

1.6. AIRCRAFT EQUIPMENTS

1. **General.** This Section summarises the various equipments fitted in Fleet Air Arm and some FRU aircraft.

2. **Nomenclature.** The majority of aircraft equipments are known by an ARI number and another alternative; these are listed below. For the purpose of reference in subsequent paragraphs the ARI nomenclature has been used.

ARI NUMBER	OTHER TITLE
5489	TR1936
	TR16440
5491	TR1934
	TR1935+relay
18032	HF
18124/1	ARC 52 UHF DC version
18124/2	ARC 52 UHF AC version
18179/1	SSB HF (Mullard)
18197/1	PTR 170 Light-weight UHF without Homer
18197/2	PTR 170 Light-weight UHF with Homer PV 141
23057	Stand-by UHF
23090	Type 618T Collins HF TR
23117	Marconi 60 VHF

HF EQUIPMENTS

3. **Fitting Policy.** It is the current policy to fit all aircraft in the Fleet Air Arm with improved HF equipment to provide a significant improvement in voice ranges. The fitting programme concerns the following types:

- a. Buccaneer Mk I ARI 18179/1
- b. Buccaneer Mk II ARI 23090
- c. Wessex Mk I ARI 18032 (being changed to ARI 23090)
- d. Wessex Mk I & III ARI 23090
- e. Wessex Mk V ARI 23090
- f. Gannet AEW Mk III ARI 23090

4. ARI 23090 (Collins 618T)

a. WHERE FITTED:

- (1) Buccaneer Mk II 618 T2
- (2) Wessex Mk I & III 618 T3
- (3) Wessex Mk V 618 T3
- (4) Gannet AEW Mk III 618 T3

b. FREQUENCY RANGE (in whole number of kHz steps only)

- (1) 2 to 30 MHz
- (2) 2 to 25 MHz when antenna tuner 180 – 3A is in use

c. FREQUENCY DETERMINATION. Synthesiser, tuning to the suppressed carrier frequency. Any whole number of kHz within the frequency range can be selected on the cockpit control unit. This means

that aircraft fitted with this equipment can only man SSB voice circuits whose assigned frequency ends in 0.5 kHz.

d. STABILITY 1 in 10^6

e. POWER OUTPUT

- (1) SSB Voice 400W (PEP)
- (2) DSB (AM) Voice 100W
- (3) CW 100W

f. POWER SUPPLIES AND POWER CONSUMPTION

- (1) 618 T2
 - (a) 27.5V DC Transmission and Reception draws 100W
 - (b) 115V 400Hz Transmission draws 650VA (SSB) or 700VA (DSB)
3 phase AC Reception draws 550VA
- (2)
 - (a) 115V 400Hz Single phase AC drawing 100W
 - (b) 27.5V drawing 950W

g. EMISSION

- (1) SSB Voice – Upper or Lower sideband
- (2) DSB (AM) Voice
- (3) CW (This facility is not normally connected in aircraft)

h. WEIGHT

UNIT	WEIGHT	
Transreceiver	50 lb	
Control Unit	2 lb	
Antenna tuner	18 lb	4 oz
Transreceiver mounting tray	5 lb	
Antenna tuner mounting tray	1 lb	4 oz
Total	76 lb	8 oz

5. ARI 18179 (Mullard SSB)

a. WHERE FITTED:

- (1) Buccaneer Mk I
- (2) Some Wessex Mk I

b. FREQUENCY RANGE

2 to 20 MHz

c. FREQUENCY DETERMINATION. 12 preset crystal controlled channels in 3 ranges:

- (1) Range 1 – 2.5 to 5 MHz
- (2) Range 2 – 5 to 10 MHz
- (3) Range 3 – 10 to 20 MHz

d. STABILITY. 1 part in 10^8

e. POWER SUPPLIES AND POWER CONSUMPTION

- (1) 28V DC – Transmission and reception draws 270W

- (2) 200V 400 Hz – Transmission draws 685VA
3 phase AC – Reception draws 190VA

f. EMISSION. Upper sideband Voice (controlled carrier)

g. WEIGHT

(1) Transreceiver

UNIT	WEIGHT	
Generator	35 lb	
Power Supply	26 lb	8 oz
Amplifier	13 lb	8 oz
Transmitter/Receiver	29 lb	8 oz
Interconnector Box	2 lb	
Control Radio Set	–	
Total	106 lb	8 oz

