Chapter 1

GENERAL INFORMATION

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GENERAL

1. The transmitter-receiver PTR 175 (fig. 1) is a u.h.f. R/T equipment and is a derivative of the ARC52. It covers both the u.h.f. band of 225·0 MHz to 399·95 MHz and the v.h.f. band of 117·5 MHz to 135·95 MHz.

2. Two versions are available; one operates solely from a d.c. supply of 27·5V (nominal), whilst the other operates from a three-phase 400 Hz a.c. supply of 115V (nominal phase to neutral) in addition to the 27·5V d.c. supply. The d.c. version is known as the PTR175 and the a.c. version as the PTR175A.

3. The equipment is pressurized and contains its own cooling facilities and may be installed in any convenient part of an aircraft. The operational controls are situated on a control unit which may be installed up to 110 ft. from the transmitter-receiver, depending on the gauge of wire used for connections.

4. In addition to R/T transmission and reception, facilities are available for m.c.w. transmission and for direction finding purposes.

5. The equipment may be set to operate on any one of 3500 frequency channels in the 225·0 MHz to 399·95 MHz range and 370 frequency channels in the 117·5 MHz to 135·95 MHz range (50 kHz channel spacing). Facilities are provided to enable any eighteen of the frequencies to be preset; they are then available to the operator, who has only to set the CHAN switch on the control unit to the appropriate channel number. Alternatively, any of the frequency channels may be selected by the operator, by using the MANUAL switches on the control unit.

6. To permit constant monitoring on the u.h.f. guard frequency, the equipment incorporates an additional fixed tuned receiver operating on a preset frequency in the range of 238·0 to 248·0 MHz. This receiver can be switched into operation as and when required. The guard receiver is normally tuned to the international u.h.f. distress frequency (243·0 MHz).

Note . . .

*A version of this transmitter-receiver is used for data link purposes (transmitter-receiver PTR*177*); it is not fitted with the guard receiver.*

7. The range of the equipment is approximately 100 miles when the aircraft is flying at a height of 20,000 feet and 200 miles at a height of 50,000 feet. The equipment is pressurized and will operate at an altitude of at least 70,000 feet.

8. The equipment can be used with a similar transmitter-receiver for automatic airborne relay purposes. By means of a special junction box the audio output from one installation is fed into

