in diameter and constructed of ¼ to ½ inch (6.35 to 12.7 mm), notch tough steel.
•10,000 feet (3.05 km) of welding - all X-rayed for faults.
•Steel imported from England.
•Foamed glass insulation which surrounds the tanks was imported from the USA.
•Each tank was surrounded by an earthen bund.
•Sniffers checked for leaks on the floor of the bund. If a leak was detected, within 15 minutes flares on top of the bund walls were ignited – 'self immolation'!!
•We always parked our cars pointing to the exit!

Refrigeration cycle

Propane gas was sucked from the tank tops by one of two compressors. Compressed gas was passed through a heat-exchanger and the liquid made then 'sparged' into the bottoms of the tanks.

Water was the coolant on the other side of the heat exchanger and the heat was removed by a cooling tower. An automatically starting 500 kVA diesel-alternator was installed in case of power failure.

Problems

Some 'nut' of a designer or constructor had chosen oil-lubricated 'horizontal compressors' instead of carbon-ringed pistons in a vertical arrangement. Hence, there was a severe oil contamination.

Supervision

Three eight hour shifts by attendants plus a Fitter during daylight.

One Assistant Engineer and one Supervising Engineer (the author).

Testing

Once per week a 'send-out' pump was chilled down and operated to compress the propane; the valve to the 4 inch pipeline was not opened.

Once per week the pressure sensing relay was checked for accuracy.

Once per week the diesel alternator was started.

Comments

Special stainless steel was used for valves and piping thereby increasing the cost!

There was little to do, and to prevent boredom I instituted gardening! One day I was visited by an American Engineer from Exon. He offered me a job constructing and then operating the Offshore plant that would clean the gas from the Offshore drilling platforms before it was piped to the Gas and Fuel Corporation of Victoria gas measuring plant.

I declined the offer and later accepted a position as Chief Electrical Engineer for the Gas and Fuel Corporation of Victoria.

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Is there any such thing as a quiet straight key?

Herman Willemsen VK2IXV
RAOTC member No 1384

The noise from straight keys is created by the noise of the front and rear contacts when the key is used, as well as reverberation of those noises by the key's hardware and the table or desk it is sitting on. However, in February 2021 I bought from an antique dealer in Lithuania[1] a rare Russian key made by Siemens & Halske. When operating, this key makes little noise and is almost silent.

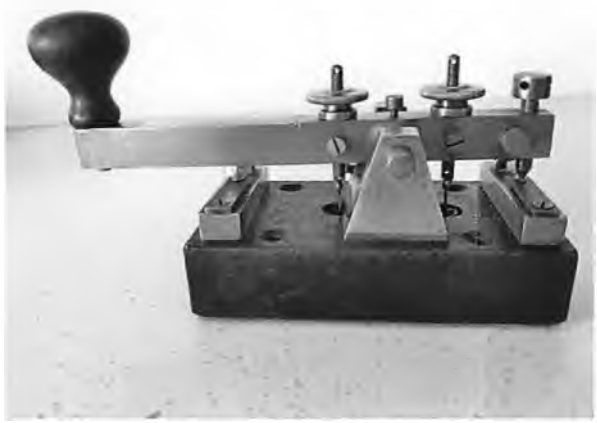
Siemens & Halske (S&H) was founded by Werner von Siemens and Johann Georg Halske in Berlin, Germany in 1847. The company, which made and repaired telegraph systems, was an instant success with branch offices not only in England, France and Russia, but worldwide, including Australia[2].

In 1859 S&H opened its first factory in St Petersburg and was involved in the building of long-distance telegraph networks throughout Russia.

Some, but not all[3], of the Morse keys made by S&H at St Petersburg feature the Cyrillic[4] mark of what looks like a C plus an upside down, reversed L (see photo at bottom of this column) but which means S&H, plus a serial number on the right-hand side of the key's bearing block. Many of those S&H style keys, like mine, are still found around the Baltic Sea area and date from the early 1900s.

Herman's rare Russian Morse key as received, dirty and with a busted wooden knob.

S&H markings in Cyrillic on the side bearing block of a similar Russian key.



The rare Russian key looking resplendent after gentle cleaning and with a new wooden knob.

Many of those S&H style keys, like mine, are still found around the Baltic Sea area and date from the early 1900s.

Why is this Morse key so quiet?

The key's hardware is mainly brass, but some smaller parts are of other metals. Its base and knob are made of a hard wood.

Its unique features are as follows:

A. Instead of solid key contacts, the contacts of this key sit on stiff metal leaf springs, a German S&H invention.

Another view of the nicely restored rare Russian key.

A closer look at the rear contacts of this key sitting on a stiff metal leaf spring.

These contact springs tend to soften the impact when the lever goes down, resulting in a slightly softer feel and possibly less wear. Also, due to the minute movement of the leaf spring contact, there is a slight 'wiping' action as the contacts meet, which might tend to keep the contacts clean.

This makes the Morse key less noisy, in fact almost silent, hence the German name *lautlose* or *geräuschlose Morsetaste*, meaning noiseless Morse key.

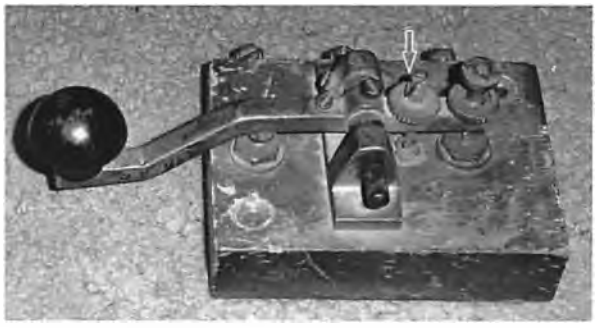
These noiseless (silent) keys were popular in a busy Telegraph Office, as they did not add to the existing racket of clickety-clack noises made by the numerous Sounders, the electro-mechanical Morse code receivers in those days. In addition, the Telegraph operators, sitting close together in the operating room, were not hindered by the clicking of the many keys around them.

B. It has two adjustable tension springs, one in front and another one behind the bearing block, for accurate tension adjustment. Perhaps the opposing springs would also balance the strain on the lever.

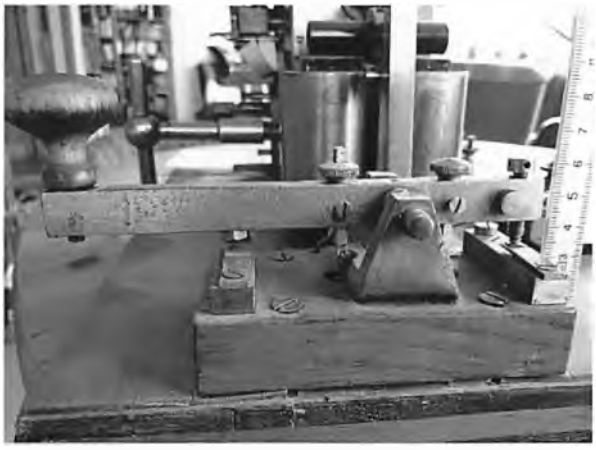
C. The top ends of the tension spring screws had small holes in them so that small metal rings could be fitted to prevent the copper nuts from being lost. They were often removed.

Similar nut retaining rings could be seen on the terminals of early UK GPO landline keys. They were harder to remove as often the ends were soldered together. I understand that they were usually put on military equipment to ensure that essential copper items did not go missing.

D. The key's terminals consist of three brass slot-headed screws, all three on the left side; two on the front and back contact blocks and one on the bearing block or fulcrum. This made it possible to use the key as required on open circuits or closed circuits.



The arrow points to the nut saving device on another Russian key (see text).



A similar small Russian key as part of an inker telegraph set from the beginning of the 1900s. Note the hole for the missing retainer ring.

In other words, this way the same key could be used on multiple circuits. The key's small base (110 x 60 x 23 mm) suggests that this key was most likely part of a complete portable inker or pen register telegraph set[5].

Footnotes

1. Lithuania is a European country on the Eastern shore of the Baltic Sea. The country is a member of the NATO, the EU and several other organisations. Its population is about three million.

2. Although the company's UK office dealt with Australia from afar since 1854, it did not open its first official agency in Melbourne until 1892.

3. The nationalisation of foreign companies, including S&H, due to the Russian Revolution in 1917, had a lot to do with this.

4. Cyrillic is an alphabet derived from the Greek alphabet and used for writing Slavic languages in countries such as Russia, Bulgaria, Serbia and the Ukraine. When Lithuania was controlled by Russia from 1865-1904 it also had to use the Cyrillic language.

5. A pen register or inker is an instrument that is designed to reproduce received Morse code signals as ink marks on a moving paper tape. In this way a dot will generate a short ink mark and a dash a longer ink mark on the paper tape. The paper tape is wound on a reel and is driven by a clockwork mechanism and a set of feed rollers.

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The Twin Cities Radio Club

Graeme Scott VK2KE
RAOTC member No 789
WIA Life member

The Twin Cities Radio Club in Albury-Wodonga was formed in the early 1970s. Since then the club has met at a number of venues and has had only a small number of Presidents. The following is a brief collection of the reminiscences and recollections of the club's past Presidents and members.

I spoke to Tom Sanders VK2MY recently, as he is the current President, and we looked over the history of the club as recorded in the archives. Tom's story is that when he moved to the Albury-Wodonga area from Melbourne he met Murray Jardine VK2BUJ who was a member of the new club. Murray invited Tom to join. Tom passed the Novice licence exam at the first try. At that time about 30 radio amateurs were members of the club.

Tom Sanders VK2MY, current President of the Twin Cities Radio Club.

By now Tom was running his own business and had no spare time to play radio for quite a few years. However, he bought a Kenwood TS-520 in order to listen to on-air QSOs in his workshop. Later on, Tom purchased a Yaesu FT-101EE and put up a three element 20 metre beam.

To upgrade, Tom attempted the Morse exam and was told by the Postmaster that 'he needed to do some more practice'! Tom practised some more and eventually passed the Morse exam, as well as the AOCP exam, to gain his full callsign VK2MY.

Not long after, Tom was voted in as Club President, having been the Secretary/Treasurer for some time.

At one stage the club investigated installing a repeater at Mt Hotham. However, the costs and access to towers became untenable and the project was dropped.

More recently the club was offered some space and installed a freight container on a site owned by the Albury City council for rental out near the Hume Dam.

The VK2RAY 2 metre repeater was installed and became operational. It was initially designed to not be a long range repeater. However, more recently the repeater has been moved to the QTH of Ross VK2DGY on a hill near Lavington from where it has very good coverage.

