GANNET ELECTRONICS

A Summary of the Electronic Equipment Fitted to early Model R.A.N Gannet A.S.1 Aircraft

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GANNET

ELECTRONIC EQUIPMENT

Introduction

The 'Heart' of the Gannet as a Weapons System was its Electronic Equipment. It contained a comprehensive range of electronic equipment to enable it to perform the various roles for which it was designed. Its Primary Role was to detect, locate, and destroy enemy submarines. For this Role, the Aircraft was fitted with a Search Radar and Sonobuoy Systems. Other electronic systems were also installed for Communications, both internal and external, and Navigation.

The various equipments were allocated an 'Aircraft Radio Installation' (ARI) number, which specified the actual equipment used in each installation. These may vary between aircraft depending on the role that the particular aircraft was to perform. A cross-reference List of ARI's is shown at Appendix 'A'. The various equipments can be grouped into four major categories as follows:

a. Communications
b. Navigation
c. Warfare Systems
d. Stores

Communications Equipment

The Communications Equipment was used to enable the crew to talk to each other (internal communications) and other aircraft, ships or bases (external communications). They are as follows:

a. Audio Amplifier Type A1961

The Type A1921 was used to amplify the Microphone outputs from the three crew members and feed it back into the earphones. It was located on the port side of the rear cockpit at about seat height just forward of the Radio Operator. The Radio Operator could operate the switches on the front of the unit to isolate one of the other two crew members if he wished to communicate only with the other one, e.g. talk to the Observer while the Pilot was concentrating on a target. A bank of switches located on the port side of the centre cockpit allowed the Observer to select either "Talk to Pilot", "Talk to Crewman" (Radio Operator), "Listen to Pilot", or "Press to Transmit".

Equipment Location:	Amplifier Unit Type A1961	Port side of rear cockpit at seat level forward of the Radio Operator

b. VHF Transceivers

The VHF spectrum is generally considered to be in the range of 100 to 156 MegaHertz (MHz). Because of the natural physical laws associated with the electromagnetic

spectrum, the maximum range that can be achieved is line of site (for ground operations) or approximately one hundred miles or one hundred and sixty kilometres (for airborne operations).

A range of VHF Transceivers was fitted depending on the role for which the aircraft was to take. All of these operated within the frequency range of 100 - 156 MHz although none covered the entire spectrum (see Appendix 'B' for details). The earliest models only had four channels but the later ones had ten. Each installation comprised one or two Transceivers, a Control Unit, Power and Signal Cables as required, and an Antenna for each Transceiver.

The Transceivers each had a mechanical Channel Change mechanism on the front of the unit which selected the appropriate crystal (which had previously been inserted when the sortie details were being planned) and connected it to the internal circuits. The remaining crystals were short-circuited to prevent interference. The crystal frequency was amplified and multiplied by a factor of eighteen through a number of stages in the circuitry. To this final frequency was added the Intermediate Frequency (I/F) of 9.72 MHz which gave the final transmitted frequency. This final transmitted frequency was then modulated by the voice signal from the A1961 Amplifier (see above). When the signal was received, it was beat with the original Crystal frequency multiplied by eighteen and the frequency difference of 9.72 MHz was passed through the I/F Amplifier and the Audio frequency was detected and passed to the Audio Amplifier A1961 and thence to the crew headphones.

A further advantage to extend the communications range was to fit some aircraft with a Relay facility. The principle was that the base would transmit to the relay aircraft on a given frequency. The relay aircraft would receive the signal on that frequency in Transceiver A and re-transmit on a different frequency in Transceiver B to the destination. This effectively doubled the communication range. The destination aircraft would then reply on the second frequency to the relay aircraft on Transceiver B which would then re-transmit it on the original frequency on Transceiver A back to the base. This was done automatically without any input from the relay aircraft other than selection of the relay function.

Other than the automatic relay system described above, all transmissions from the aircraft were done manually by a switch on the Pilot's Joystick or by separate switches in the Observers or Radio Operator's cockpits.

The various combinations of equipment are tabulated in Appendix A.

Equipment Location:	Transceivers	Port and Starboard sides of the rear cockpit at seat level well forward of the Radio Operator
	Control Unit	Pilot's cockpit on the Port side at seat level
	Antenna Assembly 1	On top of the fuselage between the centre and rear cockpits
	Antenna Assembly 2	Under the Port outer wing
	Relay Unit	Not Known

c. HF Transceivers

The HF spectrum is generally considered to be in the range of 3 to 30 MHz. Because of the natural physical laws associated with the electromagnetic spectrum, the range that can be achieved is only limited by the natural environment. Theoretically, any site in the world can be contacted but this is subject to atmospheric conditions.

