

The Australian Army Signals Museum



This photo shows the WW2-era WS122 portable HF radio transceiver at top (without its power supply) while below it is a WS22 transceiver. The latter was a low-power (1.5W) HF unit covering 2-18MHz over two bands.

This month, we take a look at an interesting museum that's dedicated to the display of ex-Australian Army radio equipment. It's not often that you get the chance to see a collection of military communications gear.

TECHNICAL MUSEUMS have always interested me and I endeavour to visit them whenever the opportunity arises. Recently, an opportunity to visit the "Royal Australian Army Corps of Signals Museum" at Macleod in north-east Melbourne

presented itself. I was fortunate that Major Jim Gordon was able to give me a personal tour of the facility.

This museum is part of the Army Museums Network, which itself is part of the Army History Unit. It commenced operation in the early 1950s at Balcombe where members of the School of Signals initially set up displays of equipment that was being phased out of use by the army. The museum was subsequently moved to its present location in Macleod in 1970, where it was housed a redundant satellite monitoring facility from the Cold War era.

It probably seems ironic that a museum is housed in a building previously used for the very "high-tech" satellitemonitoring task. In fact, the redundant monitoring station equipment still occupies some 60% of the floor space, which means the museum cannot display all of its stored equipment until the redundant equipment is removed. Two 600kVA emergency power plants are also still installed, although these are no longer operating.

Communications pre-radio

Although our interest in army communications is predominately concerned with radio, it is interesting to consider how armies communicated before radio was invented.

In very early times and even up until relatively recently, runners and couriers were often used to keep the commanders informed of progress on the battlefield and to deliver their orders. Horse-mounted dispatch riders were commonly used before giving way to motorcycle dispatch riders during WW2.

Courier pigeons were also commonly used by many armies up until WW2. In fact, they were still in use by the Swiss Army as late as 1994.

A variety of sound and visual signalling methods were also used over the centuries. Most were labour intensive and messages usually took quite some time to reach their intended recipient. However, some methods proved relatively fast in transferring signals. For example, the heliograph was an optical device that reflected strong sunlight and had quite a long range when used



Australian diggers pre-WW2 with a WT Set C Mk.2 "Cork Set". It took no less than nine soldiers to support and operate this equipment which was used by the Australian Army during the 1930s.

from hilltop to hilltop.

It was used from around the 1850s and even saw limited use in WW2.

Radio communications

With the invention of Morse code and the telegraph, communications from fixed locations became quite speedy. Insulated single and twin cables were often laid underground for fixed locations and on the surface for much more temporary installations.

Some readers will be familiar with the D-series (commonly called Don 5 by the layman) twin-insulated cable. This had one green and one black wire and was commonly available in disposals stores after WW2. This cable could be run out from a hand spool or more commonly from a cable-laying trailer.

Wired communications developed at a pace during WW1 and a variety of systems were used. Some using a single wire with an earth return proved not to provide secure communications. After all, one side of a conflict did not want to have the other side reading their messages.

To overcome this, the D-series cable and other similar twin cables were



Designated the Model 94 Mk.6, this portable radio was used by the Japanese army during WW2. It operated over the 24-47MHz frequency band and could be powered from external 3V and 135V batteries or from a hand generator.

introduced. At around the same time, a telephone system using equipment called a "Fullerphone" provided much more secure communications than some other methods of the same era. The history and use of wired communications in the army and civil life is in itself quite an extensive and interesting story.

Wireless in WW1

Wireless communications were first



The WS208 was one of the first low-power sets to be used by commando units during WW2. This CW-only 6-valve set was carried in a back-pack and had an operating frequency range from 2.5-3.5MHz.



Made by an English War Department Wireless Factory during WW1, the WT1 transmitter was fitted to reconnaissance aircraft from 1916. The pilot's task was to transmit enemy troop deployments back to HQ and to artillery batteries.

used by armies during WW1. Wireless had been around in its fledgling form since the turn of the century and was now sufficiently advanced enough for use by the military.

However, it was not enthusiastically endorsed by all sections of the military because it was still relatively undeveloped. The main problems included the bulk and weight of the equipment, its unreliability and a lack of competent radio technicians to handle the gear. At that stage, wired telephone and telegraph systems were well developed and worked well. However, the amount of wiring needed between each communications site had grown enormously and the system was inflexible due to the rapidly changing nature of the conflict.

It didn't take long for many forwardthinking military leaders to realise that "wireless" was the way to go if communications with the front line were to be effective and timely. It was just a matter of waiting for suitable equipment to be developed.

The first wireless sets in WW1 were Marconi pack sets. These required four horses to carry each pack set plus five or six men to set up a station, which took around 10 minutes! It then required two soldiers to operate it.

The range was claimed to be around 50km.

In 1915, another set called the BF was introduced, which had a range of around 17km. This meant that "portable" battery-operated spark transmitters with valve receivers were starting to be used at the front line. However, in 1915, "portable" meant that the set could be carried with difficulty by several soldiers.

Most of the sets worked on quite low frequencies which meant that their antennas were inefficient if made too small. For example, the Wilson spark transmitter worked on three wavelengths – 350 metres, 450 metres and 550 metres. However, some small spark transmitters operated on 65 and 80 metres.