Due to repeater linking it now gives access to many areas of Victoria and, indeed, it now allows overseas contacts as well. Tom VA5TM is a frequent visitor from Canada.

In 1988, the club changed its name to Twin Cities Radio Club.

Greg Sargeant VK2EXA says that he joined the club in 1984, while the author, VK2KE, joined in 1985 having also moved to Albury from Melbourne.

At the time of the club's inception, Rod Johnson (no callsign) was the President but he resigned and moved to WA. At that time the meetings were held at the home of Cleaver Duell VK2MUA in South Albury.

Then Rod Adams VK3CBO became president for a period and was followed by Kevin Hartnett VK2FUO. After Kevin, the club moved to the garage at the home of Greg VK2EXA where we met, usually around a table tennis table.

Greg Sargeant VK2EXA, past President of the Twin Cities Radio Club, a position he held for 20 years.

Club Presidents since its formation are: Kevin Hartnett VK2FUO; Ron Hanel VK3AHR; Murray Jardine VK2BUJ; Greg VK2EXA (Greg was president for 20 years, a great achievement); Tony Boddy VK2ADQ; Rod Adams VK3CBO; and Tom VK2MY the current president.

When I was speaking to Peter VK2CIM recently, he mentioned that he joined the club in 1984. He attempted the exams and failed the Morse code receive test. So he was given a limited call sign - VK2XPP. In a Lavington radio store owned by Eddy Webb, Peter saw a notice about the local radio club and decided to join the club. Peter eventually upgraded to the full call sign in 1983 with his current call sign of VK2CIM.

Meeting venues

The meeting venue moved to a classroom at Murray High school until access and security became a

problem. At about this time the club changed its name to the Albury-Wodonga Amateur Radio Club Inc.

The club held some very successful field days at the High School in conjunction with the Wagga Wagga ARC. Much gear was on display and exhibitors sold gear to the those attending who needed a new radio for their shack. At this time Tony Boddy VK2ADQ was the President.

Soon afterward the club changed its venue for meetings to the 1st Lavington Scout hall where it meets to this day.

The club has a website under the name of the Albury-Wodonga Amateur Radio Club.

Club activities

The club supports the JOTA weekend each year and sets up a station at the Camp Nelson site near Howlong, NSW. It has a tower (donated by the widow of an SK member) and a beam on a rotator. Greg VK2EXA and a number of members assist in the JOTA weekend and the young Scouts and Guides gain a lot of fun and experience in talking to others on the radio.

The club supports the rooftop run on Mt Hotham and the Murray River Challenge near Corryong.

As well, the club provided safety communications for the jet boats which operated near the Albury Airport. The launch of the PS *Cumberoona* steam powered paddle ship in Albury was supported by the club in terms of the safety of the operation as the paddle steamer was pushed into the Murray River from its construction site on the riverbank.

The 1997 floods near Wangaratta and Shepparton saw members of the club, via WICEN, provide communications between agencies such as the SES and the police.

During the 2003 bushfires some members of the club went to Corryong to provide radio communications during this emergency when the town came under great threat.

Others (including Greg VK2EXA and the author) were stationed at Ovens near Myrtleford in the Department of Conservation station. We handled radio and phone calls from the fire captains in the fire grounds as the fire developed. One of my jobs was to arrange for a change of driver on the bulldozers, and I also arranged for refuelling of the 'dozers'.

Some calls from the fire captains were to have lights fitted to the 'dozers' as they worked in the night on fire breaks in the bush and so I arranged for the crews to go out and fit the lights to them. One fire captain was worried that his crew was operating under high voltage power lines and he requested that the line be deactivated. I called the power authority and arranged for the line to be deactivated for the period the men were working under it.

At this time we operated a 'hot bed' arrangement in a motel in Myrtleford! A radio operator would get up and vacate the bed and go on shift in the HQ while I went to the local club, got a free meal and then got into the 'hot bed' in the motel to get some sleep. We were working 12 hour shifts on the radios and phones so it was a very exhausting time for us all .

The Twin Cities Radio Club assisted with the Tom Quilty and other horse events near Myrtleford which were indeed very eventful.

During the Y2K incident, the club members were on standby if any issue arose in relation to grid power supply and telephone services, etc. To my knowledge there was no immediate need for us to take any action in relation to Y2K incident but we were all in an active net and on standby if needed.

There is an Equestrian Centre in Lavington near Albury and the radio club has regularly been invited to provide security coverage for the riders. If any rider fell off, or their horse had a fall, we would call up assistance for the rider to ensure they received help as needed. There were a few incidents where a rider fell and we would call the HQ for assistance giving the numbered position of the course at which the fall had occurred.

In one Tom Quilty event, one horse had fallen down an old mineshaft so we had to summon the rescue crew to save the horse and its rider from their predicament. All ended well, thank goodness.

Guest Speakers

The late John Wilson VK3LM demonstrating slow scan TV at a club meeting.

The club has enjoyed a number of guest speakers over the years, including John Wilson VK3LM (SK) who did some demonstrations of slow scan TV, a radio inspector from the ACMA, and an SECV engineer on a project focusing on lightning strikes around the country. The result from this project showed places in Australia where lightning strikes regularly. One was near Carnarvon, WA where a power line was regularly struck and outages occurred so the line was eventually relocated to a new route where the outages did not occur any more. I'm sure many customers were greatly relieved at this outcome!

Membership

The club has had a varying membership but at one stage it was up to 31 radio amateurs.

Members of note

Bill Cromarty (SK) was the chief engineer at the ABC transmitter on Mt Baranduda near Beechworth. Don Haberecht (SK) was the principal of Haberecht's Radio, Hi-Fi and TV retail shop in Albury.

Don passed the business to his son Geoff and he then moved to Nariel near Corryong to run a fish farm there. He used to complain that the mountains all around him made signals difficult on HF, but the trout farm always kept him busy anyway.

Murray Jardine VK2BUJ was an electrician in Albury and ran his own successful business.

Ross Wheeler VK2DGY has come back to the hobby after a long break. For quite some years he had a business offering customers internet access via his 'Albury Local Internet' venture. Ross now runs another business in Lavington but at least finds time to talk to us on the local repeater.

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Some humorous naval signals[1]

Bill Roper VK3BR
RAOTC member No 978

A naval signal is a sign which conveys information. When ships first found themselves beyond shouting range, the language of naval signals was born. Initially, this signal language was expressed by the positions, colours and meanings of flags and banners. Then came Aldis lamps.

An Aldis lamp, named for its inventor Arthur C W Aldis, is a visual signalling device for optical communication (typically using Morse code). Essentially, it is a focused lamp which can produce a pulse of light. The idea of flashing dots and dashes from a lantern was first put into practice by Captain, later Vice Admiral, Philip Colomb in 1867. His original code, which the Royal Navy used for seven years, was not identical with Morse, but Morse code was eventually adopted with the addition of several special signals. Flashing lights were the second generation of signalling in the Royal Navy, after the use of flags.

Then followed the use of wireless and its development during the 20th century from Morse to radio telephony, and then to high speed digital and satellite communications. Incidentally, note the use of the word 'communications' instead of 'signals'. The very word signal has become virtually obsolete and exchanges of information between ships are now called 'communications'.

This article is concerned with the pre-microphone period of signals. Signals that had to be carefully worded to be readily understood. Signals that were impersonal and public, that carried the authority of a ship or a squadron, and that could make or break reputations, and sometimes caused the loss of, or saved, human lives.

Although most of the naval signals sent in the era of Morse code using Aldis lamps and wireless were technical, routine, or just simply dull, occasionally there were quite interesting signals being sent. This era of naval signals produced individual craftsmen who could compose on a signal pad the exact phrase to suit the situation. Signals that were sometimes humorous or ironic, signals that inspired, provoked, amused or debunked with an individuality all their own.

A signal at sea which commended a ship went around the ship like a flash of light. One which reproved spread gloom just as quickly. A signal often recorded the immediate reaction of the man-on-the-spot. Some signals took time to compose, and others came straight off the cuff.

During this era which allowed individuality of signals, there were many recorded signals made between naval ships, and between ships and shore, which were quite pithy, humorous, sarcastic or ironic, etc, and were notable for being very different from routine signals. Understandably, some were only funny at the receiving end.

It is sad that in today's era of communications there seems to be very little, if any, scope for the individuality frequently displayed in the past.

Here are a few somewhat succinct naval signals from the past which particularly appealed to me. Some were sent by flags, some by Aldis light, and most by wireless Morse code. Firstly, however, here is arguably the most famous signal in British naval history.

"ENGLAND EXPECTS THAT EVERY MAN WILL DO HIS DUTY[2]" was a signal sent by Admiral Horatio Nelson, 1st Viscount Nelson, from his flagship HMS *Victory* as the Battle of Trafalgar was about to commence on 21st October 1805. Although there was much confusion surrounding the wording of the signal in the aftermath of the battle, the significance of the victory and Nelson's death during the battle led to the phrase becoming embedded in the English psyche, and it has been regularly quoted, paraphrased and referenced up to the modern day.

What follows is just a few interesting signals from the earlier part of the 20th century. Most are from the British naval records of WWI and WWII, with a few from US ships and some from post WWII. They are not in any particular order.

HMS *Formidable*, a WWII Illustrious class aircraft carrier of 23,370 tons, carried 36 - 54 aircraft and had a top speed of 30.5 knots (56.5 km/h).

- From HMS *Formidable* (photo at left) after being attacked by a Kamikaze pilot in the Pacific towards the end of the WWII, to HMS *Indomitable* (flying flag of Admiral Vian): "LITTLE YELLOW BASTARD." The reply from HMS *Indomitable* was: "ARE YOU REFERRING TO ME."
- A Battle Cruiser Squadron was being led to the anchorage by a Senior

Captain who had not had much experience in handling the Squadron. The signal to stop engines was hoisted. When it was hauled down the leading ship did not stop her own engines, and soon began to draw away from the others. From the ship next astern to the leading ship: "WHAT SPEED ARE YOU STOPPED AT PLEASE."

•From the very old HMS *Tenor* to HMS *Protector* off Sidi Barrani in 1941: "AM PROCEEDING AT FULL SPEED TO YOUR ASSISTANCE. MY SPEED 4 KNOTS."

•A light naval force was on a sweep in the Skaggerak in World War I in hazy weather. Shortly after dawn the most northerly cruiser signalled: "ENEMY BATTLE-SHIP BEARING NNE DISTANCE 2 MILES. AM PREPARING TO RAM."

