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RESTRICTED

AIR PUBLICATION

1275B

VOLUME I

SECTION 17

NAVIGATION INSTRUMENTS

MISCELLANEOUS AND TABLES

Prepared by direction of
the Minister of Supply

R. Maxwell

Promulgated
By Command of
Their Lordships

E. S. Land

ADMIRALTY

Promulgated
By Command of
the Air Council

W. J. Dean.

AIR MINISTRY

P27415 6/57

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To record the incorporation of an Amendment List in this publication, sign against the appropriate A.L. No. and insert the date of incorporation.

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LETHAL WARNING

EJECTION SEATS AND CANOPY JETTISON MECHANISMS

1. Ejection seats and canopy jettison mechanisms are sources of potential danger to personnel and of damage to the aircraft. Serious injury (possibly fatal) may result if any firing mechanisms are inadvertently operated whilst the aircraft is on the ground.

2. The following instructions are to be obeyed:—

R.N. **Safety precautions contained in A.P.(N.)140—Naval Aircraft Maintenance Manual.**

R.A.F. **ALL PERSONNEL before entering the cockpit or cabin of an aircraft fitted with an ejection seat are to report to the N.C.O. immediately in charge of airframe servicing who is to ensure that all safety pins (or other safety devices) are correctly positioned to render the seat and canopy jettison firing mechanisms safe. On completion of servicing, tradesmen are to report to the N.C.O.**

3. Full instructions for rendering the firing mechanisms safe are contained in the A.P.4288 and A.P.(N.)1023 series, in Aircraft Servicing Schedules and in the A.D.5037 series.

NOTE TO READERS

The subject matter of this publication may be affected by Admiralty Fleet Orders, Air Ministry Orders, or by "General Orders and Modifications" leaflets in this A.P., or even in some others. If possible, Amendment Lists are issued to correct this publication accordingly, but it is not always practicable to do so. When an Order or leaflet contradicts any portion of this publication, the Order or leaflet is to be taken as the overriding authority.

The inclusion of references to items of equipment does not constitute authority for demanding the items.

Each leaf, except the original issue of preliminaries, bears the date of issue and the number of the Amendment List with which it was issued. New or amended technical matter on new leaves which are inserted when the publication is amended will be indicated by triangles, positioned in the text thus :—◄ — — — — — ► to show the extent of amended text, and thus:—► ◄ to show where text has been deleted. When a Chapter is issued in a completely revised form, the triangles will not appear.

LAYOUT OF A.P.1275B

NAVIGATION INSTRUMENTS

(For details see Air Diagram 6543)

VOLUME 1	**General and technical information**
VOLUME 2	**General orders and modifications**
VOLUME 3	*Not applicable* *Depot spares listed in A.P.1275, Volume 3* *Other spares listed in A.P.1086*
VOLUME 4	**Planned servicing schedules**
VOLUME 5	*Not applicable*
VOLUME 6	**Repair and reconditioning instructions**

LIST OF SECTIONS

Note.—*A list of chapters appears at the beginning of each section*

Old series

Revised series

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SECTION 17

LIST OF CHAPTERS

Note.—*A list of contents appears at the beginning of each chapter*

Chapter 3

RECONNAISSANCE VIEWFINDER FOR CANBERRA PR9

LIST OF CONTENTS

LIST OF ILLUSTRATIONS

Introduction

1. The reconnaissance viewfinder (Ref. No. 6B/3124) described in this chapter and illustrated in fig. 2 to 4, was specially designed for use in the pressurized cabin of the Canberra PR9 aircraft. It provides an external field of view, and is primarily intended for photographic reconnaissance operations, the operator being enabled to view an area in the flight path, prior to photographing.

2. The instrument consists broadly of a tube assembly (the viewfinder sight) extending upwards and provided, at its lower end, with a sighting head fixed to and standing proud of the aircraft's skin. At the operator's station is an eyepiece assembly as well as a control lever which enables the operator to carry out the desired scanning operations.

3. The instrument includes an optical system having a magnification of 1·2X and a field of view of 40°. It has a scan of 76° forward to include the horizon, and a scan of 64° aft to include the underside of the aircraft.

4. The viewfinder assembly provides an image which is erect both vertically and horizontally, and which remains so throughout the scanned field of view.

5. Maximum light transmission is ensured by the blooming of all optical surfaces.

6. The two exit windows of the sighting head are coated with a transparent conducting medium so that when switched on to the aircraft's a.c. supply, the conducting medium heats the windows sufficiently to prevent the formation of ice and mist.

7. A silica gel type desiccator and a blower motor are incorporated to afford added protection against misting.

OPTICAL SYSTEM

8. The optical system is shown diagrammatically in fig. 1. The external field of view is reflected through the three-component object lens (6) by the rotatable double isosceles scanning prism (7). The object lens forms an inverted image of the index field and this is erected by the two-component erector lenses (4 and 5) and re-imaged just forward of the three-component eyepiece lens (1) after reflection from the mirror (3).