Background Story:

In the early 1960's during the operation of Wessex Helicopters, a new HF Transmitter, Collins Type 618T was fitted, and tests were being carried out on board an aircraft carrier off Sydney Heads. The following is a non-verbatim outline of the communications:

***Helicopter**: "This is helicopter (callsign) testing 1-2-3-4-5 5-4-3-2-1. Calling any station. How do you receive? Over."*
***Other Station**: (In beautifully modulated Oxford English) "Helicopter (callsign) receiving you five-by-five (loud and clear). What is your position? Over."*
***Helicopter**: "Calling Station. Receiving you five by five. My position is two miles east of Sydney Heads. What yours. Over."*
***Other Station**: (after a slight hesitation and slightly softer tone) "This is Whitehall. Out"*

The test demonstrated that an HF signal can be directly transmitted off Sydney Heads and received in London England. There was also an inference that he should not have been on the air and was loath to identify himself.

Note: This situation could only have occurred if the atmospheric conditions were favourable.

The original equipment as fitted when the aircraft were received from the UK was the ARI 5206, which was later replaced by the ARI 18032 installation. The ARI 5206 was of World War II vintage and contained electron tubes and individual Components such as Resistors, Capacitors and Coils, while the ARI 18032 was of early fifties design and contained Transistors and very rudimentary Integrated Circuits. However, from an operational point of view, they were essentially similar but with better voice clarity and lower noise levels in the later equipment.

The operation of the HF Equipment was similar to the VHF Equipment in that switching was operated from the same positions.

Note: In the changeover from ARI 5206 to ARI 18032, the layout was slightly different in that the Transmitter in the ARI 18032 System was larger and the Receiver was placed to the left of it (Starboard side looking aft). The Sonobuoy Receiver System 'A' (one of two, the other being on the right hand (Port side) looking aft) was relocated down to the floor level (see Equipment Location List below).

The antenna for the HF System was located above the aircraft and was a wire, strung between a Mast (which was located immediately behind the Pilot's cockpit) through to an insulated mounting on the tail fin. The connection to this Antenna was in its centre, with a

wire fed through an insulator in the roof of the Radio Operator's cockpit to the Antenna Coupling Unit.

Equipment Location:	ARI5206 Transmitter & Receiver	Centre of the rear cockpit at seat level aft of the Radio Operator.
	ARI5206 Aerial Coupling Unit	In the top of the fuselage in the rear cockpit forward of the Radio Operator.
	ARI 5206 Control Unit	On the Starboard side of the rear cockpit at seat level adjacent to the Radio Operator.
	Antenna Assembly	Mounted between a Mast, situated immediately behind the front cockpit, and the tail fin, & connected from its centre through an insulator on top the fuselage into the rear cockpit.
	ARI18032 Transmitter	Centre of the rear cockpit at seat level aft of the Radio Operator.
	ARI18032 Receiver	Starboard side of the rear cockpit adjacent to the Transmitter.
	ARI18032 Control Unit	On the Starboard side of the rear cockpit at seat level adjacent to the Radio Operator.

Navigation Equipment

The Gannet was fitted with all of the standard aircraft Flight and Navigation Instruments. These were serviced by the Electrical Section and are dealt with in other References. However, three items of Electronic Navigation Equipment were originally fitted, with others being added later.

a. ZBX Receiver

The ZBX Receiver was designed to receive a signal from a special ground transmitter, which radiated a different signal letter from each Compass bearing.

The principle of operation was that the transmitter at the ground (or ship-borne) installation had a continuously rotating directional antenna making one complete revolution every minute. When transmitting from the N-NE sector, it would transmit Morse Code for the letter 'A' twice in succession. When in the NE-E Sector, it would transmit Morse Code for letter 'B', and so on around the compass. Thus, if the Observer listening on his ZBX Receiver heard the letter 'B' at full strength, and the letters 'A; and 'C' at lower strength, and no other letters were heard, it would be clear that to steer a course towards the transmitting station, the aircraft would have to head in a South-Westerly direction.