Later came: "CANCEL MY LAST SIGNAL. BATTLESHIP TURNS OUT TO BE A LIGHTHOUSE." (It seems that the lighthouses on the northern shores of the Skaggerak often had twin towers which looked like superstructure and turrets.)

•When lying at Argostoli with all the Mediterranean Fleet, HMS *Royal Oak* received the following from the Fleet Signal Officer: "I HOPE THAT YOUR ADMIRAL IS WELL." This puzzled the *Royal Oak* crew until, on investigation, it was found that the Admiral's flag was flying at half mast.

•A destroyer flotilla was at sea and the No 2 destroyer seemed to be keeping much too close to the stern of her leader. The following message was sent from the flotilla leader to the No 2 destroyer: "WOULD YOU CARE TO JOIN ME IN A GLASS OF PORT."

•From one ship to another: PLEASE SEND YOUR TECHNICAL EXPERT TO SEE OUR FOREMOST GUN." Reply: "OUR TECHNICAL EXPERT CAN SEE YOUR FOREMOST GUN FROM HERE.

•From C-in-C (Commander-in-Chief) Mediterranean, to HMS *Cardiff*: "YOUR CONFIDENTIAL BOOK OFFICER IS TO REPORT AT MY OFFICE FOR DESTRUCTION."

•A cruiser was trying to secure to head and stern buoys near her flagship in a congested harbour. The Admiral watched the proceedings from his quarterdeck. The cruiser made a good approach and appeared to be judging the manoeuvre well. The Admiral signalled: "GOOD." Then things started to go wrong for the cruiser. She missed the buoys and became more and more tangled up. After watching for some time the Admiral again signalled: "ADD TO MY PREVIOUS SIGNAL GOD."

•A battle-cruiser arrived in harbour after a long patrol at sea to receive a signal from her flagship saying that the flagship was unable to take her turn on patrol, so the returning ship would have to refuel and put to sea again. On setting out for the second time the battle-cruiser's Marine band was on the quarterdeck, playing a tune which had very rude words. As she passed as close as possible to the flagship this signal was sent from the flagship: "ON LEAVING HARBOUR WHO SELECTS THE BAND TUNES." The sea-going ship replied: "NORMALLY THE BANDMASTER BUT ON SPECIAL OCCASIONS THE CAPTAIN."

•From a submarine returning from patrol to Base: "EXPECT TO ARRIVE 1800 IF FRIENDLY AIRCRAFT WILL STOP BOMBING ME."

•C-in-C Eastern Fleet after Fleet Air Arm raid on Sabang sent this signal: "WE CAUGHT THE NIPS WITH THEIR HEADS DOWN AND THEIR KIMONOS UP."

•A submarine had broken down on the surface. Another submarine had been ordered to take her in tow, thereby delaying the latter's return to harbour considerably. On making contact, the broken down submarine received: "TAKE MUMMYS HAND."

•From a senior officer to a submarine which apparently was in difficulties: "WHAT ARE YOU DOING." The submarine replied: "LEARNING A LOT."

•A submarine returning from a war patrol signalled to the flotilla captain: "PSALM 17 v4." (Psalm 17 v4 reads, "Concerning the works of men by the word of thy lips I have kept me from the paths of the destroyers".)

•Sailing in some extreme Atlantic weather, one destroyer came across another which had been dismasted. The first destroyer signalled: "HOW COME." Whereupon the second destroyer replied: "SCRAPING UNDER VERY LOW CLOUD."

•A Russian bound convoy of Allied ships was being steadily shadowed day and night by relays of Blohm & Voss flying boats. The aircraft flew round and round the convoy keeping low on the horizon and well out of range of the convoy's escorts' guns. An irritated escort leader told his signalman to make by lamp to the

HMS *Swiftsure*, a WWII Minotaur-class light cruiser of 8,800 tons had a top speed of 31.5 knots (58.3 km/h) and an armament including three triple six inch naval guns and five dual four inch guns.

German: "YOU ARE MAKING ME DIZZY, FOR GOD'S SAKE GO ROUND THE OTHER WAY." The signal was read and acknowledged, and the German flying boat complied immediately.

•From a corvette returning to base to a passing MTB (Motor Torpedo Boat) which was setting out on patrol: "GOOD LUCK." Back came the reply from the MTB: "THANKS. ACTUALLY WE RELY ON SKILL."

•An Admiral, leading a line of carriers, watched one of the destroyer screen trying to cut through the line between his ship and the next astern. The destroyer captain, anxious not to make the obvious mistake of getting across No 2's bows, cut too close to the flagship's stern. Sure enough an unlucky roll brought his sea boats' davits in contact with the carrier's stern. The Admiral growled, "Make that young blighter a signal". Everyone waited to hear the great man's anger put to words. This was the signal sent from the Flag Officer to the errant destroyer: "IF YOU TOUCH ME THERE AGAIN I SHALL SCREAM."

•From an extremely fussy destroyer flotilla captain to a destroyer about to go to sea for exercises: "HOW LONG DO YOU EXPECT TO BE AFTER LEAVING HARBOUR." Came the reply from the destroyer: "310 FEET AS USUAL."

•An Admiral's Flag Lieutenant signalled to the Senior Officer, Port: "WHO DO YOU RECOMMEND FOR ADMIRAL'S WOMAN." The Senior officer ashore was most perturbed and asked for a repetition of the signal. In due course he received this amendment. From the Flag Lieutenant to the Senior Officer, Port: "REFERENCE MY SIGNAL PLEASE INSERT WASHER BETWEEN ADMIRAL AND WOMAN."

•From the flotilla leader to a US destroyer which sank six Japanese submarines in twelve days: "DAMMIT. HOW DO YOU DO IT." The destroyer escort eloquently replied: "PERSONNEL AND EQUIPMENT WORKED WITH THE SMOOTHNESS OF WELL OILED CLOCKWORK. AS A RESULT OF OUR EFFORTS RECORDING ANGEL IS WORKING OVERTIME CHECKING IN NIP SUBMARINERS JOINING HONOURABLE ANCESTORS."

•The destroyer HMS *Diamond* had just collided with the cruiser HMS *Swiftsure* (see photo on previous page) during manoeuvres at sea. The destroyer was technically in the wrong and, when the ships had sorted themselves out, the following exchange took place: From HMS *Swiftsure* to HMS *Diamond*: "WHAT DO YOU INTEND TO DO NOW."
From HMS *Diamond* to HMS *Swiftsure*: "BUY A FARM."

•An Admiral conducting a bombardment signalled to the remainder of his Battle Squadron: "WHO KNOCKED THAT LIGHTHOUSE DOWN AND WHY."

•A Flagship signalled to a private ship: "WHAT ARE YOUR WASH CLOTHES HANGING UP FOR." The succinct reply from the private ship was: "TO DRY."

•The frustrated Fleet Air Arm Commander in an aircraft carrier signalled to an airborne squadron who were not obeying instructions: "THIS IS MASTER QUOTING HEBREWS CHAPTER 12 VERSE 8. I QUOTE: BUT IF YE BE WITHOUT CHASTISEMENT WHEREOF ALL ARE PARTAKERS THEN ARE YE BASTARDS. UNQUOTE. I SAY AGAIN BASTARDS. OUT.

•When HMS *Queen Elizabeth* and the Cunard liner RMS *Queen Elizabeth* met for the first time in mid-Atlantic, HMS *Queen Elizabeth* signalled to RMS *Queen Elizabeth*: "SNAP."

•Two frigates were approaching Portland Harbour in an English Channel gale with nil visibility. Seeking some guidance, the first frigate signalled: "WHEN DO YOU EXPECT TO SIGHT PORTLAND BREAK-WATER." The not very helpful reply was: "FIFTEEN MINUTES AGO. ESTIMATE MY POSITION 4TH FAIRWAY, CAME GOLF COURSE."

HMS *Starling* (U66) was a WWII Black Swan class sloop, reclassified as a frigate in 1947. She was credited with sinking 14 U-boats during WWII. Her armament included six 4 inch AA guns, four by two pounder (British) 40 mm AA pom-poms, twelve 20 mm Oerlikon (Swedish) AA guns and eight depth charge throwers. She had a top speed of 20 knots (37 km/h) and was captained during the Battle of the Atlantic by the famous Captain F J Walker until his untimely death in July 1944.

•This signal was sent from a personal friend of a rather imperious Admiral who had recently fallen from his barge into the sea: "I AM SURPRISED THAT A MAN OF YOUR EXPERIENCE SHOULD ATTEMPT TO DO WHAT ONLY ONE MAN HAS DONE BEFORE - WALK ASHORE."

•This signal was sent from the Captain of the 2nd Destroyer Flotilla in 1940 when his flotilla, while trying to draw the enemy, was being chased by two Italian cruisers. HMS *Hyperion* to destroyers in company: "DON'T LOOK ROUND NOW BUT I THINK WE ARE BEING FOLLOWED."

•From one British corvette to another in a full Atlantic gale: "HAVE JUST SEEN DOWN YOUR FUNNEL. FIRE IS BURNING BRIGHTLY."

•Between two Atlantic convoy escorts. The first ship signalled:

"COMMENCE HOSTILITIES WITH JAPAN." The second ship rather dryly replied: "REQUEST PERMISSION TO FINISH BREAKFAST FIRST."

•HMS *Southampton*, a cruiser, had the ship's name designed in an unusually dazzling plaque. In harbour one evening, when this plaque was illuminated, she received the following signal from a senior admiral: "AS A SHAREHOLDER IN THE SOUTHERN RAILWAY I MUST PROTEST ON WHAT CAN ONLY BE CALLED PILFERING ON THE PART OF YOUR FLAGSHIP OF ONE OF THE PLATFORM SIGNS OF THE STATION WHOSE NAME YOU BEAR."

•The Eastern Fleet, returning from sea, 'hove to' outside Trincomalee waiting to proceed one by one up the swept channel to the anchorage. Apart from the ships being vulnerable to torpedo attack everyone was short of sleep and touchy. Suddenly an American merchant ship appeared and, ploughing through the waiting ships, shaped up for the swept channel. The tricky situation was relieved by Admiral Sir James Somerville's ability to sum anyone up quickly when he signalled to the US Merchant ship: "AS MAE WEST SAYS, ONE AT A TIME BOYS."

•During the Munich crisis immediately prior to the commencement of WWII, a British destroyer and a submarine were carrying out exercises together off Gibraltar. During their return to harbour a large and heavily-laden German freighter passed nearby. Somewhat prophetically the submarine signalled to the destroyer: "REQUEST PERMISSION TO START THE WAR."