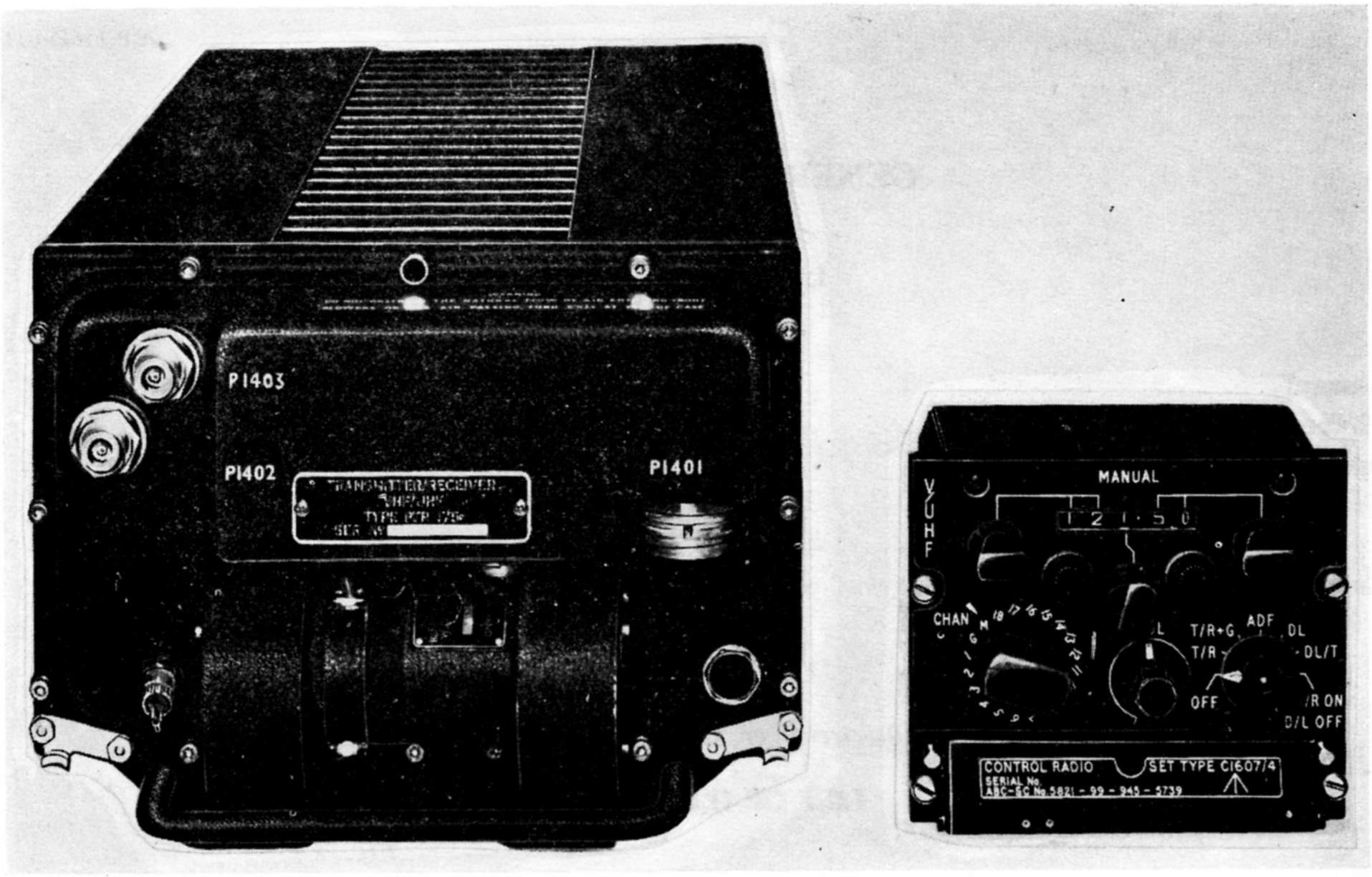

Fig. 1. Transmitter-receiver Type PTR 175 and control, radio set, Type C1607/4

the microphone of the relaying installation which radiates the signal on a different channel frequency.

POWER SUPPLIES

9. The PTR175 operates entirely from a d.c. supply of 27·5V (nominal) and the operating voltage limits are 25V to 29V. Subject to a reduced performance, the equipment will operate with a supply in the range of ~~22V to 25V~~. The current taken when operating under standard conditions is listed in the Leading Particulars.

10. The PTR175A operates from a three-phase, 400 Hz a.c. supply of 115V (nominal phase to neutral) and a d.c. supply of 27·5V. The a.c. supply operating voltage limits are 108V, to 121V and the operating frequency limits are 380 Hz to 420 Hz. Subject to a reduced performance, the a.c. supply may be in the range 102V to 108V or 121V to 124V. The d.c. voltage limits are the same as those for the alternative type given in para. 9. Details of approximate power consumption under standard operating conditions are set out in the Leading Particulars.

INSTALLATIONS

11. The standard aircraft installation is known as the ARI.23143. Those installations which include the PTR175 (d.c. version) have the suffix/1, while those which include the PTR175A (a.c. version) have the suffix/2; thus ARI.23143/1 and ARI.23143/2 respectively. ◄The ARI.23143/3 comprises the basic installation ARI.23143/1 to which a homing group radio PV141 (A.P.116D-0106-1) has been added to provide homing in azimuth on u.h.f. The ARI.23143/4 is also as ARI.23143/1, but with an additional control, radio set, C1607/7 (fig. 2) for use by another aircrew member, with limited facilities (para. 18).►

12. In addition to the transmitter-receiver and control unit, the installations include an aerial system and, where the ARI.18120 (para. 25) is not also fitted, a control, receiver muting and an interconnecting box are included, plus the necessary connectors, mounting tray, mic/tel sockets, Press-to-transmit switch, press-to-mute switch, etc. General information on the ancillary items may be found in para. 21 to 24 while detailed information on the aircraft installations is given in Chap. 4.