9. The graticule (2, fig. 1) in the present model is engraved with two parallel drift lines 3° apart and with cross lines spaced at 5°, 10°, 15° and 20° each side of the centre line. A new improved graticule is being introduced (by Mod. Inst. B/205) which includes additional markings for increasing the accuracy of aim in the release of photoflashes.

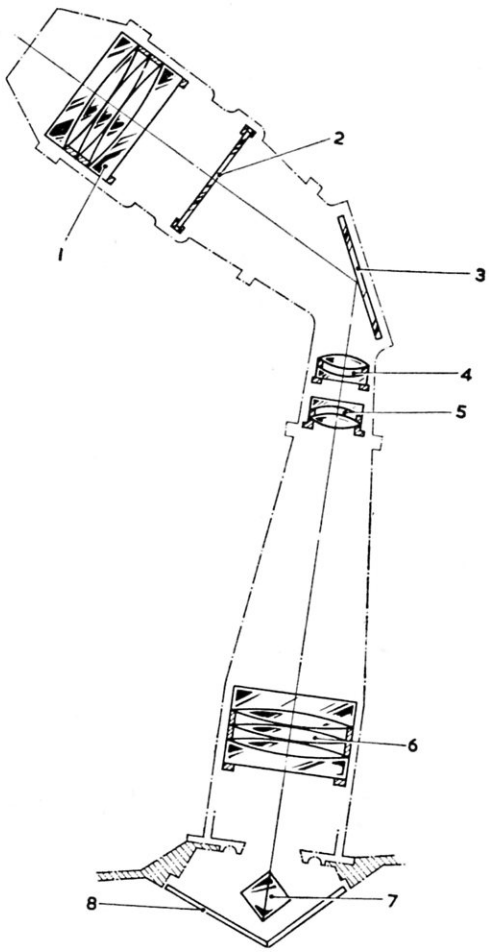
10. The graticule (2, fig. 1) caters for up to 20° of drift, port or starboard, the movement being controlled by the drift setting knob (22, fig. 3).

11. The prism (7, fig. 1) is connected to the control lever (20, fig. 2) so that the prism may be manually controlled over the scanning range of 140° (i.e., 76° forwards and 64° aft).

DESCRIPTION

Viewfinder

12. The viewfinder illustrated in fig. 2 is fixed to the aircraft by the two lugs (13), and by the connection of the outer end of the lower tube assembly (19) to the sighting head.



1 3-COMPONENT EYEPIECE LENS
2 DRIFT GRATICULE
3 MIRROR
4 2-COMPONENT ERECTOR LENS
5 2-COMPONENT ERECTOR LENS
6 3-COMPONENT OBJECT LENS
7 DOUBLE ISOSCELES SCANNING PRISM
8 TWO HEATED WINDOWS

Fig. 1. Diagrammatic optical system

13. The viewfinder sight is made up of a series of light alloy castings, and houses the optical system.

14. The lower tube assembly (19, fig. 2) supports the rotatable prism assembly. To rotate the double isosceles prism (7) through its scanning range of 140°, a Teleflex cable (15) and 2:1 reduction gearing, connect up with the scanning control lever (20) which is located on the right-hand side of the mirror box (14), and points in the direction of the line of sight. A metal protective cover (16, fig. 4) houses both the Teleflex cable and the electrical connections from the sighting head.

15. Two spring-loaded roller blinds (18, fig. 2) mounted on the prism casting and extending to two apexes of the prism, exclude any extraneous light from the upward-facing surfaces of the prism at any angle of scan. As the prism is turned by actuation of the control lever, the positions of the two opposite apexes to which one end of each blind is fixed, change; this results in one blind unrolling while the other rolls up.

16. The spring-catch lever (21, fig. 3) locks the control lever (20) in one or other of the following two fixed positions:—(1) When the line of sight is normal to the aircraft flight datum and (2) when the line of sight is 40° forward from the normal to the aircraft flight datum.

17. Secured to the mirror box (14, fig. 2) is the viewing lens housing (10) attached to which is the rubber eyepiece guard (9). ◂ The assembly 9a to 9d has been added by Mod. Inst. B/206 to provide an improved means of eye location. The rigid metal hood (9b) is held to the guard (9) by the fastener (9a), and the single density shade (9c) and the rubber eyeguard (9d) are both arranged so as to hinge out of the line of sight when not required. ▸

18. Mounted on the viewing lens housing is the control box (fig. 3) whose panel carries the undermentioned controls:—

(1) Switch (S1) — marked LAMPS — for controlling the illumination of the drift scale and the graticule. This 3-way switch permits the drift scale lamp LP1 and the two graticule lamps LP2-3 (fig. 4) to be BRIGHT, OFF or DIM.

(2) Switch (S2) — marked HEATER — for switching the two window heaters ON or OFF. A half-hood on the switch is provided to prevent the toggle switch from being accidentally knocked to OFF, since it is important that the the window heating should remain ON during flight.

(3) Control (RV1) — marked SCALE DIM — for controlling the intensity of illumination of the drift scale.

(4) Control (RV2) — marked GRATICULE DIM — for controlling the intensity of illumination of the graticule.

(5) Knob (22) — marked DRIFT — for setting the indication of drift. The amount of drift is indicated on the scale (23) on the left of the control box, against a fixed datum.

