Chapter 3

SETTING UP AND OPERATING INSTRUCTIONS

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LIST OF ILLUSTRATIONS

FUNCTIONS OF THE EQUIPMENT

1. The PTR175 type equipments permit operation on any of 3500 frequency channels, spaced 50 kHz apart, in the 225 MHz to 399·95 MHz range or on any of 370 frequency channels with similar spacing in the 117·5 to 135·95 MHz range. The installations are primarily intended for R/T simplex communication between aircraft and ground, aircraft and ships and also between aircraft. The various operational controls are incorporated in the control unit Type C1607/4, which provides for manual selection of the required frequency channel or automatic selection of one of eighteen preset frequency channels. In addition, the preselector system includes a guard channel frequency. Facilities are also included to enable the installations to be used with British or American direction finding equipment.

2. For automatic airborne relay purposes, the installation can be used with identical transmitter-receivers when an extra junction box is employed instead of the control unit. The signal output from one receiver can be fed into the transmitter of the relay equipment and re-transmitted on a different channel.

3. The control unit C1607/4 is also used in ARI.23141 data link installations. Only when used in that role are the last three positions of the function switch applicable. Also, on the right-hand side of this control unit is a switch (fig. 1) which on installation must be set as follows:—

for ARI.23143 (R/T installations) to the green, G (guard) position.

for ARI.23143 (data link installations) to the yellow, D/L (data link) position.

Caution . . .

Before removing or refitting the 42*-way connector at the transmitter-receiver, care must be taken to ensure that the function switch on the control unit is at* OFF.

FUNCTIONS OF THE OPERATING CONTROLS

4. The operating controls for the basic equipment consist only of those on the front panel of the control unit (fig. 1) and they are as follows:—

(1) MANUAL frequency controls—Three controls are used for manually selecting the operating frequency; the CHAN switch must be in the M (manual) position. When the CHAN selector switch is not in the M position, the MANUAL selectors do not affect the operating frequency.

Note . . .

The decimals switch mechanism may be set to give either 50 *kHz or* 100 *kHz steps. The method of changing over the mechanism is described in A.P.*116*D-*0133-1*A*.

(2) CHAN selector switch—In addition to the M position (sub-para. (1)) there are eighteen positions for the preset channels of operation (para. 5), and also a G position for the