•The ex-corvette *Coreopsis*, hired by Ealing Studios for making the film 'The Cruel Sea', entered Portland Harbour after a day's filming. She was meant to look as if she had been battered about in Atlantic weather, and she did. Her white ensign was being exchanged for a red one as she passed USS *Missouri*, the 'Mighty Mo', berthed in Portland Harbour. The USS *Missouri* signalled to MV *Coreopsis*: "WHAT SHIP." The MV *Coreopsis* replied: "HMS COMPASS ROSE SAILING THE CRUEL SEA (pause) WHAT SHIP." There was no reply from the 'Mighty Mo'.

•A ship was carrying out low level AA (anti-aircraft) gunnery practice at a drogue target supposed to be at 2,000 feet. The pilot of the plane obviously had not read the orders for the exercise and for an hour he flew up and down over the ship at 5,000 feet. Finally the pilot signalled to the ship: "I AM AT 5000 FEET: SHALL I COME DOWN." The ship replied: "I THINK IT WOULD BE QUICKER IF I CAME UP TO YOU."

•From Captain Walker to his famous Atlantic Escort Group when he had come to the conclusion that the particular under-water Asdic contact they were investigating was not a U-boat: "I AM AFRAID WE MUST LEAVE AND PUT IT DOWN TO AN ICHTHYOLOGICAL GEFUFFLE (*something fishy - Ed*)."

•The Union Jack is worn at the jack staff forward by HM Ships in harbour, or at sea when ships are dressed. This message was sent from a senior ship to a junior ship: "YOUR JACK IS UPSIDE DOWN." From junior ship: "THIS IS HOW IT WAS RECEIVED FROM NAVAL STORE OFFICER PORTSMOUTH." From senior ship: "SOME PEOPLE WOULD DRINK SULPHURIC ACID IF IT CAME IN A GIN BOTTLE."

•The late Captain F J Walker, CB, DSO and three bars, showed a quality of skill and leadership which became a legend in the Atlantic battle against U-boats. His enthusiasm is reflected in a signal after a fifteen-and-a-half-hour hunt which ended in the sinking of U-473 on 5th May 1944. Shortly after midnight the U-boat surfaced in a desperate effort to escape on her diesel engines. HMS *Starling* (see photo on previous page), HMS *Wren* and HMS *Wild Goose* pursued her and a running gun battle followed. Finally, the U-boat, out of control, circled and, after receiving several direct hits, sank. As she disappeared Captain Walker made his first signal of the action from HMS *Starling*: "CEASE FIRING GOSH WHAT A LOVELY BATTLE."

•From an American destroyer to Flag Officer Queenstown: "HAVE ATTACKED AND SUNK ENEMY SUBMARINE. WHERE AM I." From Flag Officer Queenstown: "TOP OF THE CLASS."

•In July 1943 a minesweeper entered Syracuse harbour towing a captured Italian submarine. She looked very pleased with herself so another minesweeper leaving harbour signalled: "IS THAT YOUR FIRST TODAY."

•From C-in-C Mediterranean to a Sunderland flying boat which has just announced proudly by signal that she had shot down a small Italian shadower: "YOU GREAT BIG BULLY."

•When the Australian cruiser HMAS *Brisbane* was visiting Hongkong, the flagship of the China Fleet, HMS *Hawkins*, gave an 'at home' to enable the officers of the *Brisbane* to meet the local ladies. Whilst this 'at home' was in progress a swarm of bees settled on the quarterdeck awning of the *Brisbane*. The Officer of the Watch in *Hawkins*, observing this phenomenon through his telescope, immediately made a signal to *Brisbane*: "HOW MANY BEES IN BRISBANE." Back came the reply from the Australian Officer of the Watch: "HOW MANY HAWS IN HAWKINS."

•A corvette signalled to base: "AM TIED UP TO NO 5 BERTH." The base replied: "SHOE LACES ARE TIED UP. HM SHIPS ARE SECURED."

•HM Minesweeepers *Prompt* and *Jason* were built, launched, commissioned and operated together. They were chummy ships and much friendly rivalry existed between them. One day *Prompt* struck an acoustic mine. While she was settling down in the water with upper deck awash, this signal was sent from *Prompt* to *Jason*: "FIRST AGAIN."

•From first cruiser to second cruiser (in harbour at anchor): "YOUR MOTORBOAT HAS JUST DESTROYED MY STARBOARD GANGWAY. IT SEEMS THAT YOUR COXSWAIN COMPLETELY LOST HIS HEAD." Immediately came the reply: "PLEASE SEND BACK MY COXSWAIN'S HEAD."

•From HMS *Renown*: "AM BEING ATTACKED BY ELEVEN DIVE-BOMBERS." Later HMS *Renown* sent: "SEVEN DIVE-BOMBERS WILL NOT BAT IN SECOND INNINGS."

•From cruiser entering harbour to base: "HAVE YOU ANY NEWS OF LADY BLANCHE." From base: "HAS LADY IN QUESTION LEGS OR PROPELLORS."

•Two submarines were accompanying a Russian convoy. One submarine captain thought it would be a good idea to show himself if the convoy was attacked. He therefore made a signal to the senior officer of the escort: "IN THE EVENT OF ATTACK BY HEAVY SURFACE FORCES, INTEND TO REMAIN ON THE SURFACE." The destroyer Escort Commander replied immediately: "SO DO I."

•Gibraltar Signal Station to passing ship: "WHAT SHIP." The reply was: "WHAT ROCK."

•From Commander-in-Chief Mediterranean, Admiral Cunningham, to Admiral Commanding Force H, Admiral

Somerville, already a KBE, on the occasion of his receiving the KCB: "FANCY, TWICE A KNIGHT AND AT YOUR AGE. CONGRATULATIONS."

•From first destroyer to second destroyer: "MY PORT SHAFT IS RUNNING HOT." From second destroyer to first destroyer: "AS THE SEWING MACHINE SAID IN THE NUDIST CAMP, SEW WHAT."

•After HMS *Kelly* was torpedoed in the North Sea on 8th May 1940, and again after HMS *Javelin* was torpedoed in the English Channel on 29th November 1940, Captain Lord Louis Mountbatten, who was on board both these ships, made the same reply to the same signal from the next Senior Captain on each occasion. Signal: "IS CAPTAIN (D) ALIVE." Reply: "YES. YOU ARE NOT IN COMMAND OF THE FLOTILLA YET."

•The Senior Officer, Atlantic convoy escort, to a rejoining corvette in very bad weather: "WHY HAVE YOU TAKEN SO LONG TO REJOIN CONVOY." Reply: "IT WAS UPHILL ALL THE WAY."

•From a tug that was towing a battle practice target to the firing cruiser whose shots were falling too close: "WE AIM TO PLEASE. YOU AIM TOO PLEASE."

•A US destroyer was ordered alongside a battleship at sea to fuel. She made several attempts to get into position but each time something went wrong, and she sheared off and circled around for another try. When the Admiral commanding the Task Force could stand it no longer he signalled to the battleship: "SUGGEST YOU TRY GOING ALONGSIDE THE DESTROYER."

•Off the Pentland Firth in a fresh easterly gale, a small landing craft was prancing and wallowing her way into the wind and performing antics which caused some anxiety to the captain of a passing battleship who signalled: "ARE YOU ALRIGHT" The Sub-Lieutenant in command replied: "YES THANKS VERY MUCH." Then, as the landing craft turned to round Duncansby Head, her skipper added: "MY NEXT PERFORMANCE WILL INCLUDE THE INDIAN ROPE TRICK."

•When the Germans produced the magnetic mine in World War II, the Allies answer was to de-magnetise ships' hulls, a process technically known as 'de-gaussing' or more commonly 'wiping'. A warship at sea received the following signal from the Commander-in-Chief, Nore: "PROCEED TO CHATHAM FORTH-WITH TO HAVE YOUR BOTTOM WIPED."

•During desert operations in World War II, a corvette was making her way up the Tobruk inlet when she came upon a small coaster which appeared to be making no headway against the strong current. The corvette circled the coaster preparatory to offering her a tow, and in the process she ran aground. She signalled the coaster: "AM AGROUND." The reply was: "SHAKE BUDDY. THIS IS MY FOURTH DAY. WALK ABOARD."

•Having refuelled from a tanker during a NATO exercise in international waters, a British frigate captain signalled a Russian trawler, who had been 'shadowing' the manoeuvres closely for several days: "DO YOU REQUIRE REFUELLING." Trawler: "NOT IF YOUR EXERCISE FINISHES ON TIME."

•While 'shadowing' a Soviet warship in the Atlantic, the Russian warship sent to HMS *Londonderry* (see photo below): "YOU ARE LAGGING BEHIND. RECOMMEND YOU CONNECT ADDITIONALLY A WASHING MACHINE TO THE SHAFT OF YOUR SHIP." The reply from HMS *Londonderry* to the Russian warship was: "I AM ONLY RUNNING ON WASHING MACHINES AT THIS SPEED. MY MAIN ENGINES ARE STILL IN RESERVE."

•In the early 1960s a Captain (D) led his Mediterranean Destroyer Flotilla into the Black Sea, where he soon sighted a squadron of Russian cruisers closing his flotilla at high speed. The leading Russian cruiser sent (by Aldis light): "WHAT ARE YOU DOING IN THE BLACK SEA." Turmoil ensued amongst the staff on the flotilla-leader's bridge while signal logs were sent for and diplomatic clearance discussed. At last Captain (D) raised an elegant hand for silence, and said quietly to the Signalman, please reply: "TWENTY-ONE KNOTS."

HMS *Londonderry* (F108) was a Rothesay or Type 12 class anti-submarine frigate in service from 1960 to 1984. She was 110 m long with a beam of 12 m and a top speed of 30 knots (56 km/h). Armament was twin 4.5 inch (British) Mark 6 guns, a Sea Cat GWS-20 SAM, two 20 mm Oerlikon guns, a Limbo A/S mortar Mark 10, and a Westland Wasp HAS 1 helicopter. During her service *Londonderry* steamed approximately 125,500 km, four times crossing the Atlantic and transiting the Panama Canal three times. She visited 50 ports in 35 different countries. Although never deployed in a war the ship's guns fired 1,232 rounds of 4.5 inch ammunition and 442 rounds of 20 mm ammunition.

Note

1. This article was originally published in the December 2010 edition of *OTN Journal*. There have been several requests recently, all from ex-servicemen, for it to be reprinted again for the benefit of those members who joined the RAOTC since 2010. Eleven years later I have reworked the article somewhat from the original. I trust readers have a good chuckle or three.

2. All messages are shown in uppercase because Navy signals' typewriters of the time were uppercase only - no lowercase at all!

Sources

• The world wide web.