19. The 6-pole, Mk. 4 miniature plug (PL1, fig. 2) located on the underside of the control box (12) receives the electrical supplies from the sighting head.

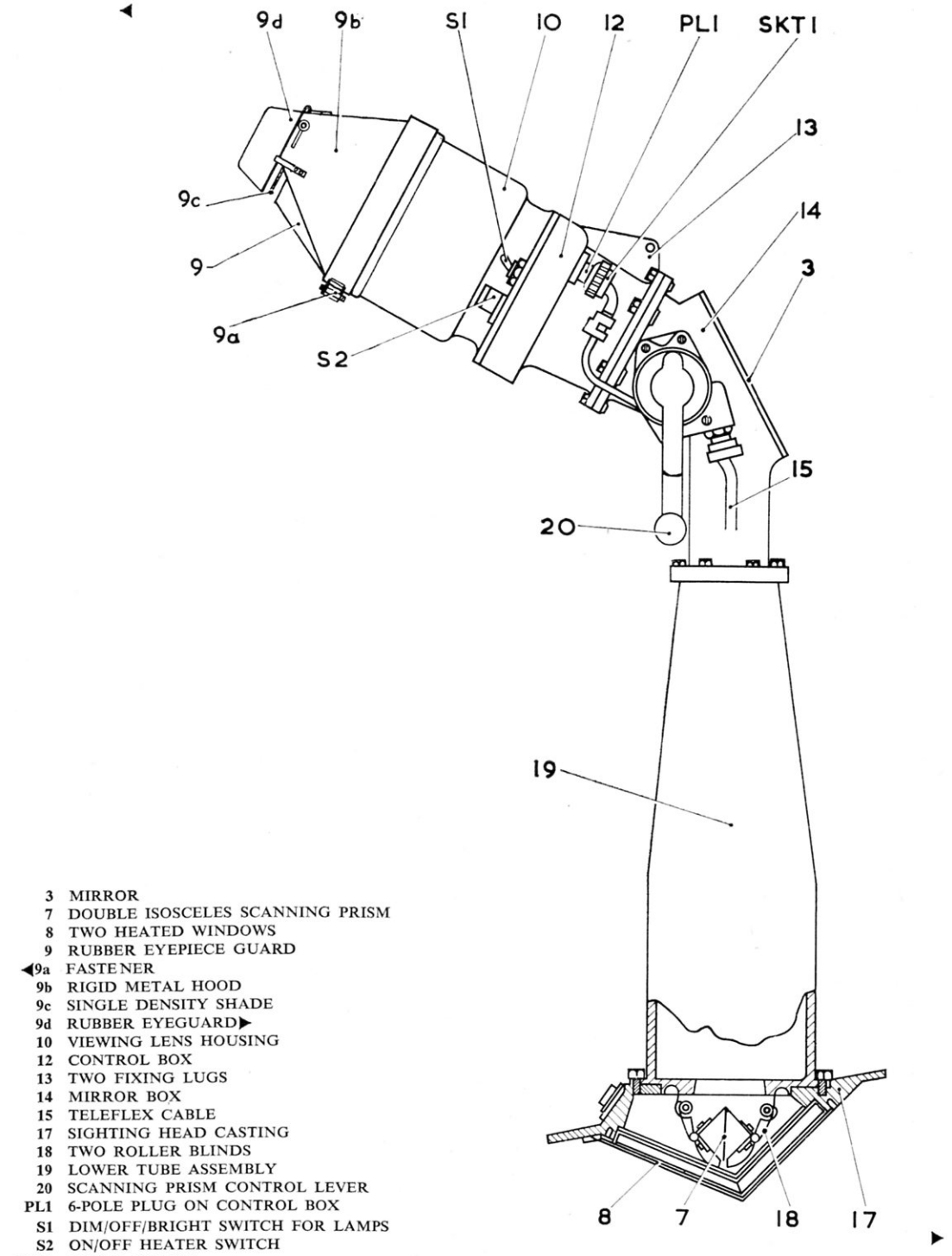
20. The silica gel type desiccator (25, fig. 4) is clipped onto the viewfinder and affords added protection against misting.

21. De-misting is improved by the use of a blower motor (M1, fig. 4) — introduced by a pre-production Mod.— which is fixed to the side of the lower tube assembly and which forces air through the silica gel desiccator.