(2) Aerial System

UNIT	WEIGHT	
Tuner Radio Frequency	15 lb	5 oz
Network Impedance Matching	2 lb	7 oz
Selector Unit	10 lb	7 oz
Connector RF	1 lb	8 oz
Mounting	2 lb	1 oz
Total	31 lb	12 oz

6. **ARI 18032 (HF DSB Set)**. Still fitted in some AEW aircraft, Wessex Mk I and Whirlwind helicopters, 4 channel VFO control. This equipment will be replaced by ARI 23090 in AEW and Wessex in due course.

V/UHF EQUIPMENTS

7. **General**. All naval and FRU aircraft are UHF fitted. The current policy has been to fit all rotary wing and a limited number of second line fixed wing aircraft with a lightweight 12 channel crystal UHF set (ARI 18197). This set has known limitations but now works up to its designed performance. It is to remain in service for some time. The majority of fixed wing aircraft and all front line fixed wing aircraft carry ARI 18124, with 1750 channels, which are available through the operation of a manual dial control on a separate unit.

8. The replacement set for existing UHF equipment is under consideration and will probably provide UHF and VHF coverage in one set, the same size and weight of the ARI 18124, with 50 kHz channel spacing.

9. The need for a lightweight equipment to cover the band from 30 MHz to 400 MHz is known. This is especially necessary for the co-operation by helicopters and ground attack aircraft with forward Army units which do not use UHF. The Army front line units operate on VHF frequencies between 40 and 60 MHz. This equipment is the subject of a Joint requirement.

VHF EQUIPMENT

10. **ARI 5489 (Type 1936 series)**. There are now three versions of the original TR1936 equipment: TR1936, TR1936B and TR16440. The differences are shown below:

a. WHERE FITTED

- (1) TR1936 & TR1936B. Whirlwind SAR aircraft and Sea Prince (T).
- (2) TR16440. Sea Devon, Sea Heron and Sea Prince communication aircraft.

b. FREQUENCY RANGE. 115 to 145 MHz

c. FREQUENCY DETERMINATION AND CHANNEL SPACING

- (1) TR1936. 10 crystal controlled channels – 180 kHz spacing.
- (2) TR1936B. 10 crystal controlled channels – 50 kHz spacing.
- (3) TR16440. 44 channel version of TR1936.

d. STABILITY. $\pm 0.005\%$ of the crystal in use.

e. POWER OUTPUT. 8 to 10W.

f. POWER SUPPLY AND POWER CONSUMPTION. 27.5V DC – Transmitter draws 220W and Receiver draws 180W.

g. EMISSION. Voice.

h. PERFORMANCE. 100 miles air to ground at 10,000 ft.

i. Weight

UNIT	WEIGHT	
Transreceiver	26 lb	8 oz
Control Unit		10 oz
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Total	27 lb	2 oz
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UHF EQUIPMENT

11. ARI 18124 (AN/ARC 52)

a. WHERE FITTED. All fixed wing front line aircraft and the majority of second line aircraft.

b. FREQUENCY RANGE. 225 to 399.9 MHz.

c. FREQUENCY DETERMINATION AND CHANNEL SPACING. 20 channels of which 18 may be preset to any of 1750 frequencies. 1 Guard (243 MHz), 1 Manual. Channel spacing 100 kHz.

d. STABILITY. + or – 10 kHz.

e. POWER OUTPUT. Minimum 12W, average 18W.

f. POWER SUPPLY AND POWER CONSUMPTION. 27.5V DC – Transmitter and channel change draws 467W. Receiver draws 343W.

g. EMISSION. Voice, Tone (in Emergency).

h. PERFORMANCE. 200 miles air to air – ground to air (with aircraft at 45,000 ft).

i. WEIGHT.

UNIT	WEIGHT	
Transreceiver	50 lb	
Control Unit	3 lb	
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Total	53 lb	(including mounting tray, control receiver Manual and Inter-connecting box)
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- Notes:*
1. Set is pressurised.
 2. The transreceiver incorporates an additional, self contained receiver set up on 243 MHz. This enables the operator to monitor 'guard' simultaneously with manual reception of the channel in use, provided the control unit switch is to T/R + Guard.
 3. The control unit has 4 positions:
 1. OFF
 2. T/R
 3. T/R + Guard
 4. ADF*
- *ADF applies power to the Violet Picture Homer which operates when the ADF switch is made.

