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PART 3 : SECTION 1

CHAPTER 1

**AIRBORNE R/T EQUIPMENT AND
THE GROUND D/F ORGANIZATION**

TRANSMITTER/RECEIVERS

Function

1. The T.R. 1430 is an eight-channel V.H.F. transmitter/receiver which permits either R/T or morse key-operated W/T communication. This set operates on eight crystal-controlled frequencies within the 100 to 124 mc/s range.

2. The T.R. 1430 is practically obsolete and is being superseded by 10-channel transmitter/receivers which are normally used in pairs to provide 20 crystal-controlled, selected frequencies in the 100 to 156 mc/s range. These sets are :—

(a) T.R. 1934—frequency range 100 to 125 mc/s.

(b) T.R. 1935—frequency range 124.5 to 156 mc/s.

(c) T.R. 1936—frequency range 115 to 145 mc/s.

3. These transmitter/receivers have intermediate frequencies (inter-channel spacings) of 180 kc/s, which means that the preset frequencies cannot be closer than 180 kc/s. Minor modifications to these sets reduced the intermediate frequencies to 90 kc/s, and to indicate that these modifications have been made the reference numbers of the sets are changed as follows :—

(a) T.R. 1934 becomes T.R. 1985.

(b) T.R. 1935 becomes T.R. 1986.

(c) T.R. 1936 becomes T.R. 1987.

4. Two further transmitter/receivers are in use. These are the T.R. 1997 with a 100 to 156 mc/s frequency range and 180 kc/s intermediate frequencies, and the T.R. 1998 of similar frequency range but with intermediate frequencies of 90 kc/s.

Method of Use

5. The sets are operated by *Press-to-Talk* and *Press-to-Mute* buttons, situated (usually) on the pilot's control column or, in fighter aircraft, on the throttle control. The receiver volume is controlled automatically and intercommunication is available where necessary irrespective of the frequency selected.

6. The control unit for the T.R. 1430 is a push-button type of controller equipped with a transmit/receive switch which may be operated manually. In the *Remote* position the pilot's push-button on the control column may be used instead of the transmit/receive switch.

7. The control unit for the other types of sets consists of an 11-position rotary switch with 10 frequency indication letters and an off position. The frequency indication letters are from A to J, but on twin installations a second controller is provided and is lettered from K to T. A change-over switch is located between the controllers.

8. The letters are illuminated internally, and a dimmer control for the lighting is provided on the controller face.

Operational Limitations

9. **Range.** Power output is sufficient for an average maximum range of 200 miles, but the range is limited to the optical horizon.

10. **Height.** T.R. 1430 equipment cannot be used above 30,000 feet unless the set is in a pressurized compartment, otherwise sparking may occur. For the same reason, the other sets cannot be used above 50,000 feet except in a pressurized compartment.

GROUND D/F ORGANIZATION

11. The direction-finding organization in the United Kingdom provides :—

(a) A very high frequency direction-finding service, based on the use of radio telephony (V.H.F. D/F).

(b) A high frequency direction-finding service, based on the use of wireless telegraphy (H.F. D/F).

(c) A medium frequency direction-finding service, based on the use of wireless telegraphy (M.F. D/F).

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Function

12. The basic function of these systems is to assess the direction of a transmitting aircraft from listening D/F stations, and to relay this information to the aircraft either in degrees true from the control station (true bearing) or as a definite position of the aircraft (fix). In the latter case, bearings from two or more D/F stations are plotted, their common point of intersection revealing the position of the aircraft at the moment of transmission. This D/F fix is then passed to the aircraft.

Classification of Bearings

13. Bearings are classified as :—

- (a) Class "A", *i.e.* accurate to within $\pm 2^\circ$.
- (b) Class "B", *i.e.* accurate to within $\pm 5^\circ$.
- (c) Class "C", *i.e.* of inaccuracy greater than $\pm 5^\circ$.

Classification of Fixes

14. Fixes are classified as :—

- (a) Class "A", *i.e.* plotted from two or more Class "A" bearings.
- (b) Class "B", *i.e.* plotted from one Class "A" bearing and one or more Class "B" or "C" bearings.
- (c) Class "C", *i.e.* plotted from Class "B" or Class "C" bearings.

CATHODE RAY DIRECTION FINDING (C.R. D/F)

Function

15. C.R. D/F is a display unit, normally mounted in an air traffic control tower, where it provides an instantaneous and continuous indication of the direction of any aircraft while the aircraft is transmitting. C.R. D/F may be used to provide bearings or homings, or to monitor controlled

descents through cloud. Bearings are indicated automatically and without ambiguity by a single radial trace on a cathode ray tube. Simultaneous direction finding and traffic reception is provided on telephony and tone-modulated signals with alternative direction finding for traffic working on C.W. signals.

16. Two-channel operation on any two frequencies in the band is provided, together with facilities for rapid switching of the D/F service from one pair of channels to another. Audio signals on both channels are monitored simultaneously.

17. By the operation of a non-locking key, either true bearings (QTE) or magnetic homing bearings (QDM) can be displayed on the scale at the edge of the tube.

18. A test oscillator is embodied in the C.R. D/F equipment to enable the accuracy of the unit to be checked at any time.

Principle of Operation

19. The transmitted signal from the aircraft is received on a double dipole pair aerial system usually situated on the airfield. The aerials assess the direction from which the signal was received and cause the cathode ray tube to present this information as a radial line on a circular scale.

Operational Limitations

20. **Range.** Range varies with aircraft height, but bearings can normally be given to any aircraft in R/T contact.

21. **Accuracy.** C.R. D/F is accurate to within $\pm 1\frac{1}{2}^\circ$ at 100 miles with the aircraft at 10,000 feet.

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