By this stage, some aircraft were also being equipped with transmitters to report conditions back to headquarters from behind the front lines and to adjust the fall of artillery. The WT1 transmitter from 1916 was one of the sets used for this task and is shown in one of the photographs. For the troops in the front line, progress in radio communications was slow but steady during WW1. During this time, low frequencies were still thought to be the most useful for long-distance communications. It was not until the 1920s that amateur experimenters proved that shortwave (high-frequency) communications were much more effective.

Perhaps the most successful "trench wireless" during WW1 was a unit developed by the British in 1917. This had a range of around 70km but if it had used shortwave frequencies, it would have been well ahead for its era. However, it was still a good performer and despite its limitations, it remained in service until the 1930s.

The post WW1 era

Developments in radio communications for both military and commercial use picked up speed during the 1920s and 1930s. In the early 1930s, the C Mk.2 "Cork Set" was being used by the Australian Army. It required no less than nine soldiers to look after it and is shown in one of the photos. Subsequently, by the time WW2 arrived, equipment like the No.11 set, the 101 and the FS6 were in use (an article on the FS6 appeared in the May 2002 issue).

During WW2, other more advanced transceivers, transmitters and receivers were developed to cater for the needs of the military. This equipment included the No.19, which was used in tanks, and the 22/122. Both were semi-portable transceivers that could be back-packed into remote areas and were good performers for their era (the 122 was featured in an article in October 2002).

Another well-known set was the AT5/AR8. Developed by AWA for the RAAF, this 50W MF/HF transmitter/ receiver combination was also often used for low-power base station work and in shipboard installations.

Yet another interesting set is the 108. This was one of the first backpack or "walkie-talkie" sets and it's closelyrelated sibling, the 208. was one of the first low-power sets to be used by commandos. The 108 was described in the November 2006 issue.

Following WW2, the 62 replaced the 122 and the 108 was replaced by a much superior back-pack set designated the 128.

Radio communications equipment



Major Jim Gordon, the Officer In Command of the museum, with a WW2 101 military transceiver.



A close-up view of the WT Set C Mk.2 used by the Australian Army during the 1930s. It required lets of support equipment.



The type "A" Mk.3 "suitcase" set was the smallest transceiver to be developed during WW2 and was commonly used by resistance groups and for clandestine operations in Europe. It used miniaturised parts and had a range of over 160km.

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played an important role behind enemy lines during WW2. Sets such as the Type 3 Mk.2 and the Type A Mk.3 transceivers, plus the MRC-1 receiver, were commonly used in Europe by various resistance movements. The Type 3 Mk.2 and the Type A Mk.3 were described in the October 1998 issue.

Of course, much larger and more powerful transmitters were used to ensure reliable long distance communications. A good example is the AT20 which had an output power of 500W.

WW2 receivers

A number of communications receivers and amenities receivers were also produced during WW2. These included sets such as the AMR300, the HRO and AR7 communications receivers, along with the No.4 general entertainment (amenities) receiver.

General overview

From this short story, it can be seen that this museum caters for well over 100 years of military communications. It really is fascinating to see how things were done over the years and the explanations given by Major Jim Gordon helped me to understand why things were done the way they were. It is rare to have the opportunity to learn the rationale behind communications developments.

Most radio collectors concentrate on domestic radios and as such tend to shun military equipment. The reasons aren't hard to find – it is generally visually unappealing and quite complex technically. However, I think that all radio enthusiasts should consider having at least one piece of our military radio communications history in their collection. We think that our domestic radios are complex (and some are) but it was the military equipment that lead the way in technical innovation.

By the way, although most of the museum's display is indoors, there were also a few large items undergoing restoration in the compound. Many of these are post WW2 semi-mobile, high-technology communications and surveillance units that were mounted in trailers and vehicles.

My favourite gear

One highly-innovative piece of equipment from WW2 is the 122 high-frequency AM/CW transceiver. It's one of my favourites bits of gear and it used aluminium extensively to keep its weight down.

It also featured a semi-break-in Morse code facility, a press to talk (PTT) dynamic microphone and a metering system that allowed reading of all vital operational indicators. It was also well-seated against moisture ingress. In fact, it could probably survive an accidental dunking in water with no ill effects.



This photo shows an AT5/AR8 MF/HF transmitter/receiver combination. It was commonly used as a low-power (50W) base station and was extensively used in RAAF aircraft and in shipboard installations during WW2.

The set ran from 12V and had quite a low current drain – about the same as many transistorised car radios, in fact. I could rave on about it for some time but the point I want to make here is that a large number of its facilities and innovations were not incorporated into domestic sets and communications receivers until 10-20 years later.

Summary

Like most good museums, this museum is still a work in progress. However, Jim would like to have more volunteers to assist in restoring equipment, setting up displays and guiding visitors around the museum.

Currently, due to staff shortages, the museum is usually open between 10am and 3.30pm on Tuesdays only. The entrance fee is just \$2 and the museum is located in the Simpson Barracks. The entrance is from Greensborough Road, just south of Yallambie Road.

If you feel that you can assist as a volunteer or have some redundant military equipment which could be of value to the museum, please contact Major Jim Gordon on 0407 264 961 or contact him via e-mail at jim.gordon@ vicsig.net



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