OTN

Old Timers' News

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

Number 56 **September 2015**

Contents

Radio Amateurs Old Timers Club Australia Inc

Established 1975 Incorporated 2002 Member of the WIA

Correspondence

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

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

OTN Journal

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

RAOTC Office Bearers

President;	Bill Roper VK3BR	**Web page co-ordinator**	Andy Walton VK3CAH
Membership Secretary;	Tel: 03 9584 9512		**Tel: 03 9783 6859**
***OTN* Editor.**		**Committee Members**	Jim Gordon VK3ZKK
Vice President;	Bruce Bathols VK3UV		Tel: 03 9893 1711
Broadcasts.			David Rosenfield VK3ADM
Secretary;	Ian Godsil VK3JS		**Tel: 03 9700 1225**
Broadcasts.	**Tel: 03 9782 6612**		
Treasurer	Derek McNiel VK3XY		**Mike Goode VK3BDL**
	Tel: 0418 991 119		**Tel: 03 9589 5797**

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 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 *raotc.org.au*

Enquiries will be welcomed by Secretary Ian Godsil VK3JS on (03) 9782 6612; or by Membership Secretary Bill Roper VK3BR on 03 9584 9512; 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)	145.700 MHz FM, plus 1.825 MHz AM, 7.060 MHz LSB, and 3.650 MHz LSB
0100	UTC (all year)	14.150 MHz USB beaming **NORTH** from Melbourne
3.650 MHz	LSB plus 145.700 MHz FM	08.30 pm Victorian time (all year)

Interstate relays

10.00 am	Western Australian time (all year) VK6OTN	7.060 MHz LSB and NewsWest FM repeaters
08.30 am	Tasmanian time (all year)	NTARC FM state-wide repeater network

Check the RAOTC web site for any broadcast variations - call back sessions follow each transmission.

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

A few words from the president . . .

As you all know, the aims of the RAOTC are 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. These aims sound great, don't they, but they really pose a challenge to a club whose membership is scattered across the vast continent of Australia.

So how do we rise to that challenge? Well, mainly through our club journal *OTN* and our monthly news and information broadcasts, both of which the members tell the RAOTC committee are well received.

Let us have a look at how the club fared over the past RAOTC financial year which ended on 30th April 2015.

Finances: First of all finances, because without a good balance sheet no organisation can function well. Have a look now at page 34 of this journal and you will see that the RAOTC is financially sound. We had a surplus of income over expenditure for the year of $1,328.37 and we have a healthy members' funds balance of $18,472.09.

Many thanks to Treasurer Derek McNiel VK3XY for his continuing excellent financial stewardship.

Broadcasts: The monthly broadcasts are popular with many stations participating each month in the check-ins and call-backs on the various radio frequencies and downloading the broadcast audio files from the RAOTC web site.

Thanks to Bruce Bathols VK3UV and Ian Godsil VK3JS who are now producing and presenting these interesting broadcasts each month; and thanks to the various relay stations and those many stations who participate in the check-ins and call-backs.

As a relay station on both 40 and 20 m I enjoy the interface with members in the call-backs.

RAOTC Web Site: The amount of information on the RAOTC web site increased again during the 2015 financial year. If you haven't visited the site for a while, have a look. Thanks to our webmaster Andy Walton VK3CAH for the great job he does in looking after

< raotc.org.au >

If any members note anything of concern about the RAOTC web site at any time, or note that any information up there is out-of-date, please let Andy or me know immediately.

(continued on page 33)

From the editor . . .

There was a great response from members to my plea in the last issue of *OTN* for more articles. So much so that, after filling this issue of the journal, I have almost enough articles left over to fill the next issue.

But don't let that stop you from continuing to write about your experiences during your journey in radio. Far too many of our fellow amateurs become silent keys without recording their experiences and hence too much interesting radio history is lost.

A couple of months ago a friend tackled me about my continual exhortations for him to write down his radio story and queried as to when I was going to write something about my story!

Suitably challenged, I did sit down and write about my experiences as a trainee telegraphist in the RAN during National Service 60 years ago.

I prepared it for publication in *OTN*, not thinking it would be particularly interesting. However, a couple of people have said they enjoyed reading it.

I then realised that this is probably how so many RAOTC members felt about setting down their own radio experiences in writing and submitting them to *OTN* for publication. I, and so many others, have thoroughly enjoyed reading every one of their stories!

Please be encouraged by the above and tell us all about your radio story. We will all be most interested in reading it.

Normally I publish articles in *OTN* more or less in the order in which I receive them from the authors. However, as there is so much interest at present about WWI and WWII because 2015 is the centenary of Gallipoli, I have deviated a little from the rule in this issue of *OTN*. You will notice that the first half contains articles which have a relationship in some form or another to the world wars.

So, enjoy your reading of the usual eclectic mix of interesting articles. As always, my many thanks to Clive VK6CSW for his outstanding proof-reading help.

Articles already to hand for the next issue are from Bruce Plowman VK3QC, John Drew VK5DJ, Wolfe Rhode VK5AXN, Ian Godsil VK3JS (2), Gerry Wild VK6GW, Clive Wallis VK6CSW (5), Lloyd Butler VK5BR (2), Brian Endersbee VK3WP, Herman Willemsen VK2IXV, and myself.

Bill Roper VK3BR ar

Editor
Bill Roper VK3BR
Typesetting and Layout
Bill Roper VK3BR
Article proof-reading
Clive Wallis VK6CSW

Printer
High Tech Printing Services P/L, Ballarat
Enveloping and addressing
Bill Roper VK3BR
Mailing
Mike Goode VK3BDL

Front Cover Photo

The late Arthur Evans VK3VQ at his home station in Sandringham a few years before he became a Silent Key. *(Obituary on page 33)*

Photo by David Dunn VK3DBD/G3SCD

RAOTC QSO Party Contest 2015

All licensed Australian Amateur Radio Operators are invited to participate in the annual QSO Party sponsored by the Radio Amateurs Old Timers Association Inc. The event this year is in the form of a contest. Please don't let that stop you from joining in!

This event was originally referred to as the 'Old Rigs Contest' because, as amateurs with lots of years of experience, many have older radios still in working order. Here is a good opportunity to give them an airing. However, do not feel afraid to use the latest 'do everything' radio!

Date: Saturday, 19th September 2015.

Time: 0400 - 1200 UTC.

Object: To make as many contacts as possible, especially with members of the RAOTC.

Bands: 160, 80, 40 and 20 metres.

Modes: CW, AM and SSB.

Suggested frequencies:

160 m: AM 1843 kHz; SSB 1850 kHz
80 m: CW 3520 kHz; SSB 3570 - 3590 kHz; AM 3560 kHz
40 m: CW 7020 kHz; SSB 7080 - 7090 kHz; AM 7120 kHz
20 m: CW 14040 kHz; SSB 14160 kHz - 14170 kHz

Calling: On **CW** "CQ OT". On **Phone** "CQ Old Timers".

Exchange: Callsigns, serial number starting at 001 and incrementing by one for each contact, whether RAOTC member or not.

Score: •One point per contact. •Add 25 points to total score if using a radio 25 years or more old.

Special Segments:

CW:	40 m on above frequency	0430 - 0515 UTC
	20 m on above frequency	0600 - 0645 UTC
	80 m on above frequency	1000 - 1045 UTC
AM:	40 m on above AM frequency	0530 - 0615 UTC
	80/160 m on above AM frequencies	1030 - 1115 UTC

Logs: Logs must show the callsign of the station worked; time; mode; exchange sent and received; callsign, name and postal address of operator submitting the log; and whether using an older radio or not.

Send logs to: Secretary RAOTC, PO Box 107, Mentone VIC 3194; or via email to:
< raotc@raotc.org.au > by Friday, 2nd October 2015.
If sending by email, and no acknowledgement is received, please resend.

Awards: Certificates will be issued to:

- Scorer with highest total contacts;
- Highest scorer using an old rig; and
- Highest scorer in each special segment.

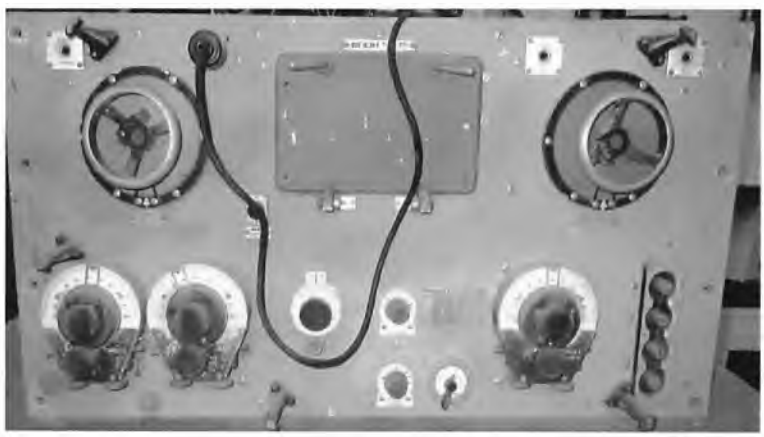
Find these Rules on the web: < www.raotc.org.au >

Ian Godsil VK3JS

ar

Do you know what this equipment is?

Merv Deakin VK4DV, RAOTC member No 1230 from North Rockhampton, would like some help from *OTN* readers in identifying the equipment pictured below. Merv writes that it came into their museum collection from the estate of the late VK4ZEB. All that is known about the equipment is that it came out of an Australian commissioned warship, but they do not know which one?



It appears to be an AM/CW rig because it came with an old style carbon hand microphone attached and a Morse key socket on the front panel.

From what I can see from the photos, there appears to be a series of 1930s era valves behind the fold down flap in the top centre of the front panel.

If any reader can identify this mystery piece of ex Naval equipment, please contact me or Merv Deakin VK4DV, QTHR. *Bill Roper VK3BR editor*

ar

My seventy seventh hamiversary

Bruce Plowman VK3QC
RAOTC member No 1448

On 9th February 1938, I received in the mail my Amateur Operator's Certificate of Proficiency and on 22nd February 1938 was allocated the call sign of VK3QC. This was the first time this call sign had been issued and I have held it continuously ever since.

In those days there was only one level of radio amateur licence and the standard was quite high. It comprised electrical and radio theory, regulations, and a no-error test of 12 wpm Morse code for five minutes each of sending and receiving. Included in these was a portion devoted to five character code blocks, each comprising five sections of characters with letters and numerals mixed. The initial licence stipulated that only Morse (CW) could be transmitted for the first six months!

I received my permission to operate on Telephony (Phone) on 30th August 1938. The initial licence cost £1/10/- (one pound ten shillings - $3.00) for a year. That was equal to half a week's pay for an adult in 1939. On that basis we should be paying about $650 today!

In country areas the written test was always held at the local Post Office and was supervised by the local Postmaster (or his deputy). Each question was asked on a separate sheet of paper and the answers were to be written on the same sheet. This sheet was handed in and the next sheet issued until all questions were answered. Two hours was allocated for the written test and this was followed by the Morse code test. In the Morse section, which was not of continuous sentences, were included punctuation and five letter/figure code.

After the test the papers were put into a large envelope which was sealed, notarised on the back by the examiner and posted immediately. In those days ALL radio and telegraph stations in Australia and Territories were under the control of the Postmaster-General's Department, Wireless Branch, Treasury Gardens, Melbourne. This division was responsible to the Federal Government for ALL radio (wireless) and wire/cable communications, including Australian Merchant Marine ships. The only exception was the Armed Forces, with the Navy as the Senior Service responsible for operations.

The PMG allocated the frequencies (or blocks of frequencies) and also set the limits of the amateur bands, in accordance with International Agreements. I had sat for my tests in September 1937 at the Bendigo Post Office, but it took three months to get the results and to allow me to make a formal application for the issue of an amateur licence. I had been home studying radio since 1934, getting-up at 4.00 am and studying until 7.30 am each day, using the ARRL and RSGB Handbooks, and the British Admiralty Wireless Handbook.

Although I had built the odd crystal set and battery valve receiver before then, my interest was really sparked in amateur radio when I listened to the 80 metre Victorian Northern Zone (of the WIA) Sunday morning hook-ups, and I phoned an amateur in Rochester, Ted Perkins VK3EP, to ask him questions about amateur radio. Ted, who ran his own jewellery shop in Rochester, invited me to come and stay with him over a weekend. This I did, and Ted became another of my mentors. He was a quiet, gentle man with lots of patience, and I came away from that visit 'walking on air'.

The author, Bruce Plowman VK3QC.

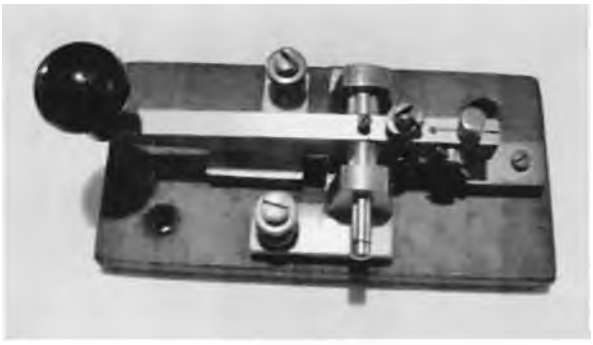
Ted referred me to a friend of his in Bendigo, Tom Frost who, whilst not a 'ham', had been a telegrapher with the British Army, attached to a Field Gunnery unit, and had seen service in France in WWI. He had migrated to Australia with his family in 1921 and taken a job with the PMG as a Line Telegraphist.

Tom volunteered to help me learn Morse code but it was to be a partnership. I was to build a tone oscillator with two sets of headphones and two sending keys, so he could learn tone CW instead of his previous (and still workday) 'sounder' code in which each dot and dash was made up of the 'clicks' at the start and end of each dot and dash! The sound, in fact, of a Morse key hitting the bottom stop and then the top stop.

Tom was the same age as my Dad and we got along famously. He would never send me a message which I could 'anticipate' but would often send me a couple of lines in reverse, then ask me to read the message back to him, starting at the end. Later on in our practice sessions, ALL conversation was by two way tone 'break-in' code. That was when my speed virtually doubled overnight! He eventually got me up to 30 wpm which created a problem for me writing down the message he was sending.

My father owned an old Remington type-writer and Tom suggested I copy that way, which of course was the way all hand sent telegrams were copied initially. That proved to be a disaster, as when I read the letter 'B' I would type it as dah, dit, dit, dit. So I had four 'B's instead of just one! So I had to learn to mentally copy part of a message then write it down as I copied the second part, and then write the second part - and so on.

It was about this time I found I had a mild touch of dyslexia which I still have. Quite often when I type the word 'that' it comes out as 'taht'. I also received a lot of



The Morse key removed from *HMS Renown* when the ship had a re-fit of its wireless room and presented to the author by Vic Smythe VK3PJ.

encouragement from other hams in Bendigo, one of whom, Vic Smythe VK3PJ, made me a presentation of a beautiful Morse key which had been removed from *HMS Renown* (which brought the Duke and Duchess of York to Australia in March 1927) when the ship had a re-fit of its Wireless Room[1]. This key had been given to Vic by his brother-in-law who was a Wireless Operator on the *Renown* (see photo below) and had left the ship to settle in Australia. It seemed that each operator on ships brought his own key with him when he 'moved jobs' from another ship!

This was amongst my most prized possessions. Years later I passed it on to my son Robert when he passed the exams and became VK3KKO. Unfortunately, he was not able to maintain his interest in amateur radio.

Quite soon after I had received my amateur licence, I decided to go for a Broadcast Operators Licence as, apart from some studio and regulations information, it was nearly the same as the amateur licence. I then was able to go out to the 3BO AWA broadcast transmitter at its Kangaroo Flat site and let the technicians, who in those days worked an 85 hour week, have a night off. They also ran the whole station, including programming, after normal 'business' hours. This was 'off the record' and I was not paid for it, but I did learn a lot.

It was not long before Campbell Spain, who was the chief technician, would leave me in charge while he went to a dance at Kangaroo Flat. One Saturday night after close-down at 10.30 pm I did the normal monthly maintenance tests, then put the rig back on air and, for a lark early on the Sunday morning, said, "This is VK3BO Bendigo, testing". In the control room was an AWA TRF receiver which was used as a monitor for the one-man duty crew to check 'off air' to see if the signal was getting out. When the mike was 'open' the monitor speaker was shut off to avoid feedback.

***HMS Renown* at Portsmouth, England on 6th January 1927, preparing to depart with HRH Prince Albert, the Duke of York (later King George VI) and HRH Princess Elizabeth, the Duchess of York.**

When I listened after this call I could hear a very weak signal, so I connected an antenna to the input of the TRF receiver and made the same announcement again. A distinctly American voice replied, "This is KDKA Pittsburgh, Pennsylvania - where the hell is Bendigo?" So we had a short contact until his signal faded out. Not bad for a 200 watt transmitter on 945 kHz! But I am sure the 160 ft (48.8 m) high half wave, centre-fed antenna helped!

But I am getting ahead of myself. In the period between sitting for my amateur licence and receiving the certificate, I had started to build my first rig, or rather the transmitter. I had previously built a TRF receiver using plug-in coils to change bands. In those far off days it was mandatory to use crystal controlled rigs and crystals were expensive.

Max Howden VK3BQ was the main source and he wanted (£3) three pounds for an 80 meter crystal! At that time in our history that amount of money was a week's wages for a business man!

So we bought or, if we were clever, cut small discs of quartz from a quartz crystal and ground them to the frequency we required. This was a very tedious process as not only were the two faces of the crystal to be smooth and the correct thickness, but they had also to be perfectly parallel. Then we would grind the faces off two half-penny coins to make the outer layers of a sandwich with the crystal in the middle, with spring pressure to keep the coins and crystal as one unit, and mount the whole in an old valve base, to plug into the rig. Naturally, we all made crystals with frequencies in that portion of the 80 m band that enabled the crystal's harmonics to fall into the 40 and 20 m bands, so there was an awful lot of crowding on these bands.

My first rig used a type 27 valve as the oscillator followed by another 27 as a buffer/doubler, into two 45s in Class C, or that was what I hoped it was! Most operations were on 80 m and of course a half-wave Zepp antenna. This antenna worked very well on 80 and also on 40 and 20 m. Mostly they were end fed (as was mine) with 300 or 600 ohm parallel wide spaced feeders, with the top ends of the feed line connected on one side to the end of the 132 ft (40.2 m) antenna and the other side was left 'floating' by terminating it at an insulator.

A very good RF indicator was a 2.5 volt torch globe with a piece of insulated wire soldered to each terminal of the globe, each about five inches long, with the ends bared, and twisted around one of the bare feed lines at the transmitter end. Sliding the wires along the feed line gave you a very accurate idea of the position of the standing waves and the varying light from the bulb showed the audio was OK!

It was considered quite normal in those days with the feeders coming right into the shack for the operator to be able to read (monitor) the outgoing signal by the variation of the lamps illumination and the roots of his hair! In the 1930s there were no commercial ham rigs available in 'Oz', nor was there any affordable test equipment.

The rig and TRF receiver worked very well on CW and I worked many countries while serving my probationary period on CW only. During this period I started on my second rig by winding a modulation transformer using homemade laminations, then making

a wide spaced final tuning condenser from aluminium sheet, brass rods and spacers, and of course a copper tubing (or heavy wire) tank coil for the final stage.

I had been saving my pennies for about a year when I was able to afford an 809 'high powered' (like 100 watts!) triode valve as a follow on final after the 45s. Along with my homemade modulation transformer, and a 50 watt audio amplifier, I was really 'working DX'. I had also bought an Astatic D104 crystal microphone which was ideal for crisp audio.

I had been transmitting on the HF end of the Broadcast Band on 1250 kHz, which we were permitted to do between 2230 hrs on Fridays to 0800 hrs on Saturdays, then from 2230 hrs on Saturdays to 1200 noon on Sundays when most commercial stations were not operating. We were permitted to play gramophone records and have guest speakers to talk about their hobbies, provided there was no mention of politics, religion, or business promotion. I often had people ride their bikes to my place and leave with me a favourite record, and then ride home to listen to it on their own radio!

I also asked listeners to phone me if they knew of children or adults who were sick and I would send a cheerio to them. In some cases I would allow the person who brought the message to come into the 'studio', which was in the lobby of my parents' house, and deliver the message.

One of the best known country amateurs who was very well set up and covered a lot of central Victoria, was Gilbert Blake VK3RG in Castlemaine, who was broadcasting 'on air' at all the permitted times. On one occasion he invited me to shift to his frequency while we had a two way QSO to demonstrate the meaning of ham radio. It turned out that Jim Martin, the PMG's Chief Radio Inspector in Melbourne, was a regular listener to 3RG, and he listened to our QSO and complimented us on a 'very fine' performance.

However, he gently suggested that we not do it again as it seemed to him to be contrary to the rule that amateur radio was not to be used to 'promote' any organisation! Naturally, Gil and I respected his wishes!

One of my fans was our next door neighbour, Mr (later Sir) Albert Dunstan who was the Premier of Victoria in a government formed with the Labour party, whose leader, as deputy Premier, was Mr John Cain (father of the later second Premier John Cain).

Another very keen fan was our family doctor, Peter Slater, who was another of my mentors who did all he could to encourage me, and played rather a large part in my adolescent life. He would sometimes call in late at night after he had finished his late calls and he was particularly thrilled when one night I worked a ham station in the Methodist Hospital in Boston, Massachusetts in the USA.

The operator of this amateur station, which was in the residential section of the Hospital Medical Centre, was an Australian who had been a fellow student with Dr Slater when they were both at University in Melbourne. He was Dr Walter Knight and he had several years previously won a scholarship to go to this famous teaching Hospital in the USA. When he had finished his training there, he accepted a position in the Hospital's Research Section and had made a 'name' for himself in the USA and Canada. They started corresponding with each other and he had invited Dr Slater to visit him to attend a Convention in 1940. Unfortunately, a guy named Adolph Hitler started WWII in September 1939 and the visit was not made.

On several occasions during 1938/39, I, along with other country amateurs, participated as individuals, or as WIA members, to provide communications in emergencies. One occasion was when Omeo in the mountains of North East Victoria suffered severe storms and flooding. Bill Williams VK3WE late one night called on 80 metres for help to ease the communication situation in Omeo. I had been studying with the receiver running on our net frequency and replied to him. For the whole of that night, and the next day and night, and on to mid-day on the third day, we provided hourly contacts with each other to handle all traffic into and out of Omeo for the PMG, the press, radio and also private messages. We were both exhausted by the time the PMG lines were up and running again, but we also felt good about being useful to the community.

Bill was Owner/Editor of the Omeo newspaper. A week after the end of our marathon effort, we both received official letters. The first one was from the Post Master General's Department thanking us for the 'sterling' service we had provided. The second letter arrived the next day, and it was from the Post Master General's Wireless Branch asking me to explain why I had broken rules such and such regarding handling Third Party Traffic for the press, radio stations including the ABC, and telegrams for the Australian Post Office, which was of course a division of the Post Master General's Department, and asking me to 'show cause' why I should not hand in my amateur licence for cancellation!

I phoned Bill about this and he told me he had received virtually identical letters. He, as a newspaper man, had sent both of his letters to the *Argus* in Melbourne, and the *Argus* later phoned me for my comments and to ask what action I was going to take. I told them I was going to send both letters to the opposite parties, the Wireless Branch letter to the Post Office, and vice versa. Remember, there was no easy way of just making copies of the letters. I have often wished I had been able to keep copies.

After I sent the letters, I spent quite a few nights chewing my nails, but I eventually received a visit from the Bendigo Post Master (who had supervised my entrance exam) to officially thank me in person for my fine service to them, and to advise me that I would be best to do and say nothing about the matter as he had been 'assured' that no further action would be taken. The *Argus* had published a small item in the back pages under the heading 'left hand/right hand'!

I had also been involved in a relay of messages on CW during the week of the terrible bush fires of Black Friday on 13th January 1939 from Omeo and Walhalla. Many amateurs were involved in this operation.

When WWII started, all radio amateurs were ordered to shut down for the duration and all microphones, Morse keys and transmitter components were boxed up and deposited with the Central Regional Post Offices. This was one time I was glad I had a PMG Type microphone which I had used in my early forays into radio, and was also glad I had an old Morse key! Nobody knew the difference!

Just as well, as when I applied post war for my boxes of bits, no one could find them!

Note

1. See <http://australianscreen.com.au/titles/australasian-gazette-arrival/ >

aт

The Turkish secret weapon - an unwelcome surprise

Ron Cook VK3AFW
RAOTC member No 824

Although this article is not in any way related to radio or electronics, it is being published because this year is the centenary of Gallipoli and one hundred years after the event we are still intrigued by new discoveries about this ill-fated WWI campaign. This article is in the same vein as the author's fascinating WWI articles in the previous issue of *OTN* and will be an eye opener to many readers.
Bill Roper VK3BR editor

When the first ANZACs stormed ashore at Gallipoli and dug in they were not expecting a new type of weapon to be used against them - the hand grenade. These hand thrown anti-personnel bombs were supplied in quantity to the Turkish Army which was well trained in their use. Their effect was devastating.

It seems probably few, if any, of the Australian troops had even heard of hand grenades and even some of the officers did not know of such things. They were essentially a secret. The official Australian War Records cite one case where two officers were standing in a trench when a Turkish grenade landed at their feet. One officer picked it up exclaiming, "What's this?" The other yelled, "Throw it, man." The startled officer tossed the bomb out of the trench none too soon as it exploded before it hit the ground. So why was this weapon effectively a secret as far as the ANZACS were concerned?

Photo 1 - A British hand grenade No 1, Mark 1.

The first grenades

While burning containers of oil had been thrown at troops from the days of the Greek empire, the Chinese invented the hand grenade as a hand thrown bomb around 1,000 AD. It was a ceramic or metal container filled with gunpowder and sometimes shrapnel. They were effective at close quarters against an enemy hidden behind battlements or in buildings.

Hundreds of years later the British and other European nations made their own versions, with mixed success. By 1900 the most common type had a wooden or cane handle attached to a cylindrical grenade. It was thrown from a standing position as the troops approached trenches after an artillery bombardment.

Grenades, what grenades?

Trench digging, hand to hand combat, and line abreast attacks on enemy lines were the basis of much of the ANZACs training in Egypt prior to embarkment for Turkey. Grenades did not get a mention so it is no surprise that the ANZACs were blissfully ignorant of them.

The reticence of the British to make much use of grenades in 1915 had a reasonable basis. Their own grenades were not well designed for trench warfare and they did not imagine someone else could do better. Grenades were therefore not initially supplied to troops at Gallipoli.

The Turkish grenade did not remain a secret for long and it was but one of several nasty surprises the troops received at Gallipoli. Indeed, it seems that the generals were also not expecting to be faced by magazine rifles, machine-guns, barbed wire and quick-firing artillery. To use a modern expression, they hadn't done their homework.

The limited effectiveness of the British hand grenades continued long after Gallipoli but the Turkish design certainly caused a reassessment of the weapon, its use and its design.

The British grenades

The Grenade, Hand, No 1 was the first British hand grenade used in World War I. It was designed in the Royal Laboratory (part of the Royal Arsenal which carried out armaments and ammunition proofing, and explosives research for the British armed forces) and was based on reports and samples of Japanese hand grenades used during the 1904 - 1905 Russo-Japanese War, provided by General Sir Aylmer Haldane who was a British observer of that war. See Photo 1 and Figure 1.

The grenade proper was a container of explosive material with an iron fragmentation band. The fuze was of the impact sort, detonating when the top of the grenade hit the ground. A long cane handle (approximately 16 inches or 40 cm) allowed the user to throw the grenade further than the blast of the explosion.