Sighting head

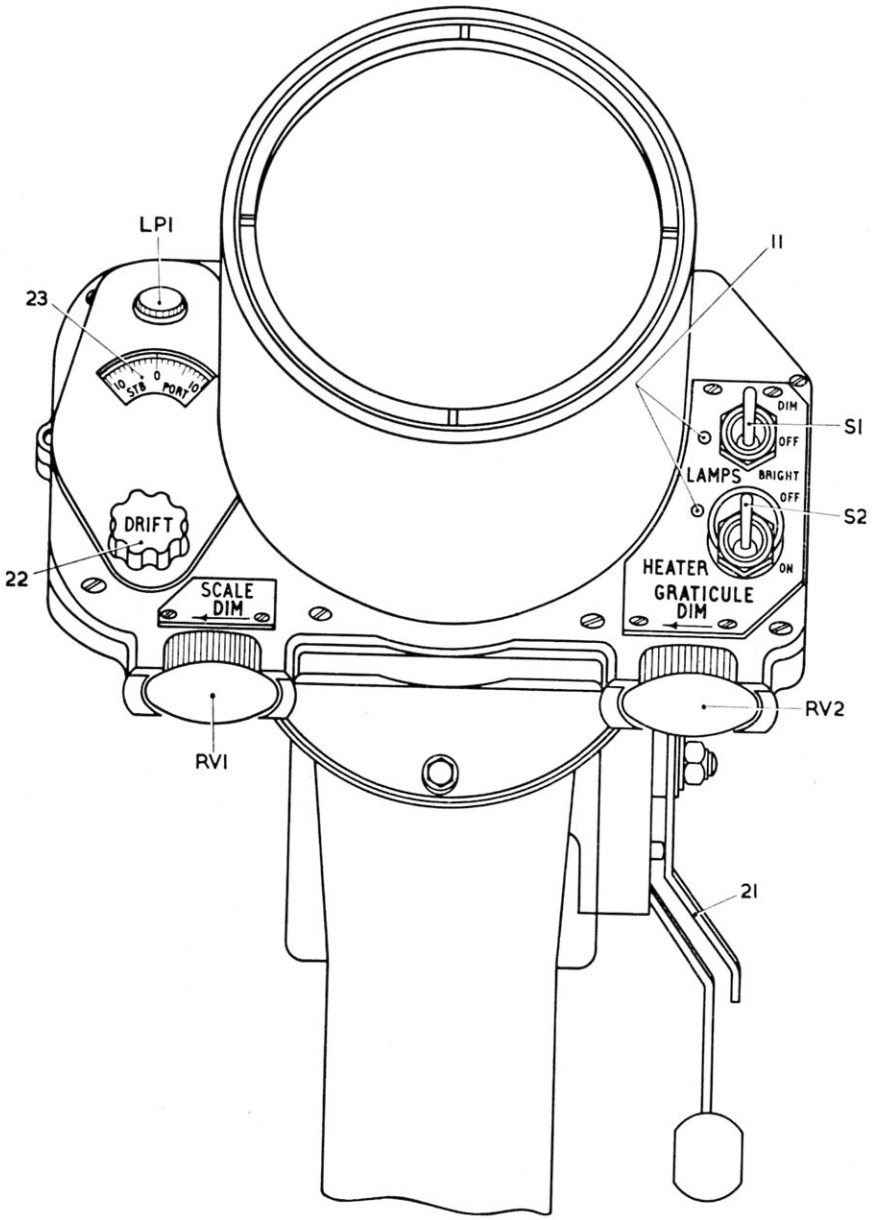
22. The sighting head (fig. 2) which is pressure-tested to 20 lb/in^2 consists of a casting (17) incorporating two glass windows (8) set in a synthetic rubber gasket and arranged in a shallow V formation.

23. The two exit windows (8) of the sighting head are coated on their inner surfaces with a film of electrically-conductive material, coupled up to the 115V, a.c. aircraft's supply. When the supply is



3 MIRROR
7 DOUBLE ISOSCELES SCANNING PRISM
8 TWO HEATED WINDOWS
9 RUBBER EYEPIECE GUARD
◀9a FASTENER
9b RIGID METAL HOOD
9c SINGLE DENSITY SHADE
9d RUBBER EYEGUARD▶
10 VIEWING LENS HOUSING
12 CONTROL BOX
13 TWO FIXING LUGS
14 MIRROR BOX
15 TELEFLEX CABLE
17 SIGHTING HEAD CASTING
18 TWO ROLLER BLINDS
19 LOWER TUBE ASSEMBLY
20 SCANNING PRISM CONTROL LEVER
PL1 6-POLE PLUG ON CONTROL BOX
S1 DIM/OFF/BRIGHT SWITCH FOR LAMPS
S2 ON/OFF HEATER SWITCH
SKT1 6-POLE SOCKET

Fig. 2. General arrangement of reconnaissance viewfinder



11 GRATICULE LAMP INDICATORS
21 SPRING-CATCH LOCKING LEVER
22 DRIFT SCALE KNOB
23 DRIFT SCALE
LP1 DRIFT SCALE LAMP

RV1 DRIFT SCALE DIMMER CONTROL
RV2 GRATICULE DIMMER CONTROL
S1 DIM/OFF/BRIGHT SWITCH FOR LAMPS
S2 ON/OFF HEATER SWITCH

Fig. 3. Control box

switched on by means of the switch (S2), the conducting medium heats the windows sufficiently to prevent the formation of ice and mist. This heating is controlled by a bi-metallic strip type, thermostat (S3, fig. 4) in the sighting head, set to maintain an ambient temperature of 48° ± 3°C.