• *Make Another Signal* by Jack Broome (borrowed from Alex Edmonds VK3BQN, RAOTC No 1341).

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It's crystal clear

Andrew Walton VK3CAH
RAOTC member No 1599

Many radio amateurs realise the need for crystals to control frequency. In fact, if you wish to search for suppliers of these products these days, the more appropriate name is Frequency Control Products, not crystals. A search for 'crystals' brings up all sorts of weird stuff! A lot of readers will be aware of one company, Hy-Q International, as one of the local Australian manufacturers. I was fortunate enough to work there for several years starting in 1988 in the engineering development section. Below is my brief look at the company's history. It's been around for over 50 years, and no doubt many readers will have bought crystals from them at some stage.

Hy-Q is a wholly Australian, privately owned company, co-founded by David Rankin VK3QV along with Peter Cooper in 1969 in Frankston, Victoria as Hy-Q Electronics Pty Ltd. There were most likely others, and some of our readers may recall who they were. Peter Cooper's main business interest was printing and I understood he bankrolled the start of the company. In hindsight, it would have been an expensive exercise to establish the equipment and plant required.

Sadly, David Rankin VK3QV / 9V1RH passed away in Singapore in 2009. David went to Singapore when Hy-Q established a factory there in 1972, married and lived in Singapore from then on.

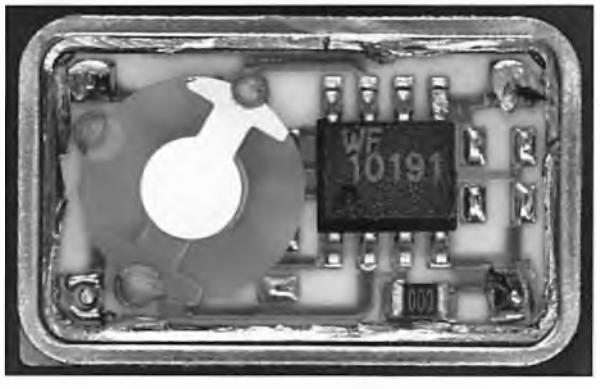
At some point in time, Peter Cooper acquired the controlling interest in the company from David and the other founding members. David was originally involved with the WIA Victorian Division, then the Federal Executive, and was Federal Vice President for a number of years.

Peter Cooper was the sole owner of Hi-Q when I joined the company in 1988.

Hy-Q's local production specialised in manufacturing crystals, in small quantity, with a fast turn around time. If you were in need of perhaps 10,000 units, then there were plenty of companies in Asia, in particular in Japan, at the time that could shell them out like peas. Hy-Q never tried to compete with them.

However, for larger production runs, Hy-Q International (Sing) Pte Ltd followed in 1972 with the UK operation being set up in Cambridge in 1977 with Dr David Salt being one of the leading experts in the UK operation. Dr Salt has published several books on the subject of quartz crystals and oscillators.

The initial vision of the UK operation was seen as a research and development centre for the group; however, it soon became evident that its potential as a springboard to the European market would prove irresistible and Hy-Q International (UK) Limited soon became the central focus for the group's European market.



An 8 pin DIL (Dual In Line) oscillator. Also referred to as a Gate Oscillator.

Hy-Q's international presence further expanded in 1989 into the fast growing North American market with the acquisition of B&D Crystals, a Cincinnati based crystal manufacturer in the United States. Hy-Q International (USA) Inc was then relocated to Northern Kentucky, adjacent to the Greater Cincinnati International Airport with production taking place in a modern 25,000 square-foot plant, located on a five acre site.

One year later, in 1990, Hy-Q International (Mauritius) Limited was set up to manufacture AT cut quartz blanks for supply to the Hy-Q group, thus ensuring some independence from outside suppliers. Hy-Q grew from 25 employees in 1969 to employing over 300 personnel on four continents.

The demise of the Australian manufacturing operation began perhaps around 1989. A combination of factors, (or perfect storm?) saw the engineering development section, which I was part of, being disbanded. This may well have been due to high interest rates at the time (>17%), along with the refitting of Hy-Q (USA), which probably cost a lot more than originally envisaged.

I never saw how B&D crystals operated when it was acquired, but hearsay was that it was a pretty run down business. Glass cookie jars turned upside down and used as vacuum chambers, and the like. If a foreign (non-USA) owned company wanted to establish itself in the USA market, it was generally a lot more successful if they bought an existing business, instead of just opening a brand new business.

A few years later, the Frankston manufacturing facility was closed, and local, fast turnaround production was outsourced.

There is still an Australian sales office. However, the Australian market couldn't really justify more than one niche manufacturer. Today Hy-Q International (Australia) Pty Ltd is still supplying customers throughout Australia and New Zealand.

Being a privately owned company, with most of the founders now SKs, a lot of this information is now lost. Some of our readers maybe able to fill in some of the blank spaces. Being a privately owned company, a search of the web reveals very little; and I have lost touch with most former colleagues, or they are now SKs.

Let's now have a look at some of the gear used to manufacture radio crystals as it was done back in 1989.

Hy-Q specialised in AT cut quartz crystals.

I don't intend to go into great length on crystal theory; however, the AT cut is best suited for radio frequencies. The type of crystal found in a modern watch is referred to as a 'tuning fork' type of crystal.

For an AT cut crystal, the fundamental resonant frequency is based on the thickness of the crystal, being approximately 1.6 mm thick for a 1 MHz crystal. The frequency is inversely proportional to the thickness, so a 10 MHz crystal is 0.16 mm thick. But there is a practical manufacturing limit, and above around 20 MHz the crystals operate in an overtone mode.

I will next explore the various processes, used at the time I was employed with the company, in manufacturing quartz crystals.

Originally, quartz crystals were made from naturally occurring quartz, which is a crystalline form of Silicon Dioxide, the same material as glass. Founded in 1956 by Dr C B Sawyer (as Sawyer Research Products), Sawyer Technical Materials began as the world's first producer of cultured quartz crystal on an industrial scale, and was the foremost supplier of cultured quartz crystals in 1990.

An example of a cultured quartz bar, with finished quartz crystal blanks in the foreground.

Photo courtesy of Sawyer Materials.

The crystals are grown under extremely high pressure in a device known as an Autoclave. Sawyer Technical Materials, located in Ohio, USA, currently have around 400 autoclaves as of 2021. As is the case with LSI (Large Scale Integration) Semiconductors, there are only a handful of manufacturers in the world, with trade secrets being very closely guarded.

I have little firsthand information on the processing of the cultured quartz bars into producing the quartz blank disks, so there's a little bit of a gap in the information. Until the time I left the company, they were supplied in the right shape and size, in a wide variety of thicknesses, depending upon the frequency requirements, ready for manufacturing into a finished electronic component.

One of the final projects I was involved with was the modernisation of an X-ray diffraction machine, to measure the Bragg angle of a particular quartz bar, prior to cutting into slices. It was explained that the actual cutting operation involved a device that resembled a tomato slicer. To keep matters rather simple, there are many different angles that a quartz bar can be cut. A particular mode of resonance will depend upon the precise angle of cut. Hy-Q was in the process of establishing a manufacturing plant in Mauritius for processing quartz bars into finished blanks.

A cultured quartz bar mounted in an X-ray machine ready for an X-ray diffraction measurement. You can see the cultured quartz bar. The bar is mounted on a base on which it will be cut, and held in place with a clamp arrangement.

Another view of the same machine, with the keypad for control and stepper motor on the right-hand side.

Working in the lap and polish department was sometimes a bit of a dirty job, but someone had to do it.

The X-ray machine would measure the Bragg angle of the quartz bar. To put it in far more simple terms, the

AT cut required the quartz to be cut at a very precise angle - 35° 15', 0° (<25 MHz) to 35° 18', 0° (>10 MHz).

Prior to placing the quartz bar onto the base, a thin smear of UV (ultra violet) setting glue is applied. This special adhesive was manufactured in Japan by a company named Threebond. The X-ray machine goes through its operation, selecting the correct (Bragg) angle for the cut. A long wavelength UV black light, the same that many readers will have used for producing photo-resist printed circuit boards, is operated for around 15 seconds, and the glue sets. It's a pretty neat trick the first time you see it.

The modernisation of the machine, which was previously manually operated, consisted in fitting a stepper motor, lower right in the photograph, under control of a microcontroller. The operator had to push a few buttons on the keypad and wait for the machine to go through its paces.

Another improvement made was the fitting of the UV black lights. In their previous use, UV light was provided by a mercury vapour lamp which also produced plenty of the more harmful short wave length UV light. In hindsight, that sort of equipment would be banned from use in this day and age. In years past there were a few crystal manufacturers in Melbourne, and one by one they closed. These two machines were obtained via a local scrap metal yard.

Working in the lap and polish department was sometimes a bit of a dirty job, but someone had to do it. When the order is received by sales, the manufacturing process begins. The first port of call is the lap and polish room.

The crystal blanks are supplied raw in a wide variety of thicknesses and diameters, along with a variety of AT 'cut' angles. After choosing the appropriate blank for the order involved, they are lapped and polished to the correct thickness, using an abrasive material similar to the cutting compound you would use to polish a dull paint surface on a car.

During the process, they are checked throughout using a device known as a 'Weight & Plate Oscillator'. Unfortunately, I don't have any photos to hand; however, here is a description of one.

A 'Weight & Plate Oscillator' is a small table top instrument, approximately A5 size. It consists of a crystal oscillator, connected to a frequency counter. The crystal blank is placed, after washing in water to remove abrasive materials, onto a brass contact plate, around the size of a 10 cent piece, which forms one electrode, mounted flush on an insulated base. Directly beneath the contact plate is glued a small ceramic magnet.

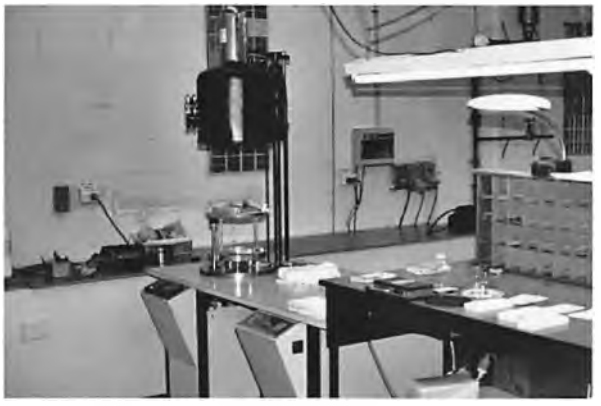
The other electrode of the oscillator consists of a small steel (ferrous) weight, approximately 20 mm tall, by about 10 mm diameter, on a short wandering lead connected via a banana plug. The idea was to place the crystal blank, after washing all the abrasive material off it, onto the brass contact plate, and then sit the weight on the fly lead that formed the other electrode on top of the crystal blank under investigation.

