Combined Adelaide DCA Radio Installation/Workshops /Maintenance staff at a function in the early 1950 years

Photos and related information on aeradio installations for Dept. of Civil Aviation around 1940 - 1954 in the SA Region

by Lloyd Butler

Introduction

The Australian Department of Civil Aviation (DCA) was formed in 1938 and operated as a Department under that name until 1973 when it was Incorporated into the Australian Department of Transport.

In the years 1947 to 1954 I was a member of the radio construction and installation technical staff in the DCA which was responsible for the installation and maintenance of ground radio communication and navigation equipment in the South Australian and Northern Territory region. I was also part of the PMG installation staff who installed the radio equipment for DCA around 1940 - 1946 before the DCA Radio Workshops and installation technical base at Parafield was started.

The initial photographs identify many of our technical staff who worked for DCA in those days and also show a few samples of the equipment we installed. The photos at Mt Gambier and Leigh Creek were taken around 1949 to 1951 when I supervised installations on aerodromes at these locations.

Further on in the article I have moved back to earlier years when the earlier transmitters and receivers were installed at DCA aerodromes by what was then the Transmission Section of the PMG department based in Adelaide.

Identification of some of the early technical staff

The leading photograph above was taken at a social function. I am able to identify the following: Dion Johnston, Ted Stephenson, John Ward, Dave Keel, Peter Syme, Eric Manole, Laurie Smith, Derek Howarth, Leon Kent, Lloyd (Dick) Butler, Kevin Moroney, Les Harper, Chris Comas, Norm Kelly, Len Clifford, Jack Marler, Syd Ross, Les Nippress, Bill Francis, John Langman, Otto Kongi, Leon Kent, Colin Woskett, Geoff Fuss, Don Crowley, Dick Wolfe and Ralph Stevens. There are also several familiar faces which I am unable to name.

There are also some names I recall from around that early era but not in the above photograph: Frank Partridge, Dudley Wilkinson, Max Tonkin, Algy Grigonis, Eric Kelly, Sid Dennison, Roy Dennison, Keith Sander, Frank Rouseau, Eugene Moleneaux and Paul Muscat.

Several others not listed above are found in some of the following photographs: Fred Sparks, John Newman, Pat Giddings, Paul Muscat, John Mortimer and Eric Halliday.

A further photo of the Radio Workshops at Parafield in 1949 was taken a little out of focus. I was unable to enhance it good enough for me to identify a few of the faces.

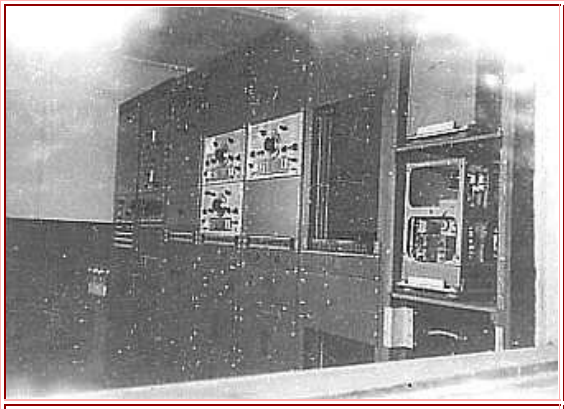
Parafield Radio Workshops
Technical staff December 1949

Back Row
Ralph Stevens,?,?, Fred Sparks, John Newmann, ?, Derek Howarth, Bill Francis
Second Row
Dick Wolfe, Lloyd Butler, Ted Stephenson, Jack Marler, Eric Haliday, Pat Giddings, ?, Colin Woskett,?
Front
John Ward, ?.