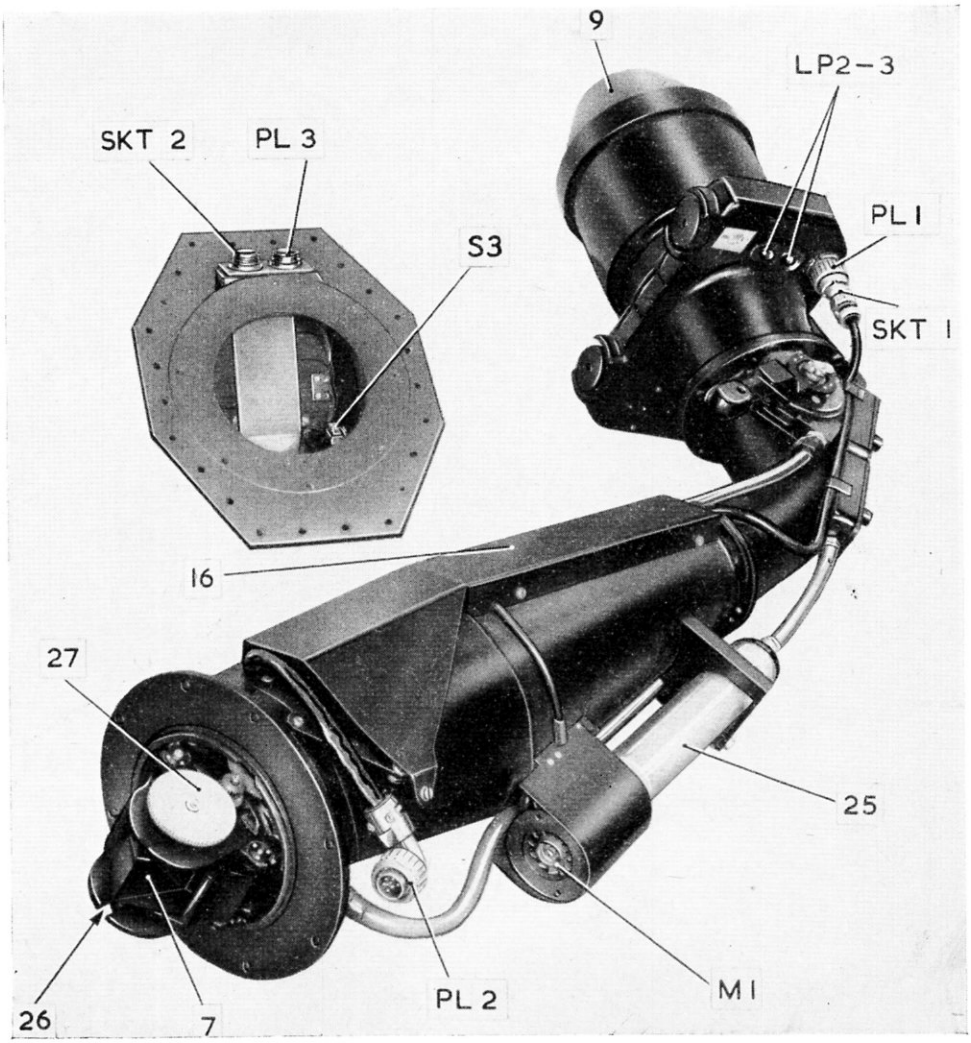
Note . . .

The control switch should be put ON *at take-off and left* ON *during the flight.*

24. At the rear of the sighting head above the skin line of the aircraft, are located a Mk. 4 miniature plug (PL3, fig. 4) and a Mk. 4 miniature socket (SKT2). The plug receives the input of the 28V d.c. for graticule and scale lighting, and the input of the 115V a.c. 400 c/s for the heaters and the motor; the socket is connected through a cable to the control box (12, fig. 2) forming part of the viewfinder sight.

CIRCUIT

25. The circuit for the reconnaissance viewfinder is given in fig. 7. The aircraft's a.c. and d.c. supplies are connected to the 4-pole plug (PL3) which feeds a.c. to the heaters and to the 3-phase blower motor (M1). Plug (PL3) also feeds the aircraft's d.c. supply to the drift scale lamp (LP1) and to the two graticule lamps (LP2 and LP3), their intensities of



7	DOUBLE-ISOSCELES SCANNING PRISM
9	RUBBER EYEPIECE GUARD
16	METAL PROTECTIVE COVER
25	SILICA GEL DESICCATOR
26	PRISM RETURN SPRING
27	GEARING BETWEEN PRISM AND TELEFLEX CABLE
LP2-3	TWO GRATICULE LAMPS
M1	BLOWER MOTOR
PL1	6-POLE PLUG ON CONTROL BOX
PL2	6-POLE FREE PLUG TO SKT2
PL3	4-POLE SOCKET RECEIVING 28V d.c. AND 115V a.c.
S3	THERMOSTAT
SKT1	6-POLE SOCKET
SKT2	6-POLE SOCKET TO PL2

Fig. 4. Photographic view of reconnaissance viewfinder

illumination being varied by the resistors (R1, RV1 and RV2).

INSTALLATION

26. The prism assembly is provided with a temporary metal protective cover which is removed when the lower tube assembly (19, fig. 2) is secured to the sighting head. To avoid damage, care must be taken to see that the bolt holes of the sighting head and of the lower tube assembly coincide as the latter is brought into position.