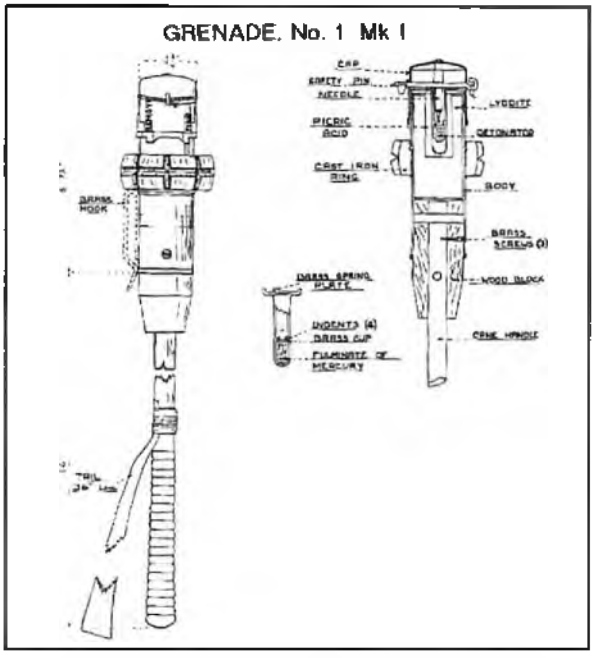


Figure 1 - Diagram of the British hand grenade No 1, Mk 1.

To ensure that the grenade hit the ground nose first, a cloth streamer was attached to the end of the handle. When thrown this unfurled and acted as a tail to stabilize flight. The grenade came with a metal loop so it could hang from the belt.

When the battlefield became confined to the trenches, the long handle became a liability - several accidents occurred when, reaching back for the throw, the fuze struck the trench side. The No 3 Grenade was a variant of the No 1 with a shorter handle for easier use in a trench.

Even with these adjustments, the No 1 and its variants did poorly in battle. According to German prisoners captured at Ypres in January 1916, the No 1 could be deflected by wooden boards. In some cases, the deflected grenade could be thrown back.

Manufacturing the No 1 was difficult as well as it required a special detonator that could only be produced by the Ordnance Factories. Because of this, the British Expeditionary Force got far fewer No 1s than were ordered. A version that used a more common detonator, the No 18, was designed but by then battlefield experience had shown that the No 1 design was ineffective.

The difficulty of operating it in trenches, plus the special detonator, caused Britain to create several stopgap grenades, such as the Jam Tin Grenade, until the Mills Bomb was adopted.

The Turkish grenades

The Turks by contrast had both the grenade with the handle and a variety of egg-shaped grenades specifically designed for throwing from trenches. These weighed about half a kilogram and the most common were 73 mm in diameter. They at least had seen the short comings of the stick handled bombs and reverted to something more like the original Chinese design (see photo 2). The casings were cast metal, usually cast iron

The standard type of grenade used by the Turkish Army at Gallipoli did not need to strike the ground and set off the detonator but used a lit fuze. The match-head on the fuze was struck on an abrasive igniter carried by each bomber, which lit the five-second fuze. Initially, ten-second fuzes were used, but these sometimes allowed time for the British and Australian troops to return the bomb to the Turkish trenches. Sometimes the longer fuzed grenades were thrown three times before detonation.

Photo 2 - The Standard Turkish Hand Grenade. Inspired by the Chinese and based on German technology, it employed low cost manufacture as evidenced by the minimal amount of machining of the casting. Initially the explosive used was probably mainly gunpowder with nitrate of baryta and potassium perchlorate as used in some German grenades, changing later to 100 gm of TNT.

These grenades were devastating when the combatant's trenches were close enough together for a strong arm to hurl the bomb into the opposition trenches.

At the beginning of the 20th century the Ottoman Empire embarked on modernisation of its army. The Turkish military had sought out advice on weaponry, principally from the Germans, and had purchased large quantities of modern German rifles, machine guns and artillery pieces. They seem to have independently investigated grenades and purchased German 'stick-handled' grenades and spherical hand grenades (see photo 3). The Turks then set about making their own

Photo 3 - 1913 German Kugelhandgranate with and without a fuze. This weighed 2 kg. The casing was machined cast iron.

grenades. They simplified the design to suit available Turkish industrial capability. Up to 15 small foundries were used to make the ball grenade casings (see photo 2).

The Turks were the first to develop dedicated grenade bombing units, small trained groups whose purpose was to attack enemy trenches using grenades. It was a significant part of their defence plan. Wisely, they did not boast of the technology advance and their grenade weapon remained a secret from the British until April 1915. The Germans upgraded their own version of this grenade in 1916.

ANZAC innovation

The ANZACS responded by building their own grenades using tin cans packed with bullets and explosive and a fuzed detonator (see photo 5). These improvised bombs worked but may not have been as effective as the Turkish ones; but then neither were the British grenades when eventually supplied. At least they raised morale. For a time it was all the ANZACS had and they were less dangerous to use in trenches than the British No 1 design. Ironically, one of the stop gap grenades produced by the British used a cylindrical can design with a lit fuze.

Photo 5 - Reconstructed jam tin grenades.

Charles Saunders, an ANZAC, is quoted in *The Penguin Book of New Zealanders at War*, 2009, as saying:

"What a disadvantage we were under with our bombs, as compared to the Turks. Ours were made of tins, with a small bag of ammonal as the charge in the centre of it – packed all round with .303 cartridges with the bullet stripped off flush with the brass – the bullets themselves inverted and packed in between the cartridges – the Turkish shrapnel, razor blades, or anything at all put in to make up – the lid of the fuse projecting through it. It was a very clumsy thing and very hard to throw accurately, or any distance, but very effective.

Photo 4 - Improvised bomb factory at Gallipoli. URL: http://www.nzhistory.net.nz/media/photo/improvised-bomb-factory-gallipoli, (Ministry for Culture and Heritage), updated 30-Jul-2014.

Photo 6 - The British Mills bomb.

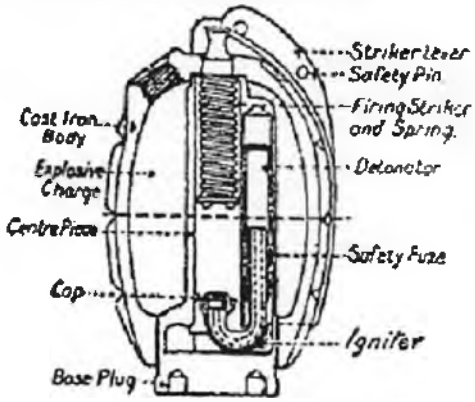


Diagram 2 - Mills bomb construction.

"The Turks had a manufactured bomb, just the size of a cricket ball – a beautiful thing to throw accurately and lit by pulling off a brass cap, with a flint and steel ignition for the fuse. Ours had to be lit by a match. We had fatigue parties collecting shrapnel from the ground where it had lain after being thrown from Turkish shells – what a state of affairs, having to collect our enemy's lead to make bombs for ourselves. Up to August (1915) I didn't see a manufactured bomb at Anzac."

Lessons learned

The Mills bomb (see above) incorporated most of the lessons learned from the Gallipoli campaign and the early conflict in France. The size was optimised and the grooving of the case done to improve the grip, not just to assist with fragmentation. It became the preferred hand grenade design for decades to come.

One would also hope that it also highlighted the need to know and understand any adversaries arsenal and tactics, and not assume the superiority of the British Military.

References

•Wikipedia
•http://www.anzacsite.gov.au/
•https://www.awm.gov.au/collection/RELAWM00408/
•http://www.iwm.org.uk/collections/item/object/30021478
•http://www.ottoman-uniforms.com/ww1-turkish-grenades-study/

ar

ANZAC communications at Gallipoli

Ron Cook VK3AFW
RAOTC member No 824

The magnificent exploits of the WWI ANZAC wireless operators in Palestine have been described by others. This was the first serious use of wireless by the Australian military. But what were the ANZAC signallers and other wireless operators doing at Gallipoli?

This article briefly covers the various means of communication used for transmission of orders, collection and dissemination of intelligence and other information for the ANZACs in the Gallipoli expedition in 1915.

Never spoil a good story

The 100th anniversary of the attack on the Gallipoli peninsula has caused many of the original records to be re-examined, revealing that the news at the time and articles immediately after the war were inaccurate, confused, and sometimes downright wrong. Fortunately, the political and personal imperatives of the day no longer blinker the view.

One myth was that the ANZACS were sent to the wrong beach at dawn and that the command had no idea of what lay before them. In fact, most of the initial force of ANZACS was well ashore before dawn and the operation was planned carefully by Australian commanders.

That's not to say things did not go wrong and that there were no surprises, but mostly the landing went as expected. Some in their enthusiasm disobeyed instructions and leapt off the stern of landing craft into deep water. With large slippery boulders on the bottom, and burdened with their full kit, many of these were doomed to drown. There were many other tragedies. Many ANZACs had an idealised conception of what the war would be like and in their disillusionment looked for someone to blame.

The planning of an attack in a foreign land relies on the latest surveillance and communication technology for producing current maps of the area and this was the case at Gallipoli. This was one thing that was done well.

Lieut General Sir William R Birdwood, the commander of the ANZAC forces at Gallipoli.

It is true, however, that the overall co-ordination of the Navy under Rear Admiral Robeck and of the Army under General Lord Hamilton was poor, and there were many other aspects of the campaign that were poorly planned or badly executed. The ANZACs were commanded by Lieutenant General Sir William Birdwood who gained their respect and he seems to have done as well as could be expected.

Up in the air

This supply of good maps was due to the British having carefully photographed the peninsula from the air before the offensive. At the time, aerial photography for military purposes was still being developed by the British.

HMS *Ark Royal*, the first aircraft carrier. Small by today's standards at 7,570 tons, it was slow even in 1914, managing only 11 knots. However, it did enable the deployment of aircraft far from friendly soil.

They had the first aircraft carrier, HMS *Ark Royal*, from which they flew a variety of aircraft. She could carry five floatplanes and two to four regular, wheeled aircraft. The latter would have to return to land after launch, but the seaplanes would take off and land in the water alongside the carrier and then be lifted on and off the ship by the cranes. Her original complement of aircraft consisted of a Short Folder, two Wright Pushers, three Sopwith Type 807 seaplanes and two to four Sopwith Tabloid wheeled aircraft.

A Sopwith type 807 seaplane. Note the wings folded back for ease of storage on board ship.

The Sopwith 807 aircraft had a range of over 500 km and carried a pilot and observer/camera operator/radio operator. They could be fitted with a machine gun and could carry a modest bomb load. Although underpowered it could reach 80 mph (129 km/h) and had an endurance of 3 ½ hours. The wings folded parallel to the fuselage for storage.

Communications with these aircraft was a very important factor in their usefulness. Unfortunately, while two way radio communications between aircraft and ship or ground had been tried, the ignition interference from the aircraft engine ruined reception for the photographer/observer/wireless operator.

However, transmissions from the aircraft were satisfactory. Consequently, Morse signals were sent from the aircraft to ship or ground with flags or simple signs such as 'OK' laid out to signal back to the plane while it was still in the air. As these airborne transmitters used a spark gap, preventing ignition of the fuel and its fumes would have been a concern. Aircrew of the early aircraft breathed in and absorbed significant quantities of castor oil with foreseeable results.

While wireless provided instant communication to the ships, the initial objective, aerial photography, was another important piece of information communication. Aerial photography provided for the creation of realistic maps of the peninsula and its terrain, intelligence on Turkish emplacements and information on landing beaches. The Australian commanders received both maps and photographs to support their operations planning well before the landing.

An aerial photo taken by a hand held camera from a biplane of a Turkish port on the Gallipoli Peninsula.

In the beginning, aerial observation was dogged by untrained observers and imperfect wireless telegraphy equipment. Later, when the aircraft were used to help the ships' guns hit targets, the lack of experience in the ships of aerial fire control produced less than perfect outcomes. On several occasions allied forces, including a group of New Zealanders, were shelled by the British.

One writer noted, "From the earliest days, spotting for the ships was carried out by aircraft operating from nearby islands and the aircraft carrier HMS *Ark Royal*, as well as by kite balloon control with searchlight (?) signalling to aircraft. That rapid strides were made in equipment and techniques was demonstrated by a string of successes against gun positions on the Asian shore in May.

"Turkish officers commented on the efficiency of aircraft in sighting their gun positions, the need for effective camouflage and the need to cease firing when an aircraft was sighted. Kite balloons were flown from

A kite balloon is held steady aboard HMS *Manica*, while its observer waits to climb into the basket, off the Gallipoli coast in 1915.

the kite balloon ship HMS *Manica*, later joined by HMS *Hector*. Although the kite balloons experienced some difficulty due to their distance from the target, and the irregularity of the terrain, their effectiveness is attested to by their effect on Turkish morale and the amount of attention paid to them by Turkish guns and aircraft."

Although the writer says searchlights were used to communicate with aircraft, he may have meant Aldis lamps as they could send Morse code whereas the searchlights could not be keyed effectively and any messaging via them would have been very limited.

Throughout the campaign, British aircraft regularly overflew the peninsula providing valuable information as to where the enemy and their guns were, what was happening on the supply lines, and how successful the naval bombardment of Turkish emplacements had been.

The cameras were at first hand held and then fixed to the side of the fuselage. The images were recorded on plates. After developing the plates, prints could be made and hand carried to the generals. Aerial reconnaissance did improve over the following years with the main advance being film replacing plates but the principles established at Gallipoli remained in use for the rest of the century.

The Turks soon learned the need to camouflage their positions and were reasonably successful at this.

Thanks to the radio reporting, sightings of enemy activity from the air could be passed to the front line in less than 30 minutes.

Radio encouragement

The landing was undertaken with confidence. However, it was clear from the first few hours of engagement that the Turks held the advantage and the expected advance was not going to be made that day. The British generals were crestfallen. To withdraw would have taken days.

Amidst this gloom at headquarters came the message that Henry Stoker on the AE2 had made it through the Dardanelles into the sea of Marmara and was harassing the Turkish navy. The mood lifted greatly.

Lord Hamilton wrote to his Generals... "there is nothing for it but to dig yourselves right in and stick it out. It would take at least two days to re-embark you as Admiral Thursby will explain to you. Meanwhile, the Australian submarine has got up through the Narrows and has torpedoed a gun boat ... you have got through the difficult business, now you have only to dig, dig, dig, until you are safe."

It was not that easy. Casualties rose as attacks were repulsed and ground gained was lost, regained and lost again. By the third of May the mood was again sombre as tactics were reassessed.

You are too loud

The Fleet communicated directly with the high command in London via a powerful Marconi station on board one of the battleships. The use of a direct link removed the several hours delay that using the land based cable service would have involved. Messages to a significant telegraph office, say in Egypt, would require using a wireless link and from the telegraph station there would have been several relay stations receiving and retransmitting the coded messages along the cables. High power wireless telegraphy was the clear choice and absolutely cutting edge technology at the time.

For the exchange of messages between ships there was a reticence to use the normal ship radio. Signal lamps were very directional and best used at night, so while the more general coverage of radio would have been better, using the fleet transmitters when in close proximity was avoided. It would cause severe overloading and complete desensing of the receiving detectors on nearby ships. Also, these messages could be easily intercepted by the Turks and, even if they could not break the code, the intensity of chatter would be a guide to action about to occur.

Here is when a curious thing happened. With the encouragement of senior navy officers, an Australian radio amateur, Walter King Witt XKW, who had enlisted as a Chief Telegraphist with the Navy, had taken his low power amateur radio spark station on board and it was put to use sending out messages to the fleet in the belief that it would not reach the Turkish receivers.

It seems logical, given the number of Australian radio amateurs embarked on ships in the fleet as wireless operators, that other low power stations would have been put together to add to the network of short range radios but there is no clear evidence for this.

I have found only one passing reference (NZ history web site) to a wireless station being set up on the beach and have been unable to find evidence of wireless stations being set up by the Australians once ashore, in spite of the Australian Army having some field radios as early as 1913.

However, a wireless signal squadron apparently had not been formed in 1914 so the radios much used by the ANZACs, the portable 500 W pack set (five pack horses and 13 mounted personnel) were not brought on this expedition. They came into their own the next year when used in Mesopotamia.

The ANZAC signal men at Gallipoli were telegraphists with rolls of wire and field telephones. They were also trained in map reading, and the use of signal lamps, heliographs and flags (semaphore).

News flashes

The British Navy supplied beach parties, each major warship contributing men. These parties would assist in placing buoys and moorings as well as getting stores ashore. There, their role was to carry out the beaching and launching of boats. A naval base station was to be established on the beach. Signal stations attached to this station relayed communications from the Army, especially artillery forward observers, to the ships. This was common across all the allied forces.

These beach stations used Aldis lamps and heliographs. Motor generator sets and large batteries supplied power. Flags were also used for some Semaphore signalling. As noted earlier there is little evidence of wireless being used from the peninsula.

Most non-urgent messages were written and carried in despatch bags by men in small boats shuttling between the ships and the shore.

The signalling lamps were of two general types: a small hand held lamp with a parabolic reflector being tilted by a trigger in the handle to produce a flash; and a higher power pedestal mounted lamp with mechanical shutters. The keying speed did not exceed 14 wpm. The larger lamps were powerful enough to give good range in daylight. Both types were referred to as Aldis lamps by the Royal Navy.

Australian heliograph signallers in WWI. The location is not known. These tripod-mounted heliographs had a second mirror which was not in place for this posed photo. It fitted to the arm that can be seen just under the mirror mount.

The heliograph employed two adjustable mirrors so arranged that a beam of light from the sun could be reflected in any direction. The beam was interrupted by a key-operated shutter. They were most effective on bright sunny days when lamps were harder to see. A big advantage was their independence from electric power, but they needed continuous re-alignment to track the sun.

Private William McIntosh, 4th Field Ambulance AIF, poses with his semaphore signalling flag on Gallipoli.

[AWM P01116.066]

Flags could be seen through binoculars for perhaps two kilometres. With sea mists and so forth, the range achieved by the beach party with flags would have been very variable. They would have been effective in sending simple instructions to landing craft as they approached the shore. Some others, such as the field ambulances, apparently used flags for signalling.

A hand held Aldis signal lamp being used.

Using flags on the peninsula was a dangerous activity as, once having obtained a position that could be seen by the intended recipient of the message, the signaller was likely quite visible to Turkish riflemen.

The larger Aldis lamps, however, could be seen 20 km away and at night extended range could be achieved. Surprisingly low cloud helped with over-the-horizon communication. The light reflected off the base of the clouds could be seen much further than the line of sight distances achieved on clear nights.

Hello, is anybody there?

At Gallipoli in 1915 only one method of long-distance instantaneous communication was available to frontline commanders and that was the portable field telephone. The alternative was to send runners back and forth but this meant that the information was usually hours out of date by the time it was received (assuming the runners weren't killed or wounded before they could deliver their message - which they often were).

A WWI era field telephone set.

Weighing around 2½ kilograms, the field telephones had to be physically connected to a central switchboard via a copper wire and rubber-insulated cable. It was the job of signal parties to not only carry and operate the field telephone but also to roll out and hook up the lines of cable needed to connect it. The field telephones were powered by dry cells. Some were key and buzzer Morse only, others included a handset and some had no key.

The signaller was engaged in a hazardous occupation often requiring working with little or no cover. The drums of cable were not just bulky but heavy. Once installed the wires were frequently cut by the Turks or by stray shrapnel. Going out to fix a cut cable was even more dangerous if the Turks who had cut it were waiting for the repairman.

The relatively short distances from the battlefront to the supply depots and optical communication stations on the beaches meant that the telephone was definitely viable. Another factor in favour of the field telephone was its relatively high security. Tapping into a field telephone at Gallipoli was not easy.

In other theatres of war Australians found the use of radio was vital as the speed of advance meant cables could not be laid fast enough. The 500 W pack radios could cover more than 50 km by day and at least 150 km by night. However, the 1st Australian Wireless Signal Squadron which was a unit of the Australian Imperial Force (AIF) and served in Mesopotamia (modern-day Iraq) during World War I was not formed until late in 1915.

The cost

The British had contributed 468,000 personnel in the battle for Gallipoli with 33,512 killed, 7,636 missing and 78,000 wounded. The French were next most numerous in total numbers and in casualties. The ANZACs lost 8,000 men in Gallipoli and a further 18,000 were wounded. The Turkish losses were even higher but they were the victors.

It was a terrible defeat for the Allies but the manner of fighting and the relationships that were forged created the ANZAC tradition at Gallipoli.

Afterwards

The advances in radio up to the end of World War I were comparable to the advances made in radar in World War II. Replacing spark and crystal detectors with valve transmitters and receivers vastly increased the number of useable channels, ranges achieved and gave the possibility of telephony.

Much of what was learned was secret for almost 20 years and only then was there a further wave of rapid progress when World War II was approaching. Today's field radio is capable of not just voice but also text, data and video transmission and reception. Morse code is no longer used.

Flag, hand and arm signals are still used by armies for short range communication on firing ranges and in the field. Semaphore is still used by navies.

Field telephones continue to be used by armies around the world. Their low cost, simplicity, reliability, security and independence from satellites or the ionosphere mean they still have a place in the communications capability of armies.

Aldis lamps and heliographs are now museum pieces as far as armies go.

Internet capabilities are now common in military communications centres and make use of radio and satellite links.

The rickety underpowered biplanes have been replaced by drones for surveillance. While the biplanes could drop small bombs, the accuracy of delivery was poor. The drones can also attack ground and sea forces with powerful rockets often guided by radar or lasers.

Couriers carrying dispatches now only appear in period films.

References

- *Business Insider* April 2014
- Hamilton, quoted by Rhodes James, *Gallipoli*, London, 1999, p.130
- Wolfenden, P. *Amateur Radio*, December 2014
- Department of Veteran Affairs web site
- Holst, A. VK3OH, *Wireless in the War 1914 1918*, *OTN* journal, March 2001.
- Partington, Dr Geoffrey, *Gallipoli – the facts behind the Myths.*
- Wikipedia.
- Gallipoli and the ANZACs web site.
- NZ History web site.

ar

My early days in amateur radio and business (part 1)

Bruce Plowman VK3QC
RAOTC member No 1448

In *My seventy seventh hamiversary*, published earlier in this issue of *OTN*, I mentioned one of my mentors, Dr Peter Slater in Bendigo, and his friend Dr Walter Knight who had also done his early training in Melbourne University, and who was 'recruited' to the Methodist Hospital in Boston in Massachusetts, USA. Unbeknownst to me, they had resumed their friendship by letters and telephone, and at some stage they decided to nominate me as a suitable Australian candidate for a scholarship being offered annually by the General Electric Company in Schenectady, New York State, USA.

For several years before WWII, due to the combination of the 'Great Depression' of the late 1920s and early 1930s, and the collapse of many businesses with the loss of competent workers, and also to find the right type of future employees, many large businesses in the USA such as the General Electric Company (formed in 1890 by Thomas Alva Edison) independently offered inducements to people who had the skills they needed. General Electric Company had already penetrated many countries outside the USA with their products, particularly power generation and distribution; lighting; electric traction (railroads); and broadcast and communication radio[1].

It was decided that the best approach would be to offer scholarships in various countries which would attract people of the calibre the Company required, and present the Company in a favourable light. By 1938 the list of countries had grown to 40 and included not only well advanced countries but also 'promising' smaller countries where there was already a good basic educational standard, but had little inducement for good students. The conditions of the scholarships varied from one country to another, probably on the basis of GE's interests in that region. The offering to Australians was one of the broadest in range of conditions, but with the exception of specific trades (crafts) they were looking for younger people who would be able to fill a whole range of job descriptions. These covered business, accountancy, communication, transport, radio and electrical of all sorts, merchandising, law, and business management, etc.

Because I had Amateur and Broadcast Operators Certificates, and was studying for a First Class Operators Certificate with appendages for Marine and Aviation operations, I was selected from three Australian nominees. The requirements were pretty tough, but quite clearly laid out, and the offerings were very clear as well. The applicant had to be acceptable to the USA Immigration Service and had to be prepared to enter into an employment contract with GE spread over a possible 10 year term. He (she) had to be prepared to live in whatever area of the USA (or overseas) required by the Company during that 10 year period.

One very definite condition was one which would eliminate a lot of nominees. He (she) had to find their own way, at their own expense, to a port in the USA, and be prepared to attend Company schools in the USA. This meant travelling to the West Coast of the USA as Hawaii was not then a State of the Union (it became a State in August 1959).

When selected for a scholarship, the candidate would be required to call at an American Consulate, or other place nominated, in his own country for an interview as to suitability and, if approved, would be given a reference to an Immigration Office at the place of arrival in the USA. From that point on virtually everything 'would be taken care of'.

At the end of the first 12 months would come the day of big decisions. Does the Company want you to continue on, and do YOU want to stay? If you are accepted, you will be offered a firm job in the selected department, and your geographical position may be changed, or you may be told to stay where you are. In any case, at this point you will be asked to accept a contract to stay with the company for five years, and you will be either told, or offered, where you will continue, bound of course by the contract you have signed.

For all of the time you have been with the Company you will have been supplied with accommodation, a living allowance, travel costs and a nominal wage. At this stage, the better performers will be called in to enter into a series of discussions about the direction of your future with the company. Those who want to accept company career training will be offered tertiary level education at various colleges and universities.

So the above is what was in prospect for me if I passed the interviews with the Consulate in Australia. I needed to decide the best way of being able to finance my travel cost to get to Los Angeles, which was at that time the most convenient. I had a few discussions with my mentor, Dr Slater, and he made enquiries about various avenues of 'getting there'.

He knew I was about to sit for my First Class Operators Certificate and suggested a job as a Ship's Radio Officer. Although I had done all of my studies at home, through a friend at AWA I had been able to sit for my Broadcast Operators ticket at the Marconi School, a division of AWA. I thought I may be able to do my First Class exam with them. No problem, and if you want a job we can assist you.

Two weeks after I had passed my exam I received a phone call from the Sydney office of the Matson line which was a large and reputable shipping company, telling me they were looking for a Third Radio Officer on their ship the *SS Mariposa*.

The ship was to sail from Sydney to the US West Coast on 3rd September 1939 and Marconi had recommended me as being suitable and available for the job.

The *SS Mariposa*, a luxury ocean liner, was launched in 1931.

Of course I jumped at the offer; the pay would be $2 per hour per eight hour shift. I later found that this was nicknamed the 'graveyard shift'. Man, I was RICH!

I had a month to get organised, but it was a very difficult period. I did not want to tell my parents that I would be leaving home because I had been a financial contributor to the household - a whole seven shillings and sixpence per week (75 cents) - until it was time to go. I felt very bad about that, but I was 20 years of age and determined to make the break.

I easily passed the First Class Certificate examination but still had to find a way to get to Sydney. One of my ham mentors, Gordon Weynton VK3XU, who lived in Castlemaine, had to go to Sydney in late August to pick up his wife and daughter and bring them home. So I now had my ride, and a share of the driving of his brand new Oldsmobile to Sydney. As my parents knew Gordon and liked him (he was the accountant and assistant manager of the Castlemaine Woollen Mills), it was easy to tell them I was going with him to Sydney.

Being a coward I wrote them a letter, which I intended to post in Sydney just before the ship sailed. To this day they never knew I was leaving home! I also had to tell my employer who had been a great boss, Laurie Tresidder, who owned a radio shop in Bendigo, where I had lived for 17 years. He was thrilled I was getting the chance.

Laurie had been for nearly 10 years a Major in the Bendigo unit of the Light Horse Brigade, an Army Reserve Unit, and he had encouraged me to join the RAAF Wireless Reserve in which, because I was a radio amateur, I had earned the rank of Pilot Officer. He expected war would break out and he was concerned he would be called up anytime thus having to close his business, leaving me without a job! Looking back, it was amazing the way things dropped into place as the need arose!

Gordon Weynton picked me up at 4.00 pm in Bendigo on 30th August 1939 and we set out for Sydney with sandwiches and a flask of tea to drive all night and arrive in Sydney next morning.