Some photos at Mt Gambier Aeradio

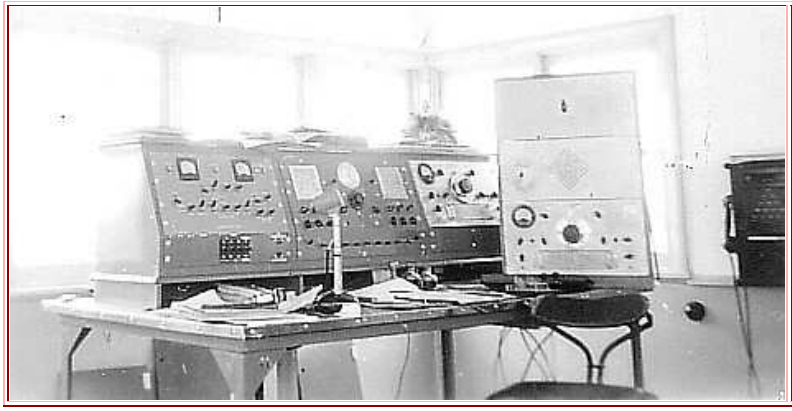
With Peter Syme as an assistant, I installed a new Aeradio Console and associated rack equipment at the Mt Gambier Aerodrome in late 1949. The

console and rack mounted equipment photographed are typical of many we built in the Radio Workshops at Parafield around the period of 1949 to 1953 for installations such as this.



Mt Gambier
AWA Tx Control,Receiver Racks
& TA2J Transmitter - Installed November 1949

Mt Gambier
Aeradio Building

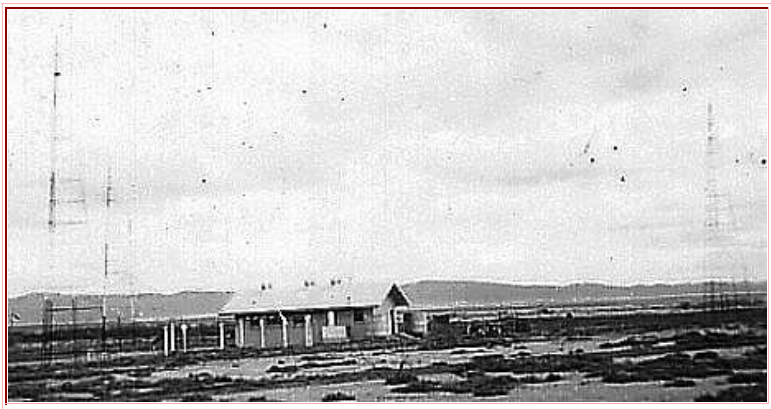


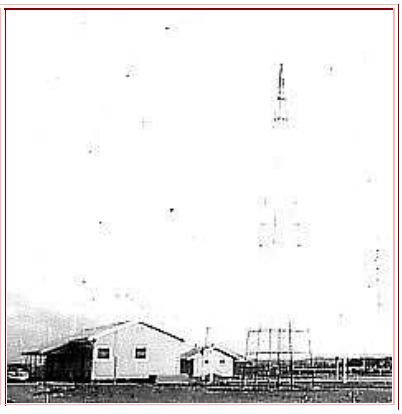
Mt Gambier Aeradio Console
Installed November 1949

A New Aerodrome at Leigh Creek

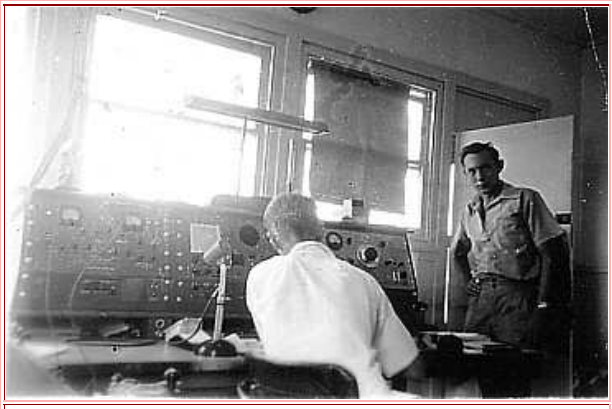
In around 1950, as Senior Technician for Radio Installation, I led a team of technicians to Leigh Creek to instal a complete aeradio installation in a new national airport. Previous to that time, aeroplanes en route to the north, landed at Mt Eba for refuelling and Leigh Creek replaced Mt Eba. My team installed all the radio facilities except the Radio Range which was a project of a different party. The installation included a new control console and associated control racks which we had built in our Radio Workshops at Parafield and a new AWA Multi-channel transmitter. The transmitter was actually a multiple arrangement of separate RF cabinets and separate power supply cabinets operated from a centralised control system. (I left DCA in late 1954 so my historic knowledge of DCA stops there. However I understand this transmitter eventually found a new home later as the facility at West Beach airport.).