12. ARI 18197 (PTR 170)

- a. WHERE FITTED. All Wasps, some other rotary wing and some fixed wing second line aircraft.
- b. FREQUENCY RANGE. 225 to 399.9 MHz.
- c. FREQUENCY DETERMINATION AND CHANNEL SPACING. 12 preset crystal channels from any 1750 in the frequency range, there is no dialling facility. Channel spacing 100 kHz.
- d. STABILITY. + or \pm 10 kHz.
- e. POWER OUTPUT. Nominal 2W.
- f. POWER SUPPLY AND POWER CONSUMPTION. 27.5V DC – Transmitter and channel change draws 4.5W. Receiver draws 3.5W.
- g. EMISSION. Voice, Tone (in emergency).
- h. PERFORMANCE. Approximately 50 miles Air to Air, Air to Ground (above radio horizon).
- i. WEIGHT.

UNIT	WEIGHT	
Transreceiver	23 lb	
Control Unit	1 $\frac{1}{4}$ lb	
Total	<u>24 $\frac{1}{4}$ lb</u>	Includes mounting tray

Note: When aircraft also carries Homer PB141 the UHF installation is given number ARI 18187/2.

13. ARI 23057 (Standard UHF set)

- a. WHERE FITTED. All fixed wing and larger rotary wing aircraft.
- b. FREQUENCY RANGE. 238 to 248 MHz.
- c. FREQUENCY DETERMINATION. 2 crystal controlled channels one set to 243 MHz and the second one not more than 1 MHz above or below this.
- d. POWER OUTPUT. 3W.
- e. POWER CONSUMPTION. 85W.
- f. POWER SUPPLIES. 24V DC either from mains or battery.
- g. EMISSION. Voice, Tone (in emergency).
- h. PERFORMANCE. 100 miles over radio horizon.

i. **WEIGHT.** Transreceiver 11 lb.

- Notes:* 1. Can provide audio side tone for use on Intercom when transreceiver is to RECEIVE.
2. Control switches which are under pilot's control give:
1. Main/Stand by UHF.
 2. Guard/Alternate frequency (on stand by set).
 3. Normal/Emergency power (for stand by set).
3. Power unit may be transistorised in different makes in which case weight is reduced to 8 lb 5 oz.

OTHER EQUIPMENT

14. UHF homing facilities are provided in all UHF fitted aircraft except for some joint V/UHF fitted second line aircraft who carry, either a radio compass, or a VHF homer. Two UHF homers are in current use, each associated with the UHF set carried in the aircraft.

15. ARI 11820 (Violet Picture)

- a.* **WHERE FITTED.** All front line aircraft equipped with ARI 18124.
- b.* **FREQUENCY RANGE.** 225 to 400 MHz.
- c.* Will operate with CW, MCW or Voice transmissions on the frequency selected from the ARI18124.
- d.* **POWER SUPPLIES.** 225V HT from ARI 18124
28V LT from ARI 18124
28V LT from aircraft supply.
- e.* **PERFORMANCE.** 100 n.m. ground to air, 200 n.m. air to air, above radio horizon.
- f.* **WEIGHT.**

UNIT	WEIGHT	
RF Unit	10 lb	12 oz
AF Unit	5 lb	4½oz
Indicator	1 lb	7 oz
Aerial	1 lb	8 oz
Total	18 lb	15½oz

- g.* **HOMING INDICATION.** In azimuth 'Left or Right'.
In elevation 'Up or Down'.

Notes: 1. ARI 18120 is suffixed with '1 to 4' to indicate modification necessary to adapt it to various aircraft, e.g. Homer in Buccaneer is 18120/4

Homer in Vixen is 18120/1

2. Homer is blanked by a muting switch from own aircraft transmissions.

16. ARI 18197/2 (PV141)

- a.* **WHERE FITTED.** All ARI 18197 fitted aircraft except Hillers.
- b.* **FREQUENCY RANGE.** 225 to 399.9 MHz.
- c.* Will operate with CW, MCW and Voice transmissions on the frequency selected by the ARI 18197.
- d.* **POWER SUPPLY.** 28V DC.
- e.* As for reception by ARI 18197.
- f.* **WEIGHT.** 4 lb 11 oz including mounting tray.

g. **HOMING INDICATION.** In azimuth only 'Left or Right'.

