

CHAPTER 1.

INTRODUCTION.

PRINCIPLES OF V/S SPECIAL APPARATUS.

1. A V/S Special transmitter is essentially a lantern, similar in general design to an ordinary V/S lantern, fitted with a screen which prevents the passage of almost all the visible light radiated from the source and allows only the short-wave infra-red radiation to be transmitted. Light from the transmitter is visible, for short distances only, as a deep red glow; the infra-red radiation cannot be detected without the aid of a special V/S Special receiver.

2. A V/S Special receiver is an instrument that converts an image, formed by infra-red radiation received from the transmitter into a visible image. When a V/S Special transmitter is viewed by means of a V/S Special receiver, a spot of light is seen in a manner analogous to that in which light is seen when a source of visible radiation is viewed by the unaided eye.

3. As V/S Special transmitters radiate energy only in the near infra-red, which cannot be detected by the unaided eye, V/S Special apparatus provides a method of secure communication between two points, as long as no suitable type of receiving equipment for interception is available. By the design of the transmitter, the dispersion of radiation can be controlled to minimise the risk of enemy interception. These properties make the apparatus suitable for night screened-signalling or for use as navigational aids, the V/S Special transmitters being used as signalling transmitters or as beacons. It should be remembered that, when using V/S Special methods for signalling, it is necessary either for the transmitting station to use a visual call-up or for the receiving station to keep a continuous watch; suitable apparatus is not at present available for the automatic reception of infra-red signals.

COUNTER-MEASURES.

4. It is known that other countries have apparatus, similar to the V/S Special apparatus, in naval use and every effort should be made to detect and report enemy transmissions. Similarly, precautions must be taken when using transmitters on the assumption that the enemy has means of detection similar to our own. In general, therefore, the use of the transmitter, selected for a particular application, should be limited to the range and dispersion required. Special care must be taken in enemy waters.

CLASSIFICATION OF APPARATUS.

5. V/S Special apparatus can be classified under the following headings and has been described under these headings in this handbook.

(i) Receivers.

The term "V/S Special receivers" covers any apparatus (except television) capable of receiving infra-red radiation and transferring it to the eye as a visual image. A general account of receivers is given in Chap. 2, followed by details of the types of receiver in use in Chap. 3.

(ii) Transmitters.

General information on these is given in Chap. 4.

V/S Special transmitters may be divided into two classes :-

- (a) Directing transmitters. These are used as navigational aids for directing craft along a defined line of bearing from the directing ship. The Lorenz beam principle is employed, i.e. two narrow overlapping beams are produced and distinctive signals made with each to give indications of bearing. These transmitters are dealt with in Chap.5.
- (b) Homing beacons and signalling transmitters. These transmitters are used as navigational aids for homing craft to the ship displaying the homing beacon. They give either an all-round arc (e.g. Type 307) or a directional arc of a fixed width which varies with the type of transmitter (e.g. Types 308, 311). The majority of the beacons can be keyed to make coded signals or slow morse. No transmitter has been designed essentially for sending messages. Homing beacons and signalling transmitters are described fully in Chap. 6.
- (iii) Trans-Receivers.

These consist each of a transmitter and receiver, combined to form one unit. They are used in cases where the operation of both transmitter and receiver is required to be carried out by one operator. They are essential for use with "corner cube" reflectors. In this system, the operator transmits a beam which is picked up by a special reflector (known as a corner cube) and sent back to the operator. The system requires the receiver to be close to the source of transmission. Trans-receivers are described in Chap. 7.

PERFORMANCE.

6. The performance of the types of equipment in use is summarised in Appendix A, "Information Table on R.G.Apparatus". It must be stressed that the performance obtained by any system of receivers and transmitters depends not only on the strength of the transmission but also on the sensitivity of the receiver. Since these vary under different conditions and, to a certain extent, from one instrument to another, it is essential that operators should know the individual performances of the instruments supplied to them.

7. The following considerations affect the performance of V/S Special systems.

- (i) The accuracy of training of the transmitter. Transmissions are stronger in the centre of the beam and grow weaker towards the limits of dispersion.
- (ii) Atmospheric conditions and temperature. The transmission of infra-red is affected by fog in the same way as that of visible light. Also, the sensitivity of the receiver, and hence the greatest range of the system, is reduced at high temperatures.
- (iii) Condition of optical system and cleanliness of glass, screen, etc.
- (iv) Age of transmitter lamp.
- (v) Condition and endurance properties of transmitter battery. The performance of the battery will drop after it has been in use for some time.

8. Since both transmitters and receivers are affected by high temperatures, special steps have been taken to provide for efficient operation in the Tropics. The whole subject of tropical conditions is dealt with separately in Chap. 8.