During the installation, I took a few photographs with a tiny very basic "Bullet" camera from which I have small prints of poor definition just 6mm by 4mm. However I have managed to enhance their quality with a little a bit of image processing on the computer and these together with the previous ones of Mt Gambier are reproduced here.

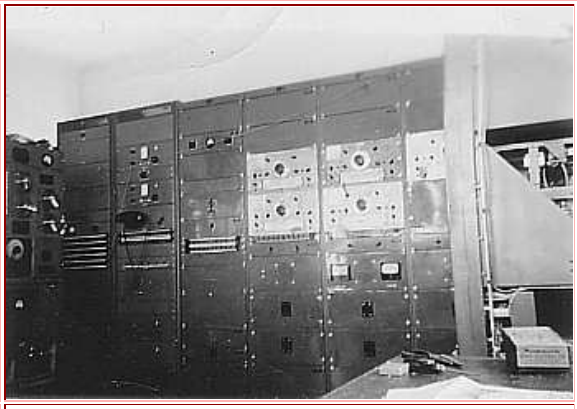




Leigh Creek Transmitter Station	Leigh Creek Aeradio Station



Leigh Creek Aeradio Control Console
Communications Officer - Andy Fisher
and technician - John Newman



Leigh Creek
Aeradio Receivers and Control Racks

Leigh Creek
AWA Multichannel Transmitter

Leigh Creek
AWA Multichannel Transmitter

Leigh Creek Radio Installation Team
at Copley Hotel
Len Clifford, John Mortimer, Fred Sparks,
Lloyd Butler, John Newman, Jack Marler
(not in photo - Paul Muscat)

Leigh Creek Radio Installation Team
at Copley Hotel
Len Clifford, John Mortimer, Fred Sparks,
Paul Muscat, Jack Marler,
(not shown in photo - Lloyd Butler, John Newman)

Lloyd Butler and Fred Sparks on the then unsealed road to Leigh Creek (Note the coats to protect from the dust)

A visit to the Leigh Creek site from Eric Halliday and Syd Ross with John Mortimer and a party unidentified. (The Blitzwaggon in the background is what we had to use after the aerial installation line party had an accident with our own vehicle)

Lloyd Butler with our vehicle the Aerial Line Party slightly damaged

Paul Muscat with the damaged vehicle. The Copley Hotel, where we lodged, is in the background

After all the radio installation of the period was finalised at Leigh Creek, I never ever returned to that town. I have been told that since then, the town and the aerodrome have all been moved to a new location. A coal mine now sits on the location of the old town.

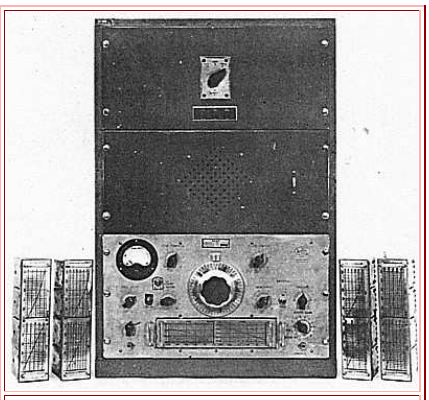
<u>Ceduna</u>

For some years before DCA formed its own groups of radio installation and maintenance staff, aeradio installations were carried out under contract by the Postmaster General's Department (PMG) technical staff. The photo at Ceduna shows some of these, including myself and Chris Comas, who both later joined DCA.