OPERATING INSTRUCTIONS

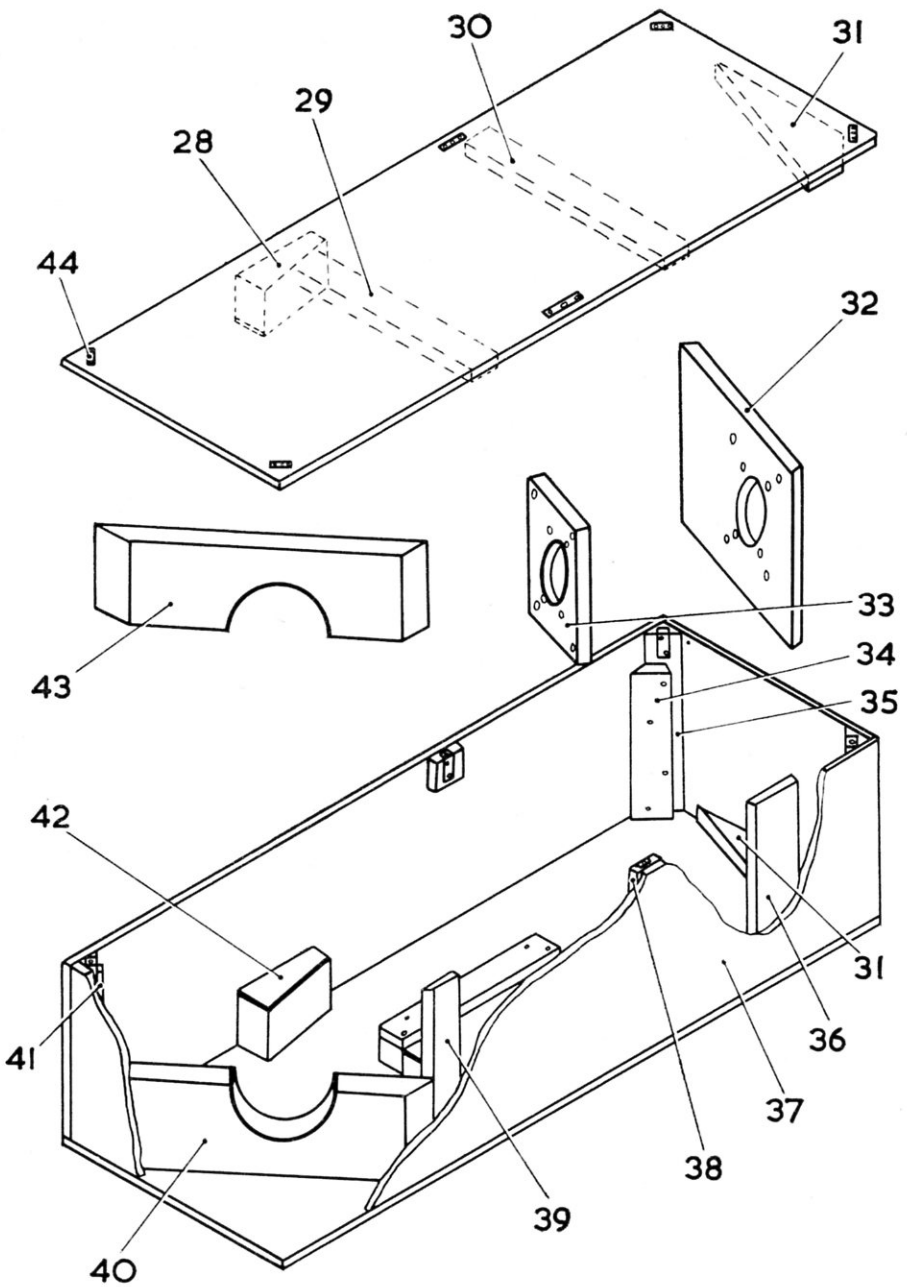
27. The following operating instructions should be carried out:—

(1) The window heaters must be switched ON, before flight commences, by means of the switch (S2, fig. 3) marked HEATER;

(2) The drift scale and graticule lamps should, if necessary, be switched on by the 3-way switch (S1), either to BRIGHT or DIM, and adjusted to the required intensity of illumination by the knobs (RV1 and RV2);