TRANSMITTER-RECEIVER

13. The transmitter-receiver is of sub-unit (or modular) construction, the main chassis assembly serviing as a mounting base for the other sub-units. The electrical connections between the sub-units are made via the main chassis assembly (with the exception of certain direct r.f. connections) and the rotary tuning drive to those sub-units concerned is via a gear train fitted underneath the main chassis assembly. Detailed information on all modules is given in A.P.116D-0133-1A.

14. A list of the sub-units of each transmitter-receiver is given in Table 1. Each sub-unit is allotted an index number, this number is always the first one or two digits of the three or four

◄Fig. 2. Control, radio set, Type C1607/7►

TABLE 1
Transmitter-receiver sub-unit identities

Index No.	NATO Stock No.	Official description	Common title
0 and 1	5821-99-971-1785	Amplifier, radio frequency	v.h.f./u.h.f. r.f. amplifier
2	5821-99-971-1783	Amplifier, intermediate frequency	1st i.f. unit (20-30 Mc/s)
3	5821-99-971-1784	Amplifier, intermediate frequency	2nd and 3rd i.f. unit (1825/500 kc/s)
4	5821-99-942-8555	Amplifier, audio frequency	A.F. amplifier
5	5821-99-942-8552	Spectrum generator unit	Spectrum generator
6	5821-99-942-8559	Amplifier, radio frequency	R.F. power amplifier
7	5821-99-942-8548	Modulator, radio transmitter	Modulator
8	5821-99-942-8558	Receiver unit	Guard receiver
9	5821-99-971-1782	Amplifier-oscillator-relay assembly	Amplifier-oscillator-relay assembly
10	5821-99-942-8551	Rectifier unit (part of PTR175A)	Rectifier unit
11	5821-99-942-8546	Power unit, alternating current (part of PTR175A)	A.C. power unit
	or		
	5821-99-942-8547	Power unit, direct current (part of Types TR5/ARC52 and PTR175)	D.C. power unit
12	5721-99-942-8549	Tuning unit, radio frequency.	Mechanical tuning unit
13	5821-99-943-7805	Drive, tuning (part of main chassis assembly 15)	Gear plate assembly
14	(Part of 15)		Front panel assembly
15	5821-99-971-1780	Transmitter-receiver sub-assembly (part of Type PTR175A)	Main chassis assembly
	or		
	5821-99-971-1779	Transmitter-receiver sub-assembly (part of Type PTR175)	Main chassis assembly
16	5821-99-942-8560	Cover, transmitter-receiver	Cover
19	5821-99-942-8553	Oscillator unit	Oscillator unit

Notes . . .

(1) *Table 1 does not include sub-units prefixed by 17 and 18 as these pertain to the mounting tray and the control unit, respectively, which are not part of the transmitter-receiver unit.*
(2) *It is important to ensure that all relevant modifications up to and including Mod. No. 8778 have been embodied in any replacement sub-unit.*

figure component reference number, the last two digits being the component number; e.g. R401 is the resistor R1 in the amplifier unit, AF and C1005 is C5 in the rectifier unit. There is one departure from this scheme of identification, which occurs in the main receiver and transmitter preamplifier where, because the components of the receiver and transmitter have been allotted independently, the receiver components dispense with the sub-unit index number. This avoids the situation of having two R101's and two C101's etc., in this sub-unit.

Cooling

15. The transmitter-receiver is enclosed in a double-walled, pressurized aluminium alloy cover which functions as a heat exchanger between the air inside and the air outside of the equipment. The forced air cooling provided by blowers built into the equipment permits use in ambient temperatures between −55°C and +55°C.

16. On the front panel is mounted a motor fitted with two centrifugal blowers, one at each end of the machine. These blowers force air between the walls of the cover, the cooling air absorbing the heat dissipated by the inner wall; this air is expelled through vents in the top of the cover.