PMG radio technical staff re-loading Crates of Ceduna VAR Radio Range from the Railway at Ceduna.
Top from left: Wilf Iverson, a lineman, Bert Lampe, Aub Johns (lineman), Lloyd Butler. In cab: Chris Comas. Boy: Comas junior.
The Ceduna VAR Range equipment was installed by PMG staff around 1945 or 1946.
The photo was probably taken by Andy Comas who was also on the team. .

The Regional Radio Workshops at Parafield

For nearly 3 years during the period of 1951 to 1953, I supervised the technical staff of the Regional Radio Workshops at Parafield. During that period , West Beach airport was under construction and Parafield was Adelaide Airport. At that time, we had around 30 technicians and Senior technicians on the workshops staff building equipment which was to be installed at aeradio stations in the region. This technical staff also provided a pool for installation teams. The operating consoles and equipment racks shown in the photographs of Mt. Gambier and Leigh Creek are typical of equipment built in our workshops. We also built many of the amplifiers, power supplies and controls systems which fitted in the racks and consoles.

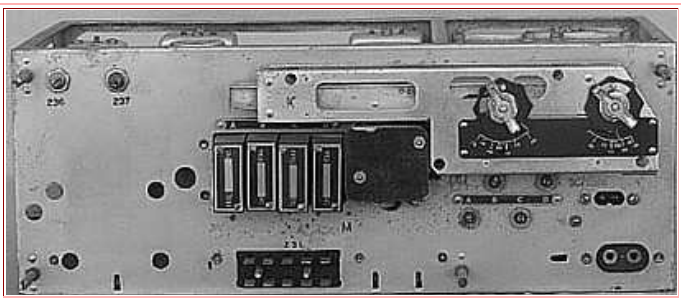


Receiver Type AR7

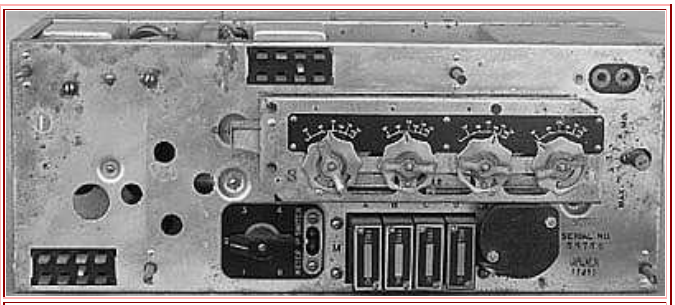
At that time our standard HF radio receiver for remote receiver stations and aeradio control stations was the Kingsley AR7 which had been recovered from use by the RAAF in WW2. Before re-use we stripped these right down to their chassis, redone the cadmium plating and rewired them. We also constructed Codan (Carrier Operated Device Anti-Noise) units which operated in conjunction with the AR7 receivers and which were a fantastic development to reduce the noise level in aeradio stations that by necessity had to simultaneously monitor many HF channels . More on the use of the AR7 in DCA is given in a further article

On the VHF side, our standard crystal locked receivers (type BC624) and transmitters (type BC625) were taken from aircraft SCR522 transceiver units. We also built Codan units for the BC624 receivers.

So the workshops provided quite a stop-gap in the provision of receivers until new crystal locked receivers, made to DCA specifications, were introduced. These were the R20 for HF and the R30 for VHF.



VHF Receiver Type BC624



VHF Transmitter Type BC625

The VHF receivers were mounted in racks and each locked on a single frequency. VHF operation commenced around 1949. At Parafield, the Tower frequency was 118.1 MHz, the approach frequency was 119.7 MHz and the en-route frequencies were 122.1 and 122.9 MHz. Around 1950, a repeater link was established to a VHF station on the hiiltop at Summertown. This improved en-route communication to aircraft in the easterly shadow of the Adelaide Hills.

Reference to the 1949 Radio Workshop photograph, at that time Eric Haliday was in charge. Don Crowley also sat in the chair for a short period before handing on to myself in 1951.