Equipment Location	ZBX Receiver	Centre cockpit Starboard side on the floor forward of the Observer.
	Control Unit	Centre Cockpit.
	Antenna Assembly	Port side Bomb Bay Door.

b. ASV Mk. 19B Radar

Whilst the ASV Mk. 19B was primarily a part of the aircraft's Weapons Systems (see below), it could also be used for navigation purposes where appropriate; e.g. Navigating back to the ship by radar or following a map display to a land-based target.

c. AYF Radio Altimeter

The AYF AN/APN-1 Radio Altimeter, ARI 5284, operated on much the same principle as Radar in that it transmitted a signal to the ground (or ocean) and the reflected signal was compared with it and the difference was displayed on an Indicating Unit in the Pilot's Cockpit. The frequency of the Transmitted signals was continually changing, (frequency Modulated Carrier at 120Hz.) so that when the echo came back to the Receiver, its frequency was different from the Transmitter frequency at that instant. Knowing the speed of propagation of radio waves, the frequency difference was used to calculate the height of the aircraft. This information was calculated within the equipment and displayed directly to the Pilot. There were two ranges of operation, viz.
Low Range: 0 - 400 Feet Operating Frequency – 420 - 460 MHz.
High Range: 0 – 4000 Feet Operating Frequency – 442 - 446 MHz.

The capability of this equipment was such that it could be used to indicate, on approach to a Carrier, when the aircraft was over the flight deck. The indicator would shown 40ft.$^{+}$ when approaching the carrier, and would immediately drop to near zero when over the flight deck giving the Pilot an instant indication of when to cut power.

It was also useful when a submarine was located on those occasions when the target was not immediately below the aircraft. Knowing the slant range distance from the ASV Mk.19B Radar Antenna to the target, and knowing the vertical height of the aircraft from the Radio Altimeter, it became a straightforward matter to calculate the horizontal distance from immediately below the aircraft to the target. This was useful in directing a surface vessel to attack the target.

Equipment Location:	Transceiver	Inside the rear of the fuselage aft of the access doors. Access from beneath the aircraft.
	Altitude Indicator	Pilot's Instrument Panel.
	Altitude Limit Indicator Switch	Pilot's Instrument Panel.
	Antennae	Underside of the Tailplane on each side of the aircraft.

d. VHF Homing Equipment

This equipment was added to some aircraft in later years but it is not known how many aircraft were so fitted or where the equipment was installed. However, it is understood that the two VHF Homing Antennae were mounted on top of the Mainplane. The principle of operation was that the signals on each of these Antennae were compared and the resultant signal was displayed on an indicator mounted in the Observer's (?) Cockpit. ARI Numbers for these installations included 18044, 18048, 18049, 18085, 18093, 18142, and 18155. However, it is not known which of these were actually used.

e. UHF Homing Equipment

As with the VHF Homing Equipment, this UHF equipment was added to some aircraft in later years but it is not known how many aircraft were so fitted or where the equipment was installed. However, it is known that the two UHF Homing Antennae were mounted on top of the Fuselage midway between the centre and rear cockpits. The principle of operation is assumed to be the same as the VHF system. It should be noted that, to have this system installed, the aircraft would also have to have a UHF Receiver (or Transceiver) installed. ARI numbers for these systems are not known.

Warfare Systems

Three items of equipment were fitted to enable the Gannet to carry out its Primary Role of Submarine detection and location.

a. ASV Mk. 19B Radar

The ASV Mk. 19B Radar was a Search Radar, which operated in the Ten Centimetre Band of the Electromagnetic Spectrum. Its nominal operating frequency was 3,000 MHz, which was generated from a Klystron in the Transmitter Unit. The Transmitter Output was fed through a waveguide system to the Antenna and the signal reflected from the target was received in the same Antenna and fed back through the waveguide system to the Receiver. The Signals were then processed and fed to the display Units in the centre and rear cockpits. The Display Units were configured to a Plan Position Indicator (PPI) presentation. The Radar echo line ran from the centre of the screen (the aircraft's position) to the periphery. The echo line rotated through 360^{o} in time with the rotation of the Antenna. The line was vertical on the display when the Antenna was pointing to the front of the aircraft. The position of the target echo along the echo line indicated its distance from the aircraft.

The Antenna Assembly itself was hung on a frame inside a Radome under the fuselage which could be lowered approximately a metre for operation and then retracted for landing. The Antenna rotated through 360^{o} during operation and the vertical angle could be controlled from either of the Control Units. A switch on the Starboard side of the rear cockpit could be used by the Radio Operator to take control of the system.