The Hume Highway in those days was gravel for large distances in NSW and the going was slow as there had been a lot of rain.

It is marvellous how, looking back, you see a very definite dividing line in one's life. That trip was mine!

At 3.00 am on 31st August we stopped in Goulburn in NSW for petrol. There were no overnight brightly lit petrol stations in the country in those far off days. You pulled up at a service station and, using a lever on the side of the pump, you filled the glass bowl on the top of the pump. You then rang the 'night bell' and the owner got out of bed, put on his pyjamas and dressing gown and came out, looked at the amount of petrol in the bowl, said, "That will be three pounds, five shillings", took the money and headed back inside.

Not this guy. He had been sitting up listening to his radio, and he said, "Have you fellers heard the news?" We had not been using the car radio as normally all broadcast stations went off the air at 10.30 pm. But not this night! He said, "Hitler has started bombing Warsaw in Poland and we are going to have a war". Gordon was a reservist in the Army Signals with the rank of Lieutenant, so he reckoned he too would be called up. I sympathised with him as I knew I would not be here, as I was going to the USA in three days time. (Gordon was called up and was sent to Singapore with his Battalion[2].)

Gordon had arranged for me to stay in Sydney with a friend of his, who was an amateur, but I have forgotten his call sign. I know he had a three letter call, his name was John, and Gordon dropped me off there and went to his in-law's home ready to pick up his wife and daughter and head back to Castlemaine the next day.

John was also a member of the RAAF Reserve, as were a lot of hams with Morse capability. We were up his antenna tower when his young sister called out, "There are two telegrams here, one for each of you". We finished what we were doing and came down. The telegrams were from the RAAF telling John to report for service at 8.00 am the next day at the RAAF unit in Sydney he had joined, and mine was for me to report at 8.00 am at Caulfield Racecourse in Melbourne the next day.

John's father drove me out to the port, and I went aboard the *SS Mariposa* and asked to see the Purser. I explained to him that I would not be able to join the ship and gave him the reason. He was quite distinctly NOT amused, although he did thank me for coming aboard to tell him.

So we returned to John's home. Just as we came inside the phone rang and John answered it. It was Gordon, and he had received a telegram too. He was to report to the Bendigo Drill Hall at 3.00 pm the next day. So, after each of us getting some sleep, Gordon picked

The official badge of the RAAF Wireless Reserve authorised in 1935.

me up at John's place and, with his wife and daughter on board, we headed for Melbourne, again sharing the driving.

One trip to Sydney on a dark wet night was one thing, but to repeat the trip the next night was less than amusing. It started to rain at Yass, and it rained all of the way to Seymour in Victoria. At one spot on the road near Benalla there was a dip which was full of water. We hit it in the dark at 60 mph (96.5 kph), and the car hydroplaned for about a 100 yards (91 m)! We arrived at Caulfield Racecourse at 8.30 am, and I reported to the RAAF office where I was given a number and told to go and sit with the other recruits. A few of them I knew and I was soon mixing around as we were nearly all radio amateurs.

After a while we were taken to the Mess for breakfast and a 'briefing'. There were 108 of us. We were told that we would be divided into two groups of about 50 each; one group would have their induction and medical checks, whilst the other group would be processed and have their interviews which would go into the records to help decide where and how we would be placed for future training.

The next day, 3rd September, the groups would swap over and the first group would have their medical checks, and the other group their interviews. They also explained that we would only be there for a few days until being directed on to other units. It so happened that the group I was in did their interviews, etc that day and our medicals the next day.

I remember that day as an interesting one. I had been apprehensive about suddenly being just a number, but I need not have worried. Everything was done with courtesy and we were free to move around until our interview was to start.

I found that in my case, at least, I was quite relaxed and comfortable in answering questions, which were firstly about making sure the details they had about me were correct. There was no hitch here at all as I already had Pilot Officer rank (equivalent to an Army Lieutenant). The rest of the interview was spent explaining the course and what issue of clothing I would receive. I should have reported in my uniform, but that was in Bendigo and, as we had come to Melbourne by the quickest route from Sydney down the Hume Highway, I was not able to collect it.

They asked me about my interests, such as jobs I had been in since leaving school, what type of training in communications I felt I was suited to, hobbies, political views (no, I was not a Communist) and so on.

My interview was not until mid-afternoon, so I was told to report to the Warrant Office to see if I could do something useful until meal time. They reminded me I had to be at the Medical tent the next morning at 8.00 am.

I was then sent to the grandstand where I was allocated bedding, clothing and boots, etc and given a sleeping spot number in the lower floor of the grandstand. There they had stretchers which we had to unfold and put into our allocated space, where we left our bedding and clothes (and were given primitive fatigue clothing and toiletries, and a dressing gown, which I had to wear next morning for the medical).

The medical consisted of standing in line after going through an entrance to the big tent where we were checked for temperature, heartbeat, pulse and a brief eye and ear check. We then had to wait in three lines with six feet (2 m) between the lines. The next two checks were the usual crude and uncomfortable checks of my nether regions followed by more questions, a sharp hard poke with a finger in my solar plexus which caused me to let out a very loud yell, then more form filling and questions, and then X-rays.

At about 2.00 pm they took me back into the first cubical where a doctor was waiting for me. His first question was, "Are you looking forward to being accepted for induction into the full time RAAF?" When I said I was already on the Reserve he explained that he felt quite sure from my answers to the questions, and from the X-rays, that I had a duodenal ulcer and, along with my need for full time eye glasses, he would have to arrange for me to be discharged from my present and future admission to the RAAF.

He filled in a form which said I would not be accepted by any of the Services. The first question I asked him was, "Could you please tell me the time?" He pulled out his pocket watch and told me it was 3.30 pm and I asked him what the date was, and he told me that it was 3rd September. He then asked me why I had asked that question instead of one about treatment for the ulcer. My reply was the Matson Line *SS Mariposa* would right then have been going through the Heads at Sydney, and that I should have been on it going to the USA to take up a scholarship with GE.

He could see I was upset and he took the time to try and encourage me. I was then directed to the first office I had visited when I had arrived at Caulfield Race Course. There I was asked to hand in any issue I had received and was given a small slip telling me I was

As you will read on the next page, the author needed an income while he worked as an unpaid volunteer in the Volunteers Defence Corps. He established a radio business in Terang and, while we don't have a photo of his store when he first opened, this is a picture of how his Radio Sales and Service and Electrical Appliances store looked in High Street, Terang after WWII in the years from 1945 to 1950.

The B M Plowman Radio Sales and Service vans in Terang in the period immediately after WWII, including the much used during WWII Ford V8 panel van.

discharged from the RAAF and that, because of my health and as a permanent wearer of eye glasses, I would not be acceptable for service in any of His Majesty's Services.

I was also given a rail warrant to Bendigo, a ten pound note (£10 - $20), a warrant to stay that night at the Coffee Palace in Little Collins Street, Melbourne, and was told to report within 10 days to the Manpower Officer at Bendigo Drill Hall where I would be directed to future war service. I was very disappointed as, like the other 107 of the members of my unit in the RAAF, we were starting our big adventure!

When I returned to Bendigo I had quite a bit of explaining to do to my parents about my new situation. They took it well and I went to see the Manpower Office where they knew nothing about my need to visit them, but told me to return in two weeks.

The first part of their interview was taken up with another complete dossier on me and my trip to Sydney, and then questions about my health and occupation. When I told them about my employer and that I worked as a Radio Serviceman, they surprised and shocked me by telling me that, as Radio Mechanics had been declared a Reserved Occupation, I could have phoned or called at their office and they would have told the RAAF I would not be released to them. But as I had already been through the hoops and discharged for service, I was back to square one and would now be directed into a position where my 'qualifications' would be put to good purpose.

They told me to stay in Bendigo until I heard from them. During this period I had received from the PMG an 'Urgent Telegram' telling me to cease operating. I also received by mail a notice banning me from 'Acquiring or disposing of any wireless equipment'!

I had no job, as Mr Tresidder had arranged to sell his business and his shop lease to some people who wanted the shop for another purpose.

As I had already started the process of leaving home, I wanted to get on with it. When Manpower phoned me I went to hear my fate. I was to go to Camperdown in South Western Victoria, and report at the Town Council Offices to a Mr Conway who was the Shire Engineer, and had been in Signals in WWI (as it was now called). I also had to find myself a job (as a radio man) as the job I was to take on was a very big one. Mr Conway, or Major Conway as he would now be known, had been commissioned by the Australian Army to start, and operate for the duration of the war, a Volunteers Defence Corps, and I was to be his 2 IC and develop an Intelligence and Signals section for South Western Victoria.

It was nothing like 'Dad's Army! Here is the only funny bit. Conway and I were both 'offering' ourselves as the first two of a volunteer organisation. We would both be 'kitted' (provided with uniforms and so on), but would receive NO pay other than re-imbursement of out-of-pocket expenses relating to our VDC activities, on a monthly basis, provided we could produce receipts for our spending!

We were also expected to provide our own 'transport'. We could claim the cost of petrol for our vehicles up to four gallons per month. I later had a 'Gas Producer' fitted to my panel van and it operated on wood charcoal gas - dirty and unreliable but I did over 80,000 miles (128,750 km) in four years in a new Ford V8 panel van on wood charcoal gas.[3]

We would, however, be housed if needed and would receive all medical care costs. I had heard from a friend in Bendigo that a Mr Albert Cohen had for sale a radio business in Terang, 15 miles (24 km) west of Camperdown, so I went to see him and found that he was not a 'tech' at all, just sales. He wanted a fancy price for the small business which included a two year old Ford V8 panel van. He was anxious to sell as he had already accepted a paying job with the Australian Comforts Fund which was set up to send parcels and food to 'the troops', so I offered him a quarter of what he was asking but he turned it down.

There was an empty shop for rent two doors from him. I went to the local Estate Agent and asked about it, and of course I had to tell the agent the type of business I would be running. The agent, who had Cohen's business and lease on his books, went to Cohen with the glad tidings. "You are going to have opposition." (You can see by now that my father had been in real estate in Bendigo).

That night, at the pub I was staying at in Camperdown, I received a phone call from Cohen. I could have the lot for six hundred pounds (£600 - $1,200) instead of the five hundred (£500 - $1,000) I had offered. I in turn offered him four hundred (£400 - $800), because the Ford Panel Van was on hire purchase and I would have to make arrangements with the Hire Purchase Company to get possession of it.

He accepted! The shop consisted of three rooms, one with a large fireplace, and a huge wall safe and it also had a toilet/shower. It had originally been a bank. It also had a fair sized shed and a rear entrance. It was next door to the local office of the SEC. It was in a Court off the centre of the Main Street. So I also had somewhere to live, with a good pub two doors away for meals. That was the start of the most hectic 12 years of my life.

Notes

1. See < www.gc.com/company/index.html > for information on GM these days.

2. Google 'Lieutenant Gordon Weynton'.

3. Look at 'Wood gas for cars' on Wikipedia for information on this method of powering cars.

Hallicrafters goes to war

Clive Wallis VK6CSW
RAOTC member No 1289

My first communications receiver was a Hallicrafters SX24 Skyrider Defiant' purchased second-hand when I was a young teenager in England and which really 'got me going' into amateur radio. I've always had a soft spot for Hallicrafters products but sadly the once famous amateur radio firm, founded by Bill Halligan W9WZE in 1932 and headquartered in Chicago, Illinois, went the way of so many other American electronics firms outclassed financially and technically by fierce Japanese competition. It ceased trading in the late 1970s.

Incidentally, the name Hallicrafters arose because Bill Halligan's first product, an amateur radio receiver, was hand crafted. Hence Halli-crafters. From small beginnings the firm grew to a huge electronics company with many of its communications products playing important roles in WWII.

This is the story of how one of Hallicrafters' most powerful pre-WWII amateur radio transmitters, the HT-4, became the US Army Signal Corps BC-610 and was incorporated into the SCR-299 mobile radio station which played an essential role in the Allied Armed Forces WWII radio communications.

Well before the attack on Pearl Harbour in December 1941, the US Army Signal Corps knew that, should America enter the war, it would take more than telephone lines to connect all their fighting units together. They knew it would take radio to reach all the units on land, sea and in the air, wherever they were, and to coordinate their movements, provide intelligence and keep the lines of communication unbroken. Their problem was that, although they knew what they wanted, the Signal Corps engineers didn't have the time to develop from scratch a suitable mobile, high powered, wide frequency range transmitter useable in any theatre of war. Was there anything readily available that could be pressed into service? They found the answer in the Hallicrafters HT-4, a 390 lb (177 kg) monster that covered 160 to 10 metres and put out 325 W of AM and 450 W of CW.

This transmitter was first marketed to the amateur radio community in 1938 and cost rather more than a good motor car did! The HT-4 employed up to three plug-in, crystal controlled exciter and driver tuning units, selectable via a front panel switch. This made frequency changing easy, and was powerful enough to make world-wide QSOs an almost daily routine for amateurs well-heeled enough to own one.

Indeed, according to the makers of the Hallicrafters sponsored film, *Voice of Victory*, produced in 1944 and which tells how the HT-4 became militarised, an important factor in the selection of this transmitter for military purposes was that, by viewing the log books of amateurs who owned one, Signal Corps inspectors were convinced of its capacity for long range, worldwide communications.

Any transmitter that serves the armed forces must be able to perform reliably anywhere and under the most arduous and unpredictable of conditions. Up to that time none of the US forces had thought of putting a high power transmitter on wheels and bouncing it around on pot-holed battle fields. What about vibration and where would the power come from? The job of toughening up the HT-4 to go to war fell on the shoulders of Bob Halligan and his chief engineer Bob Samuelson, working with Signal Corps technicians at the large US Army establishment at Fort Monmouth, New Jersey.

Although the civilian HT-4 and its companion HT-5 speech amplifier, detailed in the accompanying sidebar on the next page, was built to high standards of mechanical and electrical engineering, it was never intended to be jarred around in the back of an army truck. To ruggedise it, the plug-in tuning units for the exciter and driver stages, which had previously relied on pins and sockets to keep them in place, were modified by fixing U-channels to the chassis frames which not only acted as guides but also held the inserted tuning units firmly in place.

A Hallicrafters HT-4 AM/CW transmitter with the top cover removed. Note the presence of only one plug-in tuning unit.

All valves were fitted with retention rings and some mechanical variable capacitors in the PA stage were replaced with vacuum variable ones. Specially designed shock-proof anti-vibration feet were fitted to the cabinet and circuit changes permitted wider frequency coverage than just the amateur bands. One significant difference was that the tuning units were modified to allow either crystal control or continuously variable Master Oscillator tuning.

Although the HT-5 outboard speech preamplifier with speech

HT-4 450 WATT

The HT-4 is intended for those who want the BEST in an efficient, high-powered rig. The carrier output is 325 watts on phone and 450 watts on CW. The HT-5 pre-amplifier, supplied with the transmitter, may be mounted at the operating position, controlling volume, keying and standby. Thus, once adjusted to any band, the rig may be operated remotely. The transmitter may be set to any three of the 10, 20, 40, 80 and 160 meter bands. Subsequent selection of any of the three frequencies is by a switch on the front panel. Tubes used are 1 6F6 crystal oscillator, 1 6L6 doubler, parallel RK39 buffer driver, 1 RK63 final amplifier, PP 2A3 drivers, PP RK38 modulators, 2 5Z3, 2 866 rectifiers.

The HT-5 preamplifier uses 1 6J6, 3 6J5, 1 80.

For operation from 110v 50-60 cycles AC. Available for special frequencies. Write for prices.

MODEL HT-4. Complete with tubes, crystals, coils for any three amateur bands (10 and 160) and HT-5 preamplifier.

Dimensions 29" x 19" x 37" high.

Shipping weight 550 lbs - $695.00

Additional set of coils for any one amateur band (10-160) - $26.00

Available in U.S.A. on Hallicrafters Factory-Sponsored Time Payment Plan

The above advertisement for the Hallicrafters HT-4, published about 1938, contained the following text:

limiter and built-in mains powered power supply was rebadged as the BC-614 and painted black, it was otherwise unchanged and even retained the civilian international octal plugs and sockets for interconnection with the HT-4 and ancillaries, rather than the more usual military style Amphenol connectors.

Hallicrafters had expected that amateurs able to afford their HT-4 would also have stations well-equipped with large wire antennas for the lower frequencies and rotary beams for the higher HF bands, but these were hardly suitable for mobile field operations. A whip antenna would be more practical so an antenna tuning unit, using a manually operated rotary inductor and vacuum variable capacitors and designated BC-729, was designed especially for the purpose.

A SCR-299 installation in a Chevrolet K-51 panel van. Note the box seat containing spares and tools, etc.

Dressed up for war, the HT-4 became the BC-610 and was the standard transmitter of the SCR-299 mobile radio station, accommodated inside a Chevrolet K-51 1.5 ton panel van. Two receivers, the BC-312 and/or BC-342 general coverage sets (or variants), a BC-211 frequency meter, a BC-614 modulator, a BC-729 antenna tuning unit and a 2 kW trailer-mounted petrol driven generator completed the SCR-299 installation. As a

A BC-312 general coverage receiver.

Major General Dawson Ohlmstead, Chief of US Army Signals Corp in 1942.

space-saving measure the two radio operators sat on a box-bench which held spare parts, tools, and other essential items.

Field trials of the SCR-299 in early 1942 exceeded the Signal Corps' expectations in every way. Major General D Olmstead, Chief of US Army Signal Corps, signalled Bill Halligan, "Field performance of SCR-299 exceeds expectations. Request you expedite production as much as possible". The game was on!

Pre-war, production of the HT-4 at Hallicrafters' Chicago plant had been done by a small number of skilled technicians who hand-assembled each transmitter. Large scale war production needed a new approach. Hundreds of semi-skilled workers, mostly female, formed the assembly line. Each one completed a fairly simple task before passing it on to the next person much as any pre-robotic mass-production system did, but checking and testing required skilled personnel.

These came from the ranks of licensed amateurs who already had the knowledge to undertake this work with a minimum of specialist training and who could rapidly diagnose and rectify any problems. This essential work was overseen by a small number of Signal Corps inspectors. Each transmitter was subjected to rigorous checks including the ability to withstand significant overload without failure and would not leave the Hallicrafters factory until it was perfect in every way.

The range of the SCR-299 far exceeded its original specifications which called for coverage of only 100 miles (161 km). In service, contacts of over 2,000 miles (3,219 km) were regularly recorded.

The SCR-299's first battle-field test came soon enough. On 8th November 1942, the British-American invasion of French North Africa, code-named Operation Torch, began. Companies of the 829th Signals Service Battalion established a successful radio net between the three-pronged invasion by beach-landed forces around Algiers and their Allied Command bases in Gibraltar. According to US Army military historians, "General Dwight Eisenhower credited the SCR-299 in his successful reorganisation of the American forces and final defeat of the Nazis at Kasserine Pass". The real significance of this statement, and the vital role played by the SCR-299, becomes apparent if you read about the Battle of Kasserine Pass, Tunisia.

A Chevrolet panel van with SCR-299 and 'Ben-Hur' trailer containing a petrol driven generator photographed in North Africa in 1942.

Among its many other achievements, the SCR-299 provided reliable communications with England during the North African campaign (rather more than 100 miles [161 km] away!), kept two airborne divisions constantly connected with Britain throughout the D-Day invasion, and provided vital radio communications during the Allied invasions of Sicily and Italy.

Although the SCR-299 was originally installed in a small Chevrolet K-51 panel van, a later version, the SCR-399, was built into a more spacious housing or shelter which could be carried on a 2.5 ton lorry as a mobile installation, or demounted and used as a fixed station. In 1944, SCR-339s were mounted on DUKW[2] amphibious vehicles used in the D-Day invasion of France. A further variant, the SCR-499, was in a lightweight housing designed to be air transportable. Additionally, there was also a fixed radio station version known as the AN-GRC-38 (Army-Navy Ground Radio Communications - Type 38).

A shelter mounted version of the SCR-299 on a 2.5 ton lorry and redesignated SCR-399.

An Eimac 250TH which replaced the RK63 PA tube.

Complete SCR-299 mobile installations were provided to the Russians and other allied forces, and variants were fitted to ships and aircraft. All told, by 1945 some 25,000 SCR-299, 399, 499 and AN-GRC-38 units had been built along with several BC-610 variants. Most BC-610 changes were minor but one worth noting was the replacing of the RK63 PA valve with an Eimac 250TH.

Apart from military duties, SCR-299s and 399s were used by war correspondents and press reporters to send stories back to their newspaper offices. Hallicrafters, too, took advantage of the success of these installations, not only featuring them in their wartime advertisements but also sponsoring a short film produced in 1944 entitled *Voice of Victory*, which can still be seen as a YouTube video. The HT-4 proved to be a real war winner.

SCR-299/399/499 brief specifications

Frequency coverage: 2-8 MHz (1.0 to 18 MHz when used with conversion kits).
Operating frequency determined by plug-in tuning units (up to three at once) in addition to FT-171B crystals.
Mode: CW, AM.
RF power Output: 400 watts CW, 350 watts AM.
AM required BC-614 (or Hallicrafters HT-5) speech amplifier.
Weight: BC-610 only, 390 lb (177 kg). The BC-610 'A' through 'I' models were the same basic unit with relatively minor component and cosmetic differences.
Transmitter: BC-610 plus BC-614 (speech amplifier), BC-729 (tuning unit) and BC-211 (frequency meter).
Receivers: BC-312 and BC-342.
Antennas: 9 foot (2.7 m) whip antenna (receiver), 15 foot (4.6 m) whip antenna (transmitter). Optional 21 ft (6.4 m) whip antenna while stationary or 45 ft (14 m) auxiliary wire antenna for 2.0 to 4.5 MHz coverage.
Power supply: 2,000 watts, with additional 1,500 watts for heater and lights supplied by PE-95 (power unit) on K-52 'Ben-Hur' style trailer. Optional 12 volt storage battery, or 115 volt 60 cycle AC commercial power and two spare 6 volt storage batteries.
Standard housing: SCR 299 in K-51 panel van; SCR-399 in HO-17 shelter mountable on 2.5-ton truck; SCR-499 in lightweight air-transportable housing.
Frequency Conversion Kit MC-503: coverage down to 1 MHz.
Frequency Conversion Kit MC-516: coverage to 12 MHz.
Frequency Conversion Kit MC-517: coverage to 18 MHz.
Remote control: field telephones, control boxes and cable.

A vehicle mounted BC-610 with a BC-729 ATU above. Note the 'spares-box' operator's seat.

A rear view of a BC-610 with the panelling off. At the top is the RF deck with three plug-in tuning modules at top left; the modulator is on the middle deck; and the power supply is on the lower deck.

Notes

1. A description of this set can be found on p41 of *OTN* No 47, March 2011.
2. Although usually referred to as 'Ducks' the acronym DUKW translates as D (1942) U (utility, amphibian), K (front wheel drive), W (two rear driven axles).

References

- 1955 ARRL Handbook
- Hallicrafters advertisements
- Wikipedia
- *Voice of Victory* film which can be seen at https://www.youtube.com/watch?v=TURd_XVpwvk
- Readers may also be interested in another YouTube video entitled *Hallicrafters BC-610-E WWII AM Transmitter Restored Pearl Harbor and Battle of Midway* at https://www.youtube.com/watch?v=AMk-GjzdP64

ar

The worst maritime disaster in Queensland

Tom Ivins VK4ABA
RAOTC member No 1382

Tom VK4ABA was recently looking through some old files on his computer and came across an article he wrote back in 2010 which was published in *Boat Talk* the official publication of Volunteer Marine Rescue Brisbane Inc of which he is a member. Tom sent it along to me and wondered if, with some modification, it might be of interest to *OTN*. I thought so, particularly as there is so much interest in WWI and WWII events with 2015 being the centenary of the Gallipoli campaign. Here is Tom's article. ***Bill Roper VK3BR editor.***

Late last century, advances from analogue to digital technology provided amazing benefits in industry and indeed for mankind. The design of communications equipment alone has brought smaller yet more reliable and capable equipment. We now seem to be so dependent on it as to wonder how we lived without it!

For example, we are able now to make contact with a submerged war grave and view very clear pictures of it some 2,059 m below the surface of the ocean. What amazing skill and how clever! Yet there are those who saw and felt well beyond this amazing technology, which enabled the discovery of the wreck of AHS *Centaur*, to the sad loss of their loved ones in that tragic sinking.

Sadly, the tragedy of it all resurfaced and was as fresh again as it was when they learnt of the events of that night of 14th May 1943. Hopefully, there was now some closure for them at last.

In recent years, much has been written and spoken about what became Queensland's greatest wartime tragedy. We were amazed that HMAS *Sydney (II)* was found off the west coast of Australia on 16th March 2008, and the same people with their clever machines promised a Christmas present for Queensland that came true.

On 20th December 2009, the 2/3rd AHS[1] *Centaur* was found. Using a million dollar underwater robot named 'Remora 3' to take high definition film, world renowned shipwreck hunter David L Mearns, alongside a crew of 33, found the wreck. It is located 48 km north-east of the southern tip of Moreton Island at coordinates S 27° 16.98 and E 153° 59.22. The first and clear photo of the 'red cross' symbol on a green band proved that the *Centaur* had been found right on Brisbane's door step where it went to its grave 67 years prior to being found!

Project manager David L Mearns at work identifying parts of the sunken ship.

On 14th May 1943, this hospital ship was torpedoed on its way to Port Moresby. David Mearns said "a whole body of evidence" pointed to a torpedo strike which triggered a massive secondary explosion in the ship's oil tank, sending the *Centaur* down in minutes. It settled on its side in a gully, coming to rest at a 45 degree angle with 268 service people lost in the tragedy. Many of their relatives came forward with stories to tell of their lost loved ones. Only 64 passengers survived.

2/3 AHS *Centaur*.

Amazingly clear photos tell it all. The broken hull with years of sea growth, the scattered debris, the ship's bell, a tea set, then someone's boot and someone else's shoe, all left behind. But the emotional photo of a slouch hat, like the one many of us wore, touched the hearts of many as it lay outside of the vessel. Someone said it was like the 'tomb of the unknown

2/3rd AHS *Centaur*

2/3rd AHS *Centaur* in Sydney Harbour.

2/3rd Army Hospital Ship *Centaur* was a merchant vessel built in Scotland on the Clyde River and was launched in 1924. She could carry a mixed cargo of passengers and freight, and was employed on a run between Fremantle, Western Australia, and Singapore. When the war began in September 1939, she was placed under the government's control. In November 1941, *Centaur* was one of the ships used in the search for HMAS *Sydney*, and found a lifeboat with survivors from the German raider *Kormoran*. Among the Germans rescued was the *Kormoran's* captain, Fregattenkapitan Theodor Detmers.

Following Japan's entry into the war and the subsequent bloody fighting in Papua during 1942, *Centaur* was converted into a hospital ship with the aim of ferrying patients between Port Moresby and Townsville. Her conversion began in January 1943 and was completed two months later.

Now the 2/3rd AHS *Centaur*, the vessel had a fully equipped operating theatre and dental surgery, and could carry 252 patients. She was also clearly marked as a hospital ship. Around her freshly painted white hull a thick green band ran, broken in several places by large red crosses. At night, the vessel was brightly illuminated by powerful spotlights.

Centaur kept her civilian crew, but her medical staff were all members of the army. The men were from the Australian Army Medical Corps and the women were from the Australian Army Nursing Service. *Centaur* completed only two voyages with patients before she began her ill-fated third and final voyage.