The ceramic magnet underneath the plate ensures the crystal blank is sandwiched snugly between both electrodes. Hence the name 'Weight & Plate Oscillator'. If the frequency was too low, more polishing was required. Quite a simple idea that worked quite well to prepare the crystal blanks for the next phase of processing, which is plating with silver in the Base Coater.

After lapping and polishing, the crystal blanks are then thoroughly cleaned before moving onto the next phase of the operation.

The prototype cleaning system installed in the Frankston facility.

It's a pretty simple affair, ultrasonic cleaners and lots of fresh water. The cylinder on the lower left in the photo is the reverse osmosis filter to turn the local water supply into ultra pure, demineralised water. After all the abrasive is removed from the blank, it is dried using a hot air gun and dipped in acetone. The acetone absorbs any vestige of remaining water.



A 'base coater'.

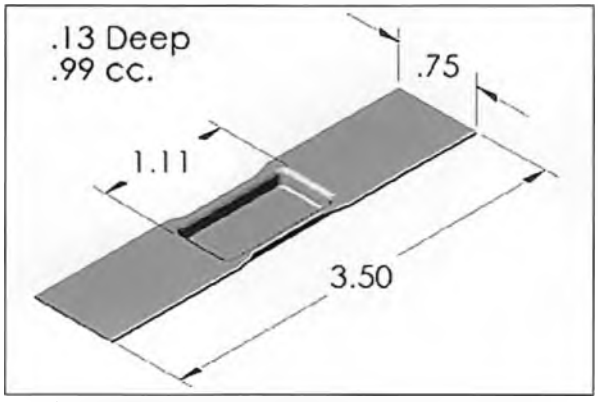
The base coater can carry more than 50 crystal blanks at a time. These are loaded via a carrier that has a mask to determine which part of the crystal blank is plated, and which isn't. After the carriers are loaded into the machine, the large vacuum jar, seen raised to allow access to the working area, is lowered via a pneumatic actuator. Air is then evacuated from the chamber, initially by using a rotary vane pump, and then a cryogenic pump, to a vacuum of around 10^{-5} Bar of atmosphere.

The rotary vane pump evacuates most of the air and the cryogenic pump removes what remains by freezing any remaining air molecules. The cryogenic pump is best described as a super cool refrigerator, using helium as the refrigerant; temperatures not far above zero degrees Kelvin can be achieved.

In the centre of the work area in the chamber is a molybdenum filament 'boat' that is loaded with silver pellets. When current is passed through it at low voltage, but very high current, it glows white hot, boiling the silver pellets. Being in an almost perfect vacuum, the silver is vaporised and sticks extremely well to everything inside the bell jar, including the

crystal blanks. This represents around 80% of the silver coating, and becomes the electrodes of the crystal.

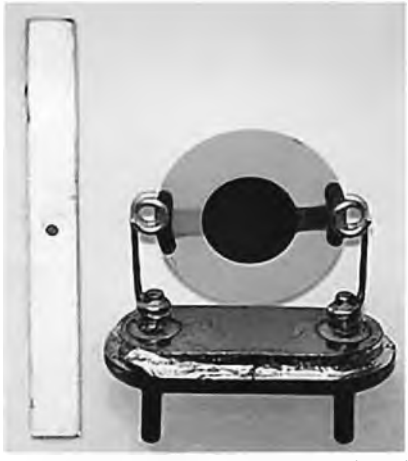
The Base Coater also has a reference crystal, forming part of an oscillator circuit that is controlled to monitor the amount of silver deposited on the crystal blank. As silver is deposited, the frequency goes lower.



An example of a molybdenum filament boat. Dimensional units are in inches.
Courtesy of Midwest Tungsten Service, Illinois.

The crystals are then mounted in the crystal base, as depicted below. You can see the silver electrode plated onto the quartz blank after processing through the base coater. Where the quartz blank is affixed to the base via two spring-like terminals, a small amount of silver loaded epoxy cement is applied to ensure the quartz is held securely.

The base is then baked in a small oven for a short period of time to cure the epoxy cement. Moderate temperature cures epoxy cement very quickly. An example is a popular adhesive many of us have used, the 24 hour curing Araldite, which will cure rock hard in 40 minutes at an elevated temperature. (The application of the silver loaded epoxy can be clearly seen in the photo of the 8 Pin DIL oscillator on page 51.)



A crystal mounted on a base, just prior to the application of the silver loaded epoxy.
Photo courtesy of Wikipedia

The next stage in production is to individually plate the remaining 20% of silver onto the crystal. The crystal, which is now mounted on a base, goes into a much smaller vacuum chamber in a machine called an Evaporator. This comprises yet another, much smaller molybdenum filament boat, and this time the crystal is plugged into a mounting socket which forms part of an oscillator circuit inside the vacuum chamber.

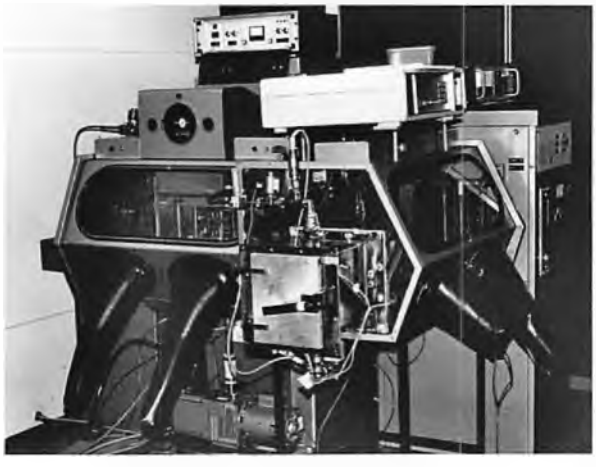
The operator also selects the appropriate loading capacitor as specified by the customer and this is plugged in at the same time. The lid is closed, and once again the air is evacuated, first by a rotary vane pump, and then either a cryogenic pump, or an oil diffusion pump, to a very high vacuum, much the same as in the base coater. The vacuum chamber is a lot smaller, so this operation happens a lot quicker than the base coater. The operator operates a momentary switch, which controls current to the filament, whilst monitoring the frequency as specified by the customer. More silver deposited makes the crystal operate lower in frequency.

A close up an 'Evaporator' that places the final 20% of silver on the quartz blank. Here the operator can be seen looking at the customer's order and ensuring the required frequency (and tolerance) is achieved.

After the final silver coating is applied in the evaporator, the crystal assembly is ready to be enclosed. This involves a resistance welding unit.

A resistance welding machine uses a large capacitor bank which is charged up prior to dumping the entire charge instantaneously across the joint to be welded.

The can, or enclosure, of the crystal is placed over the base inside the resistance welding machine. Usually a batch of crystals is processed at the same time.



A resistance welding machine.

The crystals go in and out of the chamber via an air lock. The air is pumped out and backfilled with dry nitrogen, which is an inert gas. This prevents the electrode on the crystal oxidising over time, or aging, and thus (hopefully) ensures the crystal will be fairly stable in frequency and other characteristics for many years into the future.

After the crystals are sealed in a dry nitrogen environment, it's now time to fit them to a numerically

controlled engraving machine that engraves the manufacture, frequency, and the three digit code that Hy-Q used at the time that depicts its other characteristics.

A Numerically Controlled engraving machine.

Following the engraving machine, the finished crystal is subject to a rigorous quality control regime. After visual inspection, one of the tests is a leak test to ensure they are in fact hermetically sealed. The crystal is placed in a beaker of water, along with probably 20 other crystals at a time, and then placed into a vacuum chamber, which can be visually observed by the operator.

The air is removed - usually a rotary vane pump is sufficient. If there were any leaks in the encapsulated quartz crystal, that is following it being sealed by the resistance welder, bubbles would be seen emitting from a defective unit.

Prior to resistance welding, the cans were soldered to the base. The trouble with soldering is that flux and other residues can be introduced to the plated crystal and can contaminate it, and make it 'age' a lot quicker.

Soldering was a good technology in its day, however was fading into disuse in the 1980s. One of the products the Singapore plant produced was crystal filters for the South Australian based company Codan for their range of HF radios. The crystals in these filters were still solder-sealed at the time.

The quality control team in 1989.

Nothing goes out the door unless it's up to scratch! Hy-Q was always proud of what it produced and offered a lifetime warranty. If a device failed, they would replace it, free of charge. There were very little, if any units ever returned!

One of the final checks in the quality control regime was to investigate how the device behaved in frequency with respect to temperature. This wasn't done for every order, only for customer orders which had requested a fairly tight specification.

Saunders & Associates were formed in 1967 to provide consultation to the quartz crystal industry. They soon pioneered quartz crystal electrical parameter measurement technology with the introduction of Crystal Impedance Meters. The first model of temperature test system was introduced in 1975 and these systems are still being manufactured today.

In 1989, Hy-Q owned several of their systems. The finished crystals were loaded into a carousel arrangement, around 80 at a time, as I recall, and under an automated process, one at a time they were connected to an oscillator circuit, with the correct loading capacitor. The chamber could be programmed to operate between -40° C, using CO2, and +85°C, and produce a chart of how the crystal behaved over the particular temperature range under investigation. I'm certain that some radio equipment using crystals manufactured by Hy-Q found its way for use in the Antarctic. Operating reliably, and on frequency, in sub zero temperatures would have been important.

Oven control, or temperature compensation?

Many readers will have the perception that oven controlled crystal oscillators, or more commonly abbreviated and referred to as OCXOs, are the best in frequency stability. This was true at one time. Hy-Q (UK) was involved in the early development of these devices. It is easy to be overwhelmed by the mathematics involved.

Another interesting use of a 'band run chamber' involves determining the frequency versus temperature characteristic of a crystal. Having determined these characteristics, it is then possible to design a crystal oscillator, using discrete components, that incorporates a device known as a thermistor to compensate the frequency variation of the crystal versus temperature so the oscillator is fairly stable over its required frequency range.

Whilst oven controlled oscillators have their place for extremely wide temperature ranges, usually a TCXO is more than fit for purpose, at least for the average amateur. Most modern amateur radios use a TCXO as the primary frequency reference, which can be adjusted slightly via software in the settings menu, to net it precisely on frequency. This allows the user to have the displayed frequency within a small fraction of 1 Hz at HF frequencies.