The ASV Mk. 19B Radar equipment was mostly located in a compartment under the rear of the aircraft. Two panels, one on each side beneath the aircraft, and joined at the centreline, allowed access to the internally stowed electronics equipment. These access panels were immediately behind the Radar Antenna Housing. When entering this area, the major items of the Radar System were mounted on top of the Antenna Frame (looking forward). These included the Transmitter, Receiver, and Modulator Units together with all connecting cables between these units and the Antenna Assembly and the Display Units and Control Units in the centre and rear cockpits. The Control Units and Display Units were mounted in the centre of the aircraft, the Observer's equipment looking forward and the Radio Operator's equipment looking aft.

Equipment Location:	Transmitter	In the Electronics Bay under the aircraft, on top of the Radar Antenna Mounting Frame
	Receiver	In the Electronics Bay under the aircraft, on top of the Radar Antenna Mounting Frame
	Modulator	In the Electronics Bay under the aircraft, on top of the Radar Antenna Mounting Frame
	Antenna	In the Electronics Bay under the aircraft, suspended under the Radar Antenna Mounting Frame
	Display Unit No. 1	Centre cockpit at face level forward of the Observer
	Display Unit No. 2	Rear cockpit above face level aft of the Radio Operator
	Control Unit No. 1	Centre cockpit to the right of the Display Unit
	Control Unit No. 2	Rear cockpit below face level aft of the Radio Operator (between the two Sonobuoy Receiver Control Units).

b. Sonobuoy Receiver System

The ARI 5286 Sonobuoy Receiver Installation was used to receive and process the acoustic information in signals received from sonobuoys deployed by the aircraft (see section below on 'Stores'). The sonobuoy was deployed to listen underwater for the sounds of submarines (and also surface targets if required) in the area. This information was then sent back to the aircraft in a radio signal, which was then processed in the Sonobuoy Receivers. The sonobuoy signals were processed to give the information provided. This included both the sound that the submarine made and, in some sonobuoy models, the direction that it came from. There were two sets of Sonobuoy Receivers and these were mounted on either side of the aircraft. The Radio Operator also wore headphones to listen to the submarine's signature. With the non-directional sonobuoys, the acoustic information was processed by the Receivers and displayed on the Display Unit on a straight line which covered the spectrum up to about 20,000KHz. The sound of the received noise deflected the straight line upwards which gave an indication of acoustic signal strength. By switching between sonobuoys which had been dropped in a known pattern, the relative strengths of the various sounds could be compared and an estimated position of the target could be obtained. If necessary, further sonobuoys could be dropped closer to the target to obtain a more accurate 'fix'. With the advent of directional sonobuoys, the compass heading was displayed on a small separate panel at the bottom of the Display Unit. This enabled the operator to read off the compass direction when the signal peaked. Using this directional information, a 'fix' could be obtained far more accurately and with less sonobuoys as only two were needed to get a cross on the target position with possibly a third buoy being used for confirmation.

Equipment Location:	Receiver Unit A *	Rear Cockpit at seat level on the Starboard side aft of the Radio Operator
	Receiver Unit B	Rear Cockpit at seat level on the Port side aft of the Radio Operator
	Power Supply Unit A *	Rear Cockpit at seat level on the Starboard side aft of the Radio Operator
	Power Supply Unit B	Rear Cockpit at head level on the Port side aft of the Radio Operator
	Display Unit A	Rear Cockpit at head level on the Starboard side aft of the Radio Operator
	Display Unit B	Rear Cockpit at seat level on the Port side aft of the Radio Operator
	Antenna Assembly	Under the fuselage on the Port side aft of the Electronics Bay access doors.

* Note: Receiver Unit A and Power Supply Unit A were re-located to floor level when the ARI 18032 HF Equipment was installed.

c. Identification Friend or Foe (IFF)

The use of IFF was inherently related to the Search Radar as its signals could be displayed directly on the Radar Screen, although this facility was not used in the ASV Mk.19B Radar. The equipment installed was the AN/APX-2 which comprised two Units, a Responder and a Transponder. The principle of operation was that an interrogator sent out a signal which was processed in the aircraft Transponder Unit. If this received signal agreed with the signal already programmed into the Transponder, it sent a reply signal, which was then processed in a similar manner by the originator of the original code. If the transponder code also agreed with the code held in the interrogator's unit, then the aircraft was judged to be 'Friendly'. If no reply, or an incorrect reply, is received by the interrogator, then the aircraft is judged to be 'Foe'. In this event, an intercept would be launched to instigate further. The coding of the equipment would be changed regularly to prevent copying and reusing the codes. The operation of the Unit was through a Control Unit in the Pilot's cockpit. The problems associated with the use of this equipment are:

1. Incorrect coding in the Receiver
2. Incorrect coding in the transponder
3. Incorrect coding in the Interrogator's receiver
4. Equipment malfunction

The moral of the story is "Make sure that it is working, and make sure that it is right".