In the early afternoon of 12th May, *Centaur* steamed from Sydney for Port Moresby carrying members of the 2/12th Field Ambulance. Shortly after 4 am on 14th May, while most people were asleep, a torpedo struck *Centaur's* port side, hitting the oil fuel tank which ignited in a massive explosion. The bridge super-structure collapsed and the funnel crashed onto the deck. Everything was covered with burning oil and a fire quickly began to roar across the ship. Water, meanwhile, rushed in through the gaping hole in her side. Many of those onboard not killed in the explosion or fire were trapped as the ship started to go down bow first, and then broke in two. In just three minutes *Centaur* was gone.

The survivors were at sea for a day and half before they were rescued. The ship's crew and medical staff suffered heavily, as did the 2/12th Field Ambulance - 178 men, from a total of 193, died. It was the nurses though, who suffered the worst. Of the 12 nurses onboard only one, Sister Nell Savage, survived.

At the time of the attack, none aboard *Centaur* witnessed what had attacked the ship. Due to the ship's position, the distance from shore, and the depth, it was concluded that she was torpedoed by one of the three Japanese KD7 Kaidai submarines known to be operating off the Australian east coast at the time.

Bill Roper VK3BR

I-176, a KD7 type Kaidai class submarine. The three suspected attackers were all of this type.

The underwater photo of the military issue 'slouch hat' found outside and in the debris of the wreck.

A shoe can be clearly seen through the collapsed roof of the third officer's cabin.

The *Centaur* marked ship's bell shown wedged under the vent pipe on the forward deck.

soldier'. Locating this wreck was a sombre occasion and demanded quiet reflection, while David Mearns deserved some form of accolade or recognition in a meaningful way.

This he received. On 1st November 2010, David Mearns was awarded an honorary Medal of the Order of Australia in recognition of his discovery of *Sydney* and *Centaur*.

Since the sinking in 1943 there had been controversy over the actual location of the wreckage with some believing that the ship sank off Point Danger whilst others believed that it sank off Caloundra. Today

Stained glass window depicting AHS *Centaur* at Concord Repatriation General Hospital.

***Centaur* towed her own lifeboats laden with enemy survivors of HSK *Kormoran* to shore in November 1941.**

there are memorials at Point Danger and Caloundra in memory of those who perished in the incident. This tragedy should never have happened to a vulnerable hospital ship, but it did.

A memorial service honouring the 268 service people who died in the tragedy was held on Tuesday, 12th January 2010 when a plaque was lowered onto the *Centaur*. It reads:

In memory of shipmates, relatives, colleagues and friends who paid the supreme sacrifice on a mission of mercy, 14 May 1943.
2/3 AHS Centaur Association 2010
Lest We Forget

Interestingly, in an irony of war, *Centaur* had a central role in the rescue of crew from the German raider HSK *Kormoran*, the ship that sank HMAS *Sydney* off Western Australia. While all hands were lost on *Sydney*, *Kormoran* was able to launch lifeboats before it sank. Shortly after dawn on 27th November 1941, some German survivors from HSK *Kormoran* transferred from their swamped lifeboats to P-4 lifeboats from *Centaur*. *Centaur* strung several of her own and *Kormoran's* lifeboats together and then towed them to Carnarvon where the survivors were interned at Red Bluff Quobba Station. Eighteen months later, *Centaur* would sink at the hands of another enemy.

Note

1. The '2' means 2nd World War (WWII) for all Battalions in the Australian Imperial Force. For WWI it would, of course, be 1/xx.

The '3' is the number of a unit in the AIF land or sea, etc. 2/6 Field Regiment or 2/8 Tank Regiment in WWII, for example.

Therefore, '2/3rd AHS' indicates that *Centaur* was the third Australian Hospital Ship Unit commissioned during the Second World War.

References and acknowledgements

•Numerous internet sites accessed after a Google search for 'AHS Centaur'.
•Google images.

ar

More about the BC-611-C walkie talkie

David Dunn VK3DBD/G3SCD
RAOTC member No 1252

What walks and talks, weighs 4 ½ lb (2 kg) and is tough enough to survive being run over by a Jeep? The nearest I can think of is a USA Army BC-611-C 'portable radio' circa 1943, which was also known as an SCR-536.

These radios, designed to operate on AM between 3.5 and 6.0 MHz, were the first true hand held radios to see wide-spread use and were used at the Omaha Beach landings in Normandy by the USA forces on D-Day in June 1944. They are correctly depicted in the well known 1962 war film *The Longest Day*.

Just a day before the March 2015 issue of *OTN* arrived, I was wandering around our local junk shop - sorry, I should say 'Antiques and Curios' shop - and I noticed a pair of these 'walkie talkies' with a label proclaiming them to be from about 1943. It immediately crossed my mind that portable radios of any kind were in their infancy even some time after that date.

It was therefore quite a coincidence when my March 2015 issue of *OTN* fell open and I saw the headline *Who really invented the walkie talkie?*

I read with great interest Clive VK6CSW's article, especially noting the comments on the Canadian 58 set. A friend and I actually acquired a pair of these way back about 1948/49 and (illegally, of course) used these to talk to each other over the half mile or so (805 m) between our respective dwellings. I was only about 12 or 13 years old at the time.

I do remember how beautifully made these were with their miniature valves, the first I had ever seen. I was familiar with the sight of large glass valves visible at the back of the household broadcast wireless, which had always held a fascination for me. Memory plays tricks but I am sure the 58 set had permeability tuning, similar to car radios of later years. Again, I am not too sure of the frequency coverage but I think it was in the region of 6 - 10 MHz.

To one who had only seen the inner workings of domestic and pre-war broadcast receivers containing a big (120 volt) HT battery and a glass two volt accumulator, large valves, large tuning condenser and coils, this compact transceiver was 'state of the art'. I particularly remember the microphone which, according to the instruction book, was in fact a dual microphone. If you held it as instructed, resting on your upper lip under the nose, speech sounds fell only on one 'mike' of the dual mikes and transmitted sounds from further away would hit both mikes and thus be cancelled out thereby preventing background sounds being transmitted too.

The pair of WWII BC-611-C walkie talkies that the author recently discovered in his local 'Antiques and Curios' shop.

As can be seen from this photo, what was considered compact and handy 70+ years ago is very cumbersome by today's standards.

I am sorry to report that eventually my 58 set was cannibalised for parts to build other projects much later. Such was progress in those days! Now so many years later I cannot remember at all what we used for batteries.

Back to the two walkie talkies I mentioned.

As I knew the owner of the shop quite well, he agreed that I could borrow them to make some photographic records and, whilst doing so, I naturally peered into the inner workings as much as I thought fit. Not an easy task as they were built in an approximately 13" (33 cm) long section of heavy gauge square steel tube about 3" x 3" (7.6 x 7.6 cm), much of which was clearly to hold the batteries.

The HT battery was a special, long, square shape supplying a much higher voltage to suit the valves. A special battery about the size of two C type cells was also fitted (effectively two C type in parallel) supplying just 1.5 volts for the filaments.

The BC-611-C walkie talkie No 13868 made by Electrical Research Laboratories Inc in Evanston, Illinois in 1944.

An unusual feature was the lack of any kind of on/off switch. Apparently extending the antenna operates a micro-switch for this purpose. No volume control is fitted. There are five valves used, of the miniature 1.4 volt filament type with VT numbers (civilian equivalents of 1S5, 1T4, 1R5 and 3S4). RF output was about 350 mW offering a maximum range from a few hundred feet to a mile (1.6 km) over land and up to three miles (4.8 km) over water.

My photos are, in the main, self explanatory. One of these transceivers appeared to bear the date of 1943 and the other 1944, incorporated in the USA part number code. One was made by Galvin Manufacturing Corporation, Illinois (later to become the well known Motorola) and the other by Electrical Research Laboratories Inc of Evanston IL; both bear the BC-611-C designator.

One very slight difference is the presence on only one of these sets of three small rubber plugs which gave screwdriver access to trimmers of the ceramic/ mica compression type.

The frequency marked upon both sets was 3885 kc\s (kHz) and apparently was the one that most of these radios used in service; it is derived from a suitable pair of FT-243 crystals. Provision was made for changing the crystals and coils to suit other frequencies.

The built-in telescopic whip is well protected under a metal screw-off cap when not in use, and a special threaded stowage block is provided for the cap when the antenna is in use. The whip extends 40 inches and the earpiece and microphone are arranged to work in the manner of a telephone handset, albeit considerably larger and very robust.

The antenna protection cap stowed and the whip antenna ready to be extended to its full length of 40 inches (101.6 cm).

Under the access cover for the battery compartment is a rather complex arrangement of spring loaded contacts enabling some variations of use. An external power source via a two pin socket under a hinged metal cover is apparently for an external battery supply. Also, by removing the microphone and earpiece wires with wander plugs on the end, an external headset appeared to be an option. A switch under the cover actuates the changeover.

The internally printed labelling was hard to read, but it looked as if an external antenna could be used too. Due to the fact that those facilities were only accessible when the battery contacts would be open, it appeared these extra options would only be operational when an external supply was plugged in.

Someone may have memories of this particular radio and I thought the opportunity to record some details ought not to be missed.

My thanks to Roy G4MVZ for some of the above information. Roy owns a BC-611-C radio. **ar**

Don't miss the train:
a window into the history of the railway telegraph

Herman Willemsen VK2IXV
RAOTC member No 1384

As I have in my collection a vintage Morse key used by the NSW Government Railways and have recently obtained an almost identical key used by the Victorian Railways System, I decided to find out a bit more about the use of the electric telegraph in the Australian railways.

Before electric[1] telegraphy came into existence, the sending of messages over long distances was slow and often unreliable. It was done by semaphore, pigeon post, mail coach or ship. In Australia the inter-colonial use of rail was not an option due to the difference in railway gauges.

The first electric telegraph line was erected and operated in Victoria in 1854, soon followed by SA in 1856, NSW and Tasmania in 1857, QLD in 1861 and WA in 1869.

In 1858 the first inter-colony telegraph links were built between Adelaide, Melbourne and Sydney, followed by the Sydney-Brisbane telegraph link in 1861.

In 1869 a submarine telegraphic cable linked Tasmania to the mainland.

In 1872 the 3,200 km Overland Telegraphic wire linked Adelaide to Darwin and an undersea cable Darwin to Java, thus linking Australia to the rest of the world.

The electric telegraph system became enormously popular. It was utilized by the railways, the post office, the government and the public, and expanded at a fast rate. It was a major technological change. It immediately ended the physical and social isolation of settlers, and boosted the development of the colonies.

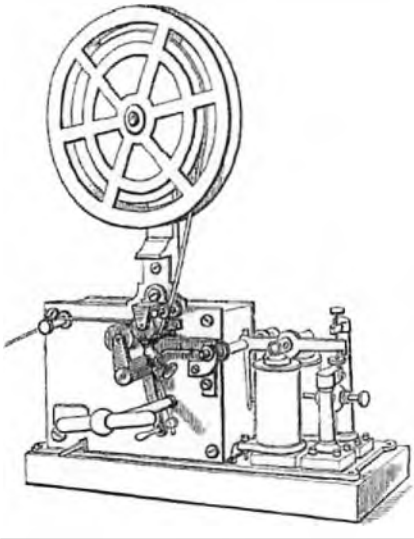
In Australia the rapid progress of the electric telegraph system and the railway system was going hand in hand with telegraph lines erected alongside railroad tracks.

Before Federation in 1901, Australia's six States were separate colonies, all of which were considered part of Britain. Each State operated independently and had its own defence force, its own postal service and its own railway system.

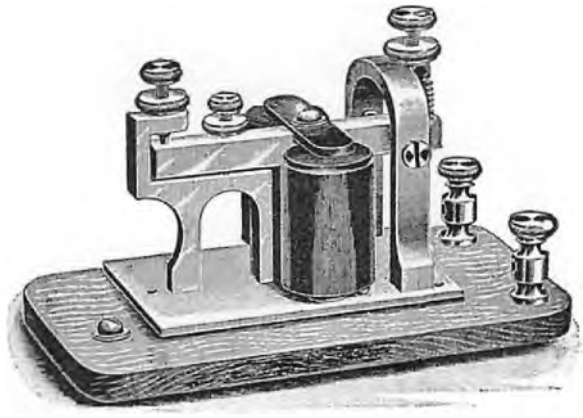
A NSW Government Railways key with its trademark crossbar and butterfly wingnut to adjust and tighten the backstop adjustment screw.

In the larger railway stations there was a separate telegraph office. In a smaller station it was whoever was available and qualified.

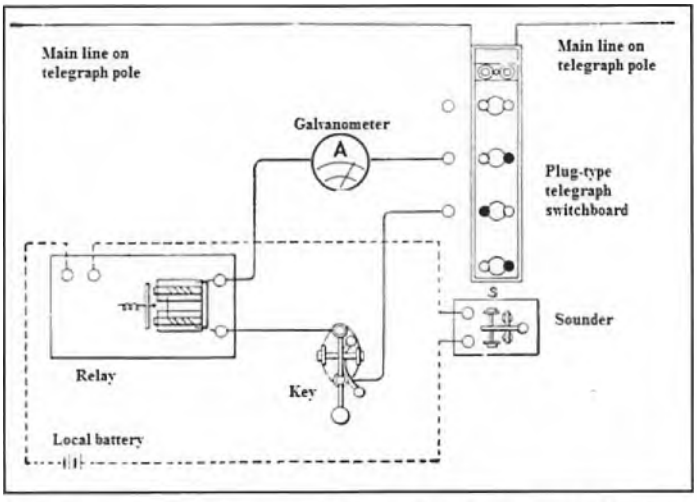
In the beginning the Morse receiver in each telegraph office was a pen register, called an inker[2], which in 1880 was superseded by a Morse sounder. The telegraphist recognized the click-clack sounds of the sounder as Morse code characters and wrote the message down on paper, either by pen or by typewriter. A skilled operator could send and receive 25 to 30 wpm (words-per-minute). In the early 1900s the telegraph instruments[3] in a railroad telegraph office consisted of a



Until 1880 the Morse receiver in each telegraph office was a pen register, called an inker.



In 1880 the pen register, or inker, was replaced as the Morse receiver by the sounder.



A diagram of instruments in a railroad telegraph office.

sounder inside a resonator, a relay, a galvanometer, a line switch, a Morse code key with circuit closer and wet-cell batteries.

Telegraphists would be stationed in individual depots along the railroad line in order to receive, by telegraphy, Line Clear Reports (train orders) from a centrally located train traffic controller and reported back on train movements. Therefore, the telegraphist was the eyes and ears of the train traffic controller.

Line Clear Reports (LCRs) prevented trains on single tracks from colliding and would override their usual timetable. These reports consisted of meet, wait and go-slow orders, or orders regarding bad tracks, or men working, and anything else to do with the efficiency and safety of train movements.

Sufficient time had to be given, however, so that all train crews could receive the changed orders. Train crews generally received the orders at the next station at which they stopped or the Line Clear telegrams would be written out on paper and handed up to the locomotive engineer of a passing train with a long-handled staff with a bamboo hoop which had a metal clip holding the order.

In the beginning the telegraph system was jointly used by the Railways and the PMG department. The Railways built telegraph lines along the train tracks and the PMG along existing roads. They would borrow each other's lines if necessary. Much later those departments would become separate entities.

A Station Master was an important man. Besides receiving and sending railway messages such as LCRs, reservations and traffic details, he also handled postal duties, accepted public telegrams, sold tickets, assisted passengers and was a freight agent. And, of course, he kept his telegraph instruments well adjusted and the batteries clean. I understand that Station Masters of Outback stations also sold rations to travellers, provided First Aid and collected weather information. However, railway business always took priority.

When a railway telegraphist was sending or receiving words like NOAH, ZEBU or LION[4], it had nothing to do with the animals in Noah's Ark. These four-letter words were just three of the many four-letter telegraph code words used by the railways. Railway telegraphic code words were introduced to reduce the size of telegraphic messages and thereby save time. Apart from the Uniform Telegraph Code words, which were accepted nationwide by all Railway systems, each individual State also used its own supplementary telegraph code words.

Railway stations were identified by a two-letter call sign. To name a few: Dubbo was DU, Narromine NA, Nyngan NJ, and the Broken Hill main office was FX.

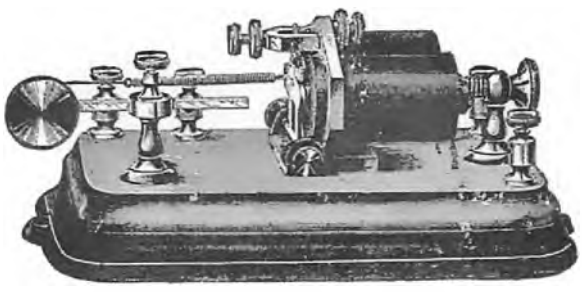
When a telegraphist called a distant railroad office, his colleague at the other end immediately recognized who he was dealing with because every telegraphist had his own unique style and pattern when transmitting Morse code, known as his 'fist'.

In 1876 the Canadian Alexander Graham Bell invented the telephone and the first government telephone exchange opened at the GPO in Sydney in 1882. In the beginning telephones were confined to the bigger cities and towns. Inter-colonial (inter-state) telephone links were slow to develop as finances were not always available. Therefore, railroad Morse code remained alive and well for quite some time.

But it was not the telephone which threatened the railroad operators' livelihood. The real threat was the invention of the Teleprinter, which finally made them redundant.

By the late 1950s Morse had all but disappeared from the majority of railway stations, although some smaller outback stations kept on using it.

In the NSW Railways the last Morse code message sent was from Dubbo (DU) to Broken Hill (FX) on 26th August 1968. That meant Railroad Morse code in NSW had lasted from 1859 to 1968 or a solid 109 years.



In the early 1900s one of the telegraph instruments in a railroad telegraph office was a relay which acted as a form of amplifier.

Footnotes

1. Called electric telegraph to distinguish it from its forerunner, the railroad semaphore optical telegraph.

2. An inker reproduced received Morse Code signals as ink marks on a moving paper tape.

3. A sounder in the local circuit was the receiver; a resonator was a sound box; a relay was a form of amplifier; a galvanometer indicated the presence and direction of a DC current; a line switch was a plug-style telegraph switchboard to connect the main telegraph lines to the Morse key and relay by pushing a brass plug through a tapered hole; the Morse key was equipped with a circuit closer switch for closed circuit working.

4. NOAH = the undermentioned left behind here. Will follow next train. LION = sent you unentered. ZEBU = arrange and advise all concerned.

Sources

The Australian Railway Historical Society - NSW Division; and the World Wide Web.

ar

RAOTC members list

as at 31st July 2015.

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*
L Ernie Hocking	VK1LK	1260
A Andrew Robertson	VK1NRO	1611
New South Wales		
Don Hunt	VK2ADY	1141
L Alex McMurray	VK2AEV	586+
Jim Brown-Sarre	VK2AGF	1640
L Gerry Sabin	VK2AGS	395+
George Paterson	VK2AHJ	1333*
L Ben Mills	VK2AJE	832+
L Jim Patrick	VK2AKJ	1003
Alan Whitmore	VK2ALA	1381
John Howard	VK2AMH	1520*
L Max Mondolo	VK2AML	1227
Bruce Thomas	VK2AMT	1415
Max Riley	VK2ARZ	1518*
L Keith Alder	VK2AXN	1002+
Brian Woods	VK2AZI	1515*
L Tony Mullen	VK2BAM	882*
L John Trenning	VK2BAR	1226*
L Jim Griffiths	VK2BGG	1271
Steve Leatheam	VK2BGL	1498
George Archibald	VK2BGU	1360
L Brendan Connolly	VK2BJC	1213
John Marland	VK2BJU	1399*
L Ray Gill	VK2BRF	1592
L Phil Orchard	VK2BTT	1285+
Lex Brodie	VK2BYA	1638
Dave Rothwell	VK2BZR	1414
John Clark	VK2CF	903*
Neale Imrie	VK2CNI	1480
L Ray Turner	VK2COX	1348*
Dot Bishop	VK2DB	1403
Brian Kelly	VK2DK	1645
Al MacAskill	VK2DM	1277*
Trevor Wilkin	VK2ETW	1570
John Boyd	VK2EZC	992
L Glen Millen	VK2FC	1180
L Nick Perrott	VK2FS	1327
Ted Dean	VK2FUP	1201
Ray Davies	VK2FW	1563*
L Gary Baxter	VK2GAB	1504
L Barry Mitchell	VK2GGA	1456
L Allan Mason	VK2GR	1221
L Peter Ritchie	VK2HC	1326
John Rath	VK2HY	1534*
Ian Jeffrey	VK2IJ	1571
Ralph Parton	VK2IRP	1301
Herman Willemsen	VK2IXV	1384
L Pat Leeper	VK2JPA	1629
Kevin Parsons	VK2JS	1586
Graeme Scott	VK2KE	789*
Greg Hilder	VK2KGH	1375
L Ken Nisbet	VK2KP	989*
Barry Wood	VK2LA	848*
Larry Hazzard	VK2LPH	1512
L Ian Paterson	VK2MW	810+
L Tom Sanders	VK2MY	1393
L John Gaynor	VK2NCE	1475+
L William Spedding	VK2NLS	1394
L George Hodgson	VK2OH	544
L Mike Rautenberg	VK2OT	1335
L Peter Mair	VK2PF	1318
L Stephen Pall	VK2PS	758*
L Roger Conway	VK2RO	1255
L John Bennett	VK2SIG	939*
A Robert Ward	VK2TAX	1625
L Robert Taylor	VK2TR	1469
Trevor Thatcher	VK2TT	1080*
Ray Wells	VK2TV	1076
L Eric De Weyer	VK2VE	1253
L Keith Sherlock	VK2WQ	1138+
Tony Rowe	VK2XAJ	1575
Brian Rodgers	VK2XFL	1608
Jack Hodge	VK2XH	1605
L Richard Cortis	VK2XRC	1474
L Bill Hall	VK2XT	812+
Ron Cameron	VK2XXG	1410
L Noel May	VK2YXM	1345
Dean Davidson	VK2ZID	1423
Gary Ryan	VK2ZKT	1267
John Bishop	VK2ZOI	1404
L Steve Grimsley	VK2ZP	465+
L Robert Alford	VK2ZRJ	1444
L Sam Faber	VK2ZZ	1359
Ray Hardimon	VK2ZZK	1536
Victoria		
John Adcock	VK3ACA	114*
Peter Doolan	VK3ACJ	1549
L Graham Rutter	VK3ACK	1322
L David Rosenfield	VK3ADM	1622*
L David Wardlaw	VK3ADW	408*
L Ron Cook	VK3AFW	824*
L Bob Duckworth	VK3AIC	1245*
Dave Parslow	VK3AIF	1552
Rob McNabb	VK3AIM	829*
Jack Spark	VK3AJK	534*
L Ken Young	VK3AKY	1103*
L Tony Smith	VK3ALS	1521
Nick Lock	VK3ANL	1621
David Waring	VK3ANP	1037
Bill Babb	VK3AQB	904
L Kevin Connelly	VK3ARD	1035+
Roy Badrock	VK3ARY	1211*
L David Stuart	VK3ASE	1346
L Max Meallin	VK3ATK	184+
Max Carpenter	VK3AUA	1489+
L Ron Mackie	VK3AVA	1478
Laurie Middleton	VK3AW	1152
John Mitchell	VK3AXE	957
L Rod Green	VK3AYQ	1380
L Jim Payne	VK3AZT	993+
Jock Mackenzie	VK3BAA	1619
L Roy Thorpe	VK3BAM	1323
Carl Dillon	VK3BBW	1618*
Tim Humphery	VK3BCN	1620
L Brian Tideman	VK3BCZ	1184
Mike Goode	VK3BDL	1610
L Digger Smith	VK3BFF	1424
Peter Cossins	VK3BFG	1257
B Muriel Plowman	VK3BJO	1511
Noel Jeffery	VK3BMU	1021
Len Heames	VK3BMY	1188*
L Alex Edmonds	VK3BQN	1341
L Albert Hubbard	VK3BQO	1506
L Bill Roper	VK3BR	978*
L Stan Roberts	VK3BSR	1272+
Mark Gillespie	VK3BU	1661
L Clem Allan	VK3BVI	1073*
Bob Whalley	VK3BWZ	1237
L Graeme Brown	VK3BXG	1542
L Andy Walton	VK3CAH	1599
L John Machin	VK3CCC	1421
Bob Crowle	VK3CDV	1588
Ken Morgan	VK3CEK	1457
L Mick Ampt	VK3CH	1365
L Vic Punch	VK3CKD	1250
Kevin Leydon	VK3CKL	1557
Geoff Tresise	VK3CNX	1240
L Nic Chantler	VK3COW	1538
L Dick Webb	VK3CP	972
Clint Jeffrey	VK3CSJ	1648
Don Jackson	VK3DBB	1290
L Mike Pain	VK3DCP	1204
Doug Twigg	VK3DIJ	679*
L Russell Ward	VK3DRW	1376
George Lance	VK3DS	389*
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 Mark Harris	VK3EME	1574
L Stewart Day	VK3ESD-ex	905
L Doug Dowe	VK3FDUG	1616
Ellis Pottage	VK3FG	1087*
Dave Bell	VK3FGE	1339
Noel Ferguson	VK3FI	1416*
B Blayne Bayliss	VK3FIS	1412
L Ernie Walls	VK3FM	1401
Peter Lord	VK3FPL	1590
L Ray Taylor	VK3FQ	1216
L John Brown	VK3FR	1407
Bob Bird	VK3GEB	1602
Geoff Wilson	VK3GJW	1658*
L Lee Moyle	VK3GK	1363
A Max Morris	VK3GMM	1265
Wayne Collyer	VK3GMV	1503
Graeme Harris	VK3GN	1630
A John Piovesan	VK3GU	1235
A Bruce Stokes	VK3HAV	1613