Parafield Aeradio Communications Centre

I was twice involved in rewiring the Aeradio Communications Centre in the Parafield Control Tower building. Around 1945 Eric Manoel and I (then technical staff of the PMG's Department) rewired the control centre and the associated racks of AWA receivers.

In the 1950's, (now employed by DCA) I supervised the construction and installation of new racks and a new control console in the Aeradio Centre. The new equipment was all built in our Parafield Regional Radio Workshops. The new console was designed on similar lines to those shown in the photographs for Mt Gambier and Leigh Creek and it was installed in a different room to the previous aeradio control location. New racks, also assembled in our workshops, were installed in a lower level of the Tower building to house new DCA R20 and R30 receivers.

Parafield Control Tower

I spent the 1955 year as a Technical Instructor in the DCA Technicians Training School, Simpsons Bulding, Adelaide. In that year West Beach commenced as an airport to become the new Adelaide Airport. I moved on to what was then the Long Range Weapons Establishment at Salisbury.

<u>Some more on early Parafield & Transmitting & Receiving equipment installed at Regional Aerodromes</u>

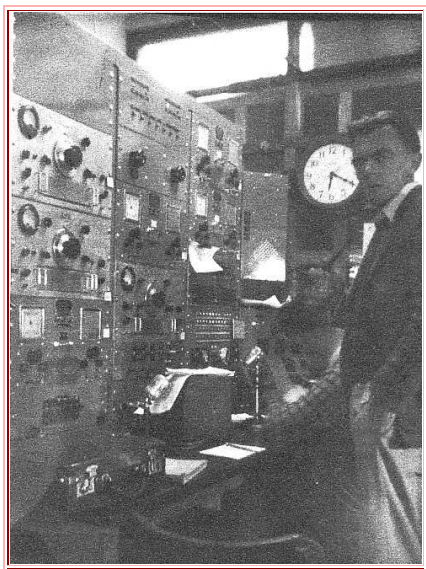
The photograph adjacent is held by WIA Historian Peter Wolfenden. Although the photo is not too clear, I have identified it as the Aeradio Operating Position and the Receiver Racks in the Control Tower at Parafield around 1945 to 1950.

Around 1945, Eric Manoel and I (technicians from the PMG) rewired the racks in that installation. At that time Jack Coulter (VK5JD) was one of the Aeradio Operators (later called Communications Officers). The man in the photograph looks very much to me like Jack Coulter.

Other operators at Parafield at that time were George Anderson (VK5GA) who was in charge, Clarrie Castle (VK5KL), and Frank Brandon (VK5FB).

Shown in the photograph are AR7 receivers and AWA C2869 receivers. I can't remember the AR7 receivers but I am certain that at that time they were using the AWA C2869 receivers. Perhaps the AR7's were a later addition at a time after we worked on the wiring.

According to the John F Ross book, C2869 receivers were installed at Parafield and Ceduna airports in 1939 by AWA.



Parafield Aeradio around 1945 to 1950 - the Operator is probably Jack Coulter

The photograph of C2869 was obtained from records held by Peter Wolfenden and verify that the receivers in the racks are C2869.

The C2869 Receiver was made in 1940 by AWA. It used two plug in coil boxes, a 9V4268 for fixed frequency using a crystal, and a 3V4268 for HF coverage (1.4 to 5mhz). Valves used were: two 6K7 RF amplifiers, a 6L7 mixer, two 6K7 IF ampliers, a 6R7 second detector and audio preamplifier, a 6F6 audio power amplifier, and an 80 rectifier. Two other valves, a 6K7 and a 6N7 were also included.

I am suggesting that the photograph in question was taken after 1945. But I think it was also taken before 1951/1953 period as I was the supervisor of the DCA SA/NT regional radio workshops between 1951 and 1953. During that period, I personally supervised the construction of a new control console and control racks for Parafield aeradio and personally supervised the installation of the new console in a different room in the Tower building.