For those readers that have ordered, or obtained a quote for a one off, custom made quartz crystal in recent years, you can now see why it's so expensive. There's a lot of specialised technology involved using a good deal of specialised equipment..

Please note that all photos used in this article were taken by the author, except where noted.

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Do QSL cards really serve a purpose?

Ron Goodhew VK3EMF
RAOTC member No 1516

Back in May this year I received a wonderful QSL card from an amateur in Townsville, North Queensland. It confirmed an AM contact made on Anzac Day this year. We had been trying for about five years to get a decent AM contact recognising the Service People who used AM and CW during times of conflict in years past.

Several weeks earlier a QSL card dated 1926 appeared for sale on the internet eBay sale site. I attempted to purchase this card, as did a mate of mine, but we pulled out of the sale when the asking price reached a crazy figure.

These two events got me to thinking (a dangerous pastime!). What use are QSL cards to you personally? What do they mean to you?

I appreciate looking back through my collection of cards from time to time. They bring memories of friends made, wonderful QSOs enjoyed, sometimes with people in places totally unknown to me. Topics of conversation can be very diverse indeed, a reminder of many happy hours spent rag-chewing in the shack at all hours of the day or night.

As an amateur historian who is fascinated with the history of our great hobby, QSL cards often provide me with very useful pieces of information which are not recorded in any other place. The recent card from 4BW, the card featured on the eBay sale, was just such a card. 4BW was one Andrew Couper Jnr, a very early wireless experimenter who lived in Mareeba, North Queensland.

I have written at length about Andy in my article *Northern Sparks*, published in the March 2014 edition of OTN Journal, and *One Hundred Wonderful Years*, published in the December 2013 issue of *Amateur Radio*. At the time of writing these articles the only information I had about Andy's aerial system was that he used a 100 foot (30.5 m) long wire up 80 feet (24.4 m) between two wooden masts.

The featured QSL card from 4BW tells me that Andy had other aerials at different times. On 13th November 1926 it appears that he was using a 28 foot (8.5 m) semi-vertical. Crossed out on this card he had his aerial as being an 80 foot (24.4 m) long, 80 feet high, six wire T Cage aerial with a six wire tapering cage lead-in, a two wire eight foot (2.4 m) high counterpoise and, as an earth, a 21 square foot (2^2 m) zinc sheet, buried six feet (1.8 m) deep in coke.

I stated in my earlier writings that I believed Andy installed the first X-ray plant at the Mareeba hospital. This belief is confirmed by his comments on the card that "*Old 5CM* (E Sagar, Adelaide) *was in Mareeba helping to install the x-ray equipment*".

All of these tiny snippets of information add a little to our knowledge of a well-loved and respected man, and a true pioneer of our hobby. This knowledge would never have come to light except for the sudden appearance of an old QSL card. I doubt if any of today's electronic QSL cards will survive more than a few years.

Before you dump your collection of QSL cards, consider of what value they might be to someone in years to come - perhaps a bored historian, or a history student doing research for his/her degree?

Who knows? At least consider getting the cards to the national collection to be preserved and enjoyed by future generations.

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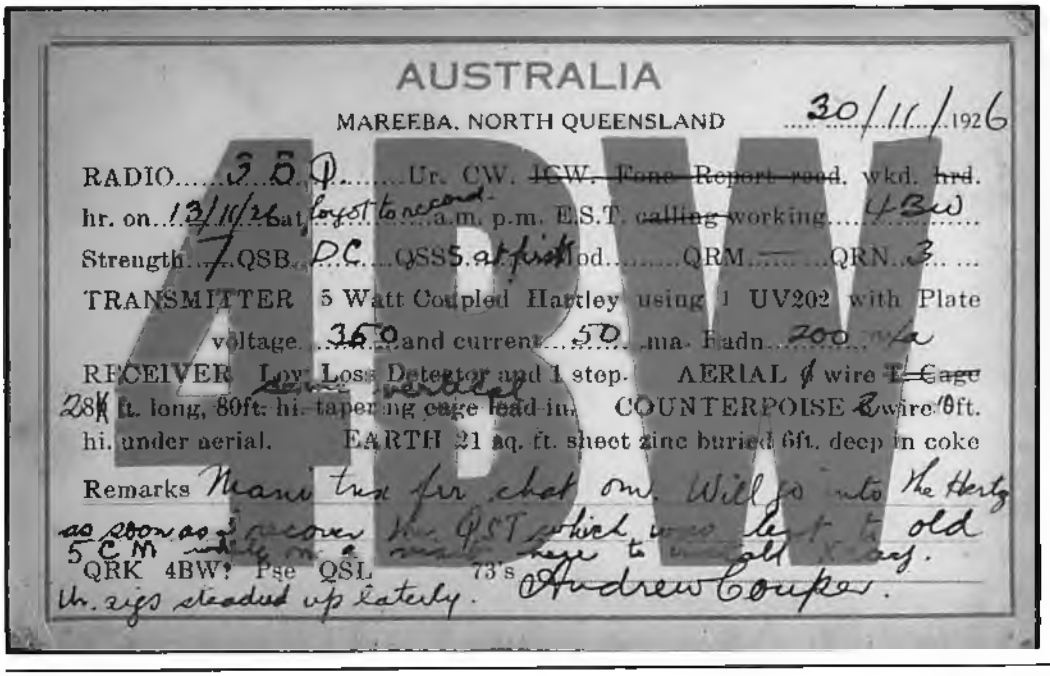
AUSTRALIA

MAREEBA. NORTH QUEENSLAND 30/11/1926

RADIO 3 5 0 Dr. CW. ~~ICW. Tone Report read.~~ wkd. ~~hrd.~~

hr. on 13/11/26 at forgot to record a.m. p.m. E.S.T. calling ~~working~~ 4BW

Strength 7 QSB DC QSS 5 at first od. QRM QRN 3

TRANSMITTER 5 Watt Coupled Hartley using 1 UV202 with Plate voltage 350 and current 50 ma. Fadn 200 ~/a

RECEIVER Lov Loss Detector and 1 step. AERIAL ~~1~~ wire ~~T Cage~~ 28~~0~~ ft. long, 80ft. hi. tapering cage lead in COUNTERPOISE 2 wire 10ft. hi. under aerial. EARTH 21 sq. ft. sheet zinc buried 6ft. deep in coke

Remarks Many tnx for chat om. Will go into the Hertz as soon as I recover the QST which was lent to old 5CM while on a visit here to my old Exp.

QRK 4BW? Pse QSL 73's Andrew Couper.

Un. rigs steadied up lately.

The 4BW QSL card from 1926, filled in just on 95 years ago by an amateur radio pioneer, Andy Couper Jnr.

Aircraft control surface flutter: Buzz, bang, burial!

Clive Wallis VK6CSW
RAOTC member No 1289

Even though this article has nothing to do with radio, many radio amateurs have an interest in aircraft and aviation. Hopefully, the following will be of more than passing interest.

In his interesting article on different types of resonance in the RAOTC's *OTN Journal* for May 2021, Ken Morgan VK3CEK asked for other examples of this phenomenon. A rather dramatic one is that of aircraft control-surface flutter. In severe cases the time between the onset of flutter and airframe destruction can be but a few seconds, often with fatal consequences. It can indeed be a case of buzz, bang, burial!

Destructive in-flight aerodynamic flutter dates back to the beginning of aviation. Fortunately, today the phenomenon is well understood and guarded against, otherwise aircraft could be fluttering out of the sky like confetti, yet it does still happen very occasionally.

One of the most spectacular of these events occurred at the UK's Farnborough Airshow in 1952 when the prototype de Havilland DH 110 jet fighter disintegrated in mid-air killing test pilot John Derry and test observer Anthony Richards. The wreckage ploughed into spectators killing 28 and seriously injuring 60 others.

Between 1947 and 1984, V-tail Beechcraft Bonanzas had a series of fatal accidents related to catastrophic failure of the so-called ruddervator tailplane.

Fig 1. A Beechcraft V-Tail Bonanza.

A famous case of aerodynamic flutter occurred in the USA when, on 29th September 1959, a Braniff Airlines Lockheed Electra disintegrated between Houston and Dallas. Just six months later another Electra operated by Northwest Orient Airlines broke up over Perry County, Indiana, when flutter led to in-flight wing separation.

Around 1963, when I was a flying instructor on de Havilland Vampire jets in the RAF, several of these aircraft suddenly broke up in the air. In only one incident was the pilot lucky enough to survive.

In 2005, two pilots died near Cape Town, South Africa, when the wings of their Interavia, a rugged two-seater aerobatic aircraft, suddenly ripped off.

In October, 2007, a Piper PA 28 Arrow suddenly broke up in the air near Colorado City, Arizona, killing two brothers.

In 2010, a young charter pilot in Namibia was killed on descent in a Cessna 210 when, without warning, the aircraft suddenly disintegrated.

Just two months later near Pretoria, South Africa, a pilot and navigator were killed when their Pegasus Flamingo ultralight aircraft broke up in flight.

This list is by no means exhaustive. Home-built and kitset aircraft are increasingly popular. Unauthorised modifications, unsatisfactory construction or poor maintenance can, and have, put this class of aircraft at risk of flutter.

Most of the above incidents were traced to divergent control surface flutter, a form of resonance with increasing oscillation amplitude that, if unchecked, can rapidly lead to in-flight destruction of the aircraft.

Although aerodynamic flutter can occur in any part of the airframe, it is most commonly associated with control surfaces, those hinged parts such as the ailerons, elevator, rudder and trim tabs which modify the shape of the flying surface and its associated airflow to provide the necessary aerodynamic forces to control the aircraft in flight.

All airframes, whether made of wood, metal or composites, exhibit some degree of aeroelasticity and will deform or bend when subjected to a strong enough airflow. Flutter is an instability due to an interaction between aerodynamic forces, structural stiffness, inertial and elastic forces.

Destructive flutter occurs when these forces interact to reinforce one another, creating an oscillation or resonance of ever-increasing amplitude ending in structural failure. Not all flutter is destructive, but it is always potentially dangerous.

A detailed description of these complex interactions is beyond the scope of this article, but a simplified description of wing and aileron flutter may give some idea and is representative of what can happen to any control surface, including trim tabs. Here we deal with subsonic airflow only; flutter due to shockwaves associated with transonic and supersonic flight is ignored.

Wing flutter

All wings have some degree of elasticity, both longitudinal and torsional. Long thin wings, such as those on sailplanes or modern airliners, are more pliable than those found on the short, stubby wings of high performance fighters, but if seriously mishandled none is immune to flutter.