Equipment Location:	Transponder Unit	Rear Cockpit at floor level forward of the Radio Operator
	Control Unit	Pilot's cockpit Starboard side at seat level beside the Pilot.

Stores

Obviously, the aircraft carried a wide range of stores ranging from bombs and rockets to flares and air-launched rescue packages. The only store directly connected to the Electronic Equipment was the air-launched Sonobuoy. There were two types of Sonobuoy operated with Gannet aircraft, the T1945 ('A' Size) and T1946 ('C' Size). The 'A' Size was approximately 4 ½" diameter by 3' 6" long while the 'C' Size was approximately 10" diameter by 5' long. Note: The 'B' Size buoy was never used by the Australian services.

a. Sonobuoy Type T1945

The Type T1945 Sonobuoy was an 'A' Size Sonobuoy which was 125mm.(5in.) in diameter and 915mm. (3ft.) long. It was designed to deploy by parachute from the deploying aircraft. The parachute was not intended to slow the velocity of the buoy when falling but to keep it vertical when impacting the water. On impact, the parachute was automatically disconnected and the buoy actuated. The buoy contained one or more hydrophones (underwater microphones) which were deployed from the bottom of the case on water impact. They then sank to the depth permitted by the connecting cable, usually about 25 feet. At the same time, the Antenna was deployed from the top of the buoy. Once the buoy entered the water, the sealed battery unit was actuated and the electronics commenced working. The electronic signals from the hydrophone(s) were passed up the connecting cable and were used to modulate the Radio Frequency Signal of the Transmitter, which was mounted in the upper flotation unit. The Transmitter output was then fed to the Antenna, which radiated the signal to the receiving aircraft. After a specified period of operation, a soluble plug in the side of the upper canister dissolved in the seawater and the unit then sank. The Sonobuoys were normally stowed in the Bomb Bay of the aircraft. However, there were facilities to hang them from hard points under the wings but as far as is known, this method was never employed on the Gannet.

b. Sonobuoy Type T1946

The Sonobuoy Type T1946 was a 'C' Size Sonobuoy which was approximately 250mm. (10in.) in diameter and 1.5m. (5ft.) long. It was significantly larger and heavier than the T1945. While its principle of operation was similar, its major advantage was the fact that the lower unit, which contained the hydrophone assembly, also contained a Compass Unit. The lower unit, which had its own separate battery, contained a motor, which slowly rotated the hydrophone which had opened up on deployment to become a directional hydrophone assembly. The information which was passed up the connecting cable contained compass direction as well as the acoustic information from the target.

Only a maximum of four T1946 Sonobuoys could be carried in the aircraft. However, the normal load was two T1946's with a further number of T1945's.

Appendix ‘A’

TABLE OF AIR RADIO INSTALLATION NUMBERS

ARI No.	Type No.	Model No.	Description	Location	Comments
5206	Type 51		HF Transmitter	Rear cockpit aft of Radio Operator	
5206	Type 53		HF Transmitter	Rear cockpit aft of Radio Operator	
5206	Type 76		HF Receiver	Rear cockpit aft of Radio Operator	
5206	Type 78		HF Receiver	Rear cockpit aft of Radio Operator	
5206			Antenna Tuning Unit	Rear cockpit forward of the Radio Operator above head height	
5206			Control Unit	Rear cockpit Port side at seat level	
5284	AN/APN-1	RT-/APN-1	Radio Altimeter Transceiver	Rear electronics bay aft of the access doors	
5284	AN/APN-1	ID-14/APN-1	Radio Altimeter Altitude Indicator	Pilot’s Instrument Panel	
5284	AN/APN-1	SA-1/ARN-1	Radio Altimeter Altitude Limit Indicator Switch	Pilot’s Instrument Panel	
5284	AN/APN-1	AT-4/APN-1	Radio Altimeter Antennae (2)	Underside of tailplane	
5307	AN/ARR-2X	R 1585	ZBX Receiver Naval Homing BA Receiver	Centre cockpit Starboard side at floor level	