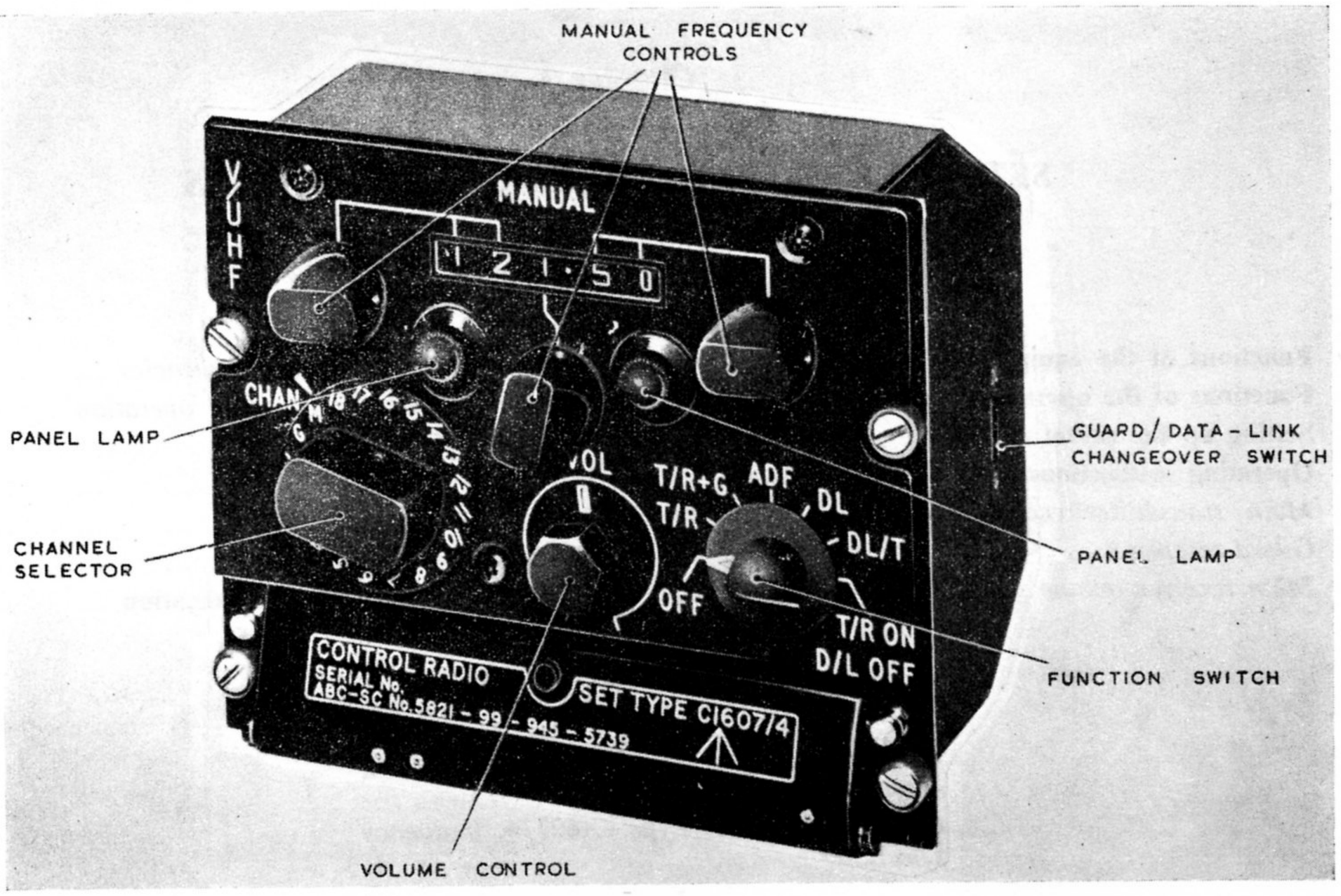

Fig. 1. Control, radio set, Type C1607/4, operating controls

guard frequency of 243·0 MHz. Note that the G (guard) position can be reached by rotating the switch in either direction. Hence, the first position against the stop is always guard. This is significant in installations where the control unit is not visible to the operator, who may select the required channel by counting switch positions from the stop.

(3) VOL control—This permits the level of the audio signals in the telephones to be set to the required level.

(4) Function switch—The seven positions of this switch are as follows:—

(a) OFF. The power supplies are switched off.

(b) T/R. The power supply is switched on and the equipment is automatically set for receiving purposes. When it is required to transmit, the press-to-transmit switch must be operated.

(c) T/R + G. The guard receiver is switched on, while normal transmit-receive facilities on the selected channel are retained.

(d) ADF. This position is for use with both British and American direction finding equipment. The British equipment includes facilities to permit normal transmission and reception when the ADF position is in use. The American equipment does not include this facility.

(e) DL. Equipment set for reception of data link signals. Transmitter inoperative.

(f) DL/T. Equipment set for reception of data link test messages. Transmitter inoperative.

(g) T/R ON DL OFF. This is an emergency position. It permits R/T communication in the event of the data link equipment becoming unserviceable and affecting normal R/T communication on the T/R position.

SETTING UP THE PRESET CHANNELS

5. The setting up scale is exposed by pulling open the cover plate. The channel to be set up is indicated by a white number on a red background at the extreme left-hand end of the scale. The channel number is rotated into the setting up position by the channel selector switch CHAN. Because of the method used for setting up purposes, the channel number indicated on the channel selector switch CHAN does not agree with that appearing on the setting up scale and, therefore, the setting of the CHAN switch should be ignored during this procedure.