	Name	Call	No
A	Phil Maskrey	VK3HBR	1387
A	John Kirk	VK3HCT	1427
L	Luke Steele	VK3HJ	1432
L	Steve Bushell	VK3HK	1001
B	Phil Cardamone	VK3HPC	1539
L	George Francis	VK3HV	620*
L	Bill Jamieson	VK3HX	1117*
L	Gavin Brain	VK3HY	1304
	Ian McFarlane	VK3IDM	1332
	Bruce Wilson	VK3IG	1639*
L	Tim Hunt	VK3IM	504
	Ian Palmer	VK3IN	1643
	Jim Mannon (Sr)	VK3IY	1635
L	Barry Gauntlett	VK3JB	267+
	Ray Proudlock	VK3JDS	1585
L	Graeme Mann	VK3JGM	1274
	Ray Lenthall	VK3JH	1663
L	Anthony Rogers	VK3JIA	1287
	Dave Wilson	VK3JKY	1278
	Fred Storey	VK3JM	1010
	Peter Drury	VK3JN	1567
	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*
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	John Blackman	VK3KJB	1319
L	Jim Hinton	VK3KJH	1366
L	Reg Lloyd	VK3KK	506*
	Maurie O'Keefe	VK3KO	1336
	Victor Self	VK3KSF	1254
L	Brenda Edmonds	VK3KT	797
L	Mike Ide	VK3KTO	1194
	Peter Clark	VK3KU	1573
L	Alan Heath	VK3KZ	1151
L	Jack Williams	VK3LG	565+
	Colin Middleton	VK3LO	1153
	Warren Moulton	VK3LX	976
	Duncan Baxter	VK3LZ	1251
A	David Davies	VK3MHV	1293
L	Rob Whitmore	VK3MQ	1352
	Peter Young	VK3MV	1400
L	Graeme McDiarmid	VK3NE	1485
	Ken Jewell	VK3NW	1650*
L	Neville White	VK3NZ	1343
L	Alan Baker	VK3OA	1646
	Bill Miller	VK3OI	1598
L	Ron Fisher	VK3OM	103*
L	Peter Freeman	VK3PF	1443
	Mark Stephenson	VK3PI	1632
	Stewart Mair	VK3PR	1641
L	Peter Simons	VK3PX	1408
	John Longayroux	VK3PZ	1553
L	Bruce Plowman	VK3QC	1448+
	Ian Hocking	VK3QL	1594
	Ray Dean	VK3RD	1577
L	Darrell Edwards	VK3RE	1185
A	Ron Sutcliffe	VK3RS	1425
L	Peter Wolfenden	VK3RV	1484*
	Ray Wales	VK3RW	1471
L	Damien Vale	VK3RX	1239
L	Sarah Dowe	VK3SD	1535
	Laurie Bain	VK3SJ	1600
L	Allen Crewther	VK3SM	311+
A	Barry Schrape	VK3SW	1560
L	Barry Abley	VK3SY	1496
	John Sutcliffe	VK3TCT	1589*
	Deane Blackman	VK3TX	1378
	Colin Durnell	VK3UDC	1244
L	Mike Thorne	VK3UE	1473
	Rodney Champness	VK3UG	1086*
L	Doug McArthur	VK3UM	1490*
L	Bruce Bathols	VK3UV	1090
	Kev Trevarthen	VK3VC	1115
L	Trevor Pitman	VK3VG	1246
A	Jeff Silvester	VK3VJS	1582
L	David Harms	VK3VL	1383
L	Greg Williams	VK3VT	1402
	Rick Morris	VK3VXI	1497
L	Peter Dempsey	VK3WD	1544
L	Brian Endersbee	VK3WP	1491*
L	Jenny Wardrop	VK3WQ	1656
L	Mike O'Burtill	VK3WW	1123*
L	Ian Keenan	VK3XI	1527
L	Ian Simpson	VK3XIS	1071
	Ted Egan	VK3XT	721*
	Drew Diamond	VK3XU	1140
	Gordon Bracewell	VK3XX	1122*
L	Derek McNiel	VK3XY	1370
	Tim Robinson	VK3YBP	1617
L	Brewster Wallace	VK3YBW	1126
L	Eric Day	VK3YHN	1398
L	Terry McIntosh	VK3YJ	1532
L	Bob Neal	VK3ZAN	1030+
	Ken Benson	VK3ZGX	1377
L	John Horan	VK3ZHJ	1541
	Kevin White	VK3ZI	1568
	Ian Baxter	VK3ZIB	1519
	Don Seedsman	VK3ZIE	1068*
L	Jim Gordon	VK3ZKK	1262
	Geoff Angus	VK3ZNA	1482
	Cal Lee	VK3ZPK	1510
	Ray Rutledge	VK3ZQ	566*
	Eric Gray	VK3ZSB	1451
	Leigh Tuckerman	VK3ZTU	1468
	Bill Adams	VK3ZWO	1356+
	Queensland		
	Alan Simpson	VK4AAE	727*
L	Tom Ivins	VK4ABA	1382*
	Ian Saunders	VK4ACU	1390
L	Harold Cislowski	VK4ANR	1550
	Roy Stephens	VK4ARS	286*
A	Glenn McNeil	VK4BG	1633
	Ken Finney	VK4BKJ	1176*
L	Graeme Dowse	VK4CAG	1417
	Chris Lowe	VK4CL	1651
L	Les McDonald	VK4CLF	961
L	Norm Phillips	VK4CNP	1015+
L	Jon Walton	VK4CY	842*
L	Ian Browne	VK4DB	1283
	John Buckland	VK4DBJ	1422
	Dale McCarthy	VK4DMC	1465
L	Merv Deakin	VK4DV	1230*
	Ron Goodhew	VK4EMF	1516
	Bob Lees	VK4ER	1609*
	Jim Downman	VK4FAD	1659
	Len Eaton	VK4FIAA	1606
	Felix Scerri	VK4FUQ	1533
L	Geoff Bonney	VK4GI	969
L	Warren Heaton	VK4GT	672*
	Daphne Ayers	VK4IA	1647
	Kevin Dickson	VK4IW	1158
	Ken Duncanson	VK4JUD	1596
L	Gordon Loveday	VK4KAL	707+
L	Andy Beales	VK4KCS	1579
L	Norman Fiori	VK4LD	1296
	John Horrocks	VK4LJ	1362*
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*
	Allan Downie	VK4QG	1565
	Mike Charteris	VK4QS	1329
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
	Trent Sampson	VK4TS	1657
	Andy Odgers	VK4WKX	1460
	Bill Lochridge	VK4WL	1379*
	Bill Gibbings	VK4WO	1372
	Bill Flannery	VK4XO	1137
L	Chris Bourke	VK4YE	1436
	Nick Watling	VK4YT	1263*
	Frank Adamson	VK4ZAK	1406
	Philip Tomlinson	VK4ZPE	1624
	Kevin Dibble	VK4ZR	1060
	Bill Wilcock	VK4ZWJ	1373
	South Australia		
L	Terry Franklin	VK5AAL	1430
L	Jack Peatfield	VK5AF-ex	822+
	Mike Hall	VK5AGI	1615
	Jack Crawford	VK5AHI	1397
	Peter Reichelt	VK5APR	1612
	Wolfe Rohde	VK5AXN	1628
	Mal Haskard	VK5BA	1107*
	Lloyd Butler	VK5BR	1495*
	Dick Turpin	VK5BRT	1347
	Barry Williams	VK5BW	1551
	Curl Blythe	VK5CL	1654*
L	Brian Condon	VK5CO	291*
	John Drew	VK5DJ	951*
	Mac Macdermott	VK5FLEN	1631
	Jeff Farmer	VK5GF	851
L	Paul Spinks	VK5GX	1214
	Harro Krause	VK5HK	1275
	John Casey	VK5IJ	859*
L	Ian Sutcliffe	VK5IS	1355
L	Ted MacKenzie	VK5KBM	1389+
	Trevor Niven	VK5NC	946
L	Keith Metcalf	VK5ND	1537*
	Bryan Scott	VK5NOS	1202
L	John Butler	VK5NX	1120

	Name	Call	No
	Tony Wilkinson	VK5PBB	1453
A	Ron Zimmermann	VK5PCZ	1449
	Trevor Greig	VK5PTL	1601
L	Ivan Huser	VK5QV	477*
	Rob Gurr	VK5RG	1500*
L	Darcy Hancock	VK5RJ	584+
L	Ron Coat	VK5RV	1000
	Colwyn Low	VK5UE	1361*
	Bill Thomas	VK5VE	1321
	Ron Holmes	VK5VH	1299+
L	Ian Werfel	VK5VJ	968
	Noel Schahinger	VK5VT	1636*
	Bill Coates	VK5WCC	1199
	Colin Luke	VK5XY	1168*
	Hans Smit	VK5YX	1517
	Adrian Waiblinger	VK5ZBR	1614
	Ian Maxted	VK5ZIM	1562
	Peter Temby	VK5ZJ	1229
L	Peter Whellum	VK5ZPG	1479
	Western Australia		
	Brian McDonald	VK6ABM	1508*
L	Bob Sutherland	VK6ABS	1483*
	Mark Barnett	VK6ACB	1665
L	Barrie Burns	VK6ADI	1273*
	Barrie Butler	VK6AF	1091
	John Farnan	VK6AFA	1409
	Mark Bussanich	VK6AR	1334
	Tony Argentino	VK6ATI	1591
	Anthony Benbow	VK6AXB	1566
L	John Van-Tiel	VK6BCU	1481
	Bob Good	VK6BI	1652
	Richard Grocott	VK6BMW	1555
	Barrie Field	VK6BR	377*
	Dick Roddy	VK6BV	1146
L	Bob Crowe	VK6CG	1405*
B	Ken Taylor	VK6CO	1529
	Clive Wallis	VK6CSW	1289
	Clem Patchett	VK6CW	742*
	Arthur Eder	VK6CY	1303
L	Doug Wells	VK6DEW	1458
	Doug Jackson	VK6DG	1243
	Chris Dodd	VK6DV	1501
	Wayne Johnson	VK6EH	1660
L	Don Newman	VK6EY	1558+
	Max Faulkner	VK6FN	1064
	Gerry Wild	VK6GW	1112*
	Phil Hartwell	VK6GX	1494
	Bob Howard	VK6HJ	1623
A	Wayne Fiddes	VK6HWF	1429
L	Glen Hufner	VK6IQ	1072*
L	John Farnell	VK6JF	1297
	Chris James	VK6JI	1587
	Jim Preston	VK6JP	1121
	Keith Hobley	VK6KH	1028*
	Phil van Leen	VK6KHV	1655
L	Bob Lockley	VK6KW	1172
L	Glenn Ogg	VK6KY	1358
L	Lance Rock	VK6LR	1509
	Bill Toussaint	VK6LT	1561
	Cliff Bastin	VK6LZ	1310
	Syd O'Neill	VK6MK	1124
L	Noel Sanders	VK6NS	1493
	Cyril Roberts	VK6OE	1209
L	Alan Gibbs	VK6PG	815*
	Rob Penno	VK6PO	1111*
L	Ray Peterson	VK6PW	346*
L	Phil Zeid	VK6PZ	752+
	Peter Walton	VK6QK	1627
	Keith Bainbridge	VK6RK	1664
L	Graham Rogers	VK6RO	1302
L	Ron Collier	VK6RT	1440+
L	Phillip Bussanich	VK6SO	1247
	Barry O'Keeffe	VK6UP	1487
	Don Truscott	VK6UT	1212
	Alan Mead	VK6VA	1649
A	Joe Page	VK6VO	1340
	Bill Rose	VK6WJ	1463
L	Geoff Green	VK6XB	1261
	John Tuppen	VK6XJ	1525
L	Roy Watkins	VK6XV	1181
	Poppy Bradshaw	VK6YF	1191
	Trevor Dawson	VK6YJ	1662
	Tom Berg	VK6ZAF	1133*
	Max Shooter	VK6ZER	1431
L	Igor Iskra	VK6ZFG	1559
L	Phil Casper	VK6ZKO	1445
	Christine Bastin	VK6ZLZ	1311
	Robert Randall	VK6ZRT	1225
	Tasmania		
	Allen Burke	VK7AN	1270
	Frank Beech	VK7BC	1522*
	Brian Proudlock	VK7BP	644*
	Anne Landers	VK7BYL	1439
	Doug Charlton	VK7DK	1050*
	Mike Hawkins	VK7DMH	1597
	Jerry Smutny	VK7EE	1595
	Winston Nickols	VK7EM	899*
	Tom Moore	VK7FM	1593*
L	Herman Westerhof	VK7HW	1604
L	Joe Gelston	VK7JG	1101
	Bob Geeves	VK7KZ	907
L	Rex Moncur	VK7MO	1298
L	William Maxwell	VK7MX	1418
L	Peter Dowde	VK7PD	1554*
L	Richard Rogers	VK7RO	908
	Trevor Briggs	VK7TB	1316
L	Winston Henry	VK7WH	1526*
	Ken Woskett	VK7WO	1626*
L	Paul Edwards	VK7ZAS	1324*
	John Jongbloed	VK7ZJJ	1584
	Overseas		
	David Dunn	G3SCD	1252*
L	Ira Lipton	WA2OAX	1344*
L	John Wightman	ZL1AH	1507+
L	Martyn Seay	ZL3CK	1159

Membership statistics

207	Life members
248	Full members
4	Associate Life members
17	Associate members
476	**Total membership**
including	
107	Licensed 50 years or more
31	Aged 90 years or more

New RAOTC members

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

Name		Call	No	
Trent	Sampson	VK4TS	1657	F
Geoff	Wilson	VK3GJW	1658	F
Jim	Downman	VK4FAD	1659	F
Wayne	Johnson	VK6EH	1660	F
Mark	Gillespie	VK3BU	1661	F
Trevor	Dawson	VK6YJ	1662	F
Ray	Lenthall	VK3JH	1663	F
Keith	Bainbridge	VK6RK	1664	F
Mark	Barnett	VK6ACB	1665	F

Silent keys

It is with regret that we record the passing of:

Fred	**Naylor**	**VK3AQN**
Russ	**Hardidge**	**VK3VH**
Arthur	**Evans**	**VK3VQ**
Ken	**Perry**	**VK5AFF**
Anthony	**Mapson**	**VK6RQ**
Rolphe	**Fox**	**VK3JWL**
Richard	**Northcott**	**VK2EIN**
Bill	**Campbell**	**VK2ZY**
Allan	**Bengtsson**	**VK3AB**

Obituary

Arthur Brodie David Evans VK3VQ

Arthur passed away on Tuesday, 3rd March 2015 aged 97. He had recently moved into Vasey RSL Community Care. Until then he had lived independently at home.

Arthur was licensed as VK3QF in 1937 at 20 years of age and proceeded to work the world using 25 watts of CW and a Windom antenna. A year later he became a Certified Practising Accountant.

He joined the WIA RAAF Wireless Reserve and was called up almost immediately hostilities commenced in 1939. Within a fairly short time Flight Lieutenant Evans was in charge of a wireless unit which included the normal communications function and an Intereceptors section. The story of the latter has been recorded in the book *The Eavesdroppers* by Jack Bleakly.

Some of Arthur's exploits also have been recorded in *OTN* journal, for example in the March 1996 and September 1999 issues. Arthur's deployment included a lot of time around Papua New Guinea, often setting up new stations as the allied forces moved forward.

Arthur's intereceptor group was, of course, proficient at KANA, the Japanese version of Morse code, and all received messages were written down and passed to the intelligence unit.

On one occasion an operator said to Arthur, "Something is up, we are all seeing a change from recruits operating the stations to professional operators".

So well did Arthur's men know the individual operators sending, they knew when someone else used the key. New, well trained men had joined the outposts. This information was passed directly to the intelligence office and was the first alert General McArthur had that a Japanese offensive was building.

Arthur returned to the family business of Evan Evans making canvas goods as well as flags and banners. Ivor Evans, Arthurs father, was co-winner of the design of Australia's flag. Arthur was a stalwart of the canvas trade.

Arthur was an avid player of squash, hockey, tennis and golf in his younger days. He was also a train enthusiast and loved to travel.

Photo by Bill Roper VK3BR

Arthur Evans VK3VQ at the 2013 RAOTC AGM.

After retiring, Arthur kept regular contact with many amateur friends on 80 m most mornings of the week. However, as the years passed, gradually the numbers in the group dwindled away, leaving only Arthur.

Arthur joined the Radio Amateurs Old Timers Club (member No 179) soon after it was formed and served on the committee from 1992 to 2013, mainly as secretary and treasurer, and then as treasurer.

He was a long term member of the Moorabbin and District Radio Club and took up the role of treasurer of the Tuesday morning coffee meeting which he rarely missed.

When in recent years he lost his driving licence he acquired a battery driven scooter and would travel on it the 4 km from home to the Club rooms and 4 km back.

Arthur valued his independence. He was a regular attender at the meetings until six months ago when he was no longer able to drive the scooter.

Whenever asked how he was his reply was always, "Oh, I'm all right". He was always kind, generous and cheerful. His ready grin will be missed.

Ron Cook VK3AFW
RAOTC member No 824

ar

(continued from page 3)

***OTN Journal*:** The Committee published the expected two *OTN* journals for members during the 2015 financial year. Judging by the feedback from members, the mix of articles from members in both issues, covering an interesting and diverse range of subjects, was well received.

The sale of '*OTN* on Disc' DVDs continued at a slow but steady rate.

Committee: No organisation like the RAOTC can thrive without the hard work and leadership of the members of the Committee which provided invaluable support to me as President throughout the year.

Not all business was conducted at our regular meetings. Much discussion and debate goes on about RAOTC matters via email and several decisions have been made and problems resolved via this means of communication.

My sincere thanks to all members of the committee for their healthy, differing opinions on a variety of matters, and their strong belief in furthering the aims of the RAOTC.

Membership: This is a matter of some concern. If you look at the opposite page, you can see that membership has dropped to 476 from our usual figure in the 490s.

We need your help! When did you last sign up a new member? Show your friends your copy of *OTN*. Get them to have a good look at the RAOTC web site and listen to a monthly broadcast. Then download an application form, or contact me for one, and sign your friend up. He or she will thank you!

Bill Roper VK3BR ar

RAOTC financial statements

Derek McNiel VK3XY
RAOTC member No 1370

Below are the RAOTC Financial Statements for the year ending 30th April 2015 with comparative figures for the preceding two years. This report was accepted by the RAOTC Management Committee at the meeting on 21st May 2015 and will be presented for approval at the Annual General Meeting to be held on 24th September 2015. If you have any queries about the results presented here, please do not hesitate to contact me.

Financial Statements

	Year to 30-Apr-2013	Year to 30-Apr-2014	Year to 30-Apr-2015
INCOME			
Sales: Badges		40.00	32.00
DVDs	260.00	160.00	40.00
CDs		40.00	40.00
OTNs	5.10	40.00	
Receipts from functions	3,552.00	3,456.00	2,880.00
Subscriptions	4,080.00	4,738.50	5,610.50
Donations	66.90	39.00	103.00
Interest received	924.49	880.00	800.00
TOTAL INCOME	**8,888.49**	**9,393.50**	**9,505.50**
EXPENSES			
Function expenses	3,419.40	3,209.30	2,512.60
DVD production	79.80	64.70	27.00
Insurance	388.80	394.81	419.97
Administrative costs	707.94	694.52	647.84
OTN printing, packaging & postage	4,782.56	4,592.18	4,569.72
TOTAL EXPENSES	**9,378.50**	**8,955.51**	**8,177.13**
SURPLUS / (DEFICIT)	**(490.01)**	**437.99**	**1,328.37**
BALANCE SHEET	**30-Apr-2013**	**30-Apr-2014**	**30-Apr-2015**
ASSETS			
Cheque Account	8,208.23	9,596.72	11,582.51
Term Deposit	20,000.00	20,000.00	20,000.00
Prepaid expense		250.00	500.00
TOTAL ASSETS	**28,208.23**	**29,846.72**	**32,082.51**
LIABILITIES			
Prepaid subscriptions	11,502.50	12,703.00	13,303.50
Account payable			306.92
TOTAL LIABILITIES	**11,502.50**	**12,703.00**	**13,610.42**
MEMBERS' FUNDS			
Opening balance	17,195.74	16,705.73	17,143.72
Surplus / (Deficit)	(490.01)	437.99	1,328.37
Closing balance	16,705.73	17,143.72	18,472.09
TOTAL MEMBERS' FUNDS & LIABILITIES	**28,208.23**	**29,846.72**	**32,082.51**

ar

Four-fifths of five-eighths of ?

Clive Wallis VK6CSW
RAOTC member No 1289

Most amateurs are aware that an antenna five-eighths of a wavelength long gives about 3 dB gain over one which is a quarter wavelength long at the same frequency. Consequently, the five-eighths antenna is the preferred type for 2 metre mobile work provided the extra length is acceptable. Many readers will also be aware that the 'five-eighths antenna' is popular with medium wave broadcasters though, as we shall see later, this figure is inexact.

This article gives a brief background to the history and development of the five-eighths antenna and is based on information from three sources: *The ARRL Antenna Handbook*; *Reflections* by M Walter Maxwell W2DU (both published by the ARRL); and discussions with ABC technical personnel.

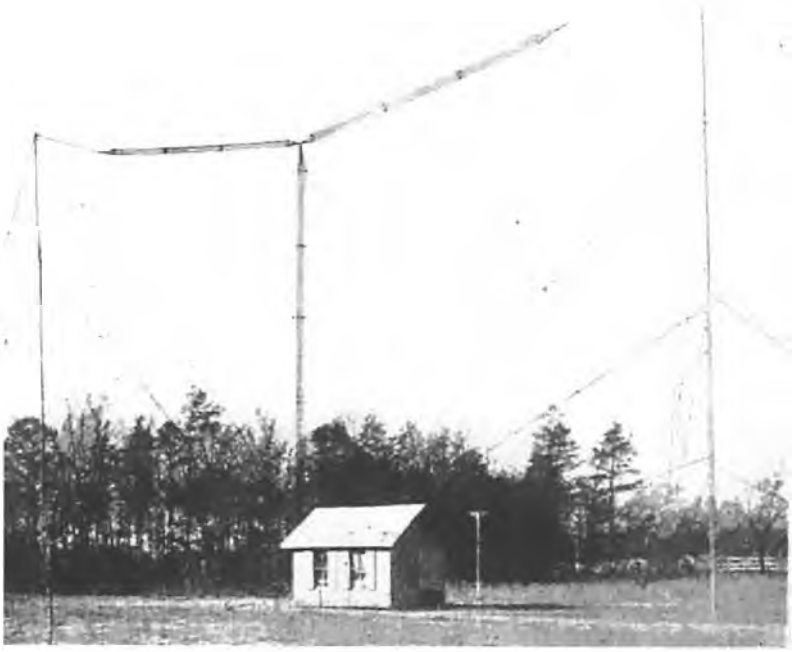
When medium wave broadcasting was in its infancy in the early 1920s, one commonly used transmitting antenna was the top loaded vertical. This consisted of a vertical wire suspended from the mid-point of a horizontal wire, the latter supported between two tall masts or towers. Although the vertical and horizontal wires were joined electrically, only the vertical part, fed at its lowest point, radiated the signal. The horizontal wire acted as a capacitance to earth (capacitance hat) and caused the vertical wire to act similarly to an electrical quarter-wave, although physically shorter.

The horizontal wire did not radiate because the instantaneous currents flowing either side of the vertical wire were in opposite directions, hence the fields cancelled each other. (In a centre-fed dipole the instantaneous currents in each half of the antenna are in the same direction with the fields additive, hence radiation occurs.)

Although less popular with broadcasters today, the top-loaded vertical is still widely used commercially and by some amateurs on 160 metres. If wooden masts, supported by non-resonant guys, are used and this antenna system is erected in a clear area, then the horizontal radiation pattern is omni-directional. When metal masts or towers are used as supports, or resonant metallic guy wires employed, distortion of the radiation pattern occurs. This is due to reradiated signals from these metallic objects mixing with the original radiation from the vertical antenna causing nulls in some directions and peaks in others. Such nulls were quite contrary to the desire for maximum area coverage by the broadcast station operator!

However, nowadays pattern nulls are introduced deliberately to reduce mutual interference between stations on the same frequency; this is done by phasing two or more vertical antennas to produce the desired horizontal radiation pattern. You may also recall that in 1926 two Japanese researchers, Shintaro Uda and Hidetsugu Yagi, used mutual interference or coupling between closely spaced elements to create the beam antenna - but that's another story.

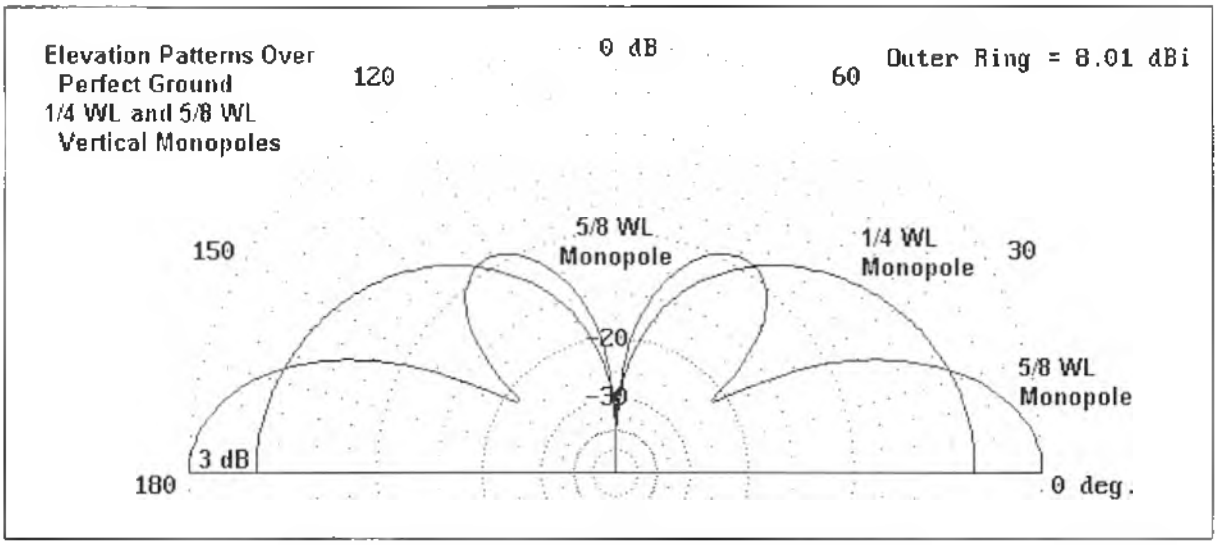
At the Proceedings of the Institute of Radio Engineers held in the USA in 1924, Charles Stuart Ballantine (see sidebar on next page), then of the Physics Department of Harvard University, published the results of an important discovery that he had made during the previous year. He had found that a vertical radiator 0.64 of a wavelength long produced the maximum horizontal or broadside radiation obtainable from a single element, and that this was 3.03 dB stronger than the horizontal radiation from a quarter-wave vertical. This effective doubling of signal strength had clear implications for broadcasters who needed the best possible area of coverage for a given transmitter power.



Amateur T cage antenna 2BML Riverhead, New York, in 1922, operating on 1,500 kHz. Only the vertical cage radiates - the horizontal cages are capacitive loading. *Photo courtesy of ARRL.*

A vertical quarter-wave antenna located over a perfect ground produces a fat doughnut-shaped field with the maximum radiation concentrated at ground level at right angles to the axis. A perfect ground gives a mirror image beneath the antenna. There is no radiation directly above the antenna but a large amount of energy is also radiated at angles well above the horizontal, creating the 'fat doughnut' pattern (see diagram on next page).

The practical effect of a poor or less-than-perfect ground is a weaker ground wave with more energy being radiated at higher angles. From the medium-wave (MW) broadcaster's point of view, energy radiated upwards is energy wasted, which explains why MW broadcasters prefer low-lying



Quarter wave vs five-eighths wave antenna radiation pattern.

swampy ground to mountain-top sites, and why they are so fussy about first-rate ground systems beneath their antennas. Ballantine found that by lengthening the radiator to 0.64 of a wavelength the radiation pattern became a thinner, lower, doughnut with much less energy radiated at the higher angles and much more concentrated at low angles where it was needed.

But what caused this pattern change?

Charles Stuart Ballantine

Born on 22nd September 1897 in Germantown, Philadelphia, Pennsylvania, died 7th May 1944, and better known as Stuart Ballantine, he was a noted American inventor.

Ballantine was also an amateur radio enthusiast by 1908 and served as a ship's radio operator during the summers of 1913-1915. He was employed in 1916 by H K Mulford Company, biochemicists, and in 1917 by the Bell Telephone Company of Pennsylvania.

From 1917-1920 Ballantine attended Drexel Institute and worked as a radio expert at the Philadelphia Naval Yard, where he led design of the Navy coil-type radio compasses. He discovered the 'antenna effect' in such systems and invented the capacity compensator for its control.

In 1920-1921 he undertook graduate studies in mathematical physics at Harvard University, then spent a year at the Radio Frequency Laboratories in Boonton, New Jersey, where he worked on radio receivers and made inventions for stabilisation of radio-frequency amplifiers via a Wheatstone bridge, linear detection at high signal levels, and automatic volume control.

He returned to Harvard 1923-1924 as a John Tyndall scholar in physics.

From 1924-1927 Ballantine carried out independent studies of radio propagation in White Haven, Pennsylvania, then was briefly research director at the Radio Frequency Laboratories, and in 1929 collaborated with F M Huntoon in studying the effects of high pressure on bacteria. From 1929-1934 he was President of the Boonton Research Laboratories investigating errors in microphones due to diffraction and cavity resonance, and developing new devices including an electrostethoscope, automatic optical recorder for frequency-response measurements, and logarithmic voltmeter.

In 1934 he founded Ballantine Laboratories, which he led until his death. There he developed improved

techniques for measuring the performance of microphones and loudspeakers and, most notably, the first throat microphone for aircraft pilots.