TABLE OF AIR RADIO INSTALLATION NUMBERS

ARI No.	Type No.	Model No.	Description	Location	Comments
5487	AN/ARR-3A AN/ARR-3B	R-2/ARR-3 R-2A/ARR-3	Sonobuoy Receiver (2 sets)	Rear Cockpit aft of Radio Operator	
5487			Sonobuoy Receiver Power Supply (2 sets)	Rear Cockpit aft of Radio Operator	
5487			Sonobuoy Diosplay Unit (2 sets)	Rear Cockpit aft of Radio Operator	
5487			Sonobuoy Antenna (Retractable)	Port Side aft of the Radar Access Panels	
5488			Single VHF Transceiver Type TR1934 with Control Unit & Antenna		
5489			Single VHF Transceiver Type TR1936 with Control Unit & Antenna		
5490			Dual VHF Transceivers Type TR1934 & TR1935 with Control Unit & Antenna		
5491			Dual VHF Transceivers Type TR1934 & TR1935 Plus Relay Unit with Control Unit & Antenna		
5492			Dual VHF Transceivers Type TR1934 & TR1936 Plus Relay Unit with Control Unit & Antenna		

TABLE OF AIR RADIO INSTALLATION NUMBERS

ARI No.	Type No.	Model No.	Description	Location	Comments
5838	ASV Mk.19B		Transmitter/Receiver Unit	Electronics Bay under the aircraft forward of the access panels on top of the Antenna Assembly	
5838			Modulator Unit	Electronics Bay under the aircraft forward of the access panels on top of the Antenna Assembly	
5838			Antenna Assembly	Electronics Bay under the aircraft forward of the access panels	
5838	101		CRT Indicator Unit	Centre cockpit forward of the Observer at head height	
5838	101		CRT Indicator Unit	Rear cockpit aft of the Radio Operator above head height	
5838	625		Control Unit	Centre cockpit to the right of the Indicator Unit	
5838	928		Control Unit	Rear cockpit aft of the Radio Operator	

TABLE OF AIR RADIO INSTALLATION NUMBERS

ARI No.	Type No.	Model No.	Description	Location	Comments
5848	AN/APX-6	RT/82/APX-6	Transmitter/Receiver Unit	Rear Cockpit forward of the Radio Operator at floor level	
5848	AN/APX-6	IFF Mk 10	Control Unit	Pilot's Cockpit on the Starboard side at seat level adjacent to the Pilot	
18032	T7304		HF Transmitter	Rear cockpit aft of the Radio Operator at seat height	
18032	R7303		HF Receiver	Rear cockpit aft of the Radio Operator at seat height on Starboard side	
18032	7305		Antenna Coupling Unit	Rear cockpit forward of the Radio Operator above head height	
18032	7306		Control Unit	Centre cockpit Port side at seat level	

Appendix 'B'

TABLE OF VHF TRANSCEIVER VARIANTS

Model	Description	Comments
TR1920	4-Channel Operating Frequency Range 115 - 145 MHz.	Early Model rarely (if ever) seen in a Gannet installation
TR1934	10-Channel Operating Frequency Range 100 - 125 MHz.	Used in various combinations with TR1935/6 with different ARI Numbers depending on the aircraft role.
TR1935	10-Channel Operating Frequency Range 124.5 - 156MHz.	Used in various combinations with TR1934/6 with different ARI Numbers depending on the aircraft role.
TR1936	10-Channel Operating Frequency Range 115 - 145 MHz.	Used in various combinations with TR1934/5 with different ARI Numbers depending on the aircraft role.
TR1985	10-Channel Operating Frequency Range 100 - 125 MHz.	Later Model used with the VHF Homing Equipment but otherwise identical to TR1934/5/6
TR1986	10-Channel Operating Frequency Range 124,5 – 156 MHz.	Later Model used with the VHF Homing Equipment but otherwise identical to TR1934/5/6
TR1987	10-Channel Operating Frequency Range 115 - 145 MHz.	Later Model used with the VHF Homing Equipment but otherwise identical to TR1934/5/6
Note: The various combinations of VHF Transceivers are listed in Appendix 'A' under their respective ARI Numbers.		

Note:

This Document was prepared from the knowledge that I gained from servicing the Aircraft and the various Items of Equipment as fitted half a century ago. In addition, I referred to some of my Training Notes which were used to write some of the Technical details. Some details were provided by other personnel to whom I am grateful, in particular George Stevens.

Any errors in this Summary are mine and I would appreciate it, if any are found, that they could be advised to me by phone on (02) 9823 9791 or by e-mail at d.pm@bigpond.com