6. Setting up is done by means of switch actua-

tors mounted on a drum, there being one bank of actuators for each channel. A special presetting tool (fig. 2) is provided for sliding the actuators to the required positions. The actuators operate switches mounted inside the control unit. The position of the channel selector switch CHAN. determines the bank of actuators which will operate the switches to obtain the operating frequency, and this bank corresponds with the number indicated on the channel selector switch. The bank of actuators accessible for adjustment is that indicated by a white number of a red background at the left-hand end of the scale.

7. The scale has four groups of digits and, reading from the left-hand to the right-hand side, they represent the frequency in MHz as follows:—

(1) The first group consists of digits 1, 2 and 3; these represent the hundreds of MHz within the frequency range of 117·5 MHz to 135·95 MHz, and 225·0 MHz to 399·9 MHz.

(2) The second group consists of two rows of five digits which represent the tens of MHz within the frequency range. Two actuators are used with these digits, one to select the required row and the other to select the actual digit required.

(3) The third group is similar to the second group and represents the units of MHz.

(4) The fourth group is also similar to the second group and represents the tenths of MHz.

(5) The fifth group represents the hundredths of MHz being designated 00 to 05.

8. The procedure for setting up the frequency channels is as follows:—

(1) The power supplies need not be switched off during the setting up procedure.

(2) Assume that channel 7 is to be set to a frequency of 351·5 MHz.

(3) Rotate the channel selector CHAN switch until the channel number 7 appears in the aperture adjacent to the setting up scale, that is, opposite the arrow pointing to PRESET CHAN.

(4) Remove the presetting tool from its stowage and set up the actuators in sequence, commencing from the left-hand side of the control unit as follows:—