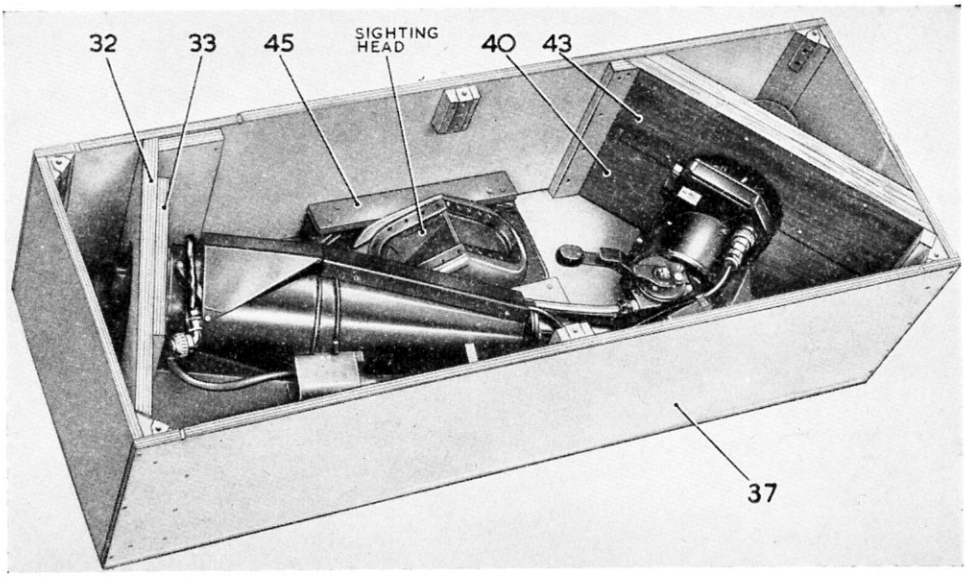
(3) The drift angle should be set by turning the drift scale knob (22); and

(4) The required line of sight of the prism should be obtained by means of the scanning control lever (20, fig. 2).



28 SOFTWOOD SUPPORT BLOCK AND $\frac{1}{8}$ in. FELT
29, 30 } SOFTWOOD BATTENS
31 SOFTWOOD SUPPORT BLOCK
32, 33 } PLYWOOD SUPPORT BLOCKS
34 SOFTWOOD SUPPORT BLOCKS
35 SOFTWOOD CORNERS
36 PLYWOOD SUPPORT BLOCK
37 PLYWOOD CASE
38 SOFTWOOD SUPPORT BLOCK
39 PLYWOOD SUPPORT BLOCKS
40 SOFTWOOD SUPPORT BLOCK AND $\frac{1}{8}$ in. FELT
41 PLYWOOD SUPPORT BLOCK
42, 43 } SOFTWOOD SUPPORT BLOCKS AND $\frac{1}{8}$ in. FELT
44 CAPTIVE SCREW FITTINGS

Fig. 5. Exploded view of inside packing case



32, 33 } PLYWOOD SUPPORT BLOCKS
37 PLYWOOD CASE

40, 43 } SOFTWOOD SUPPORT BLOCKS AND $\frac{1}{8}$ in. FELT
45 TWO PLYWOOD SECURING BLOCKS FOR SIGHTING HEAD

Fig. 6. Inner packing case with reconnaissance viewfinder in position

SERVICING

28. The equipment being desiccated, no attempt should be made to dismantle it for cleaning purposes.

29. The serviceability of the instrument may be confirmed as follows.

30. Check visually for signs of damage, security of mounting, etc., and ensure that all mechanical and electrical components are functioning correctly.

31. Should one of the graticule lamps fail to operate, it will be noticed by the absence of light from its indicator (11, fig. 3), and the lamp may be removed for inspection. The drift graticule lamp holders (LP2–3, fig. 4) are located on the underside of the panel of the control box, and the drift scale lamp (LP1, fig. 3) will be found above the drift scale (23).

32. The scanning control lever and the spring-catch locking lever should be operated to ensure freedom of movement.

33. The window heaters should be switched on and it should be checked, by feel, that both are working.

34. Check that the sighting head windows and the eyepiece lens in the eyepiece tube, are unbroken and free from grease, dirt and other foreign matter. It is recommended that these optical items should be cleaned with pure spirit using a grease-free anti-static polishing cloth (Ref. No. 14B/3599).

35. Check the silica gel in the desiccator for discoloration and, if necessary, renew.

36. Unserviceable items are to be dealt with in accordance with current Service instructions.

◂ PACKAGING

Description

37. Packaging of the reconnaissance viewfinder consists broadly in packing the instrument in an inner case which is floated between pads of rubberized hair cemented by Bostik to the inside faces of an outer container.

38. The inner and outer cases are provided with lids, are of plywood and have internal dimensions of $44\frac{1}{4}$ in. $\times$ $15\frac{1}{2}$ in. $\times$ $11\frac{1}{2}$ in. and $51\frac{3}{4}$ in. $\times$ $22\frac{1}{2}$ in. $\times$ $18\frac{1}{2}$ in. respectively.

39. Fig. 5 represents an exploded view of the inner packing case and fig. 6 shows the instrument in its stowed position. The outer case is not shown in the illustrations.

40. The inner case (fig. 5) is in the form of a box with a lid secured by six sets of captive screw fittings, and the inside contains various wooden members used for supporting and retaining the instrument.

41. The sighting head is held by the two plywood securing blocks (45, fig. 6) and the ends of the viewfinder sight are retained, one by the plywood support blocks (32 and 33) and the other, by the softwood support blocks (40 and 43).