Ballantine held more than 30 patents, and was a Fellow of the American Physical Society, the Acoustical Society of America, and the Institute of Radio Engineers, as well as a member of the American Association for the Advancement of Science and the Franklin Institute. He received the 1931 IEEE Morris N Liebmann Memorial Award, the 1934 Elliott Cresson Medal of the Franklin Institute, and the Radio Club of America's 1946 Armstrong Medal (posthumously).

The Franklin Institute's Stuart Ballantine Medal is named in his honor. Ballantine was president of the Institute of Radio Engineers in 1935.

Main source: Wikipedia

Essentially, because the antenna is over half a wavelength long, the instantaneous current on the top 0.14 wavelength is in the opposite sense to that on the lower 0.5 wavelength; that is, the field reverses after the half-wavelength point. This reversal in the top 0.14 wavelength section produces a separate radiation field from the bottom 0.14 wavelength, the fields being 180° out of phase. When the two fields combine, the net effect is a minor lobe at the top of the antenna which has a high angle of radiation, a deep null at about 35° to the horizontal, and a reinforced field at right angles to the vertical axis at the bottom of the antenna. Just what the broadcaster ordered, so to speak! 0.64 of a wavelength looks remarkably similar to what we now call the 5/8ths wavelength antenna!

Although the 0.64 wavelength antenna required a taller tower or mast than the top-loaded vertical system, only one was needed which, being also the vertical radiator, eliminated the distorted horizontal radiation pattern. Listeners had a stronger signal for a given transmitter power and the broadcaster had a larger service area. Additionally, one mast was probably cheaper than two. Idyllic! Surely there had to be a snag? There was.

At night, radiation from the high angle minor lobe was returned to earth via the ionosphere once the medium frequency absorbing D-layer had dissipated. Because of its much longer path this returning signal was out of phase with the ground wave causing severe fading and signal distortion within the normal service area of the transmitter.

The answer was to somewhat reduce the antenna's electrical length from 230° (0.64 wave length) to 190°, ie, 10° longer than a half wavelength. This almost eliminated the minor lobe but reduced the ground wave power by only 1.03 dB. Today, the 190° 'anti-fade' antenna is widely used in medium wave broadcasting but is likely to be made physically smaller by using suitably placed inductive loading with or without a capacitance hat.

From the 2 metre amateur's point of view, the high minor lobe of the five-eighths wavelength vertical VHF antenna is of no consequence. Except in the rarest of circumstances this energy will be lost to space. The improved low angle of radiation is of great benefit because it doubles the effective radiated power compared with a quarter-wave antenna, and the omni-directional pattern makes the antenna attractive for both base station and mobile use. Matching the antenna's complex feed-point impedance to a coaxial feed line is done through a simple tuning unit, usually incorporated in the antenna's base insulator.

A typical broadcast vertical capacitance hat.

An HF variant of the 5/8ths vertical is the Extended Double Zeppelin or EDZ. This is a collinear dipole type of antenna with horizontal arms each 0.64 wavelengths long. It may be thought of as two 0.64 wavelengths antennas back-to-back with the instantaneous current in each arm flowing in the same direction. Because each arm is about 230° long electrically (not a multiple of 90°), the feed-point has a fairly high impedance plus capacitive reactance. Thus excitation is usually via open wire feeder plus a suitable antenna matching (tuning) unit. Feeding via 50 ohm coax results in a theoretical SWR of 71.57:1 at the feed-point; placing the necessary matching unit at the centre of a horizontal wire antenna is usually not feasible.

In free space the antenna would give 3.03 dB broadside gain over a half-wave dipole, just as the 0.64 wavelength does relative to a quarter-wave when both are over a perfect ground. The EDZ gives the greatest broadside gain attainable from a simple 'dipole' type of wire antenna and is worth considering as a mono-bander for uni- or bi-directional areas of interest. While the 'doughnut shape' - now in the vertical plane - will be modified by the height of the antenna plus the nature of the ground beneath it, both high and low angle radiation is achieved giving the possibility of local and DX contacts broadside to the wire.

Although Ballantine came up with 0.64 wavelength as the ideal length for his antenna, more recent computer analysis by Walter Maxwell W2DU shows 0.6346 to be the optimum, giving a gain of 3.029 dB over a quarter-wave. That being so, we can only take off our hats to Stuart Ballantine for his work some ninety years ago, long before computers were even thought of! After all, what's 0.0054 of a wavelength plus 0.04 dB between mates? Four-fifths of five-eighths of b****r all!

OTN readers with a broadcast engineering background may wish to quibble with some of the comments made above. If so, let's hear from you and please tell us about your own experiences - antenna-wise or otherwise. It's your magazine, after all!

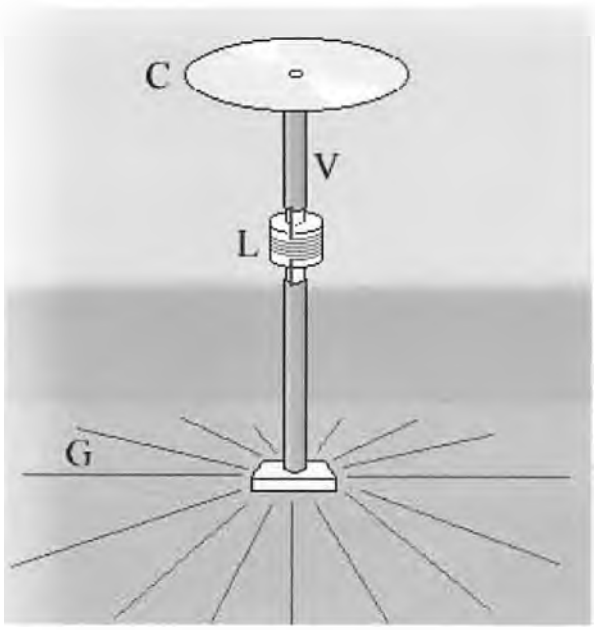


Diagram of a typical shortened, insulated, broadcast antenna with inductive loading, capacitive hat and ground radials

ar

Project HIBAL

John Sutcliffe VK3TCT
RAOTC member No 1589

I was employed at Project Hibal in Mildura, Victoria from 1963 until 1967 as a Technical officer (Electronics). Project Hibal used giant balloons to sample the upper atmosphere (stratosphere) for radio-active fallout and the program was operational from 1960.

Giant balloons are ideal for upper atmosphere sampling because they can float for hours at a constant altitude and lift great weights. The traditional Hibal payload was around 240 kilograms and flights ranged from 70,000 to 105,000 feet (21.34 to 32.00 km) in height with float times of two hours. The combined ascent and descent time was about two and a half hours so total flight time was four to five hours.

A balloon floating at great heights for hours has its own problems, and the balloon and its payload can end up at great distances if the upper winds change during flight. At times the balloon and its payload went straight up and down again after four hours in the air; short distance flights could be hazardous if the payload came down in the greater Mildura area or district.

The United States was sampling the upper atmosphere at various locations around the world and established the site in Australia to further enhance the sampling in the Southern Hemisphere; the residue from the British test sites at Maralinga, Montebello Island, Emu field and the US tests at Bikini Atoll were of particular interest as were other tests in the Pacific by the British and the French.

Filling the balloon - note the balloon bubble - the balloon is under a roller on the launch trailer.

Balloon and payload have just been released. Note the helium bubble at the top - the balloon will fill as it ascends.

Early in the program Project Hibal flew balloons as low as 50,000 feet (15.24 km) but these flights were replaced with samples taken from high flying U-2 spy aircraft. The U-2 aircraft were also operating over Russia until the Gary Powers incident in May 1960 which terminated the Americans sniffing at Soviet tests with U-2 aircraft in this region.

Three layers of conflict starting in the 1940s created Project Hibal which was located in Mildura, Northern Victoria. The first conflict was the development and use

A Lockheed U-2 spy aircraft.

The operating area and console during a balloon flight. Note the Hammarlund SP-600 receivers.

of the atom bombs on Hiroshima and Nagasaki, Japan; the second conflict was the exploding of the first nuclear device by the USSR starting an international atomic arms race; the last conflict was the forming of the environmental groups in individual countries with great concern over nuclear weapons and the resulting radio-active pollution, convictions that forced the United States to begin a measuring program and for nuclear tests to go underground.

Atomic fallout was a concern to many groups and giant balloons were the ideal sampling platform. Project Hibal was created after the US Government contacted the Australian Embassy in Washington requesting an interest in a shared program with Australia to sample the upper atmosphere for atomic waste. It was basically a shared program funded mainly by the US.

The US name for the program was 'Project Ashcan' and the method was to use giant balloons and equipment developed by the US food giant General Mills: General Mills had developed giant balloons during the 1940s that could lift heavy loads into the stratosphere. The company had also developed a range of measuring and sampling equipment to be flown.

The equipment developed consisted of fans and motors for physical sampling, filter paper suitable for collecting the sample, and the following electronic equipment:

•Balloon height monitoring telemetry, based on a 3A4 valve transmitter sending Morse code indicating height (the transmitter frequency was adjacent to the 160 metre amateur band).

•Motor speed telemetry using a five watt transmitter and transmitting in sequence the speed of each motor; each fan motor had a tachometer on the main shaft and an audio tone of about 200 Hz was returned on a frequency just below the six metre band using AM modulation. The fan motors were series wound and motor speed was around 200 Hz x 60 secs = 12,000 RPM.

•Mechanical flow-meters for air measurement.

•A radio command system to cut-down the payload from the balloon - the system was on the same VHF radio as used for communications; a decoder determined the correct sequence to perform the cut-down - basically a sharp filter accepted telephone pulses into the decoder so that if the pulses were, in Boolean, 1.2.3.7.8.9 cut down would occur, and if NOT (1.2.3.7.8.9) or the codes are out of order, the decoder would reset. The communication and radio command system was FM and the frequency just above the two metre band.

I suspect the use of frequencies around the amateur radio bands guaranteed a ready supply of technicians that could readily adapt to the program.

The altitude Morse code was monitored using a skilled operator and the motor speed was measured using a Lissajous pattern on an oscilloscope; the horizontal plates were attached to an audio oscillator and the vertical plates to the incoming audio; the operator adjusted the audio oscillator for a stationary circle then read the tachometer speed from the audio oscillator; this needed to be logged each minute with the altitude of the balloon, including general communications - we were busy!

The other method to measure motor speed was a Hewlett Packard frequency counter and printer. Although there were three methods of measuring airflow volume through the filter papers, the main one was on-board flow meters The air quantity was critical as it cost a lot of money to put a helium filled balloon into the stratosphere at up to 105,000 feet (32.00 km).

The balloons flown in Australia were, at times, up to many hundreds of feet in diameter and the standard Hibal payload was around 240 kilograms.

Sometimes other equipment was flown for Australian universities as piggy-back; the university and PhD student experiments were flown free of charge, usually being quite small packages.

So here is a typical day at Project Hibal as the event of launching and recovering a balloon and payload unfolded.

The Hibal payload and balloon laid out. Note the motor fan units either side of the payload. The payload is attached to the balloon via a cargo parachute. The launch trailer can be seen at the far end.

The payload has landed and strong winds have dragged the payload until the parachute entangled a tree. A fire has occurred on this occasion but fortunately there was not enough fuel to cause real damage.

Launch day minus one

The engineer in charge (EIC) for project Hibal, the late Mr Eric Curwood, has been monitoring the weather over days and has concluded tomorrow will be a launch day. He gives preliminary instructions to the team of a possible launch and the balloon float height required.

The required notifications are made to the Department of Civil Aviation, Bureau of Meteorology and others that have an interest in the flight.

The team is required to start at 2.00 am. My alarm rings at 12.45 am. It has been a hot night in Mildura and sleep can be difficult, especially with all the anticipation and thoughts of the coming day.

There is a lot to do before a balloon is launched and on arrival at base we are greeted by hot tea prepared by the drivers of the recovery vehicles.

The payload electronics must go through final checking and testing, and the payload must be weighed. Weight is important as the calculations can then proceed for the desired ascent rate - the weight determines the amount of helium to be put into the balloon.

Eric returns from the Meteorological office and says the expected breeze at dawn is less than eight knots - continue preparation. Eric has planned the flight path using known wind velocities and wind directions at each height the balloon must pass through from Bureau of Meteorology soundings - the expected impact after cut down is around Balranald in NSW.

Launch and sample

The balloon is laid out and ready to fill with helium, the payload (gondola) is on the back of the launch truck and balloon filling proceeds. After the required amount of gas is put into the balloon the area is cleared for launch, including visiting people.

On this occasion the launch is uneventful and the balloon begins its ascent to float altitude at the projected rate of 1,000 feet (305 m) a minute. 100+ minutes and the gondola electronics will switch on and begin taking air samples, etc.

On completion of the sampling the authorities have been informed of the descent of the gondola. All aircraft in the vicinity are to be made aware of the descending gondola and the remains of the balloon.

The gondola then goes into shut-down procedure; the gondola electronics contain all the necessary timers, etc to complete the flight sequence but this can be overridden by a radio command system.

On this occasion, with visitors in-house, the leader decides to use a radio link to terminate the flight and cut down the balloon.

Descent and impact

The required codes are sent to the payload gondola by radio. The sequence is: motors off, air sampling doors shut and the detonators are fired to cut the gondola from the balloon. The gondola descends rapidly until pulled up with a jolt as the cargo parachute opens - descent is then slower and measured.

The recovery crew have already left Mildura for the expected drop zone shortly after the launch and will be in the Balranald area awaiting instructions from the tracking aircraft.

The tracking aircraft is in the area, possibly sitting on the Balranald air-strip awaiting the cut down and a possible radar fix on the descending payload. The pilot will take off at the appropriate time as the payload descends with both the pilot and observer looking for the payload parachute.

The balloon's remains will, or should, hit the ground before the payload. One reason for the delay is that a couple of acres of plastic and an aircraft do not mix.

On this occasion all goes to plan and the payload is seen descending on its parachute. The pilot gives the expected impact zone coordinates back to base via VHF radio and alerts the recovery crew to move closer to the expected impact zone, usually giving some directions, for example, via Sturt Highway, etc.

After impact the pilot gives further instructions to the ground crew and begins to bring them to the impact site, via roads, tracks, paddocks, gates and then final directions for the Land Rovers.

Impact with the ground is softened by the honeycomb paper pads below the gondola; however, on this occasion strong winds have developed at ground level while the flight was in progress.

As the gondola nears the ground it is travelling at wind velocity. The gondola impacts and the inflated parachute rapidly drags the gondola along the ground. Fortunately, on this day the gondola is brought to a halt by the parachute entangling a tree.

We have had a battery fire, but there is no loss of flight data and instruments which can occur when considerable damage is done to the gondola.

Fire is always a hazard as the gondola contains a large quantity of batteries which have started large fires in the past. We are lucky this time that there was not enough fuel in the vicinity.

The end of Hibal

Hibal finished flying all balloons from Mildura in 1981 and most of the specially trained personnel made Mildura their home. Today there are very few of the crew left alive, possibly only four or five of a total of around 20 personnel employed by the project at different stages.

Another problem is only part of the crew were involved in the electronic side of the program and the staff from the electronic side are the only people who knew and understood the complete picture.

ar

Three men and their microphones

Clive Wallis VK6CSW
RAOTC member No 1289

There are many manufacturers of microphones, some well-known, others less so, but three names familiar to amateurs would have to be Shure, Sennheiser and Heil. Here we take a brief look at each of these companies, their founders and their products, starting with the oldest, Shure Incorporated.

Shure

Shure was founded by Sidney N Shure in 1925 as 'The Shure Radio Company', located in Chicago, Illinois, selling radios to home constructors as kit-sets. The following year, Shure published its first direct mail catalogue; at that time it was one of only six firms in the United States offering radio parts in this way. By 1928 the company had grown to over 75 employees. Sidney's brother, Samuel, became a partner in the business which was renamed Shure Brothers Company.

Sidney N Shure, founder of The Shure Radio Company in 1925.

However, in 1929, with the advent of the Great Depression and the increased availability of factory-built radios, Shure Brothers Company was forced to greatly reduce their staff and became the exclusive US distributor of a small microphone manufacturer. In 1930 Samuel left the company. Fortuitously, at about this time Sidney Shure met engineer Ralph Glover and the two formed a new partnership. Despite Samuel's departure, the company continued to trade as Shure Brothers until 1999 when it was renamed Shure Incorporated.

The first Shure microphone, the Model 33N Two-Button Carbon Microphone.

In 1931 Shure and Glover began to develop the first Shure microphone. The following year, the Model 33N Two-Button Carbon Microphone was introduced, making Shure one of only four microphone manufacturers in the US at that time.

By the late 1930s Shure's first condenser microphone, crystal microphone, and microphone suspension support system (for which they received their first patent) were all introduced. In 1939 Shure introduced the Model 55 Unidyne Microphone, a uni-directional moving coil design with a smooth frequency response from 40 Hz to 15 kHz, which went on to become one of the world's most recognised microphones.

The Shure Model 55 Unidyne uni-directional moving coil microphone.

In 1941 the company was contracted by the United States armed forces to supply microphones and by the following year the T-17B handheld (see photo on next page) was the microphone most widely used by the US Army and Navy. During WWII Shure also manufactured throat, headset and oxygen mask microphones and adopted United States military standards for all Shure microphones. By the mid-1940s the company was also manufacturing and supplying

The Shure T-17B handheld microphone widely used by the US army and navy during WWII.

phonograph cartridges to major phonograph manufacturers including Philco, RCA, Emerson, Magnavox, Admiral and Motorola, and was the largest producer of phonograph cartridges in the US at that time.

Shure also developed and produced products for medical applications. In 1937 their 66A piezoelectric stethoscope was designed to accurately reproduce chest sounds and in the early 1960s the SP-5 and SP-6 stethoscope pickups were produced. Shure also produced hearing aid cartridges used by leading American hearing aid manufacturers.

Beginning in 1956 Shure manufactured magnetic tape recording heads and two years later the company announced it was ready to mass produce four channel recording heads. By 1964, however, increasing competition cause Shure to bow out of tape recording head production.

The Shure Unidyne Three studio microphone, the predecessor of the SM57 microphone.

In 1953 Shure introduced their first wireless microphone system for performers and in 1959 they introduced the Unidyne Three studio microphone, the predecessor of the SM57 introduced in 1965, followed by the SM58 in 1966 - two of the most iconic and widely used microphones ever created. Both have seen use in countless studio albums and live sound applications. Shure had also produced portable equipment for broadcast field recording like Vocal Master, the M67 portable mixer and the FP31 portable mixer.

The amateur radio market was also well catered for. Most of us will recall the famous Shure 440 and 444 series of microphones designed by William A Simons

A Shure 444D amateur radio microphone.

Bill Simons W9BB (SK in 2012) who designed the Shure 444D microphone.

W9BB (ex-W9YXJ), whose professional career with Shure spanned 31 years. Bill had many achievements in amateur radio but perhaps none surpasses his Shure 444D microphone, one of the most popular ever produced. Bill died in 2012 aged 84.

Today, Shure Incorporated is a world-wide organisation dealing in all manner of professional and consumer audio products including wired and wireless microphones, phonograph cartridges, audio mixers, digital signal processing systems, headphones and earbuds.

Sidney Shure, who died in 1995 aged 93, sure started something back in 1925!

Sennheiser

Sennheiser is a name synonymous with high quality sound but, were it not for the depression in the 1930s in Germany, its founder may have been a horticulturist rather than a leading manufacturer of audio equipment.

Professor Doctor Fritz Sennheiser was born in Berlin in 1912. On leaving school in 1932 he intended to become a landscape gardener but, with limited career

Professor Doctor Fritz Sennheiser

prospects caused by the Depression, he decided instead to study electrical engineering and telecommunications at the Technical University in Berlin. It turned out to be a very good choice!

An early sign of his technical aptitude came when, as a research assistant at the Heinrich Hertz Institute in Berlin, he assisted in the development of a reverberation unit used at the opening ceremony of the 1936 Berlin Olympic Games. The project modified a grand piano to sound as though it were an organ being played in church.

After graduating he became a chief engineer at the Hertz Institute and helped in setting up the Institute for Radio Frequency Technology and Electro-acoustics, which played an important part in WWII in the analysing and decoding of encoded radio transmissions. Allied bombing destroyed the Institute's Berlin buildings in 1943.

Fritz, now deputy director of the Radio Frequency Institute, felt a responsibility for the seven co-workers who stayed on and he re-established his department in a small building in the Municipality of Wennebostel, just north of Hanover. This was known as Laboratorium Wennebostel, or 'Labor W' for short, but following the end of hostilities a British military telecommunications unit occupied the building and erected a sign prohibiting anyone from entering on penalty of death.

Laboratorium Wennebostel, where it all started in June 1945.

Recalling this, Fritz Sennheiser said: "We waited for a while and wondered how seriously we should take the threat of the death penalty. One night, I went and took the sign down. The next day, everyone was amazed to find that the sign had (still) gone. As I still had a spare key, we decided to go inside. And that's how it all began."

Labor W's first products post-war were vacuum tube voltmeters which, in 1946, found a successful market with Siemens in nearby Hanover. The high quality of this product was quickly recognised and Siemens commissioned them to build their DM1 microphone.

A Sennheiser DM1 microphone built for Siemens in 1946.

At first Labor W stuck to the Siemens design but soon they were able to offer a microphone of their own design, the MD2, which was to become the first in a long line of microphones. In fact it wasn't long before Labor W began to make a name for themselves outside of Siemens.

An original Sennheiser MD2 microphone.

In the years that followed the brand owed much of its rapid success to the post-war growth of the telecommunications industries; first radio, and then television and film.

Labor W continued to prosper. By 1955 it had 250 employees including specialist design staff and acoustic engineers, and was producing a range of high quality microphones for both general and specialised purposes. Of particular note is the MD82, a revolutionary 'tele-microphone' or shotgun microphone launched in 1956 (photo on next page) which allowed distant sounds to be recorded with pinpoint accuracy, eliminating the need for actors to be 'wired' or for re-dubbing the sound track in the studio. This new technique was quickly adopted by the film industry in Hollywood and elsewhere.

Labor W was renamed Sennheiser in 1958. By then annual sales had reached $US 9.9 million but it is claimed that one reason for changing the name was that the then Australian Prime Minister Robert Menzies refused to speak into a microphone labelled Labor W

A Sennheiser MD82 'tele-microphone' or shotgun microphone.

because he thought it must belong to the Australian Labor Party!

Although Sennheiser built its earlier reputation on microphones, these days most people, if asked what the name meant to them, would reply, "Headphones". This is demonstrated in the development and patenting of one of Sennheiser's most revolutionary products, which was discovered by accident when a tinkering engineer found that closed ear-phones actually sounded better when open. The resulting 'open architecture' HD414, first marketed in 1967, catapulted Sennheiser to a global market when manufacturers from around the world clamoured to sign licensing agreements and "things started to get interesting" for Sennheiser. The HD414 is still in production today.

Sennheiser 'open architecture' headphones similar to the HD414 first sold in 1967.

Sennheiser caters for many different audio markets. In 1980 their NoiseGard noise cancelling aviation headsets were first used by Lufthansa and were purchased by Qantas not long after. I can personally attest to their comfort and effectiveness, especially when worn for long periods, far better than the Telex and Amplivox headsets that we used previously.

As with many influential brands, it is the personality behind the name that drives its success. Yet, despite his many accomplishments and accolades, Fritz Sennheiser never lost sight of his humanity or ethics. Immediately post-war, Labor W was founded on the sincere responsibility that Fritz felt towards his co-workers and their families in those difficult years and, as the Laboratory grew, it was this commitment that underpinned the firm's early success.

"In the early years, I just wanted to make enough money with my Lab W to make sure that we could all feed our families," recalled Sennheiser. "Later, we were virtually forced to grow in order to stay ahead of our competitors." Nevertheless, he considered the company's independence to be one of its integral values and, as the company grew, he consistently refused offers of takeovers or partnerships in order to preserve this.

Creativity was - and is - important to Sennheiser. As he said, "Our engineers have always been given a lot of freedom. They are allowed to give free rein to their creative ideas no matter how crazy they might seem. Often, it is these very ideas that result in the best developments and the best products." Witness the HD414 headphones!

In 1973 Fritz formed a partnership with his son Jörg; three years later Jörg became Technical Director. In 1980 the now ageing father retired, handing over the management of Sennheiser Ltd to Jörg. On 1st July 2013, Jörg's sons Daniel Sennheiser and Andreas Sennheiser were promoted to the positions of joint CEOs.

Today, Sennheiser remains a private, family owned German audio company with branches in many countries worldwide, including Australia, employing over 2,500 personnel. It specialises in the design and production of a wide range of both consumer and high-fidelity products, including microphones, headphones, avionics headsets, multimedia headsets, speakers, telephony accessories, computer and information systems, and sound-based electronic components for consumer, professional and business applications. The company keeps abreast of technology; in May 2014 Sennheiser founded a new competence centre for innovative streaming solutions, Sennheiser Streaming Technology GmbH (SST). Such audio streaming can, for example, be used to enable hearing impaired people to follow sound tracks in cinemas via their smartphone earphones.

Professor Doctor Fritz Sennheiser, who died in 2010, can be very proud of his life's work. From humble beginnings as a laboratory researcher and developer, Fritz Sennheiser became a pioneer in the field of audio technologies and went on to become an entrepreneurial leader of a major international brand .

Note. It's interesting that some references refer to DM while others quote MD for various Sennheiser microphone type numbers. It may be that Mikrophon Dynamisches (German) is Dynamic Microphone in English. Perhaps microphones were labelled according to their intended destination?

Heil Sound

A more recent but very successful manufacturer of high quality microphones, headsets and other audio equipment for both the amateur radio and professional audio markets is Heil Sound Limited. The company was founded in 1966 by Bob Heil K9EID.

Bob Heil K9EID in his ham shack.

Bob was born in 1940 in Marissa, Illinois, a small town some 30 miles south east of St Louis, Missouri. He was clearly a talented young man. By the age of 14 he had become a proficient theatre organ musician, performing at various local restaurants, and at 15 he became house player for the Wurlitzer organ at the Fox Theatre in nearby St Louis. At the age of 16 he obtained his call sign K9EID. In both of these endeavours he was fortunate to have exceptional mentors.

Larry K0DGE, then chief engineer at KMOX-CBS Radio, St Louis, taught him to build all sorts of equipment including one of the first amateur one kilowatt VHF SSB stations and Bob says that those early days of building, designing circuitry and operating were his college education. Even today, amateur radio continues to be the centre-piece of his activities. He says that amateur radio has been the foundation of his success in the professional sound reinforcement industry and in bringing high quality, articulate audio to amateur radio.

His theatre organ prowess was developed as the protégé of Stan Kann, who not only taught him to play well but taught him the art of tuning and voicing the thousands of organ pipes. Stan especially taught Bob how to listen and mentally dissect what he was hearing. This was something that would become vitally important when Bob began building large concert sound reinforcement systems for some of the world's leading rock and roll bands.

Bob's first business venture began in 1966 when he opened 'Ye Olde Music Shop' in his home town of Marissa, one of America's first professional audio stores where he not only sold Hammond organs but would also fix the organs on stage for musicians before they gave their performances. Noticing that some PA systems were small, lacking in sound fidelity and unable to project into a large crowd, Bob Heil, along with long-time friend and fellow amateur Joe Walsh WB6ACU, now a Grammy Award winning rock and roll legend, began designing and building large concert sound systems for some of the world's leading rock and roll groups, often with power outputs of several kilowatts.

Grammy Award winning rock and roll legend Joe Walsh WB6ACU in his ham radio shack.

Those two amateur radio friends changed the world of rock and roll. On 2nd February 1970 the well-known American rock band The Grateful Dead were scheduled to play a concert at the Fox Theatre in St Louis, but unfortunately for them their sound engineer was whisked off to prison on drug charges and all his sound equipment impounded shortly before the performance.