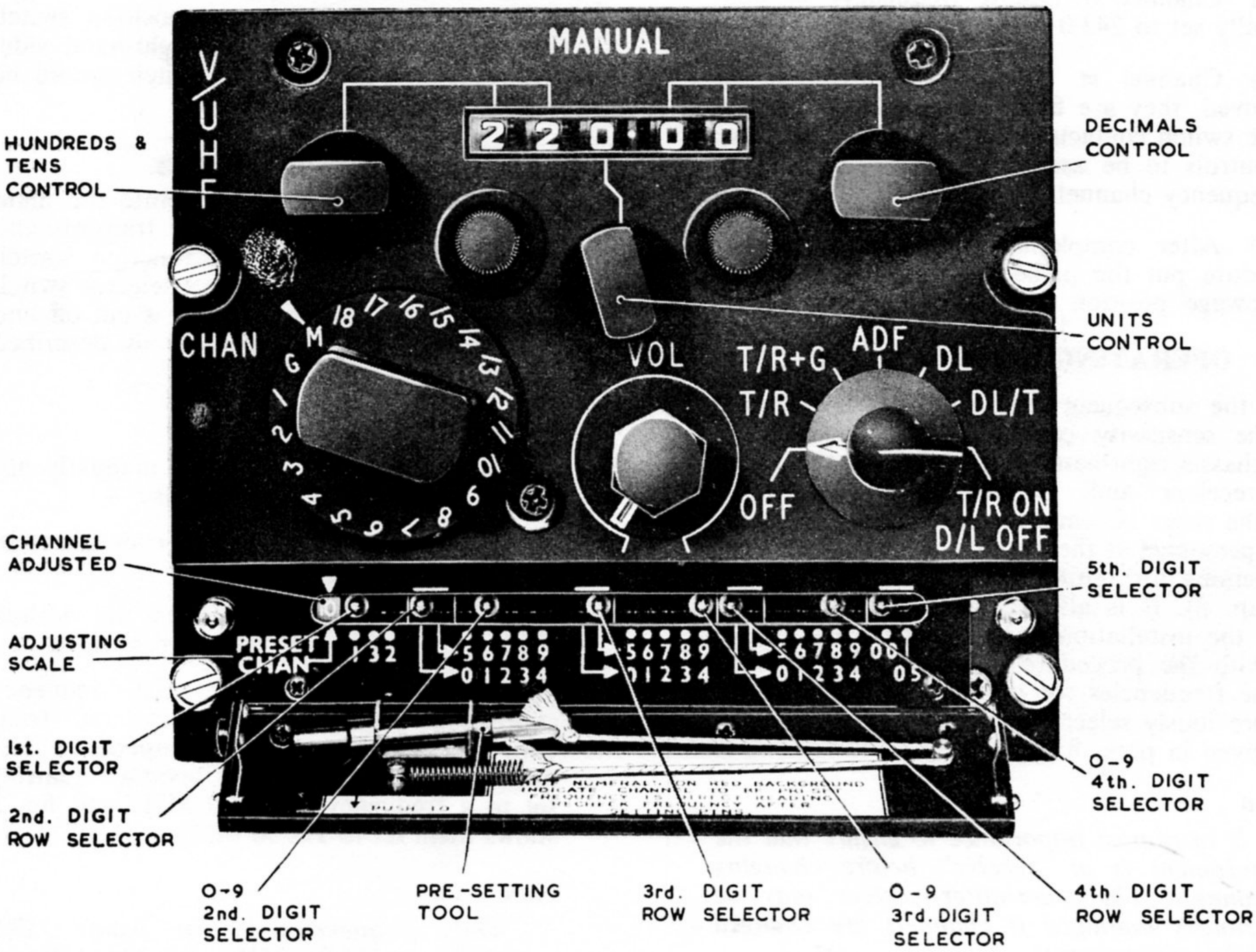

Fig. 2. Control, radio set, Type C1607/4, frequency selection

(a) Hundreds MHz, digit 3, firstg roup. Set the first actuator over the digit 3.

(b) Tens MHz, digit 5, second group. Set the second actuator over the arrow pointing to the upper row which includes the digit 5. Set the third actuator over the digit 5.

(c) Units MHz, digit 1, third group. Set the fourth actuator over the arrow pointing to the lower row which includes the digit 1. Set the fifth actuator over the digit 1

(d) Tenths MHz, digit 5, fourth group. Set the sixth actuator over the arrow pointing to the upper row containing the digit 5. Set the seventh actuator over the digit 5.

(e) Hundredths MHz, digit 00, fifth group. Set the eighth actuator over the digit 00.

(5) The remaining channels can be set to the required frequency by first turning the CHAN switch so that the required channel number appears in the PRESET CHAN position (sub-para. (3)) and then repeating the procedure contained in sub-para. (4) to set the actuators to the frequency required.

(6) Channel G (guard frequency) is normally set to 243·0 MHz.

(7) Channel M. The actuators cannot be moved, they are fixed in position to actuate the switch contacts which enable the MANUAL controls to be used for selecting a required frequency channel.

(8) After completing the setting up procedure put the presetting tool back into its stowage position and close the cover plate.

OPERATING INSTRUCTIONS

9. In the subsequent instructions, it is assumed that the sensitivity controls, which are on the main chassis right-hand gusset plate of the transmitter-receiver and, therefore, only accessible when the cover is removed, have been set by servicing personnel at the appropriate servicing lines. (Instructions for setting these controls are given in Chap. 6). It is also assumed that an overall test of the installation has been made in accordance with the procedure given in Chap. 5, and that the frequencies for the preset channels have been previously selected according to the instructions given in para. 8.

Caution . . .

It is of utmost importance to ensure that the equipment is at "receive" before changing channels. The transmitter-receiver may be seriously damaged if channels are changed whilst at "transmit".

Main transmitter-receiver

10. To operate the equipment on any one of the eighteen preset channels, proceed as follows:—

(1) Set the function switch on control unit to T/R and ◄ allow at least 2 minutes ► for the valves in the set to warm up.

(2) Set CHAN to required channel.

◄ **Caution . . .**

In the event of spurious radiation shown by weak or non-communication, operate CHAN to any other channel and then return to required channel. ►

(3) Adjust VOL. to centre of its travel.

(4) After the first received signal is heard in the headphones, VOL. may have to be readjusted to give the required level of sound.

(5) Transmit on same channel by operating the PRESS-TO-TRANSMIT.