42. The plywood outer case includes a lid with eight sets of captive screw fittings, three at each side and one at each end. The top, base, two sides and two ends of the case have cemented to their inside

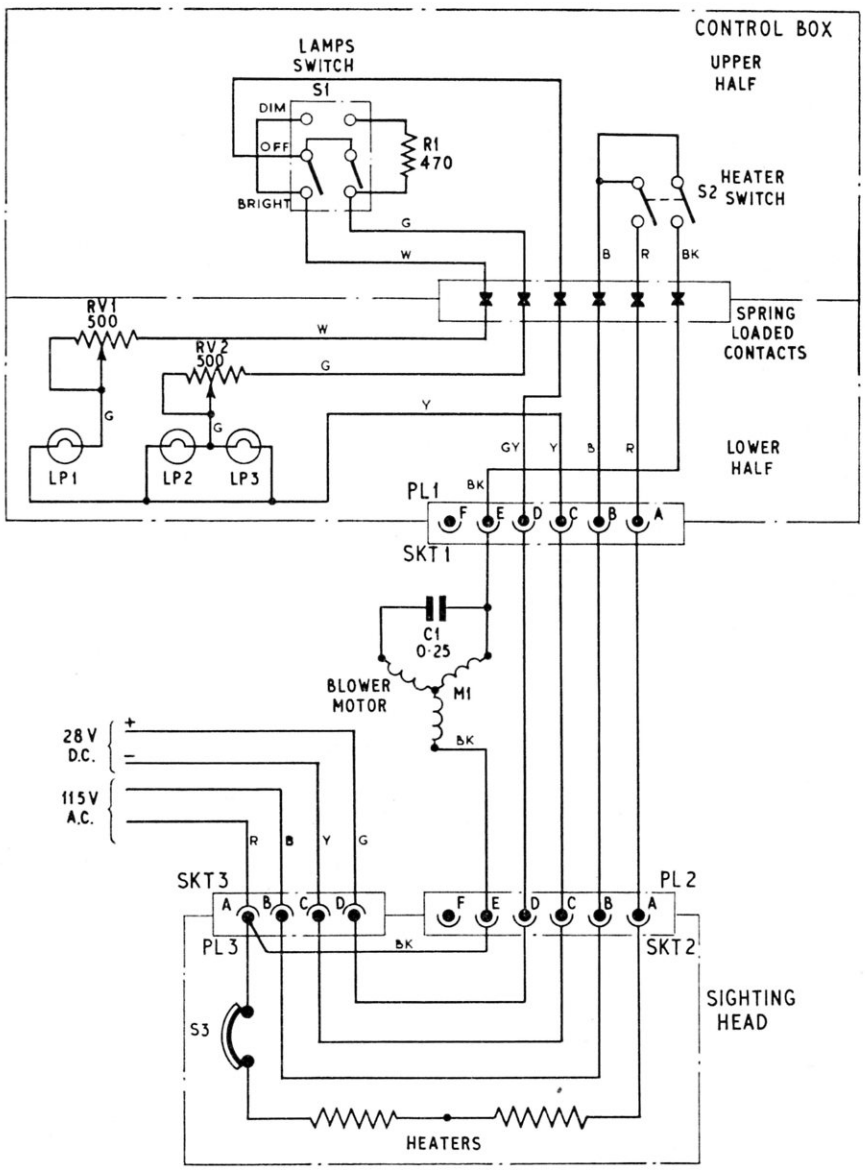


Fig. 7. Circuit diagram

faces, pads of 3 in. thick rubberized hair between which the inside case is floated. The two end pads each have a $\frac{1}{4}$ in. thick plywood pressure plate affixed by Bostik to their inside walls.

43. The actual packing of the instrument, the wrapping and the inclusion of a desiccant, are dealt with in the instructions in the following para. 44 to 53.

Special packaging instructions

44. Secure the plywood support block (33, fig. 5) to the flange on the instrument with the four $1\frac{1}{2}$ in. long screws, nuts and washers provided.

45. Wrap the free plug PL2 (fig. 4) and its cable in four thicknesses of polyvinyl chloride film (B.S.1763) and secure with tape, waterproof, transparent (C.S.2501).

46. Wrap the instrument in paper, wrapping, waxed, DEF.1242.

47. Place the wrapped instrument together with 3 lb of desiccant, wrapped in polyvinyl chloride film (B.S.1763), into a polythene envelope 50 in. × 20 in. × 0·020 in. thick (C.S.2596). Extract all excess air before sealing to DEF.1234, Part 2, Sect. 4.

48. Secure the instrument to the plywood support block (32) by puncturing the polythene envelope, through the outer holes of the plywood support block (33) and, using the four $2\frac{1}{2}$ in. long screws, the nuts, the steel washers and the red fibre washers provided, screw on the block (32).

49. Wrap the sighting head in paper, wrapping, waxed, DEF.1242.

50. Place the wrapped component together with 12 oz of desiccant, wrapped in polyvinyl chloride film (B.S.1763), into a polythene envelope 18 in. × 15 in. × 0·020 in. thick (C.S.2596). Extract all excess air before sealing to DEF.1234, Part 2, Sect. 4.

51. Locate the sealed sighting head into the inner container.

52. Locate the instrument into the inner container and place the softwood support block (43) in position. Close the lid and secure with the captive fittings.

53. Float the inner container into the outer container and secure the lid with the captive fittings, three either side and one at each end. ▶

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