17. The air inside the equipment is circulated by blowers. In the PTR175 (d.c. version) a blower is fitted on either end of the dynamotor shaft while in the PTR175A (a.c. version) two separate blower motors are fitted, one on the a.c. power unit, the other on the chassis. The main purpose of one of the blowers on the dynamotor and the blower in the a.c. power unit is to cool the r.f. power amplifier valve.

CONTROL UNIT

18. ◄There are three types of control unit used in PTR175 and PTR175A installations, the basic being Type C1607/4 (fig. 1). Type C1607/7 has only controls for manual frequency selection plus an indicator lamp and is used in the ARI.23143/4 (para. 11). Type C1607/9 is similar to Type C1607/4, differing in that the window of the manual frequency read-out is enlarged to improve visibility when used in certain types of aircraft.► The controls on the front panel are as follows:—

(1) Function switch. This has seven positions and they permit the selection of one of the following services:—

OFF—

T/R—In this position the equipment is switched on for normal use.

T/R + G—As for T/R but with the guard receiver on, in addition to the main receiver.

ADF—This position is for use when the equipment is used in conjunction with homing equipment.

DL—
DL/T—
TR ON, DL OFF—
} These positions are used with PTR177

Caution . . .

Before removing or refitting the 42-*way connector at the transmitter-receiver, it is important to ensure that the function switch on the control unit is set to* OFF.

(2) Channel selector (CHAN) switch. This has twenty positions. Those numbered 1 to 18 provide facilities for selecting the required preset frequency channel. The two remaining positions are:—

M—This position transfers the selection of the frequency to MANUAL control.

G—This positionis normally set up to the same frequency as the guard receiver and

Fig. 3. Interconnecting box 5821-99-932-6361

thus enables the main transmitter-receiver to be used on this frequency.

(3) MANUAL. There are three MANUAL switches on the control unit, corresponding to the hundreds and tens, units, and decimals of the frequency in megaHertz. Thus, any one of the 3500 u.h.f. and 420 v.h.f. channels may be selected. Figures indicating the selected frequency appear above the MANUAL switches.

(4) VOL. This is the volume control which is used to adjust the level of the audio signal in the telephones.

19. Access to the controls for setting up the preset frequency channels is obtained by releasing the access panel at the bottom of the front panel.

20. Two lamps are arranged on the front panel to provide diffused illumination of the controls.

ANCILLARY AND ASSOCIATED EQUIPMENT

Aerials

21. The r.f. input and output impedances of the transmitter-receiver are nominally 50 ohms. A number of aerials are available, some of which are suitable for aircraft and others for ground use; these are described in A.P.116D-0133-1A.

Interconnecting box

22. The interconnecting box 5821-99-932-6361 (fig. 3) is not required in all airborne installations. In some installations, the interconnections are incorporated into the aircraft wiring, whilst the AF unit Type 9635, part of the homing equipment ARI.18120 (para. 25), provides the same facilities as the interconnecting box where this installation is also fitted.

23. The interconnecting box provides for the following connections to be made to the equipment:—

(1) Microphone input and audio output circuits from the transmitter-receiver to the intercommunication system of the aircraft.

(2) Muting and tone facilities and panel lights to the appropriate switches or controls.

(3) Power supplies to the control unit and to the transmitter-receiver.

(4) Control unit to the transmitter-receiver.

Control, receiver muting

24. A negative bias supply is necessary if it is required to mute the receiver at will. This supply may be obtained from the ARI.18120 where this is also fitted, but in other aircraft installations it will be necessary to fit a control, receiver muting 5821-99-943-3247 (fig. 4).

Homing equipment

25. The ARI.18120 is a homing equipment which may be used in conjunction with the ARI.23143. It comprises an RF unit Type 11037, an AF unit Type 9635, plus aerials, indicators, etc. With this equipment, homing information is available in azimuth and elevation on to c.w., m.c.w. or R/T transmission. The ARI.18120 is fully described in A.P.116B-0302-1.

Fig. 4. Control, receiver muting