Guard receiver

11. The guard receiver is brought into operation by setting the function switch of the control unit to the T/R + G position. The channel selector switch CHAN should be set to any of the channels other than G. Thus watch can be maintained on both the guard frequency and the frequency at which the main transmitter-receiver is being operated. The level of the audio output of the guard receiver relative to that of the main receiver is preset by an internal control, while the level of the audio signals in the telephones is adjustable by the VOL. control on the control unit. The Type C1607/4 control unit has a two-position switch visible through the case on the right-hand side. In ARI.23143 installations, this switch should be in the green G (guard) position.

Main receiver on the guard frequency

12. Should it be necessary to operate the main receiver at the guard frequency or transmit and receive at this frequency, the function switch should be set to T/R and the CHAN selector switch set to G. The guard receiver output is cut off and the equipment should be operated as described in para. 10.

Manual adjustment of frequencies

13. To operate the equipment on manually adjusted frequencies proceed as follows:—

(1) Rotate the channel selector switch CHAN to the M position.

(2) Set the function switch to the desired type of operation, i.e. T/R or T/R + G.

(3) Adjust each of the MANUAL frequency controls at the top of the control unit front panel to show the desired operating frequency. Fig. 1 shows the MANUAL controls set to a frequency of 357·0 MHz and fig. 3 shows them set to 121·50 MHz.

Note . . .

Only frequencies in the bands 117·5 *MHz to* 135·95 *MHz and* 225 *MHz to* 399·95 *MHz are operative even though the* MANUAL *controls on the control unit may be set so that frequencies outside these bands appear in the window.*

(4) Operate the equipment as described in para. 10, sub-para. (3) to (5).

Automatic direction finding operation

14. To operate the transmitter-receiver with associated direction finding equipment, set the function switch on the control unit to the ADF position. When used for this purpose, the transmitter-receiver will receive r.f. signals via the direction finding aerials, amplify and demodulate them and feed the a.f. output to the direction finding amplifying and indicating equipment. The British u.h.f. direction finding equipment described in A.P.116B-0302-1 incorporates a relay system which permits the ARI.23143 to be used for transmission purposes when switched for a.d.f. operation. The current American d.f. equipment, which can be used with either of these installations set to ADF does not include facilities to allow transmission to take place when the ADF position is being used.

ADDITIONAL FACILITIES

Receiver muting

15. When it is required to mute the receiver, in order to eliminate unwanted signals or interference during crew intercommunication, the receiver muting control 5821-99-943-3247 may be used. This unit is controlled by a spring loaded toggle switch labelled PRESS-TO-MUTE, which is mounted in the aircraft in a position convenient for operation by the pilot. The control is capable of operating on either 27·5V d.c. or 115V 400 Hz a.c. depending on the setting of link wires inside the unit; the label on the unit is reversible to indicate whether it is wired for d.c. or a.c. operation. In practice, this control is responsible for injecting a negative supply of about 10V into the a.g.c. line in order to cut off the r.f. amplifier sections of the receiver.

Tone ON/OFF

16. A control, which is fitted in the pilot's compartment, completes the earth return of the 27·5V d.c. supply to energize the tone relay in the relay unit which, in turn, actuates the T/R relay to set the equipment in the transmit condition. At the same time, the tone relay switches the 140V h.t. supply to the tone oscillator in the modulator, radio transmitter. This causes the equipment to transmit a continuous wave signal, modulated at a nominal frequency of 1000 Hz, for use in distress or for direction finding.

AERIAL CHANGEOVER

17. A single pole switch is sometimes mounted in the aircraft, convenient to the operator. It is labelled with two positions, AERIAL 1 and AERIAL 2 and operates the relay, armature, 5945-99-932-1487 to change over the transmitter-receiver from one aerial to the other in installations where upper and lower aerials are used. In this way improved signal coverage is obtained when the attitude of the aircraft changes and may pertain to u.h.f. and v.h.f. aerials.

REMOTE VISUAL, CHANNEL INDICATION

18. A remote visual indicator may be used in conjunction with a Type C1607/4 control unit. This employs neon indicators which light to show the selected channel.