Luckily, a stagehand remembered that when, some months earlier, the sound system of the Fox Theatre's mighty Wurlitzer had been replaced, much of the old equipment and speakers had been given to young Bob Heil who had rebuilt them into a massive cabinet and added an array of four radial horns and ring tweeters. As Bob recalls, "That made a huge difference. It was like a big hi-fi system. The horns gave the system intelligibility and, with a frequency range from below 200 Hz to above 15 kHz, you could actually understand the lyrics!"

Heil also had a unique technique to handle the feedback problems; a small second microphone taped behind each main microphone. He says, "We would run the microphones out of phase from the monitors, something that nobody had been doing yet. Since they were out of phase with the microphones and the Front of House system, anything that leaked in from the monitors would be cancelled out. As a result, we could get these things incredibly loud before they would feed back".

The show was a success and the Grateful Dead asked Heil, his crew, and his sound system to join them on the road. Heil's setup would later become a template for the modern concert touring sound system.

In 1973 Bob Heil invented the Heil Talk Box, the very first high-powered Talk Box to be placed on the market. A talk box is an effects unit that allows musicians to modify the sound of a musical instrument. Typically, a talk box directs sound from an instrument into the musician's mouth by means of a plastic tube adjacent to their vocal microphone. The musician controls the modification of the instrument's sound by changing the shape of the mouth, 'vocalising' the instrument's output into a microphone. It continues to be a popular product amongst pop music artists.

A Heil Talk Box is still a popular product today.

In 1980 Bob Heil began paying more attention to the new breed of amateur radio equipment. He was dissatisfied with the performance of many of the so-called 'matching microphones' sold with amateur transceivers, especially imported ones, and entered the market with Heil Sound's new technology of tailored

Heil's Classic Microphone is an exact copy of a 1930s broadcast microphone but with switchable HC-4 and HC-5 microphone elements inside.

response microphones that improved speech articulation. Heil Sound microphones differ from others in the amateur radio industry by using large diaphragms to reduce distortion, increase articulation and the dynamic range. This same technology was later used to improve stage microphones. As Bob writes in his QRZ.com resume, "In 2006, Joe WB6ACU asked me to build him a better performance microphone."

Once again these two amateur radio enthusiasts put their ears together resulting in Heil Sound bringing new technology to the entertainment stages. Bob says, "Because of amateur radio and learning to listen from the years of voicing and tuning theatre pipe organs, I

One of the large range of light-weight Heil headsets available for radio use.

A Heil GM5 Goldline Dynamic Microphone with switchable elements between the full range HC-4 element for local high quality contacts and the restricted range HC-5.1 element, designed to be ideal for SSB DX contacts.

am able to design and produce new technology of microphones and headsets for my beloved amateur radio industry.

"The last decade has been spent designing and building high performance dynamic microphones for scores of leading concert and recording artists. Needless to say - I love amateur radio!".

Since the 1980s Heil has won a number of awards and honours. To mention just a few, he was the International Amateur Radio Operator of the Year in 1982; in 1987 he won the Parnelli Award for Innovator of the Year; in 1995 he received the very first 'Live Sound Pioneer Award'; and only last December the University of Missouri made him an honorary Doctor of Music.

Heil Sound continues to perform strongly in the audio market and has an impressive catalogue of microphones, headphones and other audio related equipment.

At 75 years of age Bob Heil K9EID remains very much the active CEO of Heil Sound and also a very active amateur radio enthusiast - and he still plays his own electronic organ. His compatriot Joe Walsh WB6ACU remains very a keen rock and roller and still plays guitar with the Eagles band.

Joe Walsh WB6ACU playing guitar with the Eagles rock and roll band.

References

Shure Incorporated website; Sennheiser Electronic GmbH & Co. KG company website; Heil Sound website; QRZ.com; Wikipedia; various website images.

ar

An aerial for the unit dweller

Ron Cook VK3AFW
RAOTC member No 824

After retirement most of us face having to downsize at some time. This is another phase of our life and for those of us who have had a reasonably sized block of land and a matching antenna farm it can be a bit unsettling to face the prospect of no more amateur radio. Don't give up on the hobby. The major problem is usually the antenna. This article presents one possibility.

The possibilities

There are many compact antennas for VHF and HF that the new arrival in a set of units could erect. Of course the more obvious the antenna the harder it will be to get Body Corporate or management approval.

An end fed 'white stick' less than 2 m long mounted on the barge board or balcony railing will give access to VHF and UHF bands but is more likely to have good coverage in single storey sites as you can be blocked for 180 degrees with multi-floor sites. If they have a lift, go for a top floor unit with a balcony!

But what about HF?

MFJ sell a range of multiband HF verticals and one of these mounted on a short metal pipe may suffice. Of course, if it can be raised above the gutter level so much the better. Remember, if the antenna can't see the horizon then it's radiation to distant parts will be reduced.

These verticals may seem expensive but, of course, you should spend as much on your antenna as the rig. Unfortunately, not everyone has much in the way of disposable income at this phase of their life so what will work, not be an eyesore and be cheap?

A wire antenna can provide a low visibility but useful antenna at minimal cost. A 22 foot (6.7 m) per side centre-fed doublet works well as a multiband antenna covering from 7 MHz up. To cover 3.5 MHz effectively as well, you will need more room so you can extend the doublet to 44 feet (13.4 m) per side. 300 ohm ribbon is a practical feeder for this arrangement. By using an ATU with a 4:1 balun, a good match can readily be obtained, sometimes after some feed line length adjustment. A balanced antenna will have lower noise pick-up than a vertical or an end fed antenna.

However, the feed line being in the centre might not be the most useful position as often the new 'shack' is at one end of the unit.

An end fed wire would be convenient in that case but getting a good earth or counterpoise can be difficult in a retirement unit.

A versatile HF wire antenna

I have been trying to develop an efficient end fed antenna for a number of years and the early attempts were less than satisfactory. However, perseverance pays off. The current design was first published as the 'Moorabbin Zepp' in *APC News No 235* and this article extends and updates the description.

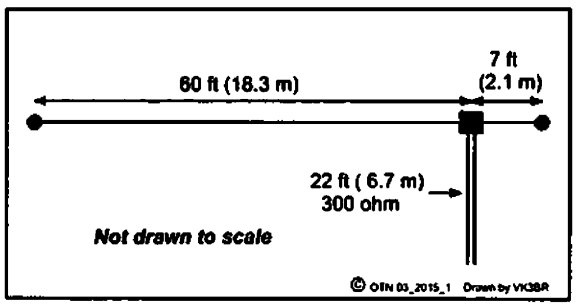


Fig 1 - Schematic of the modified End Fed Zepp.

Origins

In the 1930s, Zeppelin airships were used to provide scheduled air flights from Germany to Argentina. They were the height of modernity and, of course, carried radio communications. Fitting an aerial on a hydrogen filled airship was not without challenges. The antenna had to be at least a half wave length long at the lowest operating frequency and be independent of the airframe.

It also needed to be able to be unrolled from a drum after lift-off and re-spooled prior to landing. The antenna devised was an end fed radiator connected to an open wire line feeder. Over time all end fed antennas using parallel wire feeder came to be known as 'End Fed Zepps'.

Did you know that the Slim Jim is actually an end fed Zepp in a vertical configuration with matching to coax built in?

The most effective simple wire antenna is with a radiator that is a half wave at the operating frequency. Normally it is fed at the centre. If it is end fed the impedance is very high and changes significantly if brought near conducting materials.

Also, although theoretically is it is possible to operate it effectively on even harmonics because one end of the feeder is unterminated, it can present difficult matching problems.

This can be overcome with a version that has the feed point moved some 10% in from the end, thereby reducing the variability in the feed impedance, lowering the SWR on the feed line, providing a proper load to the feed line and enabling harmonic operation.

Think of the design as a way-off-centre-fed dipole.

How it works

On 40 m it operates as a conventional half wave dipole. On 30 m it is an extended ¾ wave dipole. On 20 m it is a full wave radiator and on 15 m it is a three by half wave dipole. On 10 m it is a two wavelength dipole. On 15 and 10 m the pattern will include some lobes with gain as well as some nulls in the pattern.

On 80 m it is physically only a quarter wave long. So how could it possibly work without a ground connection? The answer is that the feed line provides a total length of conductor electrically equivalent to 18 m or nearly equal to a quarter wave on 80 m making it just short of a half wave overall.

The ATU provides the extra inductance to resonate the feed line aerial combination. It is a surprisingly efficient 80 m radiator. Remember, the popular G5RV also has the centre of the 80 m section in the feed line.

The half size on 80 m makes it appealing for space challenged locations.

The impedance at the feed point varies so using a 4:1 balun here will not provide the optimum matching arrangement. The feed line length chosen transforms the impedance for 7, 14, 21 and 28 MHz to a value that is acceptable to a 4:1 balun and the ATU does the rest.

Construction

I used 'DX wire' which is a popular wire for antenna used by portable DX operations and Summits on the Air (SOTA) operators. It is thin but strong, and is flexible and covered in black Teflon-like plastic giving low visibility. Use any antenna wire of your choice. Hook-up wire is suitable - you don't have to use 12 gauge hard drawn copper. Indeed that might be a bad choice because it will require higher support strength.

Fig 1 (see previous page) has the lengths that my dipole and feeder finished up with. You might expect that, depending on the wire you use and how high off the ground it is used, your lengths may need to be varied a bit. Yes, but because an ATU is mandatory, a foot (0.3 m) or so error in the length isn't significant so using the nominal lengths should be OK.

Glazed porcelain egg insulators would be perfect for the ends. In my case, scrap pieces of plastic are used for the insulators. Hardware stores sell plastic sheet if you can't lay your hands on some for free. I added a sliding insulator to allow the antenna to be supported at the middle of anywhere along its length. See Figs 2 and 3 for suggested dimensions for the end insulators and centre insulator. Plastic chain links can be used as end insulators and the sliding insulator. See photo 1.

The preferred arrangement is with the centre as high as can be managed and the feed end low enough that

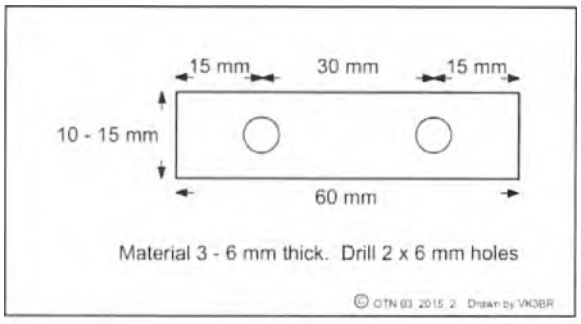


Fig 2 - End Insulator details.

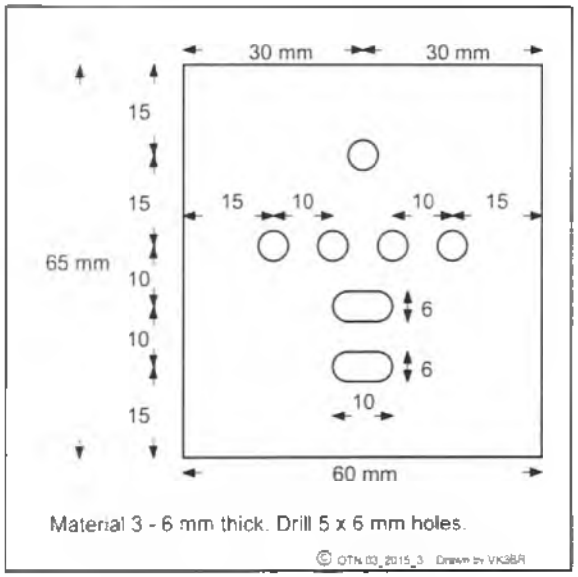


Fig 3 - Centre insulator details

Photo 1 - Chain link insulator with DX Wire. Note the wire can be tied off and should not be terminated as if it were hard drawn copper. The knot has no measurable effect.

the feeder reaches the ATU. However, a pole at one end can be used to good effect if this is more convenient. In other words, an inverted vee although the vee may be quite shallow.

The antenna can be bent to fit in the available space. Keep it three feet (1 m approx) away from metal spouting or any metal fence if at all possible. It could be mounted under a tiled roof or thrown over a tiled roof and the ends secured to stop it flapping about in the wind.

For field operation I use a heavy duty 23 ft (7 m) telescopic fibre glass mast (commonly called a squid pole) purchased from Haverford in Sydney but any timber or metal support will do.

In most parts of the country you do not need a permit from the council for a pole up to 8 m (26 ft). The Body Corporate, etc will still need to be agreeable. (Yes, I know some folk advise it is better to apologise than ask permission and the worst that can happen is to have to take it down. But they don't live in your complex).

If the best place for the pole is near the fed end then either it needs to be fixed at a height of 6 m maximum or the feed line will need to be longer than recommended. You need to be aware that some lengths of feed lines may present impedances that are out of the range of the ATU.

The antenna should be high enough that it can't be touched by standing on tip toe anywhere along its length, or around 10 feet (3 m).

What feeder?

Although Open Wire Line is the preferred feed line, it needs to be fabricated by the amateur. A practical alternative is 300 ohm TV feed line. If you can find it, use the open wire dog-bone insulator 300 ohm line or 300 ohm ladder line. The 450 ohm ladder line would be more efficient but it is heavier and less flexible and more expensive than 300 ohm ribbon. I chose cheap 300 ohm ribbon which is available new from Rockby Electronics. It should last many years in the weather.

A length of 22 ft (6.7 m) seemed to be a good compromise length. It presented a reasonable impedance to the ATU and wasn't excessively long. A balanced input ATU is required.

With an ATU with a 4:1 balun input this design allows operation on 6 HF bands. Chose an ATU rated for your transceiver. If building your own ATU consider the Z-match and you can dispense with the 4:1 balun.

On air

While tests in the backyard indicated good matching for 80, 40, 30, 20, 15 and 10 m, a proper test on air over

Photo 2 - A home made insulator on the back pack version with the feed line and radiator wire wound on a shuttle. It has been weatherproofed with neutral cure rain gutter sealant.

many hours was required and preferably against some other antennas.

In a recent outing of the Moorabbin and District Radio Club at the McCrae Light for the International Lighthouse and Light Weekend, the antenna was equal on 80 and 40 m to an off centre fed dipole designed for these bands. Although it worked well on 30 m the ATU tuning was quite sharp; and it worked very well on 20 m giving contacts into Europe and yielded some good contacts on 15 m to Japan and VK6. It also tuned up easily on 10 m but no stations were heard so it is yet to be field tested there.

It would not tune on 17 m and no attempt was made to use it on 12 m.

A high impedance end fed antenna can put high voltages in the shack leading to RF feedback in some cases. It is recommended that the ATU be connected to ground - a metal water pipe is ideal - or a quarter wave counterpoise connected to the ATU case and fitted around the skirting board. A ferrite 'clamp' on the coax feed to the transceiver should be tried too.

Bringing the twin feeder into the shack typically will be through a gap in a metal framed window. I suggest using a short piece of electrician's plastic conduit through which the feeder is run. This will help create some space between the feeder and the metal. Expanded polystyrene foam could be used to place the feeder centrally in the conduit.

An antenna of this design has been installed in a retirement home where the shack is at the rear and at one corner of the unit. The antenna starts from outside the shack and is run 33 feet (10 m) along and well above the back fence, then bends at 90 degrees and is fixed at its far end underneath the eaves near the front of the unit. A small insulated garden rod is used to elevate the antenna above the fence at the bend and a 16.5 foot (5 m) mast used at the feed end.

Conclusion.

A low cost solution to the multiband HF antenna problem has been presented. It is very compact for the frequency range and can be installed in many configurations to suit the space available. It is an unobtrusive and efficient radiator. This comes at the price of needing a balanced ATU and 300 ohm feed line.

The builder will be rewarded with an efficient and durable antenna that efficiently covers many bands.

It will appeal to the unit-bound operator or anyone who has a small yard or no yard at all and wants a small antenna that can be run from a window to a fence, with or without a centre support and covers 80 m through to 20 m with good performance and offers operation on 15 m and 10 m as well.

It would also be very useful for hikers and SOTA operators. It would also appeal to the grey nomads. If you are a camper, or staying in a motel and are able to run the antenna out without getting in anyone's way - with permission of course - you will be rewarded with excellent results.

ar

Unusual phonetic alphabet

Mike Patterson VK4MIK
RAOTC member No 824

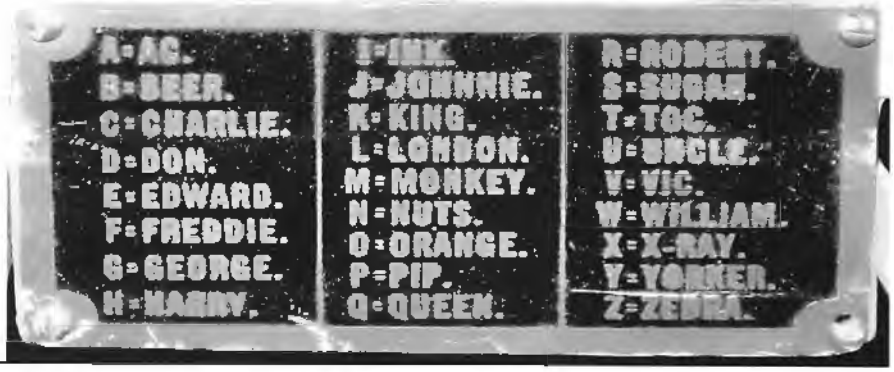
I recently assisted with a display of communications equipment at the Cardwell Bush Telegraph heritage centre at Cardwell, Queensland, which is in the original Telegraph and Post Office, built in 1870. Somehow, this building has managed to survive all the cyclones and the Australian termites since then!

The particular piece of equipment in question was in with the field telephones but I think it must have originally been attached to a transmitter as it has a Morse key and a tuned circuit.

Herman VK2IXV, ex Merchant Marine Radio Officer, and Ross VK4AQ, ex RAN WO, have no knowledge of this particular phonetic alphabet.

Can any reader shed some light on this unusual alphabet? If so, could you please contact Mike VK4MIK, QTHR, or at <vk4mike@yahoo.com.au>.

ar



Morse code hand sending technique

Herman Willemsen VK2IXV
RAOTC member No 1384

People often ask what is the best method for gripping the knob of an up-and-down or straight Morse key. I find this hard to answer, as I believe that there are several styles to send a decent drop of Morse.

In 1959, at the Radio-Holland Marine Radio College in Amsterdam, we were taught to grasp the knob of the key with thumb and middle finger, and rest the forefinger on top of the knob. Our Morse keys were situated at the front of our desks and our forearms were suspended in free space, more or less horizontal to the floor.

***MV Prins der Nederlanden* in Curacao on which I was assistant Marine Radio Officer in 1961.**

Much later I read that this was called the European method. To have the Morse key positioned at the far side of the desk with the operator's elbow resting on the desk was called the American method.

During sending, with the arm in free space, the down pressure of the key is produced by the mass of the forefinger and the forearm. The fingers and wrist were not supposed to move too much. However, because your wrist acts as a hinge between arm and hand, you will find that in practice your wrist will flex slightly and more than slightly when using the American style. But be aware that too much flexing of the wrist over long periods could cause the dreaded 'glass arm' (RSI). Should this happen then it is time to reach for a bug key.

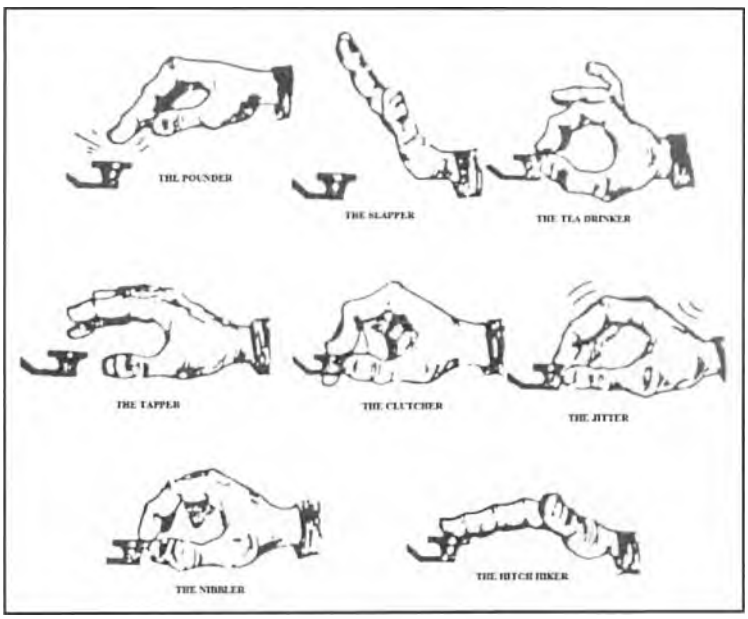
In 1965 on board *MV Straat Lombok* - my style of sending on a Junker key.

To send good hand Morse on a straight key there are, therefore, many more factors involved than just holding the knob of the key the correct way.

Additional factors are the location of the key on the front or the rear of the desk, the height of the desk, the weight and design of the key, the length of the lever, the shape of the knob (doorknob-style, flat, round, tall), the presence of a knob-skirt, the spacing of the key contacts, the tension of the spring and whether you are relaxed or tense. In other words: the factors are part hardware and part psychological.

I recall that in the 1960s my boss, the Chief Radio Officer on the Dutch passenger/cargo ship *Prins der Nederlanden* (radio call sign PGVR) sent fast and perfect Morse on his own personal straight key, from which he had removed the tension spring.

So my theory is that as long as you are in control of your key, comfortable with your own style and speed, and are not being told in plain language that "you are sending with your left foot" or by Q-code QSD or QRK 0-1, then you are doing fine.



Poor methods of sending Morse code.

ar

My journey into amateur radio

Wolfe Rohde VK5AXN
RAOTC member No 1628

My first actual amateur radio contacts didn't commence until 1974. However, much earlier as a young boy, the fascination of technical stuff began to emerge and, as far as I can recall, I was always interested in radios, gadgets and anything to do with electricity.

My early memories are as a young lad of perhaps five or six in Germany, following my grandfather around as he fiddled with bits of wire, an old radio or some other such fancy gear. It's amazing how our lives are shaped in the early years.

The year was 1955. At the time our family lived in a little town called Deichshausen in Germany, near the city of Bremen, with my grandparents. Dad had decided on a new beginning and resolved to emigrate to Australia. So we waited for clearance, inoculations and the required paperwork for a sea voyage to a far off land.

Prior to that time Dad had worked in an aircraft factory as a fabricator, riveter and welder, and later as a welder at the shipyards in Bremerhaven. Hence building things and the technical bug were implanted within me in those formative years.

My parents, sister and I immigrated to Australia in 1956, sailing on the Sitmar Line ship the *Fairsea*. We departed Bremerhaven and sailed by the usual route through the Mediterranean and the Suez Canal to Melbourne. I was fascinated by the workings of the ship and Dad was able to show me various areas such as the engine room and the wireless room.

Dad had chosen Adelaide as a final destination. We arrived in Melbourne and travelled the customary migrant hostel route of Bonnegilla (Albury), Woodside in South Australia and finally Glenelg Hostel west of Adelaide during the height of summer. The heat was almost unbearable to us and we wondered what we had let ourselves in for. I'll always remember the time I saw the Adelaide Hills alight during the catastrophic bushfires.

After the hostel we moved around a bit, staying with various people that Mum and Dad had befriended. Finally, around 1957, my parents had finance enough to build their own home.

By then an additional sister had been born and we kids finally had our own rooms. I adorned mine with wire aerials, loops and heaps of (to me) precious materials gained from the local hard rubbish collections. I would tune in old valve radios that I had found which were still in working order. I loved listening to short wave of an evening.

For bits and pieces, I would ride my bike around the neighbourhood, collecting old valve radios or anything resembling electrical items and strip them down. I was not sure what I was going to do with all that but I was certain it would come in handy some day. I still have some of that stuff, mainly the odd resistor and capacitor.

Dad had bought a very large valve broadcast radio that stood about a metre off the ground. The back of the radio was uncovered and one could see all the fine valves glowing and a rich sound came from the 12 inch (30.48 cm) Rola speaker. After homework and dinner, we kids were allowed to listen to the various serials and I was the designated wireless tuning person. We spent many pleasant hours listening to Hop Harrigan, Hagens Circus, Captain Silver and the Sea Hound, The Argonauts Club, The Gorilla Hunters, Kid Grayson Rides the Range, Hopalong Cassidy and many more. Later in the evening I would tune in the short wave bands. I wonder if readers can relate to that in their younger years?

I still didn't know much about radio then, but I pestered Dad for a crystal set because my schoolmate had one. Dad acquired some bits and made me my first crystal set. I still have the original crystal in one of the boxes. The set was quite large with a very solid timber box affair because Dad made everything to last forever, or so it seemed to me. My schoolmate and I used to pedal our bikes to the Adelaide Airport with our respective sets and tune into the control tower, or the Glenelg Taxi base, or clip onto a wire fence line somewhere and tune in to whatever could be heard, mainly the ABC I recall. My set only had one coil, so I figured if I added more coils it would work better and louder; it didn't, though.

Wolfe VK5AXN at the bench in the new home.

Dad needed a vehicle so he purchased an old, open cabin, Singer automobile. To keep us all

RAAF Butterworth, Malaysia.

dry he fashioned an entire top body section out of sheet metal pop-riveted together, complete with plastic windows, and brush painted the thing a pale Pacific Blue. On weekends the five of us went on drives and I would hang an ex US military telescopic mast out the side window hooked to my crystal set.

After primary school, Dad encouraged me to attend a technical high school since I was not inclined towards the more academic subjects at that time but preferred hands-on activities. That proved to be a good decision. Apart from the usual woodwork and metalwork shops, my school also taught plastics, photography and electricity. This was right up my alley.

By then I was reading various books on electricity, radio and so on, and getting a better grasp on the subjects. In metalwork I built a chassis and an enclosure, and to fill it I put together a Cathode Ray Oscilloscope using a couple of EF50 valves and an 80 rectifier for the HV. It worked well up to 12 kHz. The school even displayed the CRO at an open day.

I will always remember bus trips to Adelaide CBD, dragging my young sister along. No trip was complete without a visit to Rundle Street East and the Waltham Trading Company. There I would spend hours drooling over the piles of electronic bits and pieces. That's where I bought my ex military 5BP1 cathode ray tube which was used in the oscilloscope.

Following Waltham, I would generally drop into Gerard & Goodman across the road for any new bits, depending on my meagre pocket money. Unknown to me at the time was the fact that my future wife would work there some years later as the electronics department manager's PA - it's a small world!

I was still a bit rough and ready about electricity in those days. My mate and I used to put pencil leads on the end of wires and short them across the mains, resulting in huge flashes. The first multimeter that I constructed worked well until I forgot that it was still on ohms and decided to measure the 240 volt mains - another bang and the demise of one meter as the needle wrapped itself around the end stop.

Mum had some arthritis in her lower back at one stage and I had heard somewhere that electrical shock treatment might help. So I hooked together in parallel about ten Ducon electrolytic capacitors, the large brown paper ones rated at 8 microfarads and 350 VDC working. I charged them up via a power supply and proceeded to touch the two wires over her back. She didn't half twitch and complain but I reassured her that it would help. We live and learn.

In those days I also ventured into some simplistic spark transmitters but that was short lived as the interference I caused soon incurred the wrath of the neighbours, plus there was the threat of the radio inspectors. As a result my school mate John and I decided to join the Wireless Institute of Australia as associate members. They used to meet in Pulteney Street, Adelaide once a month and later at the Master Builders Association building. It meant an evening bus trip to town and back on our own, but we never thought much about that. We thoroughly enjoyed listening to the old blokes puffing their pipes and talking about the latest in SSB equipment and such like.