An aileron (Fig 2) is a hinged section of the wing usually located at the outer part of the wing's trailing edge, connected to the pilot's control column. In light

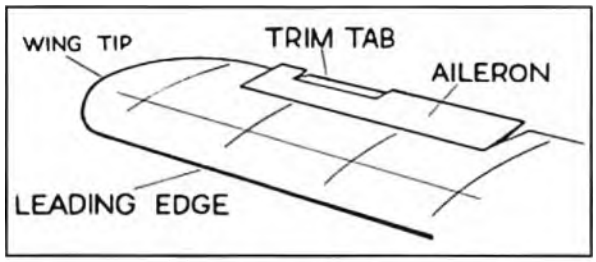

Fig 2. A typical aileron.

aircraft this will normally be via a cable and pulley system; as one aileron goes down, the one on the opposite wing goes up (Fig 2a).

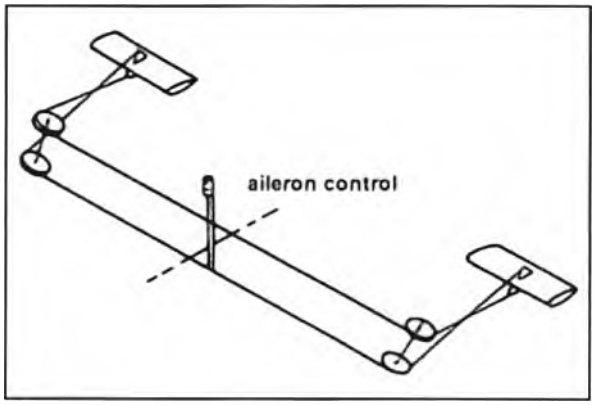

Fig 2a. A typical aileron circuit.

Aileron (or other control surface) movement alters the airflow not just over the control surface; the airflow over the entire flying surface ahead of the control surface is modified, magnifying the effect of the control's movement.

Ailerons alter lift on the outer part of the wing, the down-going one increasing lift and the up-going one decreasing lift, the combined effect resulting in a rolling motion about the aircraft's longitudinal axis.

Ailerons control roll: similarly, moving the elevator or rudder creates an aerodynamic force to control pitch and yaw.

A simple aileron is hinged at its leading edge, thus its centre of gravity is aft of the hinge line. If disconnected from its control cable, the aileron would droop down under its own weight. With the cables connected, the two ailerons counterbalance each other. But, importantly, control cable systems have some degree of stretch.

Now imagine the wing in flight. Let's suppose an upward gust strikes one wing, immediately increasing its lift and causing it to move quickly upwards. Because the wing has some degree of lengthwise flexibility, the increased lift also causes some degree of upward flexing.

Because the centre of gravity of the aileron is aft of the hinge line and because the connecting cable has some stretch, the wing's rapid upward movement, coupled with the aileron's inertia, will cause the aileron to move downwards, further increasing the lift and therefore the upwards bending of the wing.

A similar but opposite process may occur on the downgoing wing. The reaction to aileron movement also tends to twist the wing about its torsional axis, creating a complex vibrating and twisting oscillation should flutter occur, but here we'll consider just the simpler up and down motion of the wing.

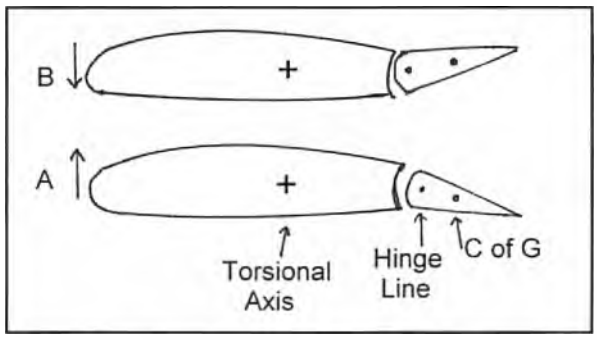

Fig 3. As the wingtip moves up (A), inertia causes the aileron to rotate downwards. As the wingtip movement reverses (B), the aileron flips upwards.

Once the wing's upward movement is arrested by its own structural stiffness, as at Fig 3B, the stored energy due to bending (elasticity) will make it flip down again to try to resume its normal position. This downward movement will now make the aileron flip upwards, reducing lift thus adding to the wing's downward momentum. Under the right circumstances of airspeed, wing flexibility and aileron inertia, the combined movement of wing and aileron will create a resonance or flutter of ever increasing amplitude. This divergent oscillation can quickly result in structural failure.

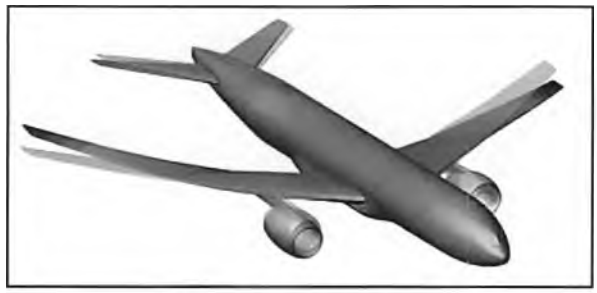

Fig 4. Wing vibration.

A similar situation can exist with the other control surfaces or even their trim tabs. Mild flutter is usually felt as a buzzing of the control column; severe flutter as a violent movement.

Obviously this shouldn't be allowed to happen, so how can flutter be prevented? Essentially, we need to prevent the inertial movement of the control surface.

Until the invention of powered controls, the standard way was (and in light aircraft still is) to statically balance the control surface about its hinge line by adding mass ahead of the hinge line until the centre of gravity and hinge line become coincident.

Thus when a wing flexes, a mass balanced aileron will not rotate under the influence of inertia, minimising risk of flutter.

Mass balancing should not be confused with aerodynamic balancing, a technique which uses the airflow to assist the pilot to move a control surface.

Clearly, the required amount of mass ahead of the hinge line, usually in the form of lead, to achieve static balance of the control surface, will be equal to the mass of the control surface behind its hinge line. This weight may be incorporated in the leading edge of the control surface and thus hidden from view, or may be mounted externally (see Figs 5A and 5).

Although essential to prevent flutter, this mass adds to the aircraft's weight. While this is acceptable for light aircraft with comparatively small and light

Fig 5. External aileron mass balance on a Messerschmitt Bf 110.

control surfaces, large aircraft would need literally tons of lead to achieve balance. For example, the all-metal elevator on a Boeing 747 spans some 22 metres, roughly twice the wingspan of most light aircraft. Imagine the weight required to counterbalance it! Carrying this huge amount of weight obviously detracts from revenue payload weight and is uneconomical.

In high performance, high speed aircraft, including airliners, control surface rigidity is achieved through powered controls, usually hydraulic, where the control surface is attached to a hydraulic jack via a short, rigid arm and the jack body is firmly attached to the wing or other appropriate part of the airframe. Quite apart from taking the manual effort out of moving the control surfaces, powered systems in large aircraft weigh very much less than mass balancing.

Fig 5a. Internal mass balances on the control sufaces.

Flutter is typically a high speed phenomenon. Provided a properly maintained, certified, type-approved aircraft is flown within its speed limitations, flutter should never occur. Testing for flutter is part of the certification process and the published 'Never exceed airspeed', **Vne**, is always well below the flutter speed or airspeed at which aerodynamic loading may cause structural failure. On civil aircraft Vne is usually shown as a red line on the airspeed indicator. Any pilot exceeding Vne, intentionally or unintentionally, is risking structural failure and the lives of all on board.

Although light aircraft, including sports aircraft, microlights, gliders, gyroplanes and even powered parachutes are manufactured to agreed safety standards, they are not required to be subjected to the rigorous, expensive certification standards required of public transport or military aircraft to demonstrate their in-flight safety.

Why then have some aircraft with ordinary mass balanced, manual control systems fluttered apart at speeds well below their limits?

The answer usually lies in poor maintenance or unauthorised modification.

Mass balancing is critical. Damaged or missing mass balance weights, worn and sloppy control surface hinges, loose or sloppy trim tabs, improperly tensioned cables or water accumulation due to blocked drain holes, unauthorised repairs or even painting, all can upset the control balance which can lead to flutter at airspeeds below Vne, perhaps as low as circuit speed. Ice accretion, too, can adversely affect mass balancing. Unless an aircraft is certified for flight in icing conditions, such conditions should always be avoided.

In the case of the Vampires (Fig 6), divergent flutter was traced to the in-flight loss of one of the substantial elevator mass balances, the resultant violent oscillation breaking off the booms and destroying the airframe in seconds. Careful pre-flight inspection, especially of external mass balances and control surface hinges is good insurance.

Fig 6. A de Havilland Vampire. The mass balances under the elevator are clearly visible.

The Interavia which lost its wings in flight had had the aileron mass balances removed to save weight!

The Cessna 210 which broke up on descent probably lost an aileron mass balance in flight when the attaching rivets failed.

Although there was some controversy over the numerous in-flight structural failures of the Beechcraft V-tail Bonanza, in many cases the probable cause was tailplane flutter due to exceeding Vne either deliberately or through loss of control in cloud resulting in a high speed spiral dive.

The Colorado incident was due to both wings breaking up where the ailerons were attached.

If flutter is encountered, the immediate action is to reduce speed and hope that the flutter ceases before catastrophic structural failure occurs.

In summary, in-flight flutter is dangerous resonance but should never be encountered if the aircraft is properly designed, maintained and flown within its authorised limits.

Although the foregoing is a simplification of a complex topic, it is something that all pilots should be aware of. Regrettably, experience shows this is not always the case.

One final comment. In January 2021, in Australia an aileron hinge failure was detected during a pre-flight check on a 20-year-old Jabiru SP4 aircraft. Fortunately, the aircraft was grounded until repairs were made. Who knows what might have happened had the failure not been spotted.

References

• RAF Air Publication 129, *Manual of Flying and Airmanship*. • Sundry websites on this topic. • Personal experience.

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Radio Amateurs Old Timers Club Australia Inc

In accordance with the Rules of Association, notice is hereby given of the

Annual General Meeting 2021

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

to be held at

2.00 pm AEST (0400 UTC) on Thursday, 23rd September 2021

and conducted by video conferencing using Zoom.

(Regrettably, due to the Covid-19 pandemic it will not be possible to have the usual face to face meeting followed by the September luncheon.)

Business: Confirm minutes, adopt accounts, elect committee members.

(Note: All existing committee members are willing to continue in office and offer themselves for re-election.)

RAOTC members who wish to participate in the 2021 AGM will need to **register beforehand** by sending an email to *raotc@raotc.org.au*

no later than Thursday, 9th September 2021.

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 participate in the AGM.

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 9th September 2021.