The AWA C2869 Receiver

The C2869 is the receiver part of the package which went with the AWA J2876 transmitter installed at Parafield and Ceduna by AWA. Later installations such as at Mt Eba, Oodnadatta, Alice Springs and Tennant Creek had the later AWA C7000 receiver packaged with the later AWA transmitter J6924. These were largely installed by the Transmission section of the PMG, mainly supervised by Cliff Moule. This equipment was all in service by the time I came on the scene but I later worked with Cliff and did get involved in relocating the Alice Springs transmitter station (including the J6924) from the aerodrome domain to a new location nearer the Gap.

AWA J2876 Transmitter
(On display at theAirways Museum, Essendon Victoria)

The J2876 was a wide-frequency range 4 channel transmitter with common modulated amplifier. It was equipped with three HF channels and one MF channel. Each channel had a separate RF power amplifier output stage.

Each channel was remotely selected by dialling a code on a telephone dial. This stepped a Strowger bi-motional switch which selected appropriate relays to operate the appropriate RF channel in the transmitter.

Around 1945, Eric Manoel and I installed a key switching system at Parafield Aeradio to provide faster control of the J2876 RF channel switching. This was superimposed on the line pair which fed speech to the remote transmitter for modulation. The switching was achieved with a system of polarised relay and marginal relay circuitry.

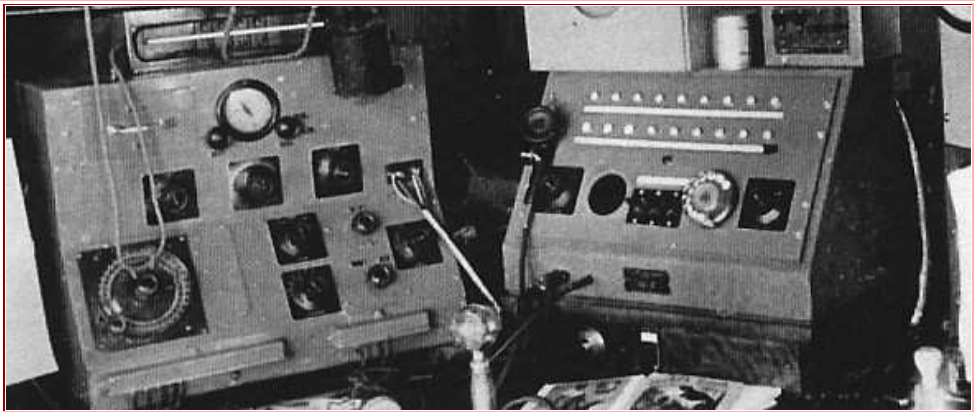
For more information on the early radio equipment at Parafield, refer to "A History of Parafeld Airport & its Facilities" by Lloyd Butler. This is published in the December 2016 issue of "Aviation Heritage", the journal of the Aviation Historical Society of Australia Inc.

The later J6924 transmitter could be operated remotely on one MF channel and up to eight HF channels. Frequencies were also selected by dialling a code on a telephone dial. This stepped a uniselector which selected, via drive motors, preset taps on tuning inductors and preset positions on tuning

capacitors.

We don't have a photo of the J6924 transmitter but its control panel is shown in the right of the following picture. Note the telephone dial to select channels and other functions.

In the left of the picture is the AWA Bellini-Tosi Direction finding receiver installed at many of the aeradio stations. I connected up one of these to its antenna at Tennant Creek aeradio. The antenna was two large single turn triangular loops at right angles, with their apex at the top of a 60 foot Meters steel tower.



Bellini-Tosi DF Receiver& J6924 Tx Control
Alice Springs Aeradio

The mating receive equipment for the J6934 transmitter was the C7000 communications receiver. This was a superhet with two RF stages, a converter, three IF stages, a detector and two audio stages. It was tunable from 150 KHz to 20.5 MHz.