Technical school was a great stepping stone. When I graduated Dad suggested I join the RAAF as a radio technician as we heard that there was a call for the trade in that service. That suited me apart from having to leave home at 17 years of age straight from school. So, in 1964 I was on a train to Wagga Wagga via Melbourne on a new adventure.

Apart from basic training we were taught metalwork practices. I'll always remember having to hand file a block of steel until it was shiny and micrometer accurate - it took nearly a week! Boy, did we learn to file accurately.

After Wagga we were posted to RAAF Base Edinburgh in South Australia for the final training, and then the passing out parade watched by proud parents. I was sent to RAAF Laverton School of Radio in Victoria for my radio mechanics course, learning AC and DC theory, mathematics for electronics, and general radio theory. I had chosen to become a 'RADTECH A', in plain language a Radio Technician on aircraft systems.

Part of the flight-line RAAF Butterworth, Malaysia in 1968.

Following that course I was posted to Pearce in Western Australia for nine months for on-the-job training where I worked on my first aircraft, the Vampire jet and an old DC3 Dakota complete with trailing HF antenna. Finally, I returned to Laverton for the Radio Technicians Course, where we were taught advanced radio theory and built various bits of equipment such as a super-heterodyne receiver. It was fun to plant faults and see how quickly we could fix the problem. By the end we had learned and worked on search

75 Squadron, my home for 2 years at RAAF Butterworth Malaysia, 1969.

radars, gun-sight radars, the different types of airborne HF and FM aircraft transceivers, radio altimeters, IFF and so on.

After graduating from radio school I began nine of the most enjoyable years with postings to various RAAF bases around Australia, working in some of the most advanced electronic sections with the best test equipment of the time.

My first posting was to Williamtown, NSW and a squadron of French built Mirage jet fighters. I worked for a time on the Mirage radar guided MATRA air-to-air missiles as well as the various aircraft systems and its radar. In 1967, during Vietnam, the entire squadron was sent to Butterworth in Malaysia for two years, a real highlight for me. I enjoyed the greatest time there of work and travel plus acquiring a taste for Asian food, especially hot curries which were prevalent in the ordinary ranks mess at RAAF Butterworth, Malaysia.

In 1969, following Malaysia, I was posted to 5 Squadron at Fairbairn, Canberra and the Iroquois Helicopters. There, as well as working on the bench and servicing the aircraft, I trained as a flight fitter on radio electrical and instrument systems plus cross training for the airframe and engines systems.

We then became part of the flight crew, flying with the machines all over Australia. I took part in many field exercises, ranging as far as Western Australia, Rockhampton, Puckapunyal and Wewak in New Guinea. On some of these the Iroquois would be stripped down, loaded on to a Hercules C130 and then reassembled at the other end.

My final posting was RAAF Base Edinburgh in SA (my home State) where I had the privilege of working on the various systems of the PC3 Orion Maritime reconnaissance aircraft.

I decided to discharge from the RAAF in February 1973, having finally made it back to my home state. So, in that month, after a mere three days off, I joined the South Australia Police Force. SAPOL was looking for qualified radio technicians at that time. The only crunch was (in those days) one had to become a sworn police officer irrespective of which area one operated within the organisation. So it was back to training and a four month adult course at the Police Academy, involving typing, physical training, law, drill and weapons training.

Following graduation I began at the police Radio Section. We serviced the entire police communications systems including base stations, mobiles, handhelds and various specialised equipment. It was during this time, in 1974, that I began an interest in personal radio communications and for a short period I took the easy way out and joined a CB club, purchased a 27 MHz set and tried to look cool. That wore off fairly quickly as most of the CB traffic over the air didn't suit my interests.

On exercise, Wewak, New Guinea, 1970.

Meeting some locals at Wewak, New Guinea.

At the time Radio Section was staffed by elderly ex military chaps who had come out of the Forces. They were all proficient Morse operators so I decided to study for my Novice License. You had to be proficient at five words a minute in those days. Our section intercom between buildings was an old PMG Morse key tone setup, so we Techs had to know Morse to converse back and forth to call people to the telephone.

For practice I used to send Morse as fast as I could to one of the old blokes and after a while I would ask, "Why aren't you writing this down"? Their answer invariably would be, "When you send sufficient text I'll write it down". I was sending pretty slowly at the beginning. For several months I voiced in Morse to and from work, such as number plates and advertisements.

The technical side of the Novice exam didn't worry me too much, as I was already a qualified technician. I passed the Novice Exam, albeit very nervously when it came to the Morse. The first few words at my sending test were just a chatter of the key so the examiner asked

About to load an Iroquois into a C130 Hercules.

me to relax and begin again. My first call sign was VK5NWB and that was in 1974.

A year or so later I decided that the Novice bands were a bit limiting so, to get the benefit of all the bands, I decided to sit for the 'full call'. More Morse practice at over 10 words a minute followed for many months before the next exam. In 1976 I selected VK5AXN as my callsign which remains so today.

Soon afterwards I constructed an HF five element, twin band, rotating beam antenna, plus several slopers and long wires. Thereafter followed a very enjoyable period of worldwide contacts on my newly acquired Yaesu FT-707. My setup also included VHF and UHF radios for local contacts. Then in 1983 I met the woman that I was to marry.

Setting up home, a new daughter and all the things that go along with married life takes up heaps of time, so amateur radio went on the backburner. I even reached the stage of wondering if I would ever use the equipment again and in a weak moment sold all my gear, even the beam antenna and mast.

But, after a few years, the amateur spark rekindled. Chaps at work, apart from the usual amateur radio contacting, were involved in radio fox hunting. They had been attending the annual amateur fox hunts at Mount Gambier for years and I was 'hooked'. Apart from acquiring second hand HF, VHF and UHF rigs, I built a Doppler DF system and fitted my old Nissan Pintara roof with a removable platform carrying an array of electronically switched, quarter wave whips. There was a fair bit of training before each yearly event, and the practice night hunts around the Metro area were great fun.

For a few years I acted as the team navigator. We either used a mate's vehicle or, on some occasions, a hire car. We even won the odd second prize but it was the fellowship and meeting other amateurs that was most enjoyable.

It was around that time that I began volunteering for the organisation called Operation Flinders Foundation that conducts Wilderness Therapy Exercises for youth at risk in the Northern Flinders Ranges of South Australia. For many years during work, and later during my holidays, I would travel up north and set up VHF communications systems. This enabled the organisers to maintain contact with the teams of kids in the field, on a 24 hour basis.

We installed VHF repeaters around the 500 square kilometre area and operated with 25 watt mobiles and one watt handhelds. The exercises took place (and still do) at least four times per year. I always travelled up with my amateur HF gear for some night time contacts.

One memorable contact on VHF, from the North Flinders, was with Dr Andy Thomas in 1989, whilst he was doing his four month posting aboard the Russian MIR Space Station. I'll keep that particular story for another article.

Re-assembling the Iroquois at Derby, WA.

We used to live in the foothills just south of Adelaide and there I had all my gear set up in a lovely little fully insulated shack-cum-repair room complete with antennas. However, life changes and about two years ago we decided to build a new home at a place called Hayborough which is 1½ hours south of Adelaide near Victor Harbour on the south coast. Since packing up all my equipment and placing it in storage, I haven't been on the air. We moved into our new home just four months ago and I have been extremely busy setting up home, laying storm water drains, building a pergola and landscaping.

I do have my 'Man Cave' finally organised now having taken over a third of the double garage. Even the various radios are in position on the bench and ready to switch on. However, as yet I don't have any antennas installed. Where we live there are certain restrictions as to how visible antennas may be, so I am planning various ideas for antennas involving possibly a tilt over mast or maybe a pump-up. Initially I will use my squid pole for HF and a J-Pole for VHF and UHF. It will be a challenge.

So, in the not so distant future I'll be back on air and even hopefully listen in on the RAOTC news broadcasts. Cheers all.

ar

Some tower maintenance in the North Flinders Ranges during an Operation Flinders exercise.

Pigeon poo, 144 spark plugs and analogue radio

Herman Willemsen VK2IXV
RAOTC member No 1384

HARS is the Historical Aircraft Restoration Society in Albion Park, NSW situated 22 km south of Wollongong. It was formed in 1979 by a group of aviation enthusiasts interested in the preservation of Australian aviation history. Their three hangars house about 40 planes of which, at this stage, about half are airworthy.

Outside is parked a Boeing 747-400 which landed there on 8th March 2015 at 0747 am and will be a permanent feature at the museum. In Hangar 1, surrounded by a Neptune, a Tiger Moth, a Canberra bomber, a Sabre and an F-111C stands a Super Constellation, affectionately called 'Connie'.

It has four Wright R3350-93 18 cylinder, air-cooled engines, of which one is exposed so that visitors can see the 18 cylinders which are fixed radially around a rotating crankshaft. Each cylinder has two spark plugs making it 4 x 18 x 2 = 144 spark plugs in total.

Being a member of HARS, I have been inside the Connie several times. As a former Marine Radio Operator I could not help wondering what type of analogue radio and navigation equipment would have been used in the days before the introduction of satellite and digital communications.

The history of a Connie is quite fascinating. The first Constellation was designed in 1939 by the Lockheed Aircraft Company as a high speed, trans-continental passenger aircraft for TWA (Trans World Airlines). Howard Hughes, the well-known American filmmaker, business tycoon, aviator, aerospace engineer and major TWA shareholder had a lot of input with regard to the Constellation's range and speed parameters.

The Connie at HARS was built in 1955 as a Super Constellation C-121C and used by the US Air Force. It was taken out of commission (mothballed) by the USAF in 1977 and taken to the Davis-Monthan Air Base aircraft graveyard at Tucson, Arizona, a storage area in the desert for retired aircraft. There the planes are either kept for a long storage period or turned into scrap metal.

An elegant Lockheed Super Constellation in flight.

They are inspected yearly just to see if they could be of any future use.

HARS members first saw the Connie in the desert in 1990 and in 1991 bought it from the USAF. The plane was in a mess. During one of the yearly inspections, a window in the cockpit had been left open and pigeons got inside; quickly the plane's interior became one large pigeon house. As a result the aircraft's interior was covered in nests and pigeon droppings. It was so badly contaminated that even scrap metal merchants did not want her. We can therefore truthfully say that pigeon poo saved this plane!

HARS members scraped off and got rid of tons of guano and the plane was further restored on site. After many years of hard work it was finally declared airworthy and flown to Sydney in 1996.

This Connie is one of only two flying Constellations left in the world. She is registered as VH-EAG. The other airworthy Connie is Swiss-based with call letters HB-RSC.

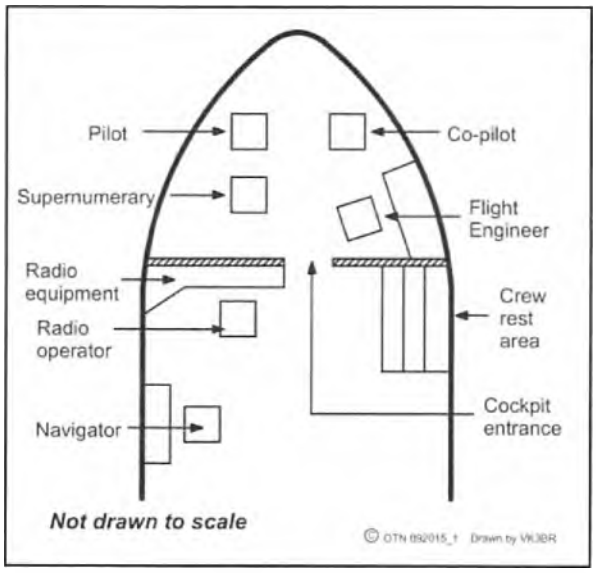
Connies were used for military and civilian use. After WWII the Super Constellations were very popular with many passenger airlines, including QANTAS on the famous Kangaroo Route to London.

With much help from aviation experts I was able to get a reasonably clear picture of the number of crew members on a civilian Connie and what sort of conventional radio and navigation equipment was used on this aircraft during the 1950s and 1960s.

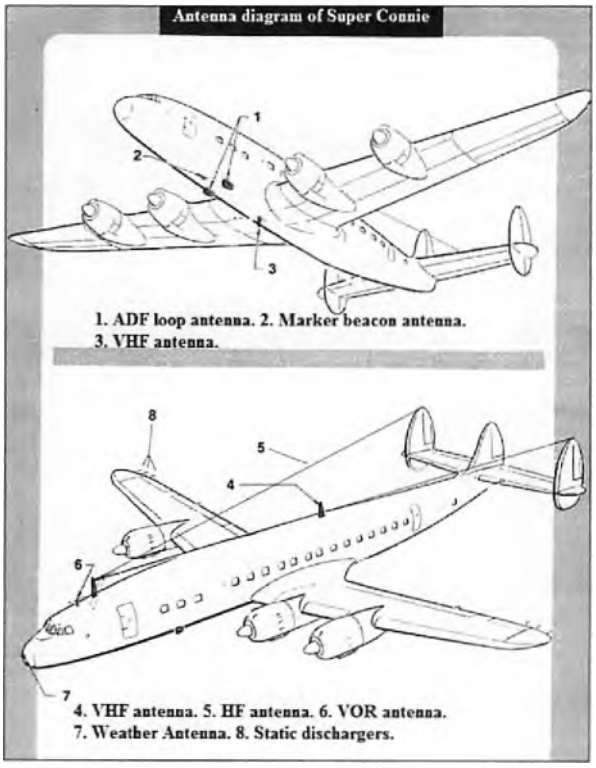
Technical crew and cabin crew: The normal technical crew on a Connie would have been a Captain, a First Officer, a Second Officer, a Flight Engineer, a Navigator and a Radio Operator. An additional pilot, usually a Second Officer, was often carried on long sectors. The cabin crew would have been about six.

Seating in the cockpit: In the cockpit, the Captain sat on the left and his Co-pilot, the First Officer, on the right. Behind the co-pilot sat the Flight Engineer in front of his instrument panel.

Behind the Captain's seat was a supernumerary seat, which had many uses. During take-off and landing the Second Officer would occupy the supernumerary seat and was responsible for reading the various checklists and ensuring



A drawing of the crew positions on a Lockheed Super Costellation.



the correct responses were given. He was also responsible for take-off data calculations, which were crossed-checked by either the Captain or the First Officer.

During training sessions the supernumerary seat could be occupied by a trainee, observing the pilot under instruction or, during crew-check flights, the supernumerary seat could be occupied by a company check pilot or an Examiner of Airmen.

The crew rest area consisted of bunks and seats.

In those days crew duty times were normally 18 hours, but could be much longer, hence the need for additional crew. Engine failure was common on Connies and ground facilities often very basic. If a diversion was made to an off-line airport, the crew had only themselves to rely on for engineering support and flight planning, etc. Once you had left Australia you were very much on your own and even getting a telephone call back to Sydney would be difficult. How things have changed!

Taking account of the extra crew and a multi-tasking crew, as explained below, a duty-roster would be drawn up and each crew member allocated time off.

Only the Captain and First Officer were qualified for take-off and landing. The Second Officer was qualified for both in-flight Pilot and Flight Engineer relief and could occupy either the Captain's, First Officer's or Flight Engineer's seat. This gave the others a chance to have 40 winks.

However, when the Second Officer took the Pilot's seat, either the Captain or the First Officer had to be on duty and two Second Officers could not be on duty at the same time.

It was the job of the Navigator[1] to calculate the aircraft's position. He did this, for instance, by using his sextant through an astrodome, a hemispherical transparent dome in the cabin roof of the aircraft. With the sextant he 'shot' celestial objects, in other words the sun, moon, stars and planets.

In those days, Captains and First Officers were also versed in celestial navigation and Morse code, and in flight could relieve the Navigator and the R/O.

A Connie cockpit with the two Pilots' seats in the background, supernumerary to the left and Flight Engineer position to the right.

In other words, by juggling the various positions all crew members could have time off in flight. You can imagine that drawing up a fair and workable in-flight off-duty roster was often a nightmare.

Supernumerary crew not required on duty during take-off or landing would occupy seats in the crew rest area.

From Analogue Radio and Navigation equipment to Satellite and Digital equipment: In the initial years, communication was limited to VHF telephony, HF radio and Morse code.

The radio equipment was just behind the cockpit in the left corner. The equipment boxes were mounted on rails to make a fast change possible and they sat on rubber shock absorbers to reduce vibrations.

This photo shows the location of the Radio Operator, the Navigator and the crew bunks in the cabin. Note the astrodome in the top of the fuselage to enable the Navigator to take 'shots' of celestial bodies with a sextant.

The equipment consisted of an ADF (Automatic Direction Finding) receiver, VHF transceivers, a Marker beacon receiver, a HF receiver and transmitter[2], a VOR (VHF Omni-directional Range) receiver, ILS (Instrument Landing System) receiver, a DME (Distance Measuring Equipment), weather radar and, not to forget, a Morse code key.

Static dischargers were needed because if the static electricity was not constantly bled off through them, the aircraft would develop problems with its navigational aids and radios.

All pilot aircrew had to be proficient in Morse code reception at 10 wpm in order to properly identify radio beacons such as NDBs, VORs, ILSs, etc.

It was up to the Pilots, Radio Operators, Flight Engineers and Navigators to ensure a safe arrival.

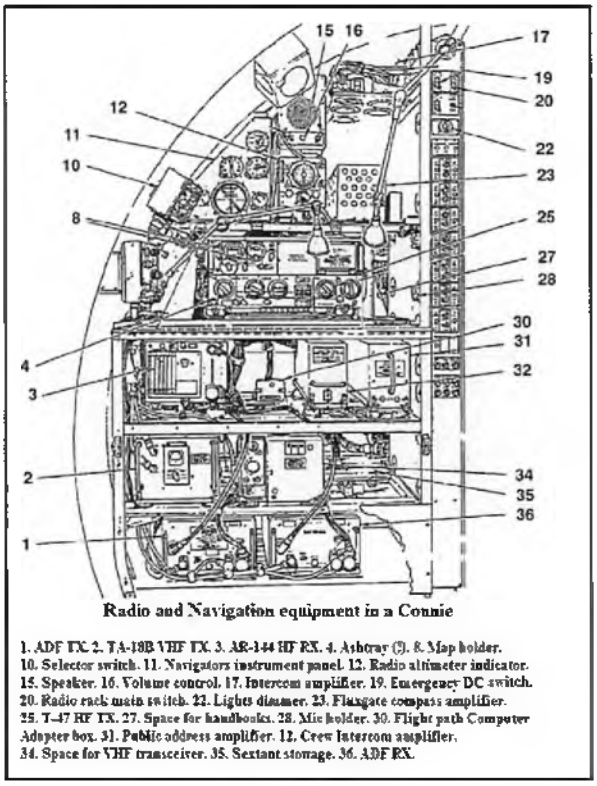
The technological advances of the past 60 years have changed the way pilots fly.

Today, flight and navigation information is displayed via the glass cockpit[3], which takes the place of the six basic blind flying instruments in earlier aircraft. The glass cockpit has selectable programmed displays which collate the flight and navigation data applicable to a particular phase of flight to make life much easier for today's pilots.

The global positioning system (GPS) is one technology that allows pilots to accurately determine their position anywhere on the earth within seconds.

In other words, in the Connies it was radio based systems, but in today's modern aircraft it is digital radio and satellite based systems - R/Os and Navigators are no longer needed!

Only little bits of the conventional radio communications are left. For instance, VHF is still being used for navigational aids and voice communications. Nearly all of continental Australia is now covered by VHF via remote ground based repeaters which communicate to the controller and back to the aircraft via satellite communications. HF is still used in some areas including airfields used by remote mining sites and also by light commuter aircraft off airways or not flying high enough to access the VHF repeaters. For example, there is a lot of HF activity by aircraft in WA transporting fly in fly out (FIFO) workers.



Radio and Navigation equipment in a Connie

1. ADF TX 2. TA-18B VHF TX 3. AR-144 HF RX. 4. Ashtray (3). 8. Map holder. 10. Selector switch. 11. Navigators instrument panel. 12. Radio altimeter indicator. 15. Speaker. 16. Volume control. 17. Intercom amplifier. 19. Emergency DC switch. 20. Radio rack main switch. 22. Lights dimmer. 23. Fluxgate compass amplifier. 25. T-47 HF TX. 27. Space for handbooks. 28. Mic holder. 30. Flight path Computer Adapter box. 31. Public address amplifier. 12. Crew Intercom amplifier. 34. Space for VHF transceiver. 35. Sextant storage. 36. ADF RX.

The glass cockpit on an Airbus A380. Compare that to the cockpit photo of the Super Constellation on the previous page.

Footnotes

1. It was the job of the Navigator to know the aircraft's position at all times and to keep the pilots informed. The Navigator calculated the position with the aid of sextant, radar, radio bearings, map reading, LORAN and dead reckoning. The R/O would send the aircraft's position by Morse code to ATC and the airline company.
2. Often the robust Collins T-47 short wave (HF) transmitter, which had a reputation for reliability and ease of use. This transmitter flew throughout WW II and well beyond the war, even out into the late 1950s and even the 1960s, and saw service until the 1970s in many military and civilian aircraft. The corresponding Rx used with the T-47 was the BC348 receiver.
3. A glass cockpit is an aircraft cockpit that features electronic (digital) flight instrument displays, typically large LCD screens, rather than the traditional style of analogue dials and gauges.

Acknowledgement

- A special thanks to RAOTC member and former pilot Clive Wallis VK6CSW
- HARS, Albion Park, NSW.
- Dutch Super Constellation historian, Ruud Leeuwen.

ar

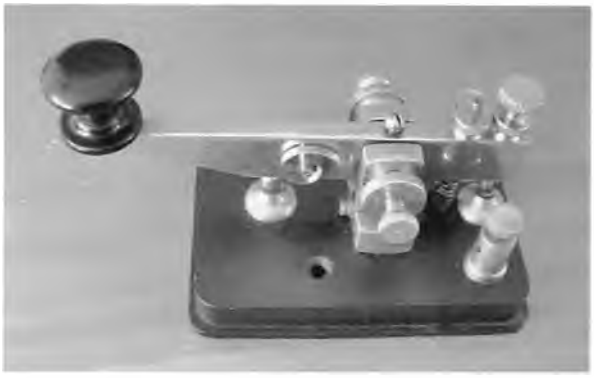
Doppelgangers

Herman Willemsen VK2IXV
RAOTC member No 1384

When I saw and won this dilapidated straight key on the well known International Auction Website, it reminded me straight away of a Japanese key which I had in my collection many years ago.

After I disposed of the useless bit of wood attached to my latest purchase and looked underneath the key's Bakelite base, I was happy to see the writing 'Levenson's Radio, 226 Pitt Street. Sydney' underneath the base of the key. I then knew that I had scored a 1930s Levenson No 1 straight key, the one which looks like a twin of the Japanese Sharp T² No 1100 key, but not as well made.

The 1930s Levenson No 1 straight key before restoration.



The Levenson No 1 straight key after restoration.

The Japanese Sharp T 1100 Morse key. Notice the similarity to the 1930s Levenson No 1 straight key.

Who was Levenson's Radio?

Levenson's Radio, owned by Joseph Levenson, was a radio store located at 226 Pitt Street, Sydney from 1927 - 1960.

The business sold radio kits, DIY radio manuals, a line of finished radios, Morse keys, a PMG-type sounder, games and hobbies, amusement items for fetes and carnivals, and much more.

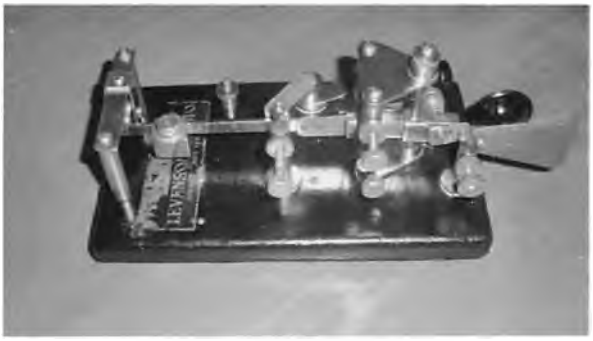
For their Morse keys and kit radio sets the brand name 'Like-A-Flash' was used.

Levenson's Radio manufactured three types of basic straight keys (the No 1, No 2 and Junior De Luxe), but did not make semi-automatic (bug) keys.

There must have been a mutual arrangement between Joseph Levenson and August Kraus of Buzza Products Sydney because Levenson's Radio sold Buzza-made bugs and, after removing the Buzza nameplate, attached its own Levenson's label (decal).

It appears that Levenson's Radio copied the Japanese Sharp T No 1100 key's hardware and design and produced the Levenson No 1 key in the late 1930s. However, in the 1940s Levenson's Radio made another model of the Levenson No 1, which had slightly different looking hardware than its predecessor with no

The two versions of the Levenson No 1 straight key. Nearest the camera is the 1940s model with the 1930s model, which had the coiled spring, in the background.



Levenson's Radio jigger.

A WT8AMP Morse key with a braided brass grounding strap.

A pigtail groundwire on a Vibroplex bug with jeweled pivot bearings

coiled spring, but was still very much a copy of the Japanese key.

After a fair bit of polishing, rust removal, recreating a coiled spring[3] and replacing the missing knob, the neglected and battered key was restored to its former glory.

Footnotes

1. Doppelgangers is a German loanword. Doppel is double and ganger is walker or goer. In other words: a double or look-alike.

2. Tokuji Hayakawa was the founder of the Sharp Corporation. The name Sharp was derived from the name of 'the Ever Sharp mechanical pencil', which Tokuji invented in 1915. The company's initial trademark was a right hand gripping the letter T, the first letter of Tokuji.

3. The coiled spring between the main lever acts as a current bypass to avoid current through the pivot frame bearings. This coiled spring is similar to the braided brass strap on the ubiquitous WT8AMP keys or the pigtail wire on a Vibroplex bug with jewelled bearings (see photos above).

Acknowledgement

Larry Hazzard/VK2LPH, friend and fellow RAOTC member. He owns a Sharp T No 1100 key. He skilfully reproduced the key's missing coiled spring using 0.010" (0.25 mm) brass sheet, and a knob with skirt from spare bits. **ar**

Have you enjoyed 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 original material from members!

Radio Amateurs Old Timers Club South Australia

There will be an informal **RAOTC Lunch** on
Thursday, 22nd October 2015
(12 noon for 12.30 pm start)
Please bring your Seniors Card
and a name badge
Venue: **Marion hotel**
849 Marion Road
Mitchell Park
Public transport Bus M44, stop 24.

Important! To ascertain tables required, please
RSVP before 15th October 2015 to:
Hans Smit VK5YX - vk5yx@wia.org.au - SMS or Ph: 0414 891 734

Radio Amateurs Old Timers Club Australia Inc

In accordance with the Rules of Association, notice is hereby given of the

Annual General Meeting 2015

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

to be held at

12.00 noon on **Thursday, 24th September 2015**

at the

Bentleigh Club, Yawla Street, Bentleigh, Victoria.

Business: Confirm minutes, adopt accounts, elect committee members.

(Note: All the existing committee members are willing to continue in office and offer themselves for re-election.)

The AGM will be followed by the Melbourne September Luncheon at 12.30 pm.

Please note the earlier times for the AGM and the Luncheon!!

The guest speaker will be Bill Roper VK3BR who will present an illustrated talk on his: "*Reminiscences of National Service as a traineeTelegraphist in the RAN 60 years ago*".

The Luncheon comprises a three course meal, plus tea and coffee at a cost of $36.00 per head (fruit juice, soft and alcoholic drinks at members' prices).

Members are welcome to bring a friend, but we must have firm bookings to PO Box 107, Mentone 3194 no later than Monday, 21st September 2015.

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 Secretary
PO Box 107
Mentone VIC 3194

to reach him by 21st September 2015.