Note: Homer is blanked by a muting switch from own aircraft transmissions.

UHF PERSONNEL BEACONS (SEARCH AND RESCUE (TYPE 958))

17. Beacon equipments (SARBE) are provided for aircrew and are fitted inside Mae West life jacket. This equipment is also being fitted in liferafts carried in ships.

18. ARI 23157 (SARBE Mk III)

a. **WHERE FITTED.** Mae Wests of air crews.

b. **FREQUENCY.** 243 MHz.

c. **FREQUENCY DETERMINATION.** Single crystal control for transreceiver.

d. **EMISSION.** Voice or beacon.

e. **STABILITY.** + or - 15 kHz.

f. **POWER OUTPUT.**

(1) Beacon 0.4W AF modulated pulses.

(2) Transmit Voice 100 mW.

g. **POWER SUPPLY.** Kalium battery unit. 150V/6V/1.34V.

h. **MODULATION.** Beacon PRF 0.25 - 0.5 Hz.
Beacon modulation 1020 + or - 250 Hz.
Modulation depth not less than 40%.

i. **PERFORMANCE.** Beacon - greater than 60 miles sea to air.
Voice - 10 miles sea to air, optical range sea to sea.
Battery life - 8 to 20 hours dependent on mode.

j. **WEIGHT.**

UNIT	WEIGHT	
Speech and T/R unit	2 lb	1 oz
HT/LT battery	3 lb	7 oz
LT battery pack including microphone convertor	2 lb	15½ oz
Total	8 lb	7½ oz

k. **BEACON.** Beacon operation is achieved as soon as the aerial is released from its holding container. When the beacon is operating a distinctive pip noise is emitted from the speech unit.

Note: The set is built to withstand pressure of ejection from aircraft at 70,000 ft and immersion to a depth of 30 ft in water.

SARBE WITH TRANSISTORISED BEACON

19. A fully transistorised Beacon is being fitted to replace the older type with the following improvements.

a. **MODULATION DEPTH.** 100% (Carrier reduced to zero between pulses).

b. **OPERATION RANGE.** Greater than 60 n.m. sea to air (at 10,000 ft)
Greater than 40 n.m. sea to air (at 5,000 ft)
Greater than 15 n.m. sea to air (at 500 ft)

c. **POWER OUTPUT.** 400 mW PEP nominal.

d. **POWER SUPPLY.** 10.7V plus 1.34V Bias Kalium battery.

e. WEIGHT.

UNIT	WEIGHT
Beacon	10½ oz
Battery	1 lb 6 oz
Total	<u>2 lb ½ oz</u>

20. **ARI 23099 (Centralised Audio Selection System (C.A.S.S.))**. The Centralised Audio Selection System made by Ultra Electronics and designated ARI 23099 is fitted in the Wessex Mk V and Buccaneer Mk II aircraft. C.A.S.S. provides complete facilities for the control of all radio installation within the aircraft. Each crew member has a 'station box' which permits him to select whichever facilities are required quite independently of the other crew members, while at all times retaining a common intercom.

21. **Procedure for supply of crystals.** When an A/S helicopter flight consisting of Wasp and Wessex helicopters fitted with ARI18197 is formed for a small ship the Signal Officer of the Air Station at which this takes place will demand one set of ARI 18197 crystals to cover the channelisation given in the A/S helicopter Table in ~~RNSO S4~~ ~~except for the ships Private frequency.~~ The ship must at the earliest opportunity demand crystals for:

- RNCP 4
- RNCP 4
- The duplicate set of the ~~RNSO S4~~ A/S helicopter Table Channelisation.
 - ~~Two Private frequency crystals. (Private frequencies are allocated in RNSO S4).~~
 - Two of each crystal laid down in RNSO S13 under Group 34A, which have not been covered above.

B. TWO OF EACH CRYSTAL LAID DOWN IN RNCP 13 UNDER GROUP 34A WHICH ARE NOT INCLUDED IN THE RNCP 4 A/S HELICOPTER TABLE