Another type of multi-channel transmitter, which used a telephone dial to remotely change frequency, was the STC 14S. Metal rods, the whole height of the transmitter rack, were fitted up the back of the rack. These were selectively operated upwards with change of frequency. The movement of rods enabled contacts to be engaged which connected tuning components. Around 1947, I installed one of these and a 500C transmitter (discused in the following paragraph) in a new transmitter building at Katherine

Commencing around 1943, the PMG were installing transmitters Airaco Type 500c for DCA at a range of key aerodromes. These had two separate 500 watt RF units, one on a selected HF channel for use on point-to-point communications and the other an LF/MF unit used as the Homer or Non Directional Beacon (NDB). I was involved with the installation of these at Alice Springs and Katherine. We also carried out modifications to other 500C transmitters which had already been installed at Parafield,Ceduna, Oodnadatta,Tennant Creek and Daly Waters.

STC 14S Transmitter

At a number of regional aerodromes (such as Port Pirie), US Army Transmitters Type BC191 were used as Non-Directional Beacons on the selected LF/MF beacon frequency. These were made to operate from a 12-14V DC supply and had a power output of 100 watts. At our DCA Regional Workshops Parafield, we provided the transmitter with an AC sourced power supply and fitted the combination in a standard 19 inch rack.

We assembled one multiple rack assembly for the unattended NDB station at Tailem Bend. This had two BC191 racks and a change-over rack unit which provided automatic switch over from one BC191 to the other in the event of a failure in the first.

Another single frequency HF transmitter used at some locations by DCA, was the STC AT20. These were manufactured by STC during WW2 for use by the armed services. After the war, a number of these were purchased by DCA and installed where a fixed channel was required.

STC AT20 Transmitter

BC191 Transmitter

Not to be omitted is the AWA Multichannel transmitter which used twelve separated transmitter cabinets as shown in the previous photographs at Leigh Creek. My team installed the Multichannel at Leigh Creek around 1950, but further down the track it was relocated to West Beach. The

SA/NT Region had another AWA Multichannel transmitter at Mt Gambier. This transmitter was installed by Les Harper who spent two years as the resident maintenance Senior Technician at that Mt Gambier aerodrome. (It was probably installed around 1948 or 1949).

Aeradio Mount Gambier
Transmitter Hall with Multichannel Transmitter on Right

To enlarge the general aeradio picture, HF radio to aircraft was gradually phased out by VHF channels. At Parafield, three AM VHF channels were used, one for Aerodrome Control, a second one for Approach Control and a third for En Route control. Aerodrome control was also carried out at most aerodromes via voice over the LF/MF Non-Directional Beacon. For Point-to-Point operation, HF radio backed up teletype communication.

Visual Aural Range Station

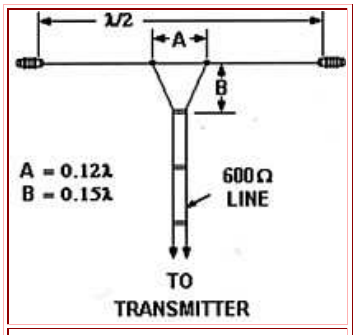
Another piece of equipment of the day for aircraft navigation was the Visual Aural Radio Range (VAR). I was a member of a PMG team who originally installed the gear at Parafield and Ceduna around 1946 or 1947. We brought up Power on the transmitters but field testing was later carried out by specialised staff. (I remember that Frank Partridge, in DCA, was later involved with this). I was similarly involved with the initial installation at Tennant Creek to bring up power, but as a member of DCA.

The VAR was never put into service at Parafield and was ultimately moved to the West Beach airport prior to when it commenced operation in 1955.
The VAR at various locations was ultimately replaced by the Visual Omnidirectional Radio Range (VOR).

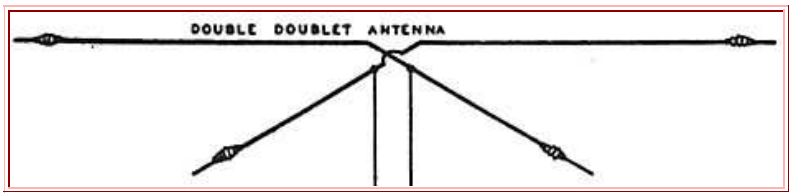
<u>Aerial Systems</u>

Typical Airport Transmitter Stations were equipped with two or three masts or towers to support the range of HF dipole antennas required. Stations such as Alice Springs had 100 ft guyed masts constructed of around nine inch square timber sections. Others had self supporting towers such as the 70 ft metters type. Dipoles hung at favoured heights to suit the radiation angle were delta fed via 600 ohm open wire lines.

Aeradio stations, or remote receiver stations with fixed frequency receivers, had doublet antennas connected via K18SM 98 ohm twin shielded feed line to the receivers. Aeradio stations normally also had one tunable wide frequency range receiver fed via that same type of cable from a wide band double doublet. Typical towers used were the 60 ft Metters type. One problem we had was detecting occasional breaking of the lead connection to the dipole centre. This was addressed by fitting 100Kohm resistors between the dipole termination and the cable braid. Routine testing for 100Kohm at the receiver end of the cable enabled the break to be detected.



Delta Matched Antenna



The Metters towers mentioned were made in Adelaide by Metters Ltd which was established in the early 1900's. Amongst other hardware, they were well known for making windmill towers which, as it turned out, were ideal also for also supporting aerial systems. They ceased to exist around the

early 1980's.

In the 1940's, guyed vertical antennas of around 120 ft high were installed by the PMG aerial line staff at numerous aerodromes for the Non-Directional Beacons (NDBs). These were constructed of steel bore casing which was isolated from ground at the base with a large insulator. The casing became the radiator which was base loaded with a large inductor and which was fed underground by coaxial cable. The coax had an air dielectric with the outer radial conductor made of lead. The cable was armoured with a binding of steel and an outer layer of pitched hemp. At Katherine, the transmission line was different in that the coax line was formed by an overhead arrangement of a centre wire caged by a square of four outer wires equally spaced around the centre conductor.

The bore casing masts were erected using a short Jury Pole (initially in a vertical position) to pull up the 120 ft section from a horizontal position at ground level. However, at Daly Waters, a 180 ft guyed latticed steel mast was installed. This was erected in sections, each one lifted up vertically above the adjacent lower section, using a Jin pole mounted on the lower section. It was quite a hazardous operation for the two linemen, connecting each section up the tower,. There was nearly an accident during the erection when a stay rod supporting temporary guy wires, pulled out of the ground, threatened the collapse of the structure and the safety of the two linemen up top.

Of course the NDB vertical radiators had the usual copper radials buried just below the surface of the ground.

Aircraft safety required that all the masts near the airports be equipped with mast lighting. In the case of the NDB vertical radiators, they operated at high RF potential above ground and the power wiring to the mast lights had to be isolated from ground potential by large series inductors at the base of the mast.

For the VHF transmitters and receivers, omni-directional operation was required and simple ground plane antennas were used. As far as Parafield aerodrome was concerned, operation east of the Adelaide Hills was difficult for the En Route channel and around 1950, a VHF repeater was installed at a hilltop near Summertown to extend coverage beyond the South Australia/Victoria border.

A radio line party was formed in the PMG to carry out the mast and aerial erection (including that for DCA) and this party worked in conjunction with the PMG technical staff on the installation projects. Much of the work of this party was directed by Cliff Moule, Chris Comas and Norm Kelly. After DCA set up their own technical and installation staff (circa 1946), DCA formed their own radio line staff who in fact, carried out the aerial line work for the Leigh Creek installation that I referred to earlier.

<u>Other DCA publications by Lloyd Butler</u>

(1) History of Parafield & its Facilities - December, 2016 issue of "Aviation Heritage",
also September 2017 issue of "OTN", also http://www.qsl.net/vk5br/Parafield_Airport.pdf

(2) History of Leigh Creek & its earlyAirport Radio Installations in DCA
September 2017 issue of "OTN", also http://www.qsl.net/vk5br/Leigh_Creek.pdf

(3) Some history of the AR7 Receiver in DCA http://www.qsl.net/vk